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## Executive Summary

A key step in the development of the *Warren County Smart Growth Plan* was the completion of this *Transportation Technical Study*. This study involved the creation of a land use and transportation model to test the impacts of land use decisions on the roadway network, and was performed in coordination with the ongoing Smart Growth Plan.

The County's transportation model was updated to year 2002 conditions and enhanced, and a buildout analysis was undertaken which compared the existing zoning regulations with a centers-based land use scenario. Both buildout scenarios were based on zoning densities, environmental constraints and land requirements for roads and utilities.

The results of the analysis showed that congestion on the County's transportation network increased significantly in both scenarios, but was significantly worse under the existing zoning. The results are summarized in the tables below.

2002 Base Conditions					
Number of Trips	Vehicle-Miles Traveled	Vehicle-Hours Traveled	Average Trip Length (Miles)	Average Trip Duration (Minutes)	Average Speed (Miles per Hour)
48,144	468,364	12,445	9.7	15.5	37.6

Existing Zoning Scenario					
Number of Trips	Vehicle-Miles Traveled	Vehicle-Hours Traveled	Average Trip Length (Miles)	Average Trip Duration (Minutes)	Average Speed (Miles per Hour)
212,178	2,661,095	269,504	12.5	76.2	9.8

Centers-Based Land Use Scenario					
Number of Trips	Vehicle-Miles Traveled	Vehicle-Hours Traveled	Average Trip Length (Miles)	Average Trip Duration (Minutes)	Average Speed (Miles per Hour)
145,808	1,729,231	73,660	11.9	30.3	23.5

The study recommends that measures be taken to preserve the capacity of the transportation network to accommodate existing and future development. Transportation planning recommendations include smart corridor planning, transit improvements, site design, access management, transportation control measures, and transportation financing districts.

***Key Recommendations:***

Smart Corridor Planning

- Avoid the creation of narrow commercial strips along roadway corridors outside of centers
- Encouragement of mixed uses and higher densities at key locations in centers
- Planning for an integrated community street network that links to adjacent areas
- Master planning for large tracts of land
- Identification of critical areas for open space conservation and create natural buffers between centers
- Design guidelines to identify the desired community character.

Transit Improvements:

- Service to meet increased demand intra- and inter-county commuting, such as NJ TRANSIT's Lackawanna Cutoff, Washington Secondary, and the extension of the Raritan Valley Line
- Pedestrian amenities including sidewalks and bus shelters
- Increased route-deviation service in less dense areas
- New Mid-County Bus service along Route 31 to Route 46 to CR 620 to CR 519 which would connect several centers as well as offer transfers with transit service along the Route 57 corridor

Site Design:

- Subdivision of parcels into lots that do not require direct access to arterials
- Provisions at the back of lots for secondary roads, require reciprocal easements for shared parking or rights of way and site commercial buildings close to the road
- Provision of adequate driveway length to allow stacking and establish limits for vertical alignment of major roadways at curb cuts
- Pedestrian and bicycle accommodations (e.g., install mid-block crossings on Route 46 and other streets, require connections between parking lots and

building entrances, limit service roads widths and curb radii, and minimize the number of conflict points)

- Incentives for smaller and fewer signs by allowing a reduced setback from the road
- Guidelines that encourage desired building designs and list examples of attractive buildings.

Access Management:

- Require developers to provide a connected and sufficient local road system to minimize using the main arterial that is designed to accommodate through traffic
- Reduce/limit the number of curb cuts by considering the location, design, and spacing of driveways
- Plan for the location of future signalized intersections and limit their proximity
- Require shared access points and connectivity between parcels
- Reduce the number of parking spaces by permitting shared parking arrangements among individual businesses
- Align driveways and create standardized offsets
- Relate driveway designs to travel speeds and traffic volumes
- Prohibit direct parking access from a parking space to arterials or collectors; and
- Plan for public parking

Transportation Control Measures:

- Detailed analysis of Transportation Development Districts (TDD's) and Transportation Enhancement Districts (TED's) along the Route 22 Corridor, Route 57 Corridor, Routes 519, 646, and 46 Corridor, and Route 31 Corridor

Countywide Transportation Model:

- Continued use of the Warren County Travel Demand Model to review individual proposed land use developments, with costs charged back to the developer

## ***I. Introduction***

A key step in the development of the *Warren County Smart Growth Plan* was the completion of this *Transportation Technical Study*. Figure 1 is a map of the study area, which encompasses the County in its entirety. The *Transportation Technical Study* involved the creation of a land use and transportation model to test the impacts of land use decisions on the roadway network. The project included the enhancement and complete updating of the transportation model. The previous Warren County Transportation System Model was converted to peak hour, enhanced to capacity-constrained assignment, updated with new links and improved centroid connections, and updated to reflect traffic conditions representative of the year 2002 (refer to the *Warren County Model* item in Section III: Travel Demand Model Development.)

The Transportation Technical Study was conducted in coordination with the Smart Growth Strategic Plan. Efforts were undertaken to ensure that the studies were mutually supportive of each other. The build-out transportation analyses were based on alternative land use choices developed by the Warren County Planning Department. Staff involved with the Transportation Technical Study were present and active at working sessions and public meetings of the Smart Growth Strategic Plan.

The preparation of the updated model will give the County and other levels of government a powerful tool for maintaining the balance between the transportation system and land use. The conversion of the model to a capacity-constrained assignment was done to connect the traffic generated by various land use types with the ability of the transportation network to accommodate it. The effects of a particular proposed development can be tested systemwide, allowing a realistic assessment of the full impacts on the transportation network.

The development of the enhanced Warren County Transportation System Model supports the goals of smart growth and sustainability between land use and transportation. The purpose of the model is to assist the development of a sustainable land use and transportation system balance, which the model shows the current zoning does not support. It provides technical analysis reinforcing the efforts among the different levels of government to work together in the public interest to keep Warren County livable and maintain accessibility.

The following is a description of how the analysis was performed and the measures of performance utilized, along with the land use scenarios that were tested using the model, and the results of the analysis. In addition, recommended next steps for addressing future transportation conditions and ensuring the County's mobility are presented in this study.

**Figure 1: Study Area Map**

## II. Transportation Analysis Methodology/Criteria

Several measures of performance were used with the model to assess the operations of the transportation system in Warren County. The key indicator of operations in the model was the volume-to-capacity (v/c) ratio on the individual parts of the roadway network. Service capacity is the maximum number of vehicles that can pass through a given road cross-section at an acceptable level of service. As the v/c ratio approaches 1.0 (volume approaches capacity) travel speeds decrease, travel times become longer and less reliable, and the performance of the transportation network decreases. Table 1 below indicates the correspondence between v/c ratio and level of service (LOS) for multilane facilities and freeways. The continuum of level of service on two-lane highway facilities is not defined by v/c ratio per se, however LOS F is defined as occurring on any link where volume exceeds capacity (v/c ratio > 1.0).

**Table 1: LOS and v/c Ratio Correspondence Table**

<b>Multilane Roadway Facilities (Free-Flow Speed 45 mph)</b>						
<b>LOS</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
<b>Maximum v/c ratio</b>	0.26	0.43	0.62	0.82	1.00	>1.00
<b>Freeway Facilities (Free-Flow Speed 65 mph)</b>						
<b>LOS</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
<b>Maximum v/c ratio</b>	0.30	0.50	0.71	0.89	1.00	>1.00

For purposes of displaying the patterns of the v/c ratio, the following ranges are displayed on the graphics to illustrate the patterns throughout the different scenarios: 0 – 0.75; 0.75 – 1.1; 1.1 – 2.0; 2.0+. Values of v/c ratio above 1.0 (in this case above 1.1 to accommodate for the level of precision of the demand model) are theoretical and represent failing operations and extensive queuing. Values above 2.0 (which are found on certain links in the future year networks) indicate that the imbalance between demand and capacity is more than 100%.

Total trips in the transportation network are a function of the interaction between the various land uses within and proximate to the County. Forecasts were developed for buildout under the existing zoning and for an alternative centers-based land use scenario. The buildout was unique in that it showed the cumulative impact of the individual land use decisions for the 22 municipalities in Warren County. For the buildout forecasts, background growth was accounted for, as well as the growth potential of individual parcels of buildable land in Warren County.

Vehicle-miles traveled (VMT) is another performance measure used with the transportation system model. This is the sum of the number of miles traveled by all vehicles using the transportation system during the weekday PM peak hour, which is the scope of the model. Therefore, VMT is reported as a systemwide aggregate measure of the performance of the transportation system.

Vehicle-hours traveled (VHT) is a performance measure that represents the sum of the number of hours traveled by all vehicles using the transportation system during the period of analysis. The combination of VHT and VMT are important in air quality analyses of the transportation system.

From the above primary performance measures, additional indicators of the operations of the transportation system can be calculated. These include average trip length, average trip duration, and average speed. These performance measures are reported systemwide. It should be noted that in the case of trips that have either an origin or destination (or both) outside the study area network, the statistics are reported only for that portion of the trip within the study area transportation network.

### ***III. Travel Demand Model Development***

Transportation planning models are, in part, developed to determine the effects of planned actions. These may include the construction of new transportation facilities, development of major traffic generators, implementation of a transit service or a revised land use development plan, widening of a major bridge, etc. Each of the proposed actions will affect travel in and through the model area either in terms of changes in trip levels or in transportation infrastructure. In the transportation planning models, these are reflected either in the trip matrices or networks, or both.

#### **Data Sources**

Data collection and analysis are integral to the development of any travel demand model. In this study, data requirements were especially extensive because of the build-out procedures used to analyze future conditions.

The following is a list of data items and their sources:

#### **Traffic Count Data**

New Jersey Department of Transportation

- 2002 Straight Line Diagrams
- Bureau of Transportation Data Development - Control Station Hourly Volume Data

Warren County Department of Planning

- Preexisting Travel Demand Model
- 2002 Warren County Traffic Count Program

Delaware River Joint Toll Bridge Commission

- Traffic Counts from river crossings

Hunterdon County Office of Engineer

- Traffic Counts

### **Land Use/Zoning Data**

New Jersey Department of Environmental Protection

- 1995/97 Landuse/Landcover

Warren County Department of Planning

- 2003 Municipal zoning shapefiles
- 2000 Existing land use analyses

### **Warren County Model**

The existing Warren County transportation planning model is based on the TRANPLAN software with daily traffic volumes and stochastic method (defined on page 12) of trip assignment. The model covers all of Warren County and also includes Bloomsbury Borough, Hampton Borough, and Ludlow Station in neighboring Hunterdon County.

The model area is divided into 126 traffic analysis zones (TAZs) based on municipal, census tract, and block group boundaries. Warren County TAZs are numbered from 1 to 73, 74 through 76 were assigned to the Hunterdon County zones, and 101 through 126 represented external border locations. Numbers 77 through 100 are reserved for future use. The TAZs cover a smaller geographic area in the more urban centers of Phillipsburg Town, Hackettstown Town, Belvidere Town, Alpha Borough, and Washington Borough and increase in size in the less dense rural townships.

The roadway network covers all state and county highways as well as all arterial and major collector roads within the model area. The network is constructed with links and nodes that represent roadway segments and intersections (or locations of change in roadway characteristics), respectively. The Warren County Model contains 3,388 links (which represent roadway segments between intersections) and 1,240 nodes (which represent intersections of links), of which 126 are centroids (which represent TAZs in the network structure). Figure 2 shows a pictorial of the Warren County Model network.

**Figure 2: Transportation Network**

## TAZ Refinements

The Warren County Model TAZ structure was reviewed for consistency with census tract boundaries, relative land area, relationship to adjacent roadway network, and the potential for future buildout alternatives. In total, 17 new TAZs were added by subdividing one or more existing TAZs in a given municipality. The affected areas are as follows: Three new zones were added in Knowlton Township; two new zones in Franklin Township, Frelinghuysen Township, Greenwich Township, and Mansfield Township; and one additional zone in Hardwick Township, Harmony Township, Independence Township, Liberty Township, Pohatcong Township, and White Township. These new zones were numbered from 77 to 93 using part of the previously reserved set of TAZ numbers. The refined zone system is shown on Figure 3. The TAZ correspondence table from the 1992 model to the updated model is shown in Appendix A.

The existing 1992 AADT trip table was modified using the “Matrix Expand” function of TRANPLAN where each new zone received a portion of the trips from the original zone; this was based on population.

## Network Refinements

The network refinement process consisted of two steps. First, the additional zones were located and tied to the network with centroid connector links following available local roadways. Second, all centroid connectors were reviewed and changes made to improve the relationship with actual roadways and driveways since the loading points in a capacity restrained assignment are critical.

The following roadway links were added and/or modified:

- Interchange and ramps between I-78 and NJ Route 173 in Greenwich Township
- Beattys Road in Greenwich Township
- Cary Road and portions of Jackson Valley Road in Mansfield Township
- Portions of Sarepta Road and Upper Sarepta Road in White Township
- Osmun Road in Knowlton Township and Hope Township
- Portions of Locust Lake Road in Hope Township
- Nightingale Road in Knowlton and Hope Township

**Figure 3: TAZ Diagram**

## PM Peak Hour Conversion and Model Calibration

The initial step in the trip table conversion process was to bring the 1992 AADT trip table to year 2002 level using the “Matrix Update” function of TRANPLAN. A growth rate of 3 percent per year was used for internal TAZs and County and State highways, while a growth rate of 4.2 percent per year was applied to interstate highways. The growth rates were determined from an extrapolation of trends in the 1990’s.

Then, based on the traffic data sets from Warren County, New Jersey Department of Transportation (NJDOT) and adjacent Hunterdon County, the evening peak hour was determined to be 9 percent of AADT. The second step in this conversion process was to factor the AADT trip table by 0.09 to obtain a generic PM peak hour trip table.

Likewise, the link capacity was converted from a daily level to PM peak hour level. The resultant converted model was still an approximation of actual roadway volumes since the volumes derived from AADT trip table were equal in both travel directions.

The final step in the model conversion process was model calibration. Based on the traffic data sources listed above, ground count volumes or traffic control volume by direction of travel was established for several screenlines. The first screenline consisted of all roadways entering and exiting the model area. An equilibrium assignment was made and the model volumes compared to the control volumes. The differences were noted and an adjustment factor computed that would bring the model volume to control volume level. These adjustment factors were input to the “Fratar Model” function of TRANPLAN that modified the trip matrix to provide the required volumes (trip ends) at each of the external stations.

Four additional screenlines were established as follows: screenline 1 is an east-west screenline that parallels Interstate 80 and is located a few miles south of I-80. Screenline 2 forms a semi-circle to the west of Hackettstown Town, while screenline 3 is also an east-west screenline that bisects the County through White Township, Oxford Township and Mansfield Township. Screenline 4 is in the southern part of the county. It follows Lopatcong Creek to the north, and then swings east around Alpha Borough and then south to the county boundary. Figure 4 shows the screenline locations.

The model screenlines calibration process involved two phases. First, link speed and/or capacity along a given corridor was increased to attract more trips to the corridor or reduced to lower the corridor volumes. This process was used primarily when on one corridor the model trips exceeded the control counts and on the adjacent corridor the assigned volumes were low.

The second phase of model calibration was an iterative process using directional “select link” analysis and adjustment of a part of the total trip table that were found on the given screenline link under evaluation. The adjustments were applied only to internal, internal to external, and external to internal trips. Through trips were not adjusted in this manner.

**Figure 4: Screenlines**

This process was continued until a reasonable agreement was obtained between the control count and model volumes.

The table in Appendix G lists the control count and model volume for each external station along with the station description and TAZ number. As indicated in Appendix G, all major roadways are within a 10 percent difference between count and model volumes; most are within 2 to 3 percent.

The table in Appendix H indicates the control count and model volumes for the four screenlines. While the differences are greater than on the external screenline, especially on low volume roadways, the overall match is within 10 percent and the model was considered calibrated.

### **Assignment Conversion**

The 1992 Warren County Model uses the stochastic method of trip assignment. In this method, first the minimum path is determined between each pair of zones, then the second, the third, etc. up to a predetermined ratio of a given path to the minimum path. Trips between the given zone pairs are then assigned to several paths depending on the impedance ratio of a given path to the minimum path. This replicates imperfect driver information and other random variables. The stochastic process provides reasonable multi-path assignments that can be calibrated to match control counts and is suitable for planning evaluations with daily traffic. However, the stochastic assignment process does not consider roadway capacity, nor are link travel times adjusted in response to increasing volume to capacity (v/c) ratios.

To determine critical peak hour roadway impacts resulting from future development scenarios, it is imperative that a reference to actual roadway capacity (existing or proposed) be maintained. Therefore, the model was upgraded with a capacity-constrained assignment, where travel paths are continuously adjusted as a function of v/c ratios. Multi-path assignments for the same trip interchanges result, since a variable portion of trips is diverted to avoid locations of congestion.

### **Rail/Bus Transit**

Survey respondents strongly supported the creation of additional bus and rail services in Warren County. As part of the model development, the potential impact of future rail/bus service in the County was considered. There are four principal opportunities to enhance transit service, including passenger rail service on the Lackawanna Cutoff, Washington Secondary and the Raritan Valley line as well as bus service among Washington Borough, Belvidere and Phillipsburg. They are discussed in detail in the Recommendations section.

In this modeling effort, transportation capacity improvement scenarios (such as new/expanded roadways, bus or rail services) were not analyzed, and the overall effect on

the transportation system of these potential transit projects was considered to be minor, therefore the model trip table was not modified to reflect any future transit services.

#### **IV. Existing Conditions Analysis**

Table 2 shows the performance measures for the 2002 existing conditions of the Warren County Transportation System. Figure 5 shows the v/c plot for the transportation network.

**Table 2: 2002 Base Conditions Performance Measures**

<b>2002 Base Conditions</b>					
<b>Number of Trips</b>	<b>VMT</b>	<b>VHT</b>	<b>Average Trip Length (Miles)</b>	<b>Average Trip Duration (Minutes)</b>	<b>Average Speed (Miles per Hour)</b>
48,144	468,364	12,445	9.7	15.5	37.6

#### **Critical Corridors**

The v/c ratios for existing conditions indicate nearly all of the study area’s roadways are operating at acceptable levels of service. There are a number of roadway segments with v/c ratios that suggest they are locations of concern, such as portions of I-78 (v/c = 1.31 between CR 637 and 632), I-80 (1.07 east of CR 519), NJ Route 57 (1.89 west of CR 519), NJ Route 31 (1.39 east of CR 632), and CR 517 (1.80 south of U.S. Route 46). Ratios greater than 1.0 indicate the roadway is operating at Level of Service (LOS) “F”, with attendant queuing, driver frustration, and traffic diverting to local and residential streets. In all, 3 percent of the study area’s roadway network was found to be operating with a v/c ratio greater than or equal to 1.0 in the 2002 base conditions.

#### **Transit Service**

Transit service to/from and within Warren County was analyzed qualitatively for the reasons cited in the *Rail/Bus Transit* heading in Section III. Residents of the County have a number of transit options that provide service intra-county as well as regionally. Most transit services within the county are located along the Route 57 corridor and provide service between and within Hackettstown Town, Washington Borough, and Phillipsburg Town. NJ TRANSIT is the primary transit agency, offering park & ride commuter rail service and suburban “Wheels” bus routes. Warren County’s Department of Human Service and Department of Transportation administers the remaining local services, including paratransit and shuttle services. Private bus carriers also administer transit services within the county and provide access to regional destinations. In total, Warren County has five established intra-county bus routes, two commuter rail lines, and two private bus carriers.

**Figure 5: Existing Conditions v/c Plot**

*NJ TRANSIT Commuter Rail*

NJ TRANSIT currently operates the only passenger rail service in Warren County. The Morristown Line and Boonton Line serve Hackettstown and connect it to the NJ Transit main terminals in Hoboken as well as various intermediate points in Morris, Essex, Somerset, and Union counties. The Morristown Line also provides Midtown Direct service to Penn Station, New York. Hackettstown is the only passenger rail station in Warren County. The station is located on the edge of the business district. On average, a one-way trip on either line to New York City costs \$9.80 and takes approximately two hours. There are five eastbound departures and six westbound arrivals at the Hackettstown Station on the Morris-Essex line.

Strong support was expressed during the strategic planning process to increase the speed of the rail service between Hackettstown and Netcong, making the use of the line a more desirable alternative to automobile travel.

*NJ TRANSIT “Wheels” Suburban Transportation Services*

Within Warren County, NJ TRANSIT administers three Wheels routes, one servicing the Hackettstown Town area and two in and around Phillipsburg Town. Wheels Route 973 provides transit service along significant commercial and residential corridors, such as Main Street, Allen Road, Mountain Avenue, and Routes 57 and 517, throughout Hackettstown Town and Mansfield Township. Route 973’s principal boarding and drop-off locations includes the Hackettstown Mall, Heath Village, the Mansfield Village Apartments, the Hackettstown Community Hospital, and the Hackettstown train station. Other stops are also made along the route. NJ TRANSIT Wheels Routes 890 and 891 operate throughout the Phillipsburg area providing access to locations such as the Warren Hospital, the Phillipsburg Mall, Phillipsburg High School, and across the Delaware River into Easton, Pennsylvania where it provides the opportunity for transfers to LANTA service.

*Warren County Route 57 Shuttle Bus Service*

Since July 2001, Warren County has provided transit service along the Route 57 corridor between Hackettstown Town and Phillipsburg Town. The program operates three shuttle buses along two routes on weekdays only. A northern route circulates between Hackettstown Town and Washington Borough and a southern route circulates between Washington Borough and Phillipsburg Town. Free transfers between the two routes are available at Abilities of Northwest Jersey, Inc, located at the corner of Route 31 and Parsing Avenue in Washington Township. Along the Route 57 corridor, shuttles make scheduled stops at a number of commercial and retail locations such as Shop Rite, Wal-Mart and the Hackettstown Mall, as well as the Warren Hospital Warren County Community College, and the municipal building housing the Department of Health and Meals on Wheels. Besides picking up riders at designated locations, passengers may flag down a shuttle bus and board at a safe location along the route.

The Strategic Plan also recommends enhancing intercounty bus service along Interstate 78 and 80 to employment centers east of Warren County.



**Figure 6: Existing Transit Service**

### *Private Transit Service*

Martz Trailways is the only private transit operator whose services operate within Warren County. It primarily provides regional bus service to New York City, the Wilkes-Barre/Scranton area, the Poconos, and southeastern Pennsylvania. Within Warren County, stops are located in Hackettstown Town at the Jigger Shop on Main Street and in Panther Valley at the Inn at Panther Valley. Fares from Hackettstown to New York City range from \$30.70 for an adult round trip to \$315.00 for a 44-trip commuter pass.

## **V. Existing Zoning Buildout Forecast**

### **Methodology**

The buildout forecast was performed using Geographic Information Systems (GIS) techniques. Using data from the New Jersey Department of Environmental Protection (NJDEP), parts of the County that were already developed and parts that were environmentally constrained from development (steep slopes [those over 25%], floodplains, local/state/federal lands, wetlands, and protected farmland) were subtracted from the buildout analysis. The remaining land, that which is not already developed and is not environmentally constrained, was overlain with the existing municipal zoning regulations. The acreage was multiplied by a factor of 0.85 to account for streets, rights-of-way, odd-shaped parcels, and any other uses of the land that would prevent density from reaching the theoretical maximum (Figure 7).

For each TAZ, trip generation was performed using the Institute of Transportation Engineers (ITE) standard equations, the same as would be used for a private development's Traffic Impact Statement. The trip distribution pattern was based on the existing pattern for each municipality. The trips were then assigned to the transportation network using the same capacity-constrained method as for the existing conditions model.

Trips to and from external TAZ's were grown to the buildout scenario by factors based on the roadway classification and trip type. For example, pass-through trips, those with both an origin and a destination outside the study area, were grown by an annual percentage rate of 3.5%. Trip level growth was performed to account for the external trip level in the year 2022, the future year specified to use as a reasonable estimate for the purposes of the buildout analysis.

The buildout analysis assumes that the "buildout" is reached in the year 2022. Due to the effect of the growth in background traffic (principally affecting the through facilities), if the buildout is reached after 2022, operating conditions would be expected to be marginally worse than the results of this analysis indicate (especially on the interstate through facilities.) The opposite would be expected if the buildout were reached earlier than 2022.

**Figure 7: Buildable Land with Zoning Overlay**

## Existing Zoning Buildout by Region

For the purpose of describing the buildout scenarios, Warren County was divided into three geographic regions. The following section of the report describes the future buildout scenarios by region, under the existing zoning regulations.

*North - (Knowlton Township, Blairstown Township, Hardwick Township, Hope Township, Frelinghuysen Township)*

The northern section of the County has a large amount of buildable land that is zoned for large-lot residential development (3+ acres/dwelling unit). There is some buildable commercially zoned land along NJ Route 94 in Blairstown Township, as well as in Columbia in Knowlton Township.

*Central – (Allamuchy Township, Hackettstown Town, Independence Township, Liberty Township, Mansfield Township, Oxford Township, Washington Township, Washington Borough, White Township, Belvidere Town)*

The central section has more diversity in the zoning of the buildable land than the northern portion, which affects the transportation system. Moderate residential densities, large buildable areas zoned for industrial uses (in White near Belvidere Town especially), and commercial/industrial zones along the US Route 46 and NJ Routes 31 and 57 corridors are characteristic of the area. In the historic centers of Belvidere Town, Hackettstown Town, and Washington Borough, growth is constrained by the scarcity of buildable land.

*South – (Harmony Township, Franklin Township, Lopatcong Township, Phillipsburg Town, Alpha Borough, Pohatcong Township)*

The southern section of the County has the least amount of land that is environmentally constrained or protected. It has much buildable land with nonresidential zoning, including along the CR 519 corridor in Harmony Township, in Greenwich Township, and Lopatcong Township. Similar to the historic centers in the central section, growth in Phillipsburg Town and Alpha Borough is relatively modest due to the lack of buildable land.

Countywide buildout under existing zoning would add approximately 17 million square feet of retail space, 66 million square feet of industrial space, 22 million square feet of office space, and more than 45 thousand additional housing units.

## Existing Zoning Buildout Trip Generation

Trip generation is the process that relates land uses to the number of trip origins and destinations. Trip generation for non-residential land uses is typically higher than that for residential land use. Trip generation varies by the type of land use, for example senior housing exhibits different trip generation characteristics than single-family housing. The table in Appendix I shows the trip generation equations for different land uses.

Non-residential land uses generate 3.48 times as many trips as residential land in the build-out scenario. Figure 8 shows the TAZ-level trip generation for the County under the buildout scenario.

**Figure 8: Buildout Total Trip Generation**

*North*

Because there is a relatively low amount of buildable land zoned for non-residential uses, and the residential zoning tends to be low density, the trip generation in this part of the County is relatively low. Even so, because of the existing low level of development, many TAZs will see growth factors of 10 to 20 times in terms of trip generation. Areas of high trip generation include northern Hope Township and Columbia in Knowlton Township.

*Central*

Trip generation in this section is higher than in the northern section. In particular, there are large tracts of buildable land that are zoned industrial in White Township surrounding Belvidere Town that are very significant trip generators. The areas of highest trip growth tend to occur outside the historic centers of Washington Borough, Hackettstown Town, and Belvidere Town. In Hackettstown Town, however, the northern portion of the Town has the highest potential for trip generation. In Mansfield Township, there is a large amount of trip generation in the southern portion of the town where there is a zone of buildable industrial land.

*South*

Greenwich, especially north of I78 and west of CR 637, has a large level of trip generation under the buildout, mostly due to the availability of buildable commercially zoned land. Large areas in Harmony Township that are zoned for moderate density residential use also exhibit significant trip generation. Trip generation is strong in Lopatcong Township, especially the southern and eastern portions.

## ***VI. Existing Zoning Buildout Traffic Conditions Analysis***

Traffic that was generated through the process discussed above was distributed and assigned to Warren County's transportation system along with the background travel and external trips, giving the buildout transportation network. The indicator of the level of service for the roadway segments was the v/c ratio. Table 3 shows the performance measures for the 2022 buildout Warren County transportation system. Figure 9 shows the v/c plot for the transportation network.

**Figure 9: Buildout v/c Plot**

## Critical Corridors

### *North*

Because there is a relatively small amount of buildable land zoned for non-residential uses, and the residential zoning tends to be low density, the roadway network in this part of the County fares the best under the buildout conditions. Sections of Route 94 (v/c ratio = 1.3 east of Mount Pleasant Road), CR 519 (1.6 north of CR 610), CR 611 (1.7 south of CR 519), and CR 612 (2.25 east of CR 519), in particular, operate with rather high v/c ratios.

### *Central*

The majority of the transportation system in this part of the County operates at v/c greater than 1.0 in the buildout conditions. Roadways such as U.S. Route 46 (v/c ratio = 3.3 west of NJ Route 31) and NJ Routes 31 (3.6 south of CR 625) and 57 (3.8 east of CR 643) operate at v/c ratios well in excess of 2.0.

### *South*

This section of Warren County experiences serious congestion in the buildout scenario. The v/c ratio on portions of NJ Route 57 is greater than 3.0 on certain segments (i.e. east of Rosemary Street), and I-78 (2.4 east of U.S. Route 22), NJ Route 173 (3.3 east of Beattys Road), and U.S. Route 22 (2.43 south of Lock Street) and Alt U.S. Route 22 (3.7 west of Limekiln Road) all operate at v/c ratios much greater than 1.0.

**Table 3: Buildout Scenario Performance Measures**

<b>Buildout Scenario</b>					
<b>Number of Trips</b>	<b>VMT</b>	<b>VHT</b>	<b>Average Trip Length (Miles)</b>	<b>Average Trip Duration (Minutes)</b>	<b>Average Speed (Miles per Hour)</b>
212,178	2,661,095	269,504	12.5	76.2	9.8

In the buildout scenario, VMT increases nearly 470%, while the average trip duration increases nearly 400% to 76.2 minutes. Trip length increases approximately 30% as drivers seek alternate paths that avoid the most heavily congested roadway segments. Systemwide average travel speed drops below 10 miles per hour.

## VII. Centers-Based Land Use Scenario Forecast

A centers-based land use scenario was developed by the Warren County Planning Department that focused, in part, on managing non-residential land uses which are disproportionately responsible for the deterioration in the operating conditions of the transportation system in the buildout scenario. The scenario included the consolidation of non-residential uses into designated centers as described below, thereby reducing the amount of strip commercial and industrial development.

### Centers Designation

A series of “centers” were developed by the Warren County Planning Department, which resulted in the conversion of the zoning of much of the buildable land outside the designated centers to the prevailing residential densities in the vicinity. In two centers (Johnsonburg and Columbia) in the northern part of the County, some of the commercial/industrial/office density in the surrounding area was transferred to the centers. Areas of “strip” non-residential zoning along corridors such as U.S. Route 46, NJ Route 94, and CR 519 were eliminated, leaving non-residential uses largely within the centers (Figure 10).

Residential zoning densities were assumed for modeling purposes to remain intact within the proposed centers. However, the centers may actually be used as receiving areas for density transferred from nearby residential areas outside the centers. If this were to happen, trip generation would be higher and operating levels of service would be correspondingly lower given the same transportation network.

A total of 24 local centers were included in the model, including at least one in each municipality. However, the size and make-up of the centers varies considerably. In addition, the Phillipsburg Town and Hackettstown Town areas (including significant portions of adjacent municipalities) received the designation of regional centers. The following is a list of the designated centers:

#### *Regional Centers*

Phillipsburg

Hackettstown

#### *Local Centers*

Squires Corner

Free Union

Marksboro

Vienna

Blairstown

Belvidere

Johnsonburg

County Center

Columbia

Oxford

Delaware

Port Murray

Hope

Anderson

Allamuchy

Washington Borough

Great Meadows

Harmony

Mountain Lake

Washington South

Bridgeville

Broadway

**Figure 10: Centers-Based Land Use Buildable Land with Zoning Overlay**

## Centers-Based Land Use Buildout by Region

### *North*

Retail/office zoning along NJ Route 94 is transferred into the centers of Columbia and Johnsonburg. The other designated centers are Blairstown, Squires Corner, Marksboro, Delaware, and Hope. Retail/office outside of the centers is rezoned to residential. Residential densities are unchanged.

### *Central*

Much of the industrially zoned buildable land in White Township has been rezoned to moderate density residential. Strip commercial and industrial zoning along U.S. Route 46 has been consolidated into the centers. Industrial land in Mansfield Township is rezoned to residential with the exception of two centers. The centers in this section of the County are Hackettstown, Allamuchy, Great Meadows, Vienna, Free Union, Oxford, Bridgeville, Belvidere, County Center, Mountain Lake, Port Murray, Anderson, Washington Borough, and Washington South.

### *South*

Strip commercial and industrial buildable land in Harmony Township along CR 519 is rezoned to residential. Industrial land in the northern corner of Greenwich Township is also rezoned to residential, as is commercial land along NJ Route 57 in Lopatcong Township. The designated centers in this section of the County are Broadway, Harmony, and Phillipsburg.

## Centers-Based Land Use Trip Generation

Countywide, trip generation (for all land use types) is reduced by 41.3% in the centers-based land use scenario versus the buildout. For non-residential trips, the reduction is 55.8%, while residential trips increase 7.7%. The ratio of non-residential trips generated to residential trips is 1.43, as compared to 3.48 in the buildout scenario. Figure 11 shows the TAZ-level trip generation for the County under the Centers-Based Land Use scenario.

### *North*

Significant trip generation reductions are found in northwest Blairstown Township, northern Frelinghuysen Township, and Hope Township. Frelinghuysen Township sees an increase in trip generation in Johnsonburg due to the transfer of nonresidential development to this designated center.

### *Central*

White Township, in the areas to the north and south of Belvidere Town, sees some of the largest reductions in trip generation, as large buildable areas currently zoned for industrial use is rezoned to moderate density residential. Trip generation is also significantly reduced in southern areas of Mansfield Township and northeastern Washington Township. Trip generation is not reduced as much in Hackettstown Town and northern Mansfield Township.

**Figure 11: Centers-Based Land Use Total Trip Generation**

*South*

Trip generation is particularly reduced in areas of western Harmony Township and northern Franklin Township. Greenwich Township also would generate significantly fewer trips than under the buildout scenario, as would Lopatcong Township. Phillipsburg Town and Alpha Borough would not see much in the way of trip reductions.

**VIII. Centers-Based Land Use Traffic Conditions Analysis**

**Critical Corridors**

Many of the County’s principal roadways continue to operate at v/c ratios greater than 1.0 under the centers-based land use scenario. However, for many key components of the transportation system the v/c ratios are considerably lower in the centers-based land use scenario than the buildout scenario (Figure 12).

The centers-based land use scenario is most effective at improving the performance of the transportation system on the local, county, and state roadways. In the case of the two Interstate facilities, I-78 and I-80, the traffic levels are affected more significantly by regional growth trends. For example, on I-78 westbound east of Alpha Borough, the v/c ratio for the buildout scenario is 1.7, and for the centers-based land use scenario it is 1.6.

Average trip length is reduced from 12.5 to 11.9 miles (under the buildout scenario), reflecting the reduction in diversion from preferred trip routings. Average travel speed more than doubles to 23.5 miles per hour, and average trip duration falls to 30.3 from 76.2, a reduction of 60.2%. See Table 4 for the transportation system’s performance measures under the centers-based land use scenario.

**Table 4: Centers -Based Land Use Scenario Performance Measures**

<b>Centers-Based Land Use Scenario</b>					
<b>Number of Trips</b>	<b>VMT</b>	<b>VHT</b>	<b>Average Trip Length (Miles)</b>	<b>Average Trip Duration (Minutes)</b>	<b>Average Speed (Miles per Hour)</b>
145,808	1,729,231	73,660	11.9	30.3	23.5

*North*

Since this part of the County was the least affected by the reduction and transfer of non-residential land uses, the improvements in the performance of the transportation system are relatively modest. Typical improvements in the v/c ratio on individual roadway segments are NJ Route 94 (1.3 to 1.0 east of Mount Pleasant Road), CR 519 (1.6 to 1.5 north of CR 610), and I-80 (2.3 to 1.5 west of Exit 12.)

**Figure 12: Centers-Based Land Use v/c Plot**

### *Central*

Extensive areas of commercial and industrial zoned buildable land are rezoned to residential in the centers-based land use scenario, resulting in significant reductions in the v/c ratio on many components of the transportation network in this section. However, since there is still a relatively large amount of development slated to take place in this section, many segments are still operating with v/c greater than 1.0. In particular, some roadways for which this is true are segments of Route 57 (from 3.8 to 2.7 east of CR 643), CR 519 (3.8 to 1.7 north of CR 620), NJ Route 31 (3.3 to 2.6 south of CR 626), and U.S. Route 46 (3.3 to 2.1 west of Route 31).

### *South*

The southern section of Warren County is home to Phillipsburg Town, the largest regional center, as well as large areas of commercial development in municipalities such as Greenwich Township and Lopatcong Township in the centers-based land use scenario. The v/c ratios for many roadways, while still substantially greater than 1.0, are lower under the centers-based land use scenario than the buildout scenario. Characteristic changes in v/c ratios for roadway segments along main corridors are: CR 632 (3.8 to 2.4 north of I-78), CR 519 (3.2 to 1.8 north of US Route 22), I-78 (1.7 to 1.0 west of Exit 3), and U.S. Route 22 (3.5 to 1.9 east of Rosemary Street).

## **IX. Recommendations**

In addition to the “smart growth” land use concept proposed as an alternative for development, there are a number of “smart transportation” concepts that should be incorporated into the Warren County Smart Growth Plan. The alternative plan will incorporate land-planning practices that create and maintain efficient infrastructure, ensure a strong sense of community, preserve natural systems, and preserve visual character. Traditional practices such as zoning ordinances that isolate land use activities from each other and low-density growth patterns oriented towards automobile travel can contribute to traffic congestion. Smart growth encourages development that reduces reliance on single-occupancy vehicles and the number of vehicle-miles traveled along a highway corridor.

Thus, transportation resources can be used as focal points for introducing smart growth concepts. There are three major opportunities for applying this philosophy, some of which are smart corridor planning, site planning, and access management. Each of these, are well as other planning strategies, are discussed below.

### **Smart Corridor Planning**

Smart corridor planning includes the following techniques:

- Avoid the creation of narrow commercial strips along roadway corridors outside of centers;

- Encourage mixed uses and higher densities at key locations within centers;
- Plan for an integrated community street network that links to adjacent areas;
- Require master planning for large tracts of land;
- Identify critical areas for open space conservation and create natural buffers between centers; and
- Use design guidelines to identify the desired community character.

Combined with the access management and site planning techniques described below, smart corridor planning could be a very effective tool for avoiding congestion.

## Transit Improvements

In order to make transit services more viable, municipalities should establish minimum land use densities needed to support ridership within the designated centers. Generally, minimum densities of 6-8 housing units per acre for local bus service and 15 housing units per acre for rail are needed within walking distance (i.e., 1600 feet) of the transit stops. Currently, the existing centers along the transit corridors do not have densities that meet these thresholds. However, the population near the recommended and existing transit services will increase as the centers are further developed under existing zoning.

Participants in the public outreach opposed increasing residential densities in centers due to concerns such as impacts on school finances. As a result, the alternatives analysis did not test zoning for increased residential density in the centers. However, the relationship between land uses and transit was explored as part of the analysis. For example, regional connections with park and ride accessibility are likely to have the greatest impact, as residents living in dispersed locations within the County would be able to access the stations via private automobile. This would include projects such as NJ TRANSIT's Lackawanna Cutoff.

In addition, pedestrian improvements (as mentioned below in *Site Design*) can provide for better connections between existing transit stops and riders' origins and destinations. In addition to the quantitative measures discussed above, factors such as walkway/sidewalk availability and attractiveness, protected pedestrian crossings of arterial roadways, bus shelters, improved transit stop signage, and improved transit service reliability all impact the desirability of transit usage.

Several of the transit services in Warren County offer route-deviation service, which involves vehicles that follow a set route but will deviate by a specified distance from the route to pick up or discharge a rider closer to their origin/destination. This paradigm allows for more efficient service in less-dense areas, and opportunities for new or expanded services should be pursued.

Survey respondents strongly supported the creation of additional bus and rail services in Warren County. There are four principal opportunities to enhance transit service. They are passenger rail service on the Lackawanna Cutoff, the Washington Secondary and the Raritan Valley line and bus service between Washington Borough, Belvidere and Phillipsburg.

Lackawanna Cut-off - Efforts are currently underway to restore passenger service along the Lackawanna Cutoff in northern Warren County. The former passenger line is anticipated to provide transit service to employment centers in Morris County and points further east when activated. It is intended to provide an alternative to the congestion on Interstate 80 during peak periods. The Cutoff would extend to Scranton, PA via a crossing of the Delaware River at the Delaware Water Gap. NJ TRANSIT is leading the planning, design and environmental approval processes in partnership with the State of Pennsylvania and counties that would be served by the line.

The only station proposed in Warren County would be located on Route 519 in Blirstown. The station area is currently zoned for low density residential and is approximately 1 mile from the Blirstown commercial and historic center. Typically, it is desirable to establish higher residential densities and mixed uses in station areas as described in the Land Use and Transit section. However, the Blirstown station area is unique in that there is an existing “downtown” that is more appropriate for these uses and densities. It may be desirable to establish a park and ride connection in the center with jitney service to and from the station.

Washington Secondary – The Strategic Plan recommends the restoration of passenger rail service on the “Washington Secondary” line between Hackettstown and Phillipsburg. The line parallels the Route 57 corridor through Port Murray, Washington Borough, Broadway, New Village and Stewartsville. Norfolk Southern currently operates the former Delaware, Lackawanna & Western Line (later Erie Lackawanna) between Phillipsburg, Washington, Port Morris and Dover for freight service.

The service would be an extension of the passenger rail service provided by NJ TRANSIT to Hackettstown from Morris County. It would allow more residents of Warren County to access Midtown Direct service to Manhattan and the rest of NJ TRANSIT lines through the Secaucus Transfer Station and Hoboken Terminal. Additionally, it would provide intracounty transit service among the county centers on the Route 57 corridor.

Raritan Valley Line – The Strategic Plan recommends the extension of NJ TRANSIT passenger rail service from High Bridge in Hunterdon County to Phillipsburg. The extension would require the shared use of a segment of the Lehigh Line. Norfolk Southern operates the former Lehigh Valley/Conrail main line known as the "Lehigh Line" for freight service. The Lehigh Line has high volume of trains and the track was recently altered to double stack clearance (20'6"). The extension would provide direct access for residents of Warren County to Hunterdon, Somerset, Union and Essex

Counties as well as the Secaucus Transfer Station and Hoboken Terminal. The line would also provide access to Phillipsburg for residents of these surrounding counties.

Mid-County Bus - A logical route for new bus transit service would be from Washington south to Phillipsburg through Washington Borough, Oxford, Bridgeville, Belvidere, County Center, and Harmony. This “mid-county bus” route would follow Route 31 to Route 46 to CR 620 to CR 519. It would connect several centers as well as offer transfers with transit service along the Route 57 corridor (See Figure 13).

As an alternative measure, the County should consider intra-county mini bus service to connect Belvidere with the Route 57 shuttle. This would be an alternative way to provide transit access between Belvidere, Phillipsburg and Washington Borough.

## **Site Design**

Site design guidelines or standards can ensure that best practices are being considered during the review of future projects. The design of individual projects has substantial impact on the success of the corridor management program. The potential best management practices that will be considered pertain to:

- Lot layouts (e.g., subdivide parcels into lots that do not require direct access to arterials);
- Parking lot location and design (e.g., make provisions at the back of lots for secondary roads, require reciprocal easements for shared parking or rights of way and, site commercial buildings close to the road);
- Driveway location and design (e.g., provide adequate driveway length to allow stacking and establish limits for vertical alignment of major roadways at curb cuts);
- Pedestrian and bicycle accommodations (e.g., install mid-block crossings on Route 46 and other streets, require connections between parking lots and building entrances, limit service roads widths and curb radii, and minimize the number of conflict points);
- Incentives for smaller and fewer signs by allowing a reduced setback from the road; and
- Guidelines that encourage desired building designs and list examples of attractive buildings.

**Figure 13: Future Proposed Transit Service**

## **Access Management**

Access management provides access to adjacent land development while simultaneously preserving the flow of traffic on the road system in terms of safety, capacity and speed. Access management can increase the capacity of the transportation infrastructure and create shorter travel times. In addition, the functional life of the infrastructure can be prolonged, thereby conserving costs for transportation infrastructure.

Prototypical access management plans are being developed as part of the Strategic Plan for portions of the Routes 519 (southern portion) and 517 (north of Hackettstown Town) corridors. The plans will identify a range of measures as described in the examples below. The plans will provide both general guidelines and explicit examples of access management improvements for future developments. The examples will use properties located in areas with vacant or underutilized parcels that are located in activity centers.

Typical access management strategies that will be included in the plans are:

- Requiring developers to provide a connected and sufficient local road system to minimize using the main arterial that is designed to accommodate through traffic
- Reducing/limiting the number of curb cuts by considering the location, design, and spacing of driveways
- Planning for the location of future signalized intersections
- Requiring shared access points and connectivity between parcels
- Reducing the number of parking spaces by permitting shared parking arrangements among individual businesses
- Planning for a new street network
- Aligning driveways and create regular offsets
- Relating driveway designs to travel speeds and traffic volumes
- Prohibiting direct parking access from a parking space to arterials or collectors; and
- Planning for public parking

## **Transportation Control Measures**

Transportation Control Measures (TCM) can be used to improve access to freeways and major arterials in Warren County. Transportation Control Measure strategies may include ramp modifications, frontage roads, ramp extensions, flyovers, and Intelligent Transportation System (ITS) applications. The intent of these measures is to minimize merge, weave and diverge movements, and provide more direct connection to major traffic generators to reduce turning conflicts. The measures offer the ability to:

- Reduce accidents and improve safety;
- Reduce travel time and costs;
- Mitigate non-standard features; and
- Reduce congestion.

The proposed centers-based land use plan is in itself a TCM as it substantially reduces future trip generation. This will, in turn, substantially reduce the amount of investment in highway improvements required for Warren County.

## **Financing Districts**

Upon completion of the TCM and Access Management program for Warren County, financing districts can be instituted. The districts are a mechanism to obtain ‘fair share’ contributions from developers for the cost of necessary roadway improvements on the county and local road system. The location of the financing districts will be established in the Strategic Plan.

The creation of financing districts will involve implementation actions by the County, municipalities, or both. For example, municipalities may establish Transportation Improvement Districts (TIDs) to fund off-site transportation improvements and a municipal subdivision/site plan ordinance may require developers to contribute funds to these improvements.

## **Transportation Development Districts**

Transportation Development Districts (TDDs) are a potential tool for planning and funding transportation improvements for high growth areas. The districts are a mechanism to obtain ‘fair share’ contributions from developers for the cost of improving circulation and mobility. The districts are authorized in New Jersey under the Transportation Development District Act of 1989 (TDD Act). Warren County does not currently have any such districts.

A TDD can be created to assess fees on future developments that are responsible for increasing the burden on the transportation system. The fees are used to finance projects on state or local roads as well as other types of projects. Fees must be based on an adopted transportation improvement program and individual project agreements approved by the DOT. The law requires that a fee formula be established that assess developers their “fair share” of transportation improvements and that developers be able to determine their share based upon the plan.

The designation of a TDD can be initiated by Warren County by applying to NJDOT. The application first must include the proposed boundaries of the district and a description of the transportation needs. It must include certification there is county master plan adopted under R.S.40:27-2 and the district would conform to both the county master plan and the State Development and Redevelopment Plan. Certification also must be shown that the affected municipalities have been given at least thirty days advance notification and the opportunity to comment on the application. Finally, the application should include the comments offered by any of these municipalities and the County responses to them, along with any additional information required by NJDOT.

Under the TDD Act, growth must be demonstrated in one of the following categories to establish a district.

- Growth rate for estimated population or employment in excess of ten percent in three of the past five years in at least three contiguous municipalities;
- Projected local traffic growth in excess of fifty percent in a five-year period generated from new development;
- Commercial/retail development projected at a rate of one million square feet per square mile in a five-year period; or
- Projected growth or employment in excess of twenty percent over a ten-year period.

Upon approval of a draft district by NJDOT, the county would be required to conduct a joint planning process to develop a District Transportation Improvement Plan and accompanying financial plan. The joint planning process must involve State, County and local governments as well as representatives from the private sector. The County must then adopt these plans before a TDD can be implemented.

To date, only four counties have engaged in a TDD planning process. They include:

- **Mercer County** - Application was approved (1990) and the TDD plan was approved (1992). The District is in operation.
- **Atlantic County** – Two former Transportation Improvement Districts (TIDs) have been grandfathered as TDDs under the TDD Act.

- **Hunterdon County** – The TDD application was approved (1990), but no plan has been approved and the district is not operational.
- **Union County** – The TDD application was approved (1998), but no plan has been approved and the district is not operational.

Based on the transportation and land use modeling done for the Strategic Growth Plan, there are several potential TDDs in Warren County. Additional analysis may be required to determine if the growth thresholds are met in these areas. It is recommended that the County initiate discussions with the involved municipalities and the State to determine the most appropriate use of financing districts.

**Route 22 Corridor:** The corridor would include Routes 22, 57, 637, 638, 646, 173, and 122 in Greenwich Township, Philipsburg Town, Pohatcong Township and Lopatcong Township. The corridor includes one of the most extensive areas of commercially and industrially zoned vacant land in the county. Given its proximity to Route 78, there is a relatively high potential for new development to significantly impact the transportation system.

In 1998, the NJDOT completed the US Route 22 Corridor Study encompassing US Route 22, NJ Routes 57 and 122 and County Route 519. The corridor was identified as having a high potential for growth activity. The study area included development proposals of almost 3,800 dwelling units and over 2.5 million square feet of commercial and industrial space. The study also found that there is a significant movement of through traffic between the northern and central counties of New Jersey and the Lehigh Valley region of Pennsylvania that travels directly through the study area.

The Route 57 Needs Assessment/Concept Development Study (2003) defines a number of improvements to the corridor between Route 22 in Lopatcong and Route 517 in Hackettstown Town. The study recommended retaining Route 57 as two lanes, but identified several intersection and site roadway improvements in this vicinity.

Both corridor studies could be used as a starting point for defining the needed transportation improvements in the vicinity. However, changes to land use and zoning should also be considered to help reduce the extent of necessary transportation improvements and their costs, and to reduce congestion. Neither study explicitly assessed the potential contributions of land use changes to the transportation system.

**Route 519, 646 and 46 Corridor:** The corridor extends through the townships of Harmony and White. It includes a thin linear strip of commercially zoned vacant land in Harmony Township and extensive areas of industrially zoned vacant land in White Township. An access management plan has been developed for the corridor as part of the Warren County Strategic Growth Plan. The improvements defined in the access management study could be used to help define the transportation improvements that would be funded by a TDD.

**Route 31 Corridor:** The corridor extends through Washington Township and Borough and the northwestern portion of Mansfield Township. The Routes 31/46 Between I-78 and I-80 Corridor Needs Study Report was completed jointly by Warren and Hunterdon Counties in 2000. This study can also be used to help define the transportation improvements that would be funded by a TDD.

**Route 57 Corridor:** The portion of the roadway that extends through Mansfield Township and Hackettstown Town could potentially be served by a TDD. The Route 57 Needs Assessment/Concept Development Study identified a number of improvements to the corridor in these two municipalities that could be funded through a TDD.

In 2000, the Warren County Planning Department completed the Hackettstown By-Pass Corridor Study. The by-pass study was updated with an Origin-Destination study and a traffic simulation model as part of the Strategic Growth Plan and Transportation Technical Study. The simulation illustrated that significant reductions in congestion could be achieved by extended Route 57 to Route 46 in the Town of Washington in Morris County. The Route 57 Extension could also be partly funded by a TDD.

**County Transportation Model:** The Warren County Transportation Model can be enhanced to perform trip generation based on the land use of individual parcels. This would provide a defensible mechanism to determine ‘fair share’ contributions by developers.

An enhanced model will be able to evaluate the system wide effects of a particular project. Usually, the traffic impacts of a development are determined only for its access point to the roadway and the adjacent intersections or roadways. With an enhanced computer model, a planner could input a proposed development into the model and determine the system- or corridor-wide effects. This would help the County to identify the most effective mitigation measures and improvements necessary to address the impacts of a proposed development.

## **Transportation Enhancement Districts**

Currently, there is a bill in the New Jersey Legislature to allow for the creation of Transportation Enhancement Districts (TEDs). TEDs would address many of the constraints to implementation of a TDD. The Regional Intergovernmental Transportation Coordinating Study Commission (RITCSC) was established by the New Jersey Legislature to review and make recommendations the TDD Act. The RITCSC interim report (2000) included several important findings regarding the use of TDDs that are summarized below.

The interim report stated that the coordination among municipalities, counties, NJDOT, NJ TRANSIT and the private sector during the required Joint Planning Process was the most consistently valuable component of TDD/TID implementation efforts to date.

Because of the regional nature of the impacts of growth and the role of the transportation system, the TDD may be a useful tool along major roadway corridors in Warren County.

However the RITCSC noted that there is no clearly defined as source of funding to support TDD planning efforts. This has been a disincentive to TDD implementation. In addition, the RITCSC also found that the growth thresholds favor TDD eligibility in under-developed areas on the exurban fringe because those areas start with low levels of site-generated traffic.

The TED would provide for the sharing of transportation costs through a long-term comprehensive planning approach. While a TDD is permitted to assess fees on future developments, the TED would allow the County to assess fees on existing properties generating traffic in a district. The TED would also permit certain planning costs for a TED to be recovered as part of the fees and does not include growth thresholds. This would encourage the use of financing districts in a wider range of land use settings, including developed areas. Because of its benefits, the joint planning process would be retained.