


Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties, as well as the City of Philadelphia, in Pennsylvania; and Burlington, Camden, Gloucester and Mercer counties in New Jersey. DVRPC provides technical assistance and services; conducts high priority studies that respond to the requests and demands of member state and local governments; fosters cooperation among various constituents to forge a consensus on diverse regional issues; determines and meets the needs of the private sector; and practices public outreach efforts to promote two-way communication and public awareness of regional issues and the Commission.


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

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### 1.0 EXECUTIVE SUMMARY

The NJ 33 corridor study area extends through the Mercer County municipalities of Hamilton and Washington townships and covers an area of approximately 11.7 square miles. NJ 33 acts as a regional corridor carrying traffic from the eastern section of the county to the City of Trenton. It experiences heavy peak-hour and weekend congestion. It is a fast growing corridor with older developments located adjacent to NJ 33 while the more recent developments expand outward from this facility. The corridor often has the characteristics of a highway commercial area rather than a residential, retail mixed-use area. Although the area consists of several housing developments, there is a lack of connectivity between residential areas, retail areas, and schools. There has been an increase in regional through trips as well as local trips, which has contributed to congestion along the corridor. This study identifies the traffic and circulation problems in the area for both short term and long term improvements.

The study includes documentation of existing conditions, examination of development/redevelopment plans, identification of problem locations, transit assessment, and development of improvement scenarios. It also documents recommendations for reducing congestion, and improving mobility and safety in the corridor with breakout projects for the New Jersey Department of Transportation (NJDOT) pipeline.

This study effort involved multiagency meetings and field views that were conducted to review potential locations for inclusion in the study. Participants included representatives from each of the local municipalities, staff from the Mercer County Planning and Mercer County Engineer's Office, NJDOT and the Delaware Valley Regional Planning Commission. The sentiments of the public at numerous NJDOT sponsored charrettes in the area were also considered. The information that follows for each location is a result of that process and recommends actions to be pursued based on cooperative discussions and input from each of the study participants.

It is proposed that zoning should be enacted that allows mixed-use neighborhood centers that are within biking distance of residential areas. Commercial and office development should be permitted to exist closer to residential areas and should be designed to accommodate bicycling and walking to and within the site. Dependency on motor vehicles should be lessened by creating linkages between neighborhoods and public services. In addition, safe conditions for bicycling and walking should be provided through education to motorists, bicyclists and pedestrians. Also, adopt and implement the appropriate recommendations for action in the NJ Bicycle and Pedestrian Master Plan.

Several improvements were identified in an effort to increase overall bicycle safety and compatibility conditions. These include: repainting streets with wider shoulders to create bicycle lanes and still allowing room for a shoulder or buffer
between the road and sidewalk. Where appropriate, right-of-way for a bicycle lane can also be carved from the buffer between the sidewalk and the curb; in some cases general-purpose travel lanes can be narrowed to accommodate the added bicycle lanes. The narrowed lanes have the potential to reduce vehicle speeds, which can increase safety and raise awareness for a bicycle rider's presence. On certain segments of NJ 33 , a reduction in lane width and buffer width could provide the required space for a bicycle lane.

Improvement to the corridor's environment is necessary in order to attract more pedestrian activity (and a corresponding reduction in auto use) as well as to improve the economic viability of the area. Retail owners should be required to provide and maintain sidewalks in front of their stores. Sidewalks should exist on both sides of the street, extend continuously, and be accessible to those in wheelchairs. If the sidewalk ends and continues on the other side of the street, a crosswalk should be provided for safe access. Trees should be planted along buffers and street furniture (such as benches) integrated into the more traveled retail areas in order to draw pedestrians and introduce a sense of one community among the various distinct developments. Adequate street lighting is essential not only because it creates a sense of security among shoppers, but also because it adds to the aesthetics of an area. Pedestrian-friendly crosswalks are necessary, especially in areas were people are most likely to cross illegally. An example would be a raised crosswalk, which makes a pedestrian more visible to a vehicle while also acting as a speed bump. Pavement markings and bright signs can be used to alert motorists to pedestrians in the roadway.

Four Build Alternatives, each comprising one or more corridor improvement concepts, were analyzed using DVRPC's travel demand model. None of the concepts in the build alternatives involve widening of NJ 33, but instead include construction of relief roads and connector roads to complete the fragmented local road network. The concepts studied are as follows:

- Relief Road at I-295 Interchange

Construct a two-lane relief road between Hamilton Avenue and NJ 33.

- Relief Road at Nottingham Neighborhood

Construct a two-lane relief road between Shady Lane and Paxson Avenue.

- Estates Boulevard Connector

Construct a new facility that would connect the existing two-lane sections of Estates Boulevard.

- Flock Road Connector

Connect the existing two-lane sections of Flock Road with a new facility across Miry Run.

- Northbound I-295 Ramp

Construct a new northbound I-295 on-ramp on westbound NJ 33.

- Paxson Avenue Connector

Connect the existing two-lane sections of Paxson Avenue with a new facility across Miry Run.

- Kuser Road Connector

Construct a new facility that would allow direct access between the NJ 33 Bypass and Kuser Road.

- Cypress Lane Connector

Following construction of a new alignment, the two-lane sections of Cypress Lane would meet at Whitehorse-Mercerville Road.

- NJ 33 Bypass, Alternative Design
- Estates Boulevard / NJ 33 Bypass Connector

Based on the travel demand analysis, several of the concepts appear to significantly reduce traffic volume on NJ 33.
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### 2.0 BACKGROUND

The NJ 33 Corridor was chosen from DVRPC's Year 2025 Long Range Plan. The corridor is particularly suitable for study due to its consistent recurring traffic congestion, future growth pressures on the traffic system, and the potential for improved public transportation. The NJ 33 Corridor Study is based upon the land use scenarios, the transportation needs and the economic development strategies, in conformance with the policy goals and objectives of the New Jersey State Plan, DVRPC's Horizons: 2025 Land Use and Transportation Plan, and local municipal plans. As suburban sprawl induces population growth and increases traffic volumes within the corridor, transportation facilities need to be examined to determine their adequacy for moving goods and people, now and in the future. This effort strives to identify the constraints and opportunities on US 33 and to make recommendations for its improvement as a travel corridor.

This study is consensus-based and developed with input from the corridor communities and various state and regional agencies. The steering committee members (consisting of representatives from NJ Department of Transportation, NJ Office of Smart Growth, NJ Transit, Mercer County, Hamilton Township, Washington Township, and DVRPC) participated in the development of this report through meetings and field views. This effort was complemented by a parallel vision study that was undertaken by the NJDOT and its consultants (Urban Engineers Inc. and Glatting Jackson Kercher Anglin Lopez Rinehart, Inc.) The study teams cooperated on problem identification and shared data. Steering committee members were involved in field views to identify potential locations for inclusion in the study. Based in part on those recommendations, DVRPC staff subsequently engaged in detailed follow-up field views of the area.

Overall, this study effort includes coordination, problem identification, data collection and analysis, and development of a strategic implementation plan for the corridor. Throughout the process, the stakeholders provided valuable information as well as facilitated a process of information sharing and review with representatives of corridor municipalities.
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### 3.0 CORRIDOR DESCRIPTION

The NJ 33 corridor extends from the interchange with I-295 in the west in Hamilton Township to US 130 in the east in Washington Township, a total of 4.52 miles (Map 1). The corridor has a mixture of land uses from single-family residential to retail commercial. There are several parallel and intersecting highway facilities that provide alternate routes to and from NJ 33. As a result, the study area extends approximately 2.6 miles to the north and south of the NJ 33 facility.

### 3.1 Existing Land Use

The NJ 33 corridor is a fast growing corridor with older developments located along NJ 33 while the more recent developments expand outward from this facility. (Map 2) Land use in the corridor ranges from dense, intensive development in the west, to agriculture and open space in the east. High-density residential clusters exist in the older residential communities along NJ 33 and Nottingham Way, the primary east-west arteries.

The corridor often has the characteristics of a highway commercial area rather than a residential, retail mixed-use area. Although the area consists of several housing developments, there is a lack of connectivity between residential areas, retail areas, and schools. Development and strip mall circulation is noncontiguous. The corridor lacks the aesthetics and streetscaping necessary to entice pedestrian traffic.

Commercial areas are concentrated along NJ 33, but also along sections of CR 533 in the west and US 130 in the east. These are primarily highway-related uses such as fast food restaurants and auto-related uses such as car dealerships, repair shops and gas stations. There are several shopping centers that provide goods and services primarily for the local population.

Located away from the commercial areas are mostly single-family residential areas. Large subdivisions consisting of single-family housing are located to the east of Yardville Road and to the north of Nottingham Way in Hamilton Township. With the exception of Washington Town Center, residential development in Washington Township is dispersed. There are clusters of multifamily housing units located primarily to the west of Hamilton Square-White Horse Road, as well as to the west of CR 533 in the vicinity of Klockner Avenue. At the eastern end of the corridor is the Washington Town Center located in the Robbinsville section of Washington Township. This development incorporates neo-traditional design guidelines in which bicycle and pedestrian transportation requirements are included in design decisions.

Open space is widely distributed throughout the corridor, with greater concentrations being in the southwestern and eastern end of the corridor.

Several parks are interspersed throughout the study area including Veterans Park and the Grounds for Sculpture that serves a local as well as regional function.

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### 3.2 Highway Network

Several interstate, state, county and local highways provide mobility and access throughout the NJ 33 corridor to both freight and automobile traffic. The highway network within the study area is comprised of about 128 miles of roadway. The following is a brief description of highways within or that influence corridor traffic circulation:

I-95 (NJ Turnpike) is a major toll road that extends the length of New Jersey. It traverses the southeast section of the study area with an interchange at I-195 (Exit 7A) in Washington Township.
-295 is an Interstate Highway that runs parallel to the NJ Turnpike from its southern origin in Salem County north to Lawrence Township in Mercer County. Interchange 63 provides a direct connection to NJ 33.

I-195 is an east-west Interstate Highway extending from I-295 in the west to the Jersey Shore. Interchanges within the study area are at Yardville-Hamilton Square Road (Interchange 3), US 130 (Interchange 5) and I-95 (Interchange 6).

US 130 is an Urban Principal Arterial extending north to south and running parallel to I-95 through Hamilton and Washington townships. It intersects with I195 at Interchange 5, as well as with CR 526 (Robbinsville - Allentown Road) and NJ 33 at Robbinsville. This highway demarcates the easternmost limits of the study area.

NJ 33 is an Urban Principal Arterial extending from the City of Trenton to the New Jersey shore. It forms the spine of the study area and is the main east-west artery for local travel in the area.

CR 533 (Whitehorse-Quakerbridge Road) is an Urban Minor Arterial that runs north to south, parallel to l-295 in Hamilton Township.

CR 535 is a north to south Urban Minor Arterial, which connects the City of Trenton with Hamilton Township

CR 606 (Hamilton Ave.) is an Urban Minor Arterial that runs east-west and connects US 206/South Broad Street in Trenton to NJ 33 in Hamilton.

CR 618 (Nottingham Way) is an Urban Minor Arterial. For the most part, this is a two-lane highway running east-west for approximately 2.8 miles in Hamilton Township. It parallels NJ 33 and acts as a reliever to NJ 33

CR 619 (Kuser Road) is an Urban Minor Arterial that runs from CR 606 to CR 533. From this point to US 130, it becomes an Urban Collector

Yardville Hamilton Square Road is a two-lane Urban Minor Arterial that runs north to south from an area to the south of US 130 to CR 618 (Nottingham Way).

Klockner Road is an Urban Collector that runs east-west in the study area. It parallels NJ 33 and acts as an alternate southern route to NJ 33 .

George Dye Road is a two-lane Urban Collector that runs north from Klockner Road to Nottingham Way, with a major intersection at NJ 33.

Whitehorse Hamilton Square Road is an Urban Minor Arterial that runs from the southwest to the northeast from CR 533 (Whitehorse - Mercerville Road) to Nottingham Way.

### 3.3 Traffic Volumes

This analysis is based on existing traffic count data gathered from two database sources: DVRPC and NJDOT. The level of detail of the analysis is limited by the available data. The traffic counts are expressed as annual average daily traffic (AADT). These numbers, derived from the sum of 24 -hour automatic traffic recorder (ATR) counts normalized by an applied factor, represent the average number of vehicles at that location on any given day of the calendar year.

The purpose of this analysis is to compare the disparate volumes at various locations along NJ 33 and adjacent highway facilities, and to recognize regional travel trends.

As listed in the previous section, there are many different classes of roadways that traverse the corridor including interstate, US routes, state routes, county and local routes. Traffic volumes increase on NJ 33 traveling from east to west. The western section intersects with I-295, which is a major north-south artery within the state. It also acts as a conduit for trips from I-95 and I-295. The western section is also closer to the City of Trenton, the state capital.

NJ 33 experiences average annual daily traffic volumes between 14,500 and 29,500 east of I-295. The volume peaks immediately east of I-295 at 29,500 cars per day and decreases with each major intersection traveling toward US 130, where the volume is 14,000 .

Other major facilities within the corridor include I-295, CR 533 (WhitehorseMercerville Road and Quakerbridge Road), Whitehorse-Hamilton Square Road, Yardville-Hamilton Square Road, CR 618 (Nottingham Way) and US 130. Daily traffic volume on US 130 is between 26,300 and 29,100 vehicles per day. CR 618 (Nottingham Way) experiences volumes between 9,900 and 13,200 daily.

### 3.4 Crash Data Analysis

## Introduction

The crash data used in this analysis was obtained from the New Jersey Department of Transportation. Data for the years 2002 to 2004 were utilized.

The purpose of this analysis is twofold. First, to perform a comprehensive safety overview of the study corridor, and second to substantiate problem locations presented during the municipal field visits and identify probable causes and potential improvements. In many cases, the safety analysis overlapped the identified problems. In other cases where a safety issue was identified by the analysis, but not by local officials, further study will be required to identify the most appropriate improvement that will address safety while balancing mobility issues.

## Corridor Summary

During the three years (2002-2004) utilized, 569 accidents were recorded along the 4.52 miles of the NJ 33 study area (MP 3.32-7.84). Of the total, there was a single fatality, 200 injuries and 368 property-damage-only accidents. Accidents occurring at intersections or between intersections were almost split evenly with 286 occurring at intersections and 283 occurring between intersections. The most predominant crash type was same-direction, rear-end collisions accounting for 46.75 percent (266) of the total accidents. Nearly 30 percent (170) of the crashes were angle collisions making it the second most predominant crash type along the study area. Almost 80 percent (451) of the crashes occurred during the daytime hours, which exclude dawn or dusk, and over 79 percent (453) of the crashes occurred during dry conditions.

Next is a comparison between NJ 33 crash statistics and the NJDOT At/Between Intersections Accident Summaries for State System Roads, excluding tolls and interstates, using 2002-2004 data (see Table 1). Considering the 4.52 miles of NJ 33's study area (MP 3.32 - 7.84), the area exceeds the threshold for angle crashes with 29.88 percent of all accidents compared to 12.70 percent of the state roads. NJ 33's left-hand turns totals exceed the threshold with 8.96 percent of the total accidents compared to the state's 3.71 percent. According to the New Jersey Department of Transportation, rear-end and sideswipe collisions involve traffic moving in the same direction. Angle crashes involve angular traffic (i.e. north and west) and left turn and head-on events involve opposing traffic.

Table 1
NJ 33 Corridor (MP 3.32-7.84)
Accident Summary
2002-2004
Corridor Total: 569
State Total: 202,325

| Collision Type | Count | \% of Total | Statewide Count | \% of Statewide Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 266 | 46.75\% | 91,031 | 44.99\% |
| Same Direction Sideswipe | 36 | 6.33\% | 33,722 | 16.67\% |
| Angle | 170 | 29.88\% | 25,691 | 12.70\% |
| Left Turn | 51 | 8.96\% | 7,514 | 3.71\% |
| Head On | 6 | 1.05\% | 3,099 | 1.53\% |
| Overturn | 0 | 0.00\% | 827 | 0.41\% |
| Pedestrian | 3 | 0.53\% | 1,523 | 0.75\% |
| Hit Fixed Object | 23 | 4.04\% | 22,560 | 11.15\% |
| Animal | 0 | 0.00\% | 5,440 | 2.69\% |
| Parked Vehicle | 2 | 0.35\% | 3,077 | 1.52\% |
| Pedacycle | 4 | 0.70\% | 992 | 0.49\% |
| Other | 8 | 1.41\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | Statewide Count | \% of Statewide Total |
| Fatal | 1 | 0.18\% | 580 | 0.29\% |
| Injury | 200 | 35.15\% | 62,188 | 30.74\% |
| Property Damage | 368 | 64.67\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | Statewide Count | \% of Statewide Total |
| Day | 451 | 79.26\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 116 | 20.39\% | 59,637 | 29.48\% |
| Unknown | 2 | 0.35\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | Statewide Count | $\%$ of Statewide Total |
| At Intersection | 286 | 50.26\% | 84,821 | 41.92\% |
| Not at Intersection | 283 | 49.74\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | Statewide Count | \% of Statewide Total |
| Dry | 453 | 79.61\% | 147,395 | 72.85\% |
| Wet Surface | 108 | 18.98\% | 46,969 | 23.21\% |
| Snow or lce | 7 | 1.23\% | 7,097 | 3.51\% |
| Unknown or Other | 1 | 0.18\% | 864 | 0.43\% |

Source: NJDOT, 2006

## Cluster Analysis

For the purposes of this study, a cluster is defined as 22 accidents or more occurring within a $1 / 10^{\text {th }}$-mile segment. The data analyzed occurred during the period 2002 - 2004. This is a modification of the New Jersey Department of Transportation's criteria, which requires a threshold of eight crashes per year for analysis. Of the 13 clusters found in NJ 33's study area, the top 6 clusters have been identified for analysis starting with 40 crashes (Table 2). Combined, the six clusters account for 47 percent (272) of the total corridor crashes during 2002 2004 in 13 percent of the study area. The remaining 297 accidents are distributed along the corridor in lesser concentrations.

Table 2 - NJ 33 CRASH CLUSTERS 2002-2004

| Location | Mile <br> Post | Nearest Cross Street | Total <br> Crashes | Total <br> Injured | Predominant Collision <br> Type |
| :--- | :--- | :--- | :---: | :---: | :--- |
| 1 | 3.44 | Hamilton Ave | 40 | 14 | Angle (20) |
| 2 | 3.70 | Vincent Ave | 43 | 8 | Rear End (15), Angle (12) |
| 3 | 4.20 | Shady Lane | 43 | 14 | Rear End (23), Angle (13) |
| 4 | 5.32 | White Horse-Hamilton Sq | 43 | 16 | Rear End (26), Angle (11) |
| 5 | 5.44 | Yardville-Hamilton Sq | 49 | 15 | Rear End (16), Angle (14) |
| 6 | 6.30 | George Dye Rd | 54 | 24 | Angle (25), Rear End (21) |
| Total |  |  |  |  |  |

Source: NJDOT, 2006
Each cluster summary was compared to statewide summaries. All crash cluster summaries and state statistics summaries are located in the Appendix. Upon examination of these summaries, the following observations were made: (Map 3)

## Location 1: MP 3.44-3.54

The area between Hamilton and Concord Avenue exceeds the state average for angle accidents (13 percent) with 20 accidents accounting for 50 percent of the accidents within the cluster. This high concentration of angle accidents is likely due to l-295's access ramps merging with NJ 33.

## Location 2: MP 3.70-3.80

Angle accidents and left-turn collisions both exceed the state percentage near the intersection of NJ 33 and Vincent Avenue. Angle accidents account for nearly 28 percent (12) of the total, while left-turn accidents account for 18 percent (8). The state percentage for angle accidents is near 13 percent and left-turn accidents is only 1.5 percent. This intersection contains a fork where NJ 33 and Mercerville-Edinburg Road splits, which could be the reason for the high number of angle and left-turn accidents.

## Location 3: MP 4.20-4.30

Rear-end and angle accidents exceed state levels at the intersection of NJ 33 and Shady Lane. Rear-end collisions account for 53 percent (23) of the cluster total while the state average is 45 percent. Angle accidents account for 30
percent of the cluster's accidents, with the state level accounting for only 12 percent of the total.

Location 4: MP 5.32-5.42
Forty-three accidents were reported at the intersection of NJ 33 and White Horse-Hamilton Square Road. Rear-end collisions account for 60 percent (26) of the cluster total while the state level is 45 percent. Angle accidents account for 25 percent of the cluster's accidents, compared to the state level of 12 percent. A small number of sideswipes account for seven percent (3) of the accident cluster.

Location 5: MP 5.44-5.54
Rear-end, angle, left-turn and hit-fixed-object accidents all exceed state levels at the intersection of NJ 33 and Yardville-Hamilton Square Road. Rear-end accidents account for 32 percent of the cluster total compared to the 45 percent state level. Angle accidents measure 28 percent (14) of the cluster total with the state level being 12 percent. Left turns account for 12 percent of the total compared to the state level of one percent. Hit-fixed-objects account for eight percent of the crash total compared to the state level of 1.5 percent.

Location 6: MP 6.30-6.40
George Dye Road is a major residential thoroughfare, and an alternative to Yardville Road. The intersection of George Dye Road and NJ 33 accounts for the largest cluster of accidents in the NJ 33 study corridor. With 54 accidents, this intersection exceeds state levels with angle and left-turn crashes. An overwhelming 46 percent (25) of accidents at this intersection are angle accidents compared to the state level of 12 percent. Left-turn accidents account for 9 percent (5) of the cluster total with state levels being 1.5 percent.
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### 3.5 Transit Service

As Map 4 illustrates, the western limits of the study area have reasonable transit coverage while the area to the east is not well served by transit. This is partly due to the rural and suburban character of the area. New Jersey Transit provides scheduled bus service to the area.

## NJ Transit Bus

NJ Transit bus routes \#603, \#606 and \#609 are the three bus routes that serve the NJ 33 corridor. NJ Transit bus \#606 provides direct connection to the Trenton rail station. NJ Transit bus \#608 is the only bus line that provides a direct connection to the Hamilton rail station. This bus route serves the communities to the west of the study area.

NJ Transit operates the \#603 bus from the Hamilton Marketplace in Hamilton Township to the Mercer Mall in Lawrence Township. There are 17 buses operating from the Hamilton Marketplace to the City of Trenton on weekdays, while 14 buses continue on to the Mercer Mall. The first bus departs Hamilton Marketplace at 7:18 a.m. while the last bus departs at 12:25 a.m. The average travel time from Hamilton Marketplace to Mercer Mall is approximately 1 hour and 15 minutes. On Saturdays, 23 buses make the trip to Trenton while 22 continue on to Mercer Mall.

The \#606 bus operates from Hamilton Marketplace to the Princeton Care Center in Princeton. There are 21 weekday buses that depart Hamilton Marketplace for Trenton. Eight continue on to the Princeton Care Center. The first bus departs Hamilton Marketplace at 6:16 a.m. while the last bus departs at $11: 11$ p.m. The average travel time from Hamilton Marketplace to the Princeton Care Center is approximately 1 hour and 40 minutes. On Saturdays, 13 buses make the trip to Trenton and continue on to the Princeton Care Center.

The \#609 bus operates from Quaker Bridge Mall in Lawrence Township to the NJDOT headquarters in Ewing Township. This bus serves communities within the study area along Quaker Bridge Road and Mercerville-Edinburg Road. There are 51 weekday buses that serve a section of Hamilton Township within the study area. The average travel time for the entire length of this bus line is approximately 54 minutes. On Saturdays, 48 buses serve this area.

## NJ Transit Rail

The Hamilton Rail station is located on Sloan Avenue near I-295 just east of the study area. This station facilitates direct connection to communities along NJ Transit's Northeast Corridor. Twelve NJ Transit trains bound for Penn Station, New York, serve this station in the AM peak period (5:41 a.m. - 8:15 a.m.). Seventeen trains provide return service in the PM peak period between 5:01 p.m. and 8:02 p.m. The station has a total of 1,904 parking spaces of which 28 are reserved for ADA customers. Occupancy levels on weekdays are at 100 percent. NJ Transit also provides connection to Amtrak, SEPTA and the River Line from the Trenton rail station to Philadelphia and points south.
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### 3.6 Bicycle and Pedestrian Facilities and Amenities

Bicycling and walking are viable alternatives to driving for certain trips. Bicycle trips are most appropriate for trips of five miles or less, while most pedestrian trips are usually of a half-mile or less. Bicycling and pedestrian activity is most successful in an environment that is safe and attractive, with convenient facilities and amenities.

In an attempt to rate and rank the suitability of arterials within the study area for bicycle and pedestrian routes, a quantitative model was applied that evaluated selected highway segments and pedestrian corridors within the study area.

## Methodology

The Bicycle Level of Service (BLOS) is a statistically generated model used to determine the level of service provided to bicycle users in a shared road environment. Similarly, the Pedestrian Level of Service (PLOS) is a statistically generated model used to determine the level of service provided to pedestrians. The software model developed by Bruce W. Landis in collaboration with Florida metropolitan planning organizations (MPOs), and Florida DOT, provides a statistically reliable method of evaluating bicycle and pedestrian conditions. The BLOS and PLOS models rate bicycling suitability or compatibility based on a combination of roadway width, shoulder width, striping patterns, daily traffic volume, pavement surface rating, speed limit and the presence of sidewalks and on-street parking. More specific parameter ranges as noted in the "Bicycle Roadway Suitability/Compatibility Using the Bicycle LOS Software" user's manual are below.

The BLOS model was developed using roads with the following parameter ranges:

- Through lanes per direction : 1 to 3 (2- to 6-lane roads)
- Width of outside travel lane, to outside stripe : 10 to 16 feet
- Paved shoulder or bike lane, outside lane stripe to pavement edge : 0 to 6 feet (no rumble strips)
- Bi-directional traffic volume : 550 to 36,000 ADT (Average Daily Traffic)
- Posted speed limit : 25 to 50 mph
- Percentage of heavy vehicles :0 to 2 percent
- FHWA's pavement condition rating : 5 (very good) to 2 (poor)
- A wide range of development types and parking conditions

The result of the BLOS and PLOS models are generated in numerical score from 0 to 5.5. The numbers are broken up into six letter grade categories "A, B, C, D, $E$, and $F$ " according to the ranges shown in Table 3. A ranking of " $A$ " is the most compatible rating while a ranking of " $F$ " denotes more unfavorable conditions that have minimal comfort for users. The model is only sensitive to the factors found to be statistically significant and the level of accuracy is highest when applied to
smaller distances. While the method is statistically reliable for grading roads for their level of service, the model does not provide any information to improve roadway conditions for bicycle suitability or pedestrian use.

## Table 3: Bicycle Level of Service

| Level-Of-Service | BLOS Score |
| :--- | :--- |
| A | $\leq 1.5$ |
| B | $>1.5$ and $\leq 2.5$ |
| C | $>2.5$ and $\leq 3.5$ |
| D | $>3.5$ and $\leq 4.5$ |
| E | $>4.5$ and $\leq 5.5$ |
| F | $>5.5$ |
| Source Trandertation Reser 1997 |  |

The BLOS and PLOS Models were applied to 23 major roadway segments along the Route 33 corridor of Hamilton and Washington townships. Roadway data such as road and shoulder widths, number of lanes, posted speed limits and pavement ratings were obtained from field observations and NJDOT's Straight Line Diagrams. The AADT was obtained from NJDOT traffic data and recent DVRPC traffic counts.

## Bicycle Level of Service

## Field Observations

Field views were conducted to identify existing conditions that would provide the necessary information as inputs to the model.

At the time of observation, the study area contained no bicycle routes. Some roadways had wide shoulders that sometimes contained debris. Some storm grates were of a design that could create potentially hazardous riding conditions. There was an absence of bicycle racks and lockers throughout the corridor. Onstreet parking in the area was negligible and therefore did not factor in the BLOS calculations.

## BLOS Findings

All of the roadway segments measured by the model gave a BLOS rating of $C$ and below (Map 5). The highest rated BLOS roadway segments were on Estates Boulevard from Yardville Road to George Dye Road with a BLOS score of 3.43 (C). Estates Boulevard from George Dye Road to Limewood Drive, Estates Boulevard from Klockner Avenue to Hamilton Square-Whitehorse Road, and Pond Road from Pond Road to Hutchinson, all had a BLOS score of 3.59 (D). The lowest rated road segment was NJ 33 from Yardville US 130 with a rating of 5.01 (E).
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## Proposed Improvements

Several factors can improve the BLOS rating for roads and increase overall bicycle safety and compatibility conditions.

- Streets with wider shoulders can be repainted to create bicycle lanes (at least four feet in width in each direction) and still allow room for a shoulder or buffer between the road and sidewalk. Where appropriate, right-of-way for a bicycle lane can also be carved from the buffer between the sidewalk and the curb.
- In some cases, general-purpose travel lanes can be narrowed to 11 or 12 feet to accommodate the added bicycle lanes. The narrowed lanes will reduce whicle speeds, which can increase safety and raise awareness for a bicycle safety and raise awareness for a bicycle rider's presence. On certain segments
of NJ 33, a reduction in lane width and of NJ 33 , a reduction in lane width and
buffer width could provide the required space for a bicycle lane.

- Secure and convenient bicycle parking facilities can be built to better accommodate those who use bicycles for commuting or recreational purposes. Bicycle racks are freestanding structures that provide a secure location for bicycles. A single bike rack can generally provide storage for several bicycles. These areas should be well lighted and in full view from the surrounding area.
- Back-in parking reduces accidents from cars backing out into through traffic. Where head-in parking now exists along potential bicycle routes, back-in parking should be considered.


## Proposed Bicycle Routes

According to the NJ Statewide Bicycle and Pedestrian Master Plan, an extensive and integrated bicycling and walking infrastructure is essential in providing nonmotorized connections between residential areas and schools, parks, businesses, downtown and transit stations. One way of encouraging bicycle use is to provide an interconnected network of clearly designated bicycle routes. These routes can provide a viable alternative to the use of the automobile for local travel. The following proposed on-street routes have been identified for the study area (Map 5).

Nottingham Way - Sections of Nottingham Way are recommended for bicycle lane development. The selected segment begins at the Five Corners intersection, which acts as a transportation hub with three NJ TRANSIT bus routes (603, 606 and 609). The route continues eastwards until it terminates at St. Gregory the Great Elementary School near NJ 33. Nottingham Way has a lower traffic volume ranging from 7,000 to approximately 10,000 ADT in contrast to volumes ranging from 9,000 to 20,000 ADT on NJ 33. The Nottingham Way segment has a pavement width of 19 feet in each direction. Five feet can be allocated from each shoulder for a bicycle lane, leaving 14 feet for a traffic lane and a shoulder or buffer. This would link three regional bus routes through this east to west artery connecting Hamilton Township to Washington Township. Nottingham Way could then act as the spine of a planned network of bicycle routes through the area. The parallel NJ 33 is not recommended as a bicycle route because the road serves higher volumes of traffic and offers minimal amounts of space to support safe bicycle riding.

CR 533 - This is the main north to south route through Hamilton Township. CR 533 is 18 feet in width per direction with a single lane from the Five Corners area, traveling north. The route from Five Corners traveling south is 24 feet wide with two lanes per direction. Both of these road segments have adequate space to accommodate a four-foot bicycle lane in each direction. The lanes would begin at Kuser Road near the public library, police station and municipal complex and travel north to Flock Road. Traffic volume on CR 533 ranges from 10,000 to 16,000 AADT. The proposed bicycle route would connect Klockner Avenue with Nottingham Way as part of a comprehensive bicycle network.

Klockner Avenue - is a major east to west route though Hamilton Township and into Washington Township. Klockner Avenue alternates between three and four continuous lanes but remains a constant 25 feet per direction, including a large shoulder that varies in width. Due to the lower level of traffic volume found on this road (between 2,000 and 8,000 AADT), lanes can be re-striped to allow for four feet per direction for bicycle lanes. The bicycle lanes could begin at or near CR 533 and run parallel to Veterans Park and terminate at Yardville-Hamilton Square Road at the Hamilton East-Steinert High School. This route would provide access to Veterans Park from the nearby residential areas. This route also would encourage students to travel by bicycle from homes in the neighborhood to the nearby Hamilton East-Steinert High School. Klockner Avenue from George Dye Road to Yardville Road gives residents access to Hamilton East-Steinert School in a similar pattern. Four feet can be allocated from each direction to accommodate bicycle travel from this residential area to Hamilton East-Steinert School and Yardville-Hamilton Square Road.

Hamilton Square-White Horse Road - This road parallels CR 533 and YardvilleHamilton Square Road while linking residential neighborhoods with Nottingham Way and Route 33. Hamilton Square-White Horse Road is between 22 and 24 feet wide including a nine-foot shoulder to accommodate one lane of traffic per
direction. There is sufficient room to carve four feet from the shoulder and travel lane to accommodate a bicycle lane in each direction along this road. The AADT for the segment between Kuser Road and Nottingham Way ranges from 1,600 to 5,000 . The bicycle lanes could begin from Kuser Road and travel north until the road terminates at the intersection with Nottingham Way. This would provide bicycle access to Veterans Park, Robert Wood Johnson University Hospital and connect with the bicycle network at Klockner Avenue and Nottingham Way.

Yardville-Hamilton Square Road - This road intersects with Nottingham Way and Klockner Avenue. It has two continuous lanes with each lane measuring an average of 25 feet per direction in width. Yardville-Hamilton Square Road would be the final piece of the bicycle network for Hamilton Township. The route could begin from Briarwood Drive next to a residential development and travel north along Veterans Park, Hamilton East-Steinert High School, and Emily C. Reynolds Middle School and terminate at the intersection with the proposed bicycle route at Nottingham Way. The daily traffic for this segment of Yardville Road is approximately 8,000.

## Pedestrian Level of Service

The Pedestrian Level of Service (PLOS) is a measure that quantifies pedestrian perception of safety and comfort.

## Field Observations

The majority of the sidewalks studied are four feet wide; however, in some places they are as much as seven feet wide. Similarly, buffer widths range from two to 10 feet, and shoulder widths are up to 12 feet in width. Often, sidewalks are poorly maintained, overgrown with vegetation, and noncontinuous (see right). In some areas, neither sidewalks nor wide shoulders exist to facilitate pedestrian traffic. Sidewalks in front of stores and shopping centers on NJ 33 are


Incomplete sidewalk often noncontiguous and deficient. From field observation, are a large number of auto body shops and car dealerships along the NJ 33 corridor. Sidewalks of these establishments are often deficient and are sometimes used as an extension of the parking lot. In residential areas, sidewalks exist on only one side of the street, or alternate between sides. Throughout the study area there are many driveways and room for on-street parking.

## General Problem



The study area is inconsistent in the amenities provided for pedestrian traffic. Sidewalks along NJ 33, where available, are narrow and poorly maintained. Retail owners provide varying degrees of pedestrian accessibility (see left), and oftentimes parking lots and driveways must be crossed to reach stores. The corridor lacks the aesthetics and streetscaping necessary to entice pedestrian traffic. The NJ 33 corridor often has the characteristics of a highway commercial area rather than a residential, retail mixed-use area. Although the area consists of several housing developments, there is a lack of connectivity between residential areas, retail areas, and schools. Some of the more problematic intersections include NJ 33 and George Dye Road, NJ 33 and Yardville Road, and NJ 33 and Hamilton Avenue.

## PLOS Findings

Throughout the corridor, levels-of-service ranged in rank from "A" to "D," with "A" being the best score and "F" being the worst (Table 4). The portions of Estates Boulevard from Klockner Avenue to Hamilton Square-Whitehorse Road and from Yardville Road to Limewood Drive received a score of 1.39 (A) (Map 6). Several road segments received B rankings, including Mercer Avenue north of Nottingham Way, Washington Boulevard north of Route 33, George Dye Road south of Route 33, Klockner Avenue from Mercerville-Whitehorse Road to Hamilton Square-Whitehorse Road, and on Hamilton Square-Whitehorse Road south of Klockner Avenue. Those receiving C-level rankings included Nottingham Way, Route 33 from 295 to Yardville Road, Quaker Bridge Road north of Nottingham Way, Hamilton Square-Whitehorse between Klockner Avenue and Nottingham Way, Yardville Road south of Route 33, Klockner Avenue west of Mercerville-Whitehorse Road, and Mercerville-Whitehorse Road south of Klockner Avenue. Segments receiving a D ranking were MercervilleWhitehorse between Klockner Avenue and Nottingham Way, Route 33 east of Yardville Road, Klockner Avenue east of Hamilton Square-Whitehorse Road, and Yardville Road south of Klockner Avenue.
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## Proposed Improvements

- Require retail owners to provide and maintain sidewalks in front of their stores. The Federal Highway Administration (FHWA) and the Institute o of $\qquad$ Transportation Institute Engineers (ITE) recommend
sidewalks of at least five feet in recommend sidewalks of at least five feet in
width - although they should be wider near schools, transit stops, and downtown areas.
- Sidewalks should exist on both
 continuously, and be accessible to those in wheelchairs. If the sidewalk ends and continues on the other side of the street, a crosswalk should be provided for safe access.
- Along with sidewalks, buffers of four to six feet in width are necessary between the sidewalk and road shoulder. Bike lanes or areas of parked cars act as buffer zones as well.
- Widen existing sidewalks, buffers, and shoulders to provide adequate space for pedestrians to pass one space or while ensuring a sense of another while ensuring a sense of distance from the dangers of vehicle traffic. This will also
constrain the roadway to slow traffic speeds.
- Plant trees along buffers and integrate street furniture (such as


Sidewalk should be of adequate width benches) into the more traveled retail areas in order to draw pedestrians and introduce a sense of community among the various distinct developments.

- Integrate raised medians and gateways that will lend to the community feel.
- Adequate street lighting not only creates a sense of security among shoppers, but also adds to the aesthetics of an area. Fixtures should be designed to illuminate both roadways and sidewalks, and should provide a consistent level of lighting. Mercury vapor, incandescent, or less expensive high-pressure sodium lighting is preferable at the pedestrian level.
- Introduce pedestrian signals with features like electronic countdowns and scramble periods. Both the countdown, which shows the walker how much time he has left to cross, and the scramble period, which allows a separate phase in which vehicles are stopped and pedestrians can travel freely through the intersection, provide pedestrians with safer crossing alternatives on busier roads.
- Retract stop bars from busy intersections by 30 feet, thus ensuring clear crosswalks that are farther from the waiting vehicle traffic.
- Pedestrian-friendly crosswalks are necessary, especially in areas where people are most likely to cross illegally. An example would be a raised crosswalk, which makes a pedestrian more visible to a vehicle while also acting as a speed bump. Pavement markings and bright signs can be used to alert motorists to pedestrians in the roadway.
- Curb extensions would improve sidewalk safety in school zones by physically distancing children from moving traffic in the street while making students more visible to the drivers.
- Bike lanes should be considered in school areas to promote bicycle travel and to distance cars from pedestrians.
- Better signage is important especially in school areas as well as areas with large senior populations.
- There should be a continuous curb along NJ 33. This will provide a
 measure of safety by separating motor vehicles from pedestrians.


## Area-wide Bicycle and Pedestrian Improvements

- Enact zoning that allows mixed-use neighborhood centers that are within biking distance of residential areas. Commercial and office development should be permitted to exist closer to residential areas. They should be designed to accommodate bicycling and walking to and within the site.
- Lessen the dependency on motor vehicles by creating linkages between neighborhoods and public services with public transit.
- Provide safe conditions for bicycling and walking through education to motorists, bicyclists and pedestrians.
- Adopt and implement the appropriate recommendations for action in the NJ Bicycle and Pedestrian Master Plan.
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### 4.0 TRAVEL FORECAST

Regional travel simulation models are used to forecast future travel patterns. These travel forecasts utilize population and employment data, land use and transportation network characteristics to simulate trip-making patterns throughout the region.

### 4.1 Introduction

This study presents current (2000-2004) traffic counts and 2025 traffic forecasts for a no-build and four build alternatives for the NJ 33 corridor. The build alternatives include one or more concepts developed by the New Jersey Department of Transportation's consultant (Glatting Jackson Kercher Anglin Lopez Rinehart, Inc.) to reduce congestion on NJ 33 and increase mobility in the NJ 33 study corridor. DVRPC believed the concepts were promising because they satisfied two conditions that were going to be essential for any successful NJ 33 congestion reduction strategy: 1) They were relatively low-cost to implement, and 2) They did not require widening NJ 33. DVRPC therefore agreed to use its travel demand model to test the performance of the concepts.

The focus of the concepts is improvement of the local road network adjacent to the primary facility, NJ 33, to provide alternate routes for travel. Most of the concepts describe connector roads that tie together isolated sections of the local road network or relief roads that operate parallel to NJ 33.

Build Alternative 1 considers five concepts, including two connector roads and two relief roads. The two connector roads connect the existing sections of Estates Boulevard and Flock Road, respectively. One of the relief roads is located east of the I-295 interchange, and the other is located at the Nottingham Neighborhood, between Shady Lane and Paxson Avenue. The fifth concept is a northbound I-295 ramp from westbound NJ 33.

Build Alternative 2 retains all the concepts from Build Alternative 1, except the Flock Road Connector. To these, it adds two connector roads that connect the existing sections of Paxson Avenue and Cypress Lane, respectively. The Kuser Road Connector to the NJ 33 Bypass is also included.

Build Alternative 3 is an alternative design of the NJ 33 Bypass. The intersection of NJ 33 and Nottingham Way west of Washington Boulevard is removed; instead, NJ 33 follows a new alignment to the bypass. A spur from Washington Boulevard to Nottingham Way is also added.

Build Alternative 4 is a connector from Estates Boulevard to the NJ 33 Bypass. The Estates Boulevard Connector from Build Alternatives 1 and 2 is also included.

This traffic study was necessary to determine the potential of the concepts under traffic conditions that reflect projected growth in NJ 33 traffic volumes. In addition, traffic projections were made for selected arterial and local roadway links throughout the study area to estimate the impact of the proposed local road network improvements. This analysis was conducted by DVRPC as part of a cooperative agreement with the New Jersey Department of Transportation and its consultants.

The DVRPC travel demand model was used to estimate future traffic volumes for NJ 33 and for impacted streets and highways in the corridor. An enhanced assignment technique focused on a detailed study area was then used to produce corridor-level highway forecasts. This focused simulation process allows the use of DVRPC regional simulation models and increases the accuracy and detail of the travel forecasts within the detailed study area. At the same time, all existing and proposed highways and transit lines throughout the region, and their impact on both regional and interregional travel patterns, become an integral part of the simulation process.

The focused simulation process involved adding missing local streets to the network. Simulation zones inside the study area were subdivided so that traffic from existing and proposed land use developments could be loaded directly onto the network. The model's highway network within the study area was reviewed and modified as needed to reflect the detailed nature of the traffic improvements to be tested.

Section 4.2 of this chapter documents the existing physical characteristics of NJ 33 as well as parallel and intersecting roadways in the study corridor. Included are brief descriptions of existing land use and the physical characteristics of the study area roadways. Current daily traffic volumes throughout the study area are also presented in this section.

Section 4.3 of this chapter presents and explains the travel forecasting methodology, with a brief discussion of the focused traffic simulation model used to develop traffic projections. The regional demographic and employment forecasts and corridor-specific future development proposals, which form the basis for the traffic forecast, are also presented.

Section 4.4 of this chapter presents, in detail, the improvement alternatives that are part of this study as well as an analysis of the travel forecasts. These forecasts represent projected 2025 daily traffic volumes for the corridor and the surrounding network under each of the improvement alternatives. The analysis presents an explanation of how traffic patterns and flows change between the build alternatives and the no-build.

### 4.2. NJ 33 Corridor Traffic Study

The study area includes portions of Hamilton and Washington townships. Land uses in Washington are beginning to intensify and increase in density as a result of residential and commercial development. Hamilton is largely built out, but continues to experience steady in-fill development. NJ 33 provides the main access route from/to US 130 and I-195 for traffic destined for locations in Hamilton and the west side of Washington. It is also an important access route for l-295. One purpose of this study is to determine the potential of the concepts developed by NJDOT's consultant to provide relief to NJ 33, which is becoming increasingly congested. The concepts include construction of relief roads and connector roads to complete the fragmented local road network. If the local road network is built up, traffic may divert from NJ 33 to these alternate routes and mobility in the NJ 33 study corridor may improve.

## A. Current Traffic Demand

In order to determine the current traffic demand, DVRPC used counts provided by Urban Engineers. They conducted a traffic counting program within the study corridor in 2003-2004. Daily traffic volumes were collected at 11 locations. Additional counts were provided by Parsons Brinckerhoff, who had conducted a traffic counting program within the study corridor in 2000-2001 for the Route 33 Realignment Traffic Study. All traffic counts were seasonally adjusted to represent average annual daily traffic (ADT) conditions.

Average daily volumes on NJ 33 reach a peak of 29,500 on the four-lane section east of I-295, at the intersection with Hamilton Avenue. Traffic volume on NJ 33 between the two Nottingham Way intersections ranges between 19,000 and 21,000. East of Washington Boulevard, ADT volume drops to 18,000. Nottingham Way, which acts as a relief road for NJ 33, carries traffic volumes of 9,990 west of Yardville-Hamilton Square Road, and 11,500 east of it. US 130 carries 26,300 north of NJ 33 and 29,100 south of NJ 33. I-195 carries 50,100 between the Yardville/Hamilton Square and Bordentown/New Brunswick (US 130) interchanges. Average daily volume on I-295 is 63,300 north of NJ 33. Under the current configuration, Washington Boulevard carries moderate traffic volumes of 6,300 AADT.

### 4.3. Travel Forecasting Procedures

Regional travel simulation models are used to forecast future travel patterns. They utilize a system of traffic zones that follow census tract and block group boundaries and rely on demographic and employment data, land use, and transportation network characteristics to simulate trip-making patterns throughout the region. NJ 33 serves local, regional, and long-distance travelers.

For the NJ 33 Corridor Traffic Study, a focused simulation process is employed. A focused simulation process allows the use of DVRPC's regional simulation models, but includes a more detailed representation of the study area. Local streets are not included in the regional network, but are of interest in this study. They are added to the highway network. Traffic zones inside the study area are subdivided so that traffic from existing and proposed land-use developments may be loaded more precisely on the network.

The focusing process increases the accuracy of the travel forecasts within the detailed study area. At the same time, all existing and proposed highways and public transportation facilities throughout the region, and their impact on both regional and interregional travel patterns, become an integral part of the simulation process.

## A. Socioeconomic Projections

DVRPC's long-range population and employment forecasts are revised periodically to reflect changing market trends, development patterns, local and national economic conditions, and available data. The completed forecasts reflect all reasonably known current information and the best professional judgment of predicted future conditions. The revised forecasts - adopted by the DVRPC Board on February 22, 2005 - reflect an update to municipal forecasts that were last completed in February 2002.

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

## 1. Population Forecasting

Population forecasting at the regional level involves review and analysis of six major components: births, deaths, domestic in-migration, domestic out-migration, international immigration, and changes in group quarters populations (e.g. dormitories, military barracks, prisons, and nursing homes). DVRPC uses both the cohort survival concept to age individuals from one age group to the next, and a modified Markov transition probability model based on the most recent US Census and the US Census' recent Population Estimates program to determine the flow of individuals between the Delaware Valley and the outside world. For movement within the region, Census and IRS migration data coupled with Population Estimates data are used to determine migration rates between
counties. DVRPC relies on county planning offices to provide information on any known, expected, or forecasted changes in group quarters populations. These major population components are then aggregated and the resulting population forecasts are reviewed by member counties for final adjustments based on local knowledge.

## 2. Employment Forecasting

Employment is influenced by local, national, and global political and socioeconomic factors. The Bureau of Economic Analysis provides the most complete and consistent time series data on county employment by sector, and serves as DVRPC's primary data source for employment forecasting. Employment sectors include mining, agriculture, construction, manufacturing, transportation, wholesale, retail, finance/insurance, service, government, and military. Other supplemental sources of data include the US Census, Dun \& Bradstreet, Bureau of Labor Statistics' unemployment-insurance-covered employment (ES 202), Occupational Privilege Tax data, and other public and private sector forecasts. As in the population forecasts, county-level total employment is used as a control total for sector distribution and municipal level forecasts. Forecasts are then reviewed by member counties for final adjustments based on local knowledge.

## 3. NJ 33 Corridor Traffic Study Area Socioeconomic Forecasts

As part of the NJ 33 Corridor traffic study, DVRPC staff reviewed its most recent current population and employment estimates, as well as its 2025 long-range population and employment forecasts. The consultants contacted the planning and zoning departments in Hamilton and Washington townships and collected the development proposals on file as well as those being contemplated. The magnitude of population and/or employment growth associated with each proposal was reviewed by DVRPC staff and compared to the expected growth in the Board-adopted forecast for each municipality in the study area. Based on this review, DVRPC developed revised 2025 municipal-level population and employment forecasts for use as inputs to the traffic simulation models. Table 4 summarizes the population and employment forecasts used for the NJ 33 Corridor Traffic Study.

Table 4. Population and Employment in the NJ 33 Corridor Traffic Study Area

| Municipality | Population |  |  | Employment |  |  | $\begin{gathered} \text { 2000-2025 } \\ \text { Absolute } \end{gathered}$ | Change Percent |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{array}{r} 2000 \\ \text { Census } \end{array}$ | Forecasted | $\begin{array}{r} 2000-2025 \\ \text { Absolute } \end{array}$ | Change Percent | $\begin{array}{r} 2000 \\ \text { Census } \end{array}$ | $2025$ <br> Forecasted |  |  |
| Hamilton Township Washington Township | $\begin{aligned} & 87,109 \\ & 10,275 \end{aligned}$ | $\begin{aligned} & 96,456 \\ & 15,080 \end{aligned}$ | $\begin{aligned} & 9,347 \\ & 4,805 \end{aligned}$ | $\begin{aligned} & 10.7 \% \\ & 46.8 \% \end{aligned}$ | $\begin{array}{r} 33,104 \\ 3,604 \end{array}$ | $\begin{array}{r} 37,099 \\ 5,974 \end{array}$ | $\begin{aligned} & 3,995 \\ & 2,370 \end{aligned}$ | $\begin{aligned} & 12.1 \% \\ & 65.8 \% \end{aligned}$ |
| Subtotal Study Area | 97,384 | 111,536 | 14,152 | 14.5\% | 36,708 | 43,073 | 6,365 | 17.3\% |
| Remainder Mercer County | 253,368 | 280,411 | 27,043 | 10.7\% | 184,207 | 209,993 | 25,786 | 14.0\% |
| Mercer County Total | 350,752 | 391,947 | 41,195 | 11.7\% | 220,915 | 253,066 | 32,151 | 14.6\% |

Source: DVRPC, 2006
In 2000, there were approximately 97,384 residents and 36,708 jobs within the NJ 33 Corridor study area. Hamilton Township is the largest municipality by population in the county. It is the second largest job center in the county, after Trenton. Growth in both population and employment, at rates slightly higher than in the county as a whole, is forecast for this area. By 2025, the study area is expected to add more than 14,000 new residents and over 6,000 additional jobs, increases of 15 and 17 percent, respectively. A disproportionate amount of the growth will occur in Washington Township, with Hamilton Township growing slowly, but remaining relatively stable into the future.

## B. DVRPC's Travel Simulation Models

DVRPC's travel models follow the traditional steps of trip generation, trip distribution, modal split, and traffic assignment. However, an iterative feedback loop is employed from traffic assignment to the trip distribution step. The feedback loop ensures that the congestion levels used by the models when determining trip origins and destinations are equivalent to those that result from the traffic assignment step. Additionally, the iterative model structure allows trip making patterns to change in response to changes in traffic patterns, congestion levels, and improvements to the transportation system. The DVRPC travel simulation process uses the Evans Algorithm to iterate the model. Evans re-executes the trip distribution and modal split models based on updated highway speeds after each iteration of highway assignment and assigns a weight $(\lambda)$ to each iteration. This weight is then used to prepare a convex combination of the link volumes and trip tables for the current iteration and a running weighted average of the previous iterations. This algorithm converges rapidly to the equilibrium solution on highway travel speeds and congestion levels. About seven iterations are required for the process to converge to the equilibrium state for NJ 33 travel patterns. After equilibrium is achieved, the weighted average transit trip tables are assigned to the transit networks to produce link and route passenger volumes.

## 1. Separate Peak, Midday, and Evening Models

The DVRPC travel simulation models are disaggregated into separate peak, midday, and evening time periods. This disaggregation begins in trip generation where factors are used to separate daily trips into time-period specific travel. The enhanced process then utilizes completely separate model chains for peak, midday, and evening travel simulation runs. Time-of-day-sensitive inputs to the models, such as highway capacities and transit service levels, are disaggregated to be reflective of time-period-specific conditions. Capacity factors are used to allocate daily highway capacity to each time period. Separate transit networks were required to represent the difference in transit service.

The enhanced model is disaggregated into separate model chains for the peak (combined AM and PM), midday (the period between the AM and PM peaks), and evening (the remainder of the day) periods for the trip distribution, modal split, and travel assignment phases of the process. The peak period is defined as 7:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m. Peak period and midday travel are based on a series of factors that determine the percentage of daily trips that occur during those periods. Evening travel is then defined as the residual, after peak and midday travel are removed from daily travel.

External-local productions at the nine-county cordon stations are disaggregated into peak, midday, and evening components using percentages derived from the temporal distribution of traffic counts taken at each cordon station.

## 2. The Model Chain

The first step in the process involves generating the number of trips that are produced by, and destined for, each traffic zone and cordon station throughout the nine-county region. Origin-destination patterns are then established and trips are proportioned between highway and transit modes. Finally, the most appropriate route for each trip is determined, and traffic volumes are assigned to individual facilities. Figure 1 displays a flowchart of the travel simulation modeling process.

Figure 1: Evans Implementation Using DVRPC's Regional Simulation Model


Source: DVRPC Technical Memorandum \#2, March 2002

## Trip Generation

Both internal trips (those made within the DVRPC region) and external trips (those that cross the boundary of the region) must be considered in the simulation of regional travel.

For the simulation of current and future travel demand, internal trip generation is based on zonal forecasts of population and employment, whereas external trips are extrapolated from cordon line traffic counts and other sources. The latter also include trips that pass through the Delaware Valley region. Estimates of internal trip productions and attractions by zone are established on the basis of trip rates applied to the zonal estimates of demographic and employment data. This part of the DVRPC model is not iterated on highway travel speed. Rather, estimates of daily trip-making by traffic zone are calculated and then disaggregated into peak, midday, and evening time periods.

## Evans Iterations

The iterative portion of the Evans forecasting process involves updating the highway-network-restrained link travel speeds, rebuilding the minimum time paths through the network, and skimming the interzonal travel time for the minimum paths. Then the trip distribution, modal split, and highway assignment models are executed in sequence for each pass through the model chain. After convergence is reached, the transit trip tables for each iteration are weighted together and the weighted average table is assigned to the transit network. The highway trip tables are loaded onto the network during each Evans iteration. For each time period, seven iterations of the Evans process are performed to ensure that convergence on travel times is reached.

## Trip Distribution

Trip distribution is the process whereby the zonal trip ends, established in the trip generation analysis, are linked together to form origin-destination patterns in trip table format. Peak, midday, and evening trip ends are distributed separately. For each Evans iteration, a series of seven gravity-type distribution models are applied at the zonal level. These models follow trip purpose and vehicle type stratifications established in trip generation.

## Modal Split

The modal split model is also run separately for the peak, midday, and evening time periods. The modal split model calculates the fraction of each person-trip interchange in the trip table that should be allocated to transit, and then assigns the residual to the highway side. The choice between highway and transit usage is made on the basis of comparative cost, travel time, and frequency of service, with other aspects of modal choice being used to modify this basic relationship.

In general, the better the transit service, the higher the fraction assigned to transit, although trip purpose and auto ownership also affect the allocation. The model subdivides highway trips into auto drivers and passengers. Auto driver trips are added to the truck, taxi, and external vehicle trips in preparation for assignment to the highway network.

## Highway Assignment

For highway trips, the final step in the focused simulation process is the assignment of current or future vehicle trips to the highway network representative of the appropriate scenario. For peak, midday, and evening travel, the assignment model produces the future traffic volumes for individual highway links that are required for the evaluation of the alternatives. The regional nature of the highway network and trip table underlying the focused assignment process allow the diversion of travel into and through the study area to various points of entry and exit in response to the improvements made in the transportation system.

For each Evans iteration, highway trips are assigned to the network representative of a given alternative by determining the best (minimum time) route through the highway network for each zonal interchange and then allocating the interzonal highway travel to the highway facilities along that route. This assignment model is "capacity restrained" in that congestion levels are considered when determining the best route. The Evans equilibrium assignment method is used to implement the capacity constraint. When the assignment and associated trip table reach equilibrium, no path faster than the one actually assigned can be found through the network, given the capacity-restrained travel times on each link.

## Transit Assignment

After equilibrium is achieved, the weighted average transit trip tables (using the $\lambda s$ calculated from the overall Evans process as weights) are assigned to the transit network to produce link and route passenger volumes. The transit person trips produced by the modal split model are "linked" in that they do not include any transfers that occur either between transit trips or between auto approaches and transit lines. The transit assignment procedure accomplishes two major tasks. First, the transit trips are "unlinked" to include transfers, and second, the unlinked transit trips are associated with specific transit facilities to produce link, line, and station volumes. These tasks are accomplished simultaneously within the transit assignment model, which assigns the transit trip matrix to minimum impedance paths built through the transit network. There is no capacityrestraining procedure in the transit assignment model.

## Post-equilibrium Highway Assignment

DVRPC has developed a post-equilibrium highway assignment process for use in selected link analysis, intersection turning movement analysis, and micro-level testing of limited scale intersection and roadway link improvements. The process uses a previously converged Evans highway assignment. After micro-level intersection and link improvements to the highway network have been incorporated, the previously converged Evans highway assignment is restarted for an additional 15 iterations of equilibrium assignment. Trip surcharges to individual traffic zones may also be incorporated. The Evans restart is executed separately for the peak, midday, and evening time periods.

The post-equilibrium assignment method has two advantages compared with the standard Evans process:

1. It has more stable convergence characteristics, providing for more realistic micro level analysis of traffic flows and turning movements, and, therefore, more precise calculation of level-of-service indicators (if input to a program such as SYNCHRO).
2. It greatly reduces the staff and computer resources needed to test alternative roadway configurations.

The post-equilibrium assignment method was appropriate for the Route 33 alternatives analysis because of the limited scope of the highway improvement alternatives and the micro-level nature of the analysis of the outputs for each alternative.

## C. Improvement Alternatives

Separate future year model runs are preformed for each alternative to be tested. For this study, NJDOT and its consultants requested that DVRPC prepare traffic forecasts for a no-build and four build alternatives. The No-Build Alternative provides a useful future-year reference against which any impacts associated with the build alternatives may be compared and quantified. The descriptions of the alternatives and the associated traffic forecasts are presented and analyzed for the No-Build Alternative in Section 4.4 A and for the four build alternatives in Section 4.4 B .

### 4.4 Projected Traffic Volumes

Projected daily traffic volumes for selected highway facilities within the corridor are presented and analyzed in this section. The forecasts presented are for the year 2025 .

## A. 2025 No-Build Alternative Traffic Forecasts

Current traffic counts and forecasted 2025 traffic volumes under the No-Build Alternative (both AADT) are provided in Map 7. Current counts are shown in black under the road and 2025 no-build volumes are shown in red above it. Table 5 lists these data along with comparisons between current and 2025 conditions.

Continued growth in land-use developments in upper Mercer County results in significantly higher traffic volumes on some north-south facilities in the study corridor compared to the present day. In contrast, the growth in traffic on NJ 33, an east-west facility, is modest. By 2025 under the No-Build Alternative, traffic volumes along NJ 33 increase by approximately 6 percent throughout the corridor, with much larger increases on the four-lane section between Hamilton Avenue and Nottingham Way, where traffic volume increases by 3,200 vehicles per day (vpd); and also between George Dye Road and Washington Boulevard, where it increases by 2,900 vpd. East of Washington Boulevard, volumes diminish because traffic is diverted to the NJ 33 Bypass. Current traffic volume east of Washington Boulevard is 18,000 vpd, but future traffic volume under the No-Build scenario is $14,600 \mathrm{vpd}$, a drop of 19 percent.

The projected traffic volume increases are much higher on US 130 and Washington Boulevard. The absolute increase on US 130 south of Main Street is $7,700 \mathrm{vpd}$; north of Main Street, it is 6,000 vpd. Projected future traffic volumes on these two sections of US 130 are 36,800 vpd and 34,300 vpd, respectively. The absolute increase on Washington Boulevard is $5,000 \mathrm{vpd}$, from $6,300 \mathrm{vpd}$ to $11,300 \mathrm{vpd}$. This represents a 79 percent increase. The north-south traffic on minor arterials and residential streets grows as well. The projected traffic volume on Paxson Avenue is $7,300 \mathrm{vpd}$, an absolute increase of $1,600 \mathrm{vpd}$, or 28 percent. The projected traffic volume on George Dye Road is 7,400 vpd, an absolute increase of $1,000 \mathrm{vpd}$, or 16 percent.


Table 5. Current Counts and 2025 No-Build Alternative Average Daily Traffic Volumes

| Highway Facility | Location | Current Count | $\begin{gathered} 2025 \\ \text { No-Build Alt } \\ \text { Forecast } \\ \hline \end{gathered}$ | 2000-2025 Absolute | Growth Percent |
| :---: | :---: | :---: | :---: | :---: | :---: |
| East - West Routes |  |  |  |  |  |
| NJ 33 | Park Ln to Sculpors Way | 11,234 | 11,828 | 594 | 5.3\% |
| NJ 33 | Williamson Ave to Donald Dr | 28,828 | 29,072 | 244 | 0.8\% |
| NJ 33 | Klockner Rd to l-295 sb ramp | 19,544 | 20,219 | 675 | 3.5\% |
| NJ 33 | $1-295 \mathrm{nb}$ ramp to Hamilton Ave | 14,496 | 16,883 | 2,387 | 16.5\% |
| NJ 33 | Concord Ave to Hillurst Ave | 29,496 | 32,684 | 3,188 | 10.8\% |
| NJ 33 | Deerwood Dr to Paxson Rd | 20,832 | 22,264 | ${ }^{1,432}$ | ${ }^{6.9 \%}$ |
| NJ 33 | Paxson Ave to Whitehorse-H Sq Rd | 19,750 | ${ }^{21,983}$ | 2,233 | 113\% |
| $\stackrel{\text { NJ }}{\text { NJ }} 33$ | George Dye Rd to Limewood Dr | 19,101 | ${ }^{21,933}$ | 2,832 | 14.8\% |
|  | Wash Blva to Robbinsville-Ed Rd | $\frac{18.016}{18297}$ | 14.610 | $\cdots$ | -18.9\% |
|  | NJ 33 Subtotal | 181,297 | 191,475 | 10,178 | 5.6\% |
| Nottingham Way | Daniels Ave to Jonathon Dr | 9,945 | ${ }^{9,853}$ | -92 | -0.9\% |
| Nottingham Way | Crest Ave to George Dye Rd | 11,526 | 13,200 | 1,674 |  |
| Estates Boulevard | George Dye Rd to Great Oak Rd | 1,901 | 1,915 | 14 | 0.8\% |
| Cypress Lane | Mandl St to Ribsam St | 2,704 | 3,265 | 561 | 20.7\% |
| Sharon Road | US 130 to Woodside Rd | 3,733 | 5,168 | 1,435 | 38.4\% |
|  | East - West Routes Subtotal | 211,106 | 224,876 | 13,770 | 6.5\% |
| North - South Routes |  |  |  |  |  |
| US 130 | Robbinsville-All Rd to NJ 33 | 26,319 | 34,250 | 7,931 | 30.1\% |
| US 130 | N. Gold Dr to Robb-Allen Rd | 29,133 | 36,826 | 7,693 | 26.4\% |
| Whitehorse-Mercerville Road | Municipal Rd to Cypress Ln | 17,701 | 18,288 | 587 | 3.3\% |
| Paxson Road | Nottingham Way to Zieglers Ln | 5,686 | 7,321 | 1,635 | 28.8\% |
| George Dye Road | Sandourg Dr to NJ 33 | 6,377 | 7,425 | 1,048 | 16.4\% |
| Washington Boulevard | NJ 33 to Yorkshire Way | 6,293 | 11,312 | 5,019 | 79.8\% |
| Flock Road | Mercerville-Ed Rd to Paxson Ave | 14,777 | 18,295 | 3,518 | 23.8\% |
| Robbinsville-Edinburg Road | Hutchinson Rd to Pond Rd | 5,860 | 6,962 | 1,102 | 18.8\% |
| Robbinsville-Allentown Road | US 130 to Robbinsville Bypass | 11,194 | 19,951 | 8,757 | 78.2\% |
| Kuser Road | Michael McCoristin Rd to US 130 | 2,057 | 4,566 | 2,509 | 122.0\% |
|  | North - South Route Subtotal | 125,397 | 165,195 | 39,798 | 31.7\% |
|  | Total | 336,503 | 390,071 | 53,568 | 15.9\% |

Source: DVRPC, 2006

## B. 2025 Build Alternative Traffic Forecasts

There are four build alternatives that were analyzed for the NJ 33 Corridor Traffic Study. None of the concepts in the build alternatives involve widening of NJ 33, but instead include construction of relief roads and connector roads to complete the fragmented local road network. Likewise, existing NJ 33 intersections are not improved under the build alternatives, although some intersections are eliminated. The concepts are shown in Map 8.

Build Alternative 1 considers the following five concepts:

- Relief Road at l-295 Interchange

The intersection of Nottingham Way and Hamilton Avenue at the I-295 interchange is removed, as is the intersection of Nottingham Way and NJ 33, east of Winslow Avenue. The existing four-lane segment is reconfigured with two travel lanes and one center-turn lane. A two-lane relief road connecting Hamilton Avenue and NJ 33 is added. Access between the reconfigured NJ 33 and the relief road is provided at several points. Finally, State Street Extension is realigned to meet Clifford Avenue at Nottingham Way.

## - Relief Road at Nottingham Neighborhood

A two-lane relief road is constructed between Shady Lane and Paxson Avenue. It follows an alignment parallel to NJ 33 , on the south side of NJ 33 , behind the retail properties to which it provides access.

## - Estates Boulevard Connector

A new facility that connects the existing two-lane sections of Estates Boulevard, which currently terminate at Whitehorse-Hamilton Square Road and Yardville-Hamilton Square Road, respectively, is constructed. A second new facility connects Paxson Avenue and Fenimore Road.

## - Flock Road Connector

The existing two-lane sections of Flock Road are connected by a new facility across Miry Run.

## - Northbound I-295 Ramp

A new northbound l-295 on-ramp is constructed on westbound NJ 33 . It is assumed that the existing ramp on State Street Extension is closed.

Build Alternative 2 includes the same concepts as Build Alternative 1, except that the Paxson Avenue Connector is substituted for the Flock Avenue Connector, and two other concepts are added.

## - Paxson Avenue Connector

The existing two-lane sections of Paxson Avenue are connected by a new facility across Miry Run.

## - Kuser Road Connector

Construction of a new facility allows direct access between the NJ 33 Bypass and Kuser Road.

## - Cypress Lane Connector

Following construction of a new alignment, the two-lane sections of Cypress Lane meet at Whitehorse-Mercerville Road.

Build Alternative 3 presents an alternative design of the NJ 33 Bypass. It includes no concepts from Build Alternatives 1 or 2. The intersection of NJ 33 and Nottingham Way west of Washington Boulevard is removed; instead, NJ 33 follows a new alignment south of the existing alignment and makes a direct connection with the NJ 33 Bypass. A new spur off of Washington Boulevard provides a second means of accessing Nottingham Way, west of the existing intersection.

Build Alternative 4 is a new facility between Estates Boulevard and the NJ 33 Bypass. The Estates Boulevard Connector from Build Alternatives 1 and 2 is also included.

## 1. 2025 Traffic Forecasts under Build Alternatives 1, 2, and 4

Map 9 displays the 2025 AADT traffic forecasts under Build Alternatives 1, 2, and 4. The 2025 traffic forecasts under the No-Build Alternative are also presented. Tables 6, 7, and 8 shows the results of the analysis and the absolute and percentage growth in traffic volumes under Build Alternatives 1, 2, and 4 for selected links in the study area from current to 2025 traffic conditions.

Construction of the relief road at the l-295 interchange attracts 7,800 vehicles per day (vpd) to the facility. East of I-295, traffic volume on the reconfigured NJ 33 is reduced by the diversion of traffic to the relief road. Projected 2025 traffic volume on the section of NJ 33 between North Hamilton Avenue and Winslow Avenue is $23,400 \mathrm{vpd}$, compared to $32,700 \mathrm{vpd}$ in the No-Build Alternative.

Construction of the relief road at the Nottingham Neighborhood attracts 3,800 vpd to the facility. As a result of the diversion of traffic to the relief road, projected 2025 traffic volume on NJ 33 between Shady Lane and Paxson Avenue decreases by $2,300 \mathrm{vpd}$, from 22,300 to 20,000 . It decreases on the same section of Nottingham Way by 1,200 vpd, from 9,900 to 8,700.

The Estates Boulevard Connector shifts north-south traffic off of NJ 33. The new facility connecting Paxson Avenue and Fenimore Road attracts $7,600 \mathrm{vpd}$, and



Table 6. 2025 No-Build Alternative and Build Alternative 1

| Average Daily Traffic Volumes |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Highway Facility | Location | 2025 NoBuild Alt Forecast | 2025 <br> Build Alt 1 Forecast | 2000-2025 | $\begin{aligned} & \text { Growth } \\ & \text { Percent } \end{aligned}$ |
| East - West Routes |  |  |  |  |  |
| N 33 | Park Ln to Sculitors Way | 11,828 | 11,735 | -93 | -0.8\% |
| N ${ }^{33}$ | Williamson Ave to Donald Dr | 29,072 | 28,749 | -323 | -1.1\% |
| N ${ }_{3} 3$ | Klockner Rd to l-295 sb ramp | 20,219 | 20,700 | 481 | 2.4\% |
| N ${ }^{3}$ | $1-295 \mathrm{nb}$ ramp to Hamilton Ave | 16,883 | 16,770 | -113 | -0.7\% |
| NJ 33 | Concord Ave to Hillhurst Ave | 32,684 | 23,408 | 9,276 | -28.4\% |
| NJ 33 | Deerwood Dr to Paxson Rd | 22,264 | 20,017 | -248 | -1.1\% |
| NJ 33 | Paxson Ave to Whitehorse-H Sq Rd | 21,983 | 16,291 | -5,692 | -25.9\% |
| NJ 33 | George Dye Rd to Limewood Dr | 21,933 | 21,875 | -58 | -0.3\% |
| NJ 33 | Wash Blvd to Robbinsville-Ed Rd | -14.610 | $\begin{array}{r} 14,493 \\ \hline 17007 \end{array}$ | $\frac{-117}{-17208}$ | $-\frac{0.8 \%}{-9 . \%}$ |
|  | NJ 33 Subtotal | 191,475 | 174,037 | -17,438 | $-9.1 \%$ |
| Nottingham Way | Daniels Ave to Jonathon Dr | 9,853 | 8,664 | -1,188 | -12.1\% |
| Nottingham Way | Crest Ave to George Dye Rd | 13,200 | 12,284 | -879 | -6.7\% |
| Estates Boulevard | George Dye Rd to Great Oak Rd | 1,915 | 2,080 | 165 | 8.6\% |
| Cypress Lane | Mandl St to Ribsam St | 3,265 | 3,469 | 204 | 6.2\% |
| Sharon Road | US 130 to Woodside Rd | 5,168 | 5,196 | 29 | 0.6\% |
|  | East - West Routes Subtotal | 224,876 | 205,730 | -19,145 | -8.5\% |
| North - South Routes |  |  |  |  |  |
| US 130 | Robbinsvill-All Ra to NJ 33 | 34,250 | 33,987 | -262 | -0.8\% |
| US 130 | N. Gold Dr to Robb-Alen Rd | 36,826 | 36,604 | -222 | -0.6\% |
| Whitehorse-Mercerville Road | Municipal Rd to Cypress Ln | 18,288 | 18,438 | 150 | 0.8\% |
| Paxson Road | Nottingham Way to Zieglers Ln | 7,321 | 7,558 | 237 | 3.2\% |
| George Dye Road | Sandburg Dr to NJ 33 | 7,425 | 6,828 | -597 | -8.0\% |
| Washington Boulevard | NJ 33 to Yorkshire Way | 11,312 | 11,032 | -280 | $-2.5 \%$ |
| Flock Road | Mercerville-Ed Rd to Paxson Ave | 18,295 | 18,951 | 656 | 3.6\% |
| Robbinsville-Edinburg Road | Hutchinson Rd to Pond Rd | 6,962 | 7,147 | 185 | 2.7\% |
| Robbinsville-Allentown Road | US 130 to Robbinsville Bypass | 19,951 | 19,959 | 8 | 0.0\% |
| Kuser Road | Michael McCoristin Rd to US 130 | 4,566 | 4,755 | 189 | 4.1\% |
|  | North - South Route Subtotal | 165,195 | 165,260 | 65 | 0.0\% |
| Concepts Totar |  | 390,070 | 370,991 | -19,080 | -4.9\% |
|  |  |  |  |  |  |
| Relief Road at 1-295 Interchange |  |  | 7,740 |  |  |
| Relief Road at Nottingham Neighborhood <br> Estates Boulevard Connector (Paxson Road / Fenimore Road) |  |  | ${ }^{3,800}$ |  |  |
|  |  |  | 7,611 3,422 |  |  |
| Estates Boulevard Connector (Estates Boulevard) |  |  | ¢, |  |  |
| Flock Road ConnectorNorthbound 1-295 Ramp |  |  | 6,921 |  |  |
| Paxson Avenue Connector |  |  |  |  |  |
| Kuser Road ConnectorCypress Lane Connector |  |  |  |  |  |
| Cypress Lane ConnectiorNJ33 Byass - Alerative DesignEstates boulvard / NJ 33 Bypass Connector |  |  |  |  |  |
|  |  |  |  |  |  |
| Additional Locations ${ }^{\text {' }}$ |  |  |  |  |  |
| NJ 33 Bypass |  | 18,707 | 18,857 | 150 | 0.8\% |
| Estates Bouluvard | Whatley Rd to Whitehorse-H Sq Rd | 5,420 | ${ }_{6,851}$ | 1,431 | 26.4\% |
|  | Whitehorse-H Sq Rd to Secretario Way | 12,153 | 10,714 | -1,439 | -11.8\% |
| Klockner Road <br> Yardville-Hamilton Sq Road | Klockner Rd to Estates Blvd | 11,744 | 12,942 | 1,198 | 10.2\% |
| Yardville-Hamilton Sq Road Mercerville-Edinburg Road | Nottingham Way to Mount Dr | 15,000 | 15,100 | 100 | 0.7\% |

Source: DVRPC, 2006

Table 7. 2025 No-Build Alternative and Build Alternative 2 Average Daily Traffic Volumes

| Highway Facility | Location | 2025 No- <br> Build Alt <br> Forecast | 2025 <br> Build Alt 2 <br> Forecast | 2000-2025 <br> Absolute | Growth Percent |
| :---: | :---: | :---: | :---: | :---: | :---: |
| East - West Routes |  |  |  |  |  |
| NJ 33 | Park Ln to Sculptors Way | 11,828 | 11,753 | -75 | -0.6\% |
| NJ 33 | Williamson Ave to Donald Dr | 29,072 | 28,753 | -319 | -1.1\% |
| NJ 33 | Klockner Rd to l-295 sb ramp | 20,219 | 20,489 | 270 | 1.3\% |
| NJ 33 | I-295 nb ramp to Hamilton Ave | 16,883 | 16,630 | -253 | -1.5\% |
| NJ 33 | Concord Ave to Hillhurst Ave | 32,684 | 23,215 | -9,469 | -29.0\% |
| NJ 33 | Deerwood Dr to Paxson Rd | 22,264 | 20,217 | -47 | -0.2\% |
| NJ 33 | Paxson Ave to Whitehorse-H Sq Rd | 21,983 | 16,806 | -5,177 | -23.6\% |
| NJ 33 | George Dye Rd to Limewood Dr | 21,933 | 21,148 | -785 | -3.6\% |
| NJ 33 | Wash Blvd to Robbinsville-Ed Rd | 14,610 | 14,208 | -401 | -2.7\% |
|  | NJ 33 Subtotal | 191,475 | 173,218 | -18,257 | -9.5\% |
| Nottingham Way | Daniels Ave to Jonathon Dr | 9,853 | 9,226 | -626 | -6.4\% |
| Nottingham Way | Crest Ave to George Dye Rd | 13,200 | 13,921 | -2,242 | -17.0\% |
| Estates Boulevard | George Dye Rd to Great Oak Rd | 1,915 | 1,944 | 28 | 1.5\% |
| Cypress Lane | Mandl St to Ribsam St | 3,265 | 3,699 | 434 | 13.3\% |
| Sharon Road | US 130 to Woodside Rd | 5,168 | 5,296 | 128 | 2.5\% |
|  | East - West Routes Subtotal | 224,876 | 207,303 | -17,572 | -7.8\% |
| North - South Routes |  |  |  |  |  |
| US 130 | Robbinsville-All Rd to NJ 33 | 34,250 | 35,772 | 1,523 | 4.4\% |
| US 130 | N. Gold Dr to Robb-Allen Rd | 36,826 | 36,746 | -80 | -0.2\% |
| Whitehorse-Mercerville Road | Municipal Rd to Cypress Ln | 18,288 | 18,609 | 321 | 1.8\% |
| Paxson Road | Nottingham Way to Zieglers Ln | 7,321 | 7,841 | 520 | 7.1\% |
| George Dye Road | Sandburg Dr to NJ 33 | 7,425 | 6,045 | -1,380 | -18.6\% |
| Washington Boulevard | NJ 33 to Yorkshire Way | 11,312 | 10,787 | -525 | -4.6\% |
| Flock Road | Mercerville-Ed Rd to Paxson Ave | 18,295 | 8,453 | -9,842 | -53.8\% |
| Robbinsville-Edinburg Road | Hutchinson Rd to Pond Rd | 6,962 | 7,039 | 77 | 1.1\% |
| Robbinsville-Allentown Road | US 130 to Robbinsville Bypass | 19,951 | 19,502 | -449 | -2.3\% |
| Kuser Road | Michael McCorristin Rd to US 130 | 4,566 | 5,921 | 1,355 | 29.7\% |
|  | North - South Route Subtotal | 165,195 | 156,715 | -8,480 | -5.1\% |
|  | Total | 390,070 | 364,018 | -26,053 | -6.7\% |
| Concepts |  |  |  |  |  |
| Relief Road at I-295 Interchange |  |  | 7,740 |  |  |
| Relief Road at Nottingham Neighborhood |  |  | 3,800 |  |  |
| Estates Boulevard Connector (Paxson Road / Fenimore Road) |  |  | 7,914 |  |  |
| Estates Boulevard Connector (Estates Boulevard) |  |  | 3,507 |  |  |
| Flock Road Connector |  |  |  |  |  |
| Northbound I-295 Ramp |  |  | 6,730 |  |  |
| Paxson Avenue Connector |  |  | 11,573 |  |  |
| Kuser Road Connector |  |  | 4,700 |  |  |
| Cypress Lane Connector |  |  | 3,699 |  |  |
| NJ 33 Bypass - Alternative Design |  |  |  |  |  |
| Additional Locations ${ }^{1}$ |  |  |  |  |  |
| NJ 33 Bypass |  | 18,707 | 18,188 | -519 | -2.8\% |
| Estates Boulevard | Whatley Rd to Whitehorse-H Sq Rd | 5,420 | 6,992 | 1,572 | 29.0\% |
| Klockner Road | Whitehorse-H Sq Rd to Secretario Way | 12,153 | 10,988 | -1,165 | -9.6\% |
| Yardville-Hamilton Sq Road | Klockner Rd to Estates Blvd | 11,744 | 13,011 | 1,267 | 10.8\% |
| Mercerville-Edinburg Road | Nottingham Way to Mount Dr | 15,000 | 14,800 | -200 | -1.3\% |

${ }^{1}$ These values are uncalibrated.
Source: DVRPC, 2006

Table 8. 2025 No-Build Alternative and Build Alternative 4 Average Daily Traffic Volumes

| Highway Facility | Location | 2025 No- <br> Build Alt <br> Forecast | $2025$ <br> Build Alt 4 <br> Forecast | $\begin{aligned} & \text { 2000-2025 } \\ & \text { Absolute } \end{aligned}$ | Growth Percent |
| :---: | :---: | :---: | :---: | :---: | :---: |
| East - West Routes |  |  |  |  |  |
| NJ 33 | Park Ln to Sculptors Way | 11,828 | 11,946 | 118 | 1.0\% |
| NJ 33 | Williamson Ave to Donald Dr | 29,072 | 29,226 | 154 | 0.5\% |
| NJ 33 | Klockner Rd to I-295 sb ramp | 20,219 | 19,972 | -247 | -1.2\% |
| NJ 33 | I-295 nb ramp to Hamilton Ave | 16,883 | 17,172 | 289 | 1.7\% |
| NJ 33 | Concord Ave to Hillhurst Ave | 32,684 | 32,463 | -221 | -0.7\% |
| NJ 33 | Deerwood Dr to Paxson Rd | 22,264 | 22,382 | 117 | 0.5\% |
| NJ 33 | Paxson Ave to Whitehorse-H Sq Rd | 21,983 | 17,632 | -4,350 | -19.8\% |
| NJ 33 | George Dye Rd to Limewood Dr | 21,933 | 20,828 | -1,105 | -5.0\% |
| NJ 33 | Wash Blvd to Robbinsville-Ed Rd | 14,610 | 14,390 | -220 | -1.5\% |
|  | NJ 33 Subtotal | 191,475 | 186,011 | -5464 | -2.9\% |
| Nottingham Way | Daniels Ave to Jonathon Dr | 9,853 | 10,021 | 168 | 1.7\% |
| Nottingham Way | Crest Ave to George Dye Rd | 13,200 | 11,179 | -1,984 | -15.0\% |
| Estates Boulevard | George Dye Rd to Great Oak Rd | 1,915 | 7,904 | 5,989 | 312.7\% |
| Cypress Lane | Mandl St to Ribsam St | 3,265 | 3,355 | 90 | 2.8\% |
| Sharon Road | US 130 to Woodside Rd | 5,168 | 5,211 | 44 | 0.8\% |
|  | East - West Routes Subtotal | 224,876 | 223,681 | -1,195 | -0.5\% |
| North - South Routes |  |  |  |  |  |
| US 130 | Robbinsville-All Rd to NJ 33 | 34,250 | 34,440 | 190 | 0.6\% |
| US 130 | N. Gold Dr to Robb-Allen Rd | 36,826 | 35,937 | -889 | -2.4\% |
| Whitehorse-Mercerville Road | Municipal Rd to Cypress Ln | 18,288 | 18,091 | -197 | -1.1\% |
| Paxson Road | Nottingham Way to Zieglers Ln | 7,321 | 7,803 | 482 | 6.6\% |
| George Dye Road | Sandburg Dr to NJ 33 | 7,425 | 5,351 | -2,074 | -27.9\% |
| Washington Boulevard | NJ 33 to Yorkshire Way | 11,312 | 10,587 | -725 | -6.4\% |
| Flock Road | Mercerville-Ed Rd to Paxson Ave | 18,295 | 18,458 | 163 | 0.9\% |
| Robbinsville-Edinburg Road | Hutchinson Rd to Pond Rd | 6,962 | 7,044 | 82 | 1.2\% |
| Robbinsville-Allentown Road | US 130 to Robbinsville Bypass | 19,951 | 19,700 | -252 | -1.3\% |
| Kuser Road | Michael McCorristin Rd to US 130 | 4,566 | 4,224 | -342 | -7.5\% |
|  | North - South Route Subtotal | 165,195 | 161,634 | -3,561 | -2.2\% |
|  | Total | 390,070 | 385,315 | -4,755 | -1.2\% |
| Concepts |  |  |  |  |  |
| Relief Road at I-295 Interchang Relief Road at Nottingham Nei | Relief Road at Nottingham Neighborhood |  |  |  |  |
| Estates Boulevard Connector (Paxson Road / Fenimore Road) |  |  | 8,078 |  |  |
| Estates Boulevard Connector (Estates Boulevard) |  |  | 5,444 |  |  |
| Flock Road Connector |  |  |  |  |  |
| Northbound I-295 Ramp |  |  |  |  |  |
| Paxson Avenue Connector |  |  |  |  |  |
| Kuser Road Connector |  |  |  |  |  |
| Cypress Lane Connector |  |  |  |  |  |
| NJ 33 Bypass - Alternative Design |  |  |  |  |  |
| Estates Boulevard / NJ 33 Bypass Connector |  |  | 9,334 |  |  |
| Additional Locations ${ }^{1}$ |  |  |  |  |  |
| NJ 33 Bypass |  | 18,707 | 17,013 | -1,694 | -9.1\% |
| Estates Boulevard | Whatley Rd to Whitehorse-H Sq Rd | 5,420 | 7,773 | 2,353 | 43.4\% |
| Klockner Road | Whitehorse-H Sq Rd to Secretario Way | 12,153 | 10,627 | -1,526 | -12.6\% |
| Yardville-Hamilton Sq Road | Klockner Rd to Estates Blvd | 11,744 | 12,763 | 1,019 | 8.7\% |
| Mercerville-Edinburg Road | Nottingham Way to Mount Dr | 15,000 | 14,600 | -400 | -2.7\% |

${ }^{1}$ These values are uncalibrated.
Source: DVRPC, 2006
the new facility connecting the existing sections of Estates Boulevard attracts $3,400 \mathrm{vpd}$. Much of the connector traffic travels between NJ 33 and points south using Paxson Avenue. As a result of diverted traffic, projected 2025 traffic volume on NJ 33 between Paxson Avenue and Yardville-Hamilton Square Road is 16,300 , compared to 22,000 under the No-Build Alternative.

Traffic on Estates Boulevard also increases, but the change is not the same everywhere. The largest effect is west of Whitehorse-Hamilton Square Road, where traffic volume is $6,900 \mathrm{vpd}$, compared to $5,400 \mathrm{vpd}$ under the No-Build Alternative. The effect is minimal east of George Dye Road; the projected 2025 traffic volume there is $2,100 \mathrm{vpd}$, only 200 vpd greater than under the No-Build Alternative. The new Estates Boulevard traffic appears to be local in nature. As a result of diverted traffic, the traffic volume on Klockner Road decreases, but only along one section of the road. Between Whitehorse-Hamilton Square Road and Yardville-Hamilton Square Road, projected 2025 traffic volume is 10,700 vpd, compared to 12,200 vpd under the No-Build Alternative.

The Flock Road Connector is projected to attract 6,200 vpd. With the Flock Road Connector in place, traffic volume drops on alternate routes. There is a decrease in 2025 projected traffic volume on both Abbott Road and Paxson Avenue of $2,100 \mathrm{vpd}$, and a decrease on Hughes Road of 2,200 vpd. Furthermore, congestion is reduced on the section of Mercerville-Edinburg Road between Paxson Avenue and Flock Road. The impact of the Paxson Avenue Connector is far more confined, although the connector itself attracts nearly twice as much traffic $(11,600 \mathrm{vpd})$. As a result of the Paxson Road Connector, congestion is reduced on the section of Mercerville-Edinburg Road between Paxson Avenue and Flock Road.

The new northbound I-295 on-ramp on westbound NJ 33 attracts 6,900 vpd. That represents 83 percent of the traffic volume on the State Street Extension northbound on-ramp under the No-Build scenario. The other existing northbound on-ramp, on eastbound NJ 33, shows a small change compared to the No-Build Alternative ( $3,400 \mathrm{vpd}$ versus $3,100 \mathrm{vpd}$ ).

The Kuser Road Connector attracts 4,700 vpd. By providing direct access between the NJ 33 Bypass and Kuser Road, the connector increases the use of Kuser Road. With the connector, projected 2025 traffic volume increases by 1,300 vpd.

Construction of the Cypress Lane Connector has little impact on Cypress Lane traffic. The projected 2025 traffic volume is $3,700 \mathrm{vpd}$, only 400 vpd greater than under the No-Build Alternative.

The Estates Boulevard/NJ 33 Bypass connector, which is implemented with the Estates Boulevard connector from Build Alternatives 1 and 2, attracts 9,300 vpd. It increases the use of Estates Boulevard significantly along its length. The
largest increase on Estates Boulevard is east of George Dye Road, where projected 2025 traffic volume is 7,900 vpd, compared to 1,900 vpd under the NoBuild Alternative. West of Whitehorse-Hamilton Square Road, the effect diminishes; projected 2025 traffic volume is 7,800 vpd, compared to 5,400 vpd under the No-Build Alternative. Because it provides an alternative to the NJ 33 Bypass for some trips, it reduces traffic on the bypass, compared to the No-Build Alternative.

## 2. 2025 Traffic Forecasts under Build Alternative 3

Map 10 displays the 2025 AADT traffic forecasts under Build Alternative 3. The 2025 traffic forecasts under the No-Build Alternative are also presented. Table 9 shows the results of the analysis and percentage growth in traffic volumes under Build Alternative 3 for selected links in the study area from current to 2025 traffic conditions.

The alternative design of the NJ 33 Bypass alters both north-south and east-west traffic near the bypass. With the intersection of NJ 33 and Nottingham Way removed, traffic destined for southbound US 130 uses NJ 33, and traffic destined for northbound US 130 uses Nottingham Way. Projected 2025 traffic volume is lower on NJ 33 by 1,800 vpd, and higher on Nottingham Way by 1,400 vpd, compared to the No-Build Alternative. Construction of the new spur from Washington Boulevard to Nottingham Way increases overall projected 2025 traffic volume on Washington Boulevard. The higher capacity of Washington Boulevard with the spur also results in a modest increase in projected 2025 traffic volume on the bypass ( 700 vpd ).


Table 9. 2025 No-Build Alternative and Build Alternative 3 Average Daily Traffic Volumes

| Highway Facility | Location | 2025 No Build Alt Forecast | $\begin{gathered} 2025 \\ \text { Build Alt 3 } \\ \text { Forecast } \end{gathered}$ | $2000-2025$ GrowthAbsolute Percent |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| East - West Routes |  |  |  |  |  |
| NJ 33 | Park Ln to Sculpors Way | 11,828 | 11,869 | 41 | 0.3\% |
| NJ 33 | Williamson Ave to Donald Dr | 29,072 | 29,034 | -38 | -0.1\% |
| NJ 33 | Klockner Rd to $1-295$ sb ramp | 20,219 | 20,258 | 39 | 0.2\% |
| NJ 33 | $1-295 \mathrm{nb}$ ramp to Hamilton Ave | 16,883 | 16,914 | 31 | 0.2\% |
| NJ 33 | Concord Ave to Hillhurst Ave | 32,684 | 32,905 | 222 | 0.7\% |
| NJ 33 | Deerwood D r to Paxson Rd | 22,264 | 22,141 | -123 | -0.6\% |
| NJ 33 | Paxson Ave to Whitehorse-H Sq Rd | ${ }^{21,983}$ | ${ }^{21,773}$ | -250 | -1.1\% |
| NJ 33 | George Dye Rd to Limewood Dr | 21,933 | 20,218 | -4,716 | -21.5\% |
|  | Wash Blvd to Robbinsville-Ed Rd | 14,610 | 14,096 | $-\frac{514}{-307}$ | -3.5\% |
|  | NJ 33 Subtotal | 191,475 | 189,168 | -2,307 | -1.2\% |
| Nottingham Way | Daniels Ave to Jonathon Dr | 9,853 | 10,036 | 184 | 1.9\% |
| Nottingham Way | Crest Ave to George Dye Rd | 13,200 | 14,608 | 1,445 |  |
| Estates Boulevard | George Dye Rd to Great Oak Rd | 1,915 | 1,802 | -113 | -5.9\% |
| Cypress Lane | Mand St to Ribsam St | 3,265 | 3,248 | -17 | -0.5\% |
| Sharon Road | US 130 to Woodside Rd | 5,168 | 5,203 | 35 | 0.7\% |
|  | East - West Routes Subtotal | 224,876 | 224,065 | -811 | -0.4\% |
| North - South Routes |  |  |  |  |  |
| US 130 | Robbinsville-All Rd to NJ 33 | 34,250 | 33,991 | -259 | -0.8\% |
| US 130 | N. Gold Dr to Robb-Allen Rd | 36,826 | 35,109 | -1,716 | -4.7\% |
| Whitehorse-Mercerville Road | Municipal Rd to Cypress Ln | 18,288 | 18,514 | 226 | 1.2\% |
| Paxson Road | Nottingham Way to Zieglers Ln | 7,321 | 7,237 | -84 | -1.2\% |
| George Dye Road | Sandurg Dr to NJ 33 | 7,425 | 7,763 | 338 | 4.6\% |
| Washington Boulevard | NJ 33 to Yorkshire Way | 11,312 | 9,763 | -1,549 | -13.7\% |
| Flock Road | Mercerville-Ed Rd to Paxson Ave | 18,295 | 18,284 | -11 | -0.1\% |
| Robbinsville-Edinburg Road | Hutchinson Rd to Pond Rd | 6,962 | 7,043 | 81 | 1.2\% |
| Robbinsville-Allentown Road | US 130 to Robbinsville Bypass | 19,951 | 19,415 | -536 | -2.7\% |
| Kuser Road | Michael McCoristin Rd to US 130 | 4,566 | 4,320 | -245 | -5.4\% |
|  | North - South Route Subtotal | 165,195 | 161,440 | -3,755 | -2.3\% |
|  Total 390,070  385,505 $-4,565$ $-1.2 \%$ <br> Concepts       |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Relief Road at Nottingham Neighborhood <br> Estates Boulevard Connector (Paxson Road / Fenimore Road) |  |  |  |  |  |
| Estates Boulevard Connector (Estates Boulevard)Flock Road Connector |  |  |  |  |  |
| Flock Road Connector |  |  |  |  |  |
| Paxson Avenue Connector Kuser Road Connector |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Estates Boulevard / NJ 33 Bypass Connector |  |  |  |  |  |
| Additional Locations ${ }^{1}$ |  |  |  |  |  |
| NJ 33 Bypass |  | 18,707 | 19,409 | 702 | 3.8\% |
| Estates Boulevard | Whatley Rd to Whitehorse-H Sq Rd | 5,420 | 5,613 | 193 | 3.6\% |
| Klockner Road | Whitehorse-H Sq Rd to Secretario Way | 12,153 | 12,174 | 21 | 0.2\% |
| Yardville-Hamilton Sq Road | Klockner Rd to Estates Blvd | 11,744 | 11,692 | -52 | -0.4\% |
| Mercerville-Edinburg Road | Nottingham Way to Mount Dr | 15,000 | 14,900 | -100 | -0.7\% |

Source: DVRPC, 2006

### 4.5 Findings

The DVRPC travel demand model has been used to estimate future traffic volumes for NJ 33 and for impacted streets and highways in the corridor, under the different build alternatives. In this section, the model results are combined with observations from field views to make a determination of the potential of each concept. For each concept, three criteria were applied:

1. Does the concept function as designed?
2. Are the results that it produces desirable?
3. Does it solve a problem of primary importance?

The concepts were ranked based on the criteria, as follows:
High - All three criteria are true
Medium - Criteria 1 and 2 are true
Low - Criteria 1 is true
No Potential - None of the criteria are true
Table 10 shows each concepts arranged by rank with a brief explanation of the ranking for each concept.

Note: Analyzing the performance of NJ 33 and other facilities using standard indicators of congestion such as volume over capacity ( $\mathrm{v} / \mathrm{c}$ ) and level of service, was beyond the scope of this study. As a consequence, there is no data on traffic conditions on specific highway links or at specific intersections, under the different build alternatives. Therefore, the determination of the potential of the concepts has to be considered provisional.

Table 10: Rankings of NJ 33 Study Corridor Concepts

| Rank | Concept | Notes |
| :---: | :---: | :---: |
| 1-High | Relief Road at Nottingham Neighborhood | Reduces congestion on two-lane section of NJ 33 adjacent to large retail area. Provides alternate travel route for local traffic. Opportunity to increase impact by combining with Estates Boulevard Connector. |
|  | Estates Boulevard Connector | Reduces congestion on two-lane section of NJ 33 adjacent to large retail area. Provides alternative travel route for local traffic. Opportunity to increase impact by combining with Relief Road at Nottingham Neighborhood. |
|  | NJ 33 Bypass, Alternative Design | Reduces congestion at intersection of NJ 33 and NJ 33 Bypass and intersection of Washington Boulevard and NJ 33 Bypass. Increases capacity of Washington Boulevard. |
| 2 - Medium | Relief Road at I-295 Interchange | Attracts a significant number of trips and increases mobility. Improves access to small retail area on NJ 33. |
|  | Kuser Road Connector | Reduces congested intersection of NJ 33 Bypass and US 130. |
|  | Flock Road Connector | Reduces congestion on MercervilleEdinburg Road, Paxson Avenue, Abbott Road, and Hughes Drive. |
| 3 - Low | Paxson Avenue Connector | Reduces congestion on MercervilleEdinburg Road between Paxson Avenue and Flock Road. |
|  | Estates Boulevard/NJ 33 Bypass Connector | Highly effective, but produces unacceptable traffic volumes on a residential street. |
|  | Northbound I-295 Ramp | Attracts a significant number of trips, but fewer than the existing ramp on State Street Extension. |
| 4 - No Potential | Cypress Lane | Attracts almost no additional trips to Cypress Lane. |

### 5.0 STRATEGIC IMPROVEMENT PLAN

Development of a strategic implementation plan for the corridor is based upon the land use scenarios, the transportation needs and the economic development strategy, in conformance with the policy goals and objectives of the New Jersey State Plan, DVRPC's Year 2020 Land Use and Transportation Plan, and local municipal plans. The Route 33 Corridor Study can be used as a dynamic longrange tool for the systematic selection of projects to create a significantly improved transportation system within the study area. This document can serve as a punch list for the government agencies with a stake in the implementation of improvements. Municipal governments are key players in this process. Even though a highway may be maintained by the state or county, it is the welfare of the local residents that is affected the most. Safety and mobility benefits are felt more by those who use the highway frequently. Therefore, the local municipality should assure that the improvements are advanced expediently by being involved in the process no matter which agency has a lead role.

This section of the report presents those locations within the corridor that have been identified using technical analysis and suggestions from the local citizens as currently experiencing transportation problems, as critical to the mobility of people or goods throughout the corridor; or as projected to have significant impacts to the transportation infrastructure. Short-term and long-term potential improvement scenarios, which represent a range of alternatives, are presented. These scenarios have been discussed with the study stakeholders in relation to their ability to solve existing or potential problems or deficiencies and are considered worthy of future action. Transportation improvements at these locations could have important implications for the economic vitality of the local areas as well as the mobility of the corridor as a whole.

At the onset of this effort, multiagency meetings and field views were conducted to review potential locations for inclusion in the study. Participants included representatives from each of the local municipalities, staff from the Mercer County Planning and Mercer County Engineer's Office, New Jersey Department of Transportation and its consultants, and the Delaware Valley Regional Planning Commission. During these preliminary field views, a base set of locations was identified for further review. DVRPC staff conducted subsequent follow-up field views to better define the existing conditions, observe the operating conditions, refine the problem identification, and begin to formulate potential improvement scenarios. The information that follows for each location is a result of that process and recommends actions to be pursued based on cooperative discussions and input from each of the study participants.

## Recommended Improvements

1. An Estates Boulevard Connector that connects the existing two-lane sections of Estates Boulevard, which currently terminate at Whitehorse-

Hamilton Square Road and Yardville-Hamilton Square Road, respectively. A second new facility that connects Paxson Avenue and Fenimore Road is also recommended. These two improvements would reduce congestion on an adjacent section of NJ 33 that provides access to a large retail area. They would also provide an alternate travel route for local traffic. There is an opportunity to increase this impact by combining with the proposed Relief Road at Nottingham Neighborhood.
2. Construction of a Relief Road at the Nottingham Neighborhood (between Shady Lane and Paxon Avenue), which would reduce congestion on a two-lane section of NJ 33 adjacent to a large retail area. It would also provide an alternate travel route for local traffic. There is an opportunity to increase this impact by combining with the proposed Estates Boulevard Connector.
3. The NJ 33 Bypass, Alternative Design, which would reduce congestion at the intersection of NJ 33 and NJ 33 Bypass and the intersection of Washington Boulevard and NJ 33 Bypass. It would also increase the capacity of Washington Boulevard.
4. The proposed Flock Road Connector would reduce congestion on sections of Mercerville-Edinburg Road, Paxson Avenue, Abbott Road, and Hughes Drive.
5. Sidewalks and pedestrian pathways should link common origins and destinations. These should be well lighted and visible from the surrounding community. Plantings and street furniture should be designed so as not to create isolated areas.
6. Building orientation should be designed so that parking areas are located to the rear or side of retail establishments. This would narrow the gap between sidewalks and businesses thereby improving pedestrian access to these businesses. Parking lots located in the front of buildings discourage pedestrian, bicycle and transit access. There should be a limited number of driveways and storefronts should be located directly along the sidewalk, which would encourage pedestrian access. This concept is being applied in the Washington Town Center development in Washington Township.
7. An effort should be made to develop a street pattern in the form of grids. This pattern encourages pedestrian and bicycle traffic by providing more direct access and an alternative to high volume roadways. It also improves auto access by dispersing traffic along many routes and providing multiple routes to each destination. A hierarchical grid pattern allows for the efficient movement of vehicles on main streets.
8. Explore the possibility of providing better bus connections to the Hamilton train station from residential and commercial areas via shuttles.
9. NJ Transit is exploring the possibility of initiating Bus Rapid Transit (BRT) service along the Route 1 corridor. Several feeder routes have been proposed between Hamilton Market Place in Hamilton Township and stations on the proposed BRT system as well as the Northeast Corridor stations of Hamilton and Trenton. These potential transit connections should be encouraged.
10. Explore additional opportunities for commuter shuttles to the train station from high-density residential areas.
11. Land use development policies for the corridor should promote compact walkable communities with bicycle and transit facilities and amenities. Neighborhood retail services should be encouraged in certain areas that are within walking distance of residents.
12. Encourage mixed-use development near interchanges of major arterials. This is most relevant in the area of NJ 33 east of the l-295 exit ramps and Winslow Avenue.
13. Amend the municipal master plan and zoning ordinance to permit Suburban Center Zoning that directs growth into identified centers. These centers are usually mixed use with retail, office, residential and recreational uses in close proximity to each other.
14. Encourage the reduction and or consolidation of driveways along NJ 33 . The policy of the NJ State Development and Redevelopment Plan is that local access to state highways should be controlled so as to "ensure that regional needs, adequate system capacity and public health and safety are protected. Encourage parallel service roads, shared driveways and parking and pedestrian access between neighborhood uses."
15. Sections of NJ 33 have experienced excessive speeding. To mitigate this problem, narrower streets in commercial areas would encourage slower speeds and provide greater visibility for adjacent shops. On-street parking would create a buffer between pedestrians and vehicular traffic, thereby improving safety and encouraging pedestrian activity. In residential areas - such as sections of Nottingham Way where speeding is an issue -traffic-calming techniques such as speed tables, narrow lanes, wide sidewalks, and central medians with landscaping should be considered.
16. Optimization of traffic signals along NJ 33 by using a system of signal coordination and signal timing.
17. Encourage investment in existing business districts, compatible with the architectural character of the community; and discourage scattered commercial and industrial developments, such as strip developments.
18. Improve the overall character of the area by: encouraging the consolidation of auto-related businesses within the corridor, improving and enforcing signage regulations, and exploring the feasibility of starting a business improvement district (BID) along NJ 33 that would improve the character, appearance and economic vitality of the area.

## APPENDIX A

## Location 1

NJ 33 at Hamilton Ave (3.44-3.54)

## Accident Summary

Year 2002-2004

Total: 40
State Total: 202,325

| Collision Type | Count | \% of Total | State Count | State \% of Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 7 | 17.50\% | 91,031 | 44.99\% |
| Same Direction - Sideswipe | 6 | 15.00\% | 33,722 | 16.67\% |
| Angle | 20 | 50.00\% | 25,691 | 12.70\% |
| Head On | 0 | 0.00\% | 7,514 | 3.71\% |
| Left Turn | 4 | 10.00\% | 3,099 | 1.53\% |
| Parked Vehicle | 0 | 0.00\% | 827 | 0.41\% |
| Unknown or Other | 1 | 2.50\% | 1,523 | 0.75\% |
| Overturn | 0 | 0.00\% | 22,560 | 11.15\% |
| Pedestrian | 0 | 0.00\% | 5,440 | 2.69\% |
| Fixed Object | 2 | 5.00\% | 3,077 | 1.52\% |
| Animal | 0 | 0.00\% | 992 | 0.49\% |
| Pedacycle | 0 | 0.00\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | State Count | State \% of Total |
| Fatal | 0 | 0.00\% | 580 | 0.29\% |
| Injury | 14 | 35.00\% | 62,188 | 30.74\% |
| Property Damage Only | 26 | 65.00\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | State Count | State \% of Total |
| Day | 30 | 75.00\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 10 | 25.00\% | 59,637 | 29.48\% |
| Unknown | 0 | 0.00\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | State Count | State \% of Total |
| At Intersection | 31 | 77.50\% | 84,821 | 41.92\% |
| Not at Intersection | 9 | 22.50\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | State Count | State \% of Total |
| Dry | 33 | 82.50\% | 147,395 | 72.85\% |
| Wet Surface | 5 | 12.50\% | 46,969 | 23.21\% |
| Snow or Ice | 2 | 5.00\% | 7,097 | 3.51\% |
| Unknown or Other | 0 | 0.00\% | 864 | 0.43\% |

Location 2
NJ 33 at Vincent Ave (3.70-3.80)
Accident Summary
Year 2002-2004

Total: 43
State Total: 202,325

| Collision Type | Count | \% of Total | State Count | State \% of Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 15 | 34.88\% | 91,031 | 44.99\% |
| Same Direction - Sideswipe | 4 | 9.30\% | 33,722 | 16.67\% |
| Angle | 12 | 27.91\% | 25,691 | 12.70\% |
| Head On | 0 | 0.00\% | 7,514 | 3.71\% |
| Left Turn | 8 | 18.60\% | 3,099 | 1.53\% |
| Parked Vehicle | 1 | 2.33\% | 827 | 0.41\% |
| Unknown or Other | 1 | 2.33\% | 1,523 | 0.75\% |
| Overturn | 0 | 0.00\% | 22,560 | 11.15\% |
| Pedestrian | 0 | 0.00\% | 5,440 | 2.69\% |
| Fixed Object | 2 | 4.65\% | 3,077 | 1.52\% |
| Animal | 0 | 0.00\% | 992 | 0.49\% |
| Pedacycle | 0 | 0.00\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | State Count | State \% of Total |
| Fatal | 0 | 0.00\% | 580 | 0.29\% |
| Injury | 8 | 18.60\% | 62,188 | 30.74\% |
| Property Damage Only | 35 | 81.40\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | State Count | State \% of Total |
| Day | 31 | 72.09\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 12 | 27.91\% | 59,637 | 29.48\% |
| Unknown | 0 | 0.00\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | State Count | State \% of Total |
| At Intersection | 34 | 79.07\% | 84,821 | 41.92\% |
| Not at Intersection | 9 | 20.93\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | State Count | State \% of Total |
| Dry | 37 | 86.05\% | 147,395 | 72.85\% |
| Wet Surface | 5 | 11.63\% | 46,969 | 23.21\% |
| Snow or Ice | 1 | 2.33\% | 7,097 | 3.51\% |
| Unknown or Other | 0 | 0.00\% | 864 | 0.43\% |

Location 3
NJ 33 at Shady Lane (4.20-4.30)
Accident Summary
Year 2002-2004

Total: 43
State Total: 202,325

| Collision Type | Count | \% of Total | State Count | State \% of Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 23 | 53.49\% | 91,031 | 44.99\% |
| Same Direction - Sideswipe | 2 | 4.65\% | 33,722 | 16.67\% |
| Angle | 13 | 30.23\% | 25,691 | 12.70\% |
| Head On | 0 | 0.00\% | 7,514 | 3.71\% |
| Left Turn | 3 | 6.98\% | 3,099 | 1.53\% |
| Parked Vehicle | 0 | 0.00\% | 827 | 0.41\% |
| Unknown or Other | 0 | 0.00\% | 1,523 | 0.75\% |
| Overturn | 0 | 0.00\% | 22,560 | 11.15\% |
| Pedestrian | 0 | 0.00\% | 5,440 | 2.69\% |
| Fixed Object | 1 | 2.33\% | 3,077 | 1.52\% |
| Animal | 0 | 0.00\% | 992 | 0.49\% |
| Pedacycle | 1 | 2.33\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | State Count | State \% of Total |
| Fatal | 0 | 0.00\% | 580 | 0.29\% |
| Injury | 14 | 32.56\% | 62,188 | 30.74\% |
| Property Damage Only | 29 | 67.44\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | State Count | State \% of Total |
| Day | 28 | 65.12\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 15 | 34.88\% | 59,637 | 29.48\% |
| Unknown | 0 | 0.00\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | State Count | State \% of Total |
| At Intersection | 18 | 41.86\% | 84,821 | 41.92\% |
| Not at Intersection | 25 | 58.14\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | State Count | State \% of Total |
| Dry | 34 | 79.07\% | 147,395 | 72.85\% |
| Wet Surface | 9 | 20.93\% | 46,969 | 23.21\% |
| Snow or Ice | 0 | 0.00\% | 7,097 | 3.51\% |
| Unknown or Other | 0 | 0.00\% | 864 | 0.43\% |

Location 4
NJ 33 at White Horse-Hamilton Square (5.32-5.42)
Accident Summary
Year 2002-2004

Total: 43
State Total: 202,325

| Collision Type | Count | \% of Total | State Count | State \% of Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 26 | 60.47\% | 91,031 | 44.99\% |
| Same Direction - Sideswipe | 3 | 6.98\% | 33,722 | 16.67\% |
| Angle | 11 | 25.58\% | 25,691 | 12.70\% |
| Head On | 0 | 0.00\% | 7,514 | 3.71\% |
| Left Turn | 3 | 6.98\% | 3,099 | 1.53\% |
| Parked Vehicle | 0 | 0.00\% | 827 | 0.41\% |
| Unknown or Other | 0 | 0.00\% | 1,523 | 0.75\% |
| Overturn | 0 | 0.00\% | 22,560 | 11.15\% |
| Pedestrian | 0 | 0.00\% | 5,440 | 2.69\% |
| Fixed Object | 0 | 0.00\% | 3,077 | 1.52\% |
| Animal | 0 | 0.00\% | 992 | 0.49\% |
| Pedacycle | 0 | 0.00\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | State Count | State \% of Total |
| Fatal | 0 | 0.00\% | 580 | 0.29\% |
| Injury | 16 | 37.21\% | 62,188 | 30.74\% |
| Property Damage Only | 27 | 62.79\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | State Count | State \% of Total |
| Day | 35 | 81.40\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 8 | 18.60\% | 59,637 | 29.48\% |
| Unknown | 0 | 0.00\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | State Count | State \% of Total |
| At Intersection | 20 | 46.51\% | 84,821 | 41.92\% |
| Not at Intersection | 23 | 53.49\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | State Count | State \% of Total |
| Dry | 36 | 83.72\% | 147,395 | 72.85\% |
| Wet Surface | 7 | 16.28\% | 46,969 | 23.21\% |
| Snow or Ice | 0 | 0.00\% | 7,097 | 3.51\% |
| Unknown or Other | 0 | 0.00\% | 864 | 0.43\% |

## Location 5

NJ 33 at Yardville-Hamilton Square (5.44-5.54)

## Accident Summary

Year 2002-2004

Total: 49
State Total: 202,325

| Collision Type | Count | \% of Total | State Count | State \% of Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 16 | 32.65\% | 91,031 | 44.99\% |
| Same Direction - Sideswipe | 5 | 10.20\% | 33,722 | 16.67\% |
| Angle | 14 | 28.57\% | 25,691 | 12.70\% |
| Head On | 1 | 2.04\% | 7,514 | 3.71\% |
| Left Turn | 6 | 12.24\% | 3,099 | 1.53\% |
| Parked Vehicle | 0 | 0.00\% | 827 | 0.41\% |
| Unknown or Other | 2 | 4.08\% | 1,523 | 0.75\% |
| Overturn | 0 | 0.00\% | 22,560 | 11.15\% |
| Pedestrian | 1 | 2.04\% | 5,440 | 2.69\% |
| Fixed Object | 4 | 8.16\% | 3,077 | 1.52\% |
| Animal | 0 | 0.00\% | 992 | 0.49\% |
| Pedacycle | 0 | 0.00\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | State Count | State \% of Total |
| Fatal | 0 | 0.00\% | 580 | 0.29\% |
| Injury | 15 | 30.61\% | 62,188 | 30.74\% |
| Property Damage Only | 34 | 69.39\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | State Count | State \% of Total |
| Day | 42 | 85.71\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 7 | 14.29\% | 59,637 | 29.48\% |
| Unknown | 0 | 0.00\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | State Count | State \% of Total |
| At Intersection | 24 | 48.98\% | 84,821 | 41.92\% |
| Not at Intersection | 25 | 51.02\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | State Count | State \% of Total |
| Dry | 36 | 73.47\% | 147,395 | 72.85\% |
| Wet Surface | 12 | 24.49\% | 46,969 | 23.21\% |
| Snow or Ice | 1 | 2.04\% | 7,097 | 3.51\% |
| Unknown or Other | 0 | 0.00\% | 864 | 0.43\% |

## Location 6

NJ 33 at George Dye Road (6.30-6.40)
Accident Summary
Year 2002-2004

Total: 54
State Total: 202,325

| Collision Type | Count | \% of Total | State Count | State \% of Total |
| :---: | :---: | :---: | :---: | :---: |
| Same Direction - Rear End | 21 | 38.89\% | 91,031 | 44.99\% |
| Same Direction - Sideswipe | 1 | 1.85\% | 33,722 | 16.67\% |
| Angle | 25 | 46.30\% | 25,691 | 12.70\% |
| Head On | 0 | 0.00\% | 7,514 | 3.71\% |
| Left Turn | 5 | 9.26\% | 3,099 | 1.53\% |
| Parked Vehicle | 0 | 0.00\% | 827 | 0.41\% |
| Unknown or Other | 0 | 0.00\% | 1,523 | 0.75\% |
| Overturn | 0 | 0.00\% | 22,560 | 11.15\% |
| Pedestrian | 0 | 0.00\% | 5,440 | 2.69\% |
| Fixed Object | 2 | 3.70\% | 3,077 | 1.52\% |
| Animal | 0 | 0.00\% | 992 | 0.49\% |
| Pedacycle | 0 | 0.00\% | 6,849 | 3.39\% |
| Severity | Count | \% of Total | State Count | State \% of Total |
| Fatal | 0 | 0.00\% | 580 | 0.29\% |
| Injury | 24 | 44.44\% | 62,188 | 30.74\% |
| Property Damage Only | 30 | 55.56\% | 139,557 | 68.98\% |
| Light | Count | \% of Total | State Count | State \% of Total |
| Day | 44 | 81.48\% | 141,902 | 70.14\% |
| Night/Dawn/Dusk | 9 | 16.67\% | 59,637 | 29.48\% |
| Unknown | 1 | 1.85\% | 786 | 0.39\% |
| Intersection | Count | \% of Total | State Count | State \% of Total |
| At Intersection | 23 | 42.59\% | 84,821 | 41.92\% |
| Not at Intersection | 31 | 57.41\% | 117,504 | 58.08\% |
| Railroad Crossing | 0 | 0.00\% | 0 | 0.00\% |
| Surface Condition | Count | \% of Total | State Count | State \% of Total |
| Dry | 44 | 81.48\% | 147,395 | 72.85\% |
| Wet Surface | 10 | 18.52\% | 46,969 | 23.21\% |
| Snow or Ice | 0 | 0.00\% | 7,097 | 3.51\% |
| Unknown or Other | 0 | 0.00\% | 864 | 0.43\% |

## APPENDIX B

Pedestrian Level of Service

| Road Name | From | To | \#Thru Lanes | Lateral Seperation Width of Outside Lane (ft) | Width of Shoulder/Bike Lane (ft) | Vol (ADT) | Speed Limit | Pavement <br> Rating | \%On-Street Parking | \% of Road Segment with Sidewalk | Sidewalk Width (ft) | Buffer Width (ft) | SCORE | GRADE |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Washington Blvd | RT 33 | Hutchinson Rd | 2 | 14 | 6 | 1800 | 35 | 5 | 0 | 100 | 5 | 7 | 1.78 | B |
| Pond Rd | CR 526 | Hutchinson Rd | 2 | 11 | 4 | 1800 | 25 | 4 | 0 | 50 | 4 | 6 | 2.48 | B |
| Nottingham Way | Greenbriar | CR 535 | 2 | 19 | 0 | 7000 | 40 | 4 | 0 | 100 | 4 | 5 | 2.72 | C |
| Mercer St | Nottingham Way | Flock Rd | 2 | 12 | 0 | 5000 | 25 | 4 | 0 | 100 | 5 | 3.5 | 2.29 | B |
| Nottingham Way | CR 535 | RT 533 | 2 | 19 | 0 | 9945 | 40 | 4 | 0 | 100 | 4 | 5 | 3.07 | C |
| Quaker Bridge Rd | Mercerville-Edinburg Rd | New St | 2 | 18 | 0 | 6000 | 35 | 4 | 0 | 50 | 4 | 2 | 3.17 | C |
| Quaker Bridge Rd | New St | Flock Rd | 2 | 12 | 8 | 6000 | 35 | 4 | 20 | 50 | 4 | 2 | 3.02 | C |
| RT 33 | 1-295 | Mercerville-White Horse Rd | 4 | 11 | 3 | 20000 | 35 | 4 | 0 | 100 | 4 | 5 | 3.04 | C |
| RT 33 | Mercerville-White Horse Rd | Yardville-Hamilton | 2 | 16 | 4 | 9000 | 40 | 4 | 0 | 100 | 4 | 5 | 2.93 | C |
| RT 33 | George Dye Rd | Nottingham Way | 2 | 16 | 4 | 14000 | 45 | 5 | 0 | 0 | 0 | 5 | 3.68 | D |
| RT 33 | George Dye Rd | Yardville-Hamilton Rd | 2 | 16 | 4 | 14000 | 45 | 5 | 0 | 0 | 0 | 5 | 3.68 | D |
| Yardville-Hamilton Rd | RT 33 | Klockner Ave | 2 | 15 | 10 | 8000 | 25 | 5 | 50 | 50 | 5 | 8 | 2.6 | C |
| Yardville-Hamilton Rd | Klockner Ave | Briarwood Dr | 2 | 15 | 12 | 8000 | 45 | 5 | 50 | 50 | 7 | 8 | 3.06 | C |
| George Dye | RT 33 | Estates Blvd. | 2 | 21 | 0 | 5000 | 25 | 4 | 60 | 100 | 5 | 2 | 1.86 | B |
| George Dye | Estates | Klockner Ave | 2 | 21 | 0 | 5000 | 25 | 4 | 0 | 100 | 4 | 5 | 2.05 | B |
| Klockner Ave | 1-295 | RT 533 | 2 | 15 | 10 | 3000 | 40 | 4 | 0 | 50 | 4 | 8 | 2.63 | C |
| Klockner Ave | RT 533 | Hamilton Sq. Whitehorse | 4 | 15 | 10 | 6000 | 35 | 4 | 0 | 100 | 4 | 8 | 2.03 | B |
| Klockner Ave | Hamilton Sq. Whitehorse | Yardville-Hamilton | 2 | 15 | 10 | 8000 | 40 | 4 | 0 | 100 | 4 | 8 | 2.7 | C |
| Estates Blvd | Klockner Ave | Hamilton Sq. Whitehorse | 2 | 25 | 0 | 1800 | 25 | 4 | 0 | 100 | 4 | 8 | 1.19 | A |
| Estates Blvd | Yardville-Hamilton Rd | George Dye Rd | 2 | 24 | 0 | 1800 | 25 | 5 | 0 | 100 | 4 | 10 | 1.39 | A |
| Estates Blvd | George Dye Rd | Limewood Dr | 2 | 15 | 9 | 1800 | 25 | 4 | 30 | 100 | 5 | 8 | 1.06 | A |
| Hamilton SqWhitehorse Rd | Nottingham Way | Klockner Ave | 2 | 12 | 9 | 5000 | 40 | 4 | 0 | 50 | 5 | 4 | 2.89 | C |
| Hamilton SqWhitehorse Rd | Kuser Rd | Klockner Ave | 2 | 15 | 9 | 1600 | 40 | 4 | 0 | 100 | 5 | 7 | 1.58 | B |
| RT 533 | Nottingham Way | Klockner Ave | 4 | 12 | 0 | 16000 | 45 | 3 | 0 | 50 | 4 | 7 | 4.02 | D |
| RT 533 | Klockner Ave | Kuser Rd | 4 | 12 | 0 | 10000 | 45 | 3 | 0 | 100 | 4 | 7 | 2.96 | C |
| Source: DVRPC 2006 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| Bicycle Level of Service |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Road Name | From | To | MCD |  | Traffic Vol. Data |  |  |  |  | Width |  | \# of Occupied |  | $\begin{array}{\|c\|} \hline \text { Desig. } \\ \hline \text { OSP } \\ \hline \end{array}$ | Pavement Condition |  | Bike | BLOS |  |
|  |  |  |  | Lanes Th | $\begin{array}{\|c\|} \hline \text { Traffic } \\ \hline \text { Vol. } \\ \hline \end{array}$ | Pk/Dly. Ratio | Dir. <br> Split <br> (D) | $\begin{array}{\|l\|} \hline \text { Trk. } \\ \hline \text { Pct. } \\ \hline \text { (HV) } \\ \hline \end{array}$ | Post. Spd. (SPp) | $\begin{array}{c\|} \hline \text { of } \\ \hline \text { Pavemen } \\ \hline \end{array}$ |  | Parking Spaces |  |  |  |  |  |  |  |
|  |  |  |  |  | (ADT) |  |  |  |  | (Wt) | (WI) | (OSPA) |  | (OSPD) <br> $(\%)$ | $\begin{aligned} & (\mathrm{PCt}) \\ & (1.5) \\ & \hline \end{aligned}$ | $\begin{array}{\|l\|} \hline(\mathrm{PCI}) \\ \hline(1 . .5) \\ \hline \end{array}$ | Lane <br> (Y/N) | Score | Grade(A..F) |
|  |  |  |  | \# | (vpd) | 0.10 | 0.565 | (\%) | mph | (ft) | (ft) | NB/E | SB/WB |  |  |  |  |  |  |
| Washington Blvd | Union St | Rt 33 | Washington | 2 | 1,800 | 0.10 | 0.565 | 2 | 35 | 20.0 | 6.0 | 0 | 0 | 0 | 5.0 | 5.0 | N | 3.79 | D |
| Pond Rd | Pond Rd | Hutchinson | Washington | 2 | 1,800 | 0.10 | 0.565 | 2 | 25 | 15.0 | 4.0 | 0 | 0 | 0 | 4.0 | 4.0 | N | 3.59 | D |
| Notthingham Ave | Greenbriar | Mercer | Hamilton | 2 | 7,000 | 0.10 | 0.565 | 2 | 35 | 19.0 | n/a | 0 | 0 | 0 | 5.0 | n/a | N | 4.49 | D |
| Nothingham Ave | Mercer St | Rt 533 | Hamilton | 2 | 9,945 | 0.10 | 0.565 | 2 | 40 | 19.0 | n/2 | 0 | 0 | 0 | 4.0 | 3.0 | N | 4.92 | E |
| Mercer St | Nottingnham Ave | Flock Rd | Hamilton | 2 | 5,000 | 0.10 | 0.565 | 2 | 25 | 12.0 | n/a | 0 | 0 | 0 | 4.0 | 2.0 | N | 4.12 | D |
| Quaker Bridge Rd | Mercerville-Edinburg Rd | New St | Hamilton | 2 | 6,000 | 0.10 | 0.565 | 2 | 35 | 18.0 | n/a | 0 | 0 | 0 | 4.0 | 4.0 | N | 4.57 | E |
| Quaker Bridge Rd | New St | Flock Rd | Hamilton | 2 | 6,000 | 0.10 | 0.565 | 2 | 40 | 20.0 | 8.0 | 0 | 0 | 20 | 4.0 | n/a | N | 4.66 | E |
| Rt 33 | 1-295 | Rt 533 | Hamilton | 4 | 20,000 | 0.10 | 0.565 | 2 | 40 | 14.0 | 3.0 | 0 | 0 | 0 | 5.0 | n/a | N | 4.77 | E |
| Rt 33 | Rt 533 | Yardville-Hamilton Square Rd | Hamilton | 2 | 9,000 | 0.10 | 0.565 | 2 | 40 | 20.0 | 4.0 | 0 | 0 | 0 | 4.0 | 3.0 | N | 4.87 | E |
| Rt 33 | Yardville Rd | US 130 | Wash/Ham. | 2 | 14,000 | 0.10 | 0.565 | 2 | 45 | 20.0 | 4.0 | 0 | 0 | 0 | 5.0 | 5.0 | N | 5.01 | E |
| Yardville-Hamilton Square Rd | Rt 33 | Klockner Ave | Hamilton | 2 | 8,000 | 0.10 | 0.565 | 2 | 45 | 25.0 | 10.0 | 0 | 0 | 50 | 4.0 | 4.0 | N | 4.88 | E |
| Yardville-Hamilton Square Rd | Klockner Ave | Briarwood Dr | Hamilton | 2 | 8,000 | 0.10 | 0.565 | 2 | 45 | 27.0 | n/a | 0 | 0 | 50 | 4.0 | 4.0 | N | 4.88 | E |
| George Dye Rd | Rt 33 | Carl Sandburg Rd | Hamilton | 2 | 5,000 | 0.10 | 0.565 | 2 | 35 | 21.0 | n/a | 0 | 0 | 60 | 4.0 | 3.0 | N | 4.48 | D |
| George Dye Rd | Estates Blvd | Klocker Ave | Hamilton | 2 | 5,000 | 0.10 | 0.565 | 2 | 25 | 21.0 | n/a | 0 | 0 | 0 | 4.0 | 3.0 | N | 4.12 | D |
| Klocker Ave | George Dye Rd | Yardville Rd | Hamilton | 2 | 2,000 | 0.10 | 0.565 | 2 | 35 | 24.0 | 9.0 | 0 | 0 | 0 | 4.0 | 3.0 | N | 4.00 | D |
| Klocker Ave | Yardville Rd | Hamilton Square-White Horse | Hamilton | 2 | 8,000 | 0.10 | 0.565 | 2 | 40 | 24.0 | 10.0 | 0 | 0 | 0 | 4.0 | 4.0 | N | 4.81 | E |
| Klocker Ave | Hamilton Square-White Horse | Rt 533 | Hamilton | 4 | 6,000 | 0.10 | 0.565 | 2 | 35 | 24.0 | 10.0 | 0 | 0 | 0 | 5.0 | 4.0 | N | 4.06 | D |
| Klocker Ave | Rt 533 | 1-295 | Hamilton | 2 | 3,000 | 0.10 | 0.565 | 2 | 40 | 24.0 | 9.0 | 0 | 0 | 0 | 4.0 | 4.0 | N | 4.31 | D |
| Estates Blvd | Klocker Ave | Hamilton Square-White Horse | Hamilton | 2 | 1,800 | 0.10 | 0.565 | 2 | 25 | 25.0 | n/a | 0 | 0 | 0 | 4.0 | 4.0 | N | 3.59 | D |
| Estates Blvd | Yardville-Hamilton Square Rd | George Dye Rd | Hamilton | 2 | 1,800 | 0.10 | 0.565 | 2 | 25 | 24.0 | n/a | 0 | 0 | 0 | 5.0 | 5.0 | N | 3.43 | C |
| Estates Blva | George Dye Rd | Limewood Dr | Hamilton | 2 | 1,800 | 0.10 | 0.565 | 2 | 25 | 24.0 | 9.0 | 0 | 0 | 30 | 4.0 | 4.0 | N | 3.59 | D |
| Hamilton Square-White Horse | Nothingham Ave | Klocker Ave | Hamilton | 2 | 5,000 | 0.10 | 0.565 | 2 | 40 | 21.0 | 9.0 | 0 | 0 | 0 | 4.0 | n/a | N | 4.57 | E |
| Hamilton Square-White Horse | Kuser Rd | Klocker Ave | Hamilton | 2 | 1,600 | 0.10 | 0.565 | 2 | 40 | 24.0 | 9.0 | 0 | 0 | 0 | 4.0 | n/a | N | 4.00 | D |
| Rt 533 | Rt 33 | Klockner Ave | Hamilton | 4 | 16,000 | 0.10 | 0.565 | 2 | 45 | 24.0 | n/a | 0 | 0 | 0 | 4.0 | n/a | N | 4.88 | E |
| Rt 533 | Klocker Ave | Kuser Rd | Hamilton | 4 | 10,000 | 0.10 | 0.565 | 2 | 45 | 24.0 | n/a | 0 | 0 | 0 | 3.0 | n/a | N | 4.97 | E |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Source: DVRPC 2006 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

APPENDIX C

Weekdays



## To Hamilton Marketplace



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Reduced Fare Program














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White Horse
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Hamilton Square
Hamilton Hospital (Limited)
Weekdays/Saturdays Prince service to/from Princeton Corporate



To Mercerville/Hamilton Marketplace







Customer Services


How to use this schedule






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Publication No.: 06025
Date Published: June 2006
Geographic Area Covered:
The study area includes portions of the Mercer County municipalities of Hamilton Township and Washington Township.

Key Words:
traffic counts, intersection analysis, improvement options, trip generators, sight distance, bicycle/pedestrian, travel forecasting, accidents

ABSTRACT: This study was developed using a consensus-based approach with input from the corridor communities as well as state, county and regional agencies in the identification of transportation problems. Detailed field views and technical analyses were conducted to identify and quantify the transportation problem areas and document practical solutions. A detailed write-up of the existing conditions, identified problems and potential improvement scenarios is presented. Crash clusters were identified and analyzed, bicycle and pedestrian improvements recommended and land use policy improvements suggested. The present and future traffic conditions on selected arterials were analyzed using the DVRPC regional simulation model. 2025 traffic volumes on arterial segments in the corridor were developed using different road network scenarios.

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