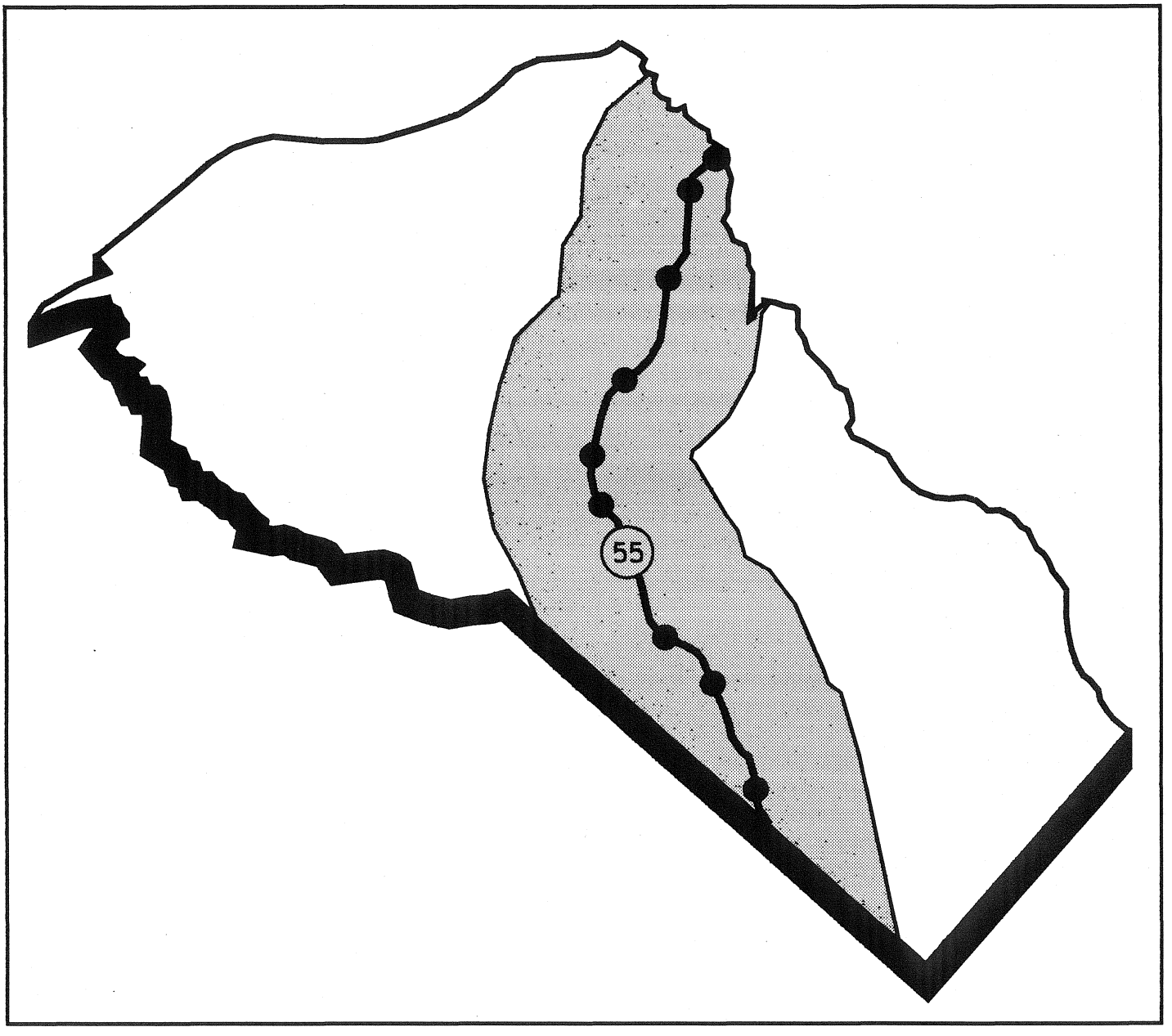
CENTRAL GLOUCESTER COUNTY TRAFFIC STUDY



DELAWARE VALLEY
REGIONAL PLANNING COMMISSION

CENTRAL GLOUCESTER COUNTY TRAFFIC STUDY

1993
(REVISED)

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Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development 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. The Commission is an advisory agency which divides its planning and service functions among the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Information Services Center which includes the Office of Regional Planning, and Finance and Administration. DVRPC's mission for the 1990s is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.

The DVRPC logo is adapted from the official seal of the Commission 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 flowing through it. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey. The logo combines these elements to depict the areas served by DVRPC.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

PUBLICATION ABSTRACT

Title	Date Published: 1993
CENTRAL GLOUCESTER COUNTY TRAFFIC STUDY	**Publication No.** 93036

Geographic Area Covered:
Gloucester County in New Jersey

Key Words:
NJ Route 55 Freeway, Existing Conditions, Future Traffic Volumes, Capital Improvement Program, Transportation Master Plan

ABSTRACT

This report evaluates the traffic impact of NJ Route 55 Freeway on Central Gloucester County. Existing traffic conditions are documented, future traffic volumes are projected. Study recommends transportation master plan including capital improvement program and policy recommendations.

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Historically, the opening of a freeway has been a catalyst in generating new development. Improved access to employment centers and lower land values make the region surrounding the freeway a prime area for development. An example is the impact that NJ Route 55 Freeway had in generating new development in Mantua and Glassboro when it was extended to Woodbury-Glassboro Road (CR 553) in May 1986. The recent completion of NJ Route 55 Freeway between Woodbury-Glassboro Road (CR 553) and US Route 40 affords a greater opportunity for new development in central Gloucester County.

Along with the opportunity for new development and economic growth, there will be detrimental impacts, in particular, traffic congestion. The purpose of this study is to project 20-year traffic volumes in central Gloucester County, identify roadway and intersection deficiencies, and recommend both a capital improvement program and a set of planning policies that the county can implement to mollify these deficiencies. With NJ Route 55 Freeway recently completed, the county and municipalities still have ample opportunity to plan and program improvements prior to the onset of development.

The traffic analysis suggests that, even though extensive development is envisioned, the traffic generated by development will be readily absorbed by the highway system. The high volumes projected for the NJ Route 55 Freeway and its approach roads suggest that the freeway will absorb many of these new trips. While an enormous amount of acreage is available for development, only a minor to moderate portion is anticipated to be developed by the Year 2010. In addition, a surplus of highway capacity currently exists in an extensive portion of the study area; therefore, doubling or tripling traffic levels on these roads will only result in moderate traffic levels and relatively minor impacts. The perception of traffic congestion will exceed the actual operational deficiencies faced by motorists. Over a longer time frame, or if build-out is more extensive than envisioned, the impact of NJ Route 55 Freeway may become more onerous.

While roadway capacity is not expected to be a widespread issue, physical deficiencies in roadway and intersection design will become more pronounced as traffic volumes increase. Central Gloucester County is largely rural in nature; the roads are generally two-lane roadways with no posted speed limits. Intersections are generally unsignalized, lack exclusive turn lanes, and have substandard turning radii. Therefore, the thrust of the recommendations is to upgrade roads in lieu of increasing capacity.

Recommendations for transportation improvements fall into two general categories: physical improvements the county needs to construct as part of its Capital Improvement Program, and recommendations that are more policy oriented.

Each year, Gloucester County spends several million dollars to reconstruct and resurface roads and construct intersection improvements as part of its Capital Improvement Program. The report documents the scope of the future needs that the county will eventually have to incorporate into its

Capital Improvement Program. Recommendations cover road widenings, traffic signals, intersection improvements, and road realignments. Road widenings were recommended when the following conditions were identified: 1) the existing roadway width is substandard, 2) a capacity analysis indicates a wider cartway is needed to rectify deficient service levels, and 3) areas with extensive commercial and industrial development where additional left turn lanes are needed. Using the Year 2010 projected traffic volumes, a traffic signal warrant analysis was conducted to determine which unsignalized intersections in the corridor warrant signalization. Approximately 12 intersections will warrant signalization, another five intersections require further monitoring because the warrant analysis was not definitive. The report calls for the elimination of angle intersections by realigning the roads to form perpendicular intersections. The improvements will reduce safety hazards, facilitate turn movements and eliminate intersections with more than four approach roads. Because of the extensive range of recommendations, Gloucester County should periodically review and refine the list.

Policy issues discussed in the report include the official map, road swaps, access control, traffic engineering programs, transportation development districts, and transit opportunities. New Jersey Statutes empower the county to establish an official map. The significance of the map is that it grants the county legal authority to plan and acquire additional land for roadway improvements. The recommendations in the report sets up a structure for the county to update their official map. New Jersey's Transportation Development District Act of 1989 provides a mechanism for counties to create a special financing district to fund transportation improvements in high growth corridors. It represents the most equitable solution to fund the growth related problems by sharing the costs among the county and the developers. A review of the provisions of the Act with respect to their applicability to the NJ Route 55 corridor indicates that the corridor is eligible for a Transportation Development District. While the county roads will be moderately affected by the new development generated by NJ Route 55 Freeway, the brunt of the increase in traffic will be felt on the freeway itself. A comprehensive transit program consisting of a transit way, express buses, park-and-ride lots, feeder buses, and preferential treatment of high occupancy vehicles, is one way to minimize congestion on the freeway and effectively increase its capacity.

INTRODUCTION

Historically, the opening of a freeway has been a catalyst in generating new development, particularly at its interchanges. Improved access to employment centers and lower land values make the region surrounding the freeway a prime area for development. An example is the impact that NJ Route 55 Freeway had in generating new development in Mantua and Glassboro when it was extended to Woodbury-Glassboro Road (CR 553) in May 1986. The recent completion of NJ Route 55 Freeway between Woodbury-Glassboro Road (CR 553) and US Route 40 affords a greater opportunity for new development in central Gloucester County. Much of the region is farmland, situated in close proximity to shopping districts in Deptford and Glassboro. NJ Route 55 Freeway's connections to Philadelphia, Cherry Hill and Moorestown are the final element needed for development.

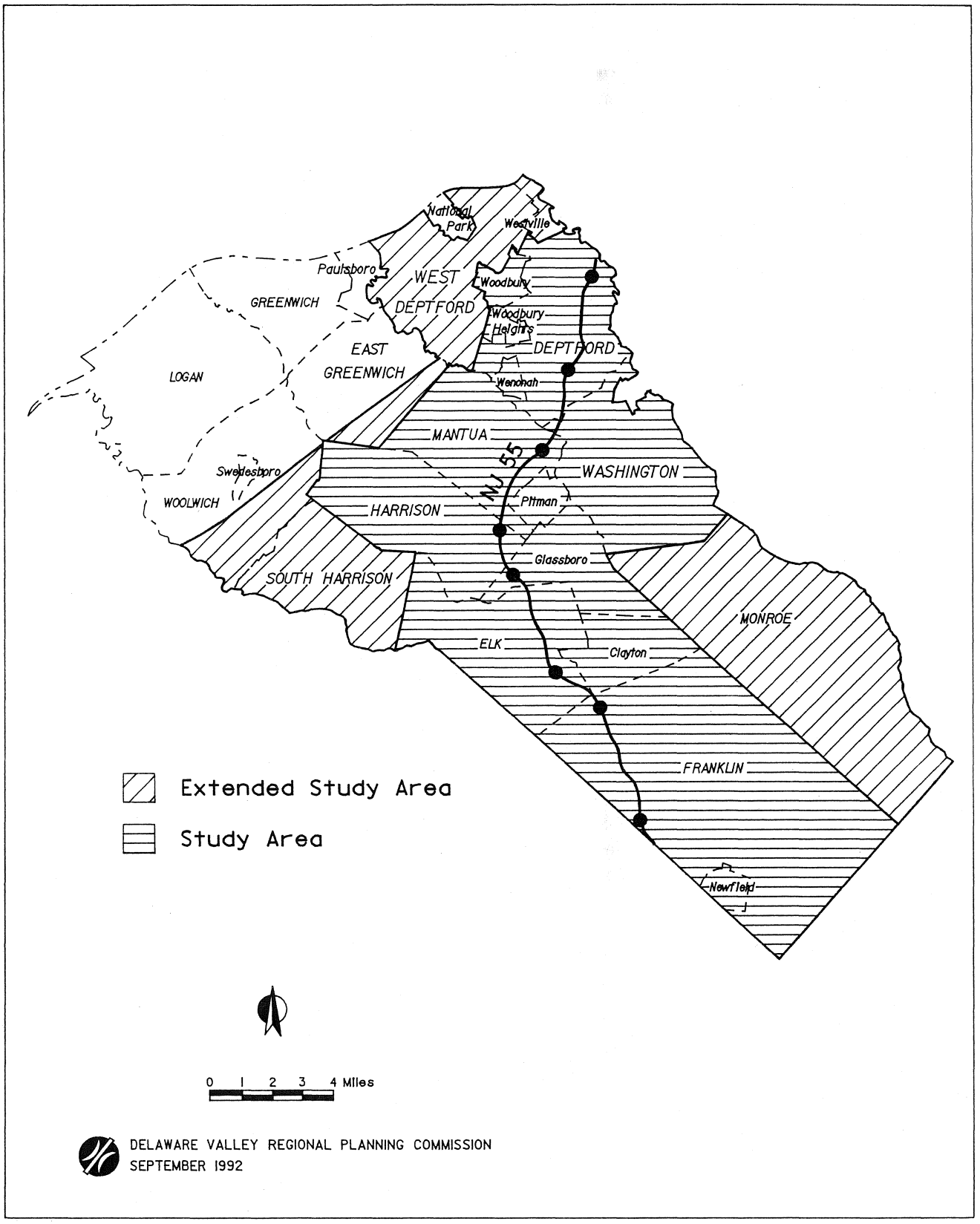
Along with the opportunity for new development and economic growth, there will be consequent impacts, in particular, traffic congestion. Since the region is largely undeveloped outside of Deptford, Glassboro and Washington Township, roads typically carry fewer than 7,000 vehicles per day, which is a relatively low volume. The roads themselves are generally two-lane roadways without posted speed limits. The intersections are usually unsignalized, lack exclusive turn lanes, and have substandard turning radii.

The purpose of this study is to project 20-year traffic volumes in central Gloucester County, identify roadway and intersection deficiencies, and recommend a capital improvement program and a set of planning policies that the county can implement to mollify these deficiencies. With NJ Route 55 Freeway recently completed, the county and municipalities still have ample opportunity to plan and program improvements prior to the onset of development. Since the magnitude and distribution of development is unknown, largely dependent upon water and sewerage availability, the foregoing analysis and recommendations are preliminary in nature. Over time, as development patterns become more apparent, the study recommendations will need to be refined.

The central Gloucester County corridor is composed of 12 municipalities: Clayton, Deptford, Elk, Franklin, Glassboro, Harrison, Mantua, Pitman, Washington Township, Wenonah, Woodbury, and Woodbury Heights (see Location Map, Figure 1). For planning purposes, an extended study area composed of Monroe, Newfield, South Harrison, West Deptford, Westville and portions of East Greenwich and Woolwich Townships is also included.

Existing conditions, such as the number of lanes, cartway widths, and intersection traffic controls, are presented in the next chapter. The subsequent chapter presents future population and employment forecasts, future traffic volumes, and future level of service. The last two chapters present recommendations. One chapter focuses on physical improvements, road widenings and intersection improvements. The other chapter presents policy recommendations, namely proposed right-of-ways, road swaps, Transportation Development Districts, traffic engineering programs, and transit programs.

Figure 1: LOCATION MAP



EXISTING CONDITIONS

The physical characteristics of the roadway system, such as road ownership, right-of-way, cartway widths, number of lanes, and functional classification, are reviewed in this chapter.

The study and its recommendations focus on the roads and intersections delineated in Figure 2. These roads and intersections, selected by Gloucester County, represent the major roads carrying traffic to NJ Route 55 Freeway and providing internal circulation within the corridor. Because of the county's responsibility to preserve the integrity of its roads, the majority of these roads are county-owned. For the purposes of continuity and to assist the New Jersey Department of Transportation (NJDOT) and the municipalities in planning their future needs, the network is expanded to include connecting roads. Limited suggestions are offered for the expanded network.

NJ Route 55 Freeway

NJ Route 55 Freeway is a limited access highway, travelling in a north-south orientation, between NJ Route 42 in Deptford Township and NJ Route 47 in Cumberland County. The four-lane highway primarily serves Glassboro, Vineland and the Cape May shore points.

Construction of NJ Route 55 Freeway was accomplished in stages. The section between US Route 40 (Gloucester County) and NJ Route 47 (Cumberland County) was opened in the late 1970's. The section between NJ Route 42 and NJ Route 47 in Deptford Township was opened in November 1985. The latter section was extended to Woodbury-Glassboro Road (CR 553) in May 1986. The freeway was fully completed in October 1989 when the 13 mile section in Gloucester County between Woodbury-Glassboro Road (CR 553) and US Route 40 was opened.

Within Gloucester County, there are eight interchanges: Deptford Center Road, Delsea Drive (NJ Route 47), Woodbury-Glassboro Road (CR 553), US Route 322, Ellis Mill Road (CR 641), Centerton-Glassboro Road (CR 553), Little Mill Road, and US Route 40. Three of the interchanges connect with county roads, two with municipal roads, and two with state highways.

Road Ownership

While the main focus of this study is on county roads in the NJ Route 55 Freeway corridor, other roads, under the administrative control of NJDOT and the various municipalities, comprise a significant portion of the highway network (see Figure 3).

Roads under NJDOT jurisdiction include NJ Route 55 Freeway, NJ Route 42 Freeway, NJ Route 41 (Hurffville Road), NJ Route 47 (Delsea Drive), US Route 40 (Harding Highway), and US Route 322.

Figure 2A: KEY ROADS AND INTERSECTIONS

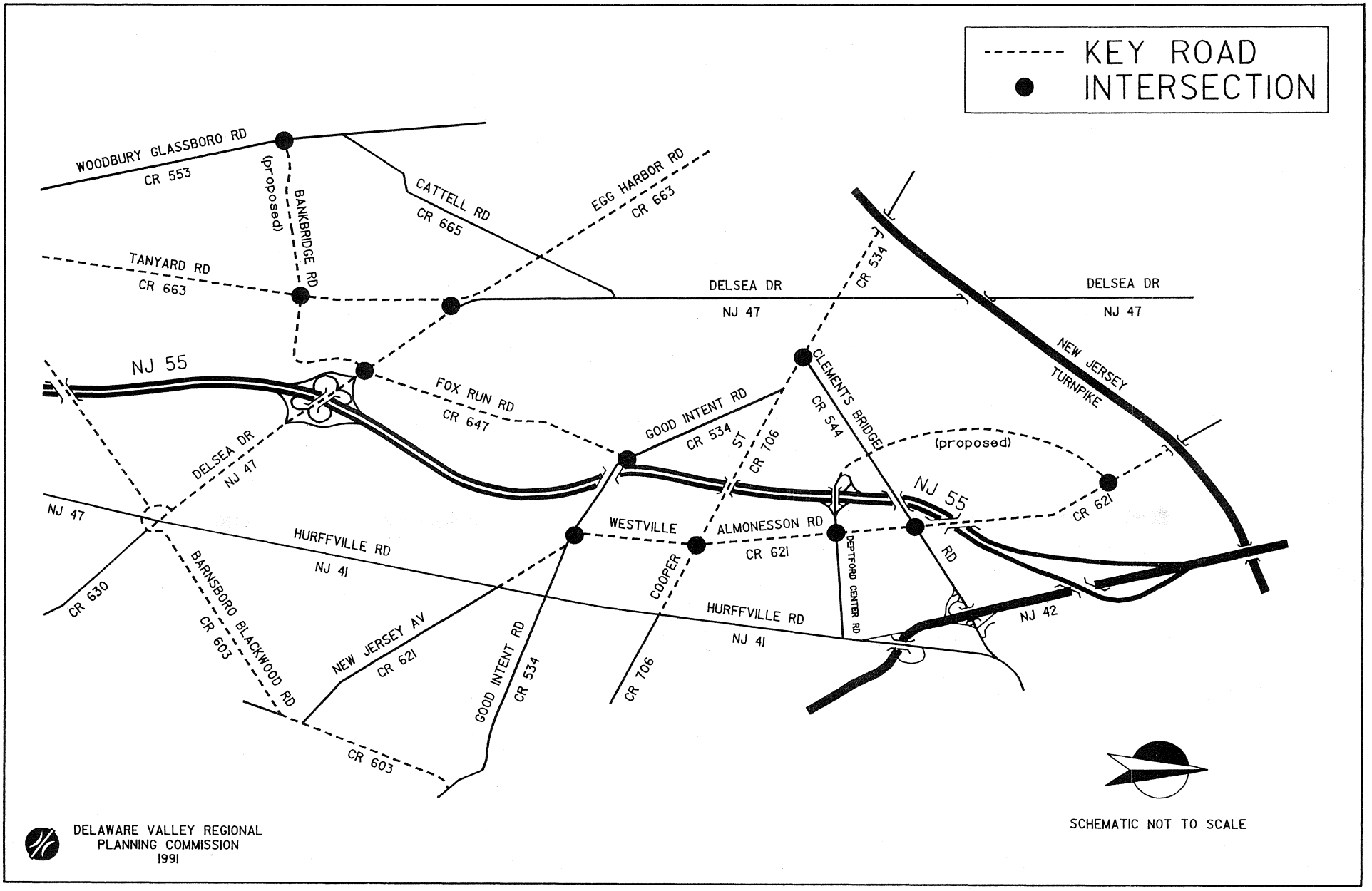


Figure 2B: KEY ROADS AND INTERSECTIONS

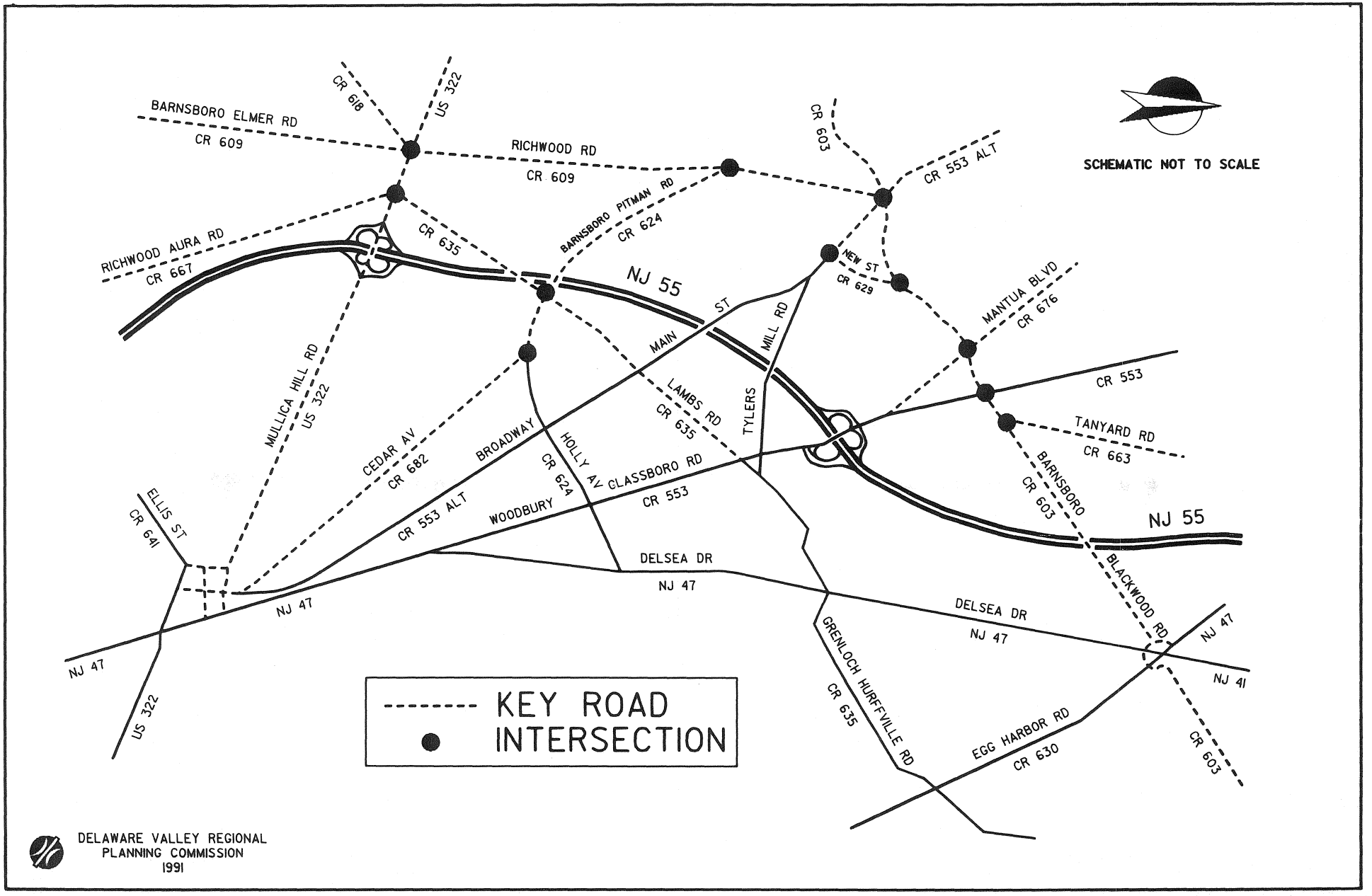


Figure 2C: KEY ROADS AND INTERSECTIONS

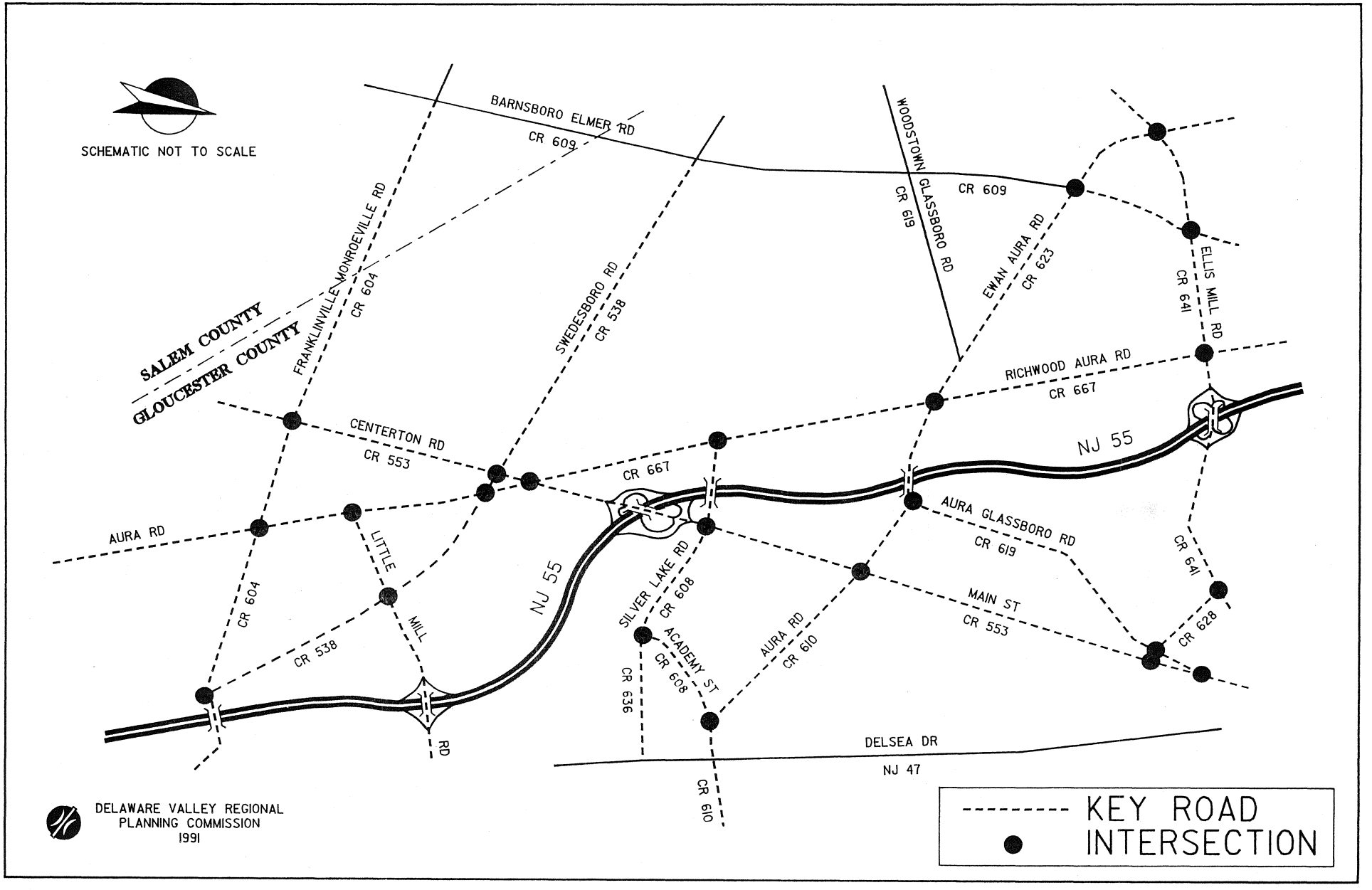


Figure 2D: KEY ROADS AND INTERSECTIONS

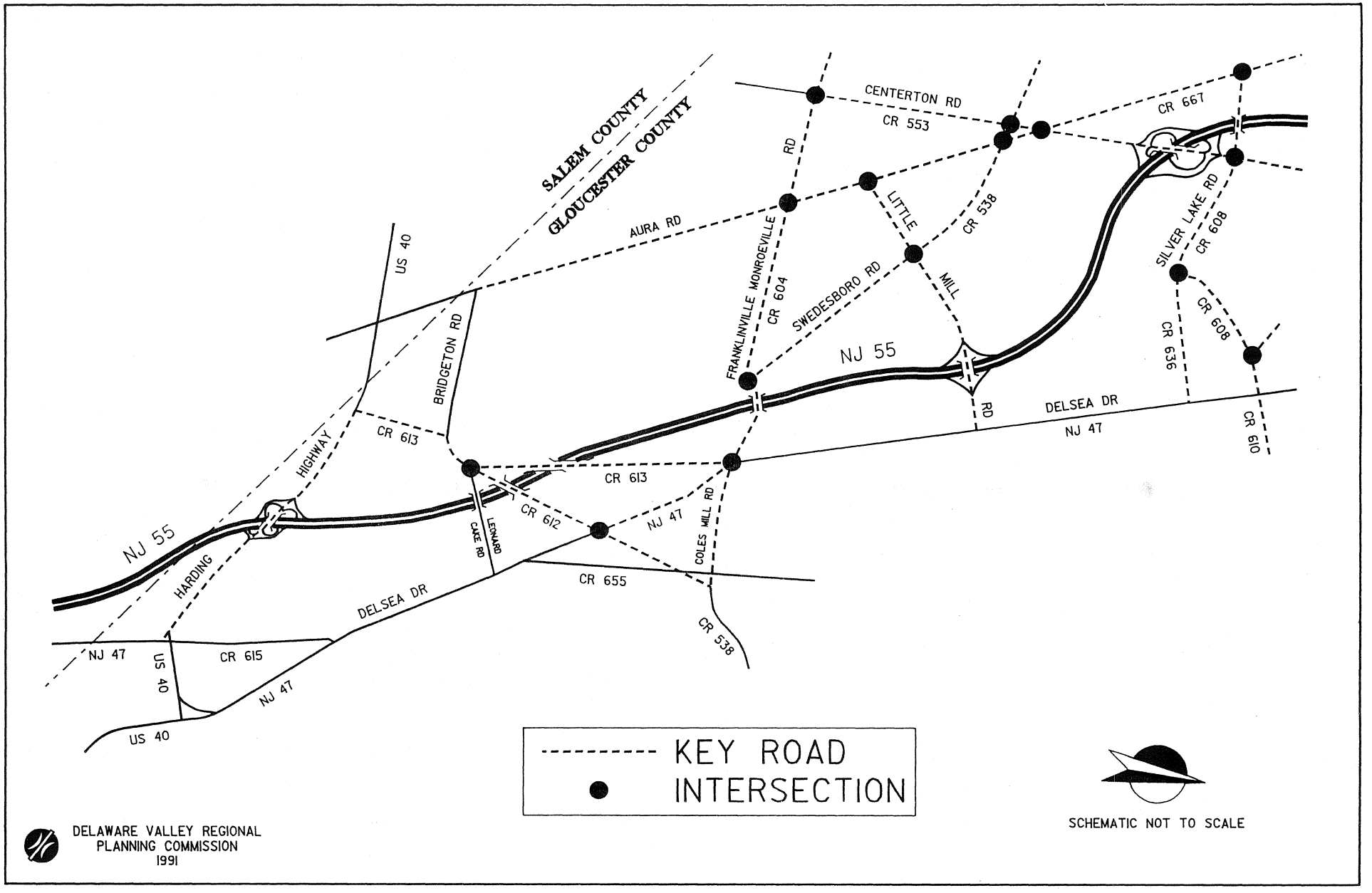


Figure 3A: ROAD OWNERSHIP

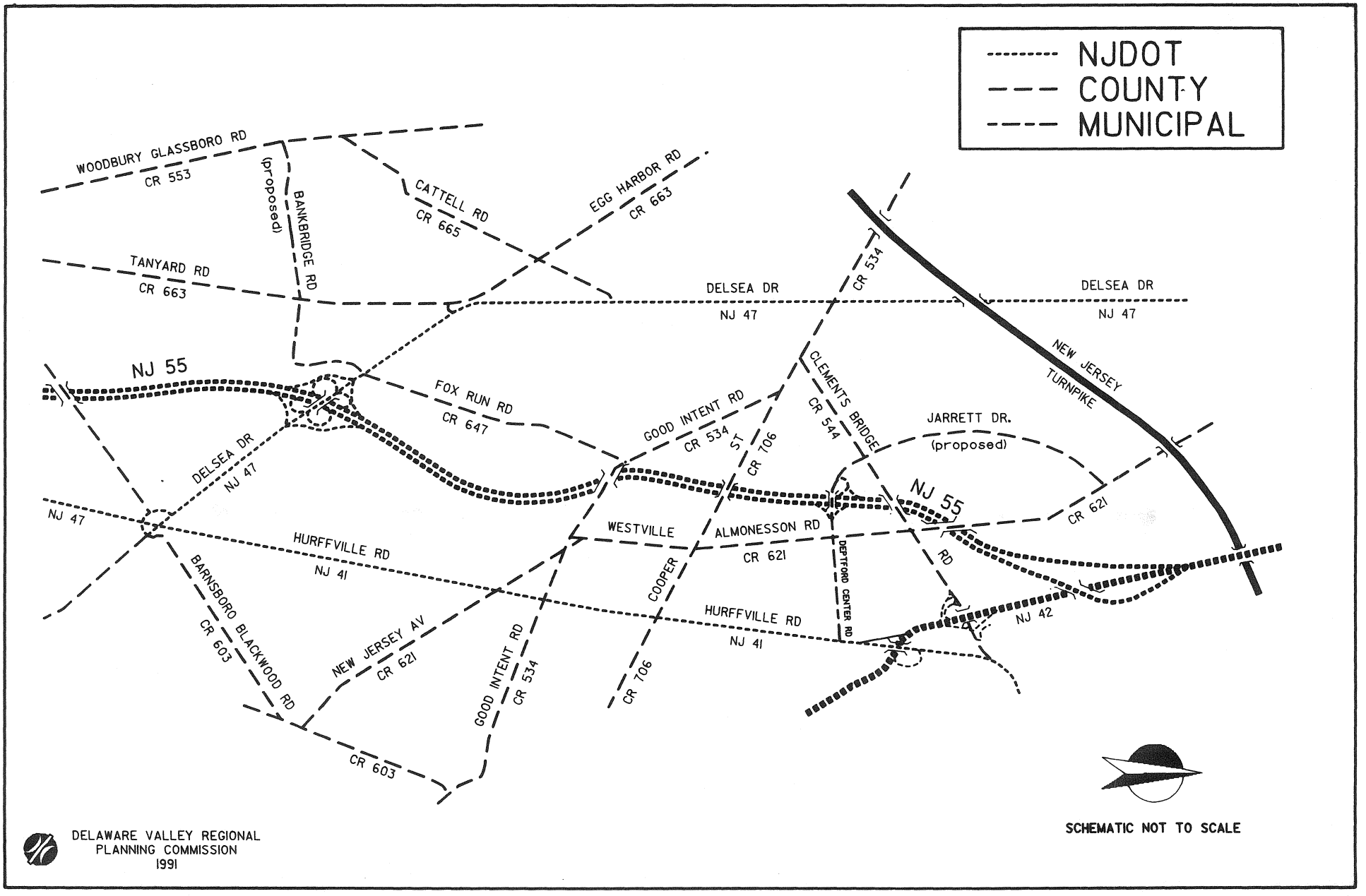


Figure 3B: ROAD OWNERSHIP

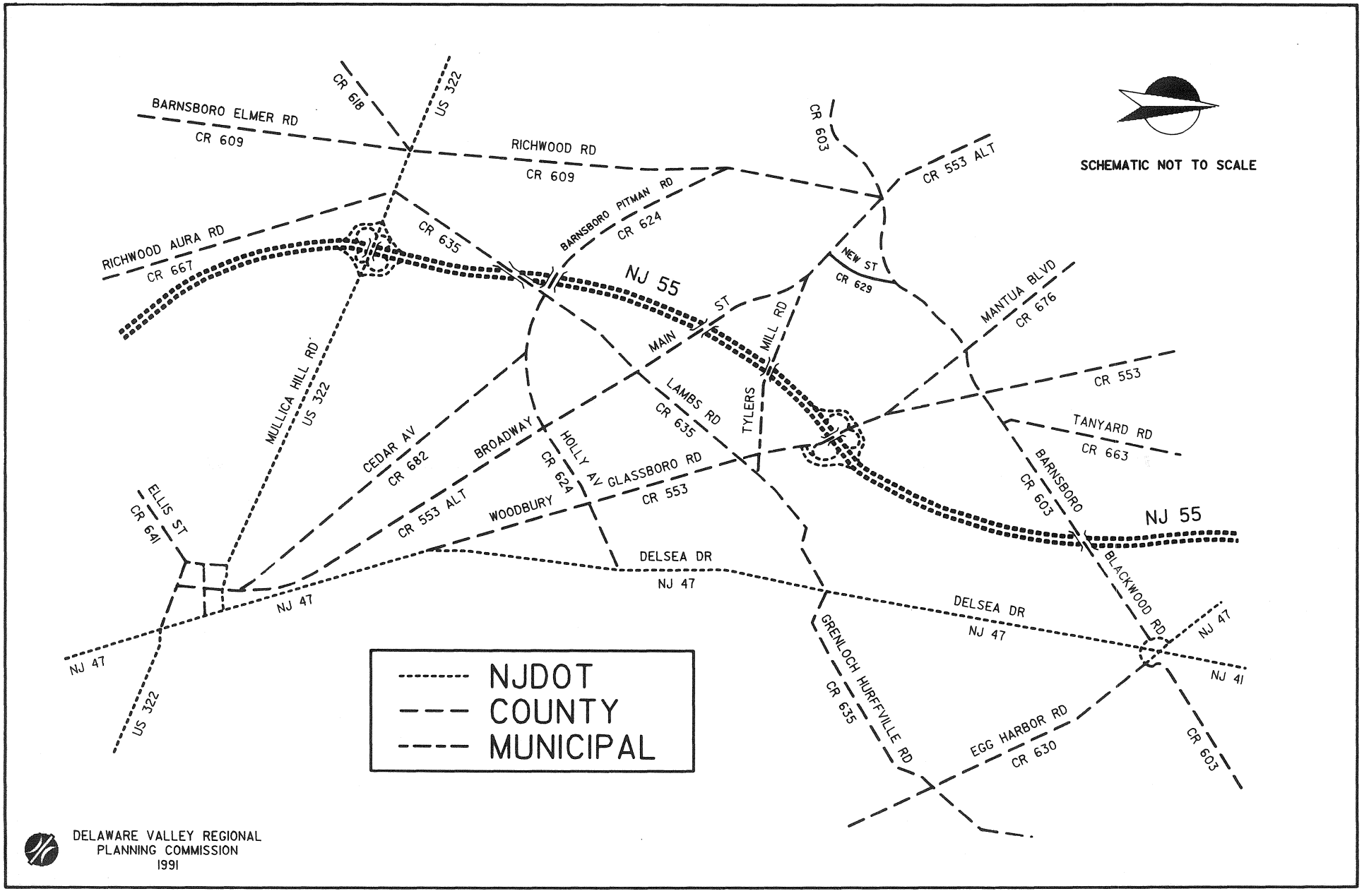


Figure 3C: ROAD OWNERSHIP

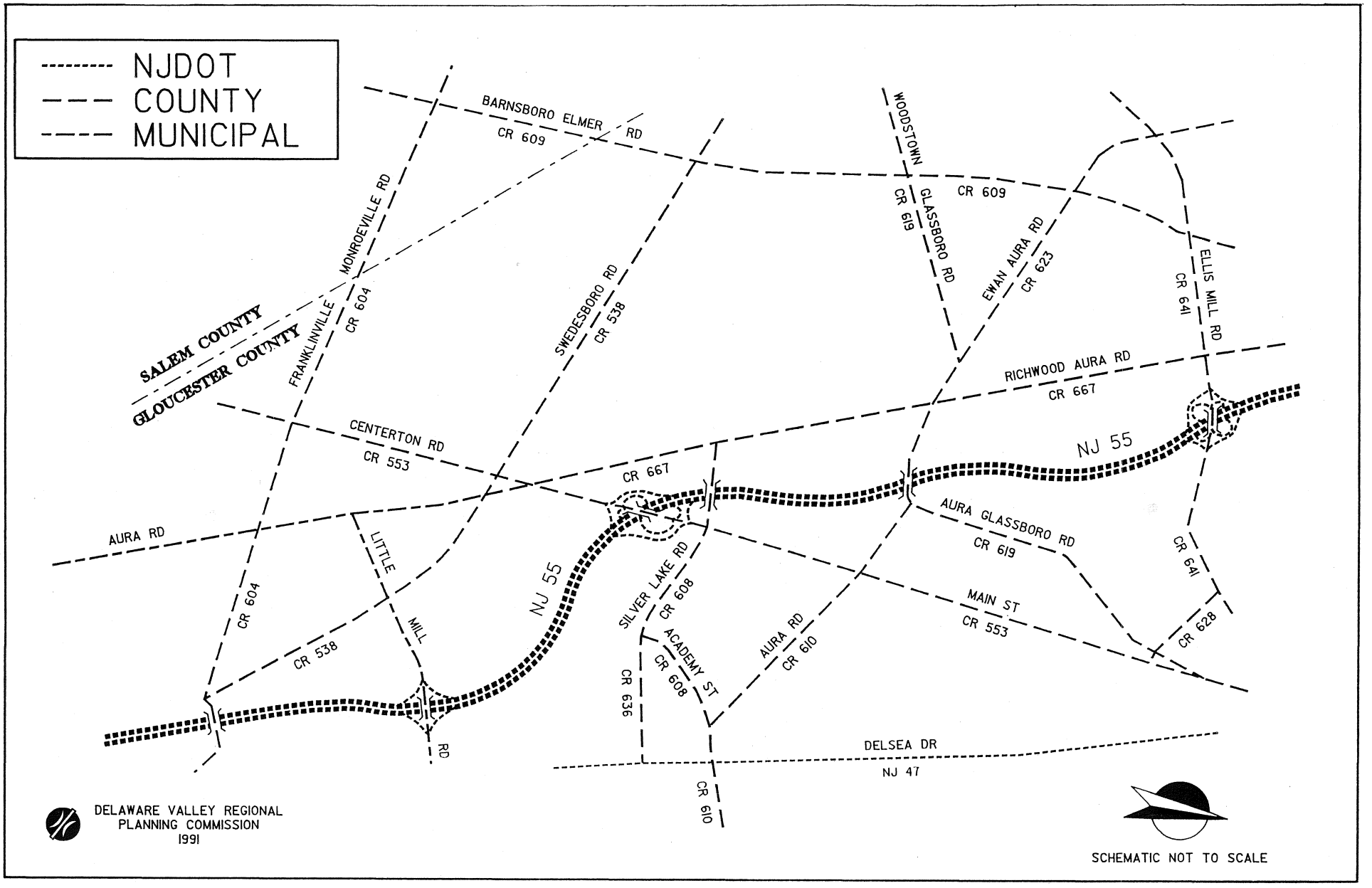
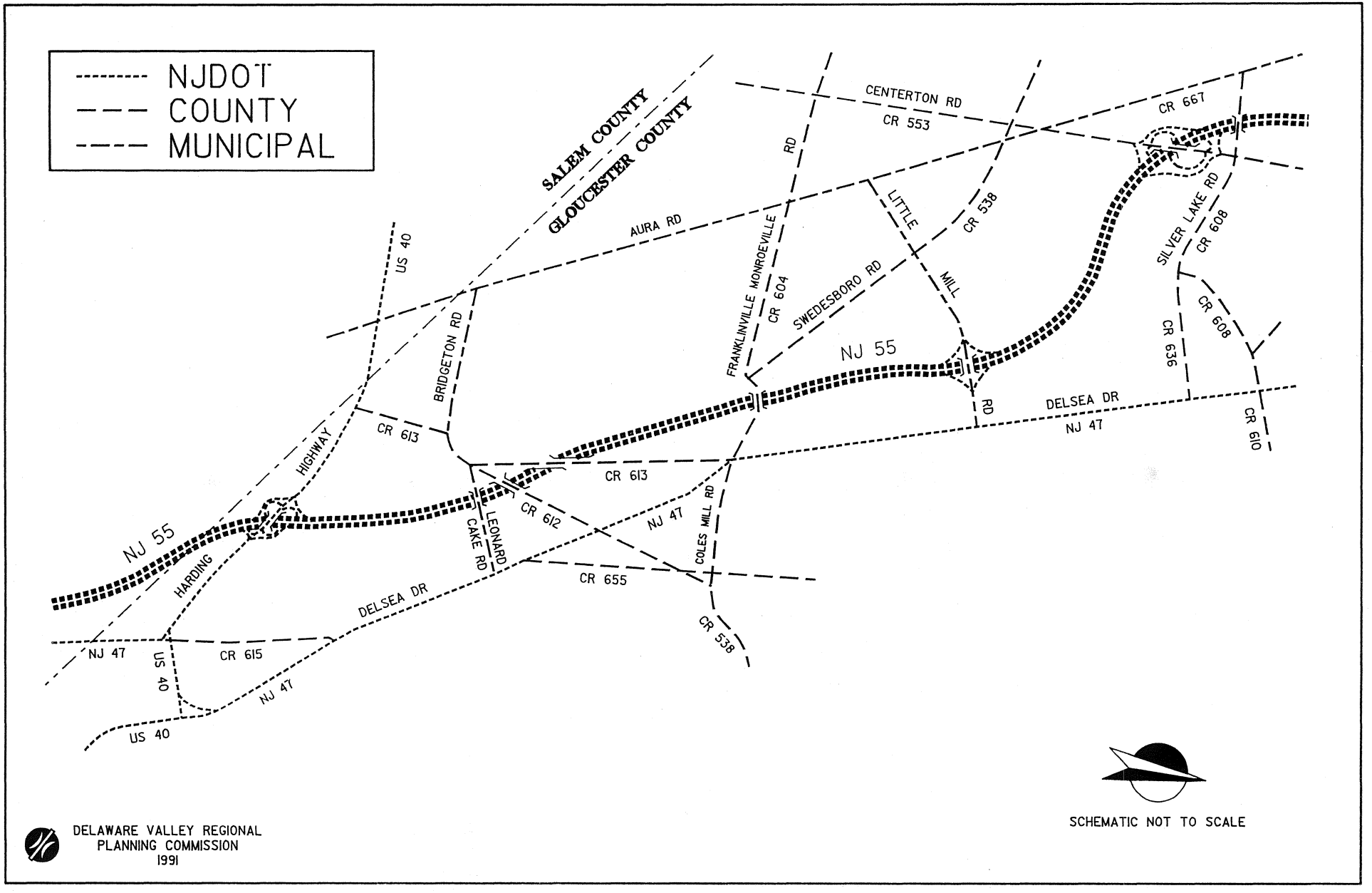


Figure 3D: ROAD OWNERSHIP



Roads under municipal jurisdiction include Deptford Center Road (Deptford Township), Bankbridge Road (Deptford Township), Tyler Mill Road (Mantua Township), High Street (Glassboro), Little Mill Road (Franklin Township), Aura Road (Elk and Franklin Townships), and Bridgeton Road (Franklin Township).

The remaining roads in the highway network are under county jurisdiction.

Right-of-Way

The proposed rights-of-way for county roads are established on the county's Official Map, amended in 1987. The county is in the process of updating the official map. Generally, the right-of-way width is 70 ft. (see Figure 4). The exemptions, all assigned a 60 ft. right-of-way, are Fox Run Road (CR 647), New Street (CR 629), Holly Avenue (CR 624), Cedar Avenue (CR 682), Harrisonville-Richwood Road (CR 618), Sewell Street (CR 628), Ewan-Aura Road (CR 623), Silver Lake Road/Academy Street (CR 608), Clayton Avenue (CR 636), Porchtown-Franklinville Road (CR 613), and Malaga-Newfield Road (CR 615).

Legal rights-of-way for county roads were not readily available.

Number of Lanes and Cartway Width

Generally, study area roads are two-lane roadways, one lane in each direction. Road widenings at intersections or major residential/commercial developments for turn lanes are limited in nature and do not affect overall roadway capacity. The exceptions, in terms of number of lanes, are Clements Bridge Road (CR 544), Westville-Almonesson Road (CR 621), and Deptford Center Road, all of which are widened to either four or six lanes in the vicinity of the Deptford Mall. NJ Route 47 is widened to four lanes in Glassboro in the vicinity of the shopping centers. At NJ Route 55 Freeway interchanges, the cross roads are usually widened to four lanes to improve ramp terminal operations.

Cartway widths for the key roads are presented in Figure 5. The widths represent generalized widths and do not account for limited widenings and pavement reductions. The cartway widths were obtained from field measurements. On the figure, the type of line denotes overall cartway width, the accompanying numbers denote travelway width and typical shoulder width. Typically, roads have 11-12 ft. travel lanes and at least 2 ft. shoulders. The narrower cartways are located in the southern portion of the study area.

On its Official Map, Gloucester County identified proposed cartway widths, which are shown in Figure 6. Typically, 40 ft. cartways are proposed. The major exemptions, assigned a 50 ft. cartway, are Cooper Street (CR 534/706), Good Intent Road (CR 534), Clements Bridge Road (CR 544), Westville-Almonesson Road (CR 621) between the New Jersey Turnpike and Cooper Street, Egg Harbor Road (CR 630), Woodbury-Glassboro Road (CR 553), Main Street (CR 553 Alt), and Blackwoodtown Road (CR 655).

Figure 4A: OFFICIAL RIGHT-OF-WAY ON COUNTY ROADS

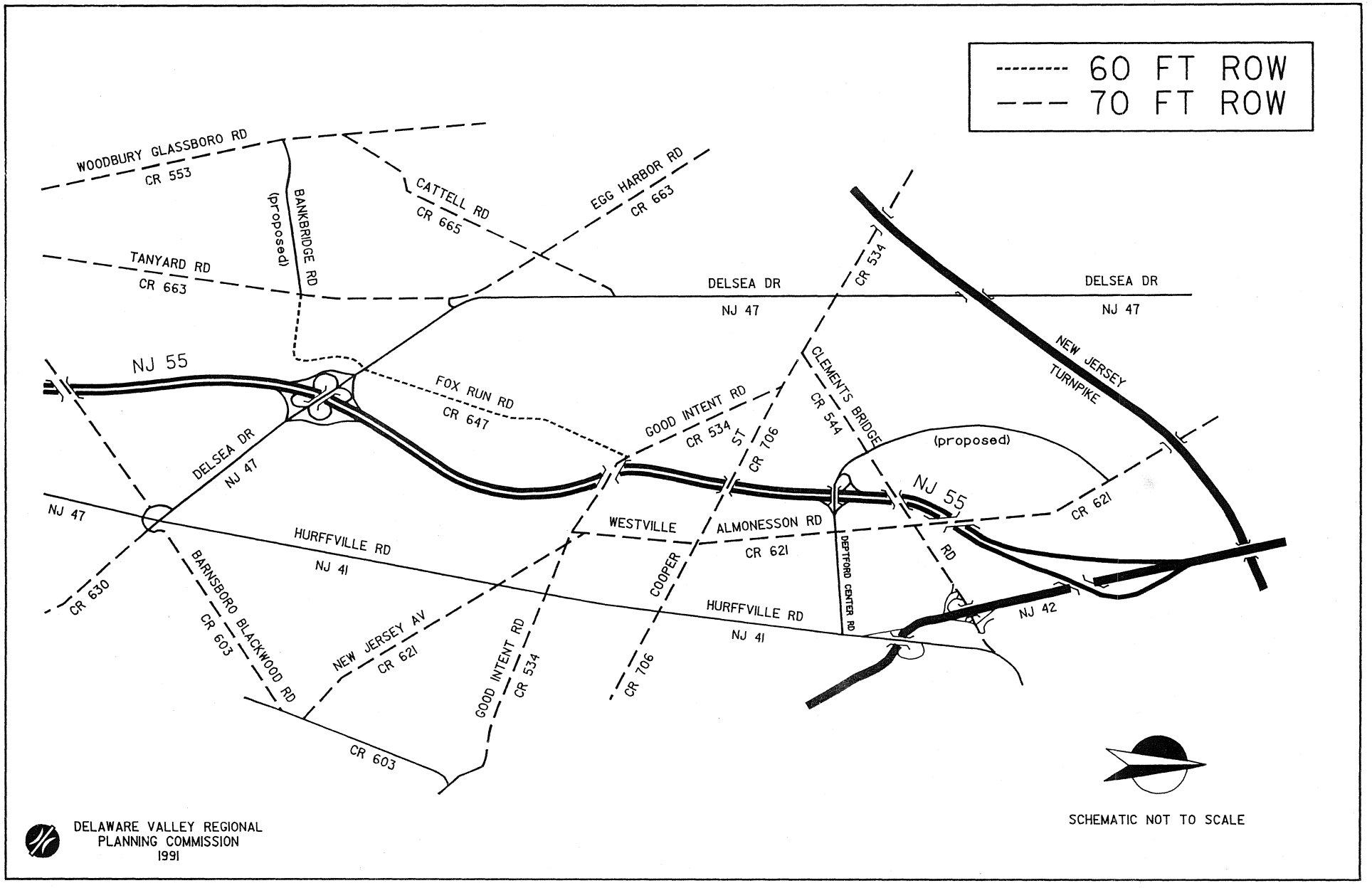


Figure 4B: OFFICIAL RIGHT-OF-WAY ON COUNTY ROADS

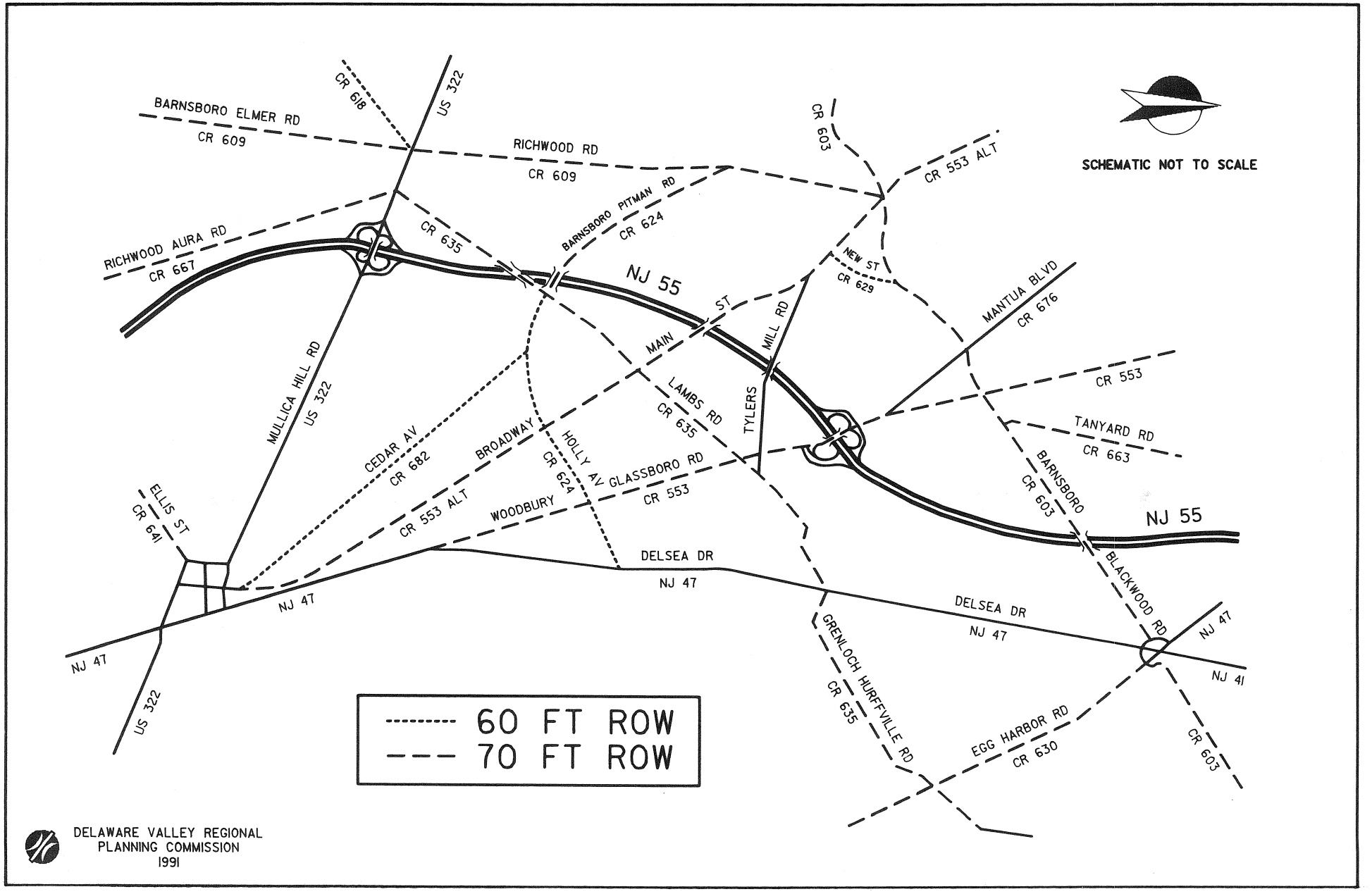


Figure 4C: OFFICIAL RIGHT-OF-WAY ON COUNTY ROADS

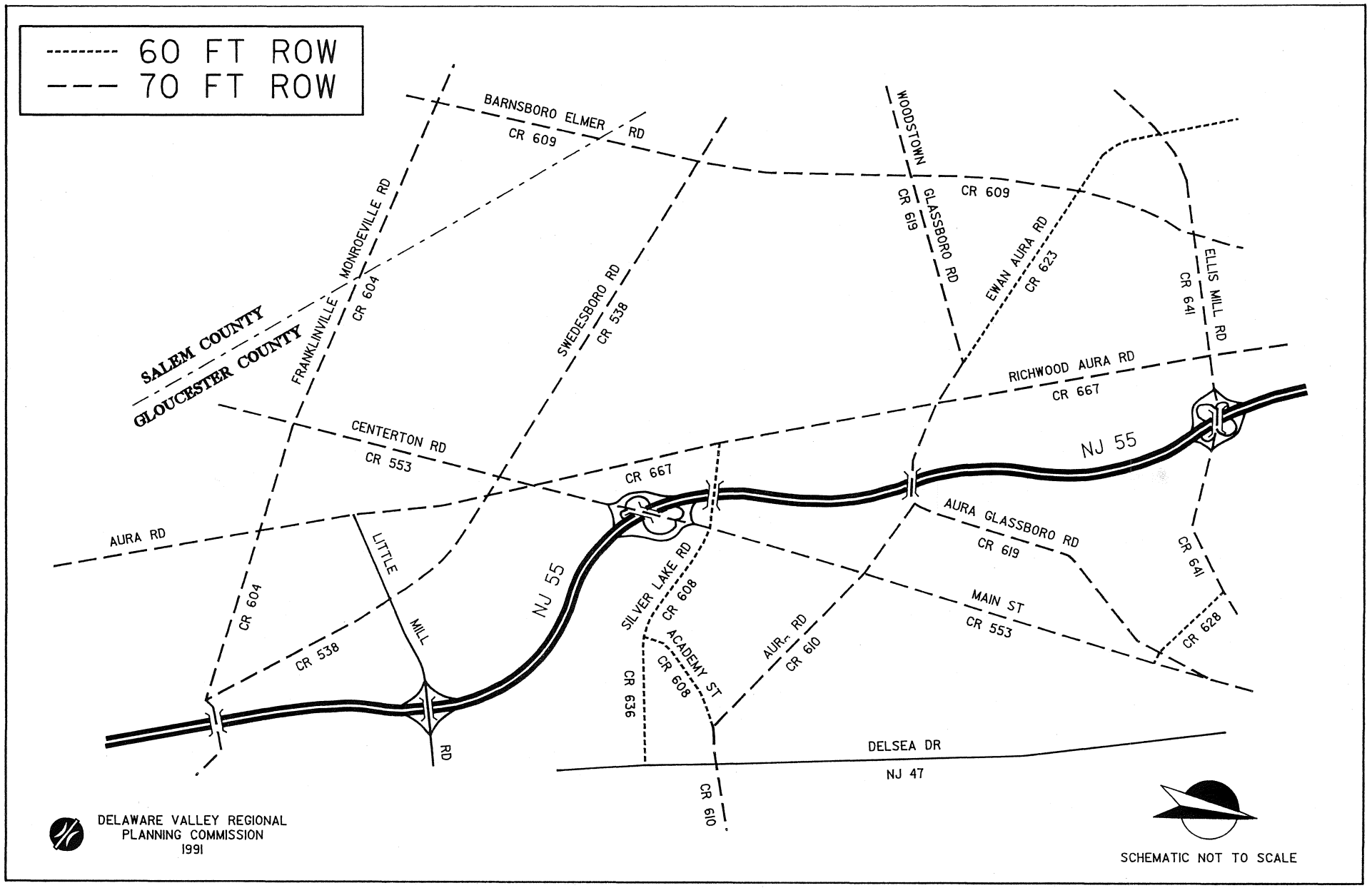


Figure 4D: OFFICIAL RIGHT-OF-WAY ON COUNTY ROADS

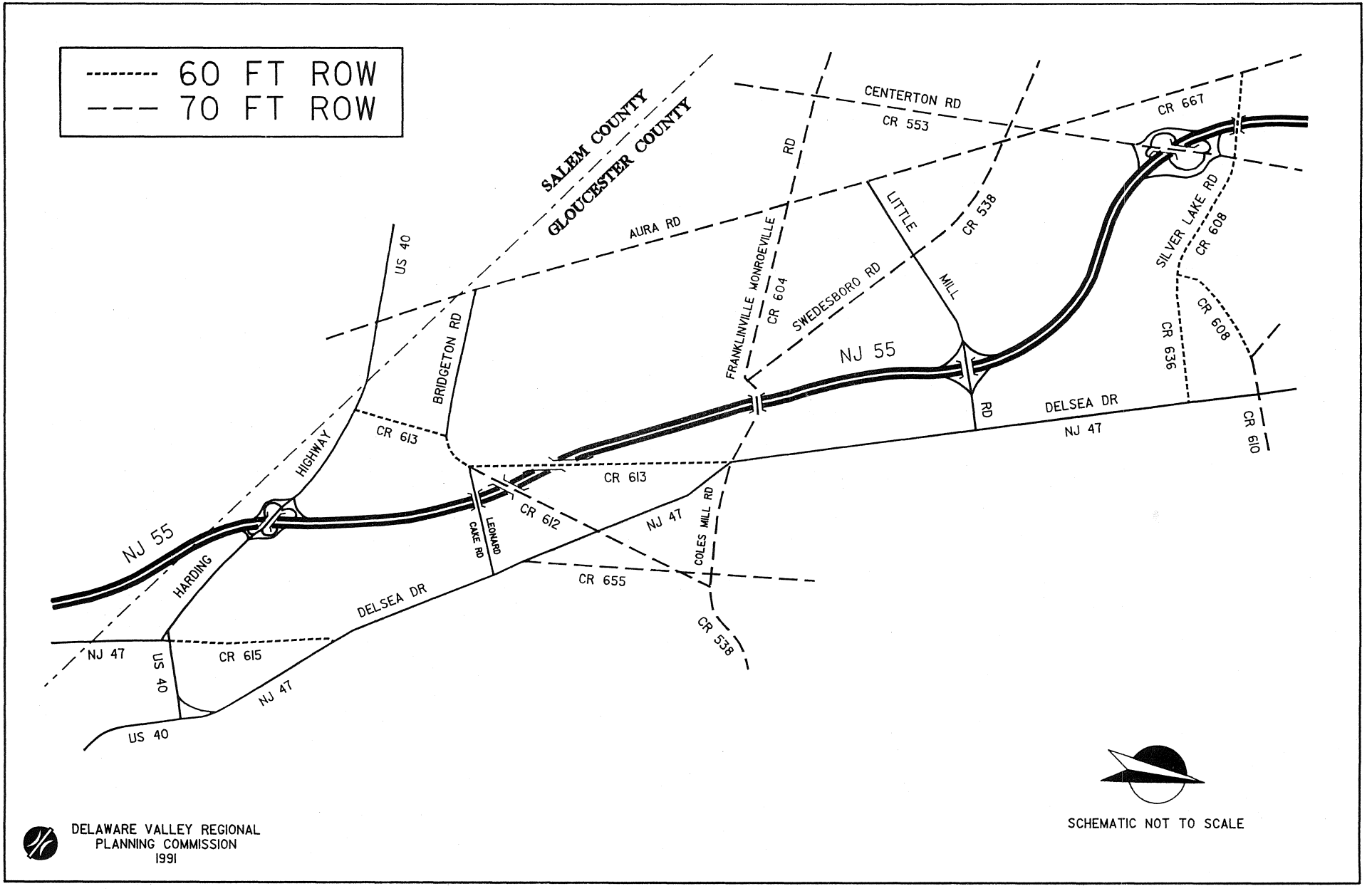


Figure 5A: EXISTING CARTWAY WIDTHS

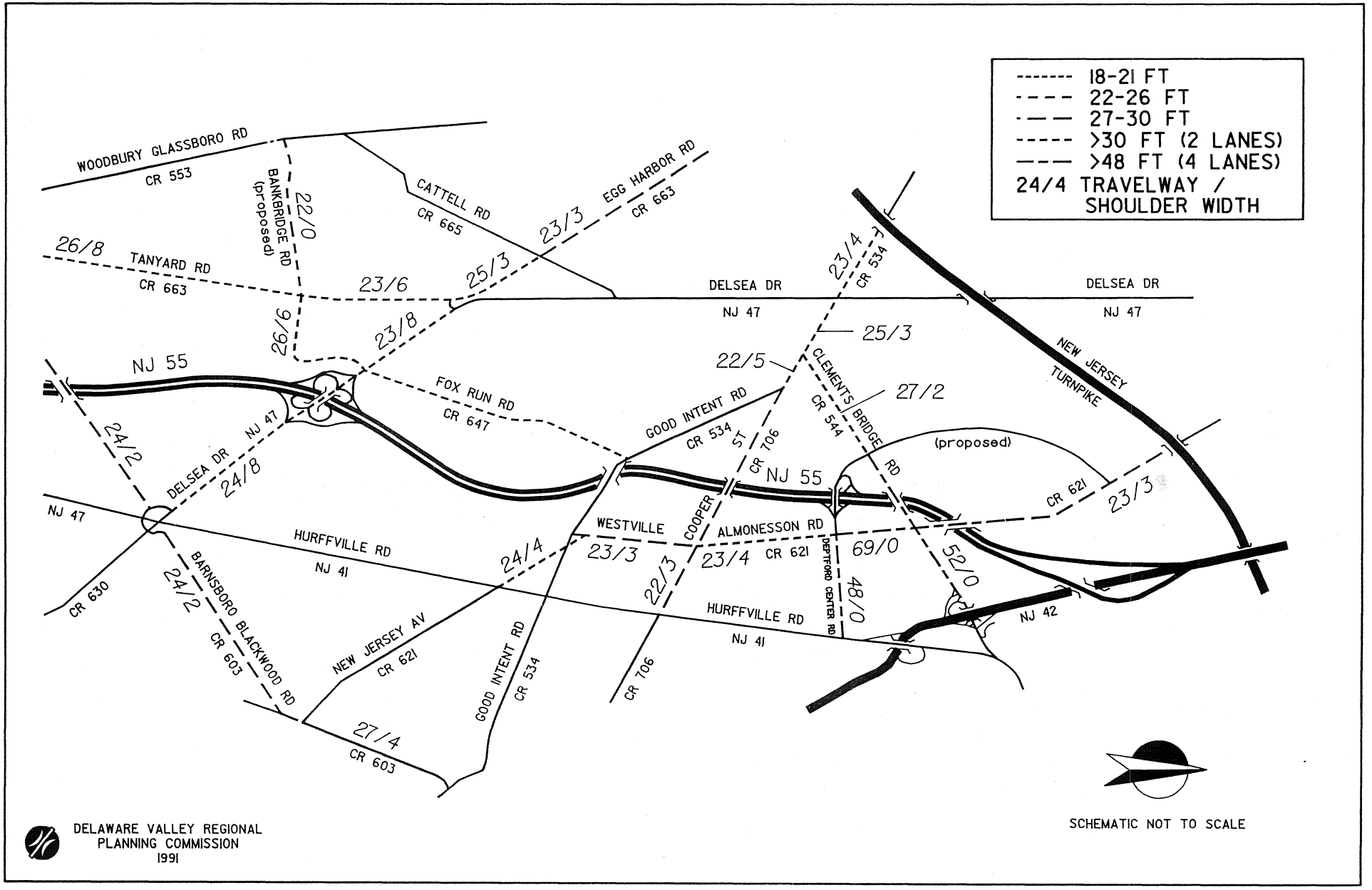


Figure 5B: EXISTING CARTWAY WIDTHS

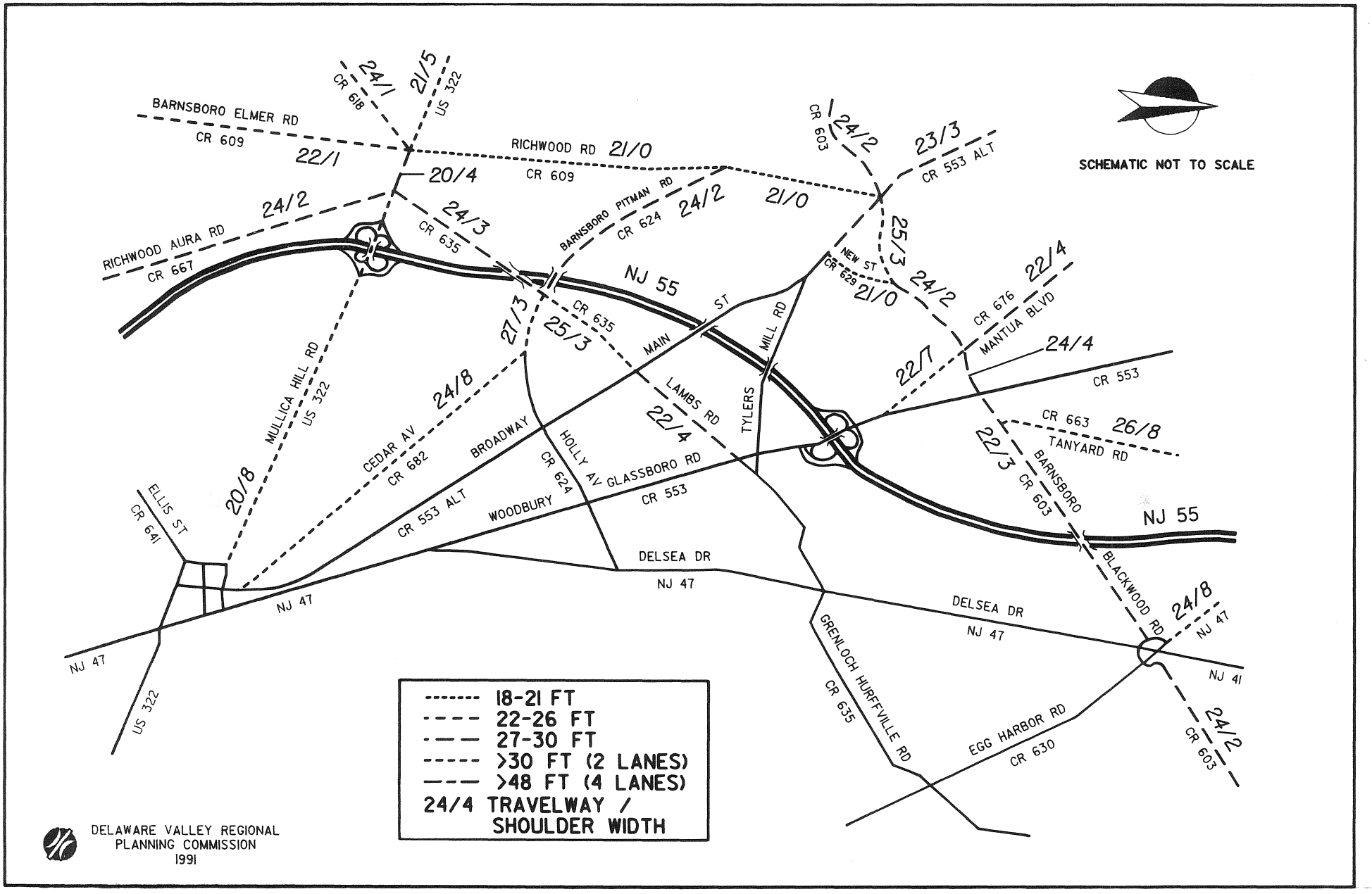
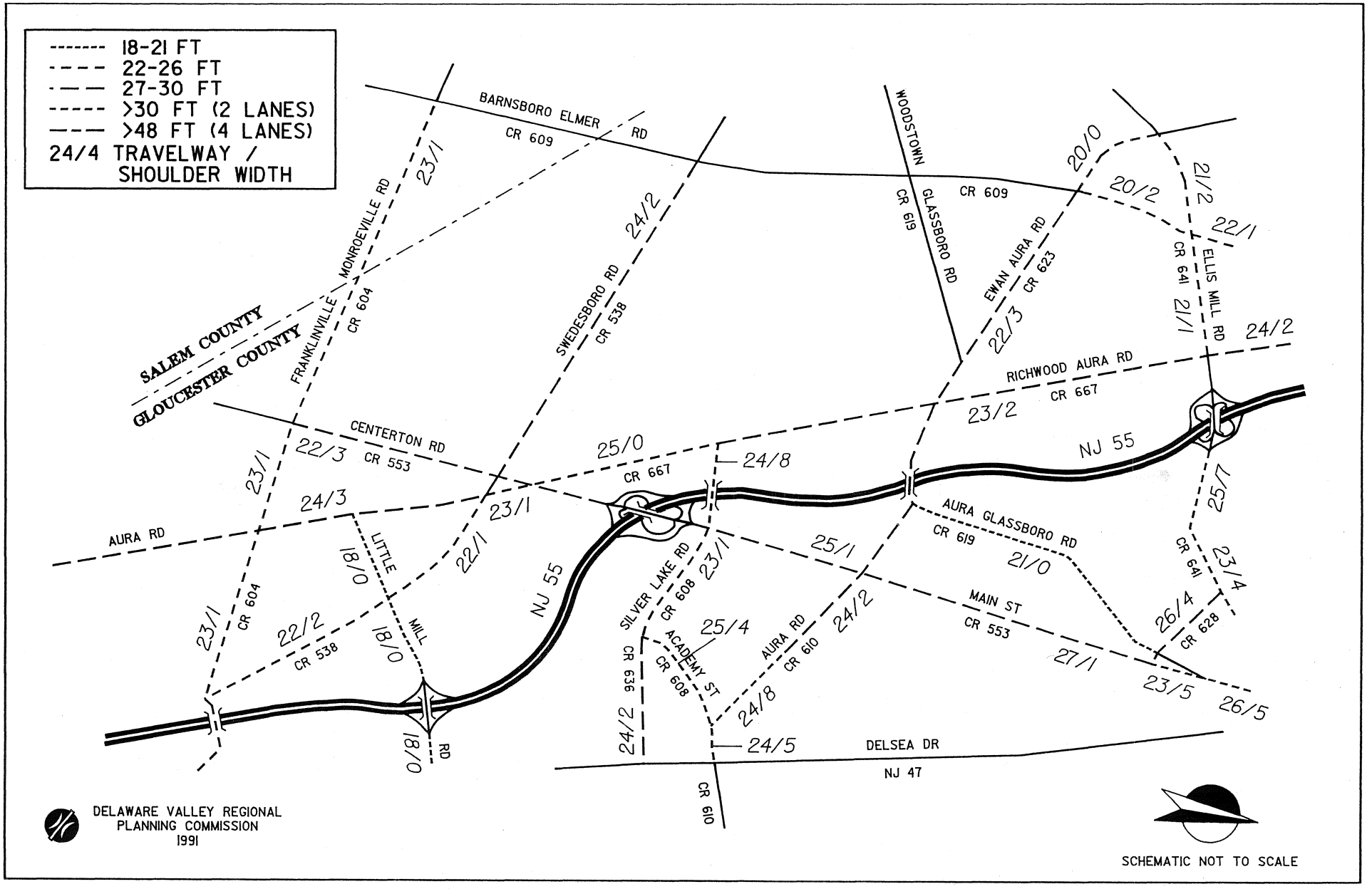


Figure 5C: EXISTING CARTWAY WIDTHS



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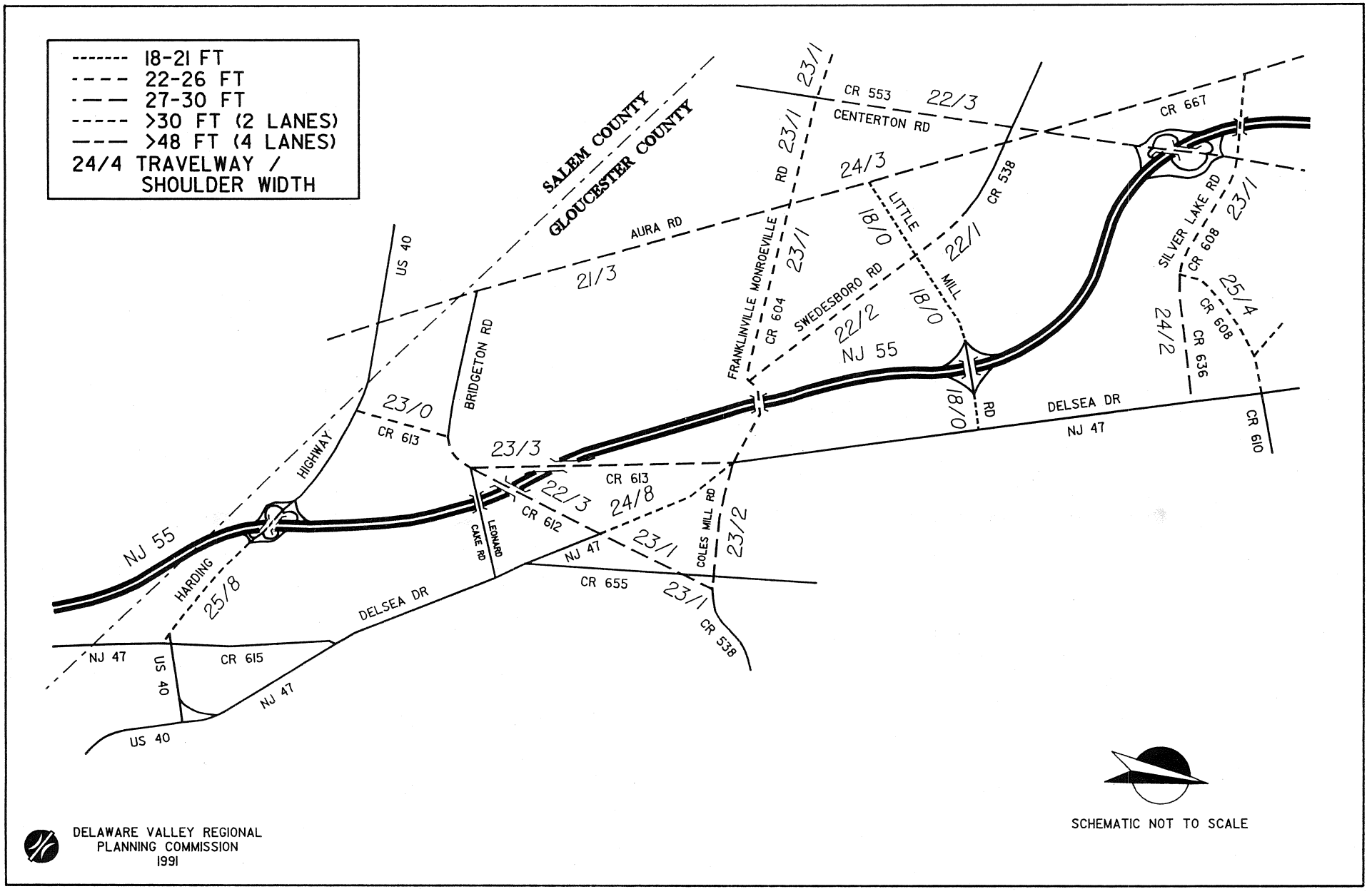


Figure 6A: OFFICIAL CARTWAY WIDTH ON COUNTY ROADS

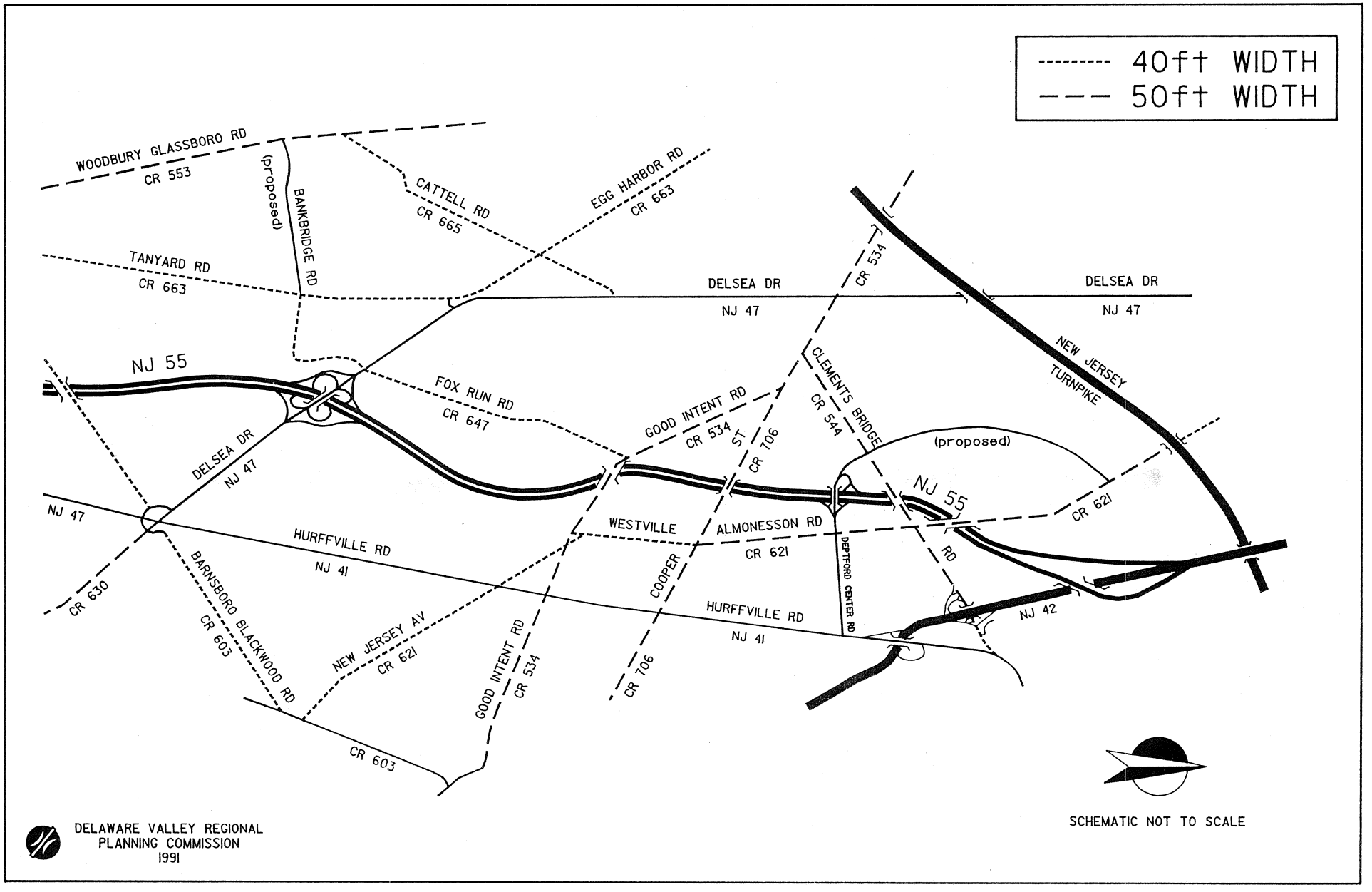


Figure 6B: OFFICIAL CARTWAY WIDTH ON COUNTY ROADS

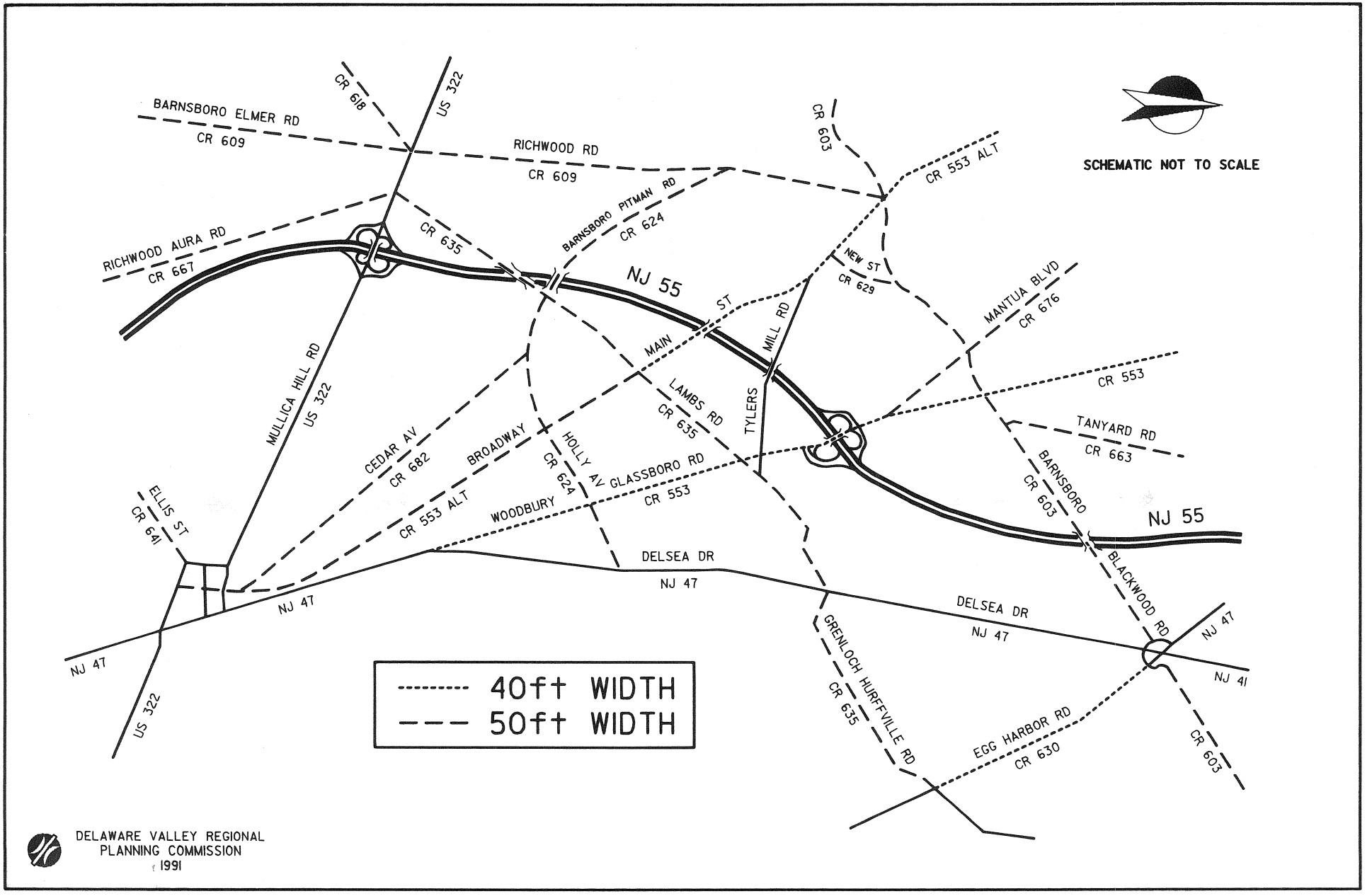
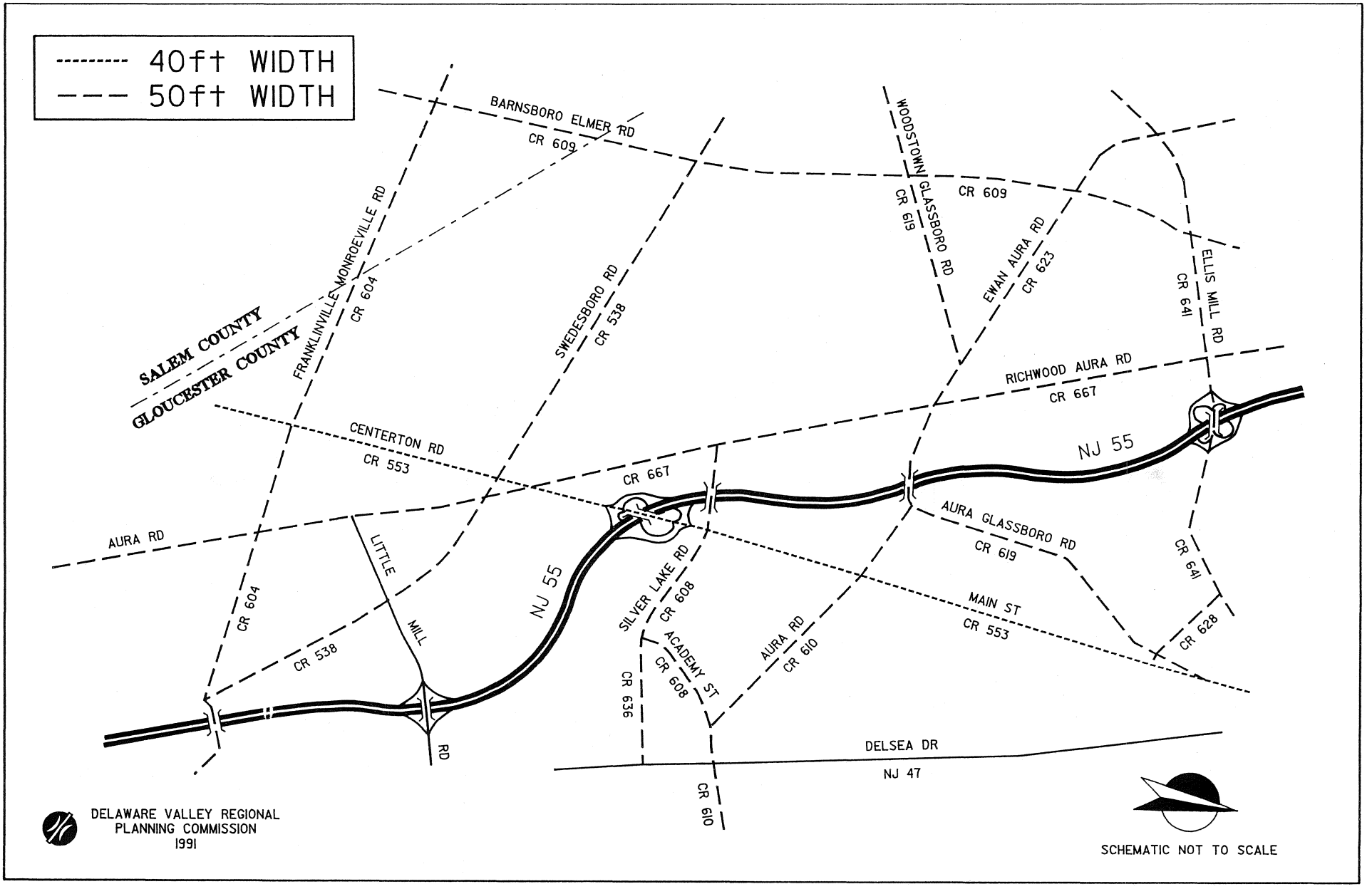


Figure 6C: OFFICIAL CARTWAY WIDTH ON COUNTY ROADS



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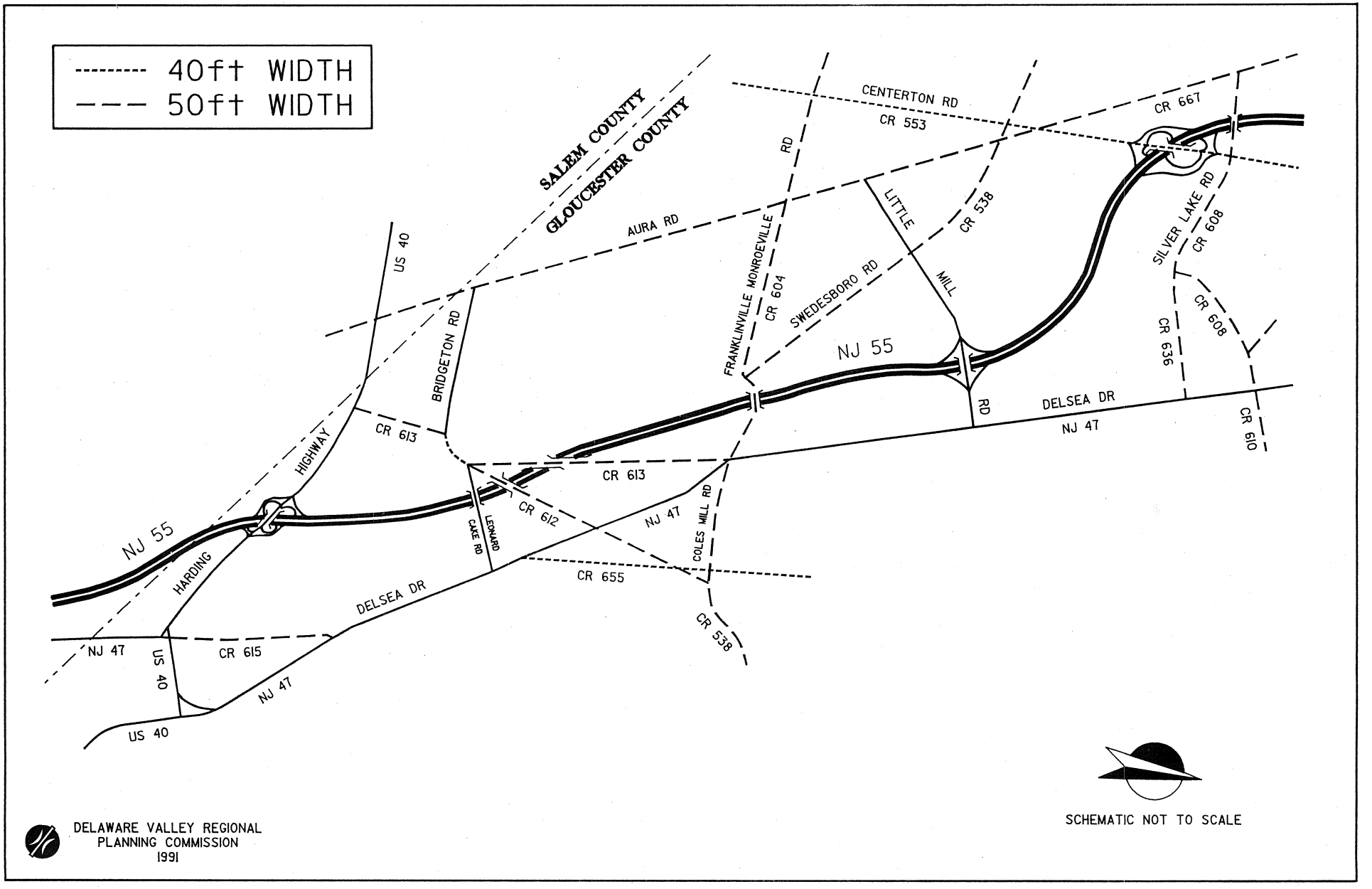


Intersection Traffic Control

Intersections can be characterized by the type of traffic control and approach lane configuration.

The type of traffic control device at each intersection under study is shown in Figure 7. Intersections are either under the control of traffic signals, stop signs or flashing beacons. In the more built-up areas, intersections tend to be controlled by traffic signals. In the less built-up areas where vehicles tend to travel at high speeds, flashing beacons are used.

The intersections under study generally have only one approach lane and one departure lane. Only in Deptford and Washington townships and Glassboro are there multiple approach lanes at intersections.

Other Physical Characteristics

An inventory of other physical conditions of the central Gloucester County study area was obtained through field observations. Due to the cursory nature of the data gathering methodology, specific features may be missing. This is particularly true for bridges and culverts, where it is especially difficult to identify culverts. Locations of physical attributes such as rail road crossings, curves, bridges and bumps/dips are displayed on Figure 8.

The Seashore rail line runs parallel to NJ Route 55 Freeway, bisecting the study area. South of Glassboro, the rail line splits with one branch destined to Cumberland County and the other branch (partially abandoned) towards Salem County. The net result is that 21 at grade rail crossings are located on key roads in the NJ Route 55 Freeway corridor.

Horizontal alignment, or curves, impact the safety and operation of the highway network. Curve signs are used where an engineering investigation of the roadway shows the recommended speed on the curve to be less than the speed limit established by law. In other words, vehicles cannot safely maintain the legal speed limit for a given degree of curvature and super elevation. Placement of curve signs does not automatically signify the need to reconstruct a curve. Similarly, curves with no warning signs may need to be reconstructed for other reasons, such as skidding or sight distance problems. Figure 8 identifies locations where curve signs are posted and where signs are not posted but may be warranted.

Locations of bridges and culverts are also shown in Figure 8. Structures with span lengths of less than 20 ft. are designated as culverts. All bridges, other than those on state highways, are owned and maintained by the county. Again, it is very difficult to identify all bridges and culverts in the study area.

Bump or dip signs are posted at four locations in the study area. Bumps and dips present a potential hazard to motorists; therefore, these features are also shown on the figure.

Figure 7A: EXISTING INTERSECTION TRAFFIC CONTROLS

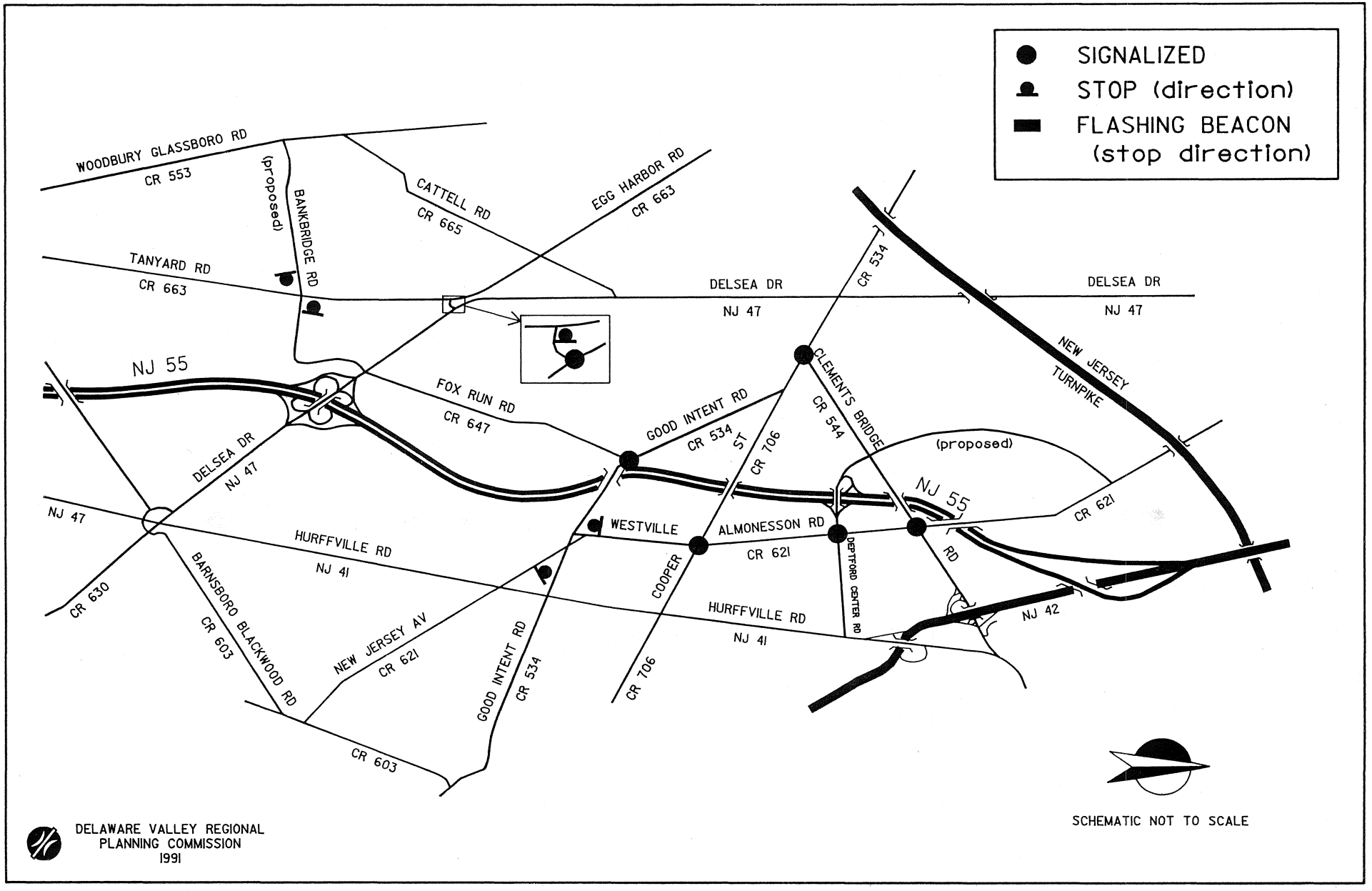


Figure 7B: EXISTING INTERSECTION TRAFFIC CONTROLS

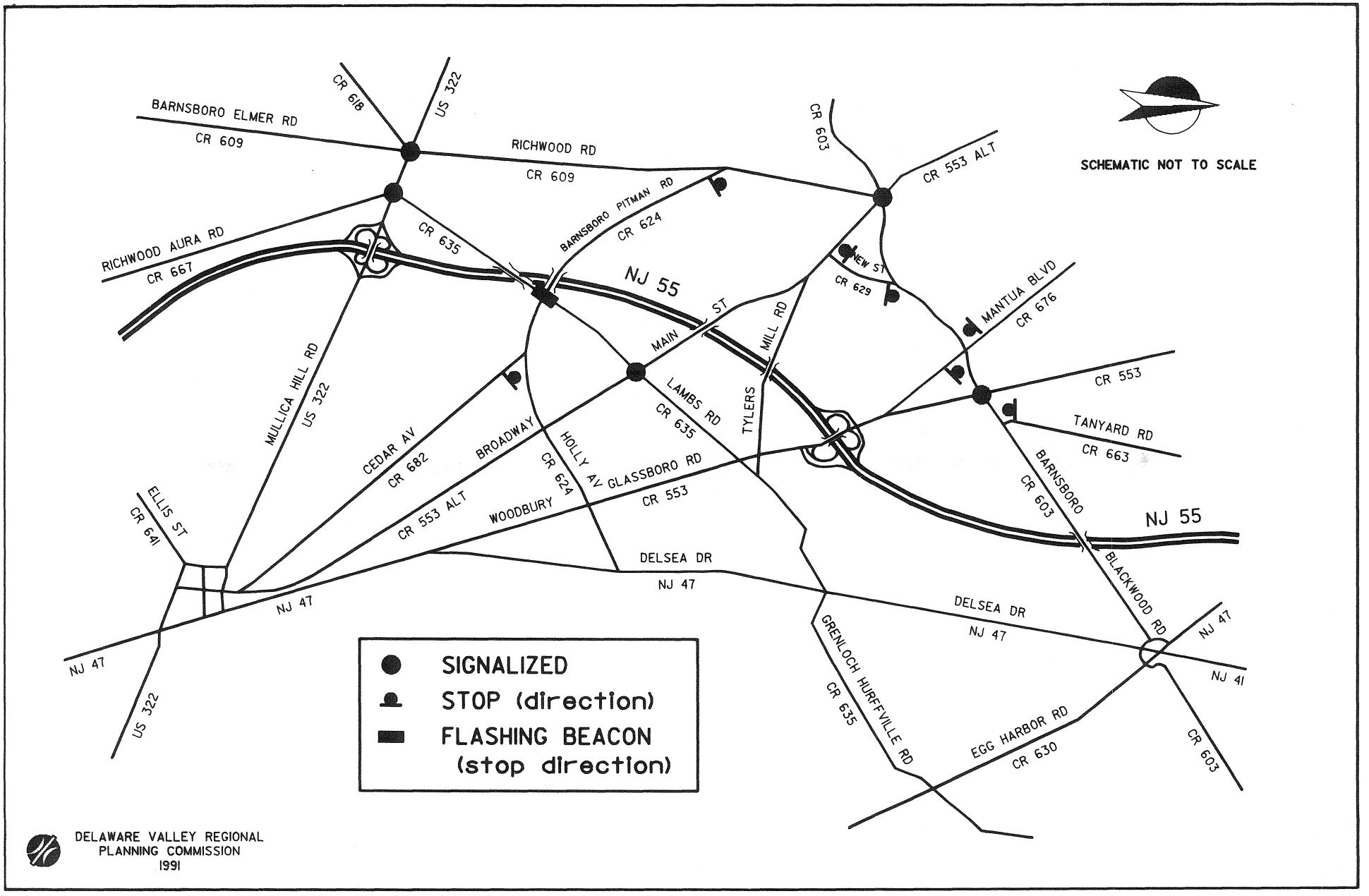


Figure 7C: EXISTING INTERSECTION TRAFFIC CONTROLS

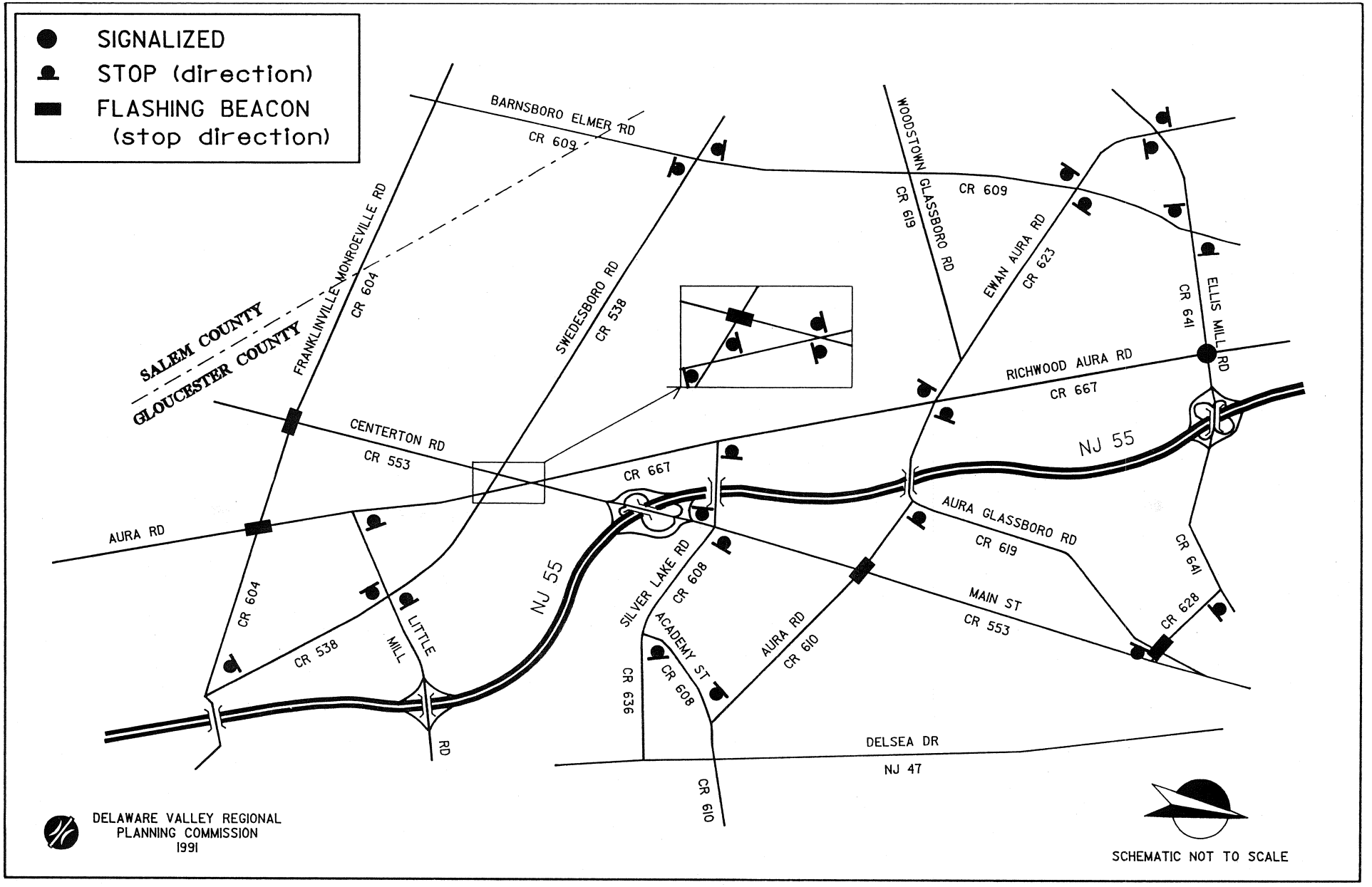


Figure 7D: EXISTING INTERSECTION TRAFFIC CONTROLS

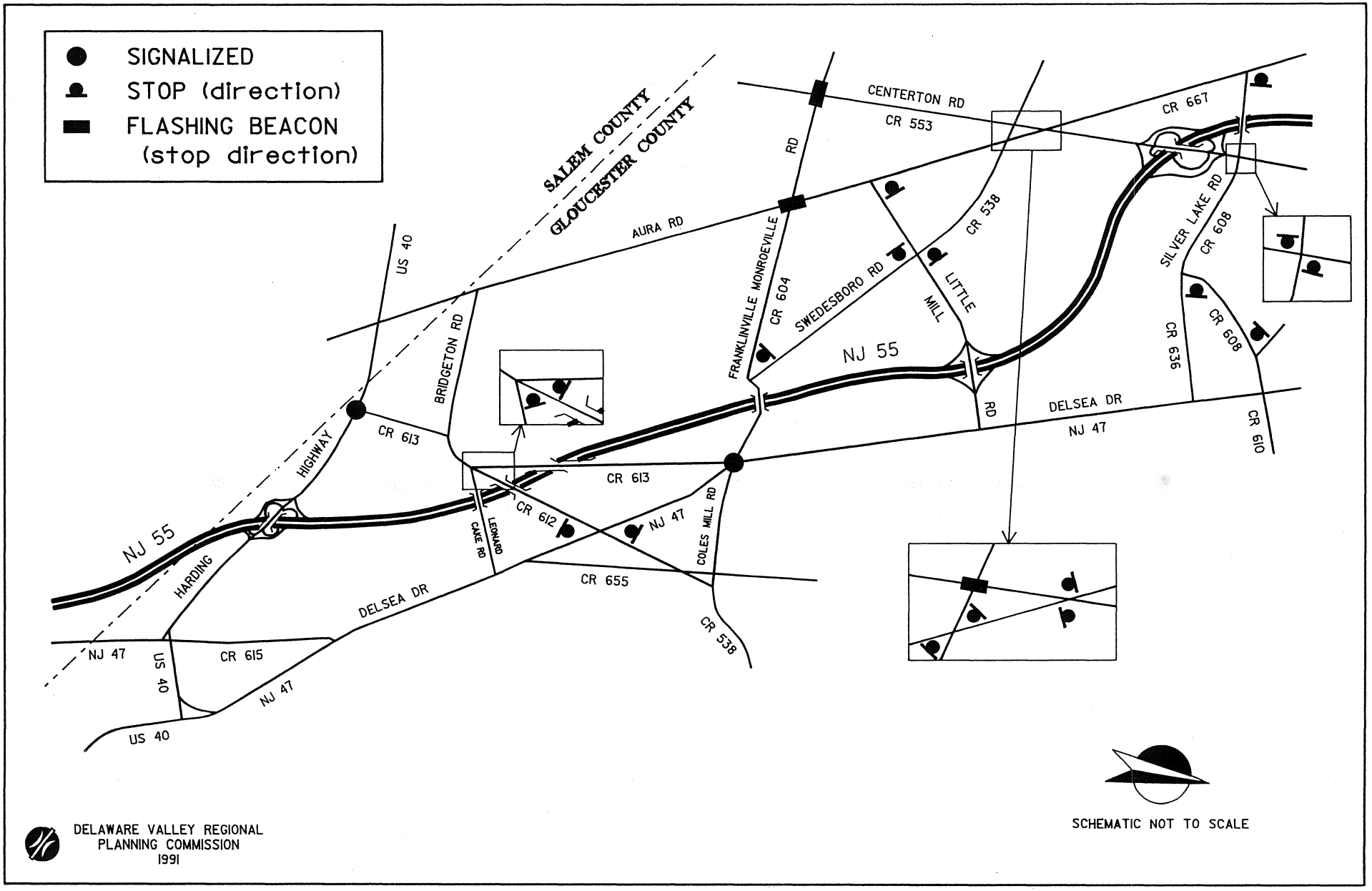


Figure 8A: OTHER PHYSICAL CHARACTERISTICS OF THE ROAD SYSTEM

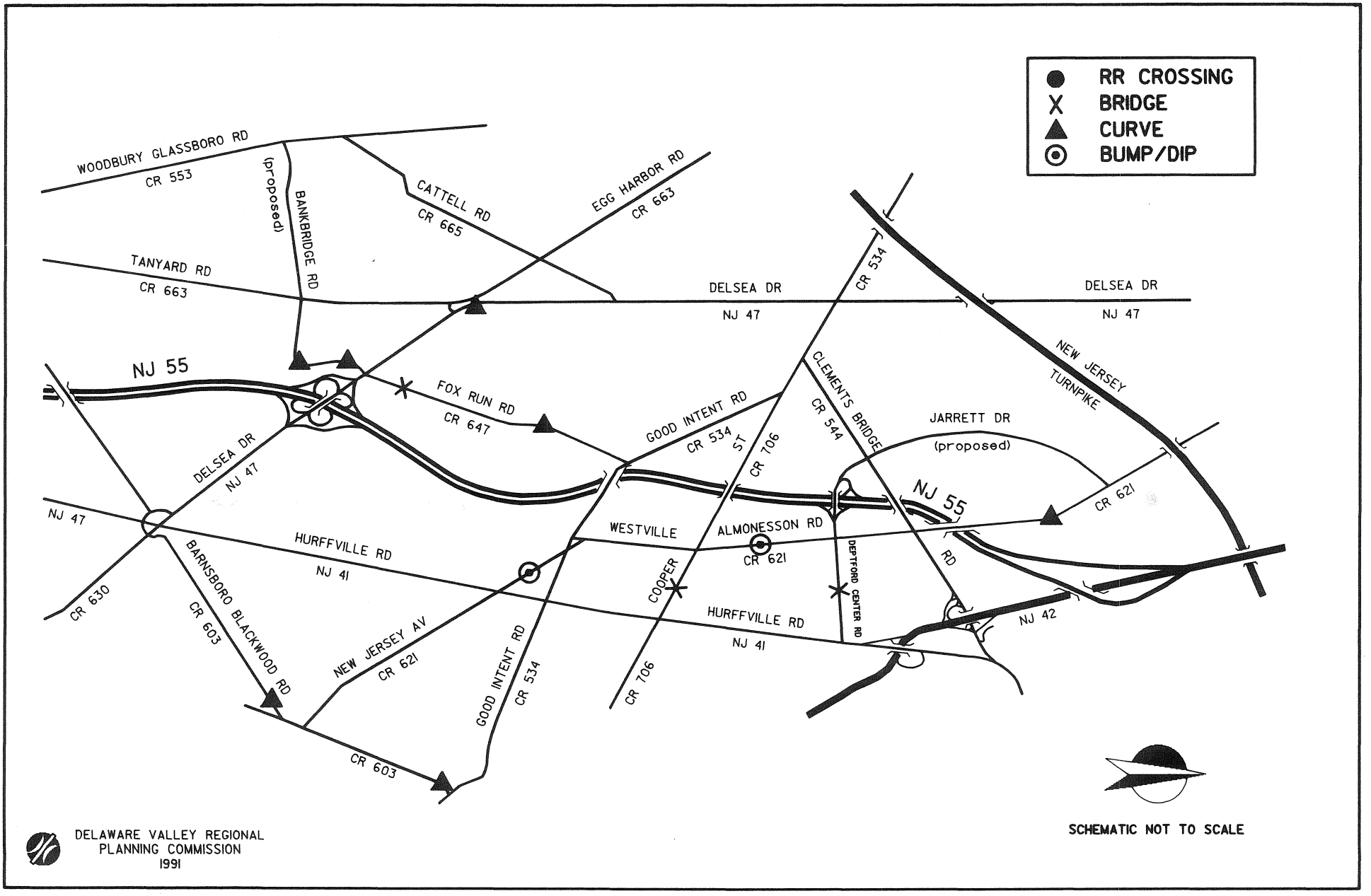


Figure 8B: OTHER PHYSICAL CHARACTERISTICS OF THE ROAD SYSTEM

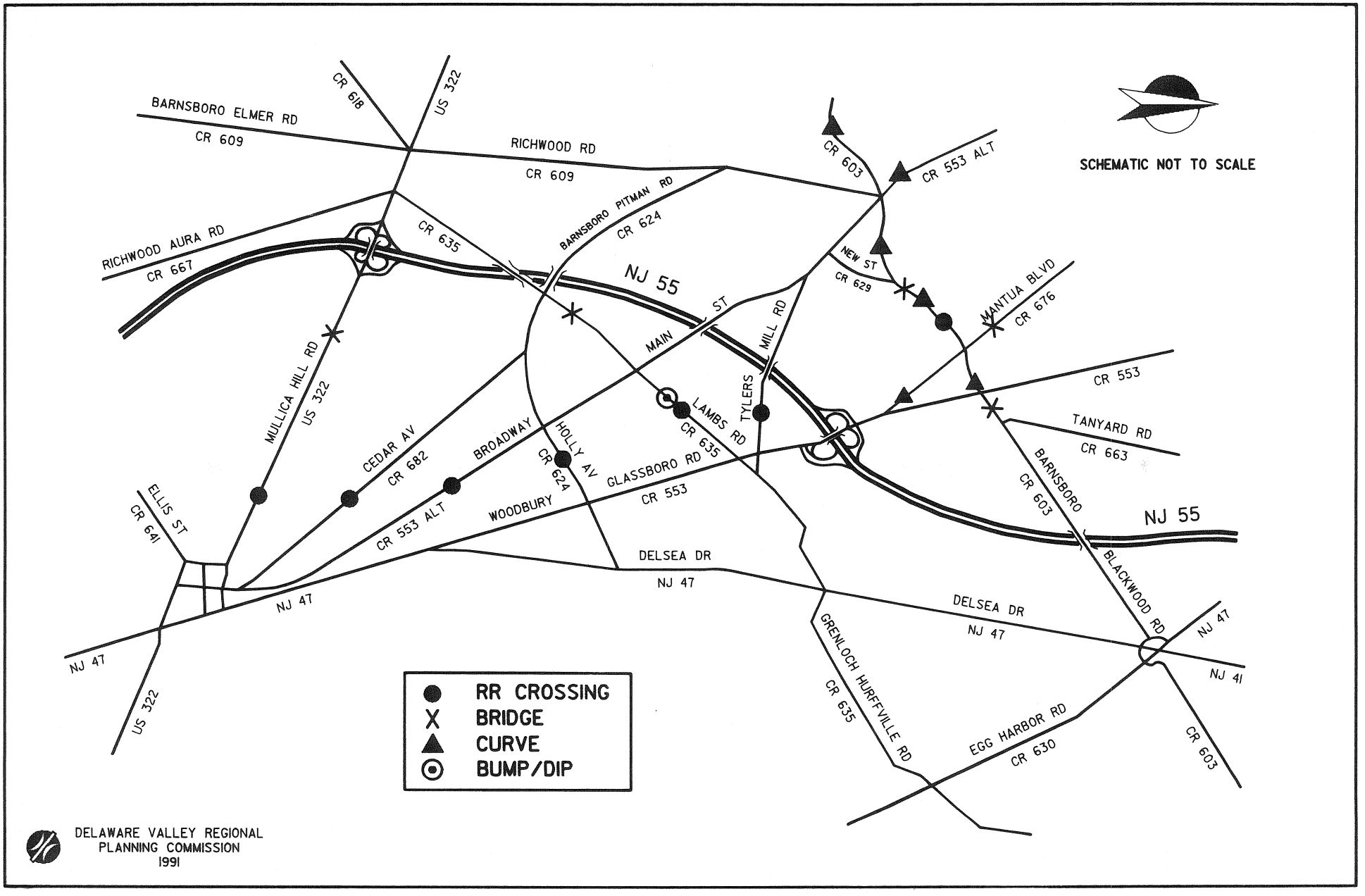


Figure 8C: OTHER PHYSICAL CHARACTERISTICS OF THE ROAD SYSTEM

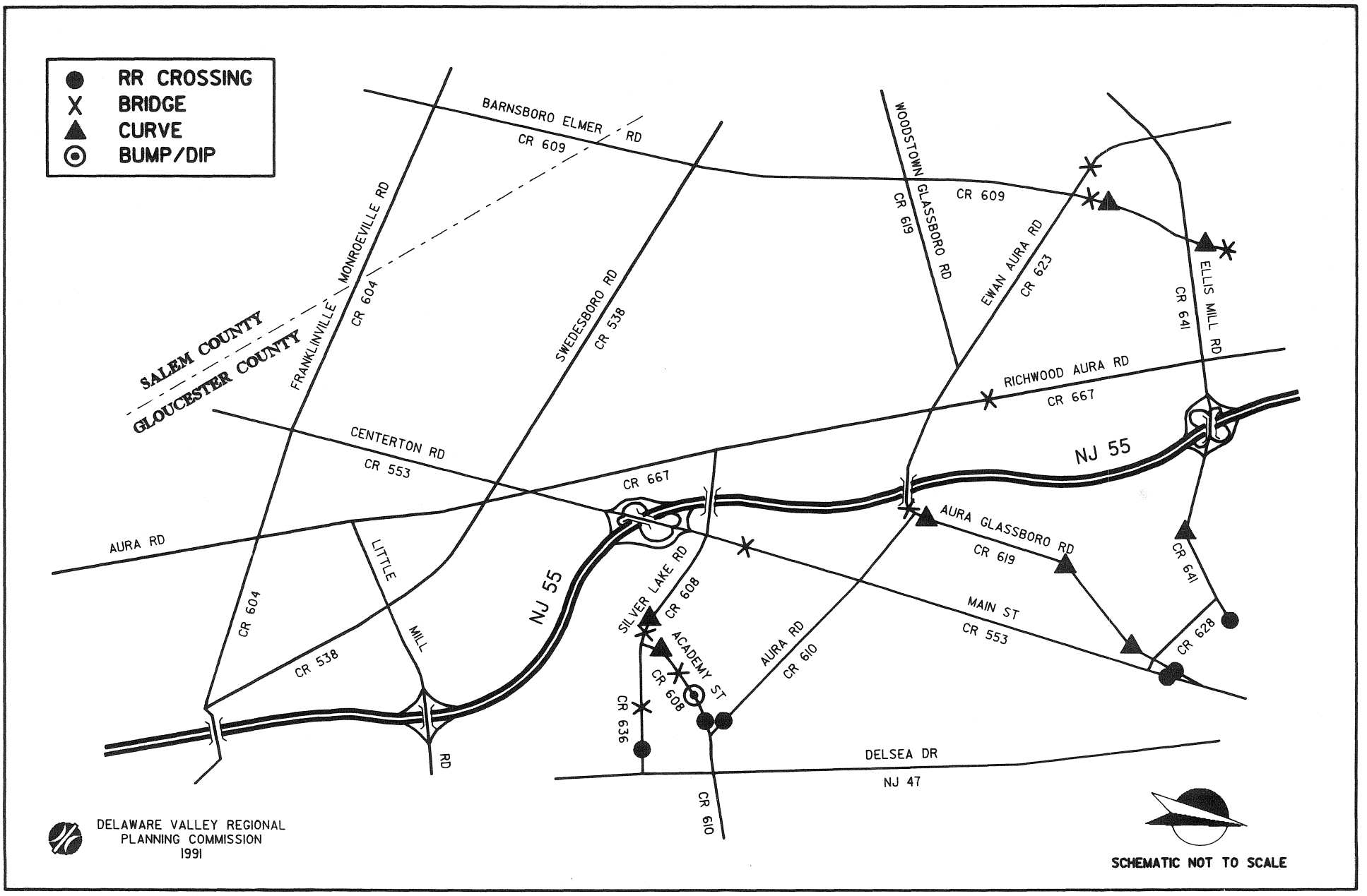
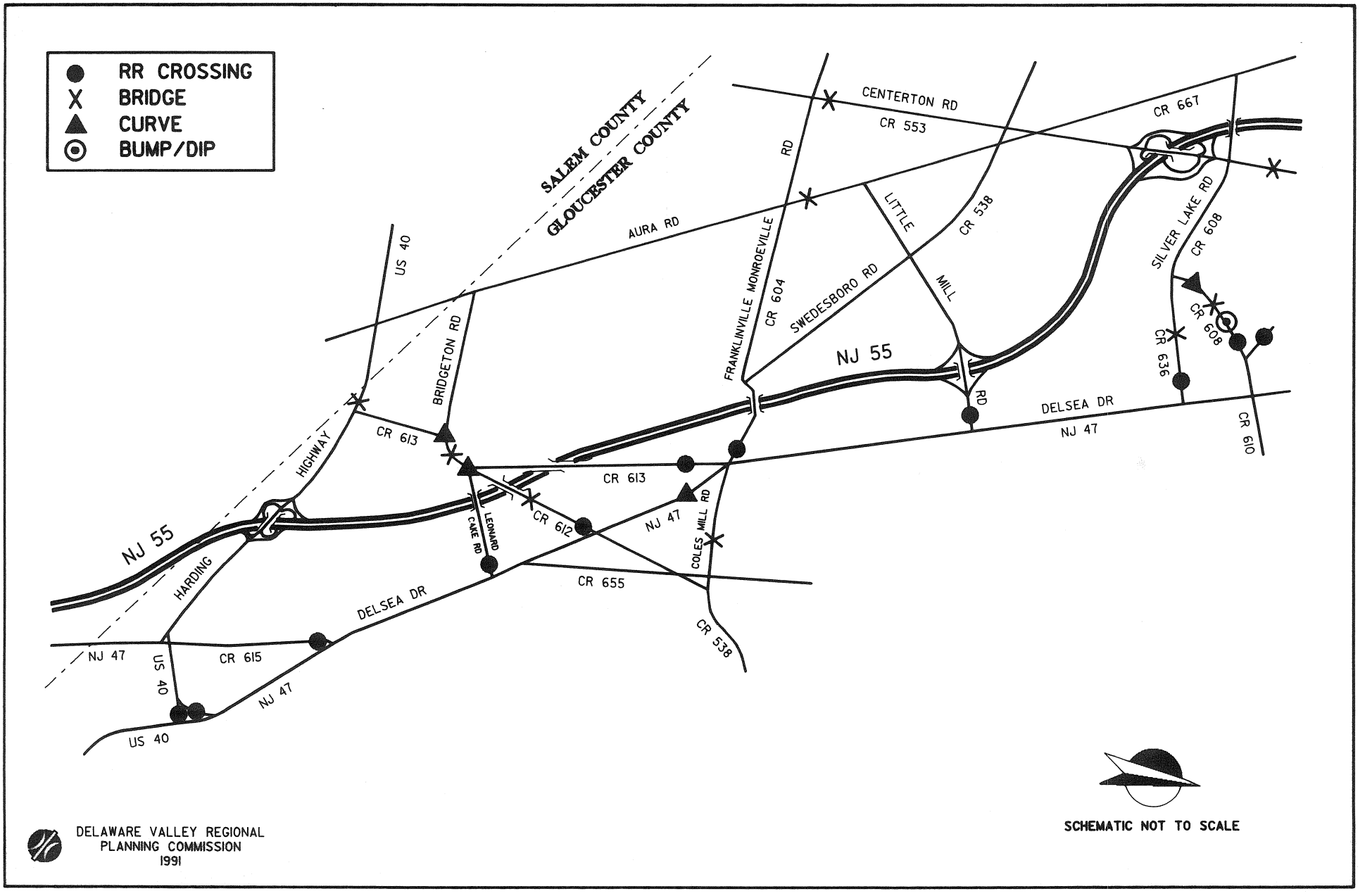


Figure 8D: OTHER PHYSICAL CHARACTERISTICS OF THE ROAD SYSTEM



Traffic Regulations

Traffic regulations encompass speed restrictions, truck routes, truck restrictions, parking restrictions, school zones, and all other forms of traffic control devices.

According to state statutes, the speed limit on all roads is 50 mph, except in residential or business districts where it is 25 mph, or as posted. Very few roads in the southern portion of the corridor have posted speed limit signs; therefore the statutory speed limit (usually 50 mph) applies. In the northern portion of the corridor, speed limit signs exist on the majority of the roads. Posted speed limits for roads within the study area are shown in Figure 9.

Also shown in Figure 9 are locations where school zone/school crossing signs are situated. School zone signs are used to reduce the speed limit on roads adjacent to schools when children are present. School crossing signs signify the location of school crossings. No attempt is made on the figure to distinguish between school zone and school crossing signs. Similarly, the pedestrian crossing signs inventoried on the figure notify motorists of locations of heavy pedestrian activity crossing the road.

The locations of bridges that have weight restrictions placed on them for structural reasons are also shown on the diagram.

Functional Classification

For planning and design purposes, highways are classified by function. Although highways have two functions: 1) to provide mobility and 2) to provide land access, there is an incompatibility between these two objectives. Mobility requires high speeds for sustained travel, while land access mandates low speeds for frequent turning movements. The functional classification categories, as defined by the United States Department of Transportation (USDOT), are described in Table 1.

Two different sets of functional classification systems are relevant to the study area. The first system, established by Gloucester County through its Official Map, focuses exclusively on county roads. The second functional classification system, established by NJDOT, classifies all roads in New Jersey regardless of jurisdiction.

Gloucester County's functional classification is shown on Figure 10. Within the study area, the only roads ranked as major arterials are Woodbury-Glassboro Road (CR 553), Egg Harbor Road (CR 630), Clements Bridge Road (CR 544), and parts of Cooper Street (CR 534) and Westville-Almonesson Road (CR 621). The major arterials are concentrated in the northern portion of the NJ Route 55 Freeway corridor. South of Glassboro, all county roads are classified as either collectors or local roads except Centerton-Glassboro Road/Main Street (CR 553) and Fries Mill Road (CR 655) which are designated as minor arterials.

The Federal Highway Administration (FHWA) through NJDOT has developed a state-wide functional classification system as part of the National Highway Functional Classification. The

Figure 9A: TRAFFIC REGULATIONS

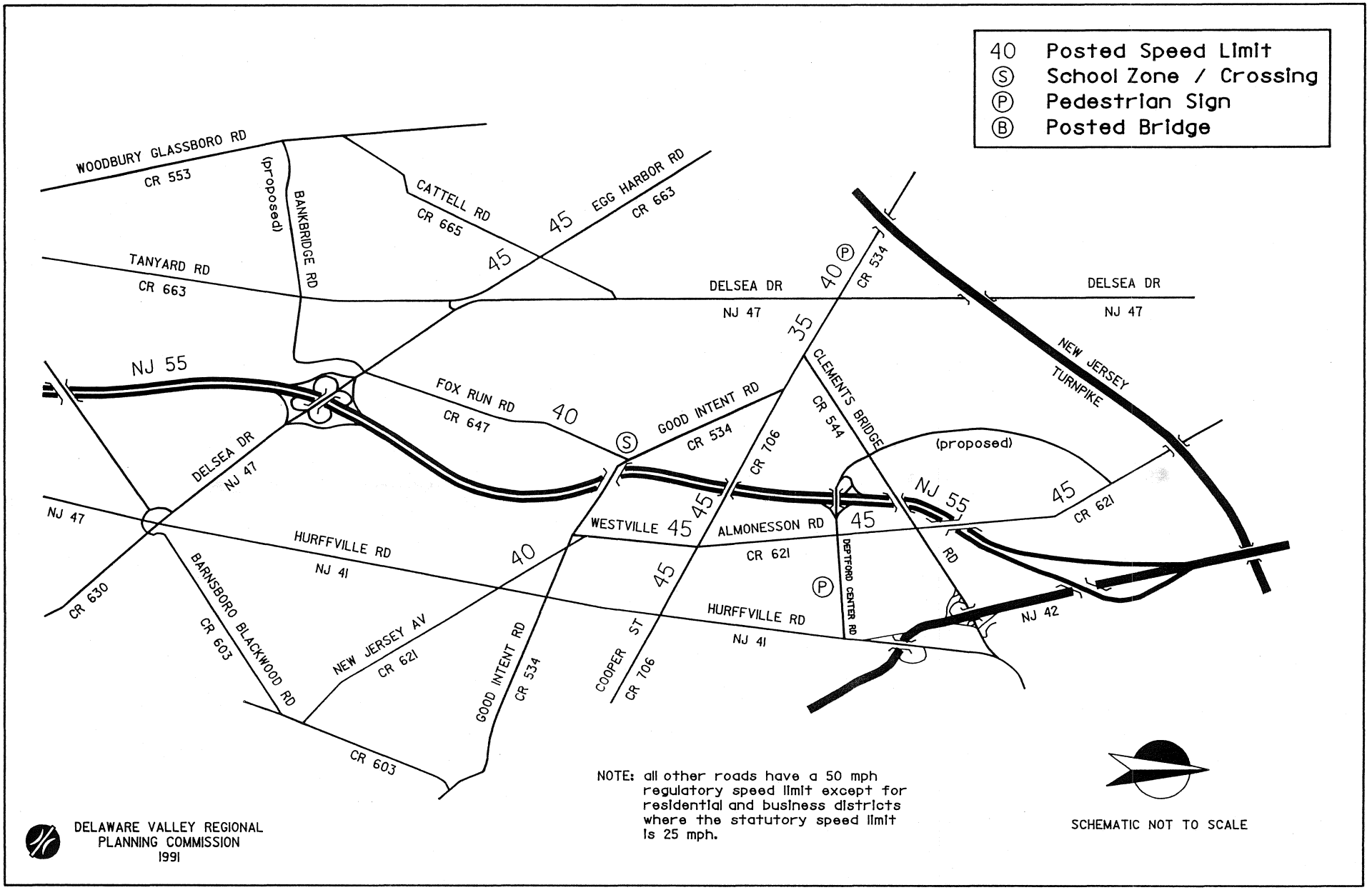


Figure 9B: TRAFFIC REGULATIONS

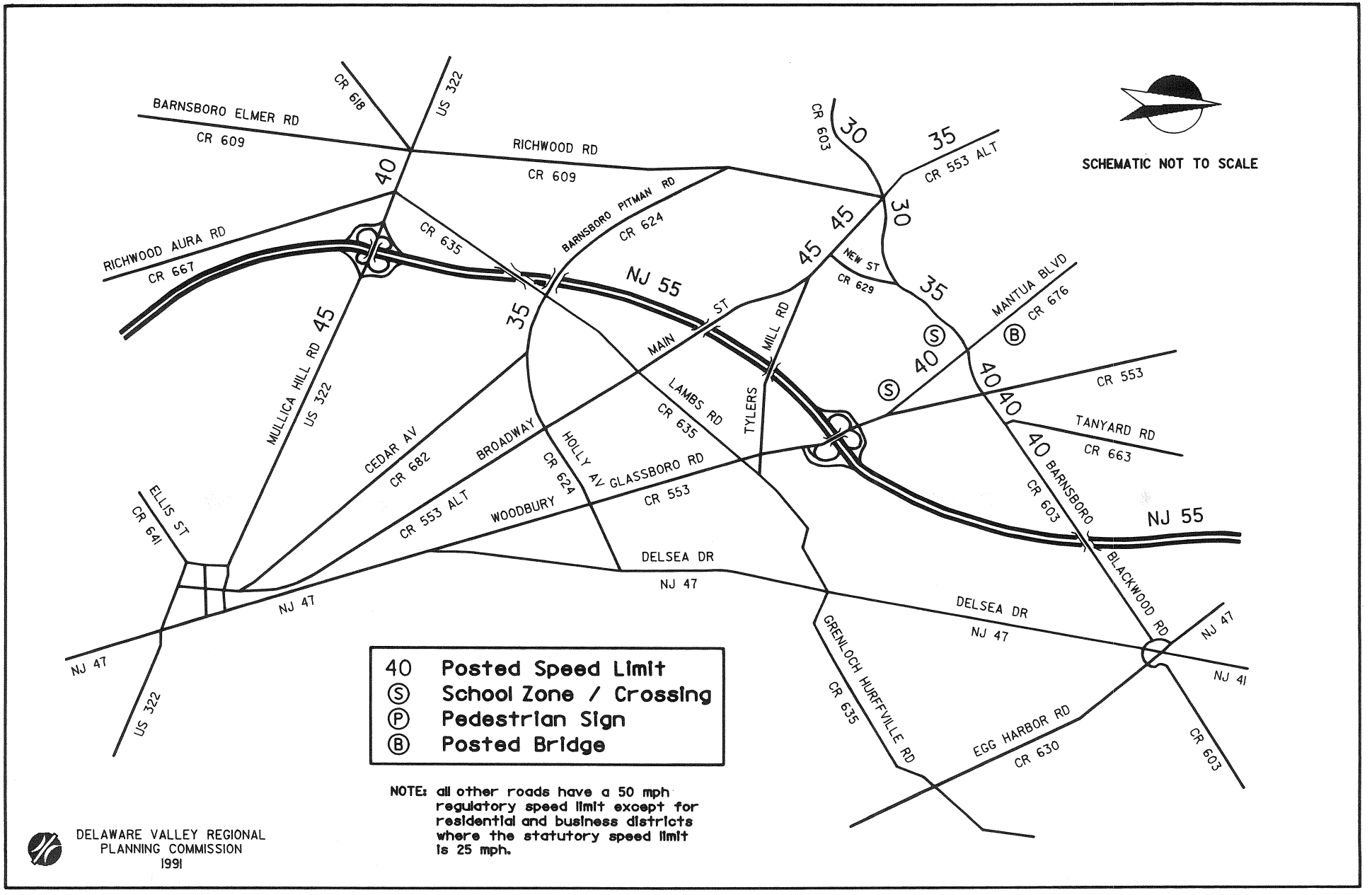


Figure 9C: TRAFFIC REGULATIONS

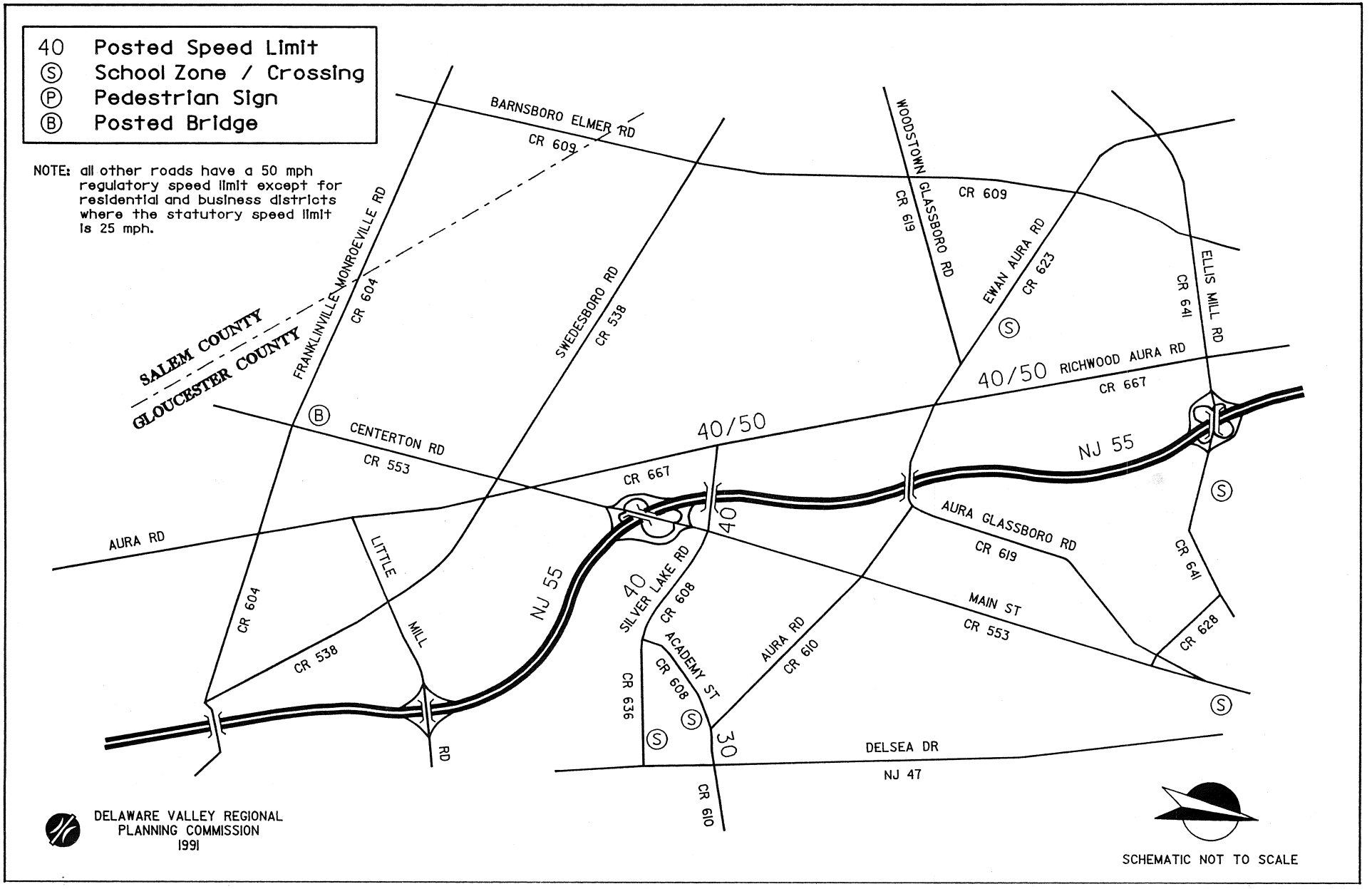


Figure 9D: TRAFFIC REGULATIONS

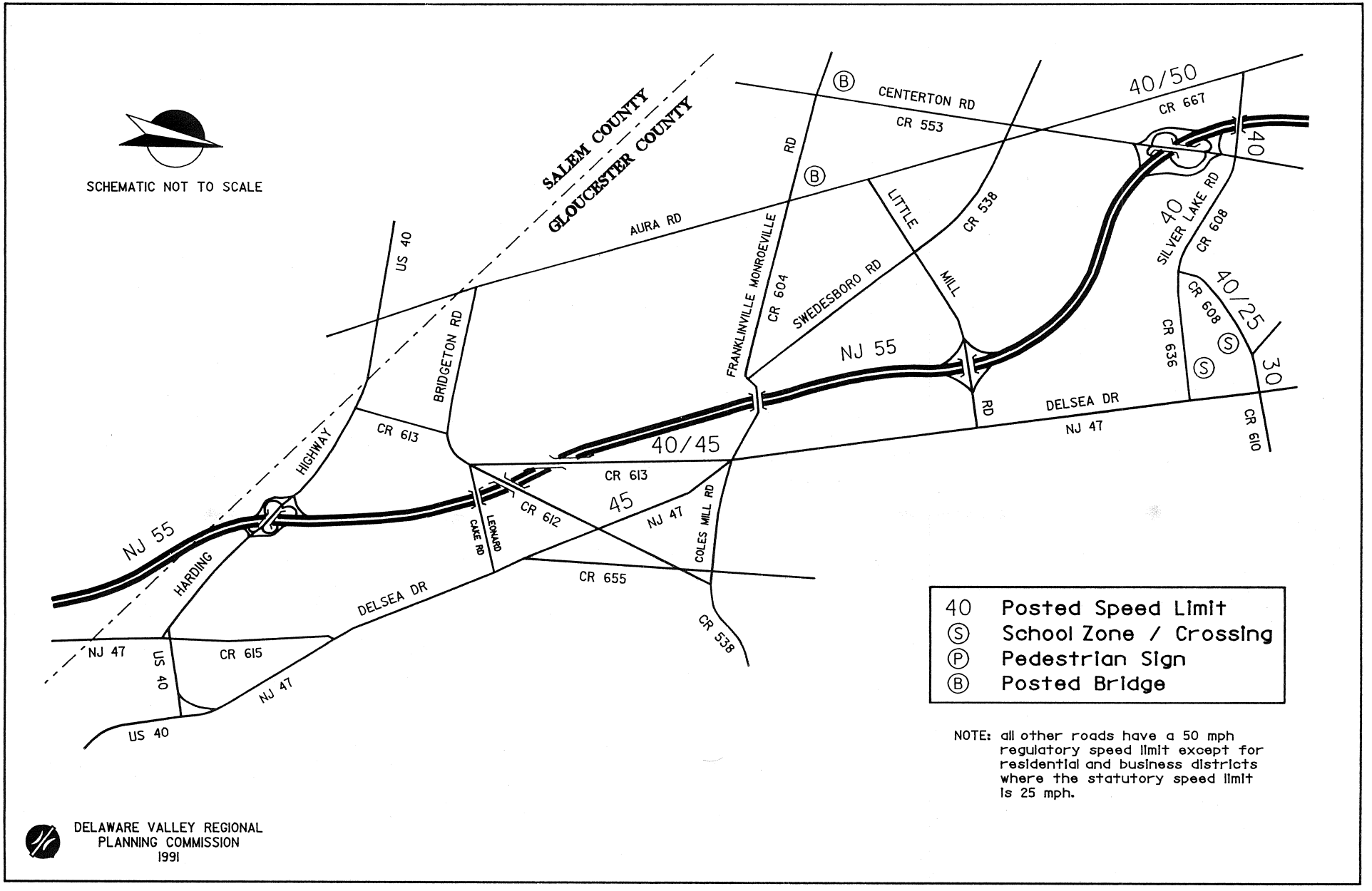


Figure 10A: EXISTING COUNTY FUNCTIONAL CLASSIFICATION

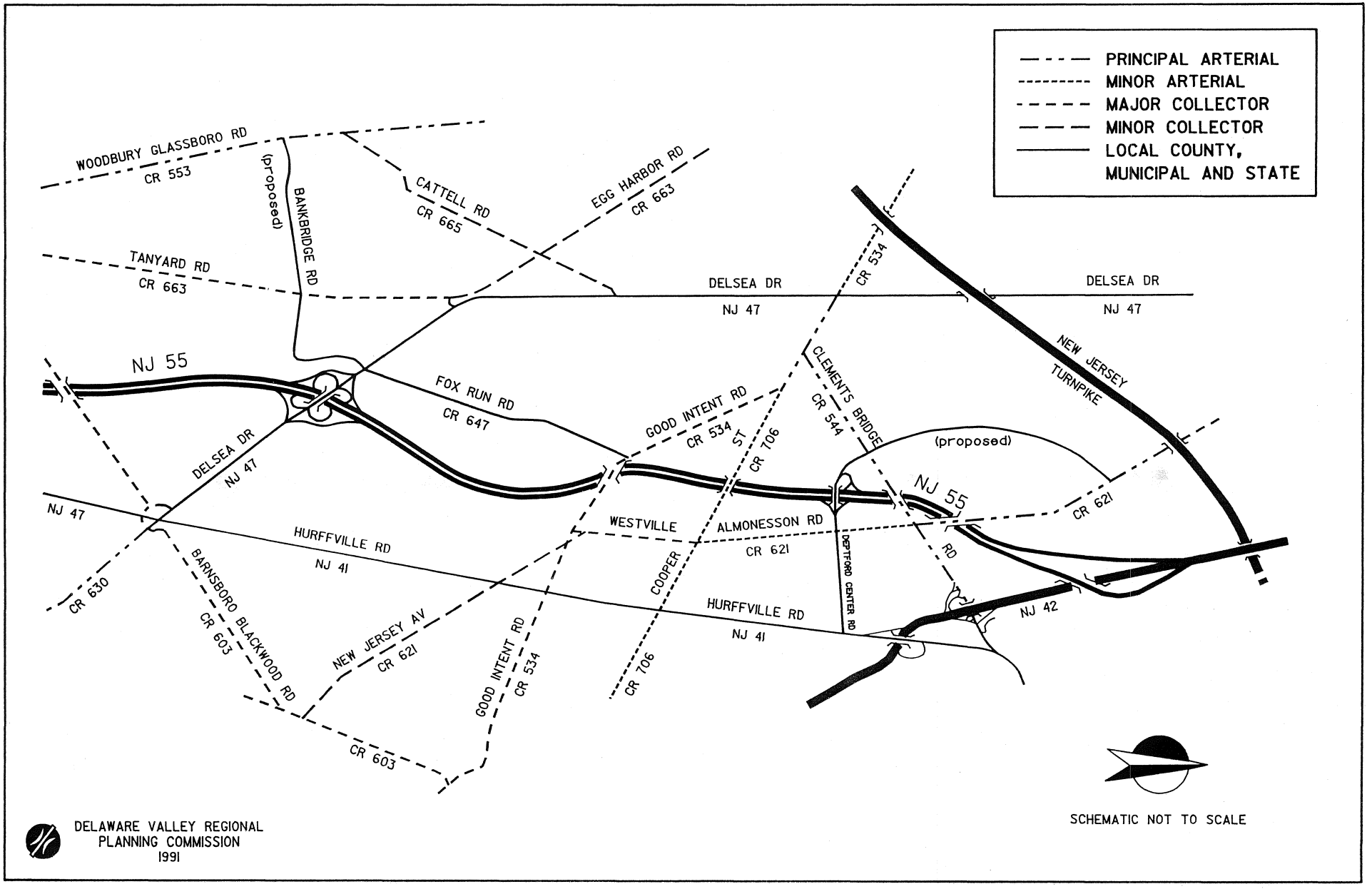


Figure 10B: EXISTING COUNTY FUNCTIONAL CLASSIFICATION

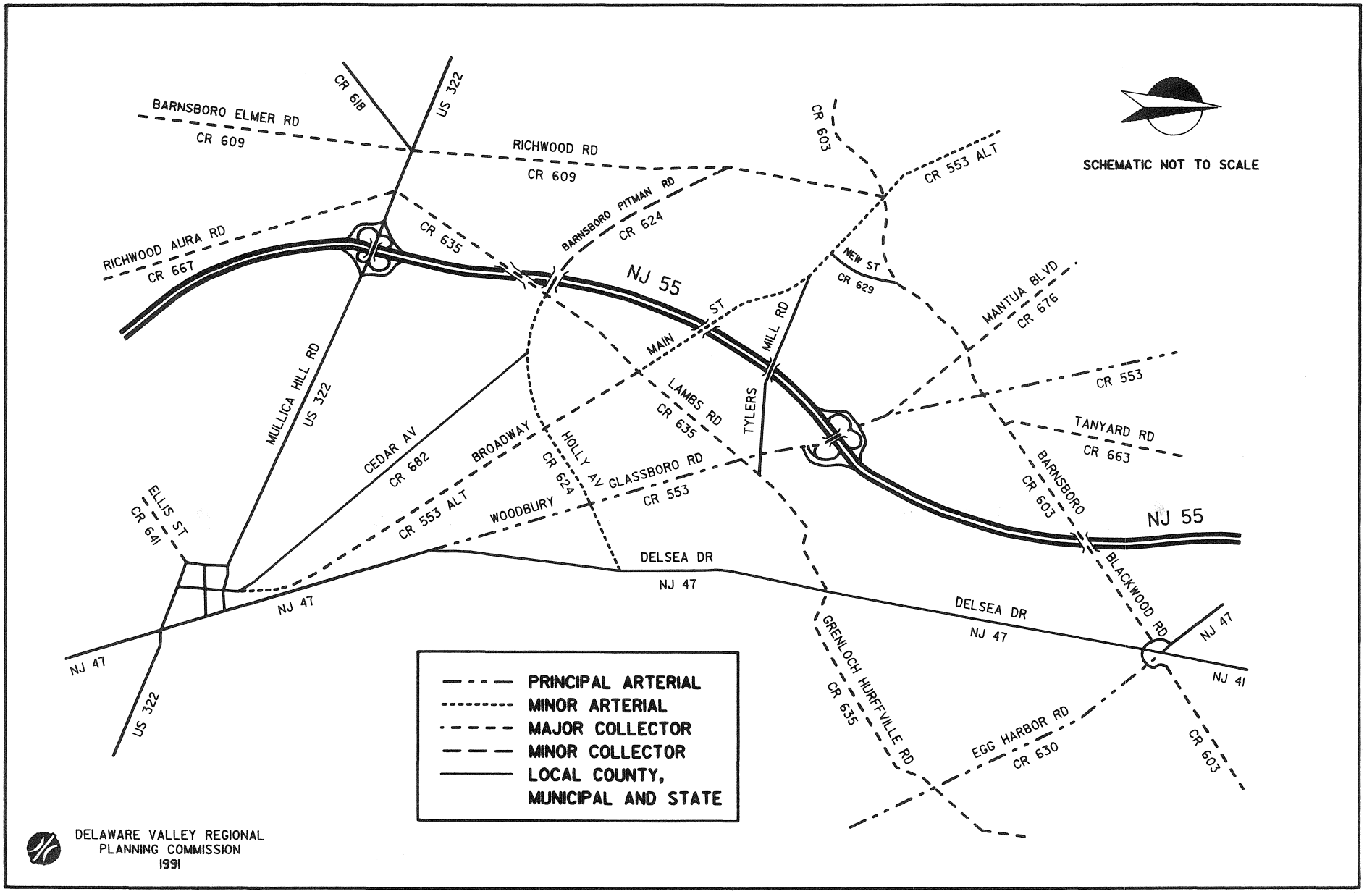


Figure 10C: EXISTING COUNTY FUNCTIONAL CLASSIFICATION

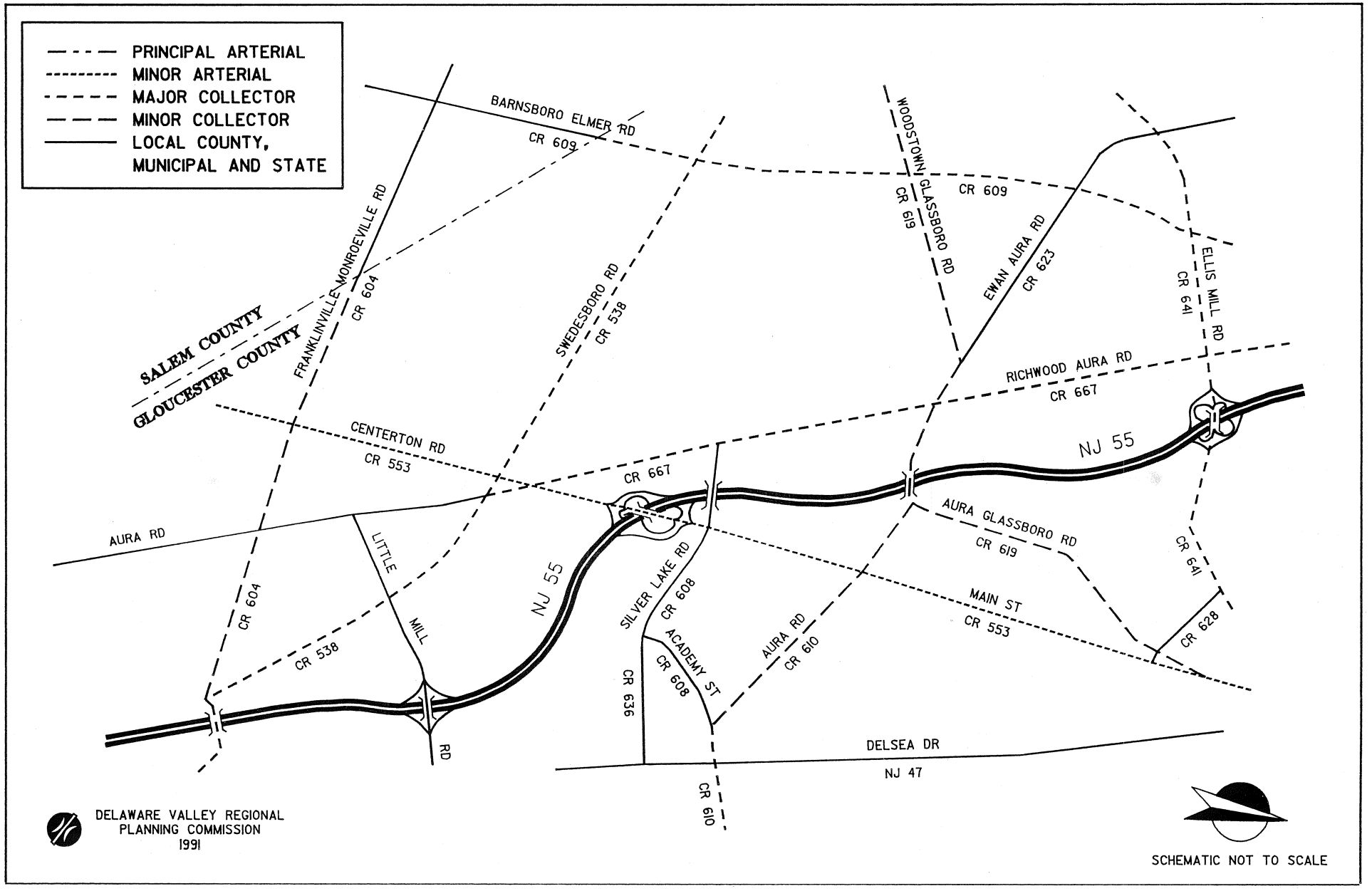


Figure 10D: EXISTING COUNTY FUNCTIONAL CLASSIFICATION

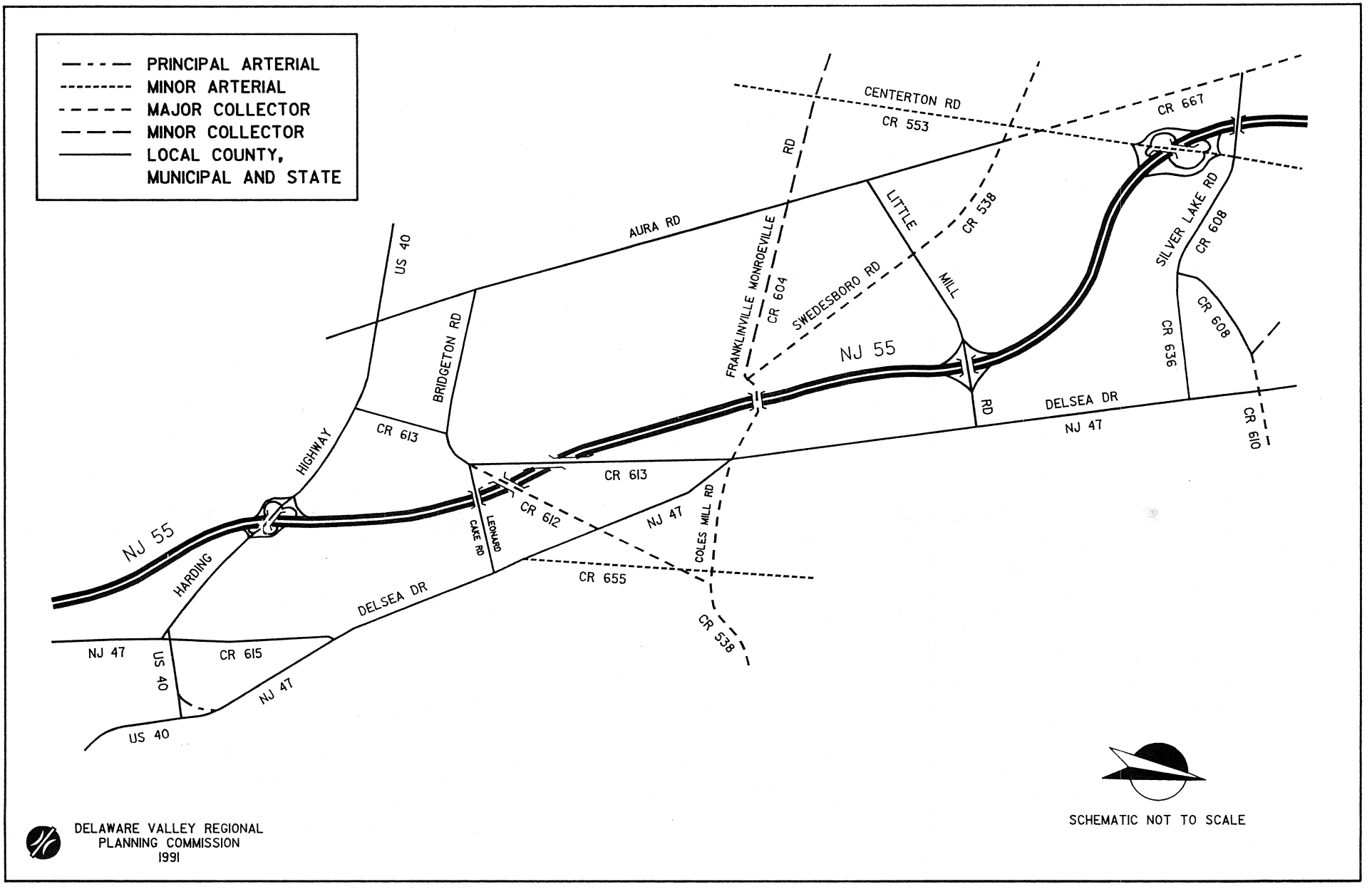


Table 1: FUNCTIONAL CLASSIFICATION SYSTEM CATEGORIES

PRINCIPAL ARTERIAL - Serves statewide and interstate travel, major activity centers in the urbanized area, through movements bypassing the central city, and most of the trips entering and leaving the urbanized area. In addition, significant intra-region travel, such as between central business districts and outlying residential areas or between major suburban centers is served by this class of facilities. Land access is subordinate to mobility.

MINOR ARTERIAL - Interconnects and augments the principal arterial system. Carries trips of moderate length. Places more emphasis on land access than the principal arterial and carries less traffic. Accommodates intra-community travel but does not penetrate identifiable neighborhoods.

COLLECTOR - Provides both land access service and traffic circulation within residential neighborhoods and commercial and industrial areas. The collector system may penetrate residential neighborhoods distributing trips from arterial to their ultimate destinations. Conversely, collects traffic from local streets and channels it onto the arterial system. Carries less traffic than arterial. May carry a minor amount of through traffic.

LOCAL - Primarily permits direct access to abutting land uses and connections to the higher categories. Carries very low volumes and offers lowest level of mobility, usually deliberately discouraging through traffic.

classification of the highway network in the study area is shown on Figure 11. All principal arterials are NJDOT highways: NJ Route 55 Freeway, NJ Route 42 Freeway, US Route 322, and US Route 40. Functional classification categories are, to some extent, dependent upon whether the road is situated in an urban or rural area as defined by the US Census Bureau. Since central Gloucester County straddles the urban boundary, the classification of a road may change as the road traverses the boundary. For simplicity, urban boundaries are not shown.

Federal-Aid System

The functional classification system is used by NJDOT to develop New Jersey's federal-aid system. Under the federal-aid system, FHWA provides funding for highway improvement projects. The federal share of the cost of projects proposed for primary funding is 75 percent. The matching 25 percent is supplied by NJDOT. The federal share of the cost of projects proposed for the urban system or federal-aid secondary roads (in rural areas) is 75 percent, with the matching 25 percent provided by either NJDOT or the county.

The federal-aid system for the study area roads is shown in Figure 12. Only NJ Route 55 Freeway, NJ Route 42 Freeway, US Route 322, and US Route 40 are designated as federal-aid primary. In the northern portion of the NJ Route 55 Freeway corridor the majority of the highway network is on the federal-aid system. South of Glassboro, only a limited number of roads are on the federal-aid system. For simplicity, the urban boundary delineating urban/rural funding categories is not shown.

A total revamping of the federal-aid system is underway at the present time. Two new categories of funding systems are being created to replace the existing federal-aid system. The National Highway System (NHS) will include all interstate routes and a large percentage of principal arterials

Figure 11A: NJDOT FUNCTIONAL CLASSIFICATION

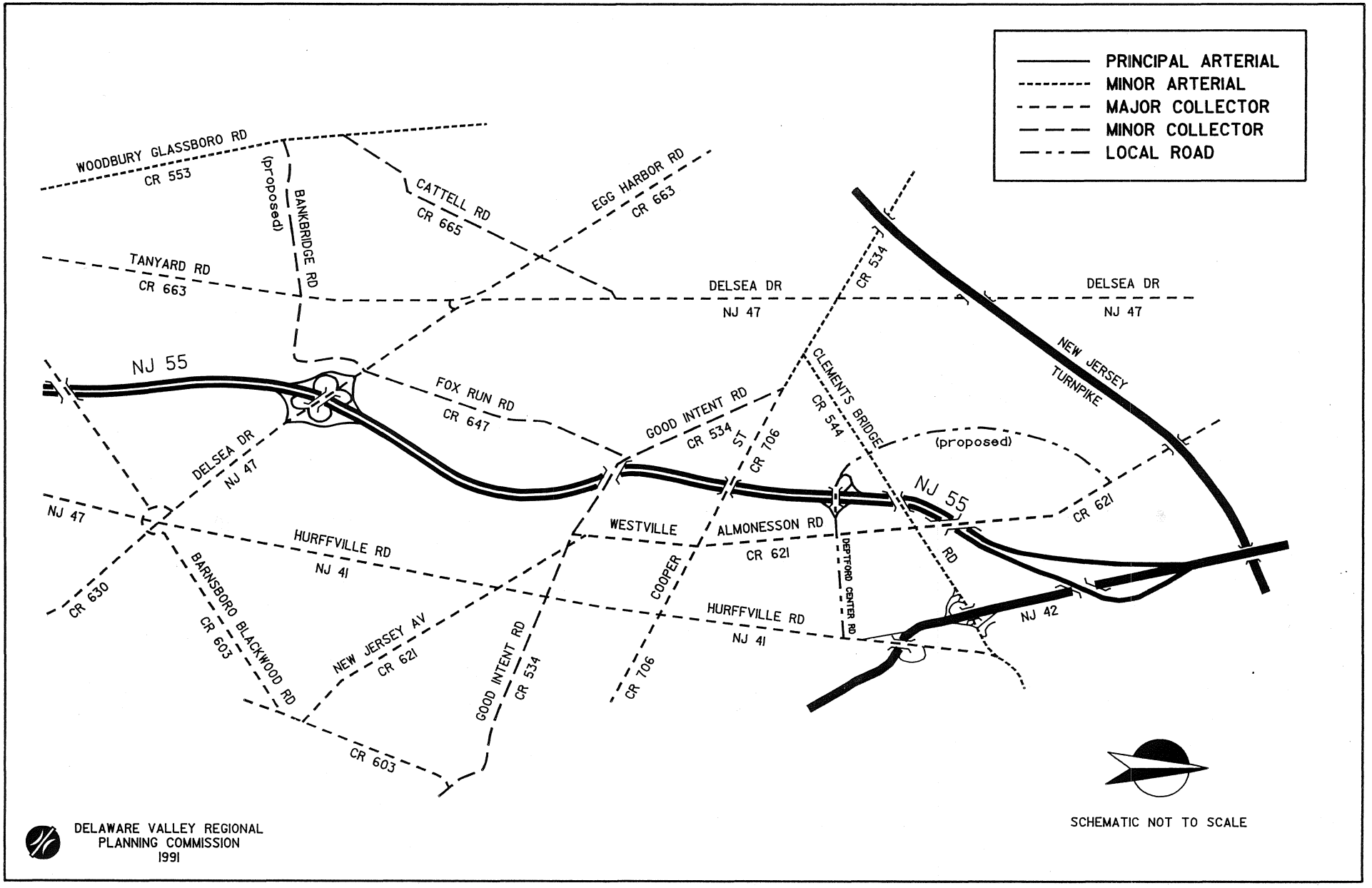


Figure 11B: NJDOT FUNCTIONAL CLASSIFICATION

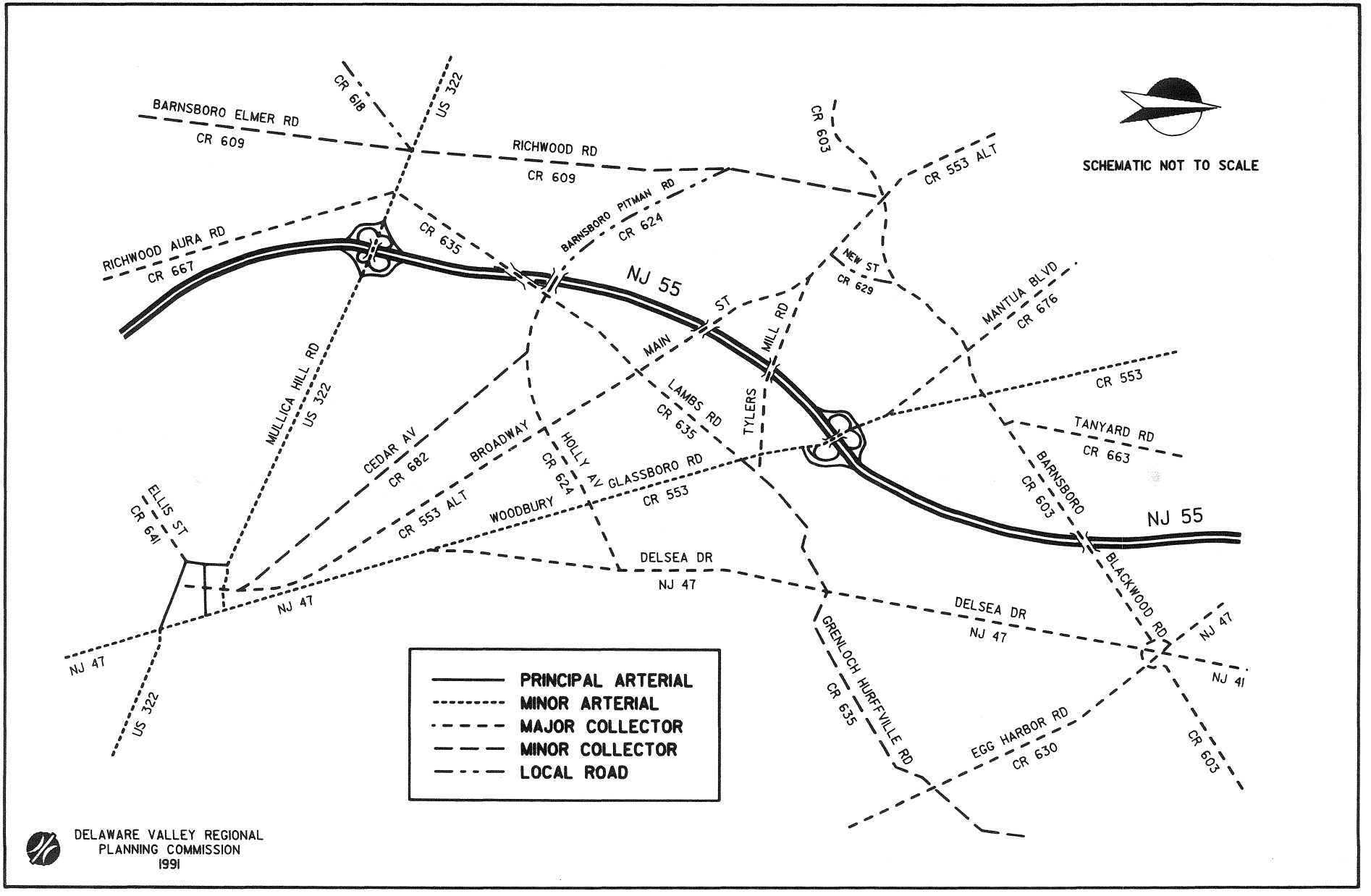


Figure 11C: NJDOT FUNCTIONAL CLASSIFICATION

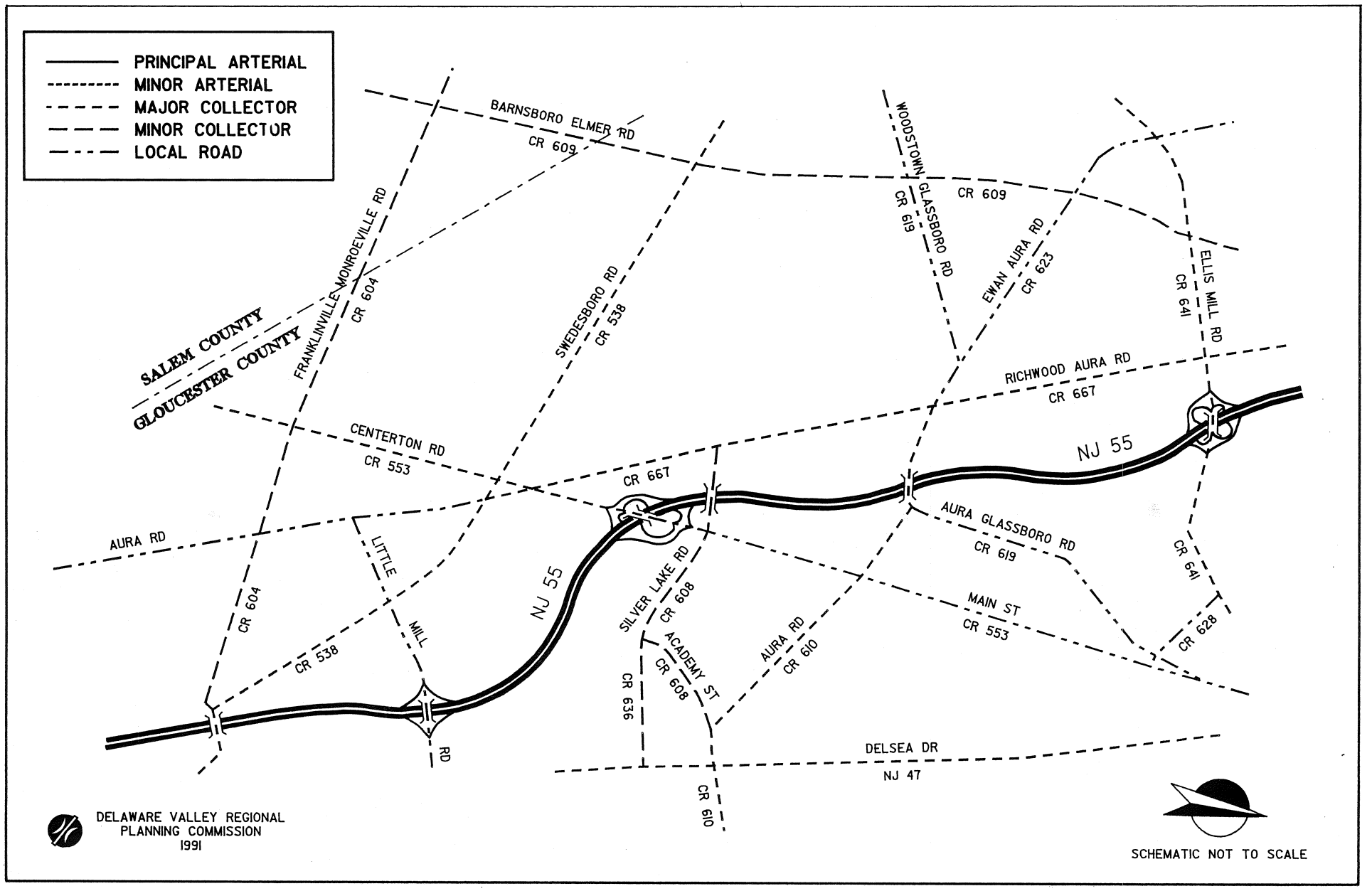


Figure 11D: NJDOT FUNCTIONAL CLASSIFICATION

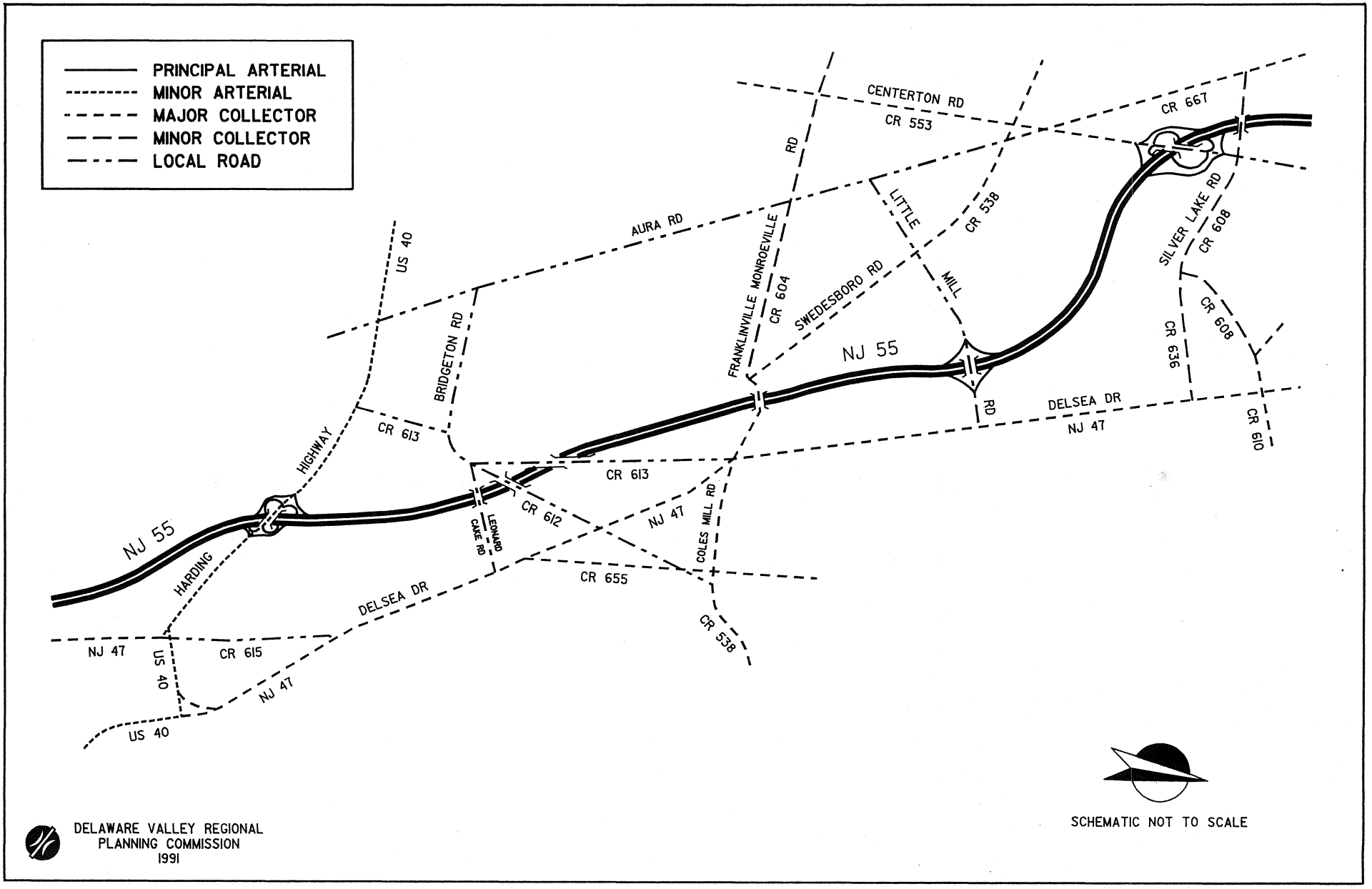


Figure 12A: FEDERAL-AID SYSTEM

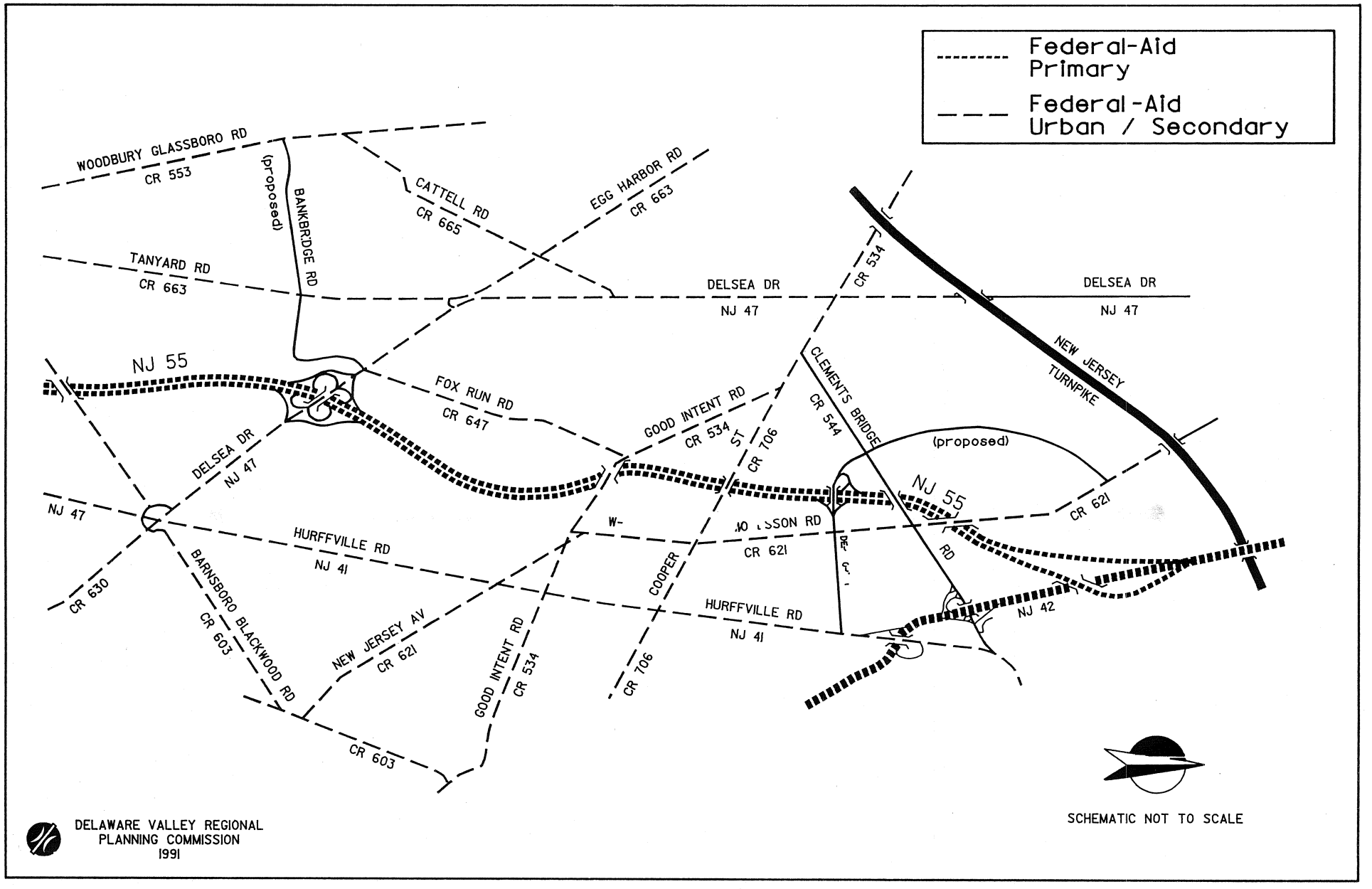


Figure 12B: FEDERAL-AID SYSTEM

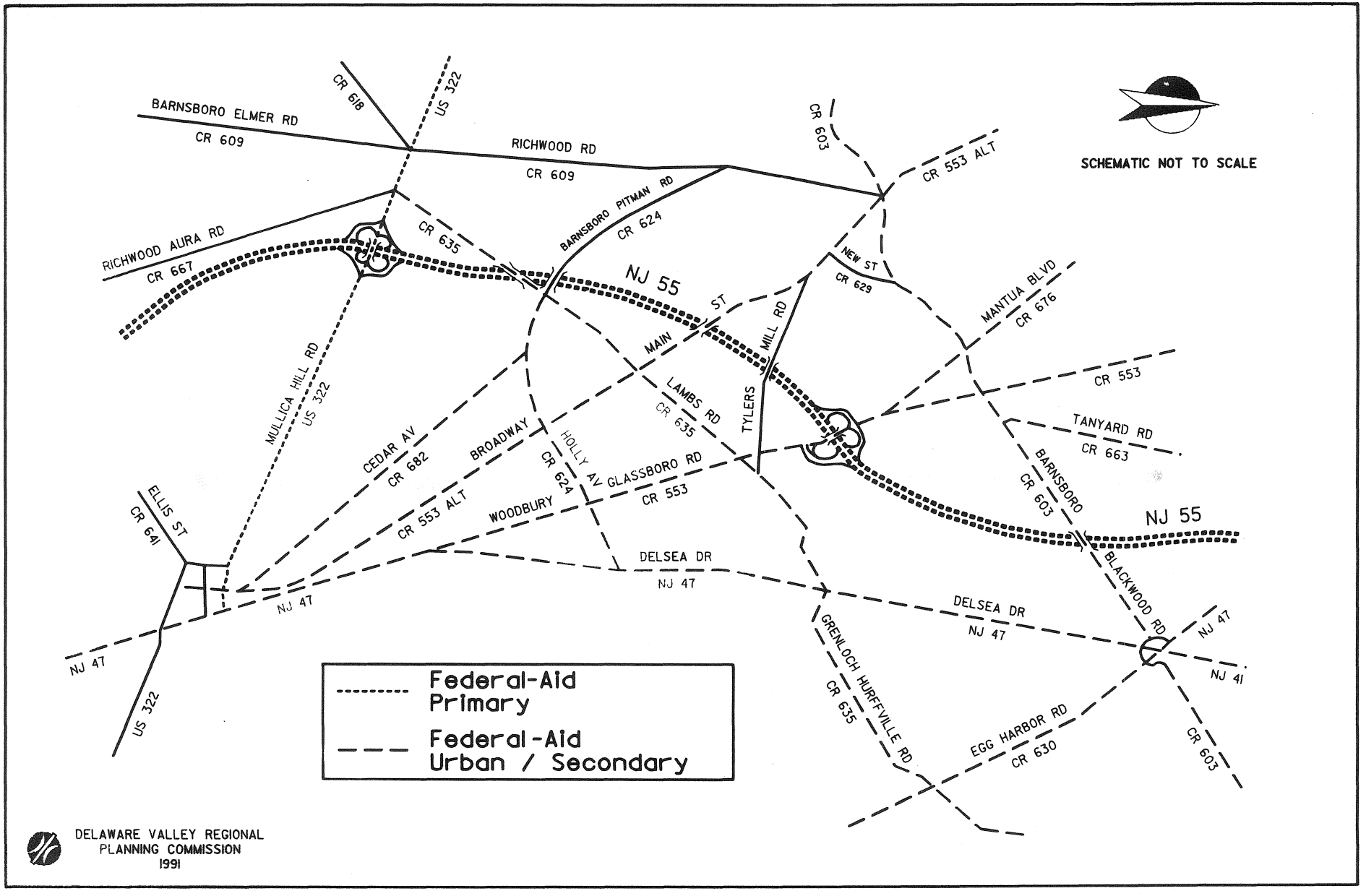


Figure 12C: FEDERAL-AID SYSTEM

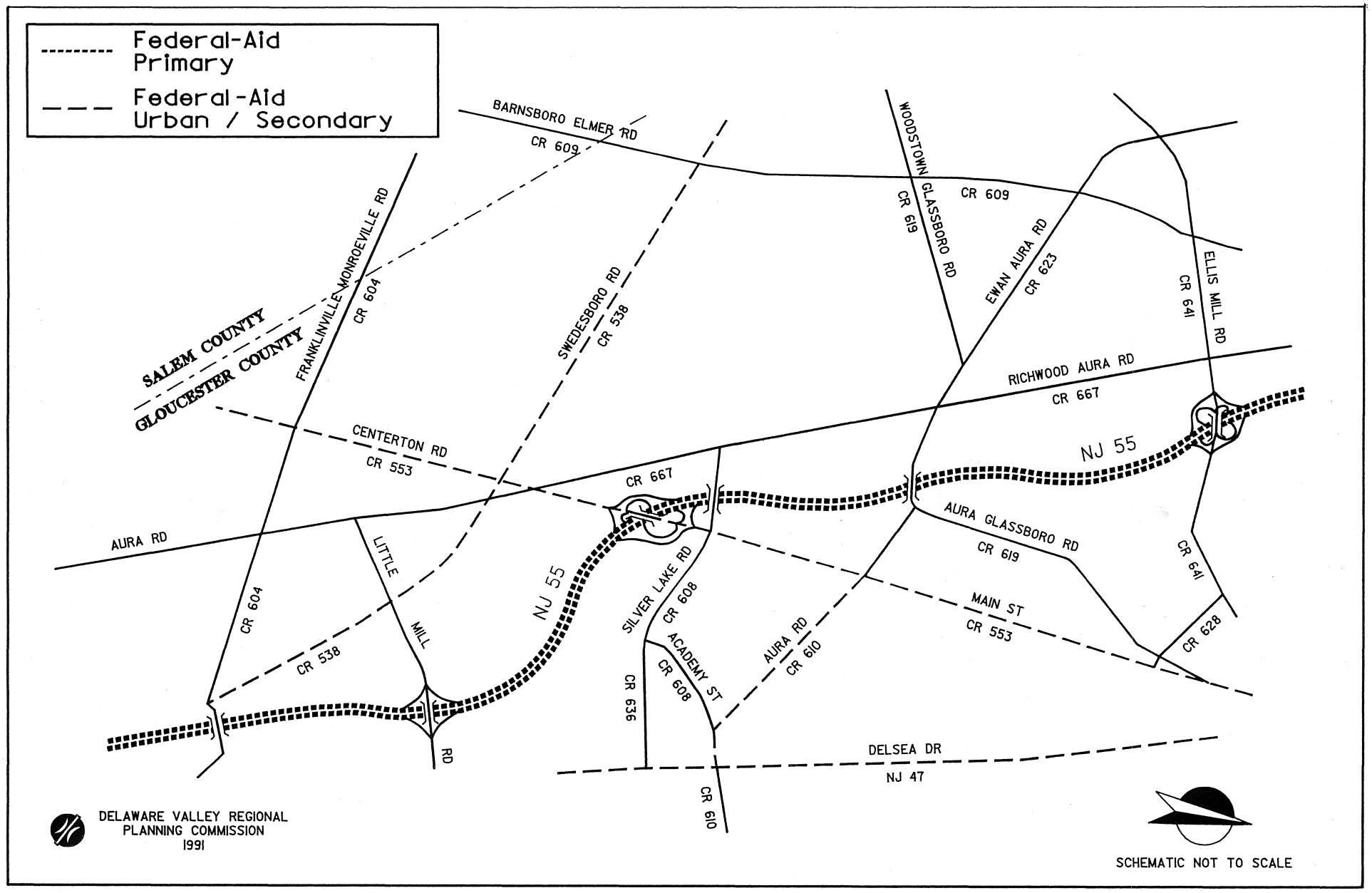
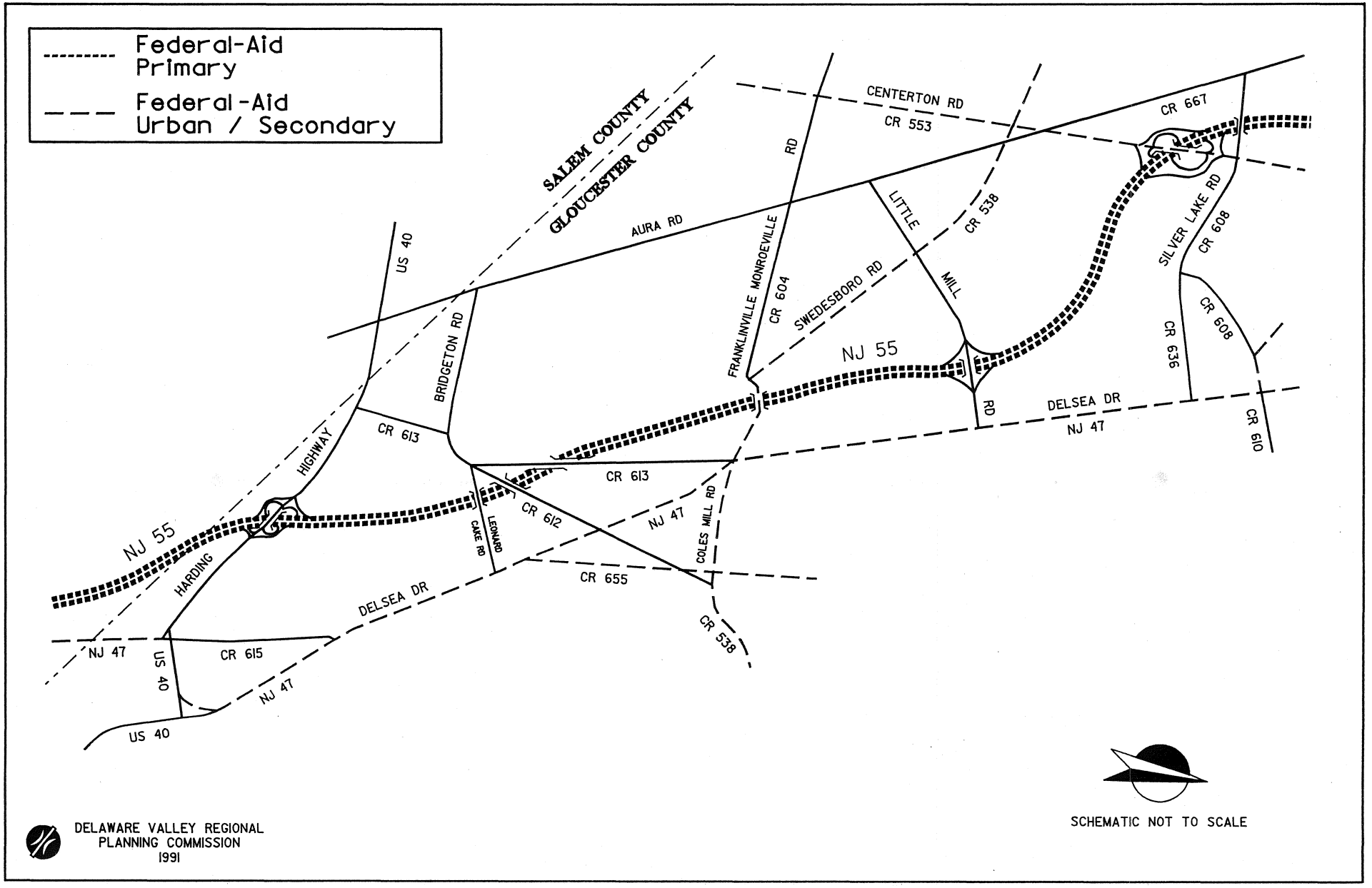


Figure 12D: FEDERAL-AID SYSTEM



(ie. federal-aid primary system). The remaining federal-aid roads will be funded through the Surface Transportation Program (STP). The thrust of the new programs is to direct federal monies towards the more significant national highways. It is not clear which roads, if any, will make the NHS system. The STP program is more applicable to roads in central Gloucester County. While STP funding is limited, there is greater flexibility because it is a block type program to be used by the states and localities, the federal share is increased to 80 percent.

Transportation Improvement Program

Federal regulations require that all projects receiving monies from FHWA or the Urban Mass Transportation Administration (UMTA) be identified in each metropolitan area's Transportation Improvement Program (TIP). The purpose of the TIP is to insure a coordinated multi-year program to plan, design and construct transportation improvements. In the New Jersey portion of the TIP for the Delaware Valley, the five year program lists not only federal-aid projects, but all projects funded by NJDOT.

All highway projects within the Route Freeway 55 corridor listed on the TIP are located in Figure 13 and described in Table 2. The table lists the approximate location of the improvement, the type of improvement (road widening, intersection improvement, or bridge repair), sponsor, total cost, and the fiscal year when construction is scheduled. Many minor improvements, such as new traffic signals, are funded out of lump sum regional accounts, thus they are not identified. Transit projects, such as new buses, bus stop signs and shelters, special services for the elderly and disabled, and rural transportation programs, are regional lump sum allocations. A breakdown of projects earmarked for the study area is unavailable.

Existing Traffic Volumes

Existing average annual daily traffic (AADT) volumes were obtained by two different methods. First, DVRPC AADT records were reviewed to identify all traffic counts conducted in the study area after 1985. In the northern portion of the study area, two on-going traffic counting programs provided up to date volumes. In the southern portion of the study area, the data was older and more sporadic. A growth rate was applied to update the AADTs. The growth factors were derived by comparing old traffic counts with recent counts taken for this study. The second source of traffic volume data were traffic counts taken in May/June 1989. These counts where necessary to fill in missing data and to estimate growth factors. All traffic counts were converted into AADT to account for seasonal fluctuations.

Figure 14 presents existing 1989 traffic volumes. NJ Route 55 Freeway volumes reflect traffic conditions prior to the completion of the highway. South of US Route 40, the volume is 11,800 vehicles per day. Within Gloucester County, traffic volumes range from 18,600 vehicles per day between Delsea Drive (NJ Route 47) and Woodbury-Glassboro Road (CR 553) to approximately 30,000 vehicles per day between Delsea Drive and NJ Route 42 Freeway.

Figure 13A: TRANSPORTATION IMPROVEMENT PROGRAM

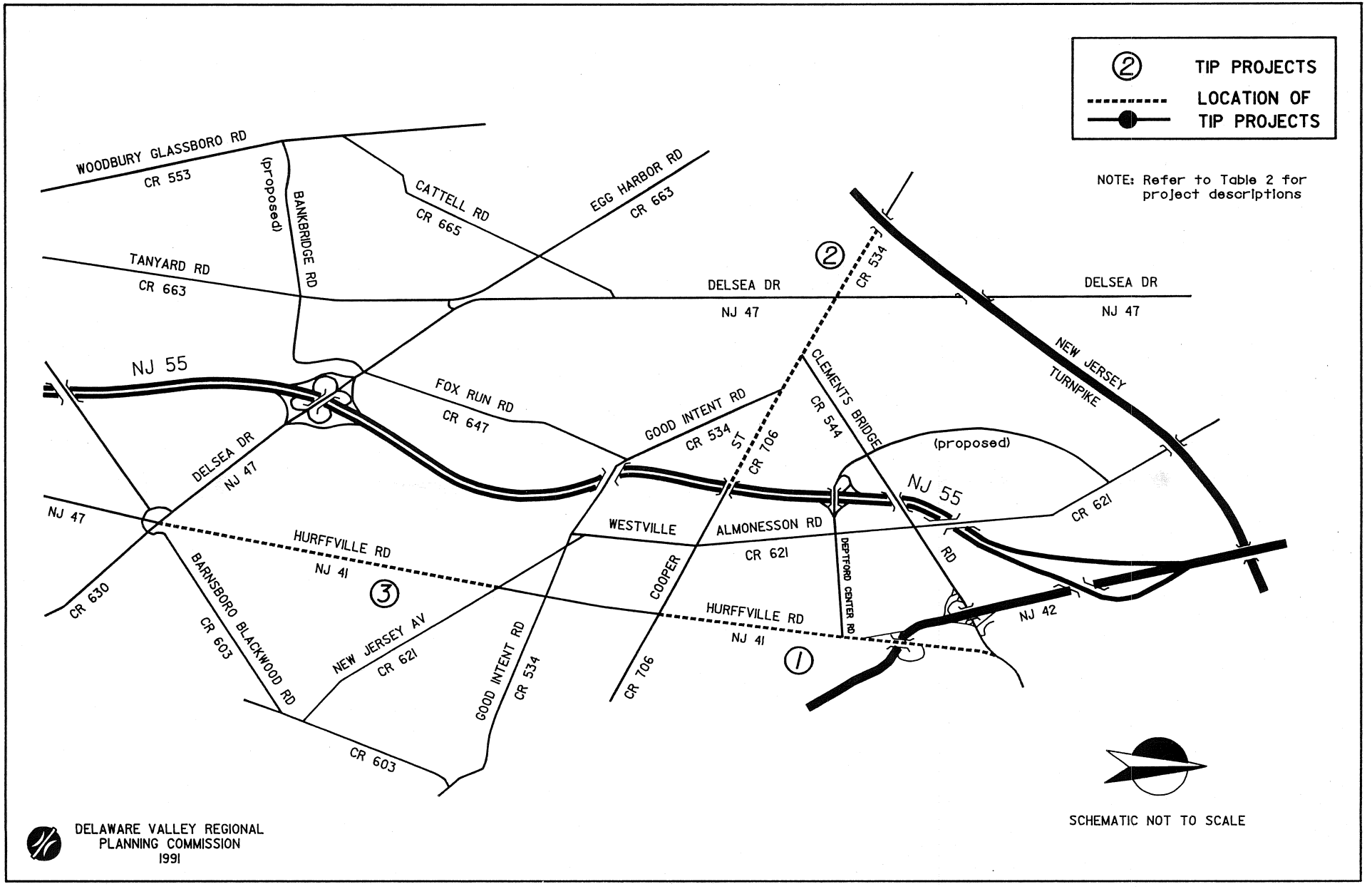


Figure 13B: TRANSPORTATION IMPROVEMENT PROGRAM

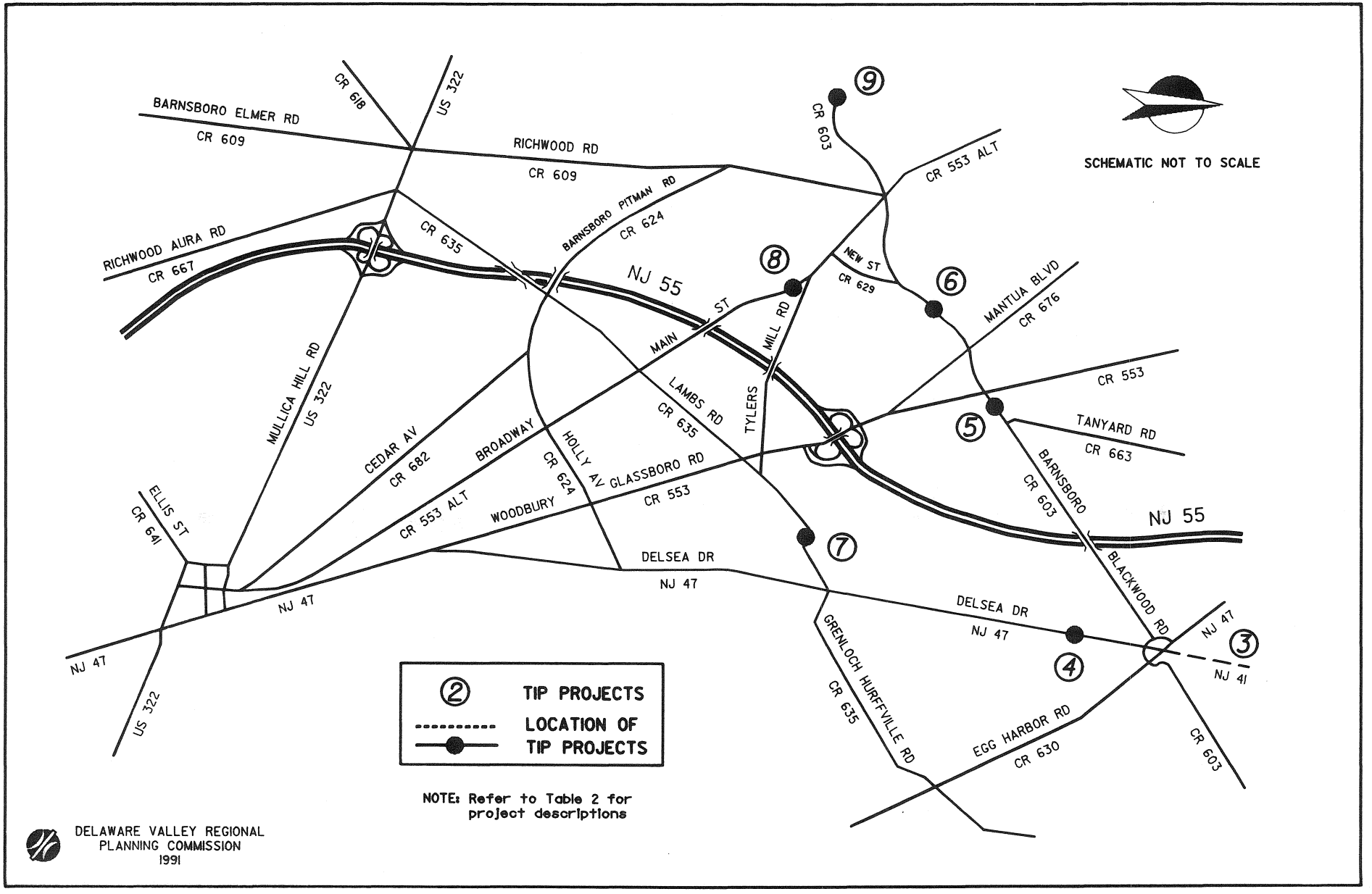


Figure 13C: TRANSPORTATION IMPROVEMENT PROGRAM

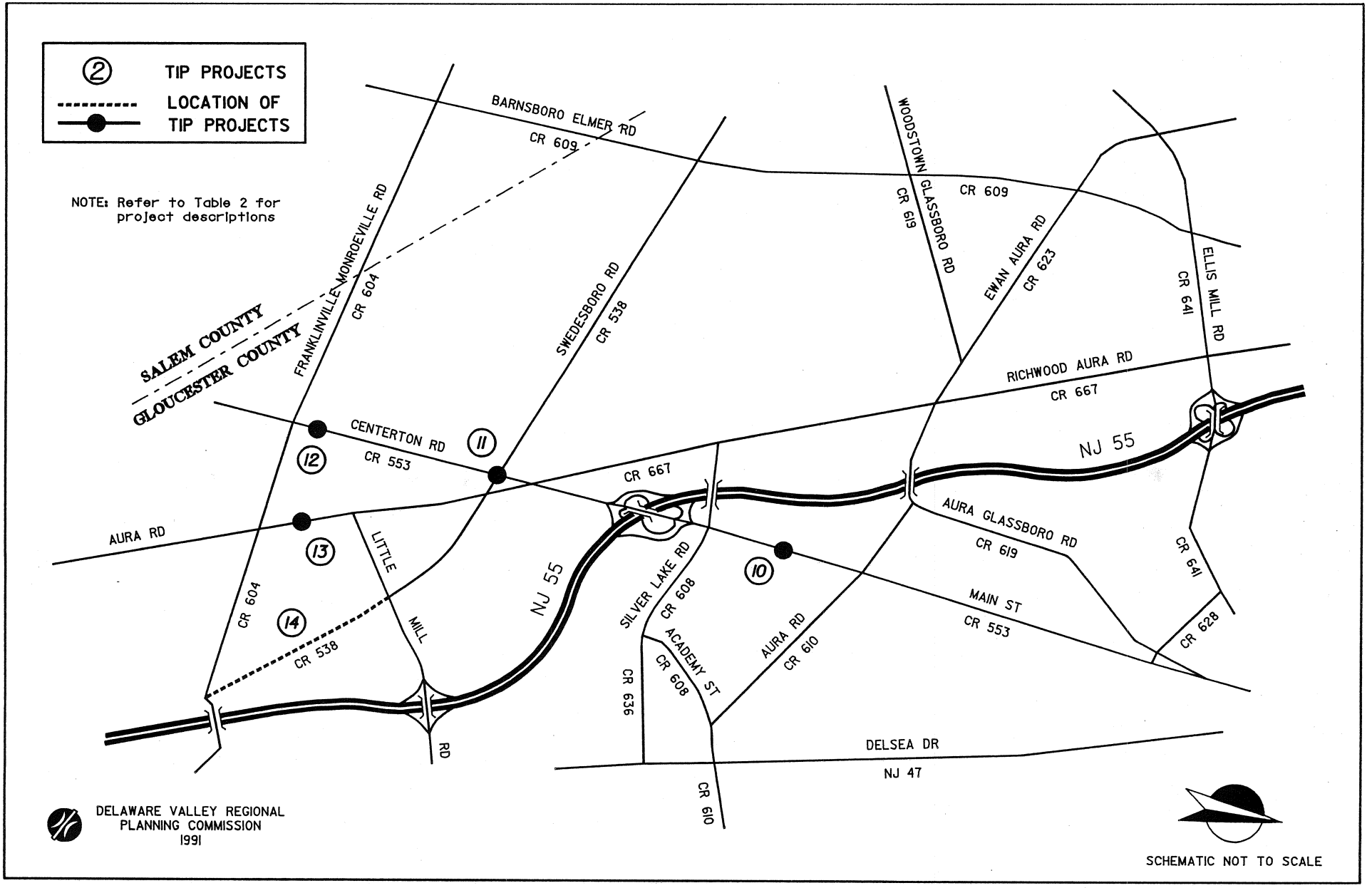


Figure 13D: TRANSPORTATION IMPROVEMENT PROGRAM

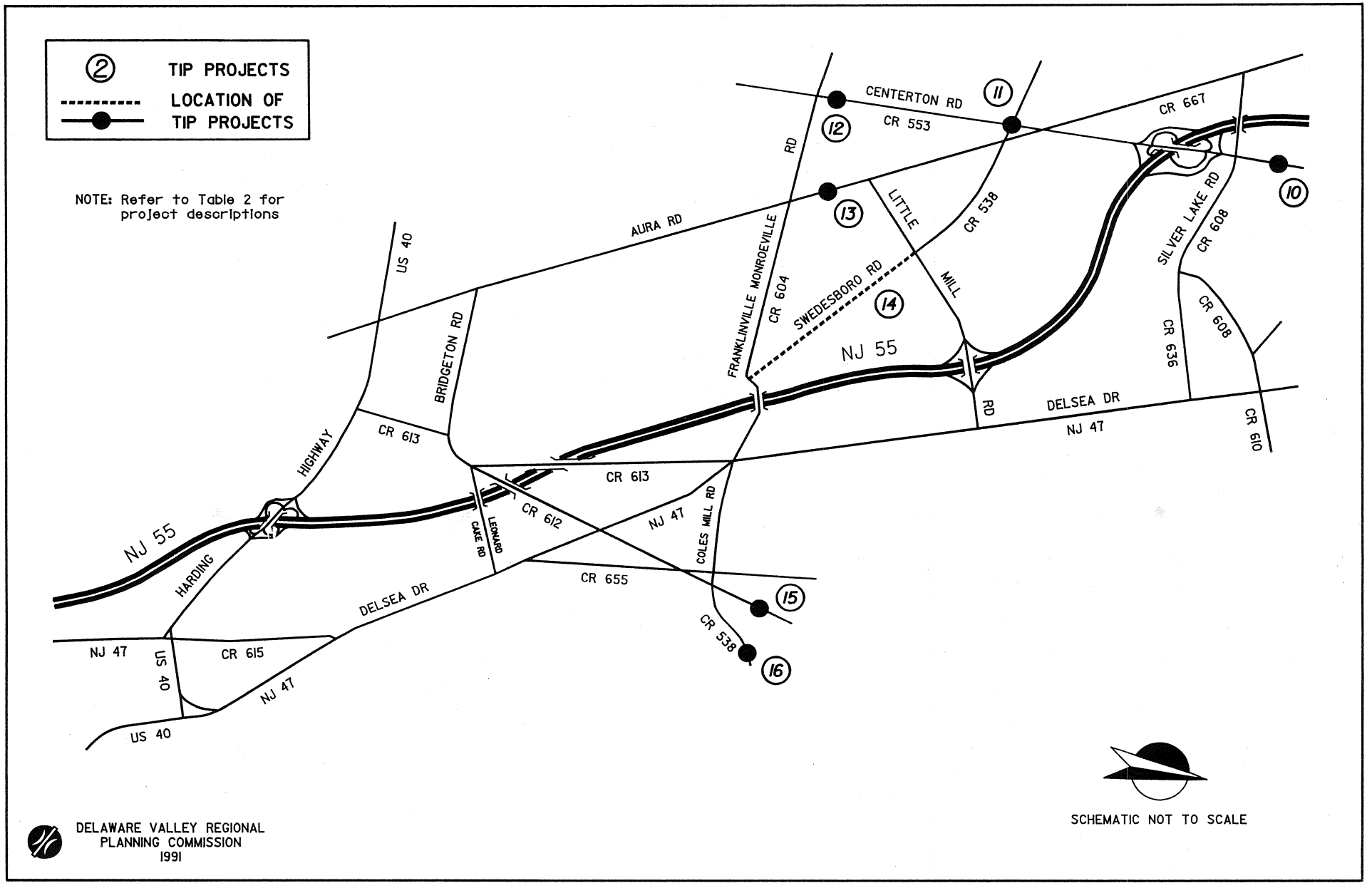


Figure 14A: EXISTING AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

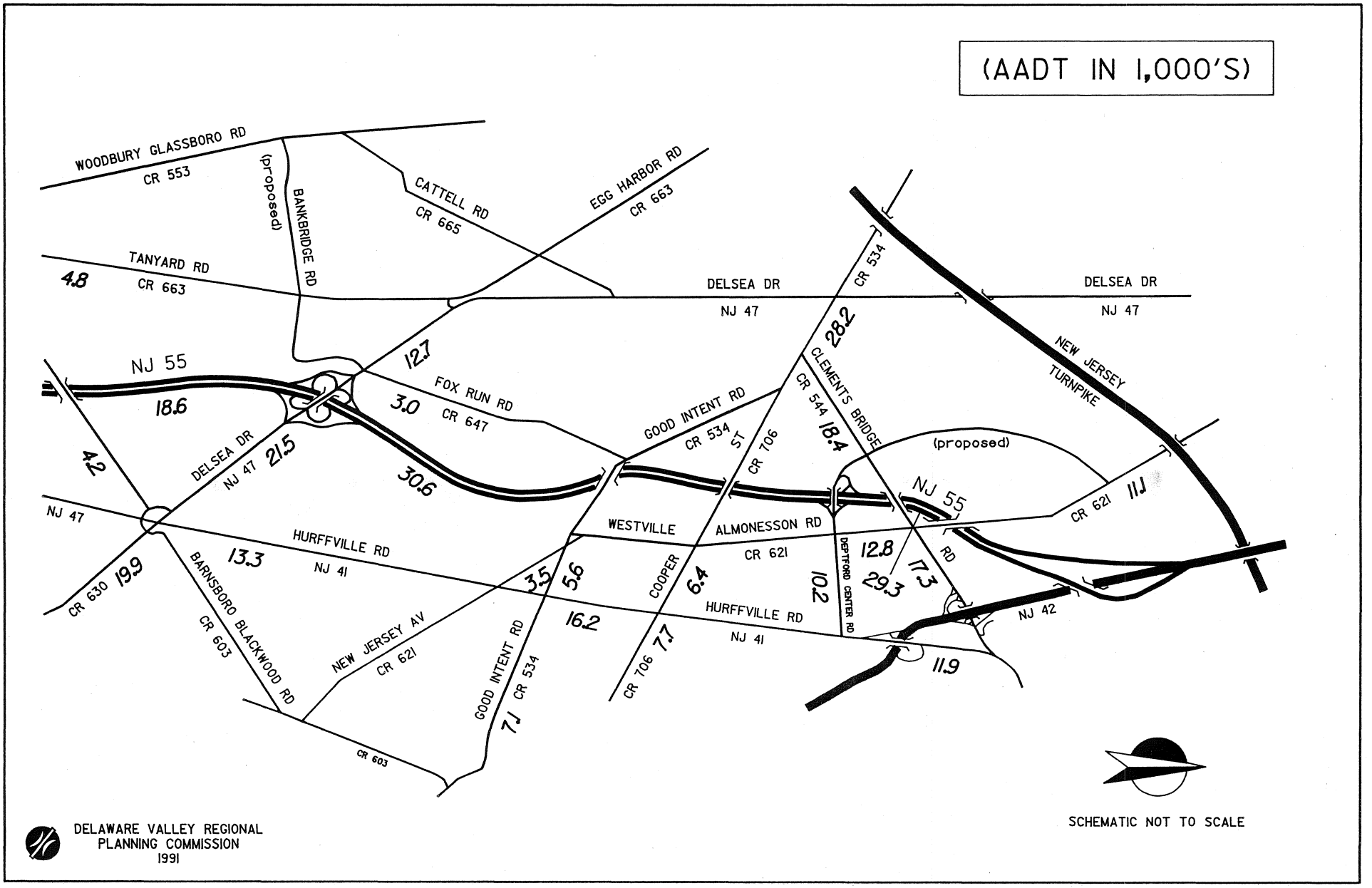


Figure 14B: EXISTING AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

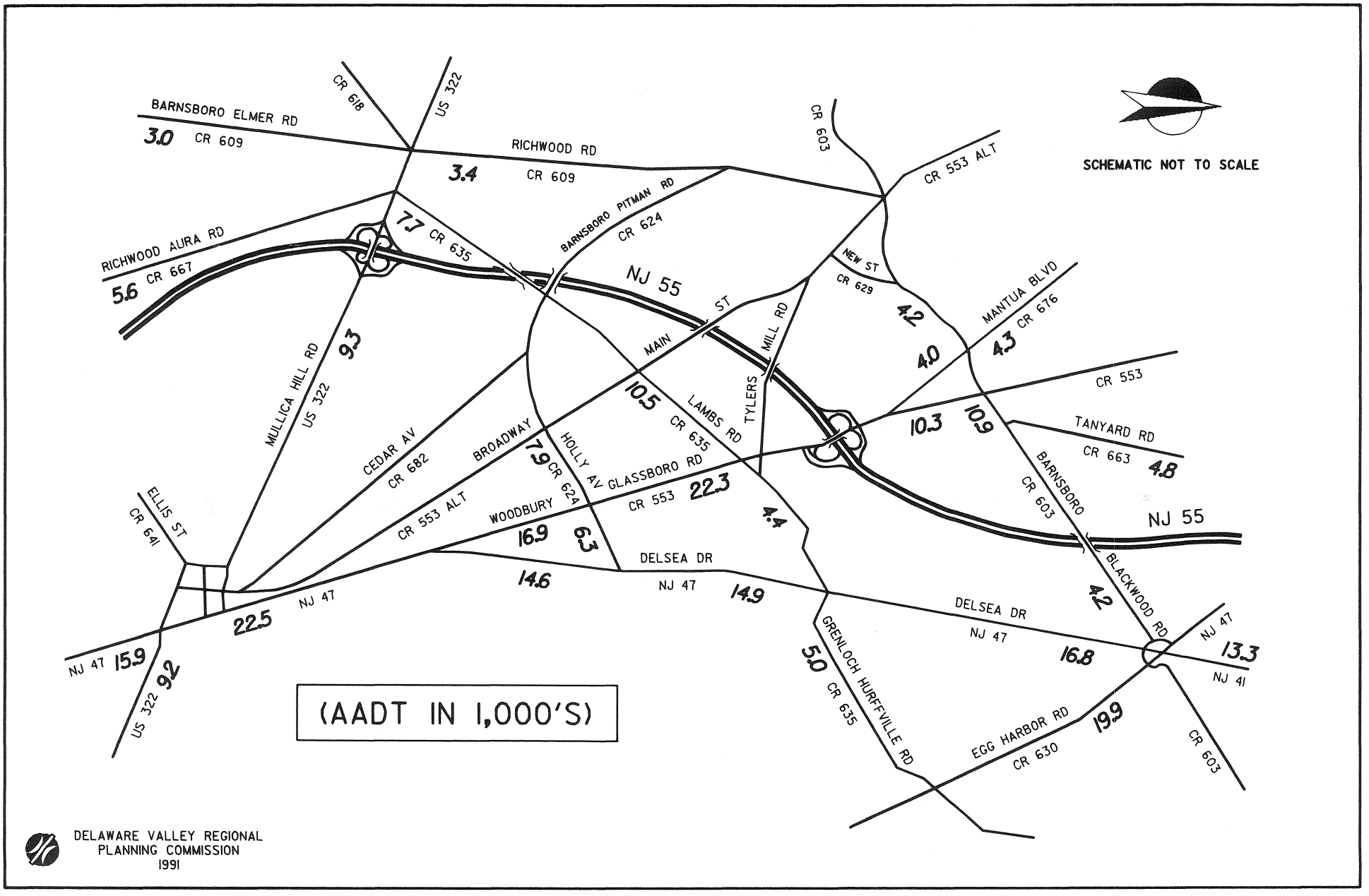


Figure 14C: EXISTING AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

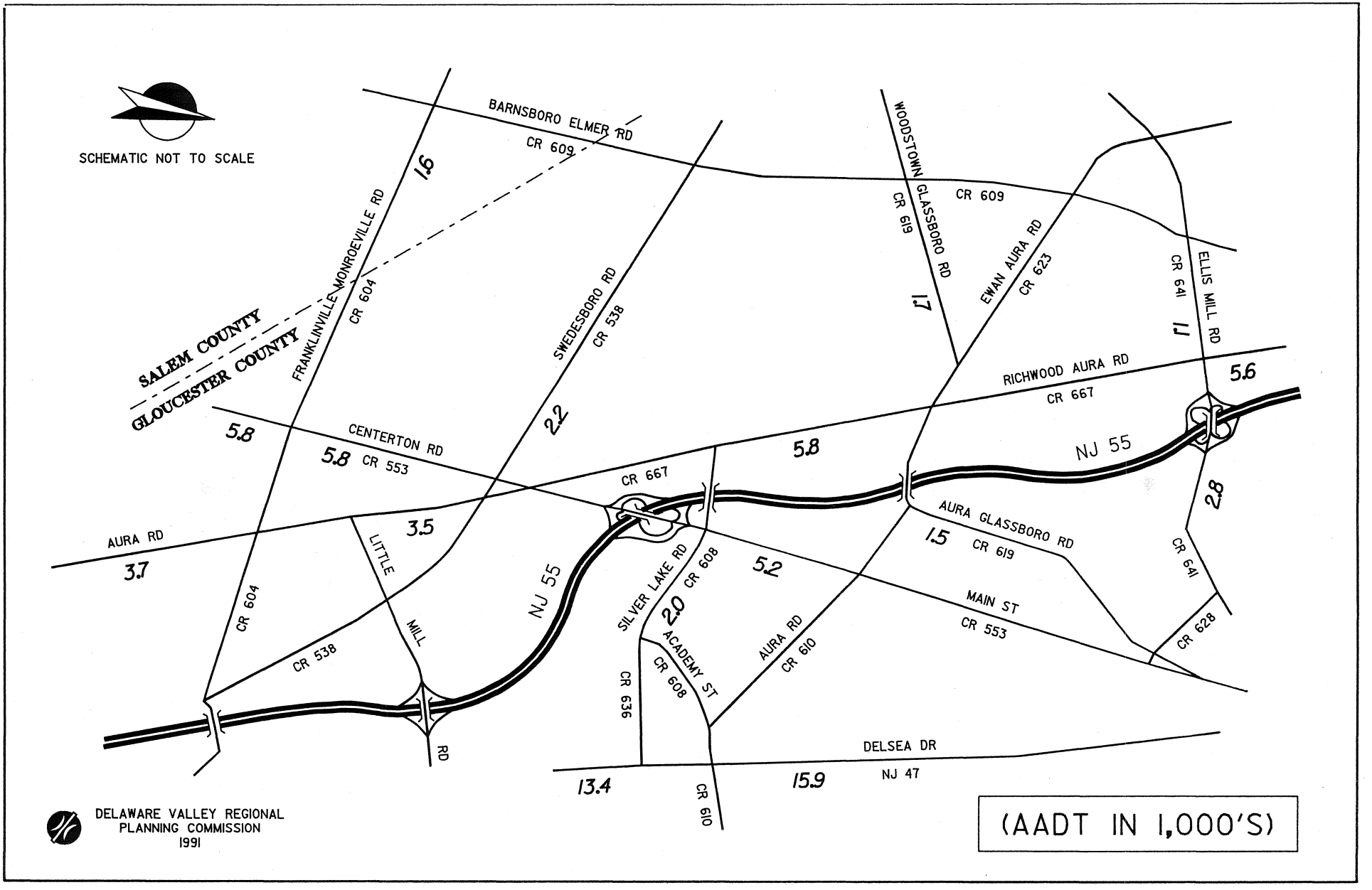


Figure 14D: EXISTING AVERAGE ANNUAL DAILY TRAFFIC VOLUMES

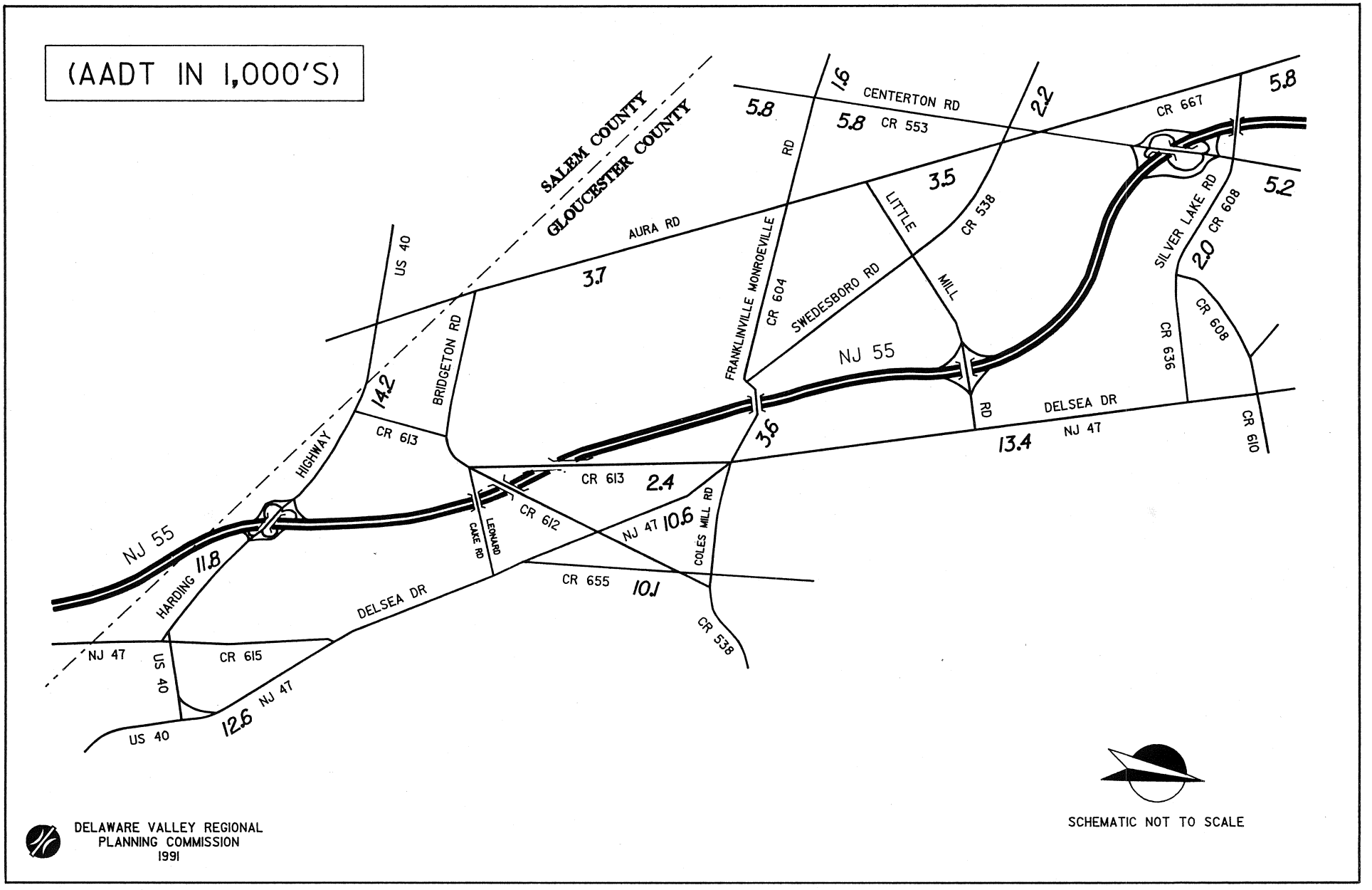


Table 2: TRANSPORTATION IMPROVEMENT PROGRAM (1991-1996) (Refer to Figure 13 for project location)

KEY #:	1
LOCATION:	Hurffville Rd. (NJ Route 41) between Cooper St. (CR 706) and Camden Co. Line
TYPE OF IMPROVEMENT:	Dualization and jughandles
CONSTRUCTION DATE:	FY 1994
TOTAL COST:	$35,300,000
FUNDING:	Federal-aid urban
SPONSOR:	NJDOT
KEY #:	2
LOCATION:	Cooper St. (CR 534)/Clements Bridge Rd. (CR 544) between NJ Turnpike and NJ Route 55 Freeway
TYPE OF IMPROVEMENT:	Reconstruction, widening and intersection improvements
CONSTRUCTION DATE:	FY 1991
TOTAL COST:	$4,000,000
FUNDING:	Federal-aid urban
SPONSOR:	Gloucester County
KEY #:	3
LOCATION:	Hurffville Rd. (NJ Route 41) between Delsea Dr. (NJ Route 47) and New Jersey Ave. (CR 621)
TYPE OF IMPROVEMENT:	Drainage and resurfacing
CONSTRUCTION DATE:	NA
TOTAL COST:	NA
FUNDING:	Federal-aid urban
SPONSOR:	NJDOT
KEY #:	4
LOCATION:	Delsea Dr. (NJ Route 47) over Bees Branch
TYPE OF IMPROVEMENT:	Culvert replacement
CONSTRUCTION DATE:	FY 1991
TOTAL COST:	$210,000
FUNDING:	NJDOT
SPONSOR:	NJDOT
KEY #:	5
LOCATION:	Barnsboro-Blackwood Rd. (CR 603) over Mantua Creek
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1995
TOTAL COST:	$620,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County
KEY #:	6
LOCATION:	Main St. (CR 603) over Chestnut Branch
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	NA
TOTAL COST:	NA
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County

Table 2: TRANSPORTATION IMPROVEMENT PROGRAM (Continued) (Refer to Figure 13 for project location)

KEY #:	7
LOCATION:	Lambs Rd. (CR 635) over Mantua Creek
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1995
TOTAL COST:	$2,700,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County
KEY #:	8
LOCATION:	Main St. (CR 553 Alt) over Chestnut Branch
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1995
TOTAL COST:	$620,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County
KEY #:	9
LOCATION:	Breakneck Rd. (CR 603) over Edwards Run
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1994
TOTAL COST:	$620,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County
KEY #:	10
LOCATION:	Centerton-Glassboro Rd. (CR 553) over Still Run
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1995
TOTAL COST:	$650,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County
KEY #:	11
LOCATION:	Centerton-Glassboro Rd. (CR 553) at Swedesboro Road (CR 538)
TYPE OF IMPROVEMENT:	Reconstruction, install traffic signal
CONSTRUCTION DATE:	FY 1991
TOTAL COST:	$520,000
FUNDING:	FAUS
SPONSOR:	Gloucester County
KEY #:	12
LOCATION:	Centerton-Glassboro Rd. (CR 553) over Reed Branch
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1993
TOTAL COST:	$620,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County
KEY #:	13
LOCATION:	Aura Rd. over Reed Branch
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1991
TOTAL COST:	$600,000
FUNDING:	Bridge replacement-off system
SPONSOR:	Gloucester County

Table 2: TRANSPORTATION IMPROVEMENT PROGRAM (Continued) (Refer to Figure 13 for project location)

KEY #:	14
LOCATION:	Swedesboro Rd. (CR 538) between Little Mill Rd. and Franklinville-Monroeville Rd. (CR 604)
TYPE OF IMPROVEMENT:	Resurfacing
CONSTRUCTION DATE:	FY 1991
TOTAL COST:	$2,600,000
FUNDING:	Federal-aid secondary
SPONSOR:	Gloucester County
KEY #:	15
LOCATION:	Williamstown-Franklinville Road over Scotland Run
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:FY 1993	
TOTAL COST:	$595,000
FUNDING:	Bridge replacement-off system
SPONSOR:	NJDOT
KEY #:	16
LOCATION:	Coles Mill Rd. (CR 538) over Scotland Run
TYPE OF IMPROVEMENT:	Bridge replacement
CONSTRUCTION DATE:	FY 1994
TOTAL COST:	$620,000
FUNDING:	Bridge project-on system
SPONSOR:	Gloucester County

On the arterials and collectors, north of Glassboro, traffic volumes tend to range between 5,000 and 8,000 vehicles per day. The exceptions with significantly higher volumes are Clements Bridge Road (approximately 18,000 vehicles), Deptford Center Road (10,200 vehicles), Hurffville Road (13,000-16,000 vehicles), Egg Harbor Road (19,900 vehicles), Woodbury-Glassboro Road (10,000-22,000 vehicles), and Delsea Drive (13,000-21,000 vehicles). South of Glassboro, traffic volumes generally range below 6,000 vehicles per day, and frequently below 4,000 vehicles. The major exceptions are US Route 332 east (9,200 vehicles), US Route 322 west (9,300-13,700 vehicles), Delsea Drive (11,000-16,000 vehicles), and US Route 40 (14,200 vehicles).

A level of service analysis was not performed to evaluate existing traffic conditions because the traffic volumes are so low that, with few exceptions, roads are operating at satisfactory service levels.

FUTURE CONDITIONS

Completion of NJ Route 55 Freeway and the consequent residential development around its interchanges will disrupt travel patterns in central Gloucester County. New population and employment centers on existing farm land will change work and retail trip patterns. The typical methodology used to conduct traffic impact analyses is inappropriate. Only a traffic simulation model can project travel demand ensuing from changes to the highway network and the anticipated increase in population and employment.

In this chapter, the model methodology will be reviewed. Demographic and highway network input into the model will be documented. Year 2010 AADTs will be presented and compared to existing traffic levels. Lastly, a level of service analysis of future conditions will be shown.

The Year 2010 was selected as the base year for future traffic volumes and demographic projections because it represents a 20-year time frame which is commonly used in transportation planning to project the need for improvements to major highway facilities.

Travel Demand Model

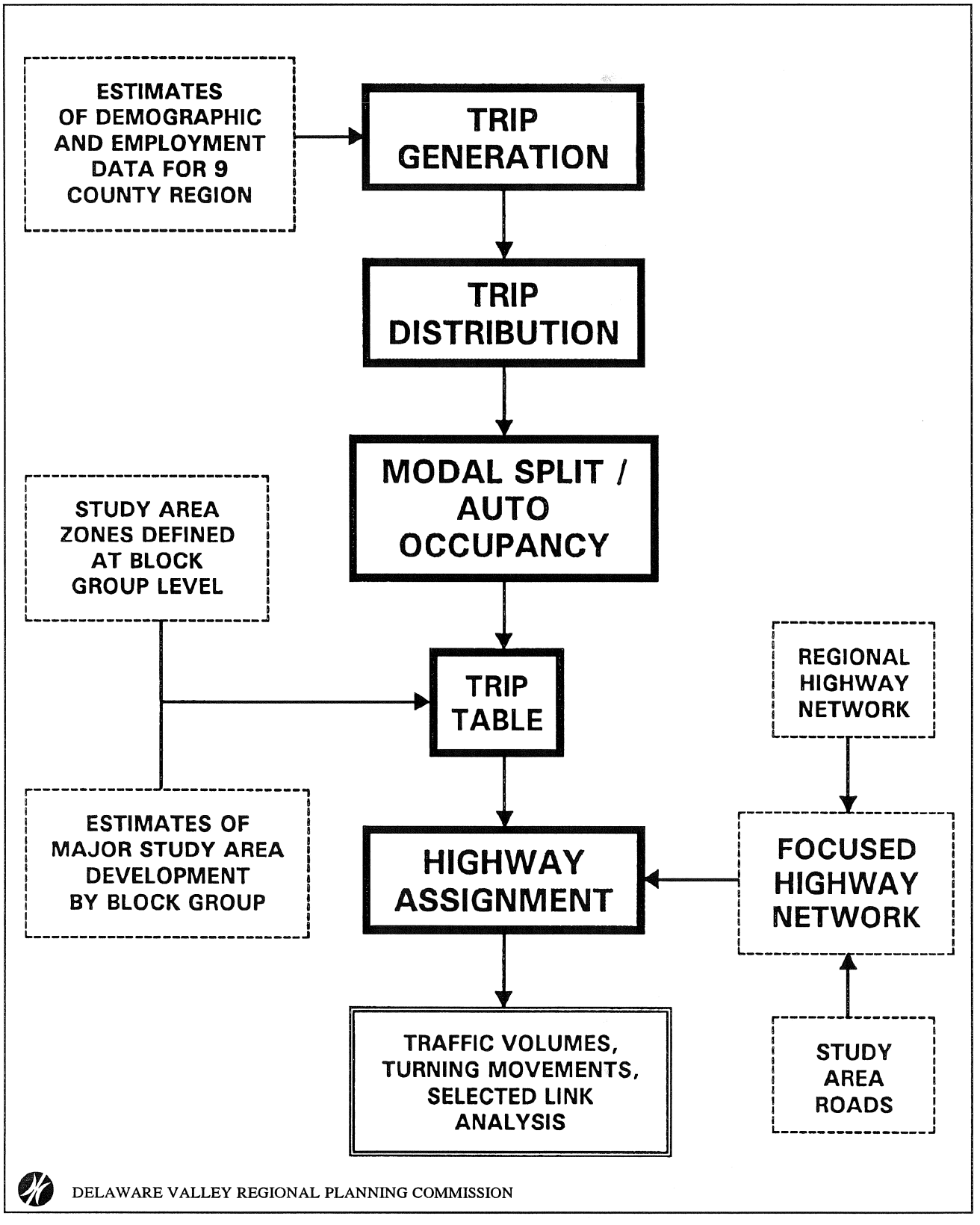
Traffic demand projections for the year 2010 were estimated using a focused traffic simulation model. The model, an extension of the DVRPC regional traffic simulation model, was specifically calibrated to evaluate impacts in the study area. Trip generation and traffic flow patterns are driven by demographic data while the assignment of traffic to particular roads is a function of the highway network; thus changes to land development patterns or the highway network were reflected in the model's output.

The DVRPC traffic simulation model is, essentially, the Federal Highway Administration's Urban Transportation Planning System (UTPS) package customized for the Delaware Valley. The model is periodically updated and recalibrated to reflect changing conditions. NJDOT uses the model for alternatives testing and 20 year traffic projections.

The model (see Figure 15) is based on the standard four step transportation planning process described below:

1. Trip Generation - The DVRPC region is divided into 1335 zones, generally corresponding to census tracts. The number of trips generated by each zone is estimated using the following demographic data: population, households, employed residents, households stratified by auto ownership, total automobiles, and employment stratified by the 11 standard industrial classification (SIC) groups. Estimates of external and through travel to the region are developed independently.

Figure 15: FOCUSED TRAFFIC SIMULATION PROCESS



2. Trip Distribution - Trips are distributed among the zones within the region by means of a gravity model. This gravity model assumes that the propensity to travel to a zone of destination increases with the attractiveness of the destination zone (as measured by employment) and decreases as the difficulty of travelling between zones increases.

3. Modal Split - Modal split divides the trips between zones into highway trips and transit trips.

4. Traffic Assignment - Through an iterative process the trips are assigned to the highway network, based upon minimal path travel times, forming link volumes. The minimum path between zones is calculated on the basis of link length, highway type (limited access expressway, arterial or collector) and link volume.

The DVRPC highway network contains virtually every street of significance in the region. All expressways, arterials and a majority of the collector roads are included in the network. The network includes over 1,000 miles of expressways, 8,500 miles of arterials, and 3,000 miles of collectors. Each highway segment, or link, is defined by the following parameters: length in miles, functional classification, type of surrounding area (e.g., urban, suburban, or rural), geographic location, hourly capacity, toll class and number of lanes.

The focused simulation traffic zones are shown in the appendix. The original 29 simulation zones constituting Gloucester County are subdivided into 161 smaller zones in order to provide more accurate estimates of trip generation and highway assignment.

The focused simulation highway network was only slightly modified north of Glassboro. Several minor roads, such as Caulfield Avenue, were added to the regional highway network as part of the focused simulation process. In Clayton, Elk, and Franklin Townships the modifications to the highway network were more extensive.

Cumberland and Salem counties fall outside of the DVRPC region; therefore the number of cordon stations used by the model to channel trips into the region had to be expanded to reflect the more detailed highway network created under the focused simulation process.

Future Development

To estimate the number of vehicle trips generated by each traffic zone, the municipality-wide population and employment projections had to be apportioned among the zones. County and municipal officials were asked to estimate where growth will occur in their respective municipalities. Projected growth was then added onto existing zonal population and employment levels estimated by DVRPC. The methodology used to project the Year 2010 zonal demographics is described in more detail in the appendix.

In 1980, the 12 municipalities constituting the study area had an aggregate population of 126,097. In 1987, (the latest estimate) DVRPC projected a population of 134,170, a growth of 8,073 (see Table 3). By the Year 2010, the county and municipal officials project a population of 203,566, an increase of 69,396 over 1987. The largest growth is expected to occur in Washington Township, an increase of 18,800 residents, a representing a 58 percent increase. Elk, Harrison, and Mantua are each expected to experience a growth of over 10,000 residents. These three municipalities are also expected to experience the largest percent increase in growth over 1987. Three municipalities, Pitman, Woodbury City and Woodbury Heights are expected to experience a decrease in population. Half of the municipalities project a different population from DVRPC's official Year 2010 estimate. In all but one instance the municipal projection is higher than DVRPC's.

Employment is projected to have just as dramatic an increase as the population. In 1980, there were 39,553 employees in the study area. For 1987, DVRPC projected 47,556 employees, an increase of 8,003 employees (see Table 4). In the Year 2010, the county and municipal officials project an employment of 76,088 people, a 60% increase over 1987. Again, Washington Township is projected to experience the largest increase. Deptford Township is projected to have an increase of 4,272 employees. Other municipalities projected to experience an increase of over 1,000 employees are Elk, Franklin, Glassboro, Mantua, and Woodbury City. The largest percent increase over 1987 is projected to occur in Elk and Franklin Townships.

Within central Gloucester County several pockets of high growth were identified: along Black Horse Pike (NJ Route 42) in Washington Township, along Delsea Drive (NJ Route 47) and Barnsboro-Blackwood Road (CR 603) in Deptford, Mantua and Washington townships, and along Ellis Mill Road (CR 641) in Glassboro. While other areas may not demonstrate as high a growth in terms of absolute number of trips, the percent increase may actually surpass the high growth areas.

Future Traffic Volumes

Projected traffic volumes are presented and analyzed in this section.

Year 2010 projected volumes are presented in Figure 16. Traffic levels on NJ Route 55 Freeway are projected to range between 31,200 vehicles per day south of US Route 40 to 77,100 vehicles per day between NJ Route 47 and Deptford Center Road. Between Glassboro-Centerton Road and the Woodbury-Glassboro Road interchanges, NJ Route 55 is projected to typically carry between 50,000 and 60,000 vehicles per day. On state highways, Hurffville Road (NJ 41) is projected to carry approximately 24,000 vehicles daily, US Route 322 between 14,000 and 20,000 vehicles per day, and on Delsea Drive (NJ 47) between 13,000 and 16,000 vehicles per day south of Glassboro and between 19,000 and 22,000 vehicles between Glassboro and Hurffville Road (NJ 41).

On key county roads traversing the study area, Barnsboro-Blackwood Road (CR 603) is expected to carry between 7,000 and 10,000 vehicles per day, Richwood Road (CR 609) between 5,000 and 6,000 vehicles, Swedesboro Road (CR 538) between 5,000 and 7,000 vehicles, Lambs Road (CR

Table 3: POPULATION ESTIMATES: 1980 TO 2010

	1980 CENSUS DATA	1987 DVRPC ESTIMATE	2010 DVRPC FORECAST	2010 COUNTY FORECAST	1987-2010 PERCENT GROWTH	1987-2010 ABSOLUTE GROWTH
Clayton	6,013	6,185	7,720	7,720	24.8%	1,535
Deptford	23,473	24,190	29,000	29,000	19.9%	4,810
Elk	3,166	3,534	6,030	**13,534**	283.0%	10,000
Franklin	12,396	14,414	22,100	22,100	53.3%	7,686
Glassboro	14,574	14,340	17,010	**21,000**	46.4%	6,660
Harrison	3,544	3,733	5,010	**14,659**	292.7%	10,926
Mantua	9,193	9,887	11,910	**20,511**	107.5%	10,624
Pitman	9,744	9,471	9,280	**8,551**	-9.7%	-920
Washington	27,878	32,511	50,470	**51,311**	57.8%	18,800
Wenonah	2,303	2,230	2,230	2,230	0.0%	0
Woodbury City	10,353	10,270	9,770	9,770	-4.9%	-500
Woodbury Heights	3,460	3,405	3,180	3,180	-6.6%	-225
Corridor Total	126,097	134,170	173,710	203,566	51.7%	69,396

13,534: ADJUSTED BY MUNICIPAL AND COUNTY OFFICIALS TO REFLECT RECENT CHANGES

Table 4: EMPLOYMENT ESTIMATES: 1980 TO 2010

	1980 CENSUS DATA	1987 DVRPC ESTIMATE	2010 DVRPC FORECAST	2010 COUNTY FORECAST	1987-2010 PERCENT GROWTH	1987-2010 ABSOLUTE GROWTH
Clayton	1,492	1,860	2,540	2,540	36.6%	680
Deptford	8,761	10,858	15,130	15,130	39.3%	4,272
Elk	152	226	590	**1,650**	630.0%	1,424
Franklin	1,653	2,042	3,590	3,590	75.8%	1,548
Glassboro	6,374	7,447	8,690	**11,100**	49.1%	3,653
Harrison	858	1,157	1,570	**1,659**	43.4%	506
Mantua	3,550	4,611	6,460	**7,342**	59.2%	2,731
Pitman	3,473	3,754	4,160	4,160	10.8%	406
Washington	3,465	4,548	6,960	**15,537**	241.6%	10,989
Wenonah	381	446	600	600	34.5%	154
Woodbury City	7,736	8,596	10,040	10,040	16.8%	1,444
Woodbury Heights	1,658	2,011	2,740	2,740	36.3%	729
Corridor Total	39,553	47,556	63,070	76,088	60.0%	28,535

11,100: ADJUSTED BY MUNICIPAL AND COUNTY OFFICIALS TO REFLECT RECENT CHANGES

Figure 16A: AVERAGE ANNUAL DAILY TRAFFIC VOLUMES - YEAR 2010

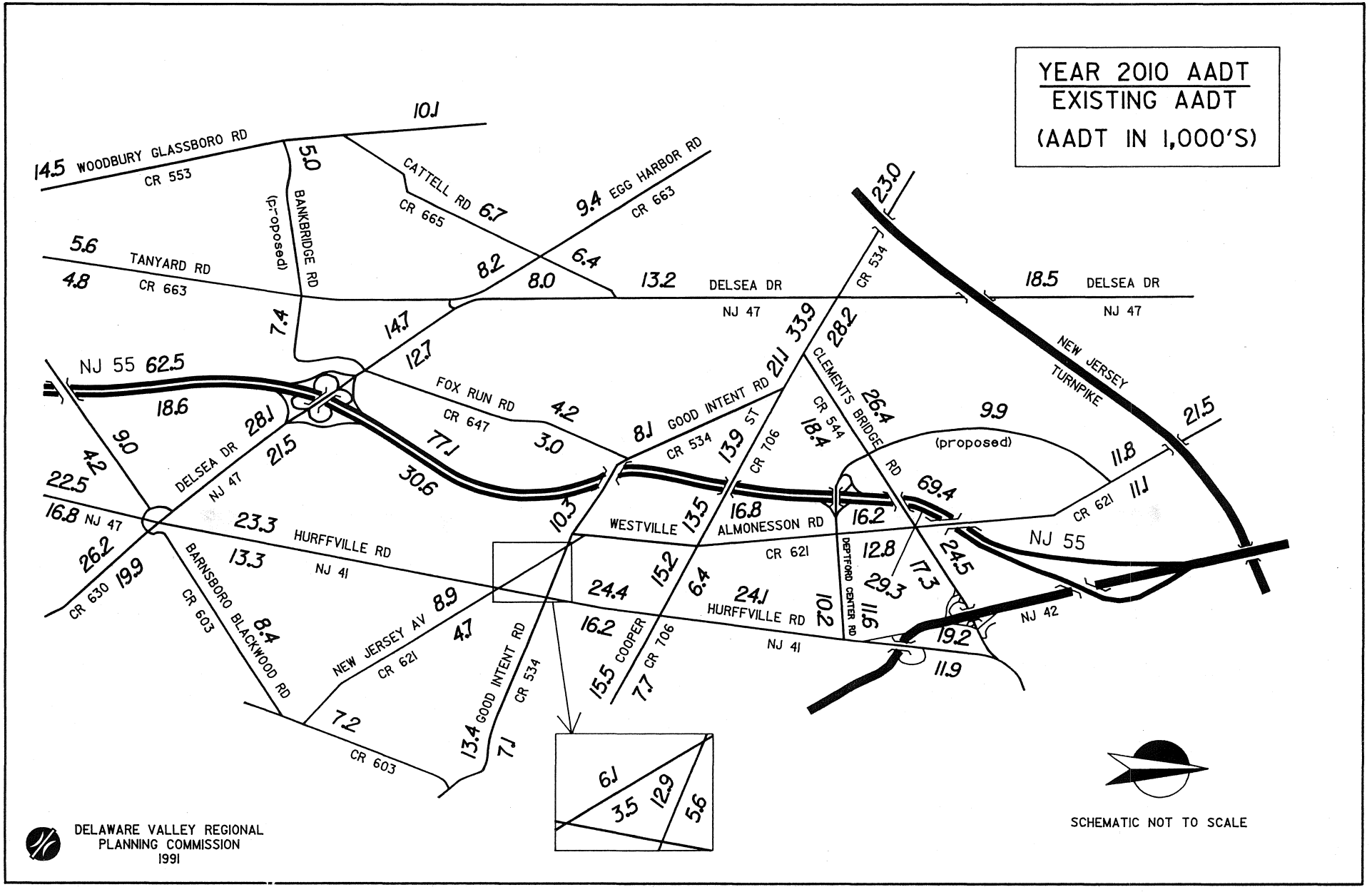


Figure 16B: AVERAGE ANNUAL DAILY TRAFFIC VOLUMES - YEAR 2010

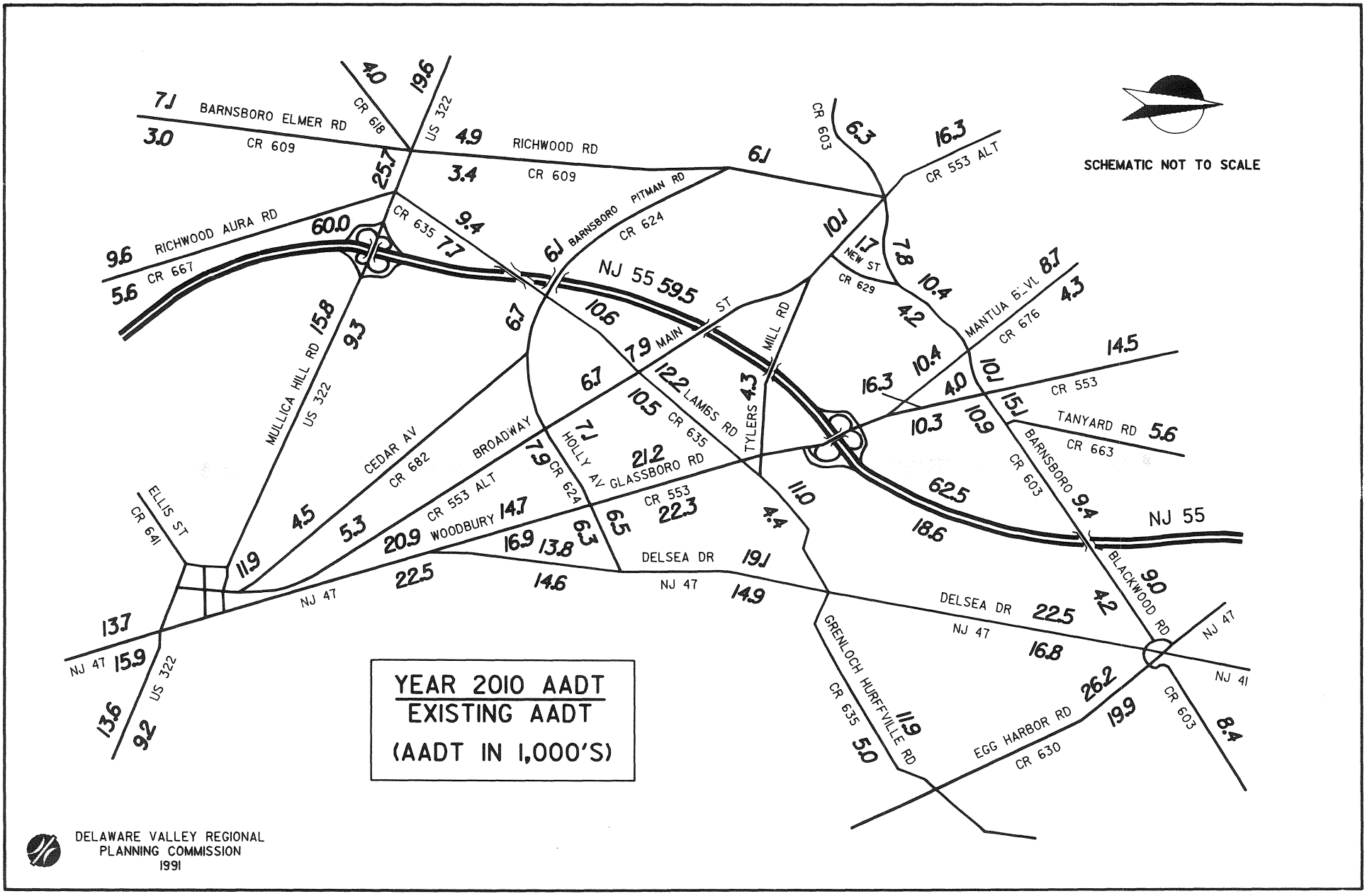


Figure 16C: AVERAGE ANNUAL DAILY TRAFFIC VOLUMES - YEAR 2010

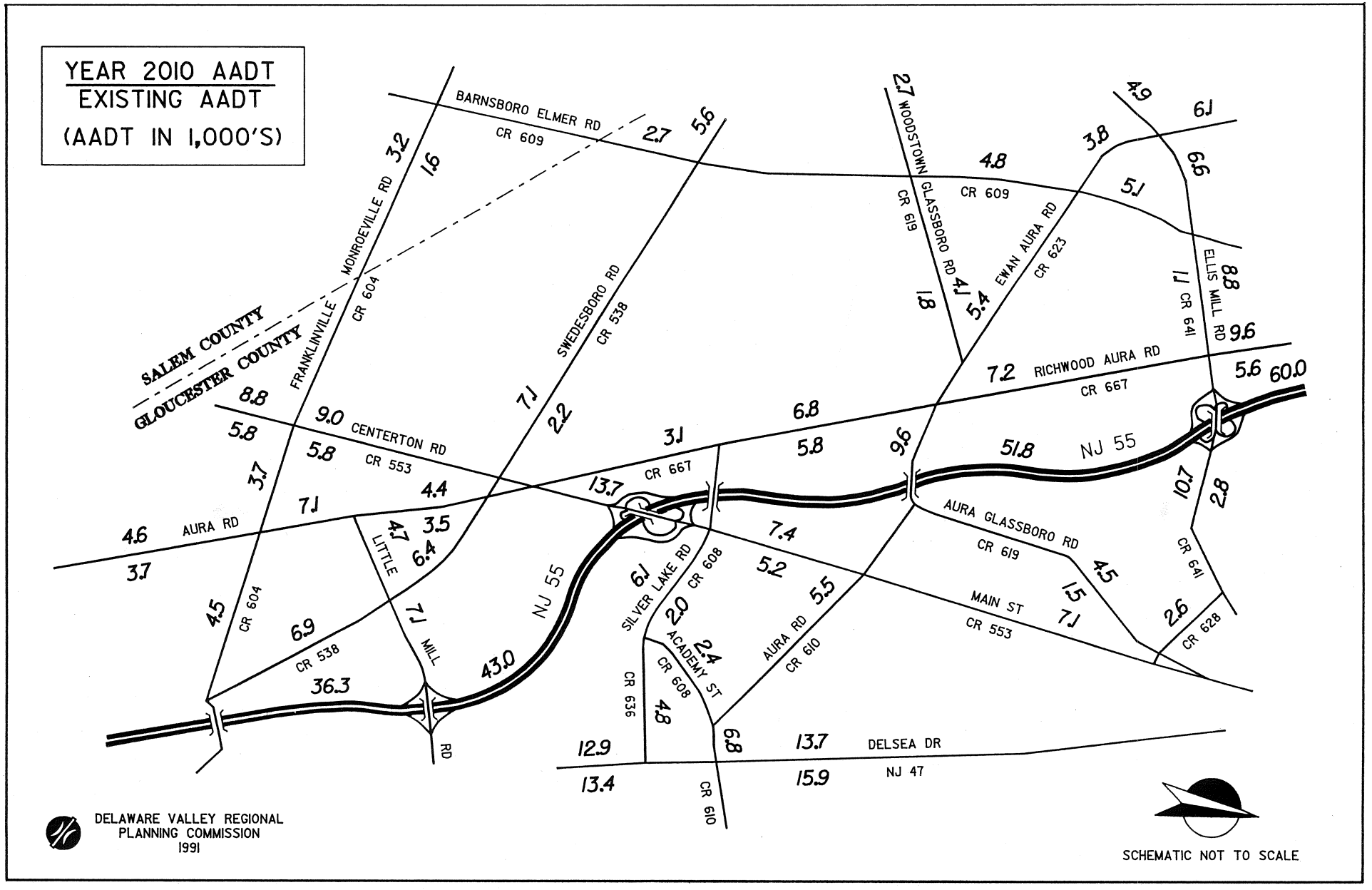
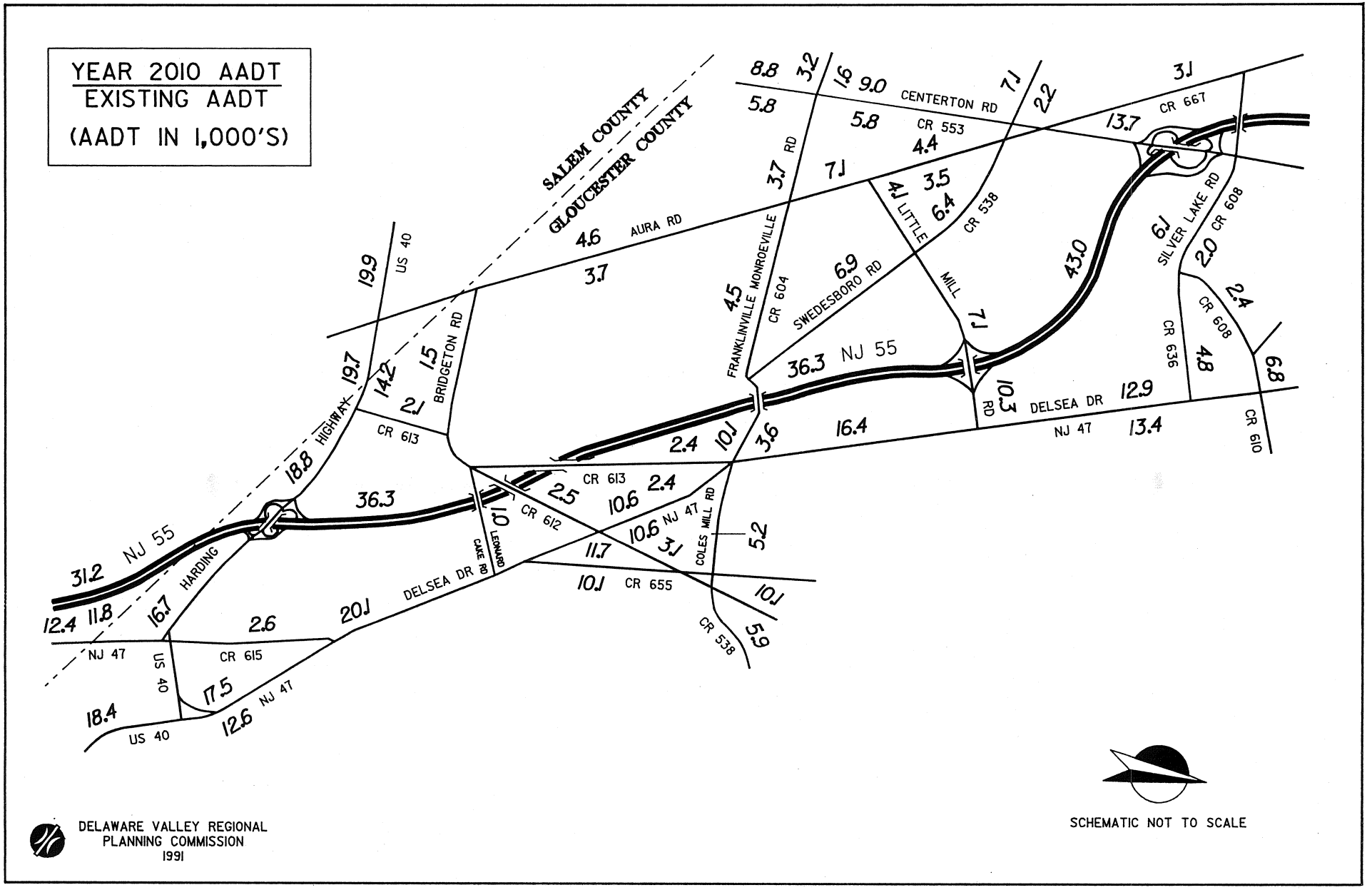


Figure 16D: AVERAGE ANNUAL DAILY TRAFFIC VOLUMES - YEAR 2010



635) between 10,000 and 12,000 vehicles, and Richwood-Aura Road/Aura Road (CR 667) averaging about 7,000 vehicles per day.

On county roads in the northern portion of the corridor, Clements Bridge Road (CR 544) is projected to carry between 24,000 and 27,000 vehicles per day, Westville-Almonesson Road (CR 621) between 12,000 and 17,000 vehicles, and Tanyard Road (CR 663) approximately 5,500 vehicles per day.

In the middle portion of the study area, Grenloch-Hurffville Road (CR 635) is anticipated to carry approximately 12,000 vehicles per day, Holly Avenue between 6,000 and 7,000 vehicles daily, Woodbury-Glassboro Road (CR 553) between 15,000 and 21,000 vehicles, Woodstown-Glassboro Road (CR 619) between 2,000 and 4,000 vehicles, and Main Street (CR 553) approximately 7,000 vehicles.

On county roads in the southern portion of the study area, Franklinville-Monroeville Road (CR 604) is projected to carry between 3,000 and 5,000 vehicles per day and Coles Mill Road (CR 538) approximately 5,000 vehicles per day.

Among municipal roads, Deptford Center Road is expected to carry between 10,000 and 12,000 vehicles, Little Mill Road between 7,000 and 10,000 vehicles east of Swedesboro Road (CR 538) and approximately 5,000 vehicles west of Swedesboro Road, and Bankbridge Road approximately 5,000 vehicles per day.

A comparison of existing and future AADTs within the study area is presented in Table 5. Traffic on the previously opened segments of NJ Route 55 Freeway is projected to increase approximately 150 percent with the segment between Woodbury-Glassboro Road (CR 553) and Delsea Drive (NJ 47) projected to increase over 200 percent. Sections of Delsea Drive and Woodbury-Glassboro Road are expected to loose traffic as through trips are diverted to the freeway. For example, between US 322 and Academy Street (CR 610) traffic on Delsea Drive will decrease 14 percent. Other sections of the same roads will experience lesser reductions in traffic or even slight increases in traffic as local development off-sets the reduction of through trips.

Roads that are anticipated to experience substantial increases in traffic are Cooper Street (CR 534), Mantua Boulevard (CR 676), Grenloch-Hurffville Road (CR 635) between Woodbury-Glassboro Road (CR 553) and Egg Harbor Road (CR 630), Ellis Mill Road (CR 641), Swedesboro Road (CR 538), and sections of Barnsboro-Blackwood Road (CR 603).

Overall, NJ Route 55 and the ensuing development will have only a moderate impact on the roadway system. In the DVRPC region, roads historically experience a 1-2 percent annual growth rate; therefore, over a 20 year period, a 20-40 percent increase in traffic would not be considered unusual. Given this fact, the projected increases in traffic are not as excessive as they appear. The model results suggest that, though extensive development is envisioned, the traffic generated by new development will readily be absorbed by the highway system. The high volumes projected for the NJ Route 55 Freeway and its approach roads suggests that the freeway will absorb many of these

Table 5: COMPARISON OF EXISTING AND YEAR 2010 AADTS ON ROADWAY NETWORK

Road Segment	Existing AADT	Year 2010 AADT	Absolute Difference	Percent Difference
NJ 55 Freeway				
Deptford Center Rd. - NJ 42	24,340	69,400	45,060	185.1%
NJ 47 - Deptford Center Rd.	30,600	77,100	46,500	152.0%
CR 533 - NJ 47	18,600	62,500	43,900	236.0%
County Line - US 40	11,800	31,200	19,400	164.4%
Clements Bridge Rd.				
CR 534 - Deptford Center Rd.	18,400	26,400	8,000	43.5%
CR 621 - NJ 42	17,300	24,500	7,200	41.6%
Cooper Street				
NJ 47 - CR 544	28,200	35,400	7,200	25.5%
CR 621 - NJ 41	6,400	15,200	8,800	137.5%
CR 706 - County Line	7,700	15,500	7,800	101.3%
Westville-Almonesson Rd./New Jersey Ave.				
Deptford Center Rd. - NJ 55	11,100	11,800	700	6.3%
CR 544 - Deptford Center Rd.	12,800	16,200	3,400	26.6%
CR 534 - NJ 41	3,500	6,100	2,600	74.3%
NJ 41 - CR 676	4,700	8,900	4,200	89.4%
Barnsboro-Blackwood Rd.				
NJ 55 Freeway - NJ 47	4,200	9,000	4,800	114.3%
CR 553 - CR 663	10,900	15,100	4,200	38.5%
New St. - CR 676	4,200	10,400	6,200	147.6%
Tanyard Road				
CR 603 - Bankbridge Rd.	4,800	5,600	800	16.7%
NJ 47				
CR 633 - CR 647	12,700	14,700	2,000	15.7%
NJ 55 Freeway - NJ 41	21,500	28,100	6,600	30.7%
NJ 41 - CR 635	16,800	22,500	5,700	33.9%
CR 635 - CR 624	14,900	19,100	4,200	28.2%
CR 624 - CR 553	14,400	13,800	-600	-4.2%
CR 553 - US 322 West	22,500	20,400	-1,600	- 7.1%
Woodbury-Glassboro Rd.				
CR 676 - CR 603	10,300	16,300	6,000	58.3%
CR 624 - CR 635	22,300	21,200	-1,100	-5.0%
NJ 47 - CR 624	16,900	14,700	-2,200	-13.0%
Mantua Boulevard				
CR 603 - CR 533 Alt.	4,300	8,700	4,400	102.3%
CR 533 - CR 603	4,000	10,400	6,400	160.0%
Lambs Road				
US 322 - CR 624	7,700	9,400	1,700	22.1%
CR 533 Alt. - CR 533	10,500	12,200	1,700	16.2%
CR 533 - NJ 47	1,400	11,000	6,600	150.0%
NJ 47 - CR 630	5,000	11,900	6,900	138.0%

Table 5: COMPARISON OF EXISTING AND YEAR 2010 AADTS ON ROADWAY NETWORK (Continued)

Road Segment	Existing AADT	Year 2010 AADT	Absolute Difference	Percent Difference
US 322				
CR 609-CR 635/CR 667	13,700	25,700	12,000	87.6%
NJ Freeway - Glassboro	9,300	15,800	6,500	69.9%
NJ 47 - CR 655	9,200	13,600	4,400	47.8%
NJ 47				
US 322 - CR 610	15,900	13,700	-2,200	-13.8%
CR 636 - Little Mill Rd.	13,400	12,900	-500	-3.7%
CR 538 - CR 612	10,600	10,600	0	0%
CR 615 - US 40	12,600	17,500	4,900	38.9%
Main Street/Centerton Rd.				
CR 610 - CR 608	5,200	7,400	2,200	42.3%
CR 538 - CR 604	5,800	9,000	3,200	55.2%
CR 604 - County Line	5,800	8,800	3,000	51.7%
Aura Road				
US 322 - CR 623	5,600	9,600	4,000	71.4%
CR 614 - CR 608	5,800	6,800	1,000	17.2%
CR 538 - Little Mill Rd.	3,500	4,400	900	25.7%
CR 604 - US 40	3,700	4,600	900	24.3%
Ellis Mill Road				
CR 638 - CR 623	2,400	4,900	2,500	104.2%
CR 609 - CR 667	1,100	8,800	7,700	700.0%
NJ 55 Freeway - CR 628	2,800	10,700	7,900	282.17%
Woodstown-Glassboro Rd./Aura-Glassboro Rd.				
CR 609 - CR 623	1,800	4,100	2,300	127.8%
CR 610 - CR 628	1,500	4,500	3,000	200.0%
Swedesboro Rd./Coles Mill Rd.				
CR 609 - CR 538	2,200	7,100	4,900	222.7%
NJ 55 Freeway - NJ 47	3,600	10,100	6,500	180.6%
Franklinville-Monroeville Rd.				
CR 609 - CR 553	1,600	3,200	1,600	200.0%
US 40				
Aura Road - CR 613	14,200	19,700	5,500	38.7%
Blackwood Rd.				
CR 612 - NJ 47	10,100	11,700	1,600	15.8%
Silver Lake Rd.				
CR 553 - CR 636	2,000	6,100	4,100	205.0%

new trips. While an enormous acreage is available for development, only a minor to moderate portion is anticipated to be developed by the Year 2010. In addition, a surplus of highway capacity currently exists in an extensive portion of the study area. Therefore, on these roads, particularly in the southern portion of the corridor, with very low traffic volumes, doubling or tripling traffic levels will only result in moderate traffic levels and relatively minor impacts. Over a longer time frame, or if build-out is more extensive than envisioned, the impact of NJ Route 55 Freeway will become more burdensome.

Future Level of Service

A level of service analysis was conducted on the critical roads to identify operating deficiencies under the projected traffic volumes.

The concept of level of service is a qualitative measure describing operational conditions within a traffic stream and their perception by motorists in terms of speed, travel time, traffic interruptions, freedom to maneuver, comfort, and convenience. Six levels of service are defined and assigned letter designations, A to F, with level of service A representing the best operating conditions and level of service F the worst. Level of service C is the minimum desirable condition; however, jurisdictions frequently tolerate level of service D when the cost to upgrade the highway facility becomes prohibitive.

Methodology to determine level of service is presented in the Highway Capacity Manual, Transportation Research Board Special Report 209. Different methodologies are specified for two-lane roadways, signalized and unsignalized intersections.

Since most of the roads in the corridor are two-lane roadways, the level of service methodology used in this report is for two-lane roadways. In the northern portion of the corridor where traffic signals are more common, traffic delays experienced at intersections are a more preferable indicator of traffic operating conditions. However, because of the magnitude of information needed for such a detailed analysis, intersection level of service analysis was not performed in the study. In the southern portion of the corridor where there are few signals and there is a considerable distance between intersections, the two-lane methodology should accurately measure future road operations.

The two-lane methodology assumes the road operates under uninterrupted flow conditions when the distance between traffic signals or stop signs exceeds two miles. When the roadway segment is less than two miles in length the intersection where flow is interrupted is the primary determinant of level of service. When uninterrupted flow conditions occur, the level of service for a two lane highway is defined in terms of average travel speed or, more frequently, utilization of capacity, namely the ratio of the demand volume to the capacity of the roadway (V/C ratio). The capacity of a highway is a function of a number of factors, including lane and shoulder widths, percent "no passing zone," percent trucks, directional split in traffic flow, and roadway grade. A subjective description of each level of service is given in Table 6. It is important to note that because of the complex relationship between travel speed, percent "no passing zone", roadway grade and level of

Table 6: LEVEL OF SERVICE CRITERIA: TWO LANE HIGHWAYS

LEVEL OF SERVICE A - Average speeds at or above speed limit. The passing frequency required to maintain these speeds has not reached a demanding level. Passing demand is well below passing capacity, almost no platoons of three or more vehicles are observed. A maximum flow rate of 420 vehicles per hour, total in both directions, may be achieved under ideal conditions.

LEVEL OF SERVICE B - Passing demands needed to maintain desired speeds becomes significant and approximately equals passing capacity at the lower boundary of Level of Service B. The number of platoons forming in the traffic stream begins to increase dramatically. Service flow rates of 750 vehicles per hour, total in both directions, can be achieved under ideal conditions.

LEVEL OF SERVICE C - Noticeable increase in platoon formation, platoon size, and frequency of passing impediment. Unrestricted passing demand exceeds passing capacity. At higher volume levels, chaining of platoons and significant reductions in passing capacity begin to occur. While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles. A service flow rate of up to 1,200 vehicles per hour, total in both directions, can be accommodated under ideal conditions.

LEVEL OF SERVICE D - Unstable flow is approached. The two opposing traffic streams essentially begin to operate separately at higher volume levels, as passing becomes extremely difficult. The fraction of no passing zones along the roadway usually has little influence on passing. Turning vehicles and/or roadside distractions cause major shock waves in the traffic stream. This is the highest flow rate that can be maintained for any length of time without a high probability of a breakdown. A service flow rate of up to 1,800 vehicles per hour, total in both directions, can be accommodated under ideal conditions.

LEVEL OF SERVICE E - Passing is virtually impossible and platooning becomes intense when slower vehicles or other interruptions are encountered. The highest volume attainable under Level of Service E defines the capacity of the highway. Under ideal conditions, capacity is 2,800 vehicles per hour total in both directions. For other conditions, capacity is lower.

LEVEL OF SERVICE F - Represents heavily congested flow with traffic demand exceeding capacity. Frequently, perturbations in traffic flow as level E is approached cause a rapid transition to Level of Service F.

service, it is not possible to simply list a V/C ratio for each level of service. Service flows at each service level are expressed for ideal conditions. Any deviation from these conditions, for example a lane width of less than 12 feet, will reduce the service flow volume.

To perform the level of service analysis, the following information was obtained from a field inspection of each road: lane width, shoulder width, grade, and percent no passing zone. Truck percentage, directional distribution and peak hour percentage of AADT (K factor) were estimated based upon a review of DVRPC's extensive traffic files for Gloucester County. The analysis was conducted for the PM peak hour when traffic congestion is most severe.

Most roads will operate with a satisfactory level of service, service level D or better, see Figure 17. Even though no traffic congestion is anticipated on these roads, local residents will feel a significant deterioration in level of service because the existing service levels are so high. Again, the high Year 2010 service levels are attributable to the surplus capacity of the existing highway system and the dissipation of traffic throughout the corridor.

Figure 17A: LEVEL OF SERVICE - YEAR 2010

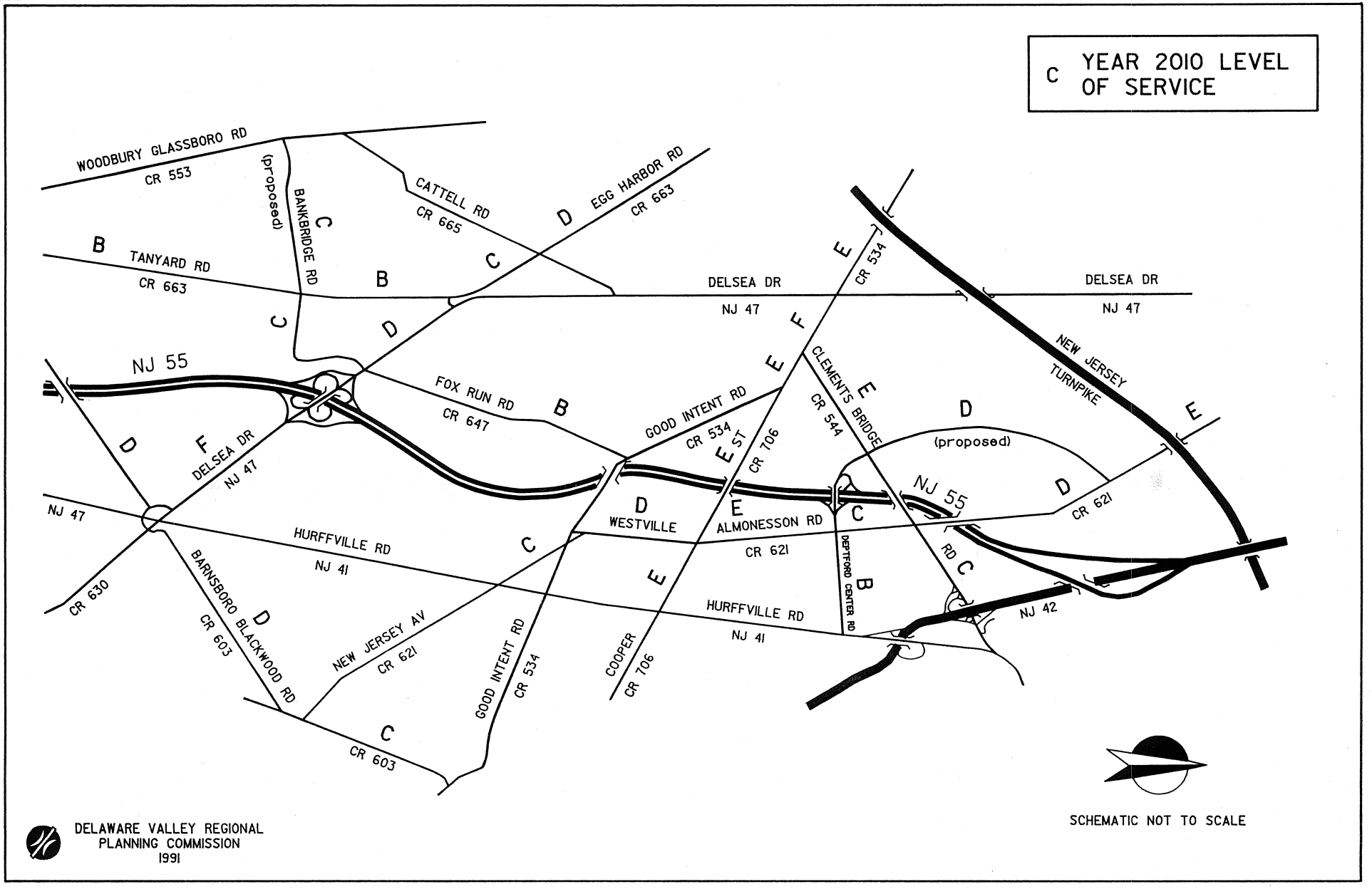


Figure 17B: LEVEL OF SERVICE - YEAR 2010

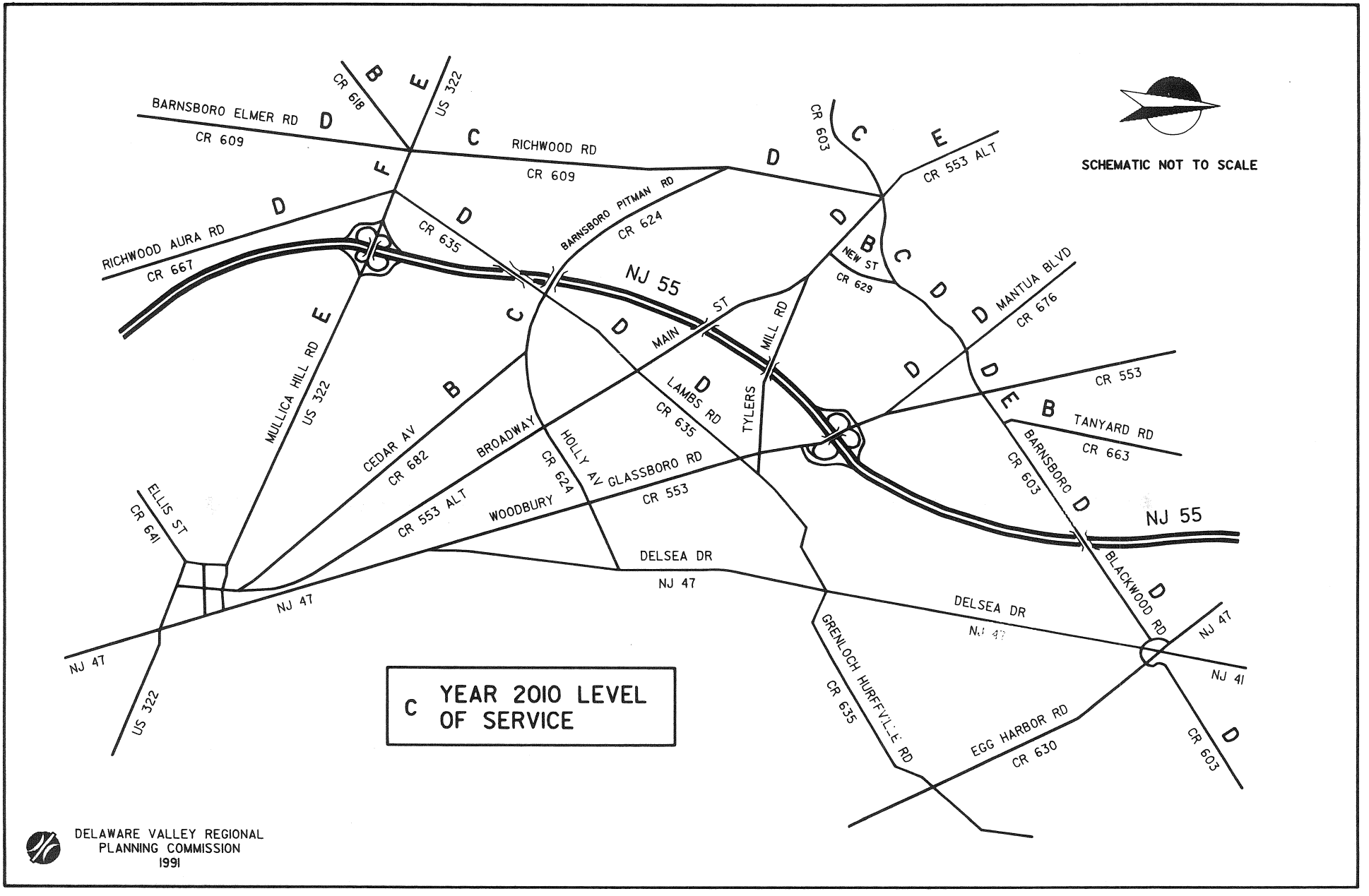


Figure 17C: LEVEL OF SERVICE - YEAR 2010

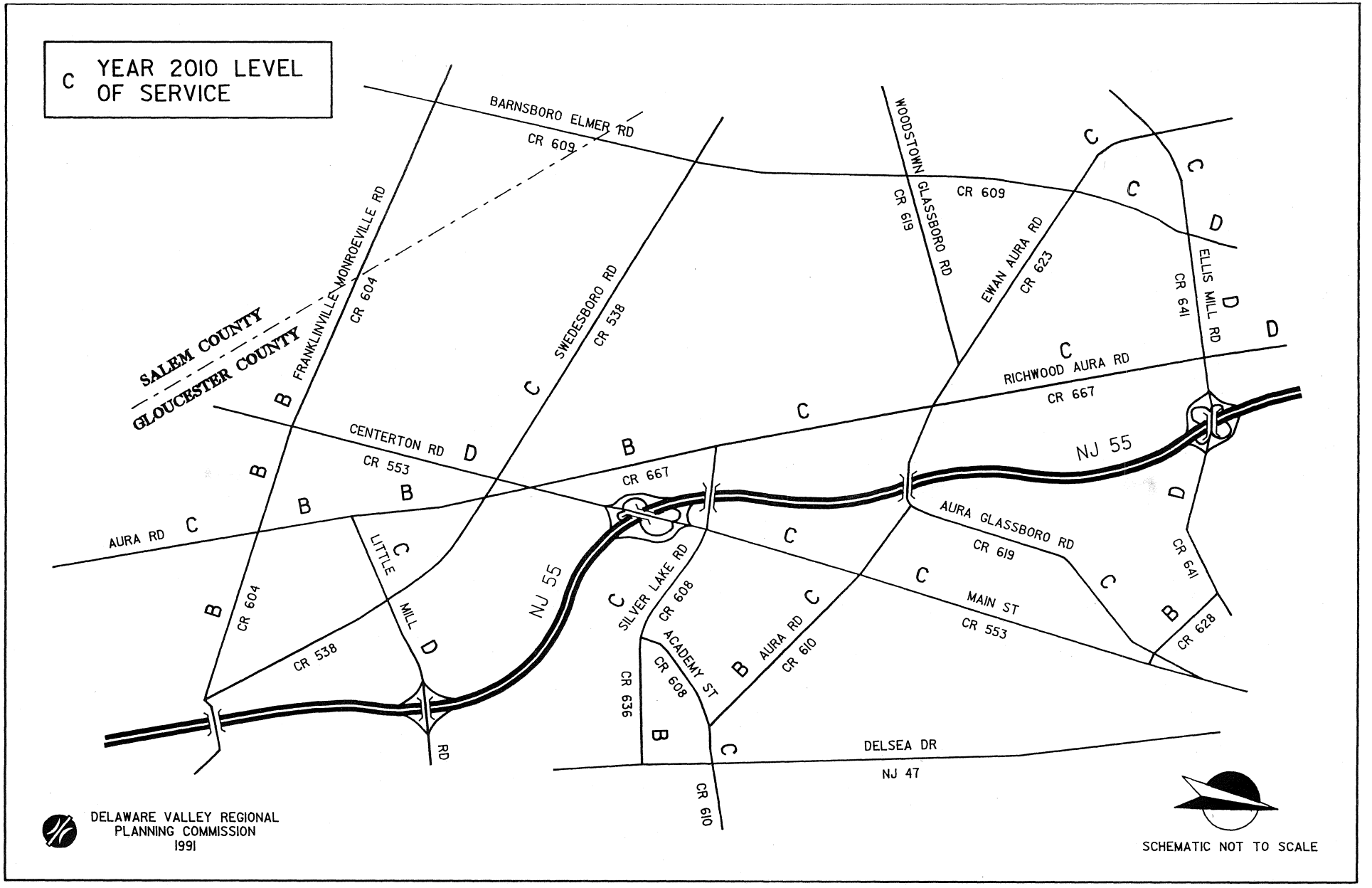
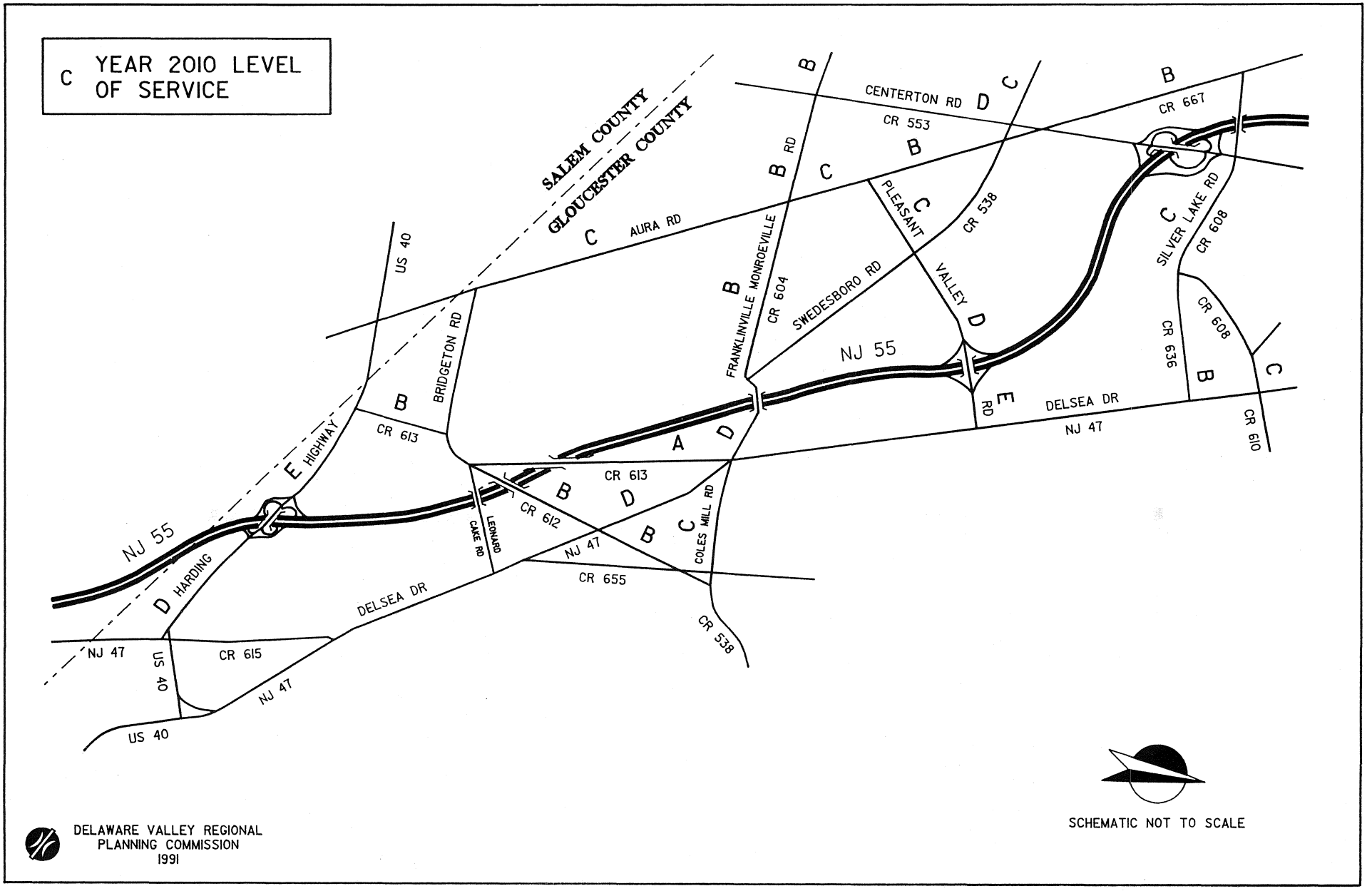


Figure 17D: LEVEL OF SERVICE - YEAR 2010



The following road segments are projected to experience substandard level of service (service level E or F) based upon Year 2010 volumes and existing physical conditions: Cooper Street between the New Jersey Turnpike and Hurffville Road (NJ 41), Delsea Drive (NJ 47) between NJ Route 55 Freeway and Barnsboro-Blackwood Road (CR 603), the two lane section of Clements Bridge Road (CR 544), portions of Westville-Almonesson Road (CR 621) by Deptford Mall, Barnsboro-Blackwood Road between Woodbury-Glassboro Road (CR 553) and Tanyard Road (CR 663), US 322 west, Little Mill Road between NJ Route 55 Freeway and Delsea Drive (NJ 47), and US 40 by NJ Route 55 Freeway.

RECOMMENDATIONS - CAPITAL IMPROVEMENT PROGRAM

Recommendations for transportation improvements fall into two general categories: physical improvements the county needs to construct as part of its Capital Improvement Program (CIP), and recommendations that are policy oriented. This chapter focuses on improvements in the former category; the next chapter discusses recommendations that are policy oriented.

Each year, Gloucester County spends several million dollars to reconstruct and resurface roads, repair bridges, and construct intersection improvements as part of its CIP. Based upon the deficiencies previously identified, as well as additional analysis documented in this chapter, this study recommends a comprehensive list of improvement projects, see Figure 18. The purpose of the list is to document the scope of future needs the county and municipalities will have to address. The scope of improvements is general in nature, reflecting the speculative development estimates used to drive the travel forecasts. Recommendations will eventually need to be refined and construction costs estimated. This can occur at a later date, when land use plans and the travel forecast are updated. Because of the extensive range of recommendations, Gloucester County should review the list to determine which elements should form the basis of future CIP's. Other elements may be more appropriately funded by developers or through federal aid grants. By setting forth a comprehensive circulation plan, the county can assign responsibilities and set priorities.

Road Widenings

The widening of roads for additional cartway widths can be justified under three scenarios: 1) the existing roadway width is so substandard as to pose a potential safety hazard, 2) in areas with extensive commercial/industrial development where additional lanes for left turns or acceleration/deceleration maneuvers are needed, or 3) on roads where a capacity analysis indicates additional travel lanes or a wider cartway is needed to rectify deficient service levels.

At a bare minimum, all roads should have a minimum cartway width of 30 ft. consisting of two 12 ft. travel lanes and two 3 ft. shoulders. However, over the long term, even the 30 ft. standard is too restrictive because the shoulders are still insufficient and there is no room for turn lanes. Any road not meeting the 30 ft. criteria should be upgraded to a more appropriate cartway standard described under the official map in the next chapter. Roads with cartway widths exceeding 30 ft. but less than the official cartway width should eventually be upgraded. The following roads possess cartway widths of less than 30 ft. (the first three roads are less than 23 ft. wide):

- Richwood Road (CR 609) between Breakneck Road (CR 603) and US Route 322
- Aura-Glassboro Road (CR 619) between Sewell Street (CR 628) and Aura Road (CR 610)
- Little Mill Road between Aura Road and NJ Route 47 (excluding section by NJ Route 55 Freeway interchange)
- Bankbridge Road between Woodbury-Glassboro Road (CR 553) and Tanyard Road (CR 663)
- Westville-Almonesson Road (CR 621) between NJ Route 55 Freeway and NJ Turnpike

Figure 18A: COUNTY CAPITAL IMPROVEMENT PROGRAM

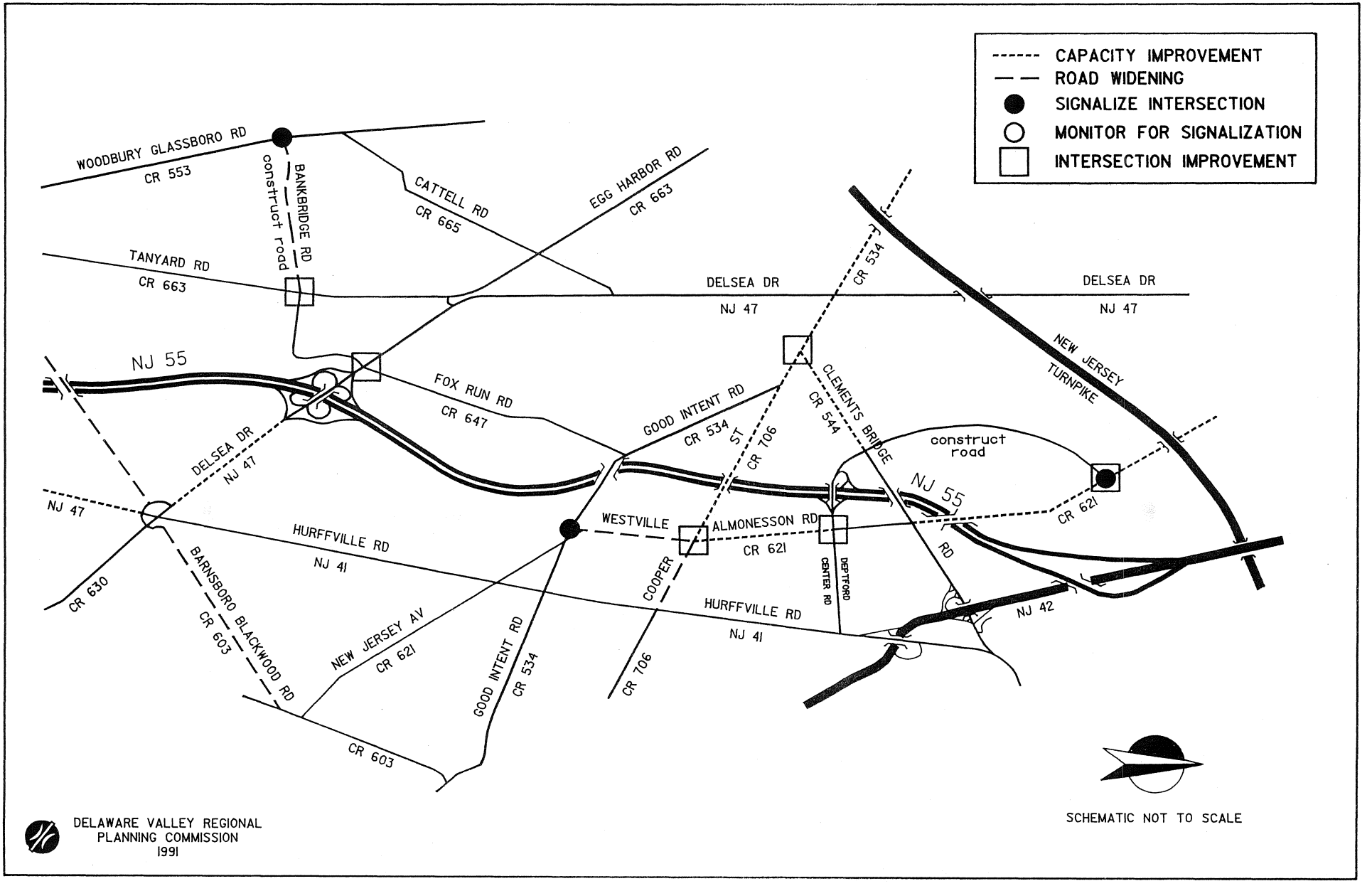


Figure 18B: COUNTY CAPITAL IMPROVEMENT PROGRAM

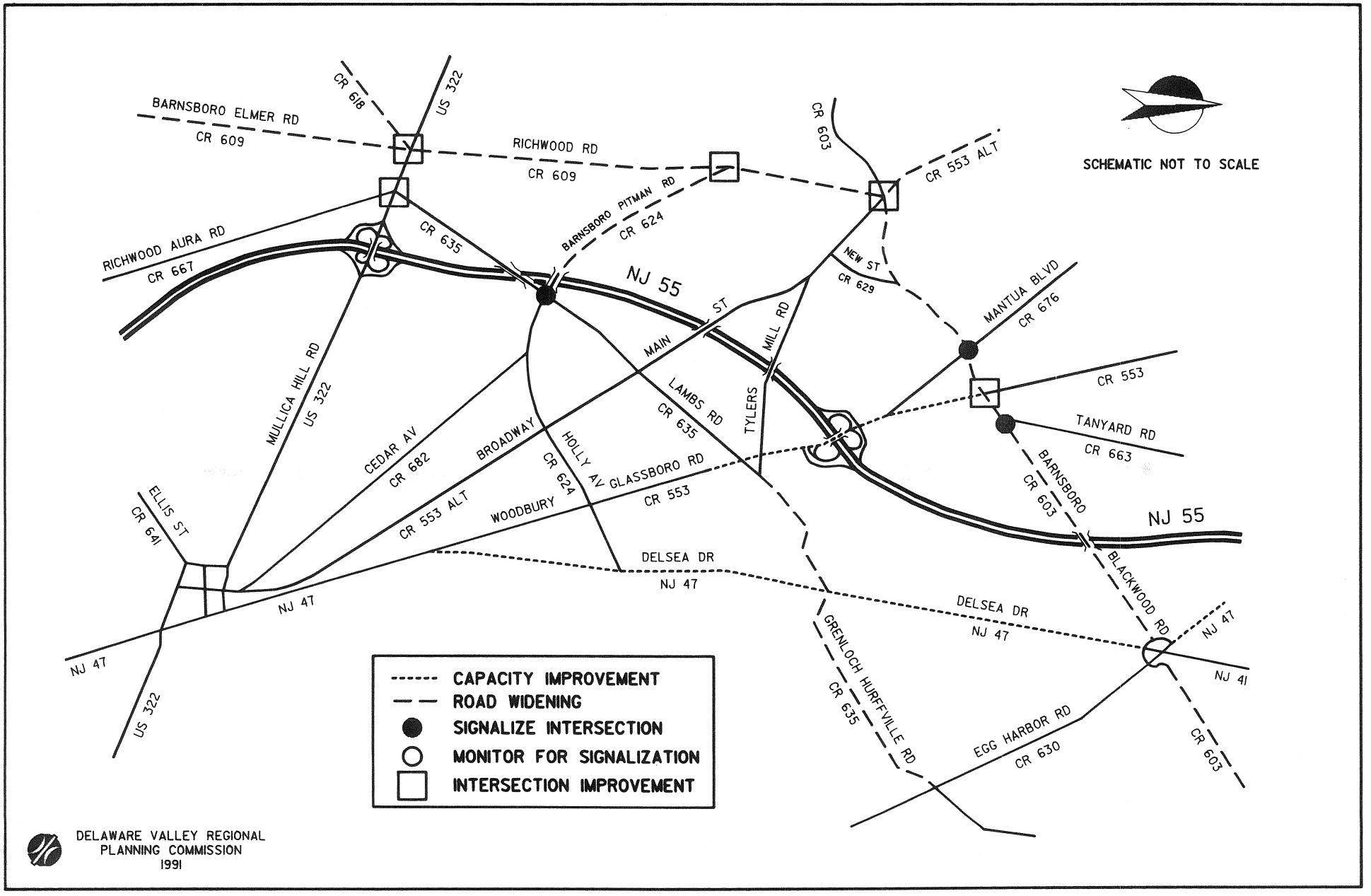


Figure 18C: COUNTY CAPITAL IMPROVEMENT PROGRAM

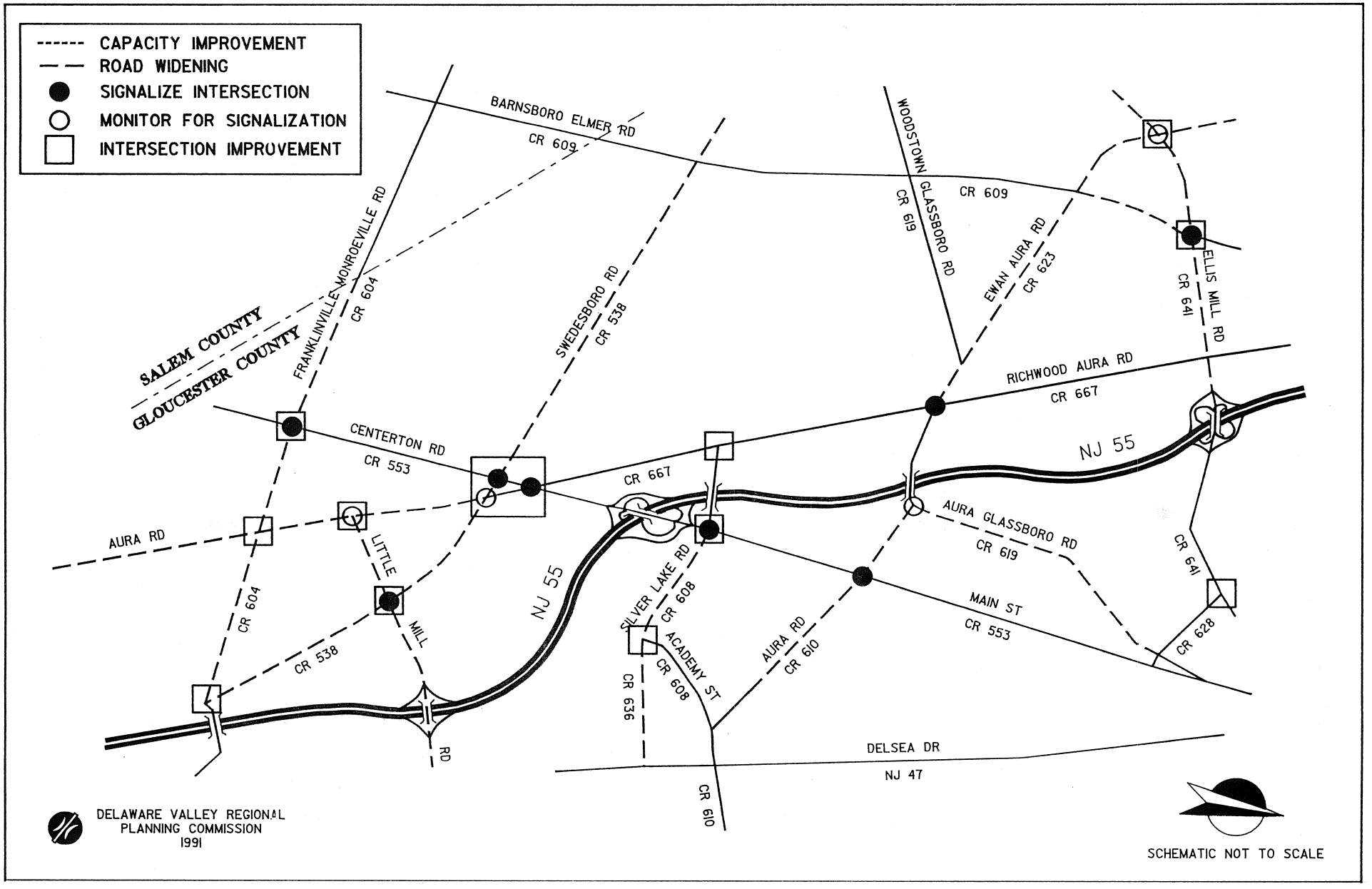
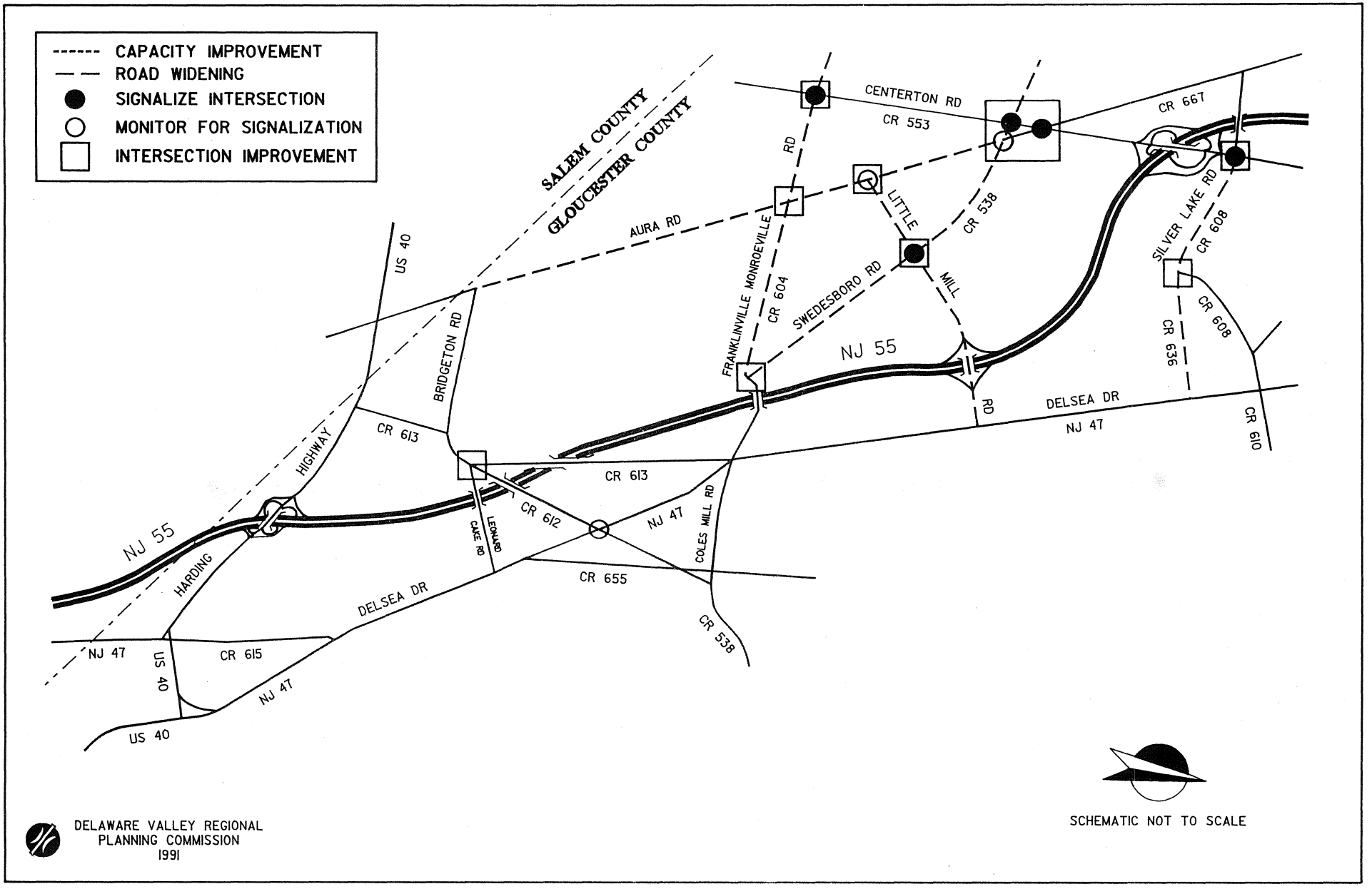


Figure 18D: COUNTY CAPITAL IMPROVEMENT PROGRAM



- Almonesson Avenue (CR 621) between Cooper Street (CR 706) and Good Intent Road (CR 534)
- Cooper Street (CR 706) east of Good Intent Road (CR 534)
- Barnsboro-Blackwood Road (CR 603) between Woodbury-Turnersville Road (CR 621) and Main Street (CR 553 Alt)
- Barnsboro-Pitman Road (CR 624) between Pitman Road (CR 624) and Lambs Road (CR 635)
- Harrisonville-Richwood Road (CR 618) Between US Route 322 and Bridgeton Pike (NJ Route 77)
- Barnsboro-Elmer Road (CR 609) from US Route 322 to Ewan-Aura Road (CR 623)
- Ellis Mill Road (CR 641) from Richwood-Aura Road (CR 667) to Bridgeton Pike (NJ Route 77)
- Ewan-Aura Road (CR 623) from US Route 322 to Richwood-Aura Road (CR 667)
- Aura Road (CR 610) from Aura-Glassboro Road (CR 619) to north of Academy Street (CR 608)
- Sliver Lake Road (CR 608) from Main Street (CR 553) to Clayton Avenue (CR 636)
- Clayton Avenue (CR 636) from Academy Street (CR 608) to NJ Route 47
- Aura Road from Swedesboro Road (CR 538) to the Salem County Line
- Swedesboro Road (CR 538) from Woodstown-Glassboro Road (CR 619) to Franklinville-Monroeville Road (CR 604)
- Franklinville-Monroeville Road (CR 604) from the Salem County Line to Swedesboro Road (CR 538)

Prioritizing these road widenings is not recommended because, to a large extent, development trends will dictate which roads will need to be upgraded first.

Based upon the demographic data supplied by the municipalities, two zones of commercial/ industrial development were identified in the NJ Route 55 Freeway corridor. One zone is situated in an area bounded by Woodbury-Glassboro Road (CR 553), NJ Route 47, Barnsboro-Blackwood Road (CR 603), and Glenloch-Hurffville Road (CR 635). The other zone is situated along Ellis Mill Road (CR 641) between Barnsboro-Elmer Road (CR 609) and NJ Route 55 Freeway. Since it is crucial to construct the capacity, shoulders, and turn lanes prior to the onset of development, these roads should receive priority in the capital improvement program. The following roads in these zones should be widened to their full official cartway widths:

- Woodbury-Glassboro Road (CR 553) between the Pitman Line and Barnsboro-Blackwood Road (CR 603), can be accomplished by a combination of widening, and/or restriping two lane sections to four lanes
- Lambs Road/Grenloch-Hurffville Road (CR 635) between Woodbury-Glassboro Road and Egg Harbor Road (CR 630) - widen to four lanes
- Barnsboro-Blackwood Road (CR 603) between Woodbury-Glassboro Road (CR 553) and Egg Harbor Road (CR 630)/Delsea Drive (NJ Route 47)
- Delsea Drive (NJ Route 47) between Woodbury-Glassboro Road (CR 553) and NJ Route 41 - widen to four lanes

- Ellis Mill Road (CR 641) between Barnsboro-Elmer Road (CR 609) and Richwood-Aura Road (CR 667)
- Barnsboro-Elmer Road (CR 609) between Ewan Road (CR 622) and Ewan-Aura Road (CR 623)

Egg Harbor Road (CR 630) between NJ Route 47 and Greentree Road (CR 651) has already been widened to four lanes.

A review of the capacity analysis of Year 2010 traffic volumes indicates several road segments will operate at deficient levels of service.

Access roads to the Deptford Mall area already experience traffic congestion. With more development proposed in the general area, consideration should be given to expanding a number of these roads to either three or four lane roadways. Four lanes are recommended on the higher volume roadways, three lanes on the lower volume roads. If roadside development prohibits widening to four lanes, a three lane configuration should be considered. A three-lane road configuration, containing a center turn lane, will permit left turn vehicles to perform that maneuver without obstructing traffic flow. This report recommends and assumes Deptford Center Road is extended to Westville-Almonesson Road (CR 621).

- Cooper Street (CR 534) from west of the NJ Turnpike to Clements Bridge Road (CR 544) - County is planning widening to four lanes
- Clements Bridge Road (CR 544) from Cooper Street to Deptford Center Road extension - County is planning widening to four lanes
- Westville-Almonesson Road (CR 621) from Turkey Hill Road to Clements Bridge Road - County planning widening to four lanes
- Cooper Street (CR 534/CR 706) from Clements Bridge Road to Westville-Almonesson Road (CR 621) - widen to three lanes
- Westville-Almonesson Road (CR 621) from Deptford Center Road to Cooper Street - widen to four lanes

Delsea Drive (NJ Route 47) should be widened to four lanes between Hurffville Road (NJ Route 41) and NJ Route 55 Freeway.

According to the Year 2010 analysis, US Route 322 east and west of the NJ Route 55 Freeway interchange will operate at level of service E to level of service F range. West of Richwood Road (CR 609), there is adequate room to widen US Route 322. However, between Richwood Road and Lambs Road (CR 635) residences line the road prohibiting any widening. Not only is there no room to widen US Route 322, two key intersections are similarly affected - the Richwood Road/Elmer-Barnsboro Road (CR 609) and the Lambs Road (CR 635)/Richwood-Aura Road (CR 667) intersections. East of NJ Route 55 Freeway there is adequate room to widen the roadway. No recommendations are offered for US Route 322 because other alternatives such as a Glassboro Bypass need to be studied.

Little Mill Road between NJ Route 55 Freeway and Delsea Drive is projected to operate at a deficient service level. The existing roadway width is only 18 feet. Widening the road to a fuller two-lane cross-section should rectify the capacity problem.

Traffic Signals

This section identifies intersections where traffic signalization may be warranted. Note, this analysis was only conducted for key intersections identified by Gloucester County officials and shown on Figure 2.

NJDOT, in conformance with the Manual of Uniform Traffic Control Devices (MUTCD) issued by FHWA, requires an engineering study to determine whether an intersection meets one of 11 warrants prior to authorization to design and install a traffic signal. The 11 signal warrants consider traffic volumes, accident experience, pedestrian movements, school crossings, and signal system warrants. The five warrants involving traffic volumes consider peak hour volumes, peak hour delay, four hour volumes, minimum vehicular volume, and interruption of continuous flow. Because of limited data available for Year 2010 conditions, the signal warrant analysis focused on the warrant for minimum vehicular volumes with the four hour volume warrant serving as a secondary indicator.

Approach volumes at each key intersection were estimated by applying generalized "K" factors, modified to reflect eight hour volumes, and directional distribution factors derived for Gloucester County from DVRPC historical data ("K" factor represents the percent of AADT occurring during the peak hour). The volumes were then compared to MUTCD criteria. Usually when an intersection met the warrant, it was due to a clause in the warrant which permits a reduction in the volume criteria when the 85-percentile speed on the major roadway exceeds 40 mph.

Based upon the above decision criteria, the following 12 unsignalized key intersections appear to warrant signalization by the Year 2010:

- Good Intent Road (CR 534)/New Jersey Avenue (CR 621)
- Tanyard Road (CR 663)/Barnsboro-Blackwood Road (CR 603)
- Mantua Boulevard (CR 676)/Barnsboro-Blackwood Road (CR 603)
- Lambs Road (CR 635)/Holly Avenue (CR 624)
- Ellis Mill Road (CR 641)/Barnsboro-Elmer Road (CR 609)
- Richwood-Aura Road (CR 667)/Aura-Glassboro Road (CR 619)
- Main Street (CR 553)/Aura Road (CR 610)
- Main Street (CR 553)/Silver Lake Road (CR 608)
- Centerton Road (CR 553)/Aura Road (CR 667)
- Centerton Road (CR 553)/Swedesboro Road (CR 538)
- Centerton Road (CR 553)/Franklinville-Monroeville Road (CR 604)
- Swedesboro Road (CR 538)/Little Mill Road

If Deptford Center Road Extension is constructed, the intersection with Westville-Almonesson Road should be signalized. Similarly, if Bankbridge Road is realigned, its intersection with Woodbury-Glassboro Road (CR 553) will need to be signalized.

The following five unsignalized key intersections need further monitoring to determine whether signalization is warranted:

- Ellis Mill Road (CR 641)/Ewan-Aura Road (CR 623)
- Aura-Glassboro Road (CR 619)/Aura Road (CR 610)
- Swedesboro Road (CR 538)/Aura Road (CR 667)
- NJ Route 47/Franklinville-Williamstown Road (CR 612)
- Little Mill Road/Aura Road

The other key intersections are either already signalized or do not warrant signalization.

INTERSECTION IMPROVEMENTS

Intersection recommendations are presented below. Some of the recommendations duplicate recommendations offered in other sections of this chapter. While not directly addressed in the recommendations, many existing traffic signals will eventually need to be upgraded with multi-phase controllers and signal actuation. Some corridors, with closely spaced traffic signals, will require coordination to improve traffic operations. At the Deptford Mall area, a closed loop traffic control system will be required to coordinate the traffic signals.

Westville-Almonesson Road (CR 621)/Deptford Center Road Extension

- Construct Deptford Center Road Extension
- Widened Westville-Almonesson Road to four lanes
- Signalize intersection
- Construct right turn lane on eastbound Westville-Almonesson Road
- Construct left turn lanes on both approaches of Westville-Almonesson Road
- Construct left turn lane and right turn lane on northbound Deptford Center Road Extension

Clements Bridge Road (CR 544)/Cooper Street (CR 534)

- Widen Cooper Street to four lanes west of the intersection, westbound approach should consist of a left turn lane and a through lane
- Widen Clements Bridge Road to four lanes, the southbound approach should consist of a left turn lane and a right turn lane
- Eliminate concrete median on Clements Bridge Road
- Improve turning radius northwest and northeast corners

Westville-Almonesson Road (CR 621)/Deptford Center Road

- Construct right turn lane on eastbound Deptford Center Road

Cooper Street (CR 706)/Westville-Almonesson Road (CR 621)

- Construct four-lane configuration on Cooper Street, the southbound approach should consist of a left turn lane and a shared through/right turn lane
- Construct three-lane configuration on Westville-Almonesson Road north of intersection, construct exclusive left turn lane at intersection
- Construct left turn lane on northbound Almonesson Road

NJ Route 47/Fox Run Road (CR 647)

- Construct left turn lane on northbound NJ Route 47

Tanyard Road (CR 663)/Bankbridge Road

- Construct left turn lane on westbound Bankbridge Road

Woodbury-Glassboro Road (CR 553)/Barnsboro-Blackwood Road (CR 603)

- Construct two through lanes and a left turn lane on the Woodbury-Glassboro Road approaches
- Construct left turn lane on eastbound Barnsboro-Blackwood Road

Main Street (CR 533 Alt)/Sewell Road (CR 603)/ Richwood Road (CR 609)

- Widen southbound approach of Main Street for right turn lane

Barnsboro-Pitman Road (CR 625)/Richwood Road (CR 609) and Barnsboro-Pitman/Pitman Road (CR 624)

- Cul-de-sac/abandon Barnsboro-Pitman Road between Richwood Road and Pitman Road
- Require Barnsboro-Pitman Road traffic to use Pitman Road
- At Richwood Road/Pitman Road intersection improve turning radius at northeast corner of the intersection, construct left turn lane on southbound Richwood Road

US Route 322/Barnsboro-Elmer Road (CR 609)/Richwood-Harrisonville Road (CR 618)

- Realign Richwood-Harrisonville Road to intersect Barnsboro-Elmer Road south of the intersection
- Cul-de-sac/abandon portion of Richwood-Harrisonville Road between US 322 and realignment
- Widen Barnsboro-Elmer Road/Richboro Road to permit bypassing of left turning vehicles at US Route 322

US 322/Lambs Road (CR 635)/Richwood-Aura Road (CR 667)

- Introduce gentle curve on the east side of Richwood-Aura and Lambs Road to improve their alignment with each other
- Construct left turn lanes on Lambs Road and Richwood-Aura Road
- Increase turn radius on northeast and southeast corners

Ellis Mill Road (CR 641)/Ewan-Aura Road (CR 623)

- Monitor intersection for traffic signal warrants
- As interim measure, install flashing beacon; make Ellis Mill Road the through street

- Widen all approaches to permit bypassing of left turning vehicles
- Improve turning radius northeast, southwest and northwest corners

Ellis Mill Road (CR 641)/Barnsboro-Elmer Road (CR 609)

- Signalize intersection
- Realign Ellis Mill Road to match opposing roadways
- Construct left turn lanes on all approaches
- Improve turning radius all four corners

Ellis Mill Road (CR 641)/Sewell Road (CR 628)

- Restripe eastbound Ellis Mill Road for right turn lane
- Improve turning radius southeast corner for tractor trailers
- Construct turning roadway for right turn movement at southeast corner of intersection (i.e., pave gravel roadway)

Richwood-Aura Road (CR 667)/Silver Lake Road (CR 608)

- Construct southbound left turn lane on Richwood-Aura Road

Main Street (CR 553)/Silver Lake Road (CR 608)

- Signalize intersection
- Construct left turn lanes on the northbound and westbound approaches
- Improve turning radius all four corners

Silver Lake Road (CR 608)/Academy Street (CR 608)/Clayton Avenue (CR 636)

- Modify island to improve sight distance
- Upgrade markings surrounding the island

Swedesboro Road (CR 538)/Centerton Road (CR 553)/Aura Road (CR 667)

- Signalize Centerton Road/Aura Road intersection
- Signalize Swedesboro/Centerton Road intersection
- Monitor Swedesboro Road/Aura Road intersection for traffic signal warrants
- Coordinate traffic signals
- Realign Aura Road, between Centerton Road and Swedesboro Road, to function as the spine of the Silvergate development
- Specific intersection improvements (e.g., turn lanes) must be coordinated with the proposed Silvergate development

Little Mill Road/Aura Road

- Monitor intersection for traffic signal warrants
- As interim measure, install flashing beacon
- Widen Little Mill Road approach
- Construct right turn lane on northbound Aura Road
- Improve turning radius at both corners, lower berm (sight distance problem) at southwest corner

Swedesboro Road (CR 538)/Little Mill Road
- Signalize intersection
- Construct left turn lanes on Swedesboro Road and Little Mill Road
- Construct right turn lanes on northbound Swedesboro Road and westbound Little Mill Road

Centerton Road (CR 553)/Franklinville-Monroeville Road (CR 604)
- Signalize intersection
- Improve turning radius northeast and southwest corners
- Widen all approaches to permit bypassing of left turning vehicles

Franklinville-Monroeville Road (CR 604)/Aura Road
- Reverse the through street designation, make Aura Road the through street
- Widen all approaches to permit bypassing of left turn vehicles

Swedesboro Road (CR 538)/Franklinville-Monroeville Road (CR 604)
- To minimize the sight distance problem - realign Franklinville-Monroeville Road to intersect Swedesboro Road north of the existing intersection
- Cul-de-sac/abandon portion of Franklinville-Monroeville Road between Swedesboro Road and the new alignment
- New alignment will make Swedesboro Road the through road
- At the new Swedesboro Road/Franklinville-Monroeville Road intersection construct a left turn lane on westbound Swedesboro Road

Porchtown-Franklinville Road (CR 613)/Leonard Cake Road
- Channelize intersection, with markings, to improve vehicular guidance
- Install directional signs
- Improve sight distance on Porchtown-Franklinville Road southbound approach

OTHER IMPROVEMENTS

This section outlines a collection of various improvements intended to improve traffic operations and safety in central Gloucester County.

The Deptford Mall area is an existing regional activity center. Proposed development, such as Locust Grove with over 1.5 million square feet of commercial/office space, will further strengthen Deptford's role as a regional activity center. NJ Route 55 Freeway will not only precipitate development in central Gloucester County, it will also directly link its own development to Deptford.

NJ Route 55 Freeway's interchange with Deptford Center Road is a partial interchange because Deptford Center Road does not extend past the freeway. As development increasing occurs north of NJ Route 55 Freeway, along Clements Bridge Road (CR 544) and Westville-Almonesson Road (CR 621), it become imperative to open up access to that quadrant of Deptford. The report

previously endorsed the county's initiatives to widen Cooper Street (CR 534), Clements Bridge Road (CR 544), and Westville-Almonesson Road (CR 621). In addition to these actions, a full interchange with extension of Deptford Center Road to Westville-Almonesson is also needed.

The traffic simulation model included a full interchange and Deptford Center Road extension in the Year 2010 traffic forecast; based upon the projected volumes, the interchange generates sufficient traffic volumes to justify its construction. A number of interchange and intersection improvement scenarios have been proposed by various parties. It is not in the scope of the study to evaluate and endorse a specific improvement plan.

A realigned Bankbridge Road, between Woodbury-Glassboro Road (CR 553) and Tanyard Road (CR 663), was modeled in the Year 2010 traffic simulation. Based on the projected traffic volume of 5,000 vehicles per day, the improvement appears to be justified. If constructed, traffic signals are warranted at the Woodbury-Glassboro Road (CR 553)/Bankbridge Road intersection.

Horizonal curves should be improved through superelevation or realignment at the following locations:

- Barnsboro-Elmer Road (CR 609) north of Ellis Mill Road (CR 641)
- Barnsboro-Elmer Road (CR 609) between Ellis Mill Road and Ewan-Aura Road (CR 623)
- Aura-Glassboro Road (CR 619) between Glassboro and Aura Road (CR 610) - two curves

RECOMMENDATIONS - POLICY

This chapter presents recommendations that are policy oriented. In addition to the physical improvements advocated in the previous chapter, the county and the municipalities, through internal actions and the site plan and subdivision review process, have an opportunity to shape many characteristics of the highway network. In the future, the consequence of these actions is just as critical as physical improvements.

Policy issues discussed in this chapter include the official map, road swaps, access control, traffic engineering programs, transportation development districts, and transit opportunities.

Official Map

New Jersey Statutes (NJSA 40:27-5) empower the Board of Chosen Freeholders to adopt and establish an official county map "showing the highways, roadways, parks, and sites for public buildings or works, under county jurisdiction, or in the acquisition, financing or construction of which the county has participated or may be called upon to participate." A county is not required to adopt an official map because there are no restrictions on repairing or maintaining existing streets. However, the statutes require an official map when a county plans and acquires additional land for roads or other county facilities.

Counties primarily use the official map as the basis for acquiring right-of-way during the land development review process. Even though counties are not permitted to "land bank" right-of-way, there is a growing recognition that given growth-related traffic problems experienced throughout New Jersey, right-of-way acquisition is a reasonable exercise of police powers if there is a master plan to justify the taking.

The right-of-way width required for a given road is a function of the cartway configuration needed to carry traffic in a safe manner. Many counties use functional classification as the determining factor of right-of-way width. The rationale for using functional classification is that roads classified as arterials carry more traffic than roads classified as collectors, which in turn carry more traffic than local roads. On roads with a higher classification (e.g. arterials or major collectors), the emphasis is on mobility; therefore these roads usually have left turn lanes at intersections and major driveways to minimize interference with through traffic. Because of the high speed of arterials, they must meet more stringent design standards. Conversely, local roads are more access-oriented, with lower speeds. Provision of left turn lanes or full shoulders for disabled vehicles are rarely incorporated into the design of local roads.

The recommendation of an official map is a two step process. First, appropriate right-of-way and cartway widths for each functional classification must be identified. Second, the functional classification of each county road needs to be designated.

There are no standard right-of-way widths for the different functional classifications. Each county in New Jersey has adopted separate standards based upon individual needs and prior experiences. This study proposes the following right-of-way widths for the NJ Route 55 corridor (see Figure 19): 100 ft. for major arterials, 88 ft. for minor arterials, 76 ft. for major collectors, 70 ft. for minor collectors, and 60 ft. for local roads. The proposed standards are appreciably larger than existing Gloucester County standards. Differences in right-of-ways may be partially attributed to a longer term perspective envisioning a more extensive build-out. Also, the proposed right-of-ways are based on cross-sectional elements (e.g. left turn lanes or shoulders) which may not always be used; however, if additional right-of-way is not preserved, the eventual use of these cross-sectional elements will be foreclosed.

Generally, the right-of-ways are based upon 12 ft. travel lanes, 12 ft. left turn lanes, 10 ft. shoulders, and 10 ft. clear areas. Clear areas provide room for utility easements, obstruction free zones, and signs. In urban areas, a sidewalk can be substituted for the clear area. As the hierarchy of a road increases, the lane configuration needs to change correspondingly from two travel lanes for a local road, to three lanes for major and minor collectors, to four lanes for minor arterials, and to five lanes for major arterials. The proposed rights-of-way give the county some degree of flexibility. If the county employs curbs instead of shoulders, the number of lanes associated with each functional classification can increase by one lane. For example, a three lane minor collector could be converted into a four lane configuration without any widening. Similarly, the county can all ways substitute a deceleration lane for a shoulder. One issue not addressed in this report deals with excessive rights-of-way in built-up urban areas where it is infeasible to enlarge the existing cartway. The county needs a policy to deal with such situations.

Proposed functional classifications for county roads in the NJ Route 55 corridor are shown on Figure 20. Assignment of functional classification is based upon the following considerations: location of major trip generators, function of the road (ie. land access vs. through trips), identification of by-pass routes, projected traffic volumes, and continuity of the county network.

Numerous modifications to Gloucester County's existing functional classification system are proposed, reflecting projected development trends. Below is a short list of the more significant alterations.

- Lambs Road (CR 635) to minor arterial from major collector
- Barnsboro-Blackwood Road (CR 603) to minor arterial from major collector between Camden County line and Main Street (CR 553 Alt)
- Ellis Mill Road (CR 641) to minor arterial from major collector between NJ Route 55 Freeway and the Glassboro CBD
- Swedesboro Road (CR 538) to minor arterial from major collector
- Aura Road (CR 610) and Ewan-Aura Road (CR 623) to major collector from minor collector

Figure 19A: RIGHT-OF-WAY CROSS SECTIONS - OFFICIAL MAP

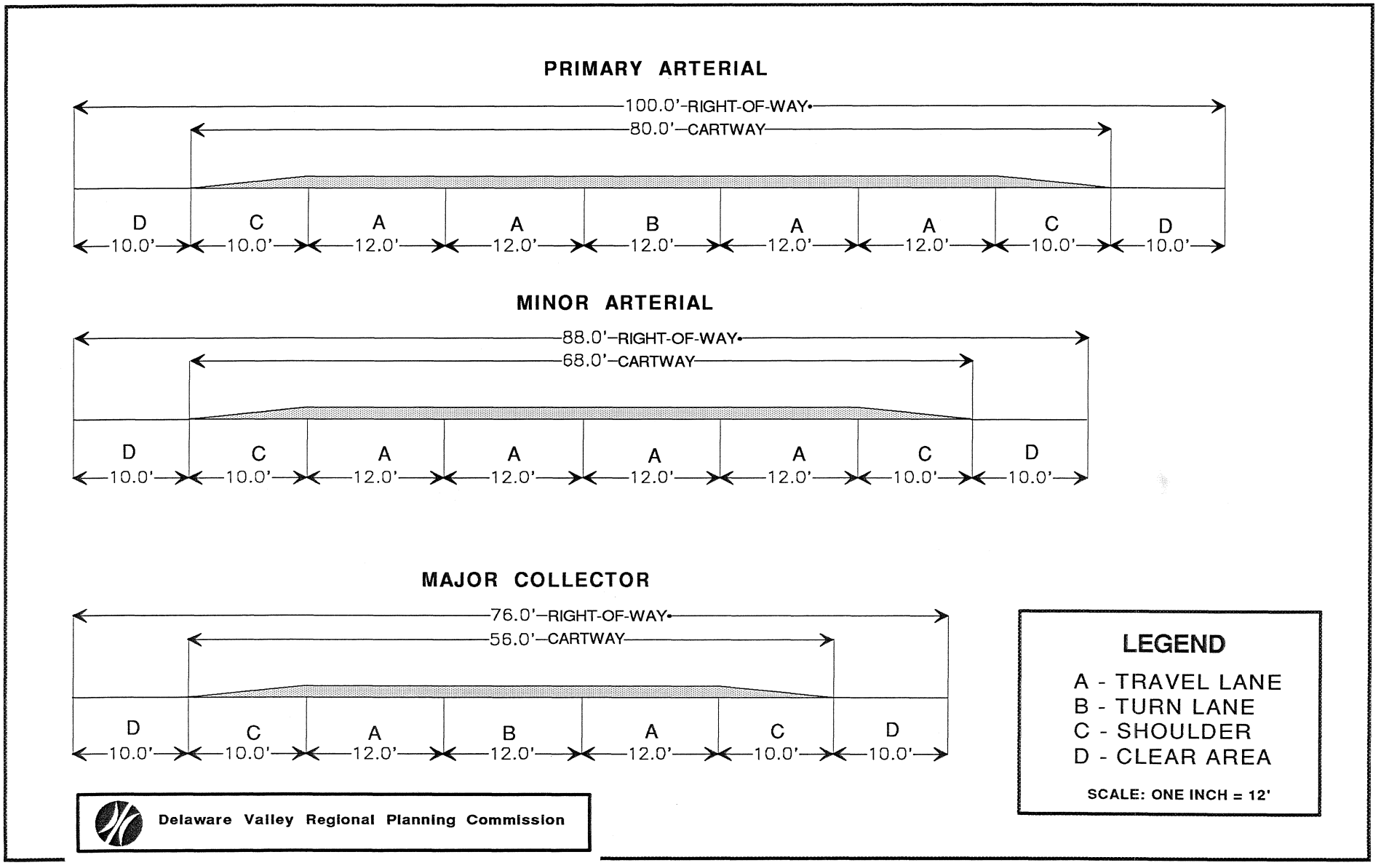


Figure 19B: RIGHT-OF-WAY CROSS SECTIONS - OFFICIAL MAP

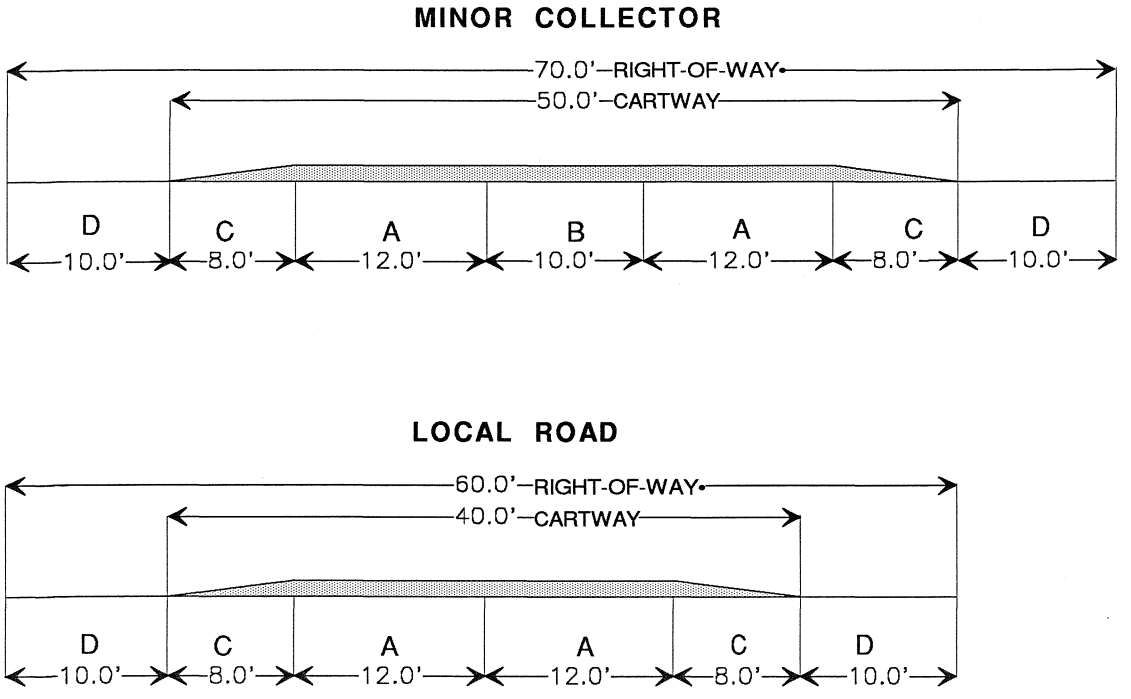


Figure 20A: OFFICIAL MAP RECOMMENDATIONS

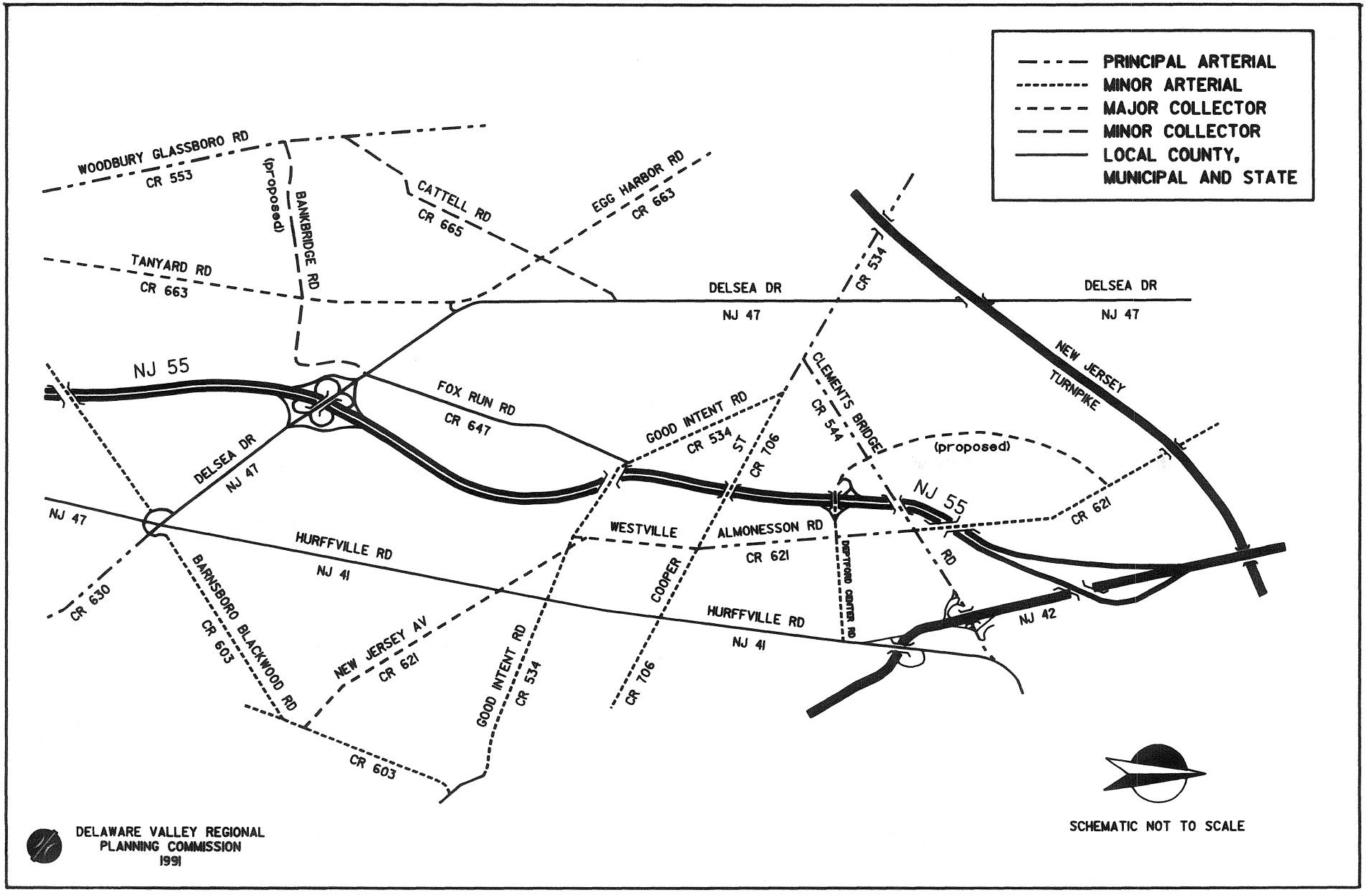


Figure 20B: OFFICIAL MAP RECOMMENDATIONS

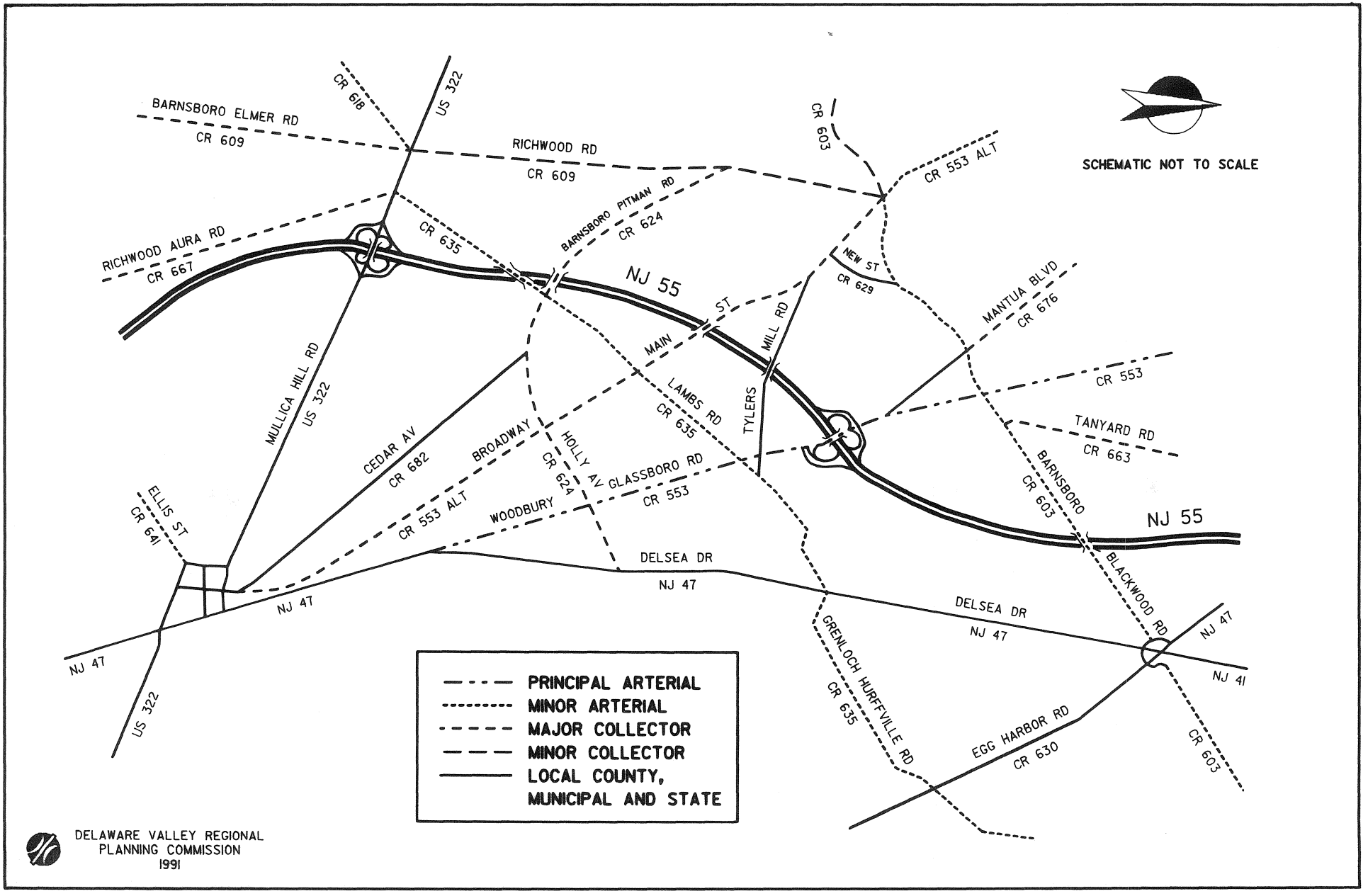


Figure 20C: OFFICIAL MAP RECOMMENDATIONS

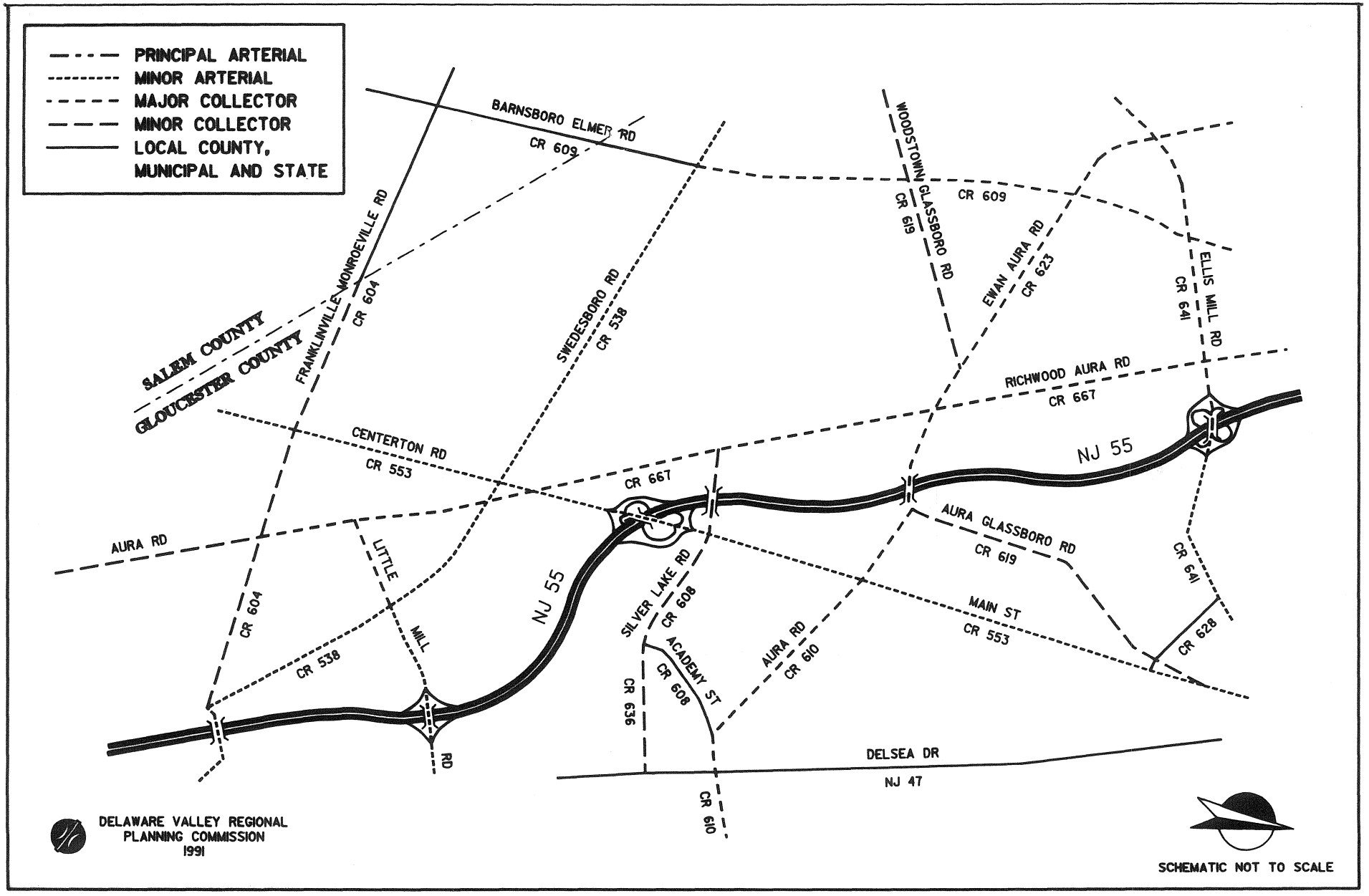
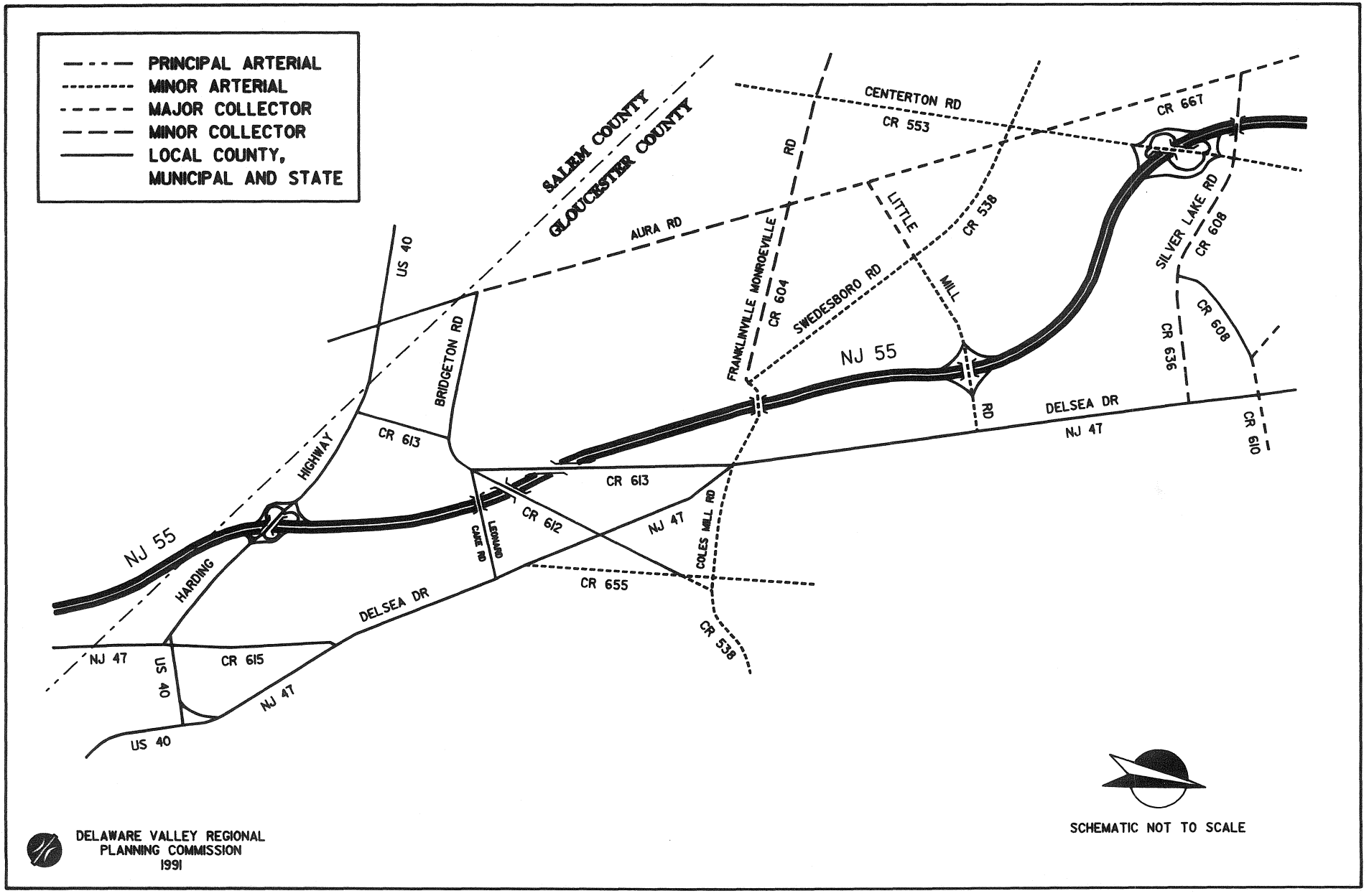


Figure 20D: OFFICIAL MAP RECOMMENDATIONS



- Holly Avenue and Barnsboro-Pitman Road (CR 624) to major collector from minor arterial

Road Swaps

From a hierarchical perspective, county roads should function as the collector system, serving as the interface between the state arterials and the municipal local roads. A review of road ownership and future traffic volumes (an indicator of road function) revealed several instances where road function and ownership is inconsistent. This section proposes transferring minor arterial and major collector roads from municipal ownership to county ownership and in return transferring minor collector or local roads from county ownership to municipal ownership (see Figure 21). To diminish any extra maintenance costs arising from the road swap, we tried to minimize the difference in road mileage where possible.

All interchanges with NJ Route 55 Freeway should be with roads classified as either minor arterials or major collectors under state or county jurisdiction. Two interchanges occur with municipal roads, Deptford Center Road and Little Mill Road. Consequently, this study recommends that Deptford Center Road between NJ Route 55 Freeway and Hurffville Road (NJ Route 41) be under county jurisdiction, approximate road length of 0.75 miles. In return, Deptford Township would acquire Fox Run Road (CR 647) from the county, approximate length 1.25 miles. In Franklin Township, Little Mill Road between Aura Road and Delsea Drive (NJ Route 47) should be under county ownership, approximate length 1.61 miles. In return, Franklin would acquire from the county Porchtown-Franklinville Road (CR 613) between Delsea Drive (NJ Route 47) and Franklinville-Williamstown Road (CR 612), approximately 1.45 miles.

The following low volume local roads should be transferred to municipal jurisdiction:

- New Street (CR 629) between Sewell Road (CR 603) and Main Street (CR 553 Alt), Mantua, 0.40 miles

- Pitman Avenue (CR 639) between Broadway (CR 553 Alt) and Delsea Drive (NJ Route 47), Pitman, 0.90 miles

- Sewell Street (CR 628) between Ellis Street (CR 641) and Main Street (CR 553), Glassboro, 0.65 miles

- Academy Street (CR 608) between Clayton Avenue (CR 636) and Aura Road (CR 610), Clayton, 0.71 miles

The following low volume local roads crossing into Salem County should also be transferred to municipal jurisdiction. However, because these roads share a common route number in both counties, removal of the route number in Gloucester County would ruin the continuity of the regional road network.

Figure 21A: PROPOSED ROAD SWAPS

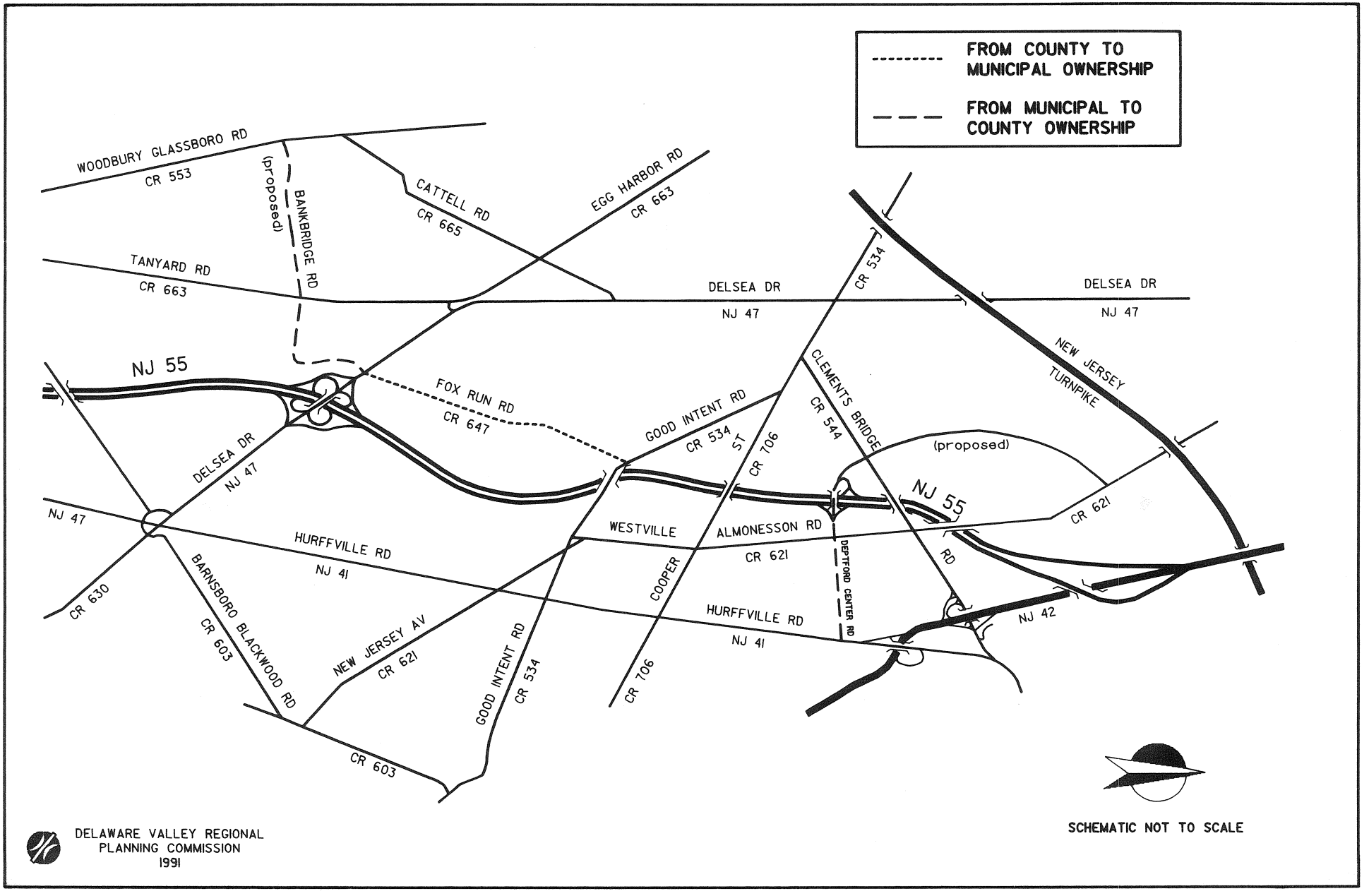


Figure 21B: PROPOSED ROAD SWAPS

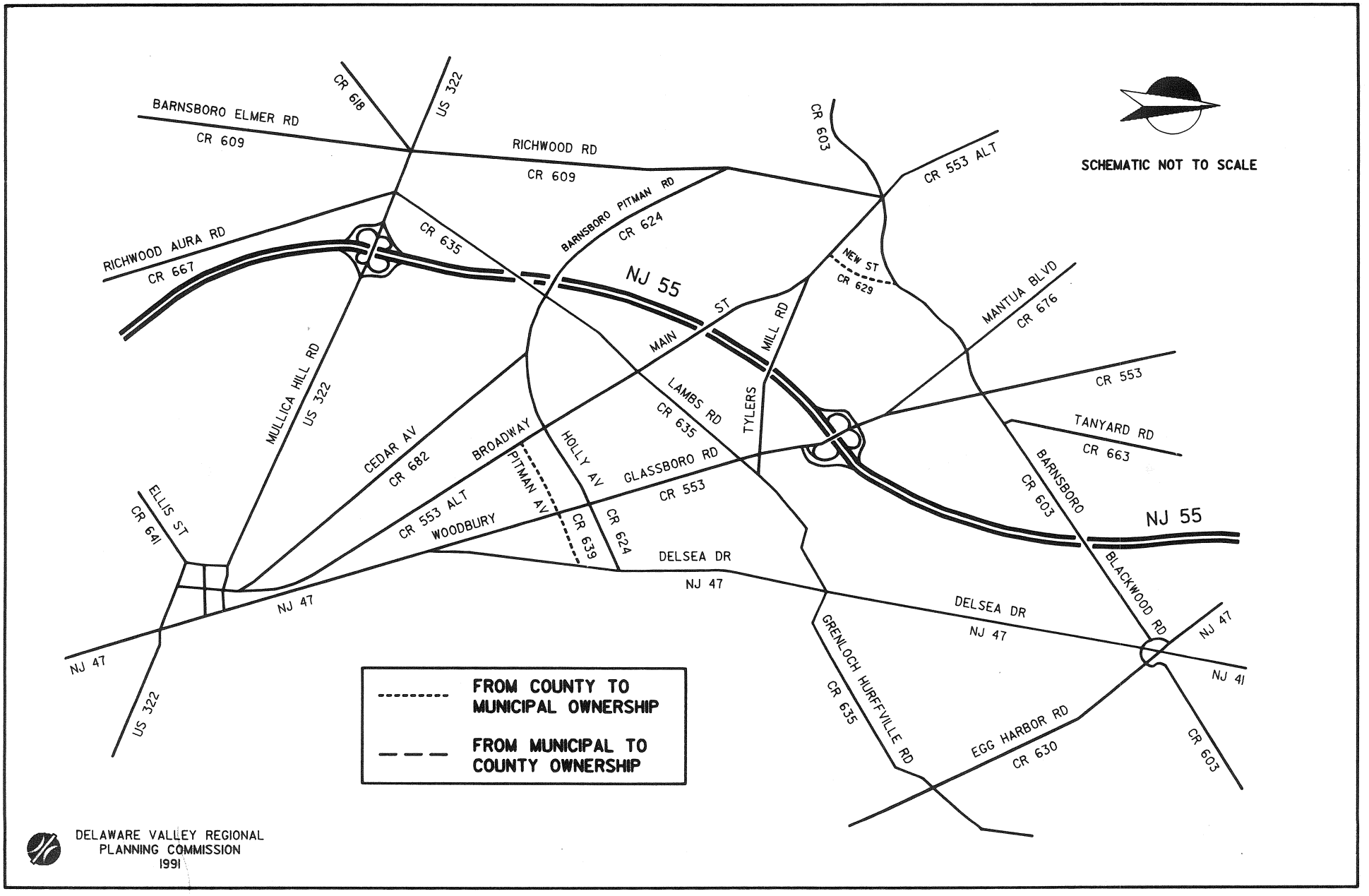


Figure 21C: PROPOSED ROAD SWAPS

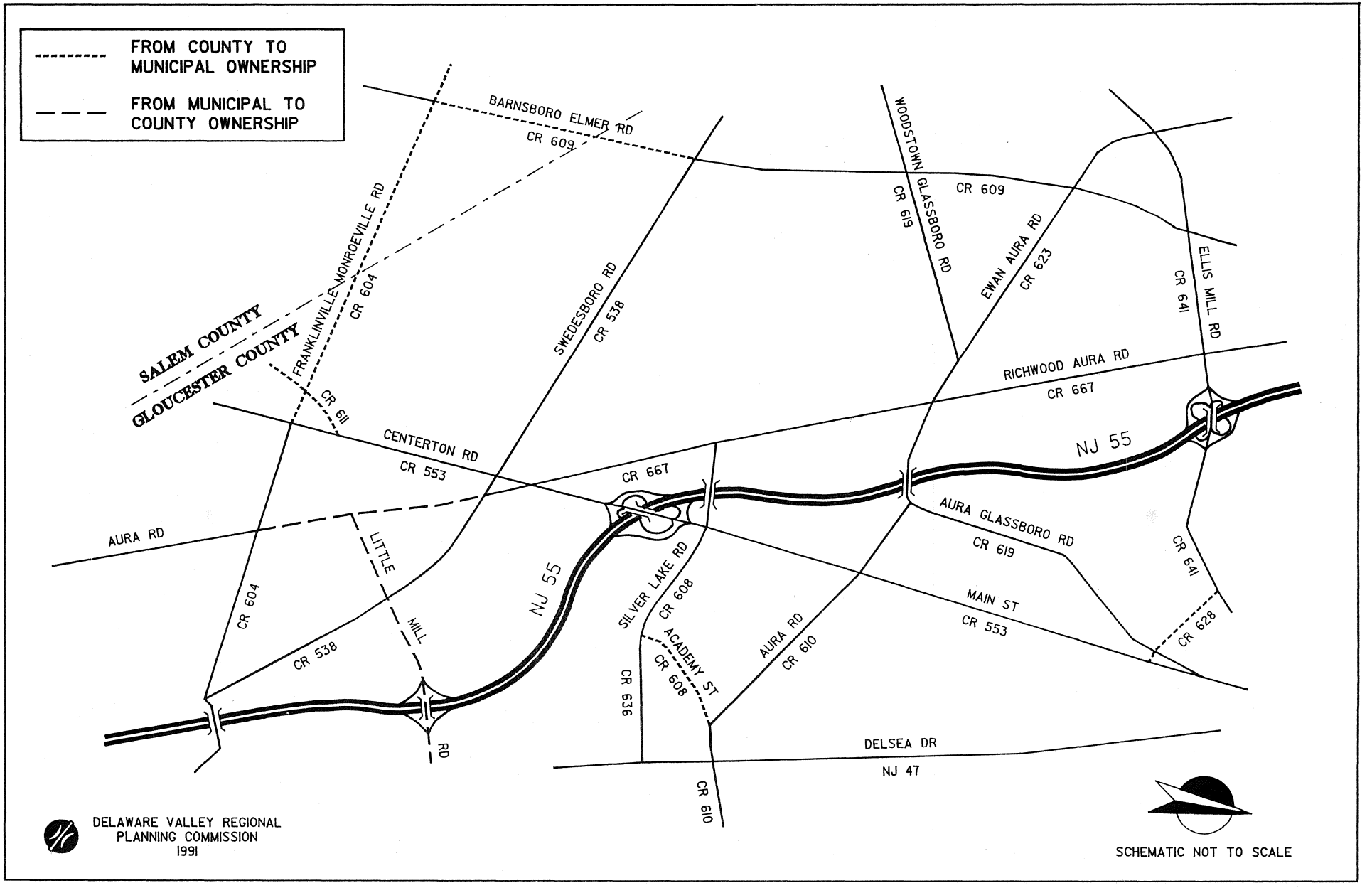
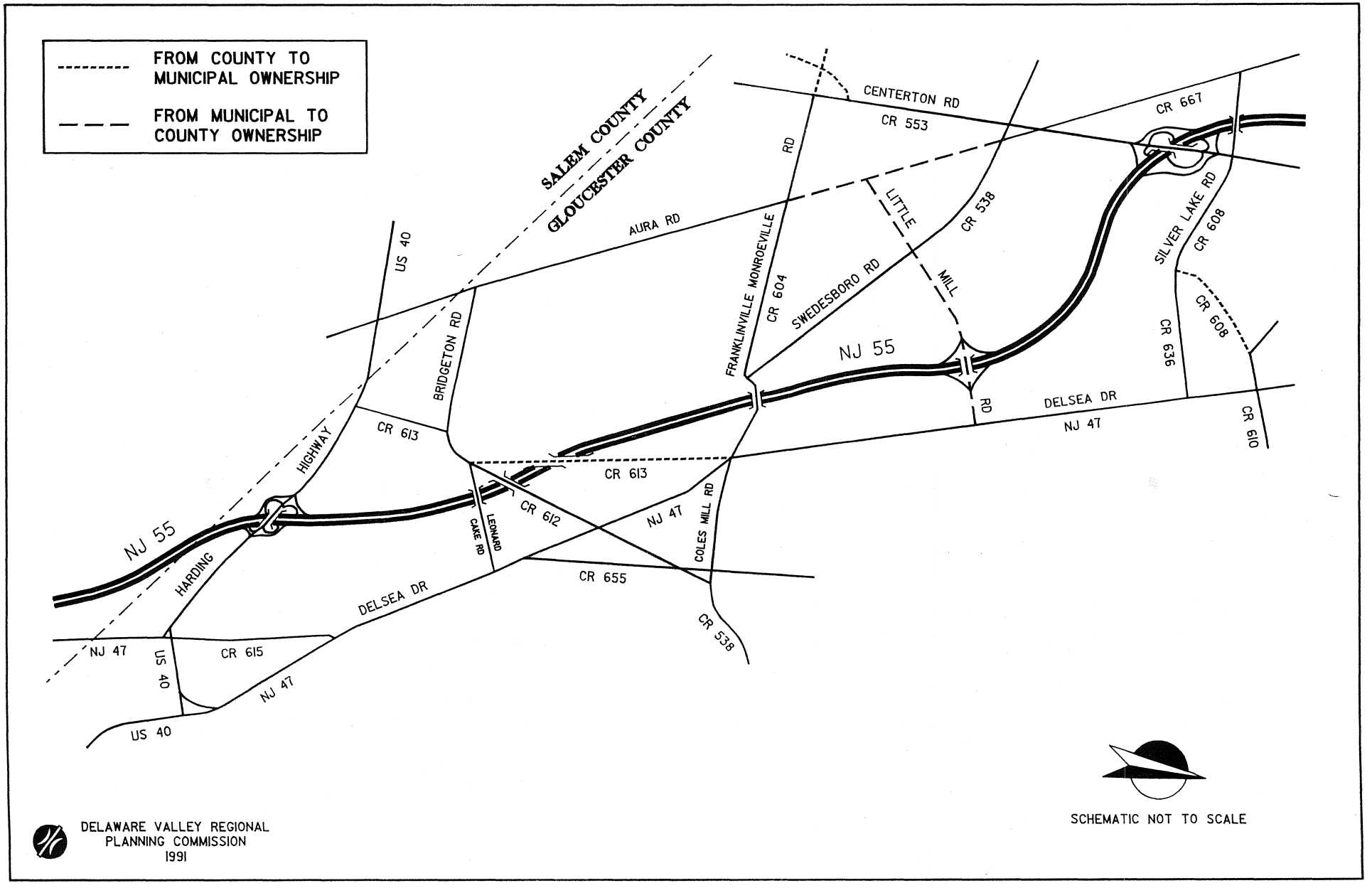


Figure 21D: PROPOSED ROAD SWAPS



- Monroeville-Franklinville Road (CR 604) between Centerton-Glassboro Road (CR 553) and Salem County, Elk and Franklin Townships, 0.75 miles

- Barnsboro-Elmer Road (CR 609) between Swedesboro Road (CR 538) and Salem County, Elk Township, 0.76 miles

- Glassboro-Monroeville Road (CR 611) between Centerton-Glassboro Road (CR 553) and Salem County, Elk Township, 0.75 miles

- Woodstown-Glassboro Road (CR 919) between Swedesboro Road (CR 538) and Salem County, Elk Township, 0.54 miles

The county should acquire the following municipal roads because they function as collectors and would strengthen the continuity of the county network.

- Bankbridge Road between Woodbury-Glassboro Road (CR 553) and Delsea Drive (NJ Route 47), Deptford, 1.07 miles

- Aura Road between Swedesboro Road (CR 538) and Monroeville Road (CR 604), Elk, 1.62 miles

Transportation Development District

The Transportation Development District Act of 1989 provides a mechanism for counties to create a special financing district to fund transportation improvements in high growth corridors or high growth districts. The Act permits the counties to assess new development in order to supplement public investments in transportation and to remedy future problems. Amelioration of existing transportation problems can not be charged to new development. A Transportation Development District (TDD) is a tool that can be used by Gloucester County to fund the improvements identified in this report. It represents the most equitable solution to fund the growth-related problems generated by NJ Route 55 Freeway. The recommendations, projections, and background material in this report can serve as the core of the county's application to NJDOT for a TDD.

Procedures to establish a TDD are clearly outlined in the Act. The Act envisions a joint planning process involving the county, NJDOT, municipalities and the private sector. An application for a TDD must be submitted to NJDOT. The application must include district boundaries, growth justification, needs description, conformity with state and county master plans, and municipal comments. If the application is approved, the county initiates a planning process leading to an improvement plan and a financial plan. The financial plan specifies a fee formula based upon vehicle trips generated, occupied square footage, number of employees or number of parking spaces. If the plans are approved by NJDOT, the county could assess a new development their "fair share" contribution at either preliminary municipal approval, at issuance of construction permit or under other timetables established by ordinance. All projects funded by TDD's must have a project

agreement signed by NJDOT, the agreement assigns financial obligations among the various parties. Under certain conditions, municipalities can initiate a TDD.

The Act stipulates that NJDOT should adopt standards for justifying TDD's based upon: 1) acceleration growth rate for population or employment exceeding 10% in three of the past five years in at least three adjacent municipalities; 2) projected local traffic growth from new development exceeding 50% in five years; 3) commercial/retail development exceeding one million square feet per square mile in five years; 4) projected population or employment growth exceeding 20% in ten years; or 5) other standards developed by NJDOT.

A review of the NJ Route 55 corridor indicates criteria 4 will be met in six municipalities. The other three criteria will not be satisfied. Criteria 4 stipulates a 20% increase in population or employment in a ten year period. Demographic projections for central Gloucester County were prepared for a 20 year period; therefore, an equivalent growth of 40% over 20 years is needed. Among the 12 municipalities in central Gloucester, the following are projected to meet this standard: Elk (population- 283%, employment- 630%), Franklin (population-53%, employment-76%), Glassboro (population-46%, employment- 49%), Harrison (population-293%, employment-43%), Mantua (population-108%, employment 59%), and Washington Township (population-58%, employment- 242%).

Criteria 1 specifies a 10% growth in population and employment in three of the last five years. Based upon DVRPC projections, no municipality meets the standard. Criteria 2 stipulates a 50% growth in traffic over a five year period; while many roads are expected to sustain traffic increases in excess of 100% over 20 years, it is questionable how many of them will meet the five year requirement. Commercial/retail development is projected to exceed one million square feet in Deptford and Washington Townships; however, this occurs over 20 years rather than five years. Additionally, the magnitude of development is not expected to exceed the density of one million square feet per square mile specified in Criteria 3.

Access Control

Level of service of a roadway rapidly deteriorates under substandard access control. Continuous driveway openings with unrestricted turning movements give rise to a greater incidence of traffic accidents, slower travel speeds, and increased traffic congestion. Since the southern portion of the corridor is still largely vacant, the county has a rare opportunity to develop and implement an access management code. Fortunately, the recently enacted State Highway Management Act provides the county with new authority to implement such a program.

The Act mandates NJDOT to adopt a State Highway Management Code. Under the proposed Code, each road segment on the state highway system is assigned one of seven access levels which determine allowable turning movements from access points on the state highway. Access level is a function of functional classification, the area surrounding the highway segment, the speed limit, and whether the highway is divided. The most stringent access classifications pertain primarily to

limited access roads with access limited exclusively to either overpasses or at grade intersections. Other levels, in descending order of access control, permit right turn only access, left turn access via a jug handle (applicable for divided highways only), driveways with left turn access via left turn lanes, left turn access without a left turn lane, and access limited only by edge clearance and safety considerations. Accompanying the seven access levels are strict standards on spacing of signalized and unsignalized access points, warrants for left turn lanes, and design standards.

The Code also permits the establishment of an access management plan which shows the design of access for every lot on an individual segment of a state highway. Implementation of an access management plan requires municipal endorsement and participation in the planning process. An adopted plan must consist of a report and a map. At the minimum, the report must identify the highway segment, name all participants in the planning process, identify all relevant transportation development districts or transportation management associations, and identify all existing and future access points. The map must show the subject highway segment, all municipal boundaries, tax map block and lot number with current land use and zoning for all parcels, all existing and proposed driveways, all existing traffic control devices, and a schematic plan showing proposed improvements to each lot.

The State Highway Access Act permits counties to adopt the State Highway Management Code. Adoption of the Code would give the county greater control in regulating access to county roads. Driveway access on county roads classified as arterials or major collectors should be strictly regulated. Using the state code would insure greater utilization of right turn only driveways and left turn lanes. With large tracts of vacant land, the county could encourage construction of service roads to serve as a collector/feeder road accessing strip developments along arterials. In areas with partial or substantial development, joint driveways are a tool to reduce the number of curb cuts. Access management plans are a mechanism to attain these objectives. Through these and other concepts, the county can control highway access.

Traffic Engineering Program

From a traffic engineering perspective, county roads in the NJ Route 55 corridor are unprepared for the forecasted development. The majority of roads have neither posted speed limits (relying on statutory speed limits) nor adequate warning signage. The no passing zones reflect rural conditions with low traffic volumes and infrequent curb cuts. Installation of new traffic signals, recommended in the previous chapter, are contingent upon signal warrants being met at some indeterminate time in the future. Most importantly, changing land use patterns and increasing traffic volumes will increase the incidence of accidents. A continuing traffic engineering program to periodically review traffic control devices and to monitor accidents is essential.

This study recommends an ongoing county program to review traffic control devices and monitor traffic flow on a recurring basis. Over a four or five year cycle, all important roads should be reviewed for speed limits, warning signage, directional signage, parking restrictions, sight distance obstructions, no passing zones, truck routes and weight restrictions. Because of the serious nature

of traffic accidents, they should be monitored on a yearly basis throughout the study area. A monitoring program consisting of automatic traffic recorder (24 hour AADT counts) and manual turning movement counts should be instituted. The monitoring program accomplishes two important goals. First, traffic volumes obtained from automatic traffic recorder counts assist the county in timing the construction of road widenings. Second, turning movement counts at intersections proposed for signalization indicate when traffic signal warrants are met and the construction of traffic signals can be initiated.

The above recommendation is both costly and time consuming to implement. It diverts the resources of the engineering and public works staff. To offset part of the cost, it is recommended that the county solicit contributions from all developers in the NJ Route 55 corridor. By sharing the cost burden among all new development and the county, the marginal cost to any participant would be minimal.

Transit Program

Traffic projections for NJ Route 55 Freeway show typical link volumes of 40,000-60,000 vehicles per day. With volumes of this magnitude, the freeway will begin to experience congestion. Unless action is undertaken to minimize traffic congestion, development within the corridor will not reach its full potential and traffic on parallel arterials will encounter far higher traffic volumes that those projected. A comprehensive transit program consisting of a transit way, express buses, park-and-ride lots, feeder buses, and preferential treatment of high occupancy vehicles (HOVs) is one way to minimize congestion on NJ Route 55 Freeway and effectively increase its capacity.

Because park-and-ride lots, express buses and other components of the transit program described below are very expensive to implement and operate, the transit program needs to be implemented in an incremental manner as traffic congestion and transit patronage increase. Potential savings on the cost of constructing a transitway can be realized by using the median of NJ Route 55 Freeway, which was designed to incorporate a PATCO rail extension.

NJTRANSIT, in cooperation with the county, should begin planning express bus service for the NJ Route 55 Freeway. Express buses would have their bus stops limited to park-and-ride lots located at freeway interchanges. Major destinations would include Deptford Mall, the Philadelphia CBD, and the Camden CBD. The routing of buses and frequency of service would require considerable planning. A transitway, consisting of either an exclusive busway or a joint busway/HOV lane, could be constructed in the freeway median. To minimize costs, the transitway should initially consist of a reversible travel lane (with shoulder) separated from the main line by a grass median. Before and after each interchange there would be a slip ramp to enter or exit the busway from the general traffic lanes. As the transitway becomes more successful, the number of lanes would increase to either carry additional vehicles or two-directional traffic.

Park-and-ride lots should be constructed at each interchange. The county and municipalities, through eminent domain or the land development review process, should try to reserve land adjacent

to the freeway for this purpose. Early acquisition of the right-of-way prior to development boosting land prices would drastically reduce acquisition costs. Park-and-ride lots should be available to car and van pools in addition to bus patrons. Initially, buses and HOVs using the park-and-ride lots would access the transitway via the general traffic lanes. If the express bus program became successful or traffic congestion interferes with bus movements, an exclusive ramp to the transitway could be constructed. Alternatively, ramp metering could be utilized to give priority to buses.

To reinforce the transit program municipalities that operate special transportation programs should coordinate their services with the NJ Route 55 Freeway bus service. Consideration should be given to operating a shuttle bus between the Glassboro CBD and NJ Route 55 Freeway. Between the CBD, Glassboro State College, local residents, and proposed industrial parks along US Route 322 there may be sufficient demand for a shuttle to the park-and-ride/express bus service.

APPENDIX A

TRAFFIC ZONES

Figure A1-A: TRAFFIC ZONES

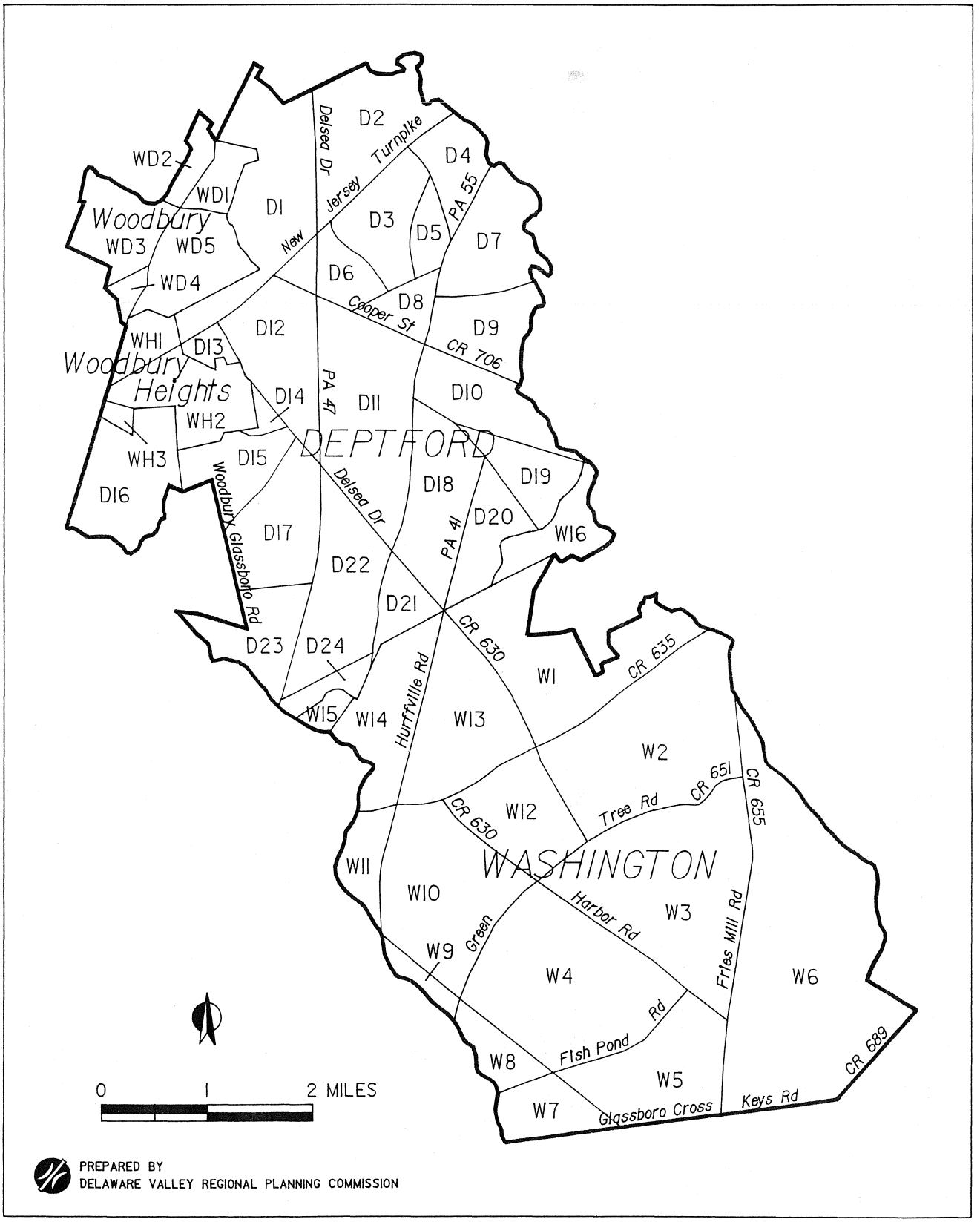


Figure A1-B: TRAFFIC ZONES

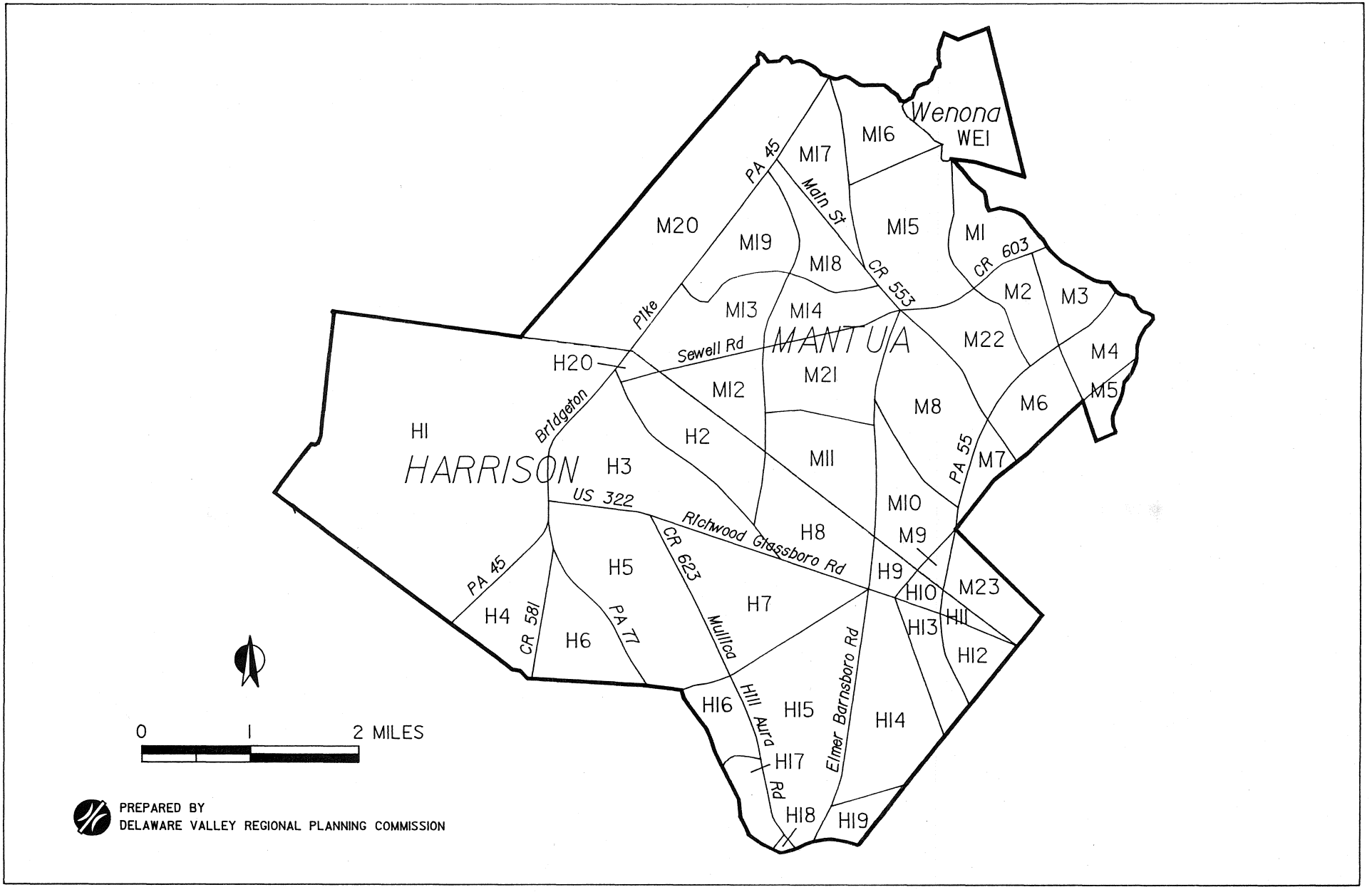


Figure A1-C: TRAFFIC ZONES

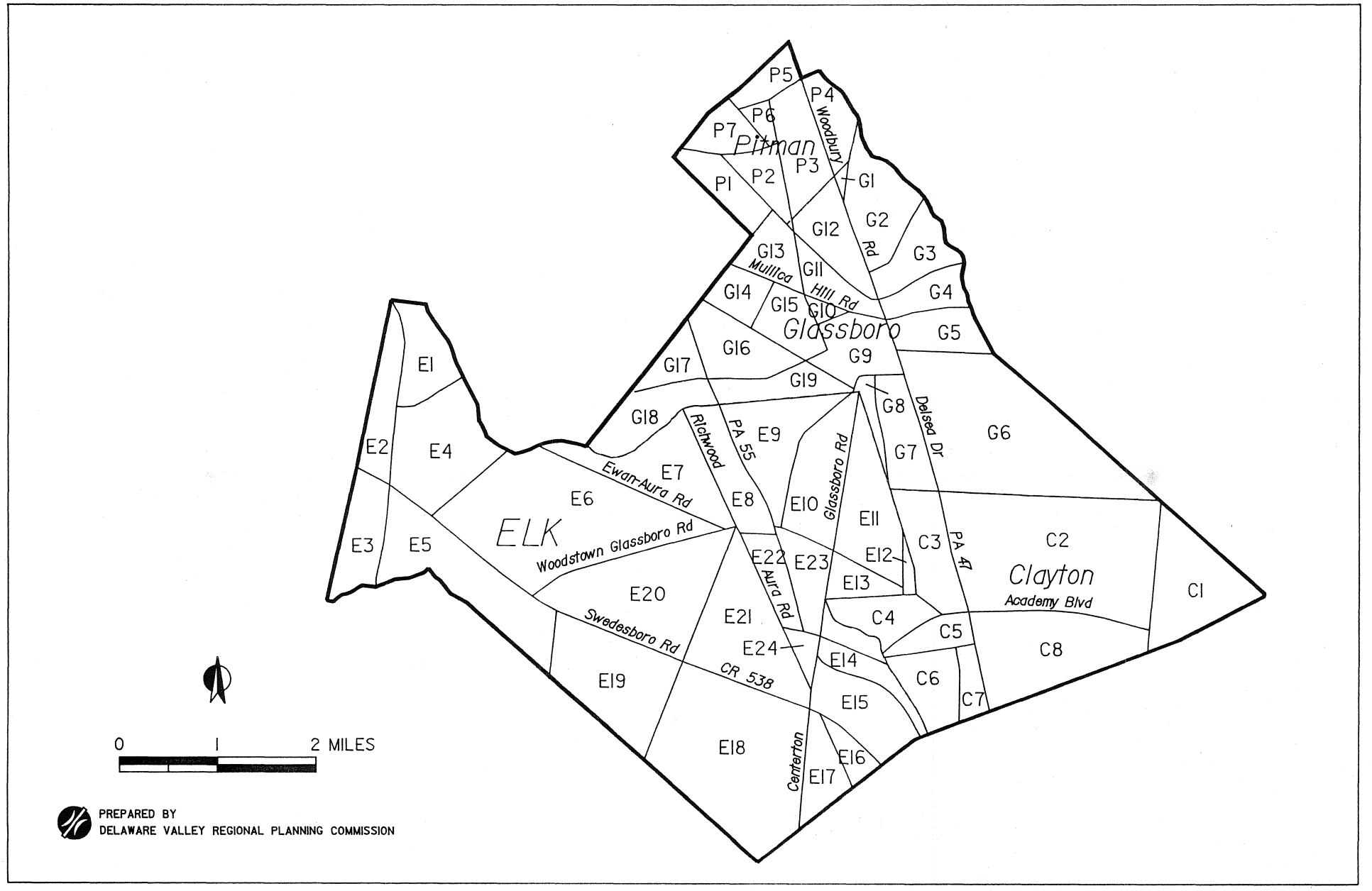
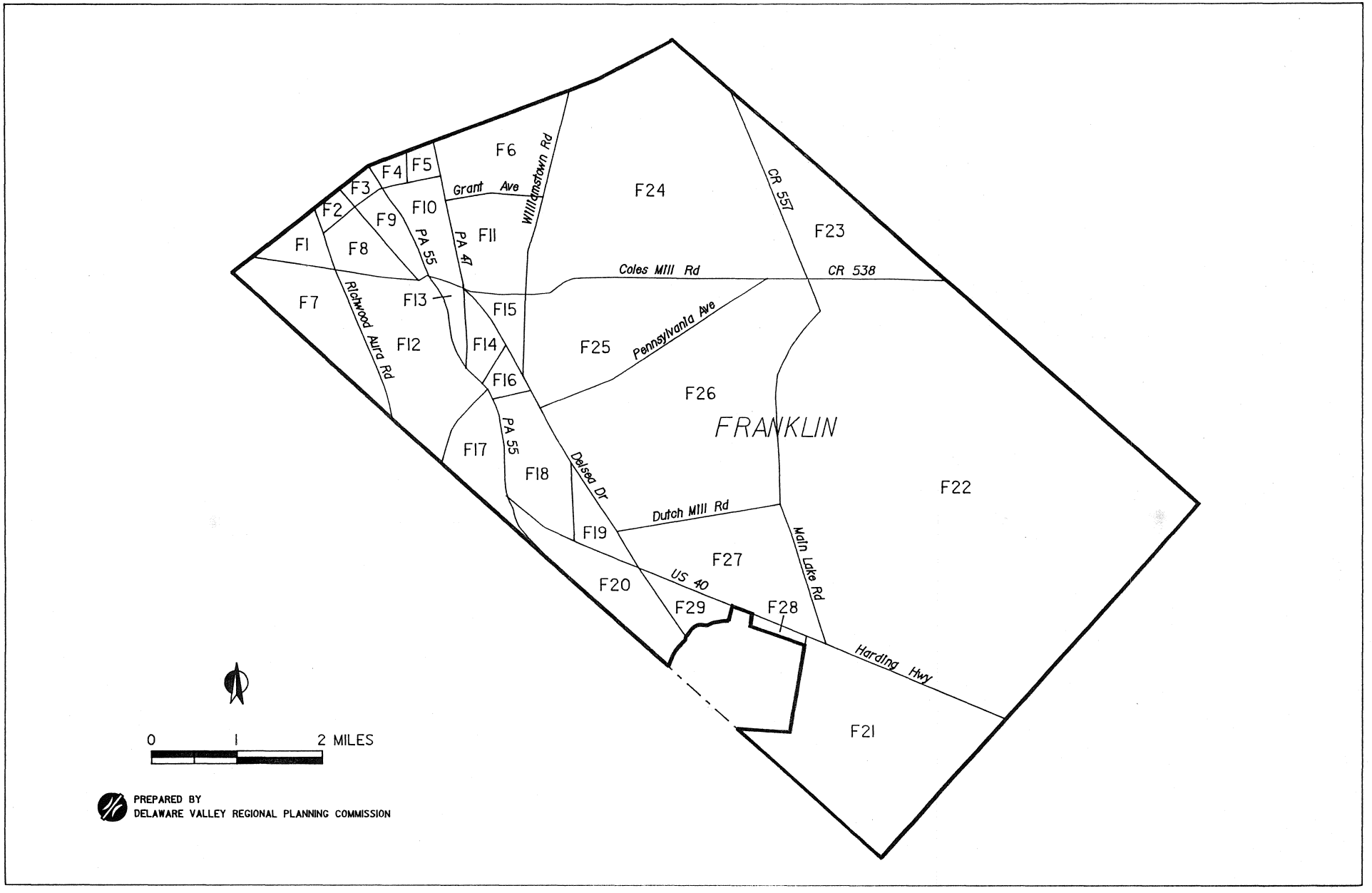


Figure A1-D: TRAFFIC ZONES



APPENDIX B

DEMOGRAPHICS METHODOLOGY

DEMOGRAPHICS METHODOLOGY

Trip making potential for a traffic zone is a function of its demographics, namely the population of the zone and the number of employees within the zone. Traffic forecasting methodology assumes residential land uses produce trips, while non-residential land uses attract trips. This appendix briefly describes the methodology used to estimate population and employment in central Gloucester County.

The methodology consists of three general steps - estimating existing traffic zone population and employment, determining Year 2010 municipal demographics, and then surcharging the projected increase of population and employment among the respective traffic zones in the municipality.

Existing municipality-wide population and employment estimates were obtained from DVRPC's 1987 MUNICIPAL POPULATION ESTIMATES FOR THE DELAWARE VALLEY and 1987 MUNICIPAL EMPLOYMENT ESTIMATES FOR THE DELAWARE VALLEY REGION. These forecasts were developed by DVRPC as part of its on-going regional planning activities. They are developed with input from member counties.

Appendix A presents the traffic zones that constitute the central Gloucester County traffic model. Zonal boundaries generally follow major roads (usually state or county roads), municipal boundaries, or natural boundaries.

Existing zonal demographics were estimated by distributing the municipality-wide population and employment totals among the municipality's traffic zones, using 1985 aerial photographs of the corridor and recent land development information provided by Gloucester County. For example, zonal population was estimated by counting the number of dwelling units in each zone from the aerial photographs; next, the relative proportion of dwelling units among the zones in a municipality was estimated; finally, the zonal population estimate was derived by multiplying the 1987 population by the relative percentage of dwelling units within that respective zone.

To estimate future demographics, DVRPC's approved Year 2010 population and employment forecast for each municipality was reviewed. DVRPC's uses a "top down" approach to estimating population and employment - first the regional, state and then county totals are estimated prior to the municipal estimates. Experience has shown the larger the aggregation, the more accurate the forecast. Where a municipality questioned its projection, the demographic forecast was adjusted appropriately. Maps were prepared showing a municipality's respective traffic zones. A municipal planning official was requested to analyze DVRPC's estimates and then show the distribution of population and employment growth among the traffic zones. To remove any bias, this was done in terms of percentages so that the total growth equals 100 percent.

DVRPC then estimated Year 2010 demographics by multiplying a traffic zone's percentage of future growth by the municipality's total anticipated growth (future minus existing demographics). The growth was then added to the existing demographics.

Our original intent was to have all municipalities provide the required data. However, none of the municipalities have in-house planning staff; they rely upon planning consultants. After consultation with the County, data requests were sent directly to some of the planning consultants. In other instances, the County took the lead in contacting municipal officials. Municipal planners were responsible for providing the information for Deptford Township, Harrison Township, Mantua Township, and Pitman. Gloucester County was responsible for obtaining data on Clayton Borough, Franklin Township, Glassboro, Wenonah, Woodbury City, and Woodbury Heights Borough. Because of insufficient information, DVRPC estimated population and employment for Elk and Washington townships.

Traffic zonal estimates for population and employment are presented in Appendices C and D respectively.

APPENDIX C

POPULATION ESTIMATES BY TRAFFIC ZONE 1987-2010

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010

CLAYTON BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
C1	6.0%	371	5.0%	77	5.8%	448
C2	16.6%	1,027	20.0%	307	17.3%	1,334
C3	8.8%	544	15.0%	230	10.0%	775
C4	3.3%	204	5.0%	77	3.6%	281
C5	11.7%	724	5.0%	77	10.4%	800
C6	9.3%	575	10.0%	154	9.4%	729
C7	7.4%	458	0.0%	0	5.9%	458
C8	36.9%	2,282	40.0%	614	37.5%	2,896
	100.0%	6,185	100.0%	1,535	100.0%	7,720

DEPTFORD TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
D1	13.0%	3,145	5.0%	241	11.7%	3,385
D2	7.4%	1,790	2.0%	96	6.5%	1,886
D3	3.2%	774	22.0%	1,058	6.3%	1,832
D4	0.0%	0	0.0%	0	0.0%	0
D5	0.0%	0	23.0%	1,106	3.8%	1,106
D6	4.6%	1,113	0.0%	0	3.8%	1,113
D7	0.0%	0	0.0%	0	0.0%	0
D8	1.2%	290	0.0%	0	1.0%	290
D9	2.3%	556	0.0%	0	1.9%	556
D10	7.6%	1,838	0.0%	0	6.3%	1,838
D11	9.3%	2,250	0.0%	0	7.8%	2,250
D12	2.9%	702	2.0%	96	2.8%	798
D13	0.0%	0	2.0%	96	0.3%	96
D14	0.3%	73	0.0%	0	0.3%	73
D15	4.3%	1,040	6.0%	289	4.6%	1,329
D16	25.0%	6,048	1.0%	48	21.0%	6,096
D17	10.0%	2,419	12.0%	577	10.3%	2,996
D18	0.9%	218	0.0%	0	0.8%	218
D19	3.7%	895	7.0%	337	4.2%	1,232
D20	1.5%	363	1.0%	48	1.4%	411
D21	0.1%	24	0.0%	0	0.1%	24
D22	0.6%	145	5.0%	241	1.3%	386
D23	1.9%	460	10.0%	481	3.2%	941
D24	0.2%	48	2.0%	96	0.5%	145
	100.0%	24,190	100.0%	4,810	100.0%	29,000

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

ELK TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
E1	4.1%	145	0.3%	30	1.3%	175
E2	1.2%	42	0.4%	42	0.6%	84
E3	5.4%	191	3.4%	343	3.9%	534
E4	5.2%	184	0.4%	36	1.6%	220
E5	6.2%	219	0.6%	62	2.1%	281
E6	12.4%	438	18.7%	1,870	17.1%	2,308
E7	3.0%	106	11.5%	1,151	9.3%	1,257
E8	1.2%	42	3.8%	378	3.1%	420
E9	1.7%	60	5.2%	518	4.3%	578
E10	7.8%	276	7.9%	788	7.9%	1,064
E11	17.4%	615	5.2%	520	8.4%	1,135
E12	1.8%	64	0.8%	76	1.0%	140
E13	3.1%	110	3.3%	325	3.2%	435
E14	9.1%	322	1.7%	173	3.7%	495
E15	4.4%	155	5.0%	504	4.9%	659
E16	0.2%	7	0.1%	10	0.1%	17
E17	1.5%	53	0.2%	15	0.5%	68
E18	4.0%	141	0.8%	75	1.6%	216
E19	1.7%	60	0.3%	30	0.7%	90
E20	3.1%	110	17.0%	1,695	13.3%	1,805
E21	2.7%	95	7.8%	783	6.5%	878
E22	1.8%	64	3.7%	373	3.2%	437
E23	0.5%	18	1.0%	104	0.9%	122
E24	0.5%	18	1.0%	99	0.9%	117
	100.0%	3,534	100.0%	10,000	100.0%	13,534

FRANKLIN TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
F1	0.3%	43	2.0%	154	0.9%	197
F2	0.3%	43	1.0%	77	0.5%	120
F3	0.7%	101	2.0%	154	1.2%	255
F4	0.0%	0	1.0%	77	0.3%	77
F5	1.4%	202	3.0%	231	2.0%	432
F6	2.2%	317	5.0%	384	3.2%	701
F7	1.4%	202	5.0%	384	2.7%	586
F8	1.1%	159	4.0%	307	2.1%	466
F9	0.9%	130	2.0%	154	1.3%	283
F10	1.4%	202	2.0%	154	1.6%	356

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

FRANKLIN TOWNSHIP (CONTINUED)

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
F11	3.7%	533	3.0%	231	3.5%	764
F12	7.0%	1,009	8.0%	615	7.3%	1,624
F13	1.2%	173	1.0%	77	1.1%	250
F14	1.5%	216	1.0%	77	1.3%	293
F15	3.3%	476	2.0%	154	2.8%	629
F16	2.8%	404	1.0%	77	2.2%	480
F17	0.3%	43	1.0%	77	0.5%	120
F18	4.3%	620	3.0%	231	3.8%	850
F19	2.8%	404	3.0%	231	2.9%	634
F20	6.9%	995	7.0%	538	6.9%	1,533
F21	8.0%	1,153	7.0%	538	7.7%	1,691
F22	14.0%	2,018	5.0%	384	10.9%	2,402
F23	3.3%	476	1.0%	77	2.5%	553
F24	15.6%	2,249	10.0%	769	13.7%	3,017
F25	3.9%	562	5.0%	384	4.3%	946
F26	7.6%	1,095	10.0%	769	8.4%	1,864
F27	3.8%	548	5.0%	384	4.2%	932
F28	0.3%	43	0.0%	0	0.2%	43
	100.0%	14,414	100.0%	7,686	100.0%	22,100

GLASSBORO BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
G1	0.0%	0	0.0%	0	0.0%	0
G2	1.2%	172	31.4%	2,088	10.8%	2,260
G3	4.8%	688	28.1%	1,874	12.2%	2,562
G4	6.2%	889	15.2%	1,011	9.0%	1,900
G5	8.7%	1,248	1.9%	127	6.5%	1,374
G6	0.6%	86	0.8%	51	0.7%	137
G7	2.3%	330	0.9%	58	1.8%	388
G8	1.7%	244	0.3%	17	1.2%	261
G9	12.7%	1,821	1.3%	84	9.1%	1,906
G10	4.3%	617	0.0%	0	2.9%	617
G11	14.4%	2,065	0.0%	0	9.8%	2,065
G12	12.9%	1,850	0.4%	25	8.9%	1,875
G13	11.5%	1,649	1.9%	127	8.5%	1,776
G14	0.4%	57	13.1%	870	4.4%	928
G15	11.9%	1,706	0.0%	0	8.1%	1,706
G16	5.2%	746	0.0%	0	3.6%	746

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

GLASSBORO BOROUGH (CONTINUED)

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
G17	0.3%	43	4.9%	328	1.8%	371
G18	0.2%	29	0.0%	0	0.1%	29
G19	0.7%	100	0.0%	0	0.5%	100
	100.0%	14,340	100.0%	6,660	100.0%	21,000

HARRISON TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
H1	20.6%	769	27.2%	2,968	25.5%	3,737
H2	3.0%	112	7.7%	837	6.5%	949
H3	22.8%	851	8.4%	920	12.1%	1,771
H4	3.3%	123	8.5%	932	7.2%	1,055
H5	11.6%	433	18.8%	2,053	17.0%	2,486
H6	1.5%	56	2.3%	255	2.1%	311
H7	7.2%	269	3.2%	354	4.2%	623
H8	1.8%	67	1.5%	160	1.5%	227
H9	1.8%	67	1.5%	160	1.5%	227
H10	1.5%	56	1.6%	176	1.6%	232
H11	1.1%	41	0.0%	0	0.3%	41
H12	1.1%	41	0.0%	0	0.3%	41
H13	1.6%	60	1.2%	128	1.3%	188
H14	3.4%	127	5.2%	565	4.7%	692
H15	8.9%	332	9.7%	1,065	9.5%	1,397
H16	2.4%	90	2.9%	321	2.8%	411
H17	2.3%	86	0.1%	16	0.7%	102
H18	1.6%	60	0.0%	0	0.4%	60
H19	1.7%	63	0.1%	16	0.5%	79
H20	0.8%	30	0.0%	0	0.2%	30
	100.0%	3,733	100.0%	10,926	100.0%	14,659

MANTUA TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
M1	9.7%	959	1.4%	154	5.4%	1,113
M2	15.5%	1,532	-0.1%	-9	7.4%	1,523

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

MANTUA TOWNSHIP (CONTINUED)

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
M3	0.0%	0	4.7%	497	2.4%	497
M4	0.5%	49	0.0%	0	0.2%	49
M5	0.5%	49	0.0%	0	0.2%	49
M6	0.8%	79	0.0%	0	0.4%	79
M7	0.0%	0	7.4%	789	3.8%	789
M8	2.4%	237	9.0%	959	5.8%	1,196
M9	0.4%	40	0.0%	-1	0.2%	39
M10	1.7%	168	9.0%	959	5.5%	1,127
M11	0.5%	49	0.6%	64	0.6%	113
M12	1.0%	99	0.6%	63	0.8%	162
M13	3.0%	297	1.5%	158	2.2%	455
M14	1.6%	158	4.5%	479	3.1%	637
M15	10.3%	1,018	1.4%	154	5.7%	1,172
M16	7.6%	751	0.6%	60	4.0%	811
M17	3.2%	316	5.2%	556	4.3%	872
M18	0.7%	69	23.7%	2515	12.6%	2,584
M19	19.3%	1,908	2.9%	309	10.8%	2,217
M20	11.6%	1,147	13.8%	1466	12.7%	2,613
M21	1.1%	109	2.0%	207	1.5%	316
M22	8.4%	831	11.7%	1247	10.1%	2,078
M23	0.2%	20	0.0%	0	0.1%	20
	100.0%	9,887	100.0%	10,624	100.0%	20,511

PITMAN BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
P1	8.3%	783	0.0%	0	9.2%	783
P2	25.6%	2,427	31.1%	-286	25.0%	2,141
P3	32.9%	3,112	39.9%	-367	32.1%	2,745
P4	17.4%	1,646	21.1%	-194	17.0%	1,452
P5	0.3%	28	0.0%	0	0.3%	28
P6	6.5%	616	7.9%	-73	6.4%	543
P7	9.1%	859	0.0%	0	10.0%	859
	100.0%	9,471	100.0%	-920	100.0%	8,551

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

WASHINGTON TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
W1	2.9%	943	9.0%	1,695	5.1%	2,638
W2	12.8%	4,161	9.5%	1,780	11.6%	5,941
W3	22.3%	7,250	9.0%	1,695	17.4%	8,945
W4	2.8%	910	9.9%	1,865	5.4%	2,775
W5	6.4%	2,081	10.8%	2,034	8.0%	4,115
W6	20.0%	6,502	8.1%	1,526	15.6%	8,028
W7	0.2%	65	2.7%	509	1.1%	574
W8	2.9%	943	1.8%	339	2.5%	1,282
W9	0.3%	98	0.3%	51	0.3%	149
W10	2.3%	748	9.4%	1,763	4.9%	2,511
W11	0.5%	163	5.9%	1,102	2.5%	1,265
W12	6.4%	2,081	2.7%	509	5.0%	2,590
W13	11.1%	3,609	6.8%	1,271	9.5%	4,880
W14	0.9%	293	4.5%	848	2.2%	1,141
W15	0.0%	0	2.3%	424	0.8%	424
W16	8.2%	2,666	7.4%	1,389	7.9%	4,055
	100.0%	32,511	100.0%	18,800	100.0%	51,311

WENONAH BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
WE1	100.0%	2,230	100.0%	0	100.0%	2,230
	100.0%	2,230	100.0%	0	100.0%	2,230

WOODBURY CITY

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
WD1	10.7%	1,099	15.0%	-75	10.5%	1,024
WD2	14.9%	1,530	15.0%	-75	14.9%	1,455
WD3	39.6%	4,067	15.0%	-75	40.9%	3,992
WD4	1.4%	144	15.0%	-75	0.7%	69
WD5	33.4%	3,430	40.0%	-200	33.1%	3,230
	100.0%	10,270	100.0%	-500	100.0%	9,770

Table C-1: POPULATION ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

WOODBURY HEIGHTS

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
WH1	10.3%	351	10.0%	-23	10.3%	328
WH2	77.1%	2,625	75.0%	-169	77.2%	2,457
WH3	12.6%	429	15.0%	-34	12.4%	395
	100.0%	3,405	100.0%	-225	100.0%	3,180

APPENDIX D

EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987-2010

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010

CLAYTON BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
C1	3.0%	56	5.0%	34	3.5%	90
C2	24.0%	446	30.0%	204	25.6%	650
C3	14.0%	260	20.0%	136	15.6%	396
C4	4.0%	74	5.0%	34	4.3%	108
C5	19.0%	353	10.0%	68	16.6%	421
C6	9.0%	167	10.0%	68	9.3%	235
C7	17.0%	316	10.0%	68	15.1%	384
C8	10.0%	186	10.0%	68	10.0%	254
	100.0%	1,860	100.0%	680	100.0%	2,540

DEPTFORD TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
D1	3.0%	326	1.0%	43	2.4%	368
D2	3.0%	326	0.0%	0	2.2%	326
D3	0.0%	0	0.0%	0	0.0%	0
D4	0.0%	0	22.0%	940	6.2%	940
D5	0.0%	0	0.0%	0	0.0%	0
D6	5.0%	543	2.0%	85	4.2%	628
D7	34.0%	3,692	13.0%	555	28.1%	4,247
D8	1.0%	109	13.0%	555	4.4%	664
D9	9.0%	977	10.0%	427	9.3%	1,404
D10	1.0%	109	1.0%	43	1.0%	151
D11	3.0%	326	5.0%	214	3.6%	539
D12	1.0%	109	0.0%	0	0.7%	109
D13	2.0%	217	0.0%	0	1.4%	217
D14	0.0%	0	0.0%	0	0.0%	0
D15	1.0%	109	0.0%	0	0.7%	109
D16	8.0%	869	1.0%	43	6.0%	911
D17	1.0%	109	0.0%	0	0.7%	109
D18	5.0%	543	2.0%	85	4.2%	628
D19	0.0%	0	0.0%	0	0.0%	0
D20	10.0%	1,086	10.0%	427	10.0%	1,513
D21	2.0%	217	20.0%	854	7.1%	1,072
D22	8.0%	869	0.0%	0	5.7%	869
D23	3.0%	326	0.0%	0	2.2%	326
D24	0	0	0	0	0.0%	0
	100.0%	10,858	100.0%	4,272	100.0%	15,130

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

ELK TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
E1	6.0%	14	1.4%	20	2.0%	34
E2	2.0%	5	0.7%	10	0.9%	15
E3	2.0%	5	2.4%	34	2.4%	39
E4	6.0%	14	1.4%	20	2.0%	34
E5	9.0%	20	1.8%	25	2.7%	45
E6	11.0%	25	11.7%	167	11.6%	192
E7	6.0%	14	8.1%	115	7.8%	129
E8	3.0%	7	5.3%	76	5.0%	82
E9	2.0%	5	7.3%	104	6.6%	108
E10	8.0%	18	9.8%	140	9.6%	158
E11	3.0%	7	7.3%	104	6.7%	111
E12	3.0%	7	1.1%	15	1.3%	22
E13	3.0%	7	4.6%	65	4.4%	72
E14	3.0%	7	2.4%	35	2.5%	41
E15	3.0%	7	7.1%	101	6.5%	108
E16	0.0%	0	0.7%	10	0.6%	10
E17	2.0%	5	0.7%	10	0.9%	15
E18	3.0%	7	1.1%	15	1.3%	22
E19	3.0%	7	1.1%	15	1.3%	22
E20	9.0%	20	10.5%	150	10.3%	170
E21	6.0%	14	5.5%	78	5.6%	92
E22	6.0%	14	5.2%	75	5.3%	88
E23	0.0%	0	1.5%	21	1.3%	21
E24	1.0%	2	1.4%	20	1.3%	22
	100.0%	226	100.0%	1,424	100.0%	1,650

FRANKLIN TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
F1	0.0%	0	0.0%	0	0.0%	0
F2	0.0%	0	2.0%	31	0.9%	31
F3	0.0%	0	3.0%	46	1.3%	46
F4	1.0%	20	1.0%	15	1.0%	36
F5	1.0%	20	3.0%	46	1.9%	67
F6	2.0%	41	5.0%	77	3.3%	118
F7	3.0%	61	5.0%	77	3.9%	139
F8	1.0%	20	5.0%	77	2.7%	98
F9	1.0%	20	2.0%	31	1.4%	51
F10	5.0%	102	7.0%	108	5.9%	210

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

FRANKLIN TOWNSHIP (CONTINUED)

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
F11	8.0%	163	6.0%	93	7.1%	256
F12	2.0%	41	5.0%	77	3.3%	118
F13	5.0%	102	2.0%	31	3.7%	133
F14	10.0%	204	6.0%	93	8.3%	297
F15	7.0%	143	5.0%	77	6.1%	220
F16	3.0%	61	1.0%	15	2.1%	77
F17	1.0%	20	1.0%	15	1.0%	36
F18	2.0%	41	2.0%	31	2.0%	72
F19	10.0%	204	8.0%	124	9.1%	328
F20	5.0%	102	5.0%	77	5.0%	180
F21	5.0%	102	5.0%	77	5.0%	180
F22	6.0%	123	1.0%	15	3.8%	138
F23	1.0%	20	0.0%	0	0.6%	20
F24	2.0%	41	2.0%	31	2.0%	72
F25	5.0%	102	8.0%	124	6.3%	226
F26	7.0%	143	5.0%	77	6.1%	220
F27	7.0%	143	5.0%	77	6.1%	220
F28	0.0%	0	0.0%	0	0.0%	0
	100.0%	2,042	100.0%	1,548	100.0%	3,590

GLASSBORO BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
G1	1.0%	74	0.0%	0	0.7%	74
G2	8.0%	596	0.0%	0	5.4%	596
G3	3.0%	223	0.0%	0	2.0%	223
G4	2.0%	149	0.0%	0	1.3%	149
G5	4.0%	298	0.0%	0	2.7%	298
G6	4.0%	298	0.0%	0	2.7%	298
G7	5.0%	372	0.0%	0	3.4%	372
G8	0.0%	0	0.0%	0	0.0%	0
G9	18.0%	1,340	0.0%	0	12.1%	1,340
G10	16.0%	1,192	0.0%	0	10.7%	1,192
G11	17.0%	1,266	0.0%	0	11.4%	1,266
G12	11.0%	819	0.0%	0	7.4%	819
G13	1.0%	74	0.0%	0	0.7%	74
G14	0.0%	0	0.0%	0	0.0%	0
G15	0.0%	0	0.0%	0	0.0%	0
G16	0.0%	0	43.3%	1,581	14.2%	1,581

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

GLASSBORO BOROUGH (CONTINUED)

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
G17	0.0%	0	11.6%	422	3.8%	422
G18	0.0%	0	43.3%	1,581	14.2%	1,581
G19	10.0%	745	1.9%	69	7.3%	814
	100.0%	7,447	100.0%	3,653	100.0%	11,100

HARRISON TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
H1	30.0%	346	18.0%	91	26.3%	437
H2	8.0%	92	0.0%	0	5.5%	92
H3	11.0%	127	0.0%	0	7.7%	127
H4	3.0%	35	0.1%	0	2.1%	35
H5	13.0%	150	0.0%	0	9.0%	150
H6	3.0%	35	1.3%	6	2.5%	41
H7	10.0%	115	19.7%	100	13.0%	215
H8	5.0%	58	0.1%	0	3.5%	58
H9	1.0%	12	0.1%	0	0.7%	12
H10	1.0%	12	19.9%	100	6.8%	112
H11	1.0%	12	8.0%	40	3.1%	52
H12	1.0%	12	19.8%	100	6.8%	112
H13	2.0%	23	12.8%	65	5.3%	88
H14	3.0%	35	0.1%	0	2.1%	35
H15	3.0%	35	0.1%	0	2.1%	35
H16	2.0%	23	0.0%	0	1.4%	23
H17	3.0%	35	0.1%	0	2.1%	35
H18	0.0%	0	0.0%	0	0.0%	0
H19	0.0%	0	0.0%	0	0.0%	0
H20	0.0%	0	0.0%	0	0.0%	0
	100.0%	1,153	100.0%	506	100.0%	1,659

MANTUA TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
M1	2.0%	92	0.0%	0	1.3%	92
M2	4.0%	185	0.0%	0	2.5%	185

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

MANTUA TOWNSHIP (CONTINUED)

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
M3	8.0%	369	18.3%	500	11.8%	869
M4	1.0%	46	14.6%	400	6.1%	446
M5	3.0%	138	6.7%	182	4.4%	320
M6	8.0%	369	4.3%	118	6.6%	487
M7	6.0%	277	1.8%	50	4.5%	327
M8	2.0%	92	0.0%	0	1.3%	92
M9	1.0%	46	7.3%	200	3.4%	246
M10	1.0%	46	3.7%	100	2.0%	146
M11	1.0%	46	0.0%	0	0.6%	46
M12	1.0%	46	0.0%	0	0.6%	46
M13	1.0%	46	1.8%	49	1.3%	95
M14	1.0%	46	0.0%	0	0.6%	46
M15	10.0%	461	1.5%	40	6.8%	501
M16	9.0%	415	1.5%	40	6.2%	455
M17	12.0%	554	22.7%	620	16.0%	1,174
M18	1.0%	46	1.2%	32	1.1%	78
M19	3.0%	138	0.0%	0	1.9%	138
M20	16.0%	738	0.0%	0	10.1%	738
M21	1.0%	46	0.0%	0	0.6%	46
M22	7.0%	323	0.0%	0	4.4%	323
M23	1.0%	46	14.6%	400	6.1%	446
	100.0%	4,613	100.0%	2,731	100.0%	7,342

PITMAN BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
P1	5.0%	188	0.0%	0	4.5%	188
P2	9.0%	338	5.0%	20	8.6%	358
P3	19.0%	713	10.0%	41	18.1%	754
P4	11.0%	413	10.0%	41	10.9%	454
P5	35.0%	1,314	50.0%	203	36.5%	1,517
P6	7.0%	263	5.0%	20	6.8%	283
P7	14.0%	526	20.0%	81	14.6%	607
	100.0%	3,754	100.0%	406	100.0%	4,160

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

WASHINGTON TOWNSHIP

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
W1	3.0%	136	2.7%	300	2.8%	436
W2	21.0%	955	5.2%	575	9.8%	1,530
W3	17.0%	773	4.1%	450	7.9%	1,223
W4	7.0%	318	2.5%	275	3.8%	593
W5	2.0%	91	2.7%	300	2.5%	391
W6	19.0%	864	37.0%	4,067	31.7%	4,931
W7	1.0%	45	0.0%	0	0.3%	45
W8	3.0%	136	0.0%	0	0.9%	136
W9	0.0%	0	0.0%	0	0.0%	0
W10	7.0%	318	1.7%	185	3.2%	503
W11	3.0%	136	26.2%	2,875	19.4%	3,011
W12	0.0%	0	2.5%	275	1.8%	275
W13	9.0%	409	10.0%	1,100	9.7%	1,509
W14	8.0%	364	5.3%	582	6.1%	946
W15	0.0%	0	0.0%	0	0.0%	0
W16	0.0%	0	0.0%	5	0.0%	5
	100.0%	4,548	100.0%	10,989	100.0%	15,537

WENONAH BOROUGH

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
WE1	100.0%	446	100.0%	154	100.0%	600
	100.0%	446	100.0%	154	100.0%	600

WOODBURY CITY

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
WD1	10.0%	860	10.0%	144	10.0%	1,004
WD2	9.0%	774	15.0%	217	9.9%	990
WD3	33.0%	2,837	25.0%	361	31.8%	3,198
WD4	20.0%	1,719	20.0%	289	20.0%	2,008
WD5	28.0%	2,407	30.0%	433	28.3%	2,840
	100.0%	8,596	100.0%	1,444	100.0%	10,040

Table D-1: EMPLOYMENT ESTIMATES BY TRAFFIC ZONE 1987 TO 2010 (Continued)

WOODBURY HEIGHTS

ZONE	1987 ESTIMATE PER	1987 ESTIMATE ABS	1987-2010 DISTRIBUTION PER	1987-2010 DISTRIBUTION ABS	2010 ESTIMATE PER	2010 ESTIMATE ABS
WH1	59.0%	1,186	10.0%	73	46.0%	1,259
WH2	25.0%	503	75.0%	547	38.3%	1,050
WH3	16.0%	322	15.0%	109	15.7%	431
	100.0%	2,011	100.0%	729	100.0%	2,740