

City of Linden Linden Economic Development Corporation Traffic Study



City of Linden Traffic & Transportation Study

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Introduction

The purpose of this City of Linden Traffic Study and Report is to present the status of safety and traffic studies that are completed and those studies that are planned in the future. Additionally, this report describes the identified traffic issues that affect local neighborhoods in terms of safety, congestion, and heavy pass through traffic. The increase in traffic on all Linden roads has become problematic. The increase in traffic volume creates gridlock, slow traffic flows on main streets, increase risks in safety, and accidents.

This document catalogs, the many aspects of traffic concerns and issues. The need is a living document that tracks changes in the City business and residential areas that change traffic patterns, volume, or flows. Planned future business development in the City will definitely change existing traffic paradigm, which would require the city to address these changes to ensure the safety of citizens and efficient flow of traffic for all sectors of the City.

This traffic study and report gives the city a snapshot of traffic status that includes:

1. Prior traffic studies and recommendations.
2. Traffic studies in progress.
3. Traffic studies that are planned in the near future.
4. Identified traffic issues that require attention and resources for resolution.
5. Identified intermodal transportation as an alternative to auto travel.

To ensure the continuity of this initial traffic management effort, it is recommended that the City Council consider raising the City of Linden traffic management to a council committee level.

City Of Linden
Economic Development Corporation
301 North Wood Ave.
Linden, NJ 07036
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Subject: City of Linden Traffic & Transportation Study

I. Traffic Study Project Details

A. Executive Summary

The City of Linden is seeking county/state/federal support to conduct a traffic study to identify traffic issues and recommend solutions to the City of Linden to control growing traffic circulation issues. The study is needed to produce evaluation information to identify and understand transportation conditions within the City. In parallel with the traffic study, Linden will be reviewing its transportation mode infrastructure for passenger service to travel into and around the city.

Linden's current traffic circulation conditions have reached a level of critical mass. Situated in the crossroads of Rte 1&9, intersected by Rte 278, Turnpike, and Goethals Bridge, the city's roads are heavily utilized by heavy traffic moving from north to south during peak travel hours and weekends. The Linden intersection streets on Rte 1&9 such as Park Ave., Woodlawn Ave., Clinton St., Wood Ave., and Stiles St. often experience gridlock during these peak periods.

Between 2003 and 2006, the City of Linden had 2,013 traffic accidents on its main roads. The accidents occurred on the following streets:

Rte # 1&9 - 595 accidents,	Wood Ave. - 523 accidents,
St. Georges Ave. - 286 accidents,	Stiles St. - 292 accidents,
Park Ave. - 119 accidents,	Linden Ave. - 62 accidents.

In 2005, Federal Highway Administration and State of NJ, Dept. of Transportation conducted a Safety Impact study on Route US 1 & 9 between M.P. (Mile Point) 35.00 to M.P. 45.50. The study was prompted by the extremely high number of accidents and fatalities in this section of Route 1&9, which occurred in 2005. The safety impact study identified 15 crash locations on Rte 1&9. The report indicated that 1/3 (five Intersections) of the crash locations were located in Linden. These are:

Park Ave. - 82 accidents,	Stiles St. - 77 accidents,
Wood Ave. - 63 accidents,	Woodlawn Ave. - 56 accidents
Ave. C- 52 accidents.	

Compounding the current issues related to high traffic volume will be the impact of the new development of the GM, Cantor, BJ properties and new Rte 278 missing link extension that will raise the level of traffic on Rte 1&9 and Linden's roads going north-south. The current traffic volumes experienced on north-south roads will grow proportionally in volume as the traffic related to Rte 1&9 and other city development projects are completed.

B. STUDY GOALS

The main goal of this study will be to improve traffic circulation, pedestrian safety, protect surrounding residential streets from growing traffic volumes, enhance transit service, and improve bicycle and pedestrian transportation facilities in the red-zoned areas. The study will examine existing and future transportation conditions to determine short-term, mid-term, and long-term management and infrastructure improvements to reduce traffic congestion, especially during peak morning, evening and weekend travel hours.

C. STUDY PURPOSE

Through this study, the City of Linden is investigating transportation management and infrastructure improvements in the Rte 1&9 shopping centers, north-south travel streets such as Stiles St., Wood Ave., and Park Ave. that handle east-west traffic. There is also a need for similar requirements for east-west roads such as Linden Ave., Elizabeth Ave., and Rte 27 St. Georges Ave.

These efforts are in response to citizen concerns regarding the growing volume of vehicular traffic and pedestrian safety on streets in these designated areas. The purpose of the study is to examine existing transportation conditions in the study area and project future transportation conditions related to peak hour traffic (AM peak, PM peak and weekend peak times) with additional emphasis on pedestrian safety, and to develop short-, mid-, and long-term improvements.

D. STUDY PROCESS

The study should be conducted with the assistance from City of Linden elected officials, residents, and businesses. The City of Linden has gathered traffic information and issues from various sources such as Linden council meetings, civic organizations, business and resident organizations.

Study Team will be organized to include federal, NJ State, NYNJ Port Authority, Union County, City of Linden businesses and developers. Traffic issue information has been gathered from council people, businesses, and residents. Additional information may need to be gathered by additional residential meetings and traffic studies. The objective is to identify the process to mitigating City of Linden traffic flow.

E. Other GUIDING PRINCIPLES

The guiding principles of the Linden Traffic and Transportation Study are as follows:

- Better manage vehicular and commuter traffic through City of Linden.
- Improve safety for pedestrians, bicyclists and mass transit users.
- Incorporate residents' experiences and suggestions through an open community participation process.
- Ensure that all suggestions promote transportation safety for all modes of travel.

The Study will use these principles to develop recommendations to address existing and future transportation issues.

II. Existing Traffic Conditions and Issues

F. Existing Traffic Conditions Report

The LEDC over the last 13 months has been meeting with county, state, and federal transportation people requesting assistance to identify and mitigate traffic circulation within the city. The City of Linden is located geographically in a junction that is exposed to high traffic volume. The traffic is composed of pass through traffic using both north-south and east-west Linden roads.

Additionally, the City of Linden shopping centers attract high traffic volume during peak shopping periods in the evening and weekends. The projections are that the recently developed Sam's Club shopping center on Park Ave. and development of the Duke Property on Rte 1&9 will increase traffic flow on main city roads. In the next 3 years, property located in Tremley Point will be developed which will increase automobile and bus traffic on South Wood Ave. and Stiles St.

A) Linden East-West Roads

1. Route 1&9 between Mile Point 43.11 Bayway Circle and MP 40.01 Avenue C is a heavily traveled road due to its geographic location that supports north-south traffic flows. Linden is located at the juncture where there is traffic from the NJ Turnpike, Goethals Bridge, and daily traffic traveling to work from communities located north, south, east, and west of the City of Linden.

In 2005, the NJDOT invited the Federal Highway Administration to organize a multi-disciplinary safety analysis to provide recommendations along New Jersey "Safe Corridors". A safe corridor is defined as a roadway that has experienced higher than average exposure to crashes as compared to similar roadways. The study identified the top fifteen (15) crash locations by ranking. Linden has 33% (5 intersections) of the study:

Park Ave. - 82 crashes,	Stiles St. - 77 crashes,
Wood Ave. - 63 crashes,	Woodlawn Ave. - 56 crashes
Ave. C - 52 crashes.	

2. Linden Ave. between Park Ave. and Stiles St. is a parallel road to Route 1&9. Linden Ave. is a heavily traveled road that serves the Sam's Club shopping center and cut through traffic heading west to avoid the many Rte 1&9 traffic lights from Woodlawn Ave., MP 41.26 and Ave. C MP 40.01. Linden Ave. between Park Ave. and Wood Ave is the home of many businesses and a bus company which add to the traffic volume. Traffic flow delays are experienced at the Park Ave., Wood Ave. and Stiles St. intersection lights on Linden Ave. These intersections experience poor Traffic circulation flows during commuting and shopping peak periods.

3. Elizabeth Ave. between Park Ave. and Stiles Street is a parallel road to Rte 1&9 and Linden Ave. Elizabeth Ave. has very similar traffic characteristics as Linden Ave. Heavy traffic from pass through traffic, large number of businesses located on the avenue and traffic to and from Sam's Club shopping center and at businesses located in Bayway area. Intersection lights on Elizabeth Ave., at Park Ave., Wood Ave., and Stiles St. experience poor traffic circulation flows during commuting and shopping peak periods.

4. Route 27 (St. Georges Ave.) between Applegate (Elizabeth) and Ross Street (Rahway) is a very heavily traveled road from Elizabeth used to connect communities located west and south of Linden. St. Georges Ave. is divided between Linden and Roselle for a portion of the street. This main road artery is home to many service and retail businesses with bus services. The State of New Jersey is currently conducting a safety study on St. Georges Ave. The City of Linden is expecting the results of the published safety study in June 2009.

B) Linden North-South Roads

1. Park Ave between Conoco Philips and St. Georges Ave. is a heavy congested road that services multi type traffic flows. Daily traffic flows on Park Ave. are comprised by employees and business support traffic traveling to Conoco Philips. Additional traffic volumes are a result of industry on Brunswick Ave and Park Ave., as well as Turnpike and Goethals Bridge traffic connecting to Route 1&9 retail shopping centers and destinations located south on Rte 1&9.

2. Wood Ave. between Rte 1&9 and Raritan Road is a heavily traveled congested road that services a busy Linden shopping district with a high degree of pass through traffic. During the years, 2003 to 2006 a total of 595 crashes were recorded on Wood Ave. Of those, 145 (24%) involved personal injury, 408 (69%) involved only property damage, 42 crashes (7%) involved pedestrians or bicycles. Wood Ave. has many problematic intersections that require mediation for turns and flow through traffic.

3. Stiles St. between Rte 1&9 and Raritan Rd. is considered second to Rte 1&9 as the most traffic congested road during most of the day. The area adjacent to Stiles St. has a large number of truck depots and warehouses that create a high volume of truck traffic and commercial traffic on surrounding roads. Stiles St. and Rte 1&9 shopping centers create high traffic flows 7 days a week. The concern at this time is how the new retail and commercial development on the GM site will affect the traffic on Stiles St. and local feeder roads.

Several intersections on Stiles St. have been identified as a serious problem, namely intersections located at Edgar Rd. (Rte 1&9), Stimpson Ave, Linden Ave., Elizabeth Ave., Blancke St., Curtis St., St. Georges Ave. and Raritan Rd.

4. Roselle St. between Elizabeth Ave. and St. Georges Ave. is a moderate to heavily traveled road that handles through traffic between east and west points in the city and surrounding junction roads and shopping locations.

Note: The City of Linden relies on the three north-south roads to service east to west traffic. Linden is Amtrak bound, which limits the city to expanding east to west road infrastructure.

G. EXISTING TRAFFIC ISSUES

LEDC solicited feedback on traffic issues from the Linden Police Traffic Department, Council persons, business owners, and residents. The data collection effort gained an understanding of the existing conditions in the areas that need to be studied. The collected information identified a wide variety of existing traffic issues.

General traffic operations issues and vehicular safety include:

- congestion along major roadways and at critical intersections,
- speeding,
- cut-through traffic,
- inadequate striping for parking and parking enforcement,
- turn lanes at selected intersections,
- non-optimized signal timings,
- street pavement condition,
- unsafe intersection geometry
- mitigating high volume truck traffic,

General pedestrian facilities and safety include:

- street ramps over high volume traffic locations- train station, Rte. 1&9 critical locations,
- narrow sidewalks at selected locations,
- lack of pedestrian signals and inadequate pedestrian timings,
- high vehicular/pedestrian conflicts,
- proper pedestrian signage.

General bicycle issues include:

- lack of bicycle routes to the station,
- bicycle route signing for designated bicycle routes,
- conflicts between vehicles and bicycles.

H. EXISTING TRANSPORTATION ISSUES

LEDC had received general information related to transit issues and needs. City of Linden has limited bus service to various areas of the city. The growth in development and associated job growth will require additional intermodal transportation from train station to shopping areas and new business in various locations.

General transit issues include:

- lack of bus service to selected areas,
- improve mass transit, trains and bus service,
- inter-city transit studies
- adequate pedestrian and bicycle access to areas.

General pedestrian facilities and safety include:

- walkovers at critical locations,
- narrow sidewalks at selected locations,
- lack of pedestrian signals and inadequate pedestrian timings,
- high vehicular/pedestrian conflicts.

General bicycle issues include:

- lack of bicycle routes to the train station,
- lack of bicycle route signing for designated bicycle routes,
- conflicts between vehicles and bicycles.

III. Traffic Studies History

I. Previous Studies

In the past, different studies have been conducted in and around Linden by Department of Transportation (DOT) and other government agencies. The previous traffic studies conducted are as follows:

Wood Ave - In June 2008, The UC Planning Department and Transportation Committee sponsored a Safety Improvement initiative performed by the North Jersey Transportation Planning Authority. The results of the published report are attached. It includes recommendations to improve safety of vehicle, pedestrian and bicycle traffic. The City will need to implement proposed recommendations.

Route 1&9- In 2005, NJ DOT launched a "Safety First" initiative in the roads that had the highest rate of crashes. Route 1&9 met the criteria as an overall high rate of crashes. The overall corridor crash history shows that there were 1,157 crashes in the calendar year of 2005. Of the total, 6 (0.5%) were fatalities, 400 (34.6%) involved injuries, and 751 (64.9%) resulted in property damage. These accident rates exhibit rates above statewide average. Linden reported 5 of the 15 highest rated intersections.

J. Studies/Projects in Progress

Route 27 Corridor Safety Study- The Study focuses on vehicular and non-motorized transportation along the Route 27 Corridor from midtown Elizabeth through the City of Linden, the Borough of Roselle and the City of Rahway. The goal of the study along this state highway is to identify specific safety related improvements to reduce vehicular accidents, improve mobility, support transit and increase pedestrian safety. The objectives are to identify transportation problems and locally accepted solutions.

This transportation study is funded through the NJTPA. The Study is currently underway and will conclude June 2009. Following the study UC Planning will be reaching out to Linden for a conversation with the traffic and engineering people to discuss St. Georges Ave and learn more about the issues.

K. Planned Studies/Projects

Stiles St. - LEDC, Linden City Engineer, Union County Engineering and Duke Developers are discussing a traffic study of traffic on Stiles St. between Rte 1&9 and Blancke St. The goal is determine how to mitigate traffic on Stiles St. with growing truck warehousing on Blancke St., Fuller Rd. and planned development of GM site.

Missing Link – LEDC is working with NYNJ Port Authority on their project to construct the missing link, which is part of Goethals Bridge Expansion. The missing link on Rte 1&9 project is expanding the Rte 278 (East to West) that connects NJ TPA Exit 13 and Goethals Bridge to Linden Rte 1&9 South. Access to Rte 278 East is allowed from Rte 1&9 northbound. The missing link will install entrance/exit on Rte 278 onto Rte 1&9 that will allow traffic to exit onto Rte 1&9 North and to access Rte 278 from Rte 1&9 South.

Goethals Bridge Expansion- NYNJPA has an approved project that will replace the current 4 lane Goethals Bridge with a new 6 lane Highway with 12 foot outer shoulder and a 5' inner shoulder, a pedestrian and bicycle lane. The plan is to construct the new structure north of existing bridge. NYNJ Port Authority is working with the LEDC to coordinate participation with city governing body and engineering.

Duke Realty Project (GM Property) - Rte 1&9 development between Stiles St. and Pleasant Ave. will require significant construction changes to the existing roadways. The road will require expanded entrances to the property to all high traffic volumes to enter and exit the property. Large retail stores on Rte 1&9 and 900,000 sq. ft. of flex workspace will require modification to Pleasant St. and Linden Ave. to accommodate traffic circulation.

Cantor Property- The business area located on the corner of Stiles St. and Rte 1&9, 33 acres are under study for redevelopment for possible retail business. Stiles St. between Rte. 1&9 and Munsell Ave., are areas of heavy traffic which will require significant reconstruction to manage traffic.

Tremley Point Rd. - The Tremley Point area currently has a large number of trucking and petroleum transport businesses utilize TP Rd. to enter and exit the area. The road is privately owned by business in the area. The challenge is to determine how to transfer private ownership to the city or county ownership. The estimate to resurface and correct flood areas is \$6,000,000.

Route 1&9 Corridor Study- The Study focuses on vehicular and non-motorized transportation along the Route 1&9 Corridor through the Cities of Elizabeth, Linden and Rahway. The goals of the study are: to further safety along the corridor; reduce delays and traffic conflicts; balance the transportation demands of the local communities along the highway with those of the region. This transportation study has been proposed to the NJTPA by Union County. Final approval by the NJTPA Board of Trustees is not expected until April, 2009 at which time we will learn with certainty that it has been funded. If approved, the funds will not be available until July 1, 2009 at which time the entire federally mandated process can begin to identify the consultant and can proceed forward.

IV. New Transportation Considerations

L. Transportation Service under Consideration

The City recognizes that an important factor to sustaining successful business and employment is inter modal transportation of rail to Linden and bus service that will allow full access between various locations within the city.

The City of Linden has a train station located in midtown that allows connections to towns located in the Jersey Shore area, south to Trenton and north to NYC. This provides a transit infrastructure for shoppers and employees to reach Linden. The City of Linden is pursuing Transit Village designation, which will result in growth of the midtown area around the train station with mixed-use buildings. It is anticipated that there will be growth in apartment units and retail establishments.

The growth in shopping centers, Linden Plaza, Aviation Plaza, GM site and other planned highway retail businesses will create a demand for intermodal transportation in the city. It is recommended that the City of Linden conduct a bus study to identify opportunities to address traffic congestion by increasing the use of public transportation, and thus allow the use of transit in a fast growing area and give residents and workers greater access to jobs and other destinations. The study will focus on short and medium term options for service and facility improvements that would promote expanded use of more efficient travel such as buses and shuttles to local and inter city locations.

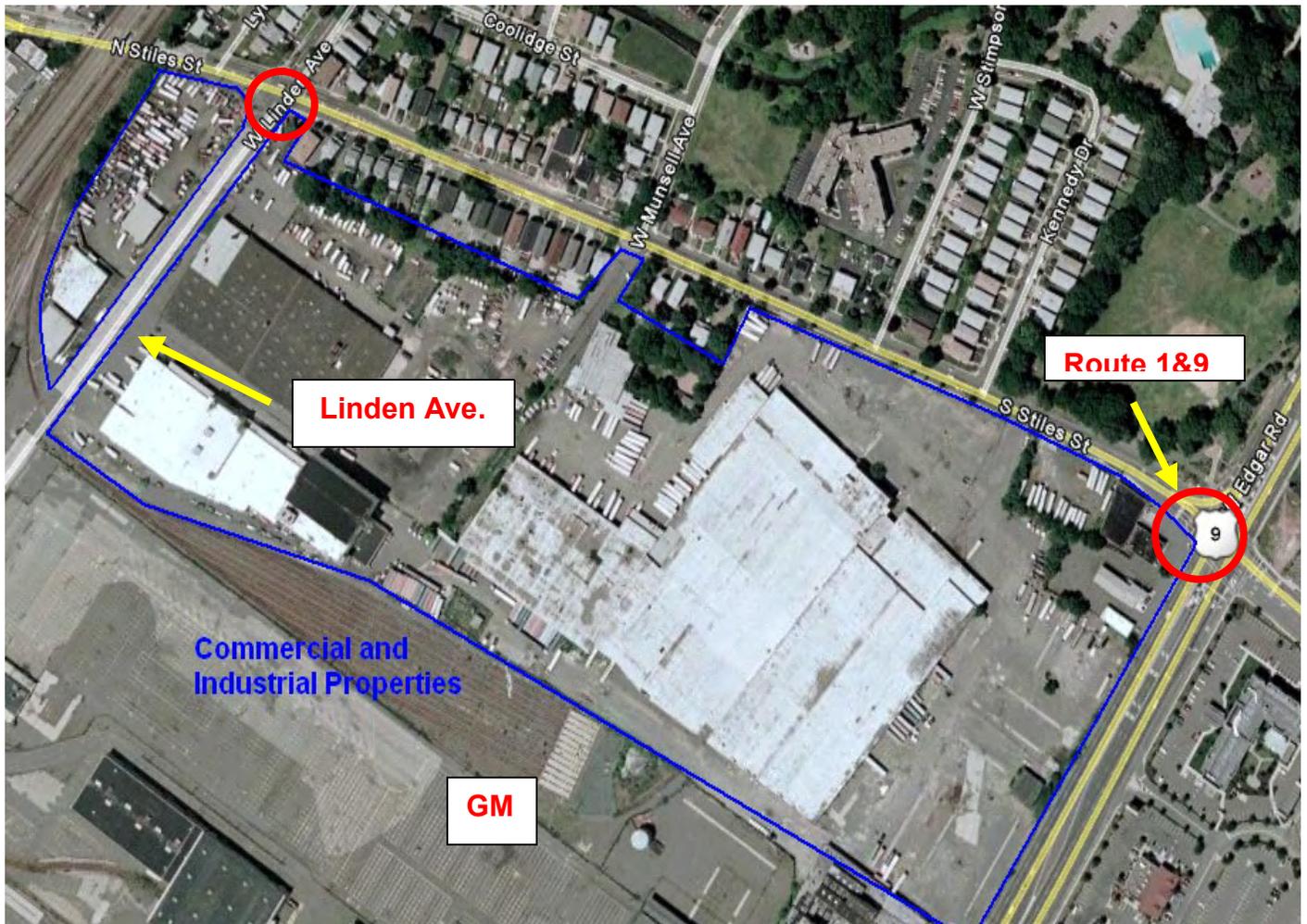
A study will also identify locations where enhanced “park and ride” facilities and “transit hubs” would ease transfers between transit modes and existing commuter services. The city is pursuing a “park and ride” in the Linden train station parking lot with NJT. A transit study should identify critical transportation corridors and travel destinations in the city. The study will conduct travel surveys; identify service improvement options and future travel demand forecasting.

Public input and coordination with elected officials, city engineering and participating agencies will be integral to the success of the Linden traffic and transit study project.

V. Linden Circulation Issues

M. Aerial View and Description of Traffic Circulation Issues

Stiles St. 6th Ward



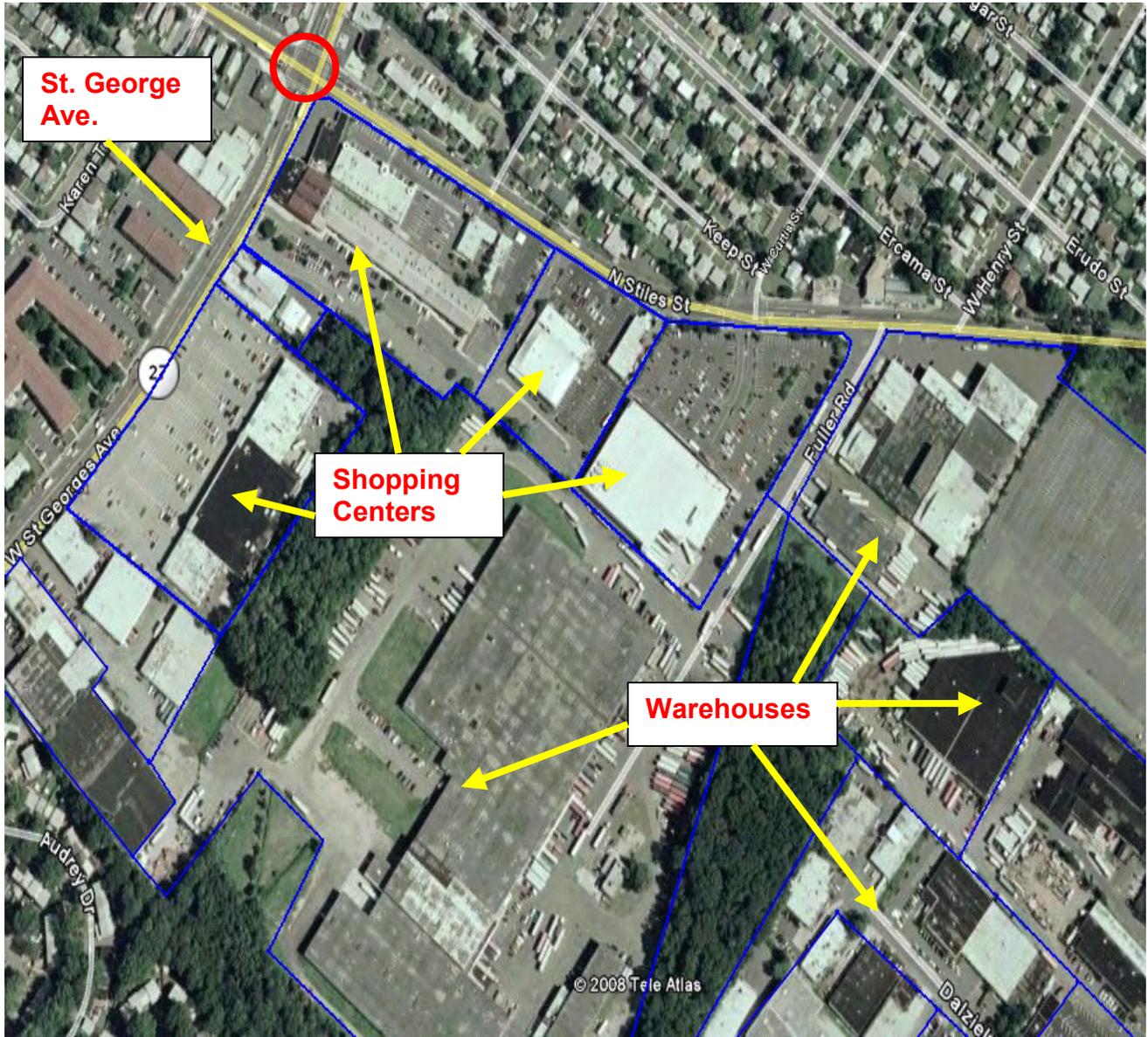
South Stiles Street between Route 1&9 and Railroad Bridge is very problematic for traffic circulation. The Road both east and west is subject to the moving from single to double back to single lanes. Merging traffic on to Stiles St. from Kennedy Dr and Stimpson Ave. is difficult and dangerous during peak travel periods. The railroad bridge under pass only allows four lanes, two east and two west. The Stiles Street approach to W. Elizabeth Ave. turns into three lanes, left on to West Elizabeth Ave, Straight to Stiles Street and right hand turn on to East Elizabeth Ave. The two lanes west at Linden Ave. light, merge into a single lane under the bridge which creates a condition of vehicles cutting into the right lane at a high speed.

Stiles St. 2nd Ward



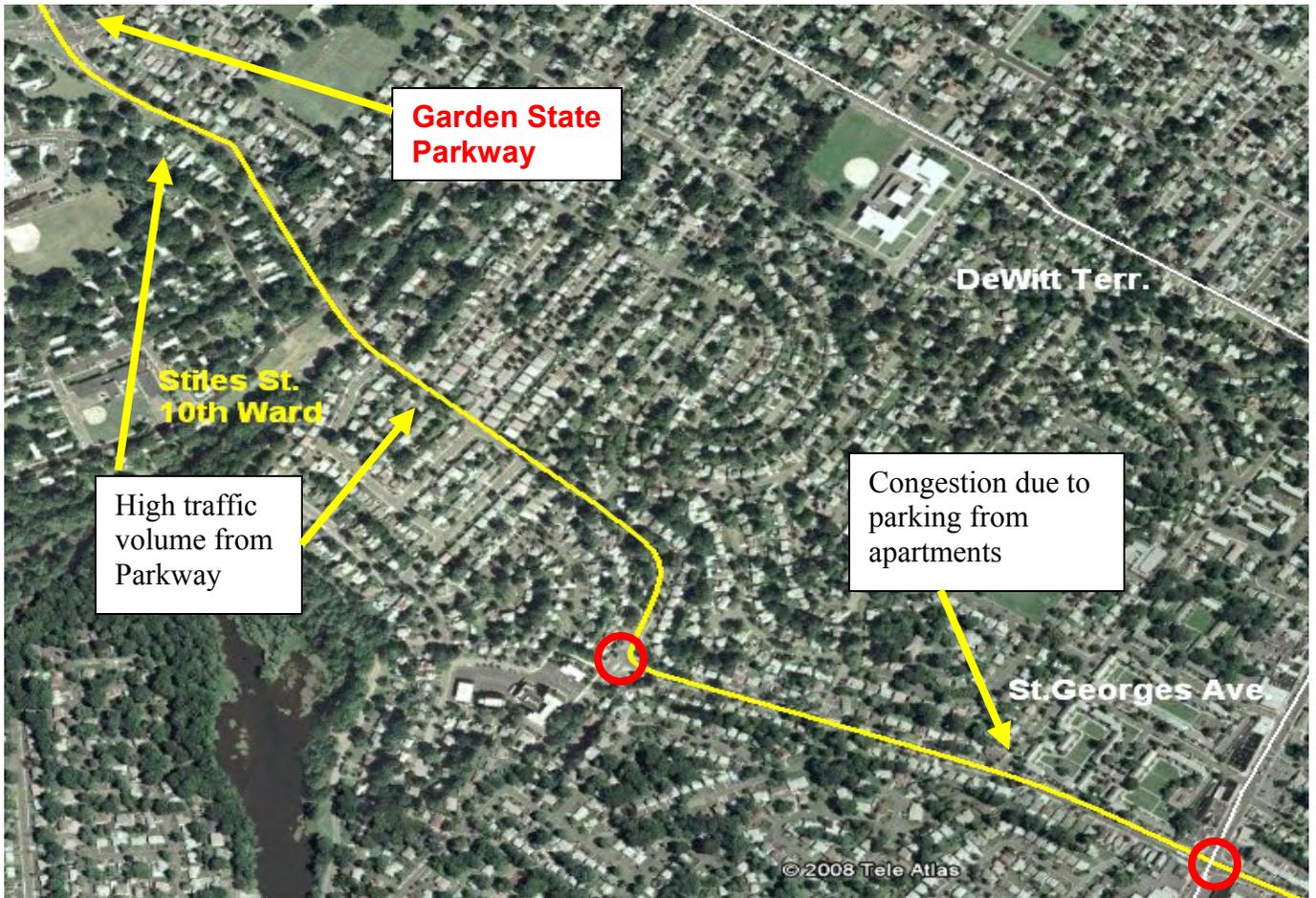
Stiles Street from W. Elizabeth Ave. to West Henry St. is problematic because of the heavy traffic merges from Elizabeth Ave & Blanche Street, North and South on to Stiles Street. Blanche Street and Stiles Street are considered most dangerous due to the heavy car and truck traffic exiting West Blanche Street Industrial area onto Stiles St. There are similar problems with E. Blanche Street exiting on to Stiles Street. This intersection is considered most dangerous because of no traffic lights and the vehicles darting into Stiles Street. Similar issues exist with Knopf, Elm and Henry Street intersections.

Stiles St. 1st Ward



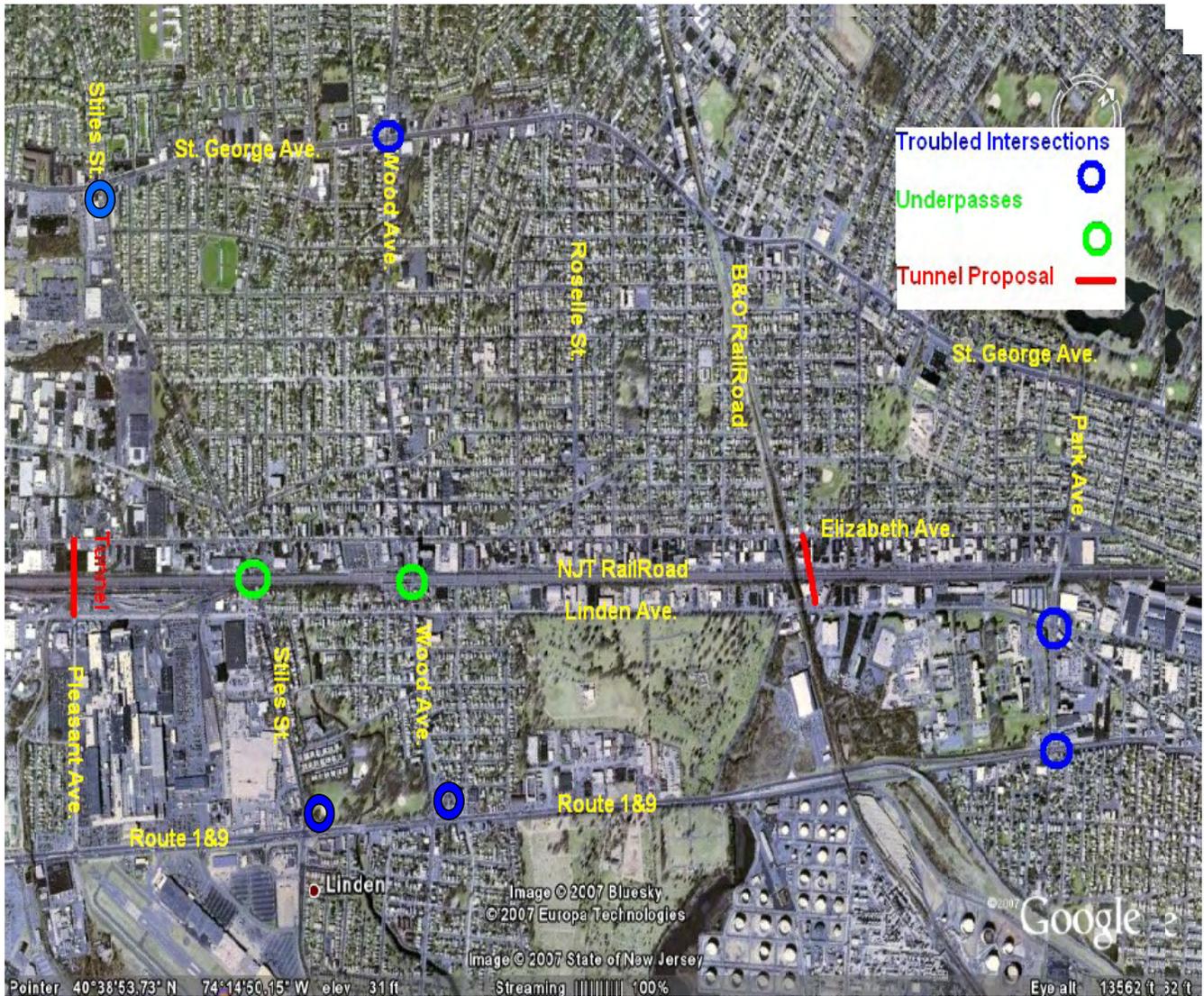
Stiles Street between Henry St. and St. Georges Ave. is a section that services heavy traffic. In addition to the heavy Stiles Street traffic, there is the pass through traffic exiting from Henry, Gibbons, and Curtis Streets into Stiles St. Adding to the traffic volume entering on and exiting out of Stiles Street is the heavy retail and warehousing Truck traffic. The large warehouse complex on Fuller Rd., Path Mark super market, Bowling Alley, Bank, Nursery, Restaurants and Strip Mall creates a high level of traffic circulation for the area. The road between Henry St. and St. Georges Ave. is limited to one lane, which creates traffic issues with vehicles exiting the retail businesses.

Stiles St. 10th Ward



Apartment tenants parking on the street just above St. Georges Ave. cause heavy congestion, causing a narrow driving situation. Tractor trailers also proceed on this residential road causing more traffic congestion. There is also high amounts of volume coming off the Garden State Parkway heading East on Stiles St.

City of Linden Traffic Circulations Routes



The City of Linden East/West and North/South Travel Roadways

Linden is located in a geographical position that supports heavy volume vehicle pass through traffic. Rte 1 & 9 is a heavily traveled road that supports Truck and Automobile traffic that connects to the NJ Turnpike, Goethals Bridge. , Linden Ave., Elizabeth Ave. and St. George Ave. The Linden Streets during peak travel hours is inundated with cross-town traffic, which results from traffic gridlocks from Woodlawn Ave. to Stiles St.

The City of Linden is Amtrak Bound, which only limits North/South bound traffic to use, Park Ave., Roselle St., Wood Ave. and Stiles Street. A suggested option to relieve traffic volume is to build a tunnel or an over pass over the Amtrak rails at Pleasant Ave. & Roselle St.

8th Ward Traffic Flow and Circulation Issues



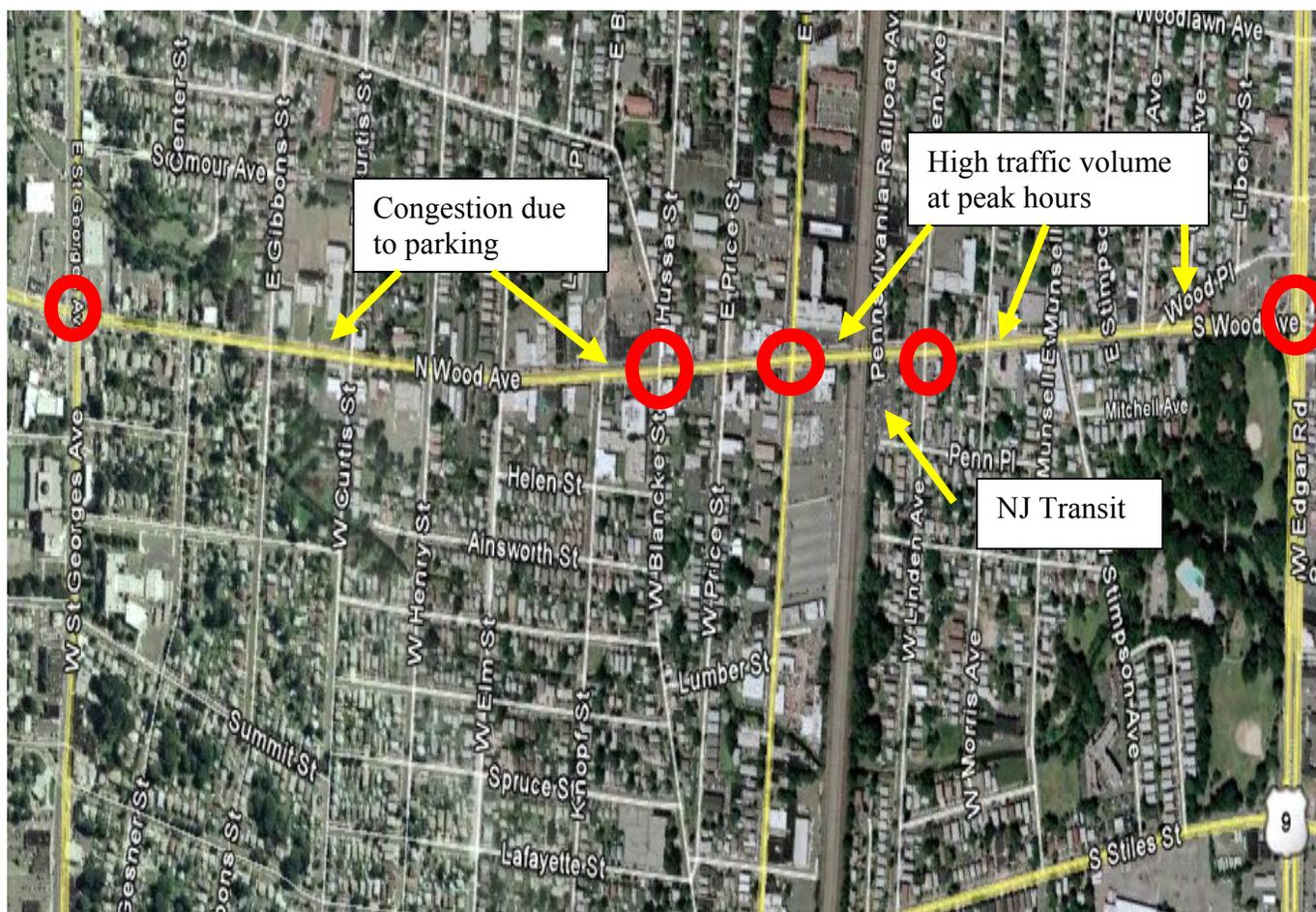
The Eighth Ward Traffic circulation is very problematic due to high volume of traffic that flows from the Turnpike and Goethals Bridge. A heavy concentration of vehicles utilize Brunswick Ave. and Park Ave. to reach route 1& 9 shopping centers and places of employment. The growth in NY migration to Linden, Cranford and surrounding municipalities has increased traffic flow on Linden's major roads.

The intersections at Park Ave., Grier Ave and Route 1&9 often experience gridlock. Traffic from Conoco Phillips, Infineum and other businesses located at lower Park Ave. create high traffic volumes during peak travel periods.

Traffic on Route 1& 9 between Bayway Circle and BJ Store is very heavy during daily peak hours and week ends travelers to/from Liberty Airport, NJ Shore Points and shopping centers adjacent to Route 1 & 9.

There are high incidents of accidents in this area due to high volume of traffic. Safety study in this area is being pursued. See Section 111, Item K, page 8 for more details.

Wood Avenue



Wood Ave Problems

Wood Avenue consists of many problems especially between Route 1&9 and St. Georges Avenue. Wood Avenue is a wide street that has a single lane going in each direction leaving drivers confused on whether to drive in the middle or to fit two cars in one direction. During peak hours, the congestion is so high that it leaves drivers blocking intersections causing a gridlock effect, slowing down the traffic flow. The parking along Wood Avenue also blocks moving traffic.

The double parking along Wood Avenue causes many problems. The parked cars block off lanes that are used to make right turns from the Elizabeth Avenue Intersection. Pedestrian jaywalking causes traffic to slow down. Large trucks using Wood Avenue also tend to get stuck in the railroad underpass between Elizabeth Avenue and Linden Avenue causing long serious delays.

VI. City Council Reported Traffic Issues

N. Councilman Reports

2nd Ward

General Traffic Concerns

1. Excessive vehicle speed - Dewitt St., entire length Curtis St. to West Blancke St.
2. Excessive vehicle speed – Wood Avenue to Dewitt St. connector streets – Knopf, Elm, Henry and Curtis St.
3. Extremely dangerous intersection – Stiles St. and West Blancke, offset crossing without traffic signal, and very limited line-of-sight, hazardous to negotiate safely..
4. Limited access across transit rails via underpass on Stiles St. from Elizabeth Ave. to Linden Ave. – creates extreme congestion.
5. West Elizabeth Ave. from Stiles St. to Wood Ave. is extremely over burdened with traffic – the road is too narrow for the amount of traffic, both residential and commercial, now being experienced.
6. West Blancke St. from Stiles St. to Rahway line – pavement in very poor condition.
7. Vehicle speeding and parking of long and short term commercial vehicles on West Elizabeth Ave., and West Blancke St.
8. Light traffic streets of Bradford Ave., Lexington Ave. and Marion Ave. continue to experience commercial truck traffic illegally crossing from West Blancke St. to Elizabeth Ave. (I have explored the possibility of creating a connector road through a long abandoned rail bed adjacent to Solar Compounds)
9. Congestion by Train Station during morning and evening rush almost constant.
10. A traffic issue which exacerbates a traffic problem is residential parking within 25' of street corner radius.
11. A more efficient timing of the traffic signals on Wood Avenue so that traffic can more efficiently travel north-south during heavy traffic times of day. Blocking-of-the-box is serious problem on Wood Ave. from Curtis St. to Elizabeth Ave.
12. The use by transit commuters of on-street all-day parking in front of residences. (Being addressed through LPD). A more efficient and comprehensive plan for residential permit parking should be implemented to alleviate traffic and parking congestion.

6th Ward

General Transit Issues

1. Route 1 and 9, Stiles Street, Wood Avenue, and Linden Avenue are very hazardous for bicycle or pedestrian traffic to access to transit.

General Pedestrian Facilities and Safety

1. There are no sidewalks on Route 1 and 9 near Woodlawn Avenue.
2. Woodlawn Avenue has no sidewalks off Route 1 and 9.
3. There is limited timing crossing Route 1 and 9 at Woodlawn Avenue, Street, Wood Avenue, and Stiles Street.
4. Woodlawn, Clinton, Wood Avenues are used to cross the highway to get to St. Theresa's Church.

General Bicycle Issues

1. The ward does not offer designated bicycle routes.
2. At the present time bicycle riders on Route 1 and 9, Wood Avenue, Stiles Street, or Linden Avenue would represent a hazard to the riders as well as to the vehicle traffic.

General Traffic Operations Issues and Vehicular Safety

1. Speeding cars and trucks are a common complaint from the residents.
2. Large trucks coming off the highway using Woodlawn Ave. and Clinton Street to make U – Turns.
3. Trucks causing traffic in residential streets when coming off 1 and 9.
4. Cars and trucks parking too close to corners in the whole ward blocking the view of pedestrians and other traffic.

5. Yellow curbing needs to be repainted so corners may stay clear.
6. During peak hours traffic on Linden Avenue is backing up to the cemetery if the light on Wood Avenue is red.
7. During peak hours traffic on route 1 and 9 from Rahway to the Elizabeth City line is backed up. In this section of the highway cars entering and leaving the malls make it a very hazardous condition.
8. Lights on this section of the highway should be timed better so the flow of traffic is not impeded.

8th Ward

General Transit Issues

1. E. Elizabeth Ave. & St. Georges Ave., Park Ave & Rt. 1 & 9 are hazardous for bike access to transit
2. Residents along Rt. 1 & 9 require 2 buses to reach Wood Ave., St. Georges Ave., or Linden Train Station

General Pedestrian Facilities and Safety:

1. Residents report poor pedestrian timings on Rt. 1 & 9, Intersections of Park Ave. & E. Elizabeth Ave. and Park & Linden Ave.

General Bicycle Issues:

1. Ward does not offer designated bicycle routes
2. Concerns about E. Elizabeth Ave. during rush hours (complaints of bicycles interfering with traffic)

General Traffic Operations Issues and Vehicular Safety:

1. Congestion and Speeding major issue along Brunswick Avenue through S. Park Ave. (driveways blocked during rush hour, reports of speeding, truck route through residential neighborhood)
2. Grier Ave (Buses congesting roadway & speeding)

General Traffic Operations Issues and Vehicular Safety (Cont.):

3. Congestion at Rt. 1 & 9 and Park Ave., Rt.1 & 9 and Linden Avenue, and the entire Rt. 1 & 9 corridor during peak hours.
4. Cut-through traffic from New Jersey Turnpike to Rt. 1 & 9 (particularly by trucks)
5. Cut-through on Bacheller Ave. (near Park) from turn off at Linden Ave. & S. Park Ave. creating congestion and speeding on Urbanowitz & Bacheller Avenues
6. Intersection of Chandler Ave. & E. Elizabeth Ave. often hazardous to make turn.
7. With amount of traffic on Brunswick Ave., street pavement is in extremely poor condition.

Safety Improvement Initiative – Phase II

**Union County Route 617
(WOOD AVENUE)**

**Milepost 1.4 to 3.2
(US 1&9/Edgar Road to Palisade Road)**

**City of Linden
Union County, New Jersey**

**North Jersey Transportation Planning Authority
Development of Regional Safety Priorities**

**Urbitran Associates
Cambridge Systematics
Arch Street Communications**

June 2008



NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY, INC.

**COUNTY ROUTE 617/WOOD AVENUE
(Edgar Road to Palisade Road)
City of Linden
Union County**

BACKGROUND

The subject segment is approximately 1.8 miles long, running from US Routes 1&9 / Edgar Road (milepost 1.4) west to Palisade Road (milepost 3.2). This segment traverses the major downtown commercial/shopping district in Linden. Wood Avenue bisects the city, and connects two major arterials, US Route 1&9 at the east end of the corridor, and NJ SR-27 (St. Georges Avenue), near the west end. The western portion of this segment shares a border with the Borough of Roselle, to the north, from the SR-27 intersection (milepost 2.77) west to Palisade Road (milepost 3.2). The abutting land use along the segment transitions from small multifamily residential units, to small commercial buildings on the eastern end, to downtown commercial/retail in the center of the corridor, to detached single-family homes on the western end.

Wood Avenue is configured for one lane of through travel, and one parking lane in each direction. Left turn lanes are provided at some intersections. There are twelve signalized intersections along the corridor. The speed limit is posted at 25 MPH throughout the segment. There is a significant volume of pedestrian traffic in the downtown district (midway along the segment), metered on-street parking, and civic buildings and storefront retail business associated with a thriving downtown area.

The Amtrak Northeast Corridor rail line crosses the segment (milepost 1.9) and it is here that NJ Transit's Linden station is located, on the south side of Wood Avenue. The station's parking lots are located on the both east and west sides of the tracks, accessed from driveways fronting Wood Avenue. The Wood Avenue railroad underpass has a substandard 12'4" clearance, and is regularly struck by large trucks, despite active over-height warning devices on both approaches. Eastbound over-height trucks that do heed the bridges' active warning device have few turn-off options short of backing to Elizabeth Avenue (CR 514), causing traffic hazard and delay.

The railroad forms a traffic barrier between the eastern and western sections of Linden. Only two road crossings at Wood Avenue and Styles Street (CR-516) serve the central portion of the city, and traffic is focused at these constriction points. Major redevelopment of the city's industrial sites, primarily along US Routes 1&9, includes the mixed-use conversion of the General Motors plant site (now underway) which could cause a significant increase in the volumes of traffic using Wood Avenue. Several large retail stores are projected to open in this vicinity, as well. Linden has also

passed an initial screening for a state Transit Village designation, and the resultant transit-oriented development, focused on the city's NJ TRANSIT station, could also affect the corridor.

A Total 595 crashes were recorded on this section of CR-617/Wood Avenue during the four-year period from 2003 to 2006. Of those, 145 (24%) involved personal injury and 408 (69%) involved only property damage. No fatal crashes were recorded during the period. 42 crashes (7%) involved pedestrians or bicycles.

A field briefing was attended by NJTPA and consultant staff and local representatives. The following were in attendance:

Ron Stefanowicz	Director, Linden Economic Development Corporation
George Vircik	Engineer, City of Linden
Eileen Schact	Local Aid, NJ Department of Transportation
Liza Betz	Planner, Union County
Angelo Paparella	Director, Bureau of Traffic Maintenance, Union County
Lt. Bruce Taylor	Linden Police Department
Elmer Ertl	Roselle Police Department
David Battaglia	Engineer, Borough of Roselle
Christine Bugel	Engineer, Union County
Jeff Vernick	NJTPA staff
Gary Davies	Urbitran Associates
Jeff Gerlach	Arch Street Communications

IMPROVEMENT NEEDS

Assessments of the corridor safety problems and suggestions for improvements to the corridor were received. Suggested actions for improvement of the corridor's safety are described in the following section. As is indicated in the following list of Exhibits, annotated aerial photos of the subject area with crash locations are provided, as are street-level photos of specific features and a map showing the suggested improvements.

Short-Term Improvements

1. At the Amtrak/Wood Avenue underpass, an over-height warning system was recently installed by Union County to help prevent the over-height truck crashes which occurred frequently. The system included height detectors, an over-the-road sign with actuated message and flashers, and an audible warning. A review of the installation indicates that better advance warning of the restricted clearance is warranted, because over-height incidents have continued despite the installation. It appears that existing side-of-the-road advanced signage is routinely overlooked, in part because the signs are small and visually

lost in the tree foliage and visual clutter of the downtown area. The over-the-road over-height warning sign is not large and can be lost in the background visual clutter. It was suggested that additional advance overhead signage may be needed, and that the yellow back-plate of the dynamic sign should be expanded and more flashing lights added to attract offending drivers' attention. Nearby residents had complained about the noise from the audio warning device (leading to its removal), and this should be taken into account in the design and installation of new warning devices.

2. Pedestrian crossing facilities at the high crash volume SR-27 intersection need immediate improvement. Pedestrian heads have been damaged, as have crosswalk signal activators buttons. Only one crosswalk (across the northerly leg of Wood Avenue) has high-visibility crosshatching; it was suggested that the other three crossings should be repainted with crosshatching.
3. As is the case with nearly every crosswalk along the segment, striping at the Gibbons Street crosswalks, in front of Elementary School #1, are worn to near invisibility. It was suggested that these, and all other crosswalks in the segment, should be restriped with crosshatched markings. It was suggested that pedestrian signal activation buttons should be labeled with adhesive pole signage, to replace often missing metal placards, and that countdown pedestrian heads could improve safety, and should be installed throughout the segment.

Long Term Improvements

4. It was suggested that inexpensive satellite-based time coordinators would provide dependable coordination among the closely-spaced signalized intersections in the downtown area. It could be expected that this would aid traffic flow, and the resulting smoother flow could reduce rear-end crashes.
5. Pedestrian crossings in the vicinity of NJ TRANSIT station warrant particular attention. While the eastbound station platform crosses Wood Avenue, there is no exit to the sidewalk on the north side. The westbound platform ends just short of the Wood Avenue underpass. In coordination with future Transit Village improvements, it was suggested that consideration be given to providing pedestrian access to each platform from the north side of the underpass, eliminating the need to cross Wood Avenue (particularly at this mid-block, station-access location).

IMPLEMENTATION

The following table indicates the approximate range of costs for each of the suggested improvements, and which agency might be responsible for progressing the project through implementation. For discussion purposes the following cost ranges are assumed:

Low	Less than \$100,000, including design and permitting
Modest	\$100,000 to \$500,000
Medium	\$500,000 to \$1,000,000
High	Greater than \$1,000,000

Quantitative cost estimates have not been prepared. The costs presented below are based on professional judgement and experience for similar types of work.

SUMMARY OF IMPROVEMENT IMPLEMENTATION ISSUES

Project / Location	Safety Benefit	Cost Range	Responsibility
1. Improve, overhead advance over-height warning at the Amtrak / Wood Avenue underpass. Improve the visual impact of the current active warning device at the underpass and install better warning lights on the bridge structure.	Reduce underpass crashes by over-height trucks, and increase safety by reducing "back-outs" by over-height trucks.	Medium	NJDOT Union County City of Linden
2. Immediate repair to SR 27 intersection pedestrian facilities, including damaged heads crosswalk signal activators buttons. Upgrade three remaining crosswalks with crosshatching.	Improved pedestrian safety	Low	NJDOT Union County
3. Starting with Gibbons Street, restripe all crosswalks along the segment, and repair damaged or missing pedestrian signal actuation buttons and signage, replacing all pedestrian heads with countdowns.	Improved pedestrian safety at signalized street crossings	Low	Union County City of Linden
4. Install satellite-based coordination among signalized intersections in downtown area.	Reduce congestion and smooth traffic flow.	Low	NJDOT City of Linden Union County
5. As part of Transit Village planning, improve pedestrian access across Wood Avenue near NJ TRANSIT station, including platform access from the north side of Wood Avenue via the Amtrak overpass.	Improve pedestrian safety by reducing number of street crossings	Medium	NJ TRANSIT City of Linden Union County

EXHIBITS

The following exhibits are provided to illustrate and tabulate crash locations and suggested improvements within the area of concern related to this safety initiative:

STUDY AREA MAP	Illustrates the location of the roadway segment under study and the surrounding street network
COMMUNITY ENVIRONS MAP	Illustrates the study area in greater detail, showing on an aerial photographic base map the roadway segment, surrounding land uses, key landmarks, and transit and park-and-ride facilities
STRAIGHT LINE DIAGRAM	Mapping of the subject segment in the NJDOT Straight Line Diagram format, showing roadway functional and jurisdictional attributes
2003 TO 2006 CRASH SUMMARY	summarizes the overall number of crashes that occurred within the roadway segment, by severity, vehicle type, and pre-crash action.
GEO-CODED CRASH FREQUENCY MAP	Shows the location of 2003 to 2006 crashes within the subject roadway segment. Crash locations have been identified by geo-coding the crashes to specific roadway mileposts, street addresses, or intersection locations. Some crash records did not contain sufficient information to accurately locate the crash and those are not shown on this map. The size of each bracket on this map is proportional to the number of crashes that occurred at that specific location in the four-year period 2003 to 2006. The number posted adjacent to the bracket is a Location Number, which indexes to the following tables of crash locations.
GEO-CODED CRASH SUMMARY AT PRIORITY LOCATIONS	The number of crashes that occurred in the four-year period from 2003 to 2006, at each of the above locations is summarized by severity (fatal), vehicle type (motorcycle, bus, truck, pedestrian, bicycle), special population (elderly, teenage), and pre-crash action (left turn, right turn, u-turn).

This table does not include crashes that could not be geo-coded because of insufficient information on the accident record.

GEO-CODED CRASH DETAILS AT PRIORITY LOCATIONS

**ROUTE U.S. 1 and 189
M.P. 35.00 to M.P. 45.50
SAFETY IMPACT TEAM**

Individual crashes that occurred at each of the above locations are tabulated. Greater detail is provided as to severity (fatalities, injuries, pedestrians killed or injured). As in the above summary report, details as to vehicle type, special population involvement, and pre-crash action are provided for each crash. This table does not include crashes that could not be geo-coded because of insufficient information on the accident record.

STUDY AREA PHOTOS

Provides photographs of key street locations within the study area.

SUGGESTED IMPROVEMENTS

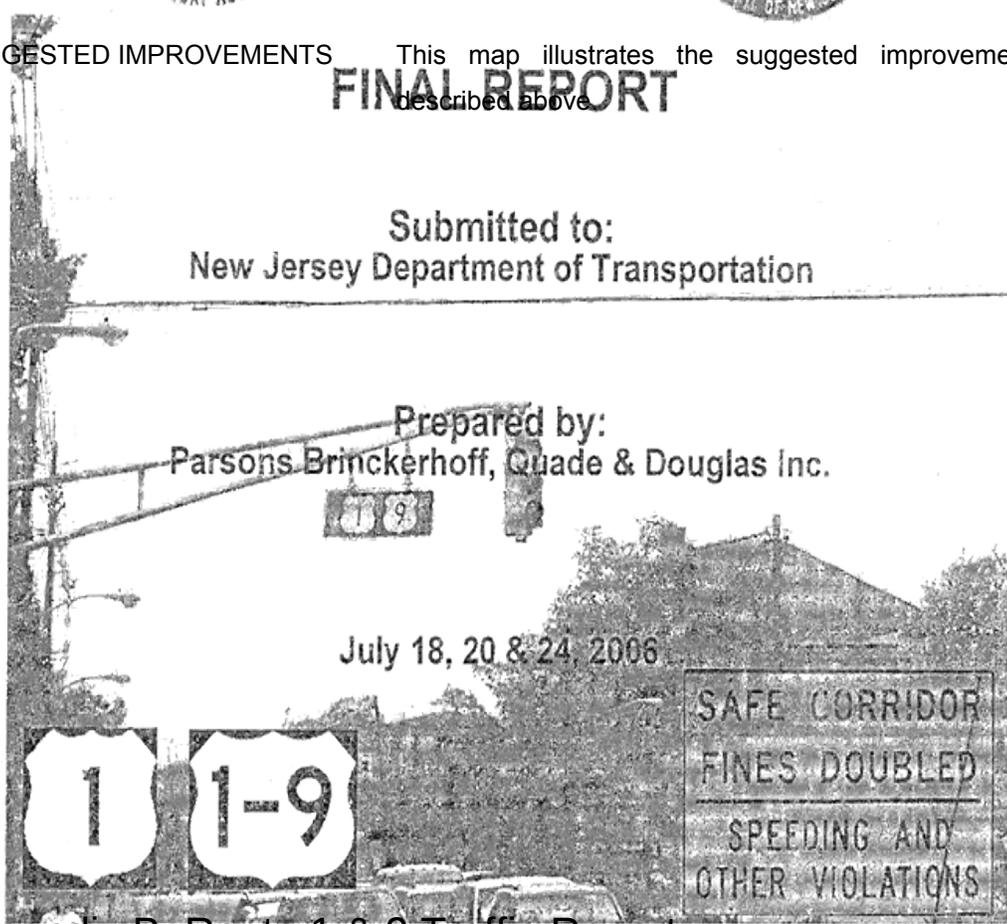
This map illustrates the suggested improvement needs described above.

FINAL REPORT

Submitted to:
New Jersey Department of Transportation

Prepared by:
Parsons Brinckerhoff, Quade & Douglas Inc.

July 18, 20 & 24, 2006



Appendix B: Route 1 & 9 Traffic Report



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- Municipality Input (To Come Later)
- Day One Presentation
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- Day Three Presentation

Route U.S. 1 and 1 & 9 (MP. 35.0 - 45.5)
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Morteza Ansari
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Inc.

NJDOT Bureau of Safety
Programs

New Jersey Department of Transportation Commissioner Jack Lettiere launched the Governor's "Safety First" initiative in March 2003, a plan that combines engineering, education, and enforcement to implement solutions to make New Jersey's roadways safer. The New Jersey Department of Transportation (NJDOT) has invited a multidisciplinary team to *be* part of a permanent task force to further these safety initiatives along our roadways.

As PART of the initiative, the Federal Highway Administration (FHWA) made A commitment to organize a USDOT Safety Impact Team (SIT) to conduct a multidisciplinary safety analysis and provide recommendations along New Jersey's "Safe Corridors." A Safe Corridor is defined as a roadway that has experienced a higher than average exposure to crashes as compared to similar roadways. The NJDOT has also implemented a program for doubling the fines for traffic violations along these corridors. To date, Safety impact TEAMS have analyzed 5 of the 13 corridors. Because of a high-profile fatal crash in 2003 that took the lives of five people, and that this segment has the highest crash rate of ten-mile corridors on the State, current Commissioner Kolluri recommended that the section of Route U.S. 1 and 1&9 between M.P. 35.00 and M.P. 45.50 (along with four other corridors) be designated a Safe Corridor. Parsons Brinckerhoff Quade & Douglas, Inc. (PBQD) coordinated the SIT safe corridor engineering, education, and enforcement study for this corridor, extending from Woodbridge Center Drive - Gill Lane in Woodbridge Township, Middlesex County to North Avenue in the City of Elizabeth, Union County.

The overall corridor crash history shows that there were 1,157 crashes in the calendar year 2005. Of the total, 6 (0.52%) were fatalities, 400 (34.6%) involved injuries, and 751 (64.9%) resulted in property damage only. The 2005 crash statistics indicate that the following categories exhibit rates above the 2005 Statewide Averages: Fatalities, Injuries, Same Direction - Rear End, Same Direction - Sideswipe and Pedestrian type crashes; crashes At Signalized Intersections; crashes on Dry surfaces; and crashes at Night, Dusk or Dawn.

It is noted that 536 of the total crashes (46.3%) were coded as southbound mainline crashes, despite the slight skew of traffic to the northbound direction. 496 crashes (42.8%) were coded as northbound mainline crashes, and the remainder (125, or 10.9%) was coded as side street crashes.

The SIT review consisted of seven intersections ranked by crash frequency over a three-year period. Bureau of Safety Programs developed three-year crash summaries by severity, type, surface condition, and light condition for the top fifteen locations within the corridor, fourteen signalized intersections and one grade-separated interchange (Route U.S. 1 &9/Route 35). Of these locations, seven are or have been directly addressed by current or recent construction projects, such as Route U.S. 1/Woodbridge Center Drive - Gill Lane and Route U.S. 1 &9/Louisa Street - Woodruff Lane or have undergone extensive study previously, such that additional study would not shed significant additional findings, such as Route U.S. 1 &9/Route 439 - Bayway Circle and Route U.S. 1&9/North Avenue. These locations have been eliminated from further study. The following table illustrates the intersection locations, number of crashes and their corresponding ranks.

**Three Year Signalized Intersection Crash Summary
From January 1, 2003 to December 31, 2005
Top Fifteen (15) Crash Locations by Ranking**

Intersection # ¹	Location	# Of Crashes	Ranking ³
32	North Avenue (C.R. 624) (M.P. 45.44)	373	1
1	Woodbridge Center Drive – Gill Lane (M.P. 35.10)	116	2
– ⁴	Route 35 Interchange (M.P. 36.42)	115	3
31	Louisa Street – Woodruff Lane (M.P. 45.27)	106	4
25	East Jersey Street (C.R. 612) (M.P. 44.30)	90	5
21	Route 439 – Bayway Circle (M.P. 43.11)	86	6T
5	Lawrence Street (C.R. 514) (M.P. 38.85)	86 ²	6T
18	Park Avenue (C.R. 616) (M.P. 42.65)	82	8
4	Avenel Street (C.R. 650) (M.P. 37.15)	80 ²	9
26	East Grand Street (C.R. 610) (M.P. 44.52)	78	10
2	Green Street (C.R. 604) (M.P. 35.69)	77	11T
13	Stiles Avenue (C.R. 615) (M.P. 40.74)	77	11T
14	Wood Avenue (C.R. 617) (M.P. 41.06)	63 ²	13
16	Woodlawn Avenue (M.P. 41.26)	56	14
9	Avenue C (M.P. 40.01)	52	15

- ¹ Intersections are numbered sequentially south to north starting from M.P. 35.10 to M.P. 45.44.
² Fatal crashes at indicated intersections.
³ Rankings based on 2005 crash totals.
⁴ Grade-separated interchange, but with sufficient crash history to be ranked.

The SIT findings resulted in a series of comprehensive solutions to significantly reduce crashes and fatalities utilizing the three 'E' approach: engineering, education, and enforcement. The team recommended immediate and short-term solutions that would be considered 'quick fixes,' in addition to identifying intermediate and long-term solutions that could be implemented by NJDOT. Recommendations included both corridor-wide and intersection specific improvements. Some of the recommendations included adjustments to signal timing, upgrade of existing signals, enhanced striping and signing, improved signal visibility, improved connectivity between signalized intersections, reduction of sign clutter, improved police enforcement, community education/outreach programs, and many other improvements.

The Department should begin facilitation of the education and enforcement

In March 2003, the New Jersey Department of Transportation (NJDOT) launched the Governor's "Safety First" initiative. Then Commissioner Jack Lettiere's plan combines engineering, education, and enforcement to implement solutions to make New Jersey's roadways safer. The NJDOT has invited a multi-disciplinary team to be part of a permanent task force to further these safety initiatives along our roadways.

As part of the initiative, the Federal Highway Administration (FHWA) made a commitment to organize a USDOT Safety Impact Team (SIT) to conduct a multidisciplinary safety analysis and provide recommendations along New Jersey's "Safety Corridors." A Safety Corridor is defined as a roadway that has experienced a higher than average exposure to crashes as compared to similar roadways. The NJDOT has also implemented a program for doubling the fines for traffic violations

along these corridors. Thirteen (13) Safety Corridors were designated under the original initiative, of which 5 have been analyzed by Safety Impact Teams: Route U.S. 1 (milepost 5 to 15) in May 2003; Route U.S. 9 (milepost 120 to 130) in February 2004; Route U.S. 46 (milepost 30 to 40) in November 2004; Route 73 (milepost 19 to 30) in September 2005; and Route U.S. 9 (milepost 110 to 120) in April 2006.

A refinement in the corridor selection criteria was applied to the statewide crash data in 2004, resulting in up to five (5) additional corridors for future Safe Corridor designation and study. One such corridor is Route U.S. 1 and 1&9 from milepost (M.P.) 35.00 to 45.50, in Middlesex and Union Counties. Based on this corridor's distinction as the most critical crash corridor in the State using the refined criteria, current Commissioner Kris Kolluri has recommended this section of Route U.S. 1 and 1&9 be included in the Safe Corridor Program. NJDOT's Bureau of Safety Programs directed Parsons Brinckerhoff Quade & Douglas, Inc. (PBQD) to advance an SIT safe corridor engineering, education, and enforcement study for this critical crash corridor.

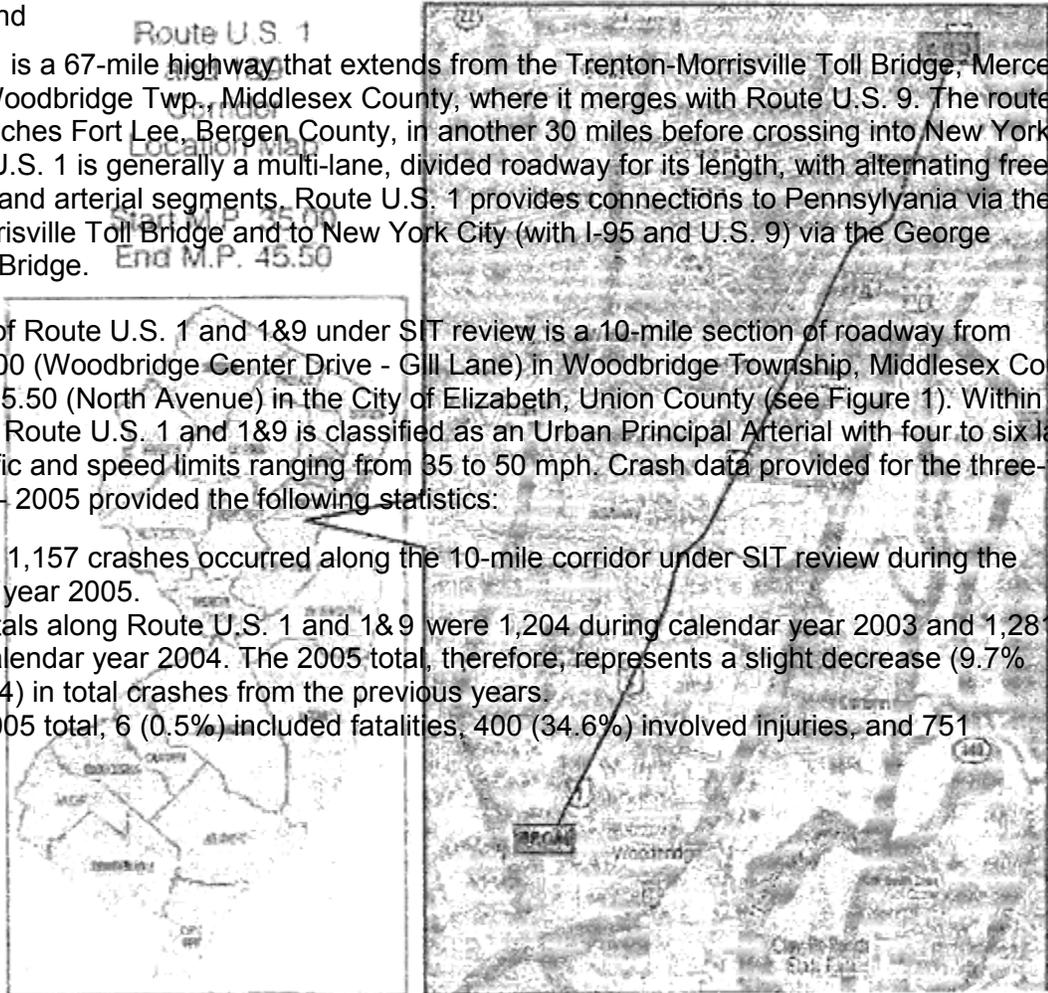
Figure 1.

A. Background

Route U.S. 1 is a 67-mile highway that extends from the Trenton-Morrisville Toll Bridge, Mercer County, to Woodbridge Twp., Middlesex County, where it merges with Route U.S. 9. The route multiplex reaches Fort Lee, Bergen County, in another 30 miles before crossing into New York City. Route U.S. 1 is generally a multi-lane, divided roadway for its length, with alternating freeway, expressway and arterial segments. Route U.S. 1 provides connections to Pennsylvania via the Trenton-Morrisville Toll Bridge and to New York City (with I-95 and U.S. 9) via the George Washington Bridge.

The portion of Route U.S. 1 and 1&9 under SIT review is a 10-mile section of roadway from milepost 35.00 (Woodbridge Center Drive - Gill Lane) in Woodbridge Township, Middlesex County to milepost 45.50 (North Avenue) in the City of Elizabeth, Union County (see Figure 1). Within the SIT corridor, Route U.S. 1 and 1&9 is classified as an Urban Principal Arterial with four to six lanes (total) of traffic and speed limits ranging from 35 to 50 mph. Crash data provided for the three-year period 2003 - 2005 provided the following statistics:

- A total of 1,157 crashes occurred along the 10-mile corridor under SIT review during the calendar year 2005.
- Crash totals along Route U.S. 1 and 1&9 were 1,204 during calendar year 2003 and 1,281 during calendar year 2004. The 2005 total, therefore, represents a slight decrease (9.7% from 2004) in total crashes from the previous years.
- Of the 2005 total, 6 (0.5%) included fatalities, 400 (34.6%) involved injuries, and 751



B. What is a Safety Impact Team?

The Safety Impact Team is a multi-disciplinary team of highway safety stakeholders. Members for the Route U.S. 1 and 1&9 SIT include representatives from the NJDOT, FHWA, New Jersey State Police (NJSP), the New Jersey Division of Highway Traffic Safety (NJDHTS), the National Highway Traffic Safety Administration (NHTSA), the American Automobile Association (AAA), North Jersey Transportation Planning Authority (NJTPA), Rutgers University, and local safety police officers. Representatives from Meadow link and Keep Middlesex Moving, two commuter organizations with interests in this corridor, were also invited.

The purpose of the SIT is to develop comprehensive solutions to significantly reduce crashes and fatalities applying the three E's (engineering, education and enforcement) to high crash/fatality locations along the corridor. The team looks for immediate short-term solutions that would be considered "quick fixes," as well as identifying intermediate and long-term solutions that could be implemented by NJDOT.

c. Approach

The methodology for conducting this review is as follows:

- Identify the high-crash corridor to be analyzed. (NJDOT selected a portion of a Safety Corridor previously identified as a high crash location.)
- Compile data elements to be used for analysis of the corridor, including:
 - crash rates and number of fatalities/injuries/property damage only

- summary of crash records
 - traffic volumes and signal timings
 - vehicle classification and straight-line diagrams
 - roadway geometry and typical sections
 - pavement condition (friction data/skid numbers, age, type, etc.)
 - scheduled construction or maintenance work in the area
 - planned or proposed development in the area
- o Identify potential significant crash locations
 - o Prepare crash collision summaries and diagrams to identify locations of over-represented crashes (Summaries only were provided for this corridor, to focus on angle and left turn crashes)
 - o Review existing conditions, data elements and crash diagrams with the Team members; identify additional information that may be needed; formulate the plan on how the field review will be conducted
 - o Conduct the field review with Team members
 - o Review findings and potential recommendations with the Team members; develop a draft outline
 - o Prepare a final report detailing the findings, short, Intermediate and long-term recommendations, implementation plan, and final conclusions

III. OPERATIONAL CHARACTERISTICS

A. General

The Route U.S. 1 and 1&9 study corridor extends from Milepost 35.10 (Woodbridge Center Drive - Gill Lane) in Woodbridge Township, Middlesex County to Milepost 45.44 (North Avenue) in the City of Elizabeth, Union County. In general, Route U.S. 1 and 1&9 is a four-lane, divided Urban Principal Arterial with posted speed limits ranging from 35 to 50 mph. It is briefly constrained to four lanes on the Rahway River bridge (milepost 38.67) and the Elizabeth River viaduct (M.P. 43.99). In addition, this 10.5-mile section of roadway experiences three different cross-sections. The Route U.S. 1 and 1&9 study corridor is a land use highway that consists of 31 signalized intersections, one signalized traffic circle, eight grade-separated interchanges and numerous unsignalized intersections and driveways.

Generally speaking, the Route U.S. 1 and 1 &9 corridor consists of a four- to six-lane mainline, divided by a grass, curbed or barrier median, with or without shoulders. Left turn control is provided from some signalized intersections via a combination of left turn lanes and near-side jug handles or far-side loop ramps. Left turns are prohibited at some intersections, particularly those in Elizabeth. Left turn control to and from driveways and unsignalized intersections is provided via adjacent signalized intersections. No median openings are provided outside of at the signalized intersections. The grade-separated interchanges within the corridor are either fully-directional or operate in pairs (for example, Grove Street and E. Jersey Street in Elizabeth), with any intersection control off of the mainline.

Various units within (and outside) the NJDOT provided a significant amount of data and information to the team. This includes traffic volumes, ongoing roadway projects that are either in planning or

construction, future projects, signal plans and timings, and pavement management data. A brief description of this data is provided below.

B. Traffic Volumes

Limited turning movement count data was available from the NJDOT's Interactive Traffic Count Reports. Counts were only available for three of the intersections undergoing further study under this SIT (see Crash Characteristics): Route U.S. 1/Green Street; Route U.S. 1 & 9/Avenel Street and Route U.S. 1&9/Stiles Street. Mainline peak hour approach volumes (and year of count) are summarized in

Table 1
Route U.S. 1 and 1 & 9 Traffic Volume Data (Peak Hour Approach Volumes)

Year	Approach	Volume (vph)	Intersection	Year	M.P.	Peak Hour	NB	SB	WB	BI	Green Street
(2005)	35.697:30A.M.1,4711,6706556985:00P.M.1,5381,067631749		Avenel Street								
(2005)	37.157:30A.M.2,3991,7272434165:00P.M.1,6692,531416518		Stiles Street								
(2001)	40.747:15A.M.2,0802,0054152204:45P.M.2,1432,339423352										

morning and northbound in the evening. North of the U.S. 9 merge, the peak directions are Based on the limited information, the counts suggest that at the south end of the project area, i.e. south of the U.S. 9 merge, the peaking characteristic favors clearly northbound in the morning and southbound in the evening. Further north, around Stiles Street, the peak period directionality still favors northbound in the morning, southbound in the evening, but the difference is much less. Machine counts in the area (for which ADT's are summarized below in Table 3) support this directionality.

The Bureau of Safety Programs (BSP) provided 2005 Annual Average Daily Traffic (AADT) volumes for the corridor, from which crash rates were derived (as discussed in the next section). These AADTs are summarized in Table 2.

Available machine counts along the corridor provide a glimpse of the directional distribution of

Table 2
Route U.S. 1 and 1&9 Traffic Volume Data (AADT)

Milepost Station	2005 AADT	35.10- 35.89
(Woodbridge Center Dr.-Gill La. to U.S. 9 Merge)	53,500	35.89 - 36.42
(U.S. 9 Merge to Route 35 Interchange)	58,400	36.42 - 38.85
(Route 35 Interchange to Lawrence St.)	65,200	38.85-43.11
(Lawrence St. to I-278)	66,200	43.11 -45.45
(I-278 to North Ave.)	90,700	

daily traffic in this area. Table 3 summarizes the directional weekday ADT's at various locations in the corridor.

Table 3
Route U.S. 1 and 1&9 Traffic Volume Directional ADT's Milepost (Year) NB ADT SB ADT

ADT35.50(2002)30,90029,30037.50 (2000)32,40033,70041.85 (2003)39,40038,400
--

Table 3 SUGGESTS that weekday ADT's in the Route U.S. 1 and 1&9 corridor do not show a strong directional split between northbound AND southbound. THE splits RANGE from 51% northbound to 51% southbound.

Turning movement count reports are contained with the other intersection data in the respective Appendices, while the machine count summaries are contained in Appendix L.

C. Vehicle Classifications

Vehicle classification data WAS not available within the limits of SIT review. The nearest available classification is at milepost 48.1 (near the I-78 connector road). A 2003 weekday distribution for THE combined southbound local and express lanes suggests that about 12.5% of the AVERAGE weekday southbound traffic is heavy vehicles, i.e. trucks and buses.

Anecdotally, tractor-trailers and other trucks make up a major part of the traffic stream, especially in the northern section of the Route 1&9 corridor. Many of the side streets, such as Stiles Avenue, contribute truck traffic from adjacent industrial areas along parallel corridors such as Linden Avenue.

D. Signalized Intersection Level of Service

Based on available turning movement counts at the Green Street, Avenel Street, and Stiles Avenue intersections and current traffic signal timing plans, level of service analysis was performed using the current software supporting the *Highway Capacity Manual 2000*. Analyses were performed on the three intersections for the peak a.m. and p.m. hours. These hours correspond to the commuter travel hours, but do not coincide from intersection to intersection. The hours used for analysis correlate to those shown in Table 1. In the case of the Stiles Street intersection, the signal phasing used in the analysis reflects the current protected-permitted side street phasing.

The level of service analysis indicated the following:

- The Green Street intersection exhibited levels of service D or better for all approaches during each peak period.
- At Avenel Street, WB left turns and EB thru movements experience levels of service E or worse during the p.m. peak period. Midday field observations, however, indicate long traffic queues eastbound at the intersection.
- The Stiles Avenue intersection experiences level of service D or better for all movements for both peak periods, with the exception of the northbound left turn, which operates at LOS E.

E. Pedestrians, Bicycles and Transit

The Route U.S. 1 and 1&9 SIT corridor is a transit corridor, based on the presence of signed bus stops. Bus turn-outs are not present in the corridor, and existing bus stops are denoted by signs. Bus shelters are also not present in the corridor. Due to the geometry in the corridor, bus stops between Green Street and Jersey Street, where the highway has no outside shoulders, require the bus to stop in the live traffic lane to pick up and discharge passengers. This corridor also roughly parallels the Northeast Corridor service provided by NJ Transit and Amtrak. Signs direct motorists off of Route U.S. 1&9 to the various stations served by the commuter rail.

There are no estimates of pedestrian traffic within the corridor, and little pedestrian traffic was observed during field views of the corridor, with the exception of a few pedestrians at the Wood Avenue intersection. Because this corridor passes through highly urban areas, significant pedestrian activity would be expected at some point during the day. Pedestrian accommodations are good in the urban areas, such as Elizabeth, with marked crosswalks at the intersections and sidewalk connectivity. Some crosswalks are controlled by pedestrian signals (some of which may

be countdown indications), while others are controlled by vehicular signal heads. Push buttons are provided at nearly all of the signalized intersections. Further south, in the more suburban areas, pedestrian accommodations are not as prevalent. The Green Street intersection, for instance, has push buttons and some vehicular heads for pedestrians, but no crosswalks or accessible ramps.

Some shoulders are provided in the corridor, such as at the south end and in parts of Elizabeth, so that limited bicycle compatibility exists in these areas. Most of the corridor, however, has no shoulders, and the outer lanes are not bicycle-compatible.

F. Local Planning Board Projects

Contact with Planning Boards of the township and cities within the Route u.S. 1 and 1&9 SIT corridor revealed the following information.

Woodbridge Twp.

- Off-track waginger proposed for Route U.S. 1/Ford Ave. intersection (south of SIT corridor boundary)
- Shopping Center on Gill Lane is to add two restaurants.
- Proposed bank at Route U.S. 1/Green Street, on west side.
- Two commercial buildings (restaurant/retail) on Route U.S. 1&9 northbound between Kirk Street and Mitchell Place.

City of Rahway

- Approved future development includes:

- 900-unit storage warehouse
- 74-unit hotel (near existing hotel)
- 150 senior rental units at East Hazelwood Avenue
- 6,000 s.f. restaurant
- 40-unit condominium low-rise with parking deck
- 5,000 s.f. Quik Chek gas station with 8-to-12 pumps
 - Indicated that they are actively seeking developers for areas from E. Scott Avenue to the Linden City line (about ½ mile).

City of Linden

- Townhouses proposed by the BJ's Wholesale Club near Willow Glade Road.
- Proposed Lowe's by GM.

City of Elizabeth

- Identified proposed mini-mall proposed at the Route U.S. 1&9/North Avenue intersection.

G. Municipal Police Input

Early contact with the municipal police departments, prior to the field view, revealed the following concerns:

Woodbridge Twp.

- Traffic Safety Officer indicated that township is requesting upgrades to timing at Route U.S. 1 & 9/Avenel Street, specifically for westbound protected left or protected-only lefts on side street.

City of Rahway

- Traffic Safety Officer indicated that most crashes were rear-end crashes.
- Also cited congestion and construction for the new Rahway River Bridge.

City of Linden

- Traffic Safety Officer cited major traffic during the whole day, with many collisions and fatalities. He cited a number of 38 to 48, but unsure what that number referred to.
- He identified the segment between Woodlawn Avenue and Park Avenue as a critical area within the City.
- He cited instances of weaving from I-278 westbound across three through lanes to turn right onto Willow Glade Road and shop at the BJ's Wholesale Club.

- Linden's officers sometimes park in the island between the I-278 westbound ramp and Route U.S. 1&9 southbound lanes and have registered motorists' speeds as high as 120 mph.

City of Elizabeth

- No information obtained from Traffic Safety Officer.

H. Construction Projects

There are currently several projects within the study corridor that are in design, under construction, or recently completed, by the NJDOT or by other agencies. These projects are summarized below by location/municipality:

Entire Corridor

NJDOT has no corridor-wide projects for the Route U.S. 1 and 1&9 SIT limits at this time.

Woodbridge Twp., Middlesex County

- Route U.S. 1 Over Conrail
 - Major reconstruction project: Started about Fall 2003, completed Spring 2006.
 - Project extended from Garden State Parkway (south of SIT boundary) to Green Street.
 - Widening added capacity to Route U.S. 1 in both directions.
 - Replaced narrow four-lane bridge over Conrail track.
 - Reconstructed Woodbridge Center Drive - Gill Lane intersection.
 - Most of crash data for this intersection during construction period.
- Route U.S. 1&9/Route 35 Interchange
 - Currently under construction, completion expected February 2009.
 - Reconstruction of existing tight cloverleaf interchange,
 - New or modified traffic signals on Route 35, no new intersections on Route U.S. 1&9.
 - As of SIT field date, traffic riding in existing southbound lanes while northbound side of new structure and approaches under construction.

City of Rahway, Union County

- Route U.S. 1&9 Rahway River Bridge and Route U.S. 1 &9, Section 1K, 3M
 - Under construction since February 2006, estimated completion date January 2009.
 - Rahway River Bridge segment broken out as separate contract to expedite construction. This is complete.
 - Bridge constructed along new alignment, enlarging curve radius.
 - Eliminates existing Route U.S. 1 &9/Lawrence Street intersection.
 - Creates new signalized intersection Route U.S. 1&9/Randolph Avenue on Middlesex-Union County line.
 - Provides consistent cross-section of three lanes and shoulder in each direction.
 - Existing bridge reused as southbound on-ramp from Lawrence Street.
 - As of SIT field date, construction underway on northerly tie-in to bridge. No work on south end.

City of Linden, Union County

- No projects along Route U.S. 1&9 within the City of Linden.

City of Elizabeth, Union County

- NJDOT BSP and the Bureau of Traffic Engineering and investigations (TE&I) performed a recent study and implementation of various safety improvements to signalized intersections along Route U.S. 1&9 in the City of Elizabeth.
 - Improvements included timing adjustments, signing upgrades, including use of new "No U/Left Turn" symbol, painting crosswalks, installing pedestrian signals, and installing accessible ramps. .
 - Project performed between about 2002 and 2004.
 - Project later included pedestrian safety improvements in the Route 439 Bayway Circle.
- Route U.S. 1&9, Section 4T
 - Currently under construction, completion expected October 2003.
 - Reconstruction of Elizabeth River Viaduct, narrow four-lane bridge with new six-lane structure.
 - Signalized intersection at East Jersey Street to be modified by construction.
 - As of SIT field date, northbound structure complete and in use by both directions of traffic; existing structure under demolition and southbound structure under construction in same place.
- Route U.S. 1 &9, Section 6
 - Construction soon to begin, completion expected May 2007.
 - Reconstruction of Magnolia Avenue Bridge over Route U.S. 1&9.
 - Closure of existing connections from Magnolia Avenue to Route U.S. 1&9, due to substandard sight distance.
 - Maintain and/or improve connections from Route U.S. 1&9 to Magnolia Avenue.
 - Route U.S. 1&9 and North Avenue
 - Currently under construction, completion expected January 2007.
 - Project includes new traffic signal at Route U.S. 1 &9/Fairmount Avenue intersection.
 - Project includes elimination of existing traffic signal at Louisa Street -Woodruff Lane.
 - As of SIT field date, construction activities were underway in project area. New signal equipment up at Route U.S. 1&9/Fairmount Avenue, but bagged and not in operation. New equipment operational at Route U.S. 1&9/North Avenue earlier BSP initiative.

Plans and other relevant materials for the above projects can be found in various Appendices of this report. The Route U.S. 1&9 Rahway River Bridge and Route U.S. 1&9, Section IK, 3M project materials can be found in Appendix D. Since the other projects are not in areas under further study in this SIT (see Crash Characteristics), materials for these projects are found in Appendix L. No graphical information is available for the Route 1&9, Section 6 project (Magnolia Avenue).

I. Other items

The NJDOT has provided existing traffic signal plans and timing plans for the eight intersections to be studied further under this SIT (see Crash Statistics, below). The traffic signal plans and signal timing schedules are contained in Appendices B through K.

There are currently no immediate plans for any pavement management projects within the study corridor. Pavement Management data is included in Appendix L.

IV. CRASH CHARACTERISTICS

A. General Crash Statistics

The NJDOT Bureau of Safety Programs (BSP) compiled 2003, 2004 and 2005 crash *data* for the Safety Impact Team review. The crash detail sheets are provided in Appendices A through K. To

better identify the crash problems along the Route U.S. 1 and 1&9 Corridor, *BSP* prepared overall corridor crash summaries for each of the three years, *determined* the three-year intersection crash frequencies for the top fifteen (15) locations, and also *calculated* the crash rates by roadway cross-section for the three years.

The overall corridor crash history shows that there were 1,157 crashes in the calendar year 2005. Of the total, 6 (0.52%) were fatalities, 400 (34.6%) involved injuries, and 751 (64.9%) resulted in property damage only. The 2005 crash statistics indicate that the following categories exhibit rates above the 2005 Statewide Averages: Fatalities, Injuries, Same Direction - Rear End, Same Direction - Sideswipe and Pedestrian type crashes; crashes At Signalized Intersections; crashes on Dry surfaces; and crashes at Night, Dusk or Dawn.

It is *noted* that 536 of the total crashes (46.3%) were coded as southbound mainline crashes, despite the slight skew of traffic to the northbound direction. 496 crashes (42.8%) were coded as northbound mainline crashes, and the remainder (125, or 10.9%) was coded as *side street* crashes.

The *corridor-wide* crash statistics for each of the three years are summarized *in* Appendix A. A further breakdown of the 2005 crash data in one-tenth mile increments, indicating direction, crash type and frequency, is provided on Straight Line Diagrams for the corridor, also found in Appendix A. As expected, larger crash totals were found in the northerly 5.5 miles of the SIT corridor. This corresponds to the more densely urbanized *areas* of Rahway, Linden and Elizabeth. The large crash total at the southern end of the corridor reflects that the Woodbridge Center Drive - Gill Lane intersection ranked second among the signalized intersections in crash totals in the corridor, as will be shown later in this report.

Table 4
Route U.S. 1 and 1&9 Crash Totals by Mile

Route U.S. 1 and 1&9 from...	Total Crashes (2005)	% of Corridor Total	M.P.
35.10 to M.P. 36.10	100	8.6%	M.P. 36.10 to M.P. 37.10
37.10 to M.P. 38.10	685	59.1%	M.P. 38.10 to M.P. 39.10
39.10 to M.P. 40.10	201	17.4%	M.P. 40.10 to M.P. 41.10
41.10 to M.P. 42.10	221	19.1%	M.P. 42.10 to M.P. 43.10
43.10 to M.P. 44.10	94	8.1%	M.P. 44.10 to M.P. 45.10
45.10 to M.P. 46.10	44	3.8%	

The three-year crash data analysis also suggests that a significant portion of the corridor crashes occur at or in close proximity to the 32 signalized intersections. By facility type, the crash breakdown is as shown below.

- 849 (73.3%) are located at or within one-tenth mile of a signalized intersection.
- 84 (7.3%) are located at or near a grade-separated interchange.

- The remaining 224 (19.4%) are at unsignalized intersections, driveways, or other mid-block locations.

With such a high frequency of crashes located at the signalized intersections, a closer look at the crash trends at the signalized intersections was warranted.

B. Fatal Crashes

A total of twenty-one (21) fatal crashes occurred within the Route U.S. 1 and 1&9 *SIT* corridor during the three years studied. Most were scattered throughout the corridor, but 2 were located at Wood Avenue, 3 occurred within one-tenth mile of Myrtle Avenue and 2 occurred on the Elizabeth River viaduct. Of these fatal crashes, 9 involved pedestrians, 3 involved motorcyclists, 2 involved bicyclists, one was a single-vehicle crash with a bridge parapet, and 5 were multi-vehicle crashes. Almost all of these crashes occurred during late-evening and overnight hours. Four fatal crashes involved alcohol or drugs (driver or pedestrian), and nine crashes involved unsafe and/or unlawful vehicular or pedestrian maneuvers.

A brief summary of location and circumstances is provided below.

2003 Fatal Crashes (7)

- Near Willow Glade Road, 6 people were killed when a southbound vehicle darted across the southbound lanes and median and collided head-on with a northbound

vehicle with five occupants, which caught fire (overnight). The driver of the southbound vehicle was found to be under the influence of alcohol and drugs.

- North of the Route 35 interchange, a pedestrian darted into path of through vehicle (overnight).
- At Wood Avenue, an intoxicated pedestrian crossed the highway on an unmarked crossing, against signs directing to cross on the other side (overnight).
- On the Elizabeth River viaduct, a northbound motorcyclist was killed in a head-on collision with a wrong-way southbound vehicle (overnight).
- At Anna Street, a northbound bicyclist riding along the median barrier was killed when he crossed into the path of a vehicle in the left lane (night).
- At the Grove Street intersection, on the south side of the Elizabeth River viaduct, a northbound truck driver was killed when he hit the nose of the parapet, apparently trying to move out of the right lane, which does not enter the viaduct (a.m. peak period).
- Circumstances were unclear in a 2-car crash in the vicinity of Olive Street (p.m. peak period).

²⁰⁰⁴ Fatal Crashes (8)

- At Avenel Street, a pedestrian was killed, but no further details were available (evening).
- At Randolph Avenue, a young child in the southbound lanes was killed by a hit-and-run driver (overnight).
- At Lawrence Street, a bicyclist was killed in a collision with a vehicle (mid-day), but no other details are known.
- At GM's West Gate, across from Linden Airport, a motorcyclist was killed in a collision with a tractor-trailer cab (night). The cyclist was found to be intoxicated.
- Near Fairmount Avenue, a pedestrian was killed by a hit-and-run driver, but not much more is known of the circumstances (night).
- At Myrtle Avenue, a pedestrian was killed when apparently crossing the highway against the traffic signal (night).
- South of Broad Street, a pedestrian was killed by a hit-and-run driver (overnight). Pedestrian was crossing mid-block.

- Circumstances were unclear, including exact location, regarding a pedestrian fatality (overnight).

2005 Fatal Crashes (8)

- Near Milton Avenue, a pedestrian was killed by a northbound vehicle (night). The pedestrian was crossing against the signal, and may have had alcohol in his system.
- Near Malcolm Place (south of Park Avenue), a pedestrian was killed by a northbound vehicle while crossing the highway at an unmarked crossing (overnight). There was alcohol in the pedestrian's system.
 - At Wood Avenue, a southbound motorcyclist was killed when he collided with a northbound vehicle making a left turn (night). The cyclist apparently ran the red signal after proceeding from the signal at Clinton Street, about 500 feet upstream.
 - On the Elizabeth River viaduct, a motorist was killed in an overturn crash (overnight). No further details are known.
 - Details are unknown regarding a two-vehicle crash at the North Avenue intersection (overnight).
 - North of Woodlawn Avenue, a head-on crash involving two vehicles, one going the wrong way, resulting in a fatality (night). No further details available.

C. Pedestrian Crashes

Thirty-six (36) crashes involving pedestrians occurred during the 2003 - 2005 period within the Route U.S. 1 and 1&9 SIT limits. A few locations experienced multiple pedestrian crashes during the period, including Avenel Street (3), Milton Street (2), Wood Avenue (3), Broad Street (3), Bond Street (2) and Anna Street (2). The following can also be summarized about the pedestrian crashes.

- Ten (10) of the crashes resulted in death of the pedestrian, as described above.
- Eight (8) total pedestrian crashes occurred in 2003; 16 in 2004; and 12 in 2005.
- Crash locations were fairly random, but many were at locations in Linden and Elizabeth, where greater pedestrian activity would be expected.
- Almost all of the non-fatal pedestrian crashes resulted in injury to the pedestrian.
- An overwhelming majority of the pedestrian crashes occurred during hours of darkness.
- At least nine (9) crashes involved pedestrians crossing between Intersections in unmarked locations.
- At least nine (9) of the pedestrian crashes resulted from intersection crossings against the signals controlling pedestrians or crossing legs not controlled by signals.
- At least nine (9) of the pedestrian crashes were with left turning vehicles moving on the same phase as the pedestrian. Two (2) other crashes resulted from similar circumstances with right turn vehicles.

D. Bicycle Crashes

A total of fourteen (14) crashes involving bicyclists occurred in the Route U.S. 1 and 1&9 corridor under study during the three years 2003 - 2005. Two (2) of the bicycle crashes occurred at Wood Avenue, and 3 were located at Anna Street. The following other observations were made upon examination of the crash reports for these crashes.

- Two (2) of the crashes resulted in the death of the bicyclist, as described above.
- As with the pedestrian crashes, nearly all of the bicycle crashes occurred during hours of darkness.
- Two (2) of the crashes occurred when the bicyclist moved against the signal indication.
- Turning vehicles (left or right) struck bicyclists in four (4) of the crashes.

- One crash occurred in foggy conditions because the bicyclist and motorist could not see one another. It was unclear which made the contact.
- Erratic maneuvers contributed to two (2) of the crashes.

E. Fixed Object Crashes

A closer view of the fixed-object type crashes for 2005 revealed that 59 of the 103 fixed-object crash entries in the corridor cited curb or median barrier as the object struck. Other fixed objects cited in the crash details included guide rail, sign posts, utility poles, light standards, trees and attenuators. Common locations where fixed-object crashes occurred in the corridor included Douglas Ave., Lawrence St., the I-278 area, and North Ave. These locations each experienced at least four occurrences of fixed-object crashes.

F. Other/Unknown Crashes

In 2005, there were 26 crashes that were categorized as Other or Unknown. Closer examination of these listings revealed the following information.

- 26 total fixed object crashes
- 3 involved motorists backing up.
- 3 were vehicles that ran off the road.
- 6 indicated debris in the roadway.
- 3 appeared to occur within 20 minutes of one another in the same 0.2-mile segment.

G. Top intersection Crash Locations

BSP developed three-year crash summaries by severity, type, surface condition, and light condition for the top fifteen locations within the corridor, fourteen signalized intersections and one grade-separated interchange (Route U.S. 1 & 9/Route 35). The fifteen locations and rankings are shown in Table 3. Of these locations, seven have been or will be directly addressed by recent or current construction projects such that additional study would not shed significant additional findings, therefore, these locations have been eliminated from further study for the purposes of the SIT. For the remaining eight locations, shown in bold in Table 3, the majority of the crashes fell into three types: same direction rear-end, same direction sideswipe and angle. The details for each intersection are contained in Appendices B through H.

Of the 21 total fatal crashes, four have occurred at one of the top fifteen crash locations. Two fatal crashes occurred at the Route U.S. 1 & 9/Wood Avenue intersection, while one fatal crash occurred at each of the Route U.S. 1 & 9/Lawrence Street and Route U.S. 1 & 9/Avenel Street intersections.

Table 5
 Three Year Signalized Intersection Crash
 Summary from January 1, 2003 to

Intersection #	Location	# Of Crashes	Ranking
332	North Avenue (C.R. 624)	(M.P. 45.44)	
1162_4	Route 35 interchange	(M.P. 36.42)	
115331	Louisa Street - Woodruff Lane	(M.P. 45.27)	
106425	East Jersey Street (C.R. 612)	(M.P. 44.30)	
90521	Route 439- Bayway Circle	(M.P. 43.11)	
866T5	Lawrence Street (C.R. 514)	(M.P. 38.85)	
8626T18	Park Avenue	(C.R. 618)	
(P.P. 42.85)	8284 Avenel Street (C.R. 850)	(M.P. 37.15)	
802926	East Grand Street (C.R. 610)	(M.P. 44.52)	
78102	Green Street (C.R. 804)	(M.P. 35.69)	
7711T13	Stiles Avenue (C.R. 615)	(M.P. 40.74)	
7711T14	Wood Avenue (C.R. 617)	(M.P. 41.06)	
6321316	Woodlawn Avenue	(M.P. 41.26)	
56149	Avenue C	(M.P. 40.01)	
5215			

M.P. 45.44.

2 Fatal crashes at indicated intersections.

3 Rankings based on 2005 crash totals.

4 Grade-separated interchange, but with sufficient crash history to be ranked.

H. Corridor Crash Rates By Cross-Section

In addition, BSP developed crash rates and summaries by types and conditions for various roadway cross-sections of Route U.S. 1 and 1&9 and compared them to the Statewide Average crash rates and percentages for similar facilities. These crash rates are for the three-year period 2003 - 2005, and are summarized in Table 6 below. The crash summary sheets in Appendix A provide detailed information relating to the severity, type of crash, location, surface condition and time of day for each section.

Table 8
Route U.S. 1 and 1&9 Three-Year Crash Rates by
Cross-Section From January 1, 2003 to December 31,

Route U.S. 1 and 1&9 from...Crash Rate1	Statewide Average Crash Rate1'2% Over Statewide Average
Intersections in Top 15 Within Section	M.P. 35.10 to M.P. 36.425.582.10 (A)1662, 3,
11TM.P. 36.42 to M.P. 39.394.013.51 (B)146t, 9M.P. 39.39 to M.P. 41.654.533.93	
(C)1511T, 13, 14, 15M.P. 41.65 to M.P. 45.446.273.51 (B)791, 4, 5, 6T, 8, 10	

Crashes per million vehicle miles 2 2005
Statewide Average Crash Rate for similar
sections

- (A) 4 or More Lanes, Barrier Median with Shoulder
- (B) 4 or More Lanes, Barrier Median without Shoulder

All of the separate cross-sections within the SIT corridor have crash rates greater than the 2005 Statewide Average for similar sections. *The* fifteen highest crash locations in the corridor are spread across the cross-sections. The southernmost section (Woodbridge Center Drive - Gill Lane to the *Route* 35 interchange, contain two of the three highest crash locations, accounting for over half of the total crashes in the section. In addition, the two highest crash locations in this section are covered by a completed construction project (Woodbridge Center Drive - Gill Lane) or a continuing construction project (*Route* U.S. 1 &9/*Route* 35 interchange). The northernmost section (south of 1-278 to North Avenue) Includes the highest crash location in the corridor, which is under construction, and five other signalized intersections among the top fifteen locations (three of which are under construction or impacted by construction projects). The two middle sections do not exhibit crash rates far above the Statewide Average rates, and include the remaining intersections in the top 15 locations. All of the sections' crash rates are influenced by the crashes at the signalized intersections. This analysis suggests that the crash rates are not a direct result of the cross-sectional geometry.

V. Findings & Recommendations

The Safety Impact Team reviewed the Route U.S. 1 and 1&9 Corridor roadway from milepost 35.00 (Woodbridge Center Drive - Gill Lane) In Woodbridge Township, Middlesex County to milepost 45.50 (North Avenue) in the City of Elizabeth, Union County. The approach used for the *review* was a three-pronged methodology that *included* engineering, education, and enforcement perspectives on the crash issues in the corridor. The engineering component consisted of the team's onsite review of the Route U.S. 1 and 1&9 corridor both corridor-wide and specific to the signalized intersections identified in *the* Crash Characteristics section of this report. The team identified improvement needs for each intersection, which were later organized into immediate-, short-, medium-, and long-term improvement timeframes. The education and enforcement components of the review focused on recommendations to raise motorists' awareness of traffic safety and to enhance law enforcement within the study corridor. A summary of the engineering, education, and enforcement findings and recommendations is provided below.

A. Engineering

The engineering timeframe of immediate, short, medium, and long-term improvement assignments ranges from a few days, up to nine months, nine months to two years, and two years or more, respectively. Immediate projects generally consist of maintenance-related issues that can be addressed with a phone call or memo to the Regional Maintenance yards. Short-term projects generally consist of issues that are easily solved (i.e. signal timing changes, minor signing or striping changes, signal head changes) that do not require extensive plan preparation work; medium-term projects include more complicated signal upgrade or maintenance curb and sidewalk projects to simple geometric fixes; long-term projects are generally large-scale geometric changes and/or improvements involving significant roadway reconstruction, drainage and/or utility work, or right-of-way acquisition.

Recommendations were categorized by the reason for the recommendation. Some recommendations are made based directly on the crash statistics while others are not specifically related to crash trends, but may be due to a lack of conformity with standards, practice, policy or other guidelines. The recommendations are grouped into five codes:

C = Crash-related; G? = Potentially crash-related, but needs further study; P = Current MUTCD standard or NJDOT design policy or practice; M = Maintenance issues, including plan conformity; and A = All others.

Corridor Wide

The Safety Impact Team participants identified general recommendations for areas of improvement along the Route U.S. 1 and 1&9 study corridor. These recommendations, along with applicable general safety recommendations from previous SITs, are provided below.

Recommendations Immediate:

M . Replace faded street name signs.

Short-Term:

- C . Provide "Ladder" striping to crosswalks at selected high-frequency locations to improve visibility.
Review and adjust all-red interval between mainline left turn and through lanes.
Install additional signing at unsignalized intersections to minimize wrong-way movements.
 - C? . Provide signing to indicate areas of high pedestrian activity.
 - P . Install Safe Corridor signs.
Upgrade outdated signing, especially left turn signal signs.
Add Keep Right and No Left/No U Turn signs (where appropriate) at median breaks at signalized intersections.
 - A . Review locations and visibility of advance signs for jughandles and ramps

Install pedestrian count-down indications and push button signs

Evaluate signal progression.
Examine signal mast arm loading in relation to signal recommendations.
- Medium-Term:
- C? . Install left turn and through signals in near-left locations.
Review highway and intersection lighting, including in the vicinity of bus stops.
 - P . Review and adjust alignment of signal heads over travel lanes, especially left turn signals,

- A . Study feasibility of providing one signal head per lane with adjacent overhead lane use signs.

Add pedestrian fencing to median barrier to discourage mid-block pedestrian crossings.

Long-Term:

- C? . Install bus pull-outs at bus stop locations in no-shoulder areas.

Route U.S. 1 and Green Street Background

The Green Street intersection is ranked eleventh (tied) (T-11th) in the corridor with a total of 77 crashes in three years. The two highest crash types were same direction-sideswipe (35.1%), same direction-rear end (31.2%) and angle (19.5%). All but one of the same direction accidents were NB or SB and were split fairly evenly. Following are the short-, medium- and long-term recommendations by the Safety Impact Team.

Recommendations

Short-Term:

- C . Add "RIGHT LANE ENDS" sign upstream of signal on U.S. 1 NB. Improve signing for NB right turns to Green Street. . Add "NO LEFT TURN" and "ONE WAY" signs to signal heads to prevent left turns going south.

- C? . Add additional arrows and "ONLY" markings on Green Street between U.S. 1 NB and SB.

- P .
 - Install pedestrian crosswalks and ADA ramps in locations served by pedestrian indications.
 - Add pedestrian countdown indications and update push button signs.
 - Realign pedestrian push buttons on southbound side for crossing direction.
 - Add yield bar and crosswalk to WB channelized right.
 - Add 12" signal head on SE corner.

- A . Add NB clamp mount signal head to median pole.
- Replace M6-3 with M(NJ)8-1R on the east approach U.S. 1 South trailblazer assembly.

Medium-Term:

- A . Construct refuge island at northeast corner of Route 1 NB intersection to facilitate pedestrian signals.

Route U.S. 1&9 and Avenel Street

Background

The Avenel Street intersection is ranked ninth (9th) highest in the corridor with a total of 80 crashes in three years. The two highest crash types were same direction-rear end (57.5%) and same direction-sideswipe (42.1%). There were 3 pedestrian crashes between 2003 and 2005, including one fatal. The local police are currently seeking a timing change with an EB lead in order to relieve long EB queues. Following are the immediate-, short-, medium- and

long-term recommendations by the Safety Impact Team.

Recommendations Immediate:

- M . Fix pedestrian push button on NE corner.
- Replace the Avenel Street mast arm street name sign.

Short-Term:

- C? . Add "NO TURN ON RED" signs for U.S. 1&9 SB.

- P . Replace "NO LEFT TURN" signs with combination "NO U / NO LEFT TURN" signs.

Improve ramps to be ADA compliant (NE & NW quadrant)

- A . Review stop line locations related to truck turns.
Create level ground on the NE corner for pedestrians using a wheelchair. .
Install "ALL TURNS FROM RIGHT LANE" sign in place of "U AND LEFT TURNS" sign on the NB approach.

Medium-Term:

- C . Add crosswalk, ADA ramps and signals on southern leg of U.S. 1&9.
Install Pedestrian signals.
Add detectable warning devices on southerly handicap ramps.
Study possible reductions of U.S. 1&9 speed limit
- P » Upgrade 8" signal heads to 12" signal heads.

Long-Term:

- C? . Add a shoulder at the NB accel/decel for Hyatt Street.

Route U.S. 1&9 and Avenue C

Background

The Avenue C intersection is ranked fifteenth highest in the corridor with a total of 52 crashes in three years. The two highest crash types were same direction-rear end (63.5%) and same direction-sideswipe (28.9%). The same direction crashes were almost evenly split between NB and SB approaches. Following are the short-, medium- and long-term recommendations by the Safety Impact Team.

Recommendations

Immediate:

- M . Refresh the striping on Avenue C.
Replace the missing Avenue C mast arm street name sign.
Install the missing "No U Turn" sign for U.S. 1&9 SB

Short-Term:

- C? . Add crosswalk, ADA ramps and pedestrian heads on Avenue C approach.
Evaluate and adjust signal coordination with signal to the north.

- A . Connect sidewalks in NE corner.
. Install "NO PEDESTRIAN CROSSING" signs to prohibit crossing of Route 1&9 on the south side of the intersection.

Medium-Term:

- P . Upgrade Avenue C signal heads to provide non-conflicting displays for right turn, overlap.
Upgrade 8" signal heads to 12" signal heads.

Route U.S. 1&9 and Stiles Avenue

Background

The intersection at Stiles Avenue is ranked tied for eleventh in the corridor with a total of 77 crashes in three years. The three highest crash types were same-direction rear end (62.3%), same-direction sideswipe (18.2%), and angle (13.0%). Most of the same direction crashes involve SB vehicles. There are significant truck turns at the intersection. Following are the short- and medium-term recommendations by the Safety Impact Team.

Recommendations Short-

Term:

- C? . Change protected-permitted phasing to protected-only on side street (as per Aviation Plaza access permit project).

- P . Add pedestrian countdown indications and upgrade push button signs.

- A . Add near left arrow and through indications for NB and SB. Medium-Term:
- . C . Provide additional second of all- red following mainline double left turn phase
- . A . Relocate near right signal #7 to 15' mast arm mount location.

Route U.S. 1&9 and Wood Avenue

Background

The Wood Avenue intersection is ranked thirteenth (13th) in the corridor with a total of 63 crashes in three years. The three highest crash types at Wood Avenue were same-direction rear end (50.8%), same-direction sideswipe (17.5%), and left turn (11.1%). There were 2 fatalities at the intersection. The same direction accidents slightly favor the SB direction. Following are the short-, medium-, and long-term recommendations by the Safety Impact Team.

Recommendations

Immediate:

- M . Refresh the striping the Wood Avenue approaches.
- . Cut the vegetation on the WB approach blocking a sign.
- . Install 2 second clearance time for highway lefts.

Short-Term:

- M . Fix NB mast arm signal head (twisted downward).

- P . Add crosswalk and push buttons on southern leg of U.S. 1&9.
- . Add pedestrian countdown indications and upgrade push button signs.
- . Upgrade Wood Avenue signal configuration to near-left, far-right layout
- . Consider allowance of NB U turns.
- . Add signs to emphasize SB "No U Turn" condition.
- . Replace "Left Turn Signal" sign with R10-5.
- . Check lateral clearance of near side and far side heads (northbound).
- . Check ramps for ADA compliance.
- . Upgrade 8" signal heads to 12" signal heads for side street.
- Add or upgrade school crossing signing.

- Relocate "NO TURN ON RED" sign obscured by utility pole. ,
- Move the NE side push button closer to the sidewalk.
- Install near left side signal heads (left turn and through) for both directions of U.S. 1&9.
- Improve coordination with adjacent signals.

Medium-Term:

- C? . Reevaluate and modify intersection lighting.
- . Consider protected-permitted left turn phasing for side street.

- M . Add bicycle safe grates.

- A . Prohibit parking in the WB right turn lane.

Long-Term:

- A . Increase the radius of the SE corner curb for large trucks making right turns from U.S. 1&9 NB.

Route U.S. 1&9 and Clinton Street Background

The Clinton Street intersection was not part of the original list of locations for further study. The signal at this intersection tends to disrupt the traffic movements through the adjacent signals at Wood Avenue and Woodlawn Avenue. The signal is designated as a school crossing for St. Theresa School. Local police perform traffic control at the intersection during Sunday services, at the Catholic Church. Following are the short-, medium-, and long-term recommendations by the Safety Impact Team.

Recommendations

Short-Term:

- P . Upgrade school crossing signs.

Medium-Term:

- C? . Evaluate whether traffic signal is warranted.

Route U.S. 1&9 and Woodlawn Avenue

Background

The Woodlawn Avenue intersection is ranked fourteenth (14th) in the corridor with a total of 56 crashes in three years. The highest crash types were same-direction rear end (53.6%) and same-direction sideswipe (30.4%). Most of the same-direction crashes occurred in the S3 direction (70.0%). Following are the short- and medium-term recommendations by the Safety Impact Team.

Recommendations

Short-Term:

- C . Install larger speed limit 35 sign north of intersection on SB approach.

- C? . Improve signal coordination with adjacent signals.

- P . Provide signing on raised median.

- . Replace "LEFT TURN SIGNAL" with R10-5.

- . Upgrade school crossing signs.

Add pedestrian countdown indications and upgrade push button signs.

Provide for pedestrian crossing between northerly corners.

Upgrade 8" signal heads to 12" signal heads.

- A . Add near side left turn and through signals to mainline mast arms.

Medium-Term:

- C » Evaluate and improve intersection lighting.

- P . Improve ramps to be ADA compliant

Revise side street layout to near left/far right

U.S. 1&9 and I-278

Background

This area was specifically identified by the local police as a problem area. The posted speed is 45 mph, but is routinely exceeded. Bollards have been installed as an attempt to stop the weave from I-278 to Willow Glade Road on U.S. 1&9 SB, but many of the bollards show damage from vehicles disregarding them. This area was also the scene of a fatal head-on crash in 2003 that killed 6 members of a family and that involved high speeds/alcohol and a median crossover movement. Investigation of this crash resulted in installation of about 2000 feet of concrete median barrier divider north of the Woodlawn Avenue intersection, about where the crash occurred. Following are the short- and medium-term recommendations' by the Safety Impact Team.

Recommendations Short-

Term:

C? . Install larger speed limit signing along mainline and on I-278 WB Ramp.

Medium-Term:

C? . Install overhead dynamic speed warning sign.

Route U.S. 1&9 and Park Avenue

Background

The Park Avenue intersection is ranked eighth (8th) highest in the corridor with a total of 82 crashes in three years. The three highest crash types were same-direction rear end (31.7%), same-direction sideswipe (29.3%), and angle (18.3%). The rear-end crashes are primarily in the SB direction. Following are the immediate, short, medium, and long-term recommendations by the Safety Impact Team.

Recommendations Immediate:

M . Replace missing "NO TURN ON RED" signs.

Short-Term:

P . Check ramps for ADA compliance.

Medium-Term:

C . Evaluate and improve intersection lighting.

C? . Evaluate alignment of signal heads on mainline mast arms.

Provide left turn phase and signals for EB left turns.

Move/close-off driveways close to intersection.

P . Upgrade 8" signal heads to 12" signal heads.

Replace "LEFT TURN SIGNAL" signs with R10-5.

A . Upgrade to pedestrian countdown indications and upgrade push button signs.

Remove clam mount signal head #13 from northeast corner

Install near side signal heads (left turn and through) for both directions of U.S.

1&9.

B. Education

Crash statistics generated by the NJDOT, as commented on by the SIT members, point to several different factors contributing to motor vehicle crash occurrences along the studied ten-mile segment of Route U.S. 1 and 1&9. Of these, approach speeds, driver inattention and pedestrian behavior are the most prevalent.

Several methodologies exist to encourage drivers to be more attentive and less influenced by 1distractions, to encourage pedestrians to use marked roadway crossings, and to encourage all stakeholders to become involved in traffic safety campaigns along- the corridor. Recommended programs to target the various stakeholders are provided below.

Programs targeting the general motoring public

Public education campaigns should be created that will combat the problem of driver awareness. Drivers should be educated on how to read and interpret the meanings of traffic signs to limit the confusion and subsequent erratic driver behavior.

Public education campaigns should also .address the driver's responsibility in terms of pedestrian safety. Drivers should be educated on the rules and subsequent penalties for failure to comply.

A website should be created and kept up to date that explains in greater detail the purpose, function, efforts, and eventual plan for Safe Corridors. AH final reports made on safety corridors should be placed on the site to give access to the information. Other information on each corridor should also be included such as crash statistics, links to partner agencies and organizations, updates on projects created and their progress, and

subsequent crash reductions that occur as a result. Lastly, the website address (if short) should be listed on each 'Safe Corridor' sign so that citizens know where to find additional information. Currently, a search of NJ DOT's website only yields a few initial news reports.

Programs targeting pedestrians and bicyclists¹¹

The Route U.S. 1 and 1&9 SIT corridor is a transit corridor with NJ Transit and other private bus companies maintaining bus routes along this corridor. With the cooperation of local retailers and businesses along the corridor and the transit companies operating in the area, a series of informative pamphlets, posters, and other visual aids should be launched to help commuters stay safe along the Route U.S. 1 and 1&9 Corridor. In parallel with this effort, pedestrian facilities at key intersections should be upgraded and the signing made more available and informative to ensure the safest and most accommodating environment for pedestrians and bicyclists.

Programs targeting corporations along the corridor

Many of the vehicles using this roadway daily take commuters to work or are commercial vehicles. The companies the commuters work at or the commercial vehicles belong to may welcome programs such as the Network of Employers for Traffic Safety (NETS) where safety specialists visit them to identify traffic problems, make presentations, distribute

literature, and answer questions about traffic safety. Substantial monetary savings for all companies can be realized when motor vehicle crashes are lowered through decreased health care costs, vehicle and other insurance premiums, administrative and legal costs, reduced employee turnover and training costs for new hires, fewer fleet replacements, and other societal cost reductions. More information on NETS can be found at <http://www.trafficsafetv.org>.

The NETS program should be reinstated in New Jersey and an employer awareness program be created that provides employers in the area with information on both the human and economic cost of crashes, along with specific information to share with employees regarding driving the Route U.S. 1 and 1&9 Corridor.

Programs targeting retailers *along* the corridor

The Route U.S. 1 and 1&9 corridors have several shopping opportunities that include one mall and several large box stores. The retailers along Route U.S. 1 and 1&9 should be contacted about joining a roadway safety program. They more than likely belong to a retailers association or enterprise zone association, which could be very interested in a program dealing with the safe and uneventful arrival and departures of their customers. Their participation in this program may also assure their assistance with any traffic engineering improvements being planned.

The malls and businesses could be encouraged to consider placing pamphlets at their entrances or signs and road stencils at their driveways informing drivers to be as safe as possible when re-entering traffic and to buckle their seat belts, and to create a campaign of posters and other visual aids alerting all highway users, motorists and non-motorists alike, to measures that can help ensure their safety on the roads.

Programs targeting other stakeholders

It is important to keep legislators, mayors, police chiefs, local traffic engineers, the media, and any other stakeholders up to date on the intent of the program and progress being made: Their political assistance, ideas, and matching efforts, whether engineering, enforcement or educational in nature, can multiply the successes that are experienced. Periodic briefings with these individuals, agencies and organizations are critical to the successful implementation of many of the proposed engineering improvements.

Multicultural Education

The cultural diversity of the area through which the U.S. 1 and 1&9 corridor runs implies the need for the development of a multicultural education program in conjunction with those mentioned above. Language and cultural barriers need to be hurdled in order to ensure educational

information reaches and is understood by its target audience. An important part of this would include the identification of the cultural groups within the community and the use of schools, churches community groups and the local media to develop and effectively deliver educational information.

C. Enforcement

The NJDOT and law enforcement agencies should work together so that everyone is aware of any new traffic safety initiatives. State and local police departments should be encouraged to institute a policy of zero tolerance on aggressive driving violation enforcement, as well as seat belt enforcement. To ensure that these initiatives will be successful, grant monies should be provided so that state and local police departments can increase their presence along the corridor. A program should be instituted that educates the municipal police departments on the purpose of the Safe Corridor enforcement grants and

Municipality police departments who have not already done so should be encouraged to apply for the available grant monies.

The NJDOT and partnering agencies should also collaborate together with state and local police departments to implement the strategies provided by NHTSA in Aggressive Driving Enforcement: Strategies for Implementing Best Practices. This document provides step-by-step assistance to law enforcement personnel in developing an aggressive driving enforcement program. Many of the strategies were developed based on the successful experience of various law enforcement agencies across the nation.

In order to increase seat belt usage along the study corridor and throughout the state of New Jersey, law enforcement agencies should be encouraged to issue summonses to ail motor vehicle operators involved in a crash who were not wearing seat belts. Seat belt use is the best defense motorists have in the event of a crash. Therefore, seat belt enforcement should consist of both primary and secondary enforcement. As a primary offense, summons should be issued to motorists who are involved in a motor vehicle crash and are not wearing a seat belt. Summonses should also be issued as a secondary offense when motorists are stopped for another violation (e.g. speeding, following too closely, etc.) and not wearing a seat belt.

Municipal Police departments should be encouraged to apply for the comprehensive Pedestrian Safety Grants available through the New Jersey Division of Highway Traffic Safety. They should also be encouraged to issue summonses pedestrians and motorist who, through their actions, put pedestrians at risk such as pedestrians put who do not cross at crosswalks or cross against the signal. Increased enforcement with the possibility of fines should help deter pedestrians from crossing at unsafe locations.

Based on the crash data for the U.S. 1 and 1&9 corridor and the input provided by municipal police departments, the use of automated enforcement to control speeds should be examined. The corridor appears to be a good candidate for the development of a pilot program in conjunction with public education and a media campaign to develop public awareness.

Other education and enforcement initiatives should include the use of speed monitoring trailers. The speed-monitoring trailers can be used to alert motorists of their speed as compared to the posted speed. Variable message boards can be used to remind motorists to wear their seatbelts and to encourage them to report aggressive drivers by dialing cell #77.

VI. Conclusion

The Safety Impact Team gathered for three days to conduct a review of a portion of the Route U.S. 1 and 1&9 Corridor. From this review, the team identified problem areas along the corridor and

identified recommendations to improve safety throughout the corridor. These recommendations were in the areas of engineering, education and enforcement - the three E's approach.' The anticipated success of the Safety Impact Team program is based on the assumption that the Department will follow through with most of the recommendations set forth in this report.

The Department should begin implementation of the education and enforcement recommendations immediately. The engineering recommendations were categorized into immediate, short-term, medium-term, and long-term, with an estimated time frame for implementation of immediate to a few weeks, up to 9 months, 9 months to 2 years and more

than 2 years, respectively. In addition, there were several recommendations that require further investigation, which should also begin immediately.

To determine the effectiveness of the Safety Impact Team program, an evaluation process is also necessary. Such an evaluation should include at a minimum a comparison of the crash data prior to and after the implementation of the recommended improvements. It is also important to gain an understanding of the public's perception of the program through feedback. This could be accomplished through the Safety Impact Team website or surveys at the many businesses along the Route 1 and 1&9 Corridor and at the many retail centers present. By working together through engineering, education and enforcement, the safety of New Jersey's roadways can be improved significantly.

While many of the intersections ranking in the upper half of the Top Fifteen Crash Locations (Table 5) were not analyzed by the SIT panel because of previous studies or construction projects, progress of measures already programmed for locations such as those in the City of Elizabeth should be monitored, both for implementation as well as impact. Locations affected by construction projects should be examined starting about 6 months after the completion of said projects to evaluate the effectiveness of these projects on the crash trends.

VII. Lessons Learned

The Safety Impact Team review of the Route U.S. 1 and 1 & 9 study corridor that occurred on July 18, 20, and 24, 2006, was the sixth of its kind in New Jersey. Based on the success of this review and the previous SITs, it is expected that the NJDOT will continue reviews of high crash corridors in New Jersey utilizing multidisciplinary teams. At the completion of the review, several recommendations were offered to improve the process for future SITs. Incorporating these lessons into future reviews will result in a more comprehensive program.

Various lessons learned from previous SITs were incorporated into the Route U.S. 1, 1&9 SIT. Some such lessons included the following:

1. The three days of the SIT process were spread over a 6-day period. First-day discussion resulted in additional issues meaningful to the panel which could be researched prior to the field visit. The extra day to compile feedback from the panel's field visit permitted additional research that generated meaningful discussions during the third-day debriefing. The third-day debriefing was reduced from a full day to a half day and resulted in more focused discussion.
2. The Route U.S. 1 and 1&9 SIT included a representative from Meadowlink. A representative from New Jersey Transit was invited, but could not attend.
3. This SIT provided greater analysis of fatal crashes as well as pedestrian/bicycle crashes, since both proved to be significant portions of the crash histories.

The following presents a list of lessons learned from this SIT. The Route 1 and 1 & 9 SIT incorporated many of the previous lessons learned with much success. Observations and further recommendations are noted based on this experience.

1. The Safety Impact Team consisted of representatives from various agencies that included backgrounds in engineering, education and enforcement. However, representation in future reviews should include the following depending on the characteristics of the corridor (create a checklist for participant types):

- o NJDOT Major Access Unit
- o Local authorities (i.e. municipal & county engineers and planners)
- o Community Groups
- o Board of Education (i.e., school transportation representatives)

While the multidisciplinary team that makes up the Safety Impact Team should be - balanced between engineering representatives and representatives with education and enforcement expertise, it is important to maintain a manageable size team.

2. Evaluate the need for shorter corridor lengths or more focused corridor improvements - fewer locations scheduled to screen. In this fashion, unexpected locations (such as Clinton Street in this case) can be examined in a less hurried manner.
3. Closer review of construction schedules of projects underway in SIT corridors can minimize the preparation, analysis and field review of locations where even immediate improvements are not practical.
4. Provide data far in advance of SIT to give participants the opportunity to review info and provide additional meaningful recommendations.
5. Create "Traffic Intelligence Reports" that can be shared with local/STATE police and local businesses.