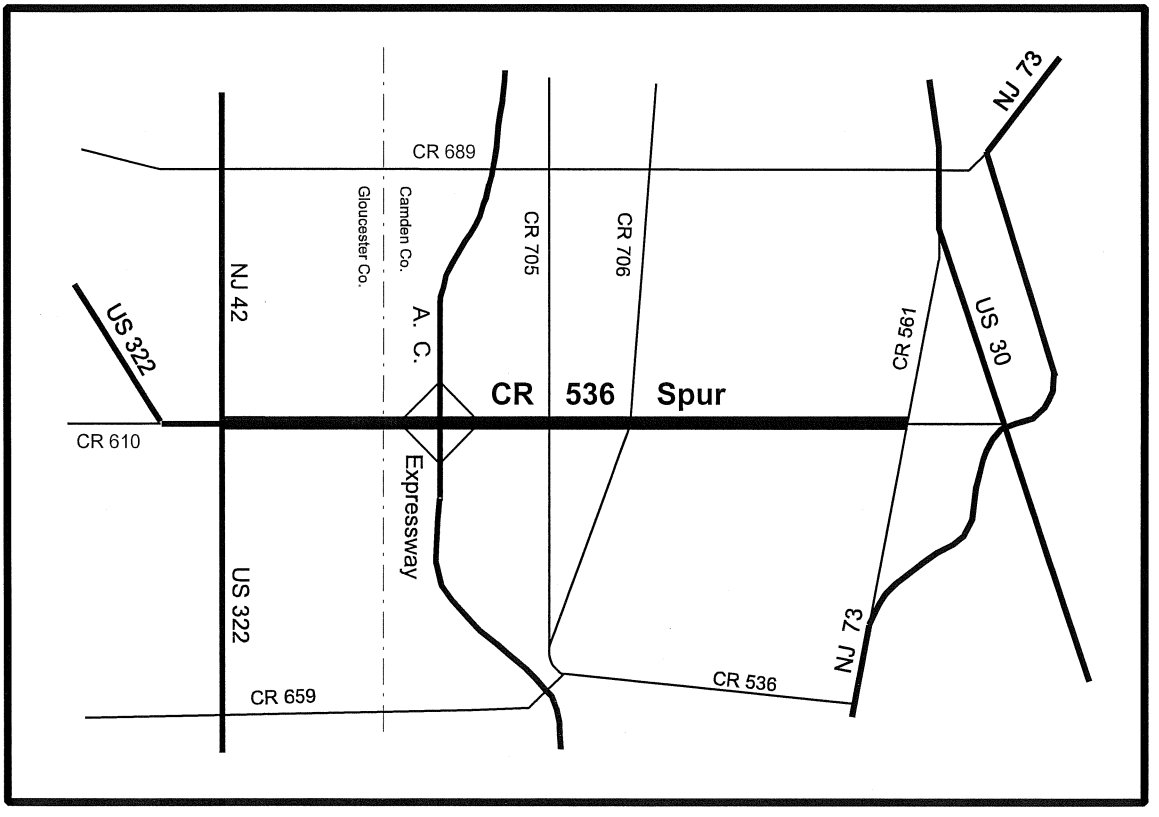
WILLIAMSTOWN NEW FREEDOM ROAD

(CR 536 SPUR)

CORRIDOR TRAFFIC STUDY



DELAWARE VALLEY REGIONAL
PLANNING COMMISSION

FEBRUARY 1998

WILLIAMSTOWN-NEW FREEDOM ROAD

(CR 536 SPUR)

CORRIDOR TRAFFIC STUDY

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
The Bourse Building
111 South Independence Mall East
Philadelphia, PA 19106

February 1998

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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 four line Divisions: Transportation Planning, Regional Information Services Center, Regional Planning, and the Office of Administration and Finance. 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.

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DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

TITLE

Williamstown-New Freedom Road (CR 536 Spur)
Corridor Traffic Study

Date Published: February 1998

Publication No. 98005

Geographic Area Covered:

Winslow Township and Gloucester Township in Camden County; Monroe Township and Washington Township in Gloucester County

Key Words:

traffic congestion, traffic counts, population growth, land development, traffic growth, level of service analysis, recommended improvements

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ABSTRACT

This report summarizes an examination of existing and proposed future traffic volumes along Williamstown New Freedom Road (CR 536 Spur). Undertaken at the request of Camden and Gloucester Counties, the study was conducted to determine the ability of CR 536 Spur to accommodate continued traffic growth resulting from the concentration of new development within the study area, the background growth of area traffic and changes in travel patterns resulting from the construction of a new interchange on the Atlantic City Expressway at Cross Keys Road.

Right-of-way needs of the recommended traffic improvements were sketched on aerial photographs of the corridor (scale: 1" = 200') and are provided in an addendum to this document.

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1 EXECUTIVE SUMMARY

This report, prepared by the Delaware Valley Regional Planning Commission (DVRPC), summarizes the undertakings and findings of a traffic evaluation of Williamstown New Freedom Road (CR 536 Spur) and was performed in cooperation with the Camden County Planning Department and the Gloucester County Planning Department. The 6.8 mile corridor extends from the Black Horse Pike (NJ 42/US 322) to Tansboro-Cedarbrook-Blue Anchor Road (CR 561).

The study area includes four of the fastest growing municipalities in the DVRPC region (Winslow Township, Monroe Township, Gloucester Township and Washington Township) as evidenced by the population growth between 1980 and 1990. According to population forecasts prepared by DVRPC, similar growth trends are expected to continue in these municipalities to the year 2020. In fact, the main reason for conducting this study emanated from the counties' concern for the ability of CR 536 Spur to accommodate the associated future traffic growth.

Multiple activities were performed as part of the work program. The initial task was to examine the existing physical and operational conditions of the corridor. Next, future expected traffic volumes were projected by identifying proposed developments in the study area and making assumptions about the background traffic growth. Two scenarios for future travel patterns were evaluated; one assumed that a full interchange would be constructed on the Atlantic City Expressway at Cross Keys Road and the other assumed that this location would remain without an interchange. The operating conditions of the corridor was then reevaluated using the projected traffic levels and expected deficiencies were identified. Finally, improvement recommendations were identified which would address the expected deficiencies related to the scenario which included construction of a full interchange.

In summary, the primary recommendations identified in this study include:

- Widen CR 536 Spur to two travel lanes in each direction between the Black Horse Pike and CR 706 plus appropriate turning lanes at the eleven study intersections.
- Construct a full interchange along the Atlantic City Expressway at Cross Keys Road.
- Install a traffic signal on CR 536 Spur at Holiday City Blvd.

The recommended improvements may be staged within the corridor based upon available finances , incremental costs and/or changes in planned conditions or circumstances.

2 INTRODUCTION

This report addresses existing traffic conditions occurring along Williamstown New Freedom Road (CR 536 Spur) in Camden and Gloucester Counties and the conditions projected to occur as a result of recent and proposed development within the corridor. The section of CR 536 Spur under study extends from Tansboro-Cedarbrook-Blue Anchor Road (CR 561) in Winslow Township, Camden County to the Black Horse Pike (NJ 42) in Monroe Township, Gloucester County. This covers a distance of approximately 6.8 miles (Figure 1).

CR 536 Spur functions as a primary cross-county route for southern Camden County and provides direct access to NJ 73, US 30, the Atlantic City Expressway, NJ 42 and US 322. The section between the A.C. Expressway and NJ 42/US 322 has been designated as part of the National Highway System. Throughout the study area, this facility carries one travel lane in each direction and is supplemented at several intersections with additional turning lanes.

Significant development occurred in this area of Camden and Gloucester Counties during the 1980's and 1990's. The four municipalities considered within the study area and their respective 1980 - 1990 population increases are: Washington Township (50.5%), Winslow Township (50.1%), Monroe Township (23.4%) and Gloucester Township (19.1%). Much of this growth resulted from new residential development within the study corridor. The corridor has not seen the end of this growth; in fact Winslow (+20,948), Gloucester (+19,873) and Washington (+18,013) are projected by DVRPC to be the fastest growing municipalities, in terms of population, in the nine-county DVRPC area between 1990 and 2020. Monroe, with a projected increase of 7,678 people is number 22 on that list of 353 municipalities.

With the expectation of continued significant development in this corridor, the counties are concerned about the amount of traffic to be accommodated on the county road networks. To address this concern, DVRPC was requested by Camden and Gloucester Counties to conduct an in-depth analysis of existing and projected future traffic conditions within the CR 536 Spur corridor. This report summarizes that effort. Components of the work effort are outlined below.

- ✓ Determine the existing physical characteristics of CR 536 Spur and its intersecting streets.
- ✓ Obtain existing peak hour traffic volumes at eleven study intersections along the corridor.
- ✓ Conduct level of service analysis of existing traffic volumes and identify improvements

necessary to rectify existing deficiencies at the eleven study intersections.

- ✓ Identify, with the counties' participation, proposed developments within the corridor.
- ✓ Estimate future peak hour traffic demands resulting from the new development, as well as traffic resulting from ongoing regional growth for two traffic scenarios. One assumes no changes to the existing roadway network. The second scenario assumes construction of a full interchange on the Atlantic City Expressway at Cross Keys Road.
- ✓ Conduct a traffic signal warrant analysis of future conditions at CR 536 Spur and Holiday City Blvd.
- ✓ Conduct a level of service analysis of future (2020) traffic volumes to identify improvements necessary to accommodate each scenario.
- ✓ Coordinate with the counties and affected operators to determine a final set of recommended improvements within the corridor.
- ✓ Prepare aerial photographs (scale: 1" = 200') showing the right-of-way requirements associated with the recommended improvements.

FIGURE 1

STUDY AREA MAP

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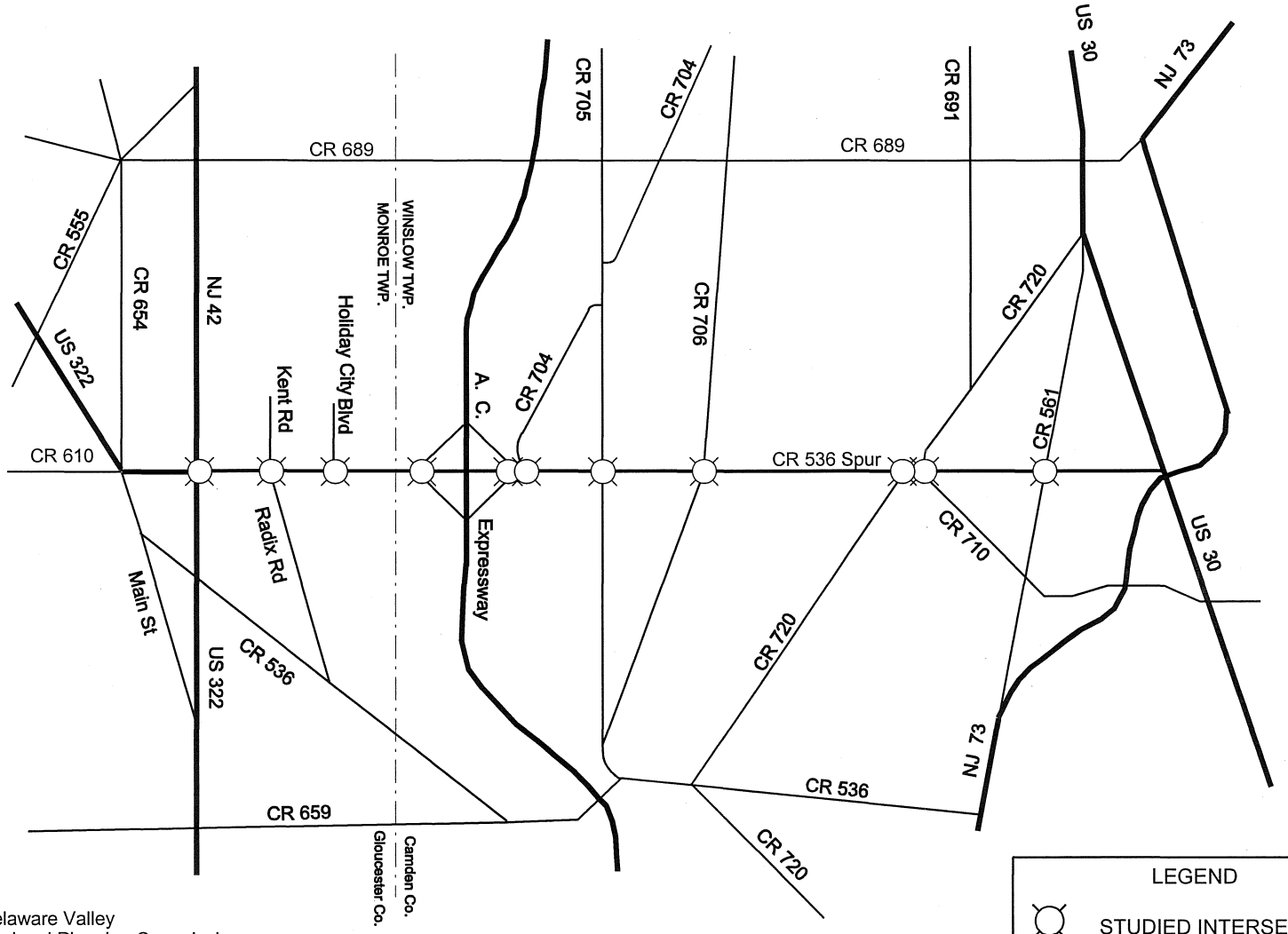

LEGEND

STUDIED INTERSECTION

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3 EXISTING TRANSPORTATION CONDITIONS

In examining existing transportation conditions, the variety of and demand for transportation services within the corridor are presented. The ability of the network to adequately satisfy the demand is also assessed.

HIGHWAY NETWORK DESCRIPTION

Williamstown-New Freedom Road runs in an east-west direction through Winslow Township, in southern Camden County, and Monroe Township, in southern Gloucester County. The section under study extends from the intersection with Camden County Route 561 at Taunton Road (the NJ 73 access road) to the Black Horse Pike at US 322 in Williamstown, Gloucester County. Enroute, the highway intersects with the Atlantic City Expressway (interchange #38).

The highway typically provides one travel lane in each direction. Approaches to signalized intersections intermittently provide left turning lanes and less frequently right turning lanes. There are no posted speed limits in the eastern section of the corridor, between CR 561 and CR 706. By statute this sets speed limits to 50 miles per hour. As one travels westward in the corridor, development gradually intensifies and lower speed limits are posted. Between CR 706 and the Atlantic City Expressway, 45 miles per hour speed limit signs are posted. Between the Atlantic City Expressway and the Black Horse Pike, posted speeds are 40 miles per hour.

Land use abutting Williamstown-New Freedom Road varies considerably. Between the CR 561 and CR 720 / CR 710 intersections, abutting land use is primarily agricultural and low density residential. Between CR 720 / CR 710 and CR 720 industrial quarrying activities predominate. From CR 720 to CR 706 abutting land is undeveloped, reflecting the corridor's crossing of designated Pinelands. Westward from CR 706, through the remainder of the corridor, adjacent land use becomes more typically suburban in character. Moderate density residential development predominates with commercial activity in the vicinity of major intersections, notably Sicklerville Road (CR 705) and the Black Horse Pike (NJ 42). Major new subdivisions are served by driveways / roadways which are complemented with acceleration and deceleration lanes.

The physical and operating conditions at the eleven study intersections along the Williamstown-New Freedom Road study corridor are described below.

Taunton Road (approach roadway to NJ 73) and Tansboro-Cedarbrook-Blue Anchor Road (CR 561), Winslow Township, Camden County - This skewed four-way intersection is controlled by a three-phase traffic signal. A split green phase is afforded to the eastbound and westbound approaches, while both CR 561 approaches operate on the same green indication. The CR 536 Spur / Taunton Road approaches provide two through travel lanes in each direction separated by a wide grass median. On the west side of the intersection the cross section is reduced to one travel lane in each direction without a median (requiring a merge for westbound departure traffic). The westbound Taunton Road approach consists of an exclusive left turn lane, a through lane and a channelized through / right turn lane. The eastbound approach consists of a shared left turn / through lane and a channelized through / right turn lane. CR 561 provides one continuous undivided travel lane through the intersection in each direction. Its cross section is enhanced by the presence of paved shoulders on both sides of the roadway. Buildings on the northeast corner (a candle shop) and the southwest corner (a residence) encroach very closely to the intersection.

Berlin-New Freedom Road (CR 720) / Factory-Hayes Mill Road (CR 710), Winslow Township, Camden County - A three phase traffic signal controls traffic movement at this four-way intersection. CR 536 Spur's eastbound approach is provided an advance left turn phase, while shared phasing controlling eastbound and westbound movements along CR 536 Spur follows. A shared green phase controls both side street approaches to the intersection (CR 720 and CR 710). Both the CR 720 and CR 710 approaches to the intersection curve in close proximity to the intersection (the result of an intersection realignment improvement which eliminated an unsignalized acute angle intersection). Each intersecting roadway provides one continuous undivided travel lane through the intersection. Additionally, each approach to the signalized intersection is provided a separate left turn lane. The eastbound CR 536 Spur and southbound CR 720 approaches are afforded separate right turn lanes. A church and a commercial garden center occupy the southwest and southeast corners of the intersection, respectively.

New Freedom Road (CR 720), Winslow Township, Camden County - This is a "T" intersection with stop sign control on the northbound approach. The northbound CR 720 approach serves shared lane left and right turn traffic movements. Both legs of CR 536 Spur provide a single lane for through traffic in each direction. The westbound approach is afforded a separate left turn lane, and the eastbound approach is complemented with a painted right turn channelization island. All quadrants to the intersection are undeveloped and an unpaved driveway, serving a quarry, joins the intersection's southeast corner.

Blenheim-Erial-New Brooklyn Road (CR 706), Winslow Township, Camden County - This four-way intersection is controlled by a two-phase traffic signal. The signal timing does not include an all-red interval between phases. Each intersecting highway provides one continuous through travel lane. The eastbound CR 536 Spur approach is afforded a separate channelized right turn lane. Single family homes abut the southwestern quadrant of the intersection, and a gas station occupies the southeastern corner ("Mongan's Corner").

Sicklerville Road (CR 705), Winslow Township, Camden County - This is a four-way intersection, controlled by a two-phase traffic signal. The signal timing does not include an all-red interval between phases. The northbound CR 705 approach consists of an exclusive left turn lane, a through lane and an exclusive right turn lane. The through lane is not lined up properly with the departure lane so that through traffic must shift to the left as it passes through the intersection. The southbound approach is striped for one lane but, is sufficiently wide so that vehicles frequently line up two abreast. The eastbound CR 536 Spur approach lane is also sufficiently wide so that through and right turning traffic can easily bypass vehicles queued up to turn left. The westbound approach also provides sufficient width for two travel lanes to form abreast. Dependent upon traffic volume on the approach — a left turn lane plus a shared through and right turn lane form reducing the through carrying capability to one lane. Alternately, two westbound through lanes can form on the approach which becomes problematic as through traffic must merge back into one lane as it departs the intersection. All other intersection departure legs also function as one lane. The adjacent land use consists of two gas stations and a convenience store. The southwest corner is presently vacant.

Erial-Williamstown Road (CR 704), Winslow Township, Camden County - This three-legged intersection is controlled by a stop sign on the southbound CR 704 approach. Total pavement width (roadway and shoulder) on the southbound approach is sufficient to allow separate left and right turning lanes to form at the stop sign. One through lane is afforded to each direction of travel along CR 536 Spur, although a separate left turn storage lane is provided for eastbound CR 536 Spur and sufficient pavement width exists on the westbound approach to act as an auxiliary right turn lane. A gas station occupies the northeast corner of the intersection. The Atlantic City Expressway's westbound on and off ramps lie just 200 feet to the west of the CR 704 intersection.

Atlantic City Expressway Westbound Off and On Ramps, Winslow Township, Camden County - In total, the Williamstown interchange (interchange #38) is a diamond interchange providing full movement access between the Atlantic City Expressway and Williamstown-New Freedom Road. This intersection comprises the eastern half of the interchange, and provides for local

interconnection between CR 536 Spur and expressway traffic movements from the east and to the west. Ramp movements entering the westbound expressway (i.e., to Camden and Philadelphia) are subject to a toll - $0.10 for autos and $0.25 for trucks.

Traffic movement at the intersection is controlled by a three phase traffic signal. The signal's operation affords an advance left turn phase for eastbound CR 536 Spur traffic (i.e., traffic accessing the on-ramp to the expressway's lanes toward Camden and Philadelphia). The remaining two phases of the traffic signal are devoted to shared eastbound and westbound movement along CR 536 Spur, and movements from the expressway's westbound off ramp. The traffic signal is interconnected with the traffic signal regulating traffic movements at the interchange ramps serving eastbound off and on movements — located 1,000 feet to the west along Williamstown-New Freedom Road.

One through traffic lane is afforded to each direction of travel along CR 536 Spur. A separate left turn storage lane is provided for eastbound CR 536 Spur while the westbound approach is afforded a separate channelized right turn lane. Traffic exiting the ramp from the westbound expressway operates from separate left and right turning lanes.

Atlantic City Expressway Eastbound Off and On Ramps, Winslow Township, Camden County - The intersection comprises the western half of the Williamstown interchange, and provides for local connection with expressway traffic movements from the west and to the east.[1] Ramp movements exiting the eastbound expressway (i.e., from Camden and Philadelphia) are subject to a toll - $0.10 for autos and $0.25 for trucks.

Traffic movement at this half of the interchange is also controlled by a three phase traffic signal. The signal's operation affords an advance left turn phase for westbound CR 536 Spur traffic (i.e., left turns to the expressway's on-ramp toward Atlantic City). The remaining two phases of the traffic signal are devoted to shared eastbound and westbound movement along CR 536 Spur, and left turning movements from the expressway's eastbound off ramp. The traffic signal is interconnected with the traffic signal regulating traffic movements at the interchange ramps serving westbound off and on movements — located 1,000 feet to the east along Williamstown-New Freedom Road.

[1]Additional use of the eastbound off ramp is made via a local road connection with Old Erial Road. Along this link, traffic exiting from an adjacent residential development — desiring to go east on Williamstown-New Freedom Road — is directed to the expressway off ramp. In this manner, left turns from the development are accommodated in a protected fashion by the traffic signal regulating the ramp and CR 536 Spur intersection.

One through traffic lane is afforded each direction of travel along CR 536 Spur. A separate left turn storage lane is provided for westbound CR 536 Spur, while on the eastbound approach right turns are channelized from the through travel lane. Left turning traffic exiting the ramp is afforded a separate lane. Right turns from the ramp operate on a sweeping channelized lane controlled by a yield sign. These right turning vehicles often conflict with the westbound traffic attempting to turn right onto Old Erial Road. This local road, which provides access to a residential development, is approximately 380 feet west of the off ramp. This creates a hazardous weave movement between the traffic turning right from the off ramp and the traffic turning right into Old Erial Road.

Holiday City Boulevard, Monroe Township, Gloucester County - Holiday City Boulevard is a locally owned and maintained street serving the Holiday City development. Holiday City is an age restricted community consisting of single and twin homes. Construction is still taking place within the development. Holiday City Boulevard forms a "T" intersection with CR 536 Spur, providing divided entry and exiting lanes. Outbound (southbound) traffic is afforded sufficient cartway for separate left and right turn lanes controlled by a stop sign. The two lane cross section of CR 536 Spur is complemented with a separate eastbound left turn lane and a separate westbound right turn lane. The adjacent corners of the intersection are undeveloped.

Kent Road and Radix Road, Monroe Township, Gloucester County - These are two lane locally owned and maintained streets serving residential neighborhoods. They intersect Williamstown-New Freedom Road in offset fashion. Kent Road, on the north side of the intersection, is offset slightly west of Radix Road, which is the south leg of the intersection. Traffic movement at the intersection is controlled by a multi-phase traffic signal — providing dual left turn phases on CR 536 Spur, shared green phasing for through movement along CR 536 Spur and split phasing for the side street (Kent Road and Radix Road) approaches. Each CR 536 Spur approach is provided a separate left turn lane, while the side streets consist of single lane approaches to the signal. The northwest corner of the intersection is occupied by an apartment building, while the other corners support single family dwellings and / or dwellings converted to office use.

Black Horse Pike (NJ 42 / US 322), Monroe Township, Gloucester County - The intersection of the Black Horse Pike with Williamstown-New Freedom Road forms a four-way intersection. The northbound and eastbound approaches are designated US 322. The southbound approach is designated as NJ 42 and the westbound approach is designated CR 536 Spur. A three-phase traffic signal with provision for split green phasing on the eastbound and westbound approaches, regulates the intersection.

The Black Horse Pike's cross section provides two continuous travel lanes in each direction separated by a grass median. Its cross section is enhanced by the presence of an additional northbound and southbound intersection approach lane which serve right turns and traffic movements to far-side jughandles. These jughandles are provided to accommodate left turns from the Black Horse Pike.

A yield sign controlled free-flow right turn lane serves right turns from the eastbound US 322 approach. The eastbound and westbound approaches are each afforded exclusive left turn lanes. In addition, the westbound approach has a shared through/right turn lane. Subsequent to the initiation of this report, a second through lane was added to the eastbound approach. The eastbound departure lanes taper back to one through lane approximately 250 feet west of the intersection.

Commercial development typifies the intersection's surrounding land with the exception of the southwest quadrant (an undeveloped corner occupied by one of the jughandles). An observed physical constraint at the intersection is the proximity and alignment of the jughandle exit to both the intersection's eastbound and westbound approaches.

EXISTING PUBLIC TRANSPORTATION SERVICES

In addition to the above referenced highway facilities, traditional automobile travel within the corridor is supplemented by the Avandale Park and Ride lot and New Jersey Transit (NJT) bus services. The Avandale Park and Ride lot is located on a parcel adjacent to the northeast quadrant of the Williamstown-New Freedom Road (CR 536 Spur) and Erial-Williamstown Road (CR 704) intersection, just east of interchange #38 of the Atlantic City Expressway. The lot is serviced by four NJT bus routes and has 368 free parking spaces, including seven handicapped spaces. According to a Thursday, July 18, 1996 field visit it was determined that the lot contained 171 parked cars. The Avandale Park and Ride lot is currently available for use by NJT patrons only.

The Williamstown-New Freedom Road corridor is served by the four regularly scheduled NJT bus routes which service the Avandale Park and Ride lot plus a route which largely operates perpendicular to the corridor — along the Black Horse Pike. Both local and express type bus services are offered by these routes. Descriptions of the routes as they operate within the environs of the study area on typical weekdays (according to NJT schedules effective as of September 3, 1996) are shown below.

- 315 - Operating between Cape May, Wildwood and Philadelphia — via US 9, NJ 50, the Black Horse Pike and the North-South Freeway. One late morning trip and one early evening trip are scheduled from Philadelphia to Cape May. One morning peak trip, one midday trip and one evening peak trip are provided from Cape May to Philadelphia.
- 400 - Operating between Sicklerville, Williamstown, Camden and Philadelphia — via CR 536 Spur and the Black Horse Pike. Service to the Avandale Park and Ride lot is provided about every 15 to 20 minutes during the peak hours and hourly during the midday and evening periods. All of these trips have recently been extended from the park and ride lot to the "village" of Sicklerville.
- 459 - Operating between Echelon Mall, Camden County College and the Avandale Park and Ride lot — via Laurel Road, Peter Cheeseman Lane, Garwood Road, Sicklerville Road and Erial-Williamstown Road. Hourly service is provided during the peak, the midday and the evening service periods.
- 463 - Operating between Woodbury and the Avandale Park and Ride lot — via Delsea Drive, Egg Harbor Road, Main Street through Williamstown and CR 536 Spur. Hourly headways in each direction are maintained during the peak, midday and evening service periods.
- 551 - Operating between Philadelphia, Camden, the Avandale Park and Ride Lot, Atlantic City, and Ocean City — via the North-South Freeway and Atlantic City Expressway for the Atlantic City trips; diverging from the Expressway at the Garden State Parkway for the trips oriented to Ocean City. Atlantic City service is provided at thirty minute intervals in both directions throughout the majority of the day; owl service (i.e., during the late evening and the early morning) is hourly. Two trips from Ocean City to Philadelphia are scheduled during the morning peak. Two return trips to Ocean City are scheduled during the evening peak period.

EXISTING TRAFFIC VOLUMES

Average daily traffic volumes (ADTs) were assembled for selected segments of the study corridor. Those counts were either conducted for this study or were obtained from recent traffic counts performed in the area as part of DVRPC's ongoing travel monitoring program.

From those sources the following traffic data were assembled:

— 7,700 vehicles per day (1996) travel the highway in both directions in the eastern end of the corridor east of the CR 720 / 710 intersection in Camden County;

- 10,800 vehicles per day (1995) were recorded between CR 710 and CR 706 in Camden County;
- 13,800 vehicles per day (1992) between CR 706 and CR 705 in Camden County;
- 19,800 vehicles per day (1992) between CR 705 and CR 704 in Camden County, and;
- 18,800 vehicles per day (1996) east of the Radix Road / Kent Road intersection in Gloucester County.

Manual turning movement traffic counts were conducted by DVRPC or were obtained from traffic studies recently performed along the corridor to — determine peak hour traffic demands at the study intersections and serve as the analytical basis for this study. Sources and dates of the traffic count data are listed below.

Williamstown-New Freedom Road (CR 536 Spur) and:

1) Taunton Road (approach roadway to NJ 73) and Tansboro-Cedarbrook-Blue Anchor Road (CR 561) - DVRPC, June 1996.
2) Berlin-New Freedom Road (CR 720) / Factory-Hayes Mill Road (CR 710) - DVRPC, June 1996.
3) New Freedom Road (CR 720) - DVRPC, June 1996.
4) Blenheim-Erial-New Brooklyn Road (CR 706) - DVRPC, October 1992 (as contained within DVRPC's report: Camden County Intersection Study, October 1992.
5) Sicklerville Road (CR 705) - DVRPC, October 1992 (updated as contained within DVRPC's report: Sicklerville Road (CR 705) Traffic Study, February 1996).
6) Erial-Williamstown Road (CR 704) - A-Tech, June 1995 (as contained within Horner & Canter Associates' report: Traffic Impact Analysis - Atlantic City Expressway Proposed Interchange #41, October 25 1995).
7) Atlantic City Expressway Westbound Off and On Ramps - A-Tech, June 1995 (as contained within Horner & Canter Associates' report: Traffic Impact Analysis - Atlantic City Expressway Proposed Interchange #41 October 25 1995).
8) Atlantic City Expressway Eastbound Off and On Ramps - A-Tech, June 1995 (as contained within Horner & Canter Associates' report: Traffic Impact Analysis - Atlantic City Expressway Proposed Interchange #41 October 25 1995).
9) Holiday City Boulevard - DVRPC, June 1996.
10) Kent Road and Radix Road - DVRPC, June 1996.
11) Black Horse Pike (NJ 42 / US 322) - DVRPC, June 1996.

Current peak travel hour traffic volumes are presented in Figures 2a and 2b for the a.m. peak hour and Figures 3a and 3b for the p.m. peak traffic hour. A brief overview of the peak hour traffic situation within the corridor indicates that during the a.m. peak hour, the distribution of traffic is predominantly eastbound. During the p.m., higher traffic volumes are generally encountered and westbound flow predominates. During both peaks, traffic activity typically increases from east to west within the corridor.

EXISTING LEVEL OF SERVICE ANALYSIS

Level of service analysis is a procedure which relates traffic operations to motorist's perceptions — of speed, travel time, traffic operations, freedom to maneuver, comfort, convenience, etc. — by means of six letter designations (A through F). Level A generally connotes free flowing traffic conditions, while operational breakdown or forced flow conditions are typically described as level F.

The analyses for this study were accomplished using the methodology and procedures of the Highway Capacity Manual (Special Report 209, Transportation Research Board, Washington, D.C., 1985.). Existing level of service analyses were performed assuming current peak hour traffic demands at each of the eleven study intersections given existing roadway, geometry and traffic control conditions.

At intersections, level of service reflects the ability to clear a traffic signal and / or the freedom to maneuver through conflicting traffic volume. It should be noted that both signalized and stop sign controlled intersections comprise the set of intersections evaluated in the study corridor. Since each type of intersection is evaluated / measured differently, the letter designations for level of service are not directly comparable to one another.

Level of service at signalized intersections is measured in terms of average stopped delays encountered by vehicles traversing the intersection. Delays in these cases are influenced by the length of the signal cycle, the amount of green time apportioned to an approach, as well as, the vehicular demand on the approach. Table 1 gives a description of each level of service and its delay range. It is important to note that delay (i.e., level of service) is not related to capacity in a direct manner. Thus, the designation of level of service F does not automatically signify that the approach is overloaded. Long cycle length and / or poor progression through adjacent traffic signals can also result in excessive delays.

FIGURE 2a

EXISTING AM PEAK HOUR

TRAFFIC VOLUMES

SCHEMATIC NOT TO SCALE

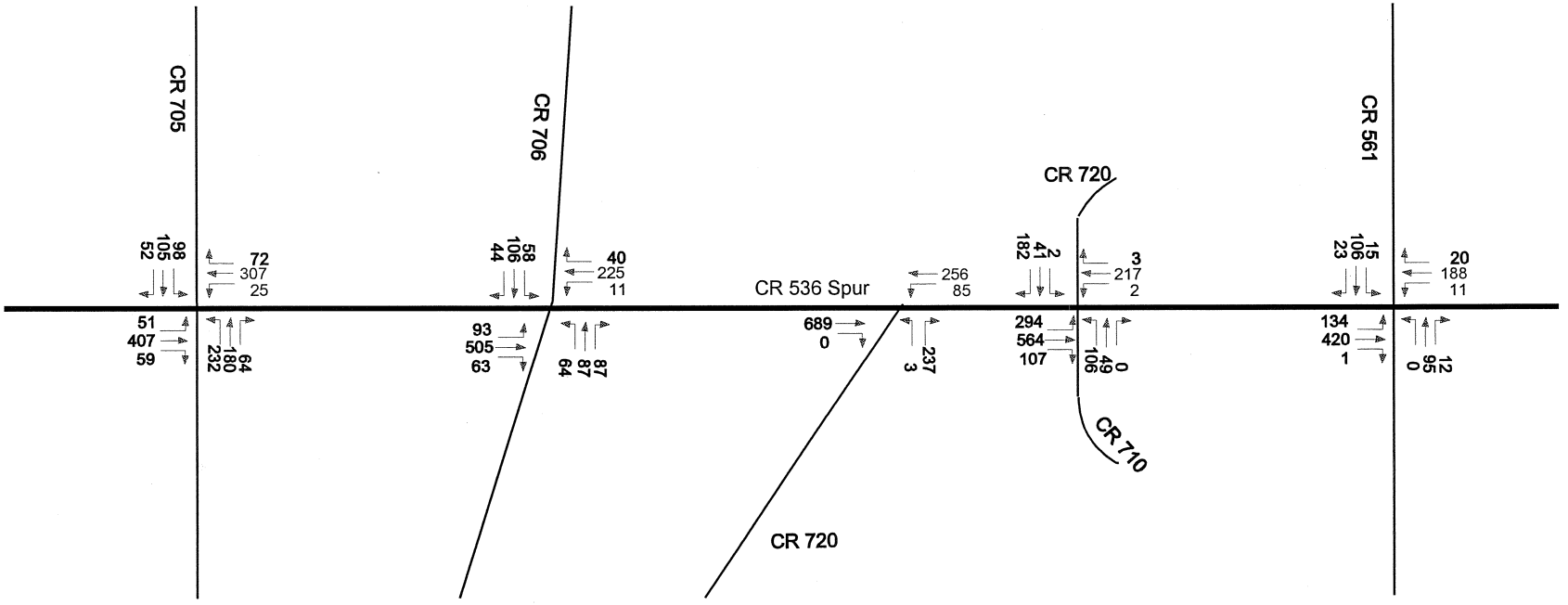

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FIGURE 2b
EXISTING AM PEAK HOUR
TRAFFIC VOLUMES

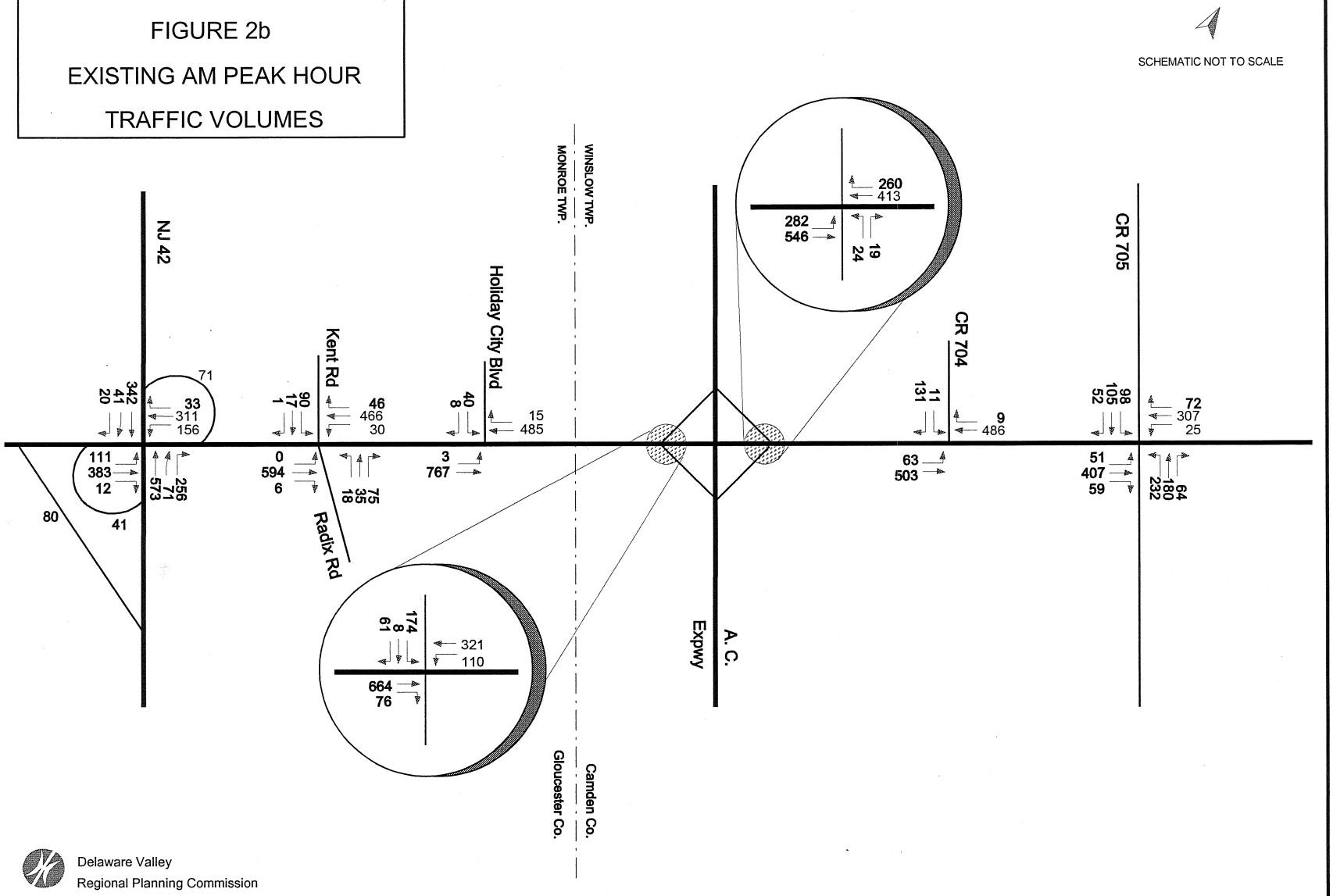

FIGURE 3a

EXISTING PM PEAK HOUR

TRAFFIC VOLUMES

SCHEMATIC NOT TO SCALE

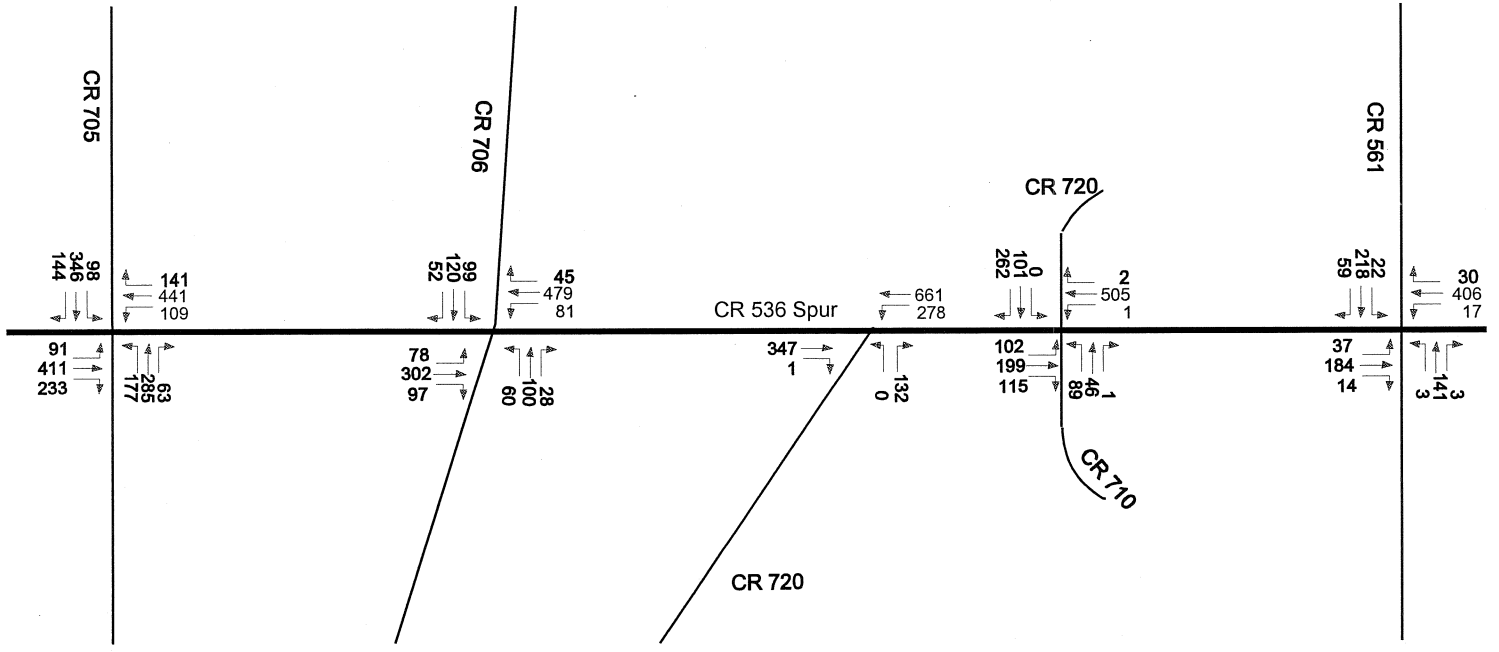

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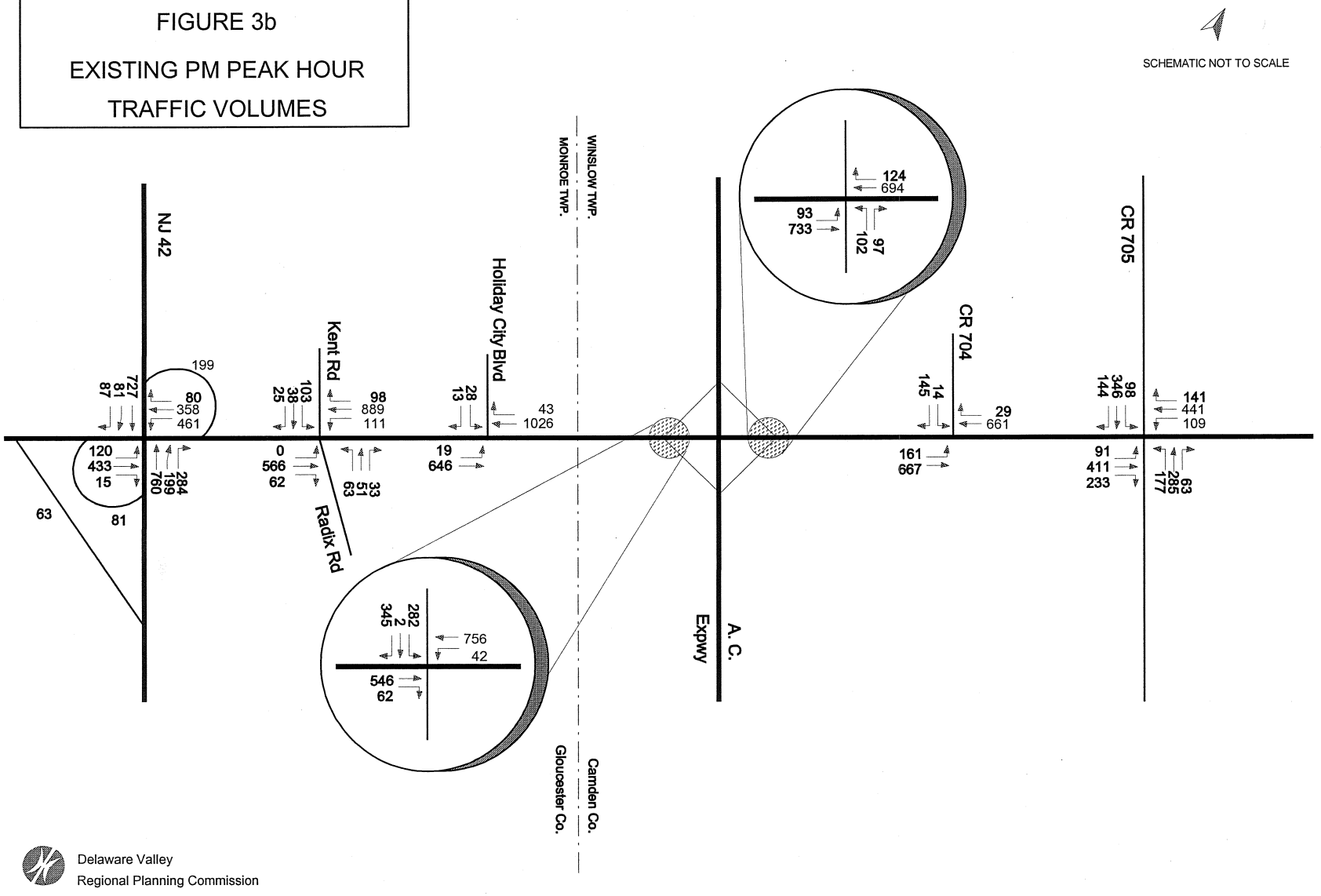
FIGURE 3b

EXISTING PM PEAK HOUR TRAFFIC VOLUMES



Level of service criteria for unsignalized intersections (e.g., stop sign controlled side streets approaching uninterrupted major highway segments) are measured in terms of reserve capacity. Reserve capacity is related to qualitative delay ranges (see Table 2). The analysis for unsignalized operation focuses on minor street traffic approaching a stop or yield sign, and left turns from the major street. The potential capacity of the critical traffic movement is based upon two factors: 1) distribution of gaps in the cross traffic stream, and; 2) driver judgement in selecting gaps through which to execute the desired maneuvers. Reserve capacity represents the difference between the approach volume and potential capacity.

Level of service analyses were completed for the study corridor's eight signalized and three unsignalized intersections. The results of existing level of service conditions are illustrated on Figures 4a and 4b. A summary of the findings, on an intersection-by-intersection basis, follows.

Taunton Road (approach roadway to NJ 73) and Tansboro-Cedarbrook-Blue Anchor Road (CR 561) - All approaches to the intersection operate with good levels of service during both peak traffic hours. Overall intersection performance is level C in the morning and in the evening.

Berlin-New Freedom Road (CR 720) / Factory-Hayes Mill Road (CR 710) - Lengthy delays are experienced by eastbound CR 536 Spur left turns in the morning, and northbound CR 710 left turns in the evening. Overall intersection operations are level C during the a.m. peak and level B in the p.m. peak.

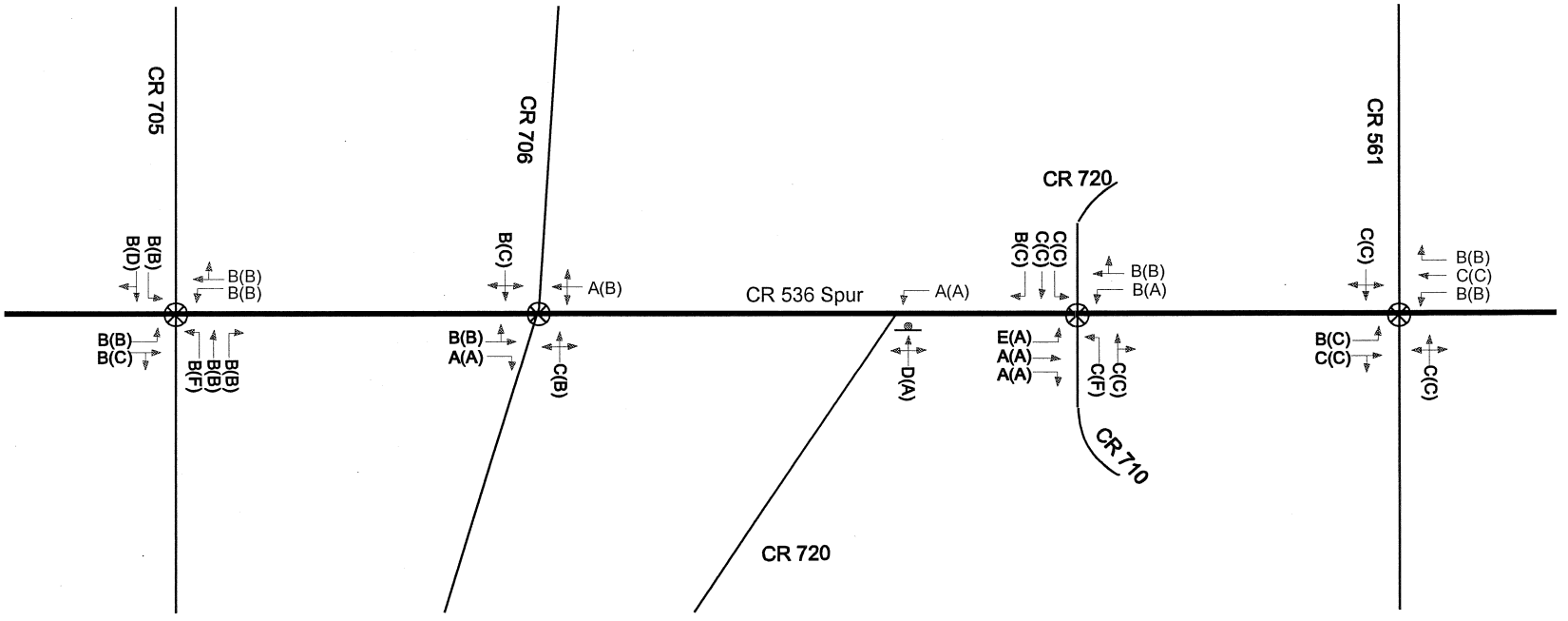
New Freedom Road (CR 720) - Moderate levels of delay are encountered on the northbound CR 720 stop sign controlled approach during the a.m. peak travel hour. Traffic movements along CR 536 Spur are uninterrupted and operate with little or no delays.

Blenheim-Erial-New Brooklyn Road (CR 706) - All approaches to the intersection operate with good levels of service during both peak traffic hours. Overall intersection performance is level B in the morning and in the evening.

Sicklerville Road (CR 705) - All approaches to the intersection operate reasonably well during the morning peak, however during the evening rush hour the Sicklerville Road southbound through and right turn movement experiences a moderate degree of congestion and the northbound left turn lane experiences lengthy delays. Overall intersection operations are level B in the morning and level D in the evening.

FIGURE 4a
EXISTING PEAK HOUR LEVEL OF SERVICE

SCHEMATIC NOT TO SCALE



LEGEND

A(A) AM(PM) PEAK HOUR LEVEL OF SERVICE

TRAFFIC SIGNAL

STOP SIGN OR YIELD SIGN

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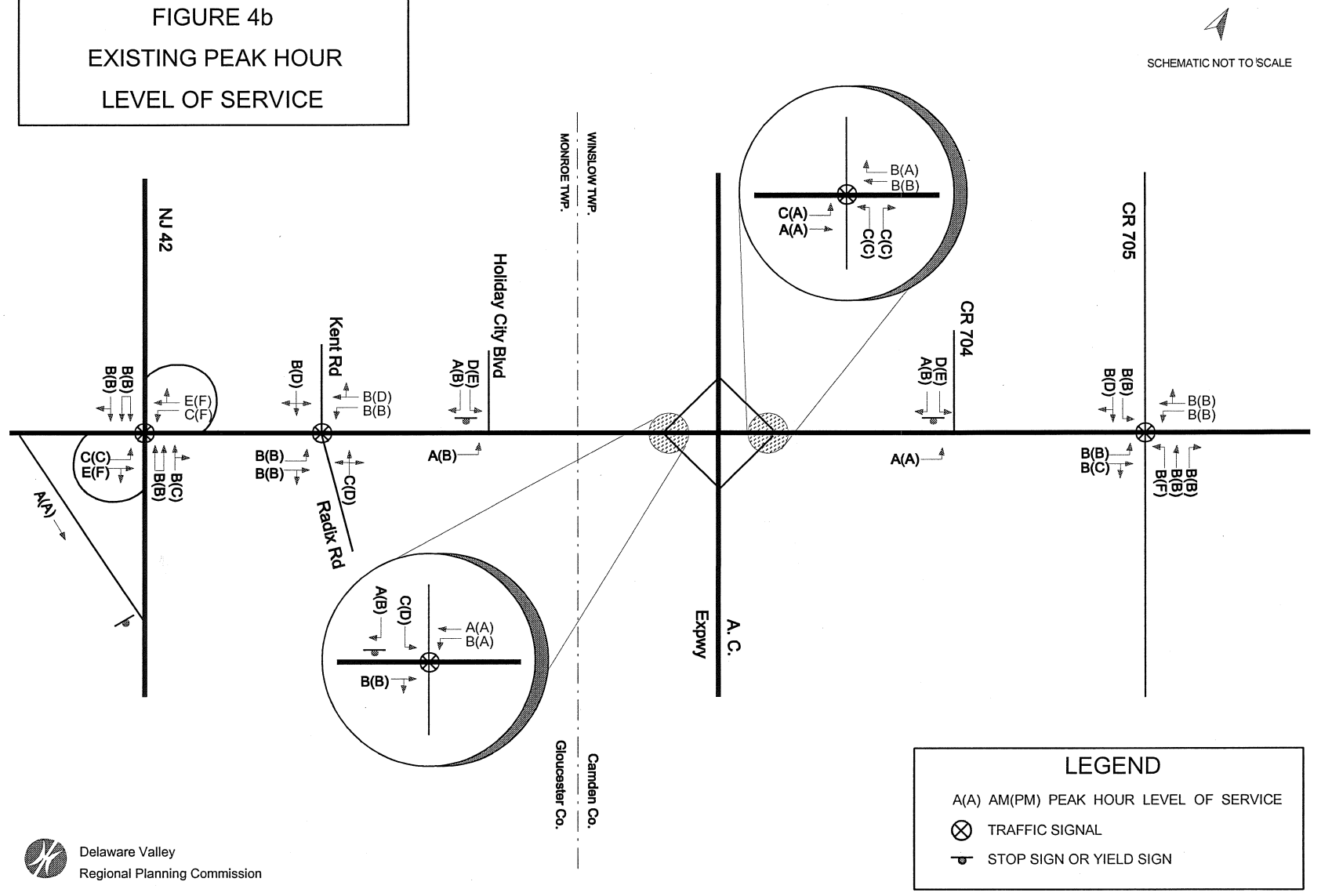
FIGURE 4b
EXISTING PEAK HOUR
LEVEL OF SERVICE



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Erial-Williamstown Road (CR 704) - Left turns from the CR 704 southbound stop sign controlled approach are accomplished with some difficulty during both peak hours. However, the higher volume right turning movement on the same approach experiences little delays. Traffic movements along CR 536 Spur are uninterrupted and operate with little or no delay.

Atlantic City Expressway Westbound Off and On Ramps - All traffic movements operate at good conditions during both peak hours. Overall intersection performance is level B during the a.m. and p.m. peaks.

Atlantic City Expressway Eastbound Off and On Ramps - Moderate delays are encountered by left turns exiting the expressway ramp during the evening rush. All remaining movements operate with lesser levels of delay during each peak. Overall intersection performance for this half of interchange #38 is level B during the a.m. and p.m. peak hours.

Holiday City Boulevard - Left turns from the Holiday City Boulevard southbound stop sign controlled approach are accomplished with moderate to long delay during both peak hours. Right turns on the same approach experience little delays. Traffic movement along CR 536 Spur is uninterrupted and operates with little or no delay.

Kent Road and Radix Road - During the a.m. peak hour all traffic movements operate at good levels of service. In the p.m., moderate delays are experienced by traffic movements on the side street approaches and the westbound CR 536 Spur approach. Overall intersection operations are computed at level B in the a.m. and at level D in the p.m. peak hour.

Black Horse Pike (NJ 42 / US 322) - Traffic operations along the Black Horse Pike's approaches are good during both peak travel hours. Conversely, long delays are encountered for most movements along the westbound (CR 536 Spur) and eastbound (US 322) approaches during the peak hours. Overall intersection performance is level C in the morning peak hour and level E in the evening peak.

In summary of the level of service analyses of existing peak traffic volumes, it is concluded that — while long delays may be encountered on selected intersection approaches during the morning or evening peak traffic hours — stable and predictable traffic conditions exist for the set of study intersections along the Williamstown-New Freedom Road (CR 536 Spur) study corridor.

IMPROVEMENTS TO EXISTING TRAFFIC OPERATIONS

The study Steering Committee identified level of traffic service thresholds for the purposes of achieving preferred standards for traffic operations at the eleven study intersections. Consequently, the level of service analyses of existing traffic volumes were re-performed to identify a practical set of improvements which would yield the highest operating threshold achievable from the following set:

- desirable - level of service C;
- acceptable - level of service D;
- poor, but operable - level of service E.

The resultant traffic improvements suggested to achieve minimum preferred operating conditions are described on Table 3. "Before and after" conditions of overall intersection levels of service are summarized on Table 4.

TABLE 1: LEVEL OF SERVICE CRITERIA - SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE A - Very low delay, good progression; most vehicles do not stop at intersection. Average stopped delays equal 5.0 seconds or less per vehicle.

LEVEL OF SERVICE B - Generally good signal progression and / or short cycle length; more vehicles stop at intersection than level of service 'A'. The average stopped delay range is between 5.1 to 15.0 seconds per vehicle.

LEVEL OF SERVICE C - Fair progression and / or longer cycle length; significant number of vehicles stop at intersection. The delay range averages 15.1 to 25.0 seconds per vehicle.

LEVEL OF SERVICE D - Congestion becomes noticeable, many vehicles stop at signal, individual cycle failures. Longer delays from unfavorable progression and longer cycle lengths. Delay range is between 25.1 to 40.0 seconds per vehicle.

LEVEL OF SERVICE E - Considered limit of acceptable delay, indicative of poor progression, long cycle lengths. Frequent individual cycle failures. Delay range equals 40.1 to 60.0 seconds per vehicle.

LEVEL OF SERVICE F - Unacceptable delay, indication of possible oversaturation (i.e., arrival flow exceeds capacity). Average delay exceeds 60.0 seconds per vehicle.

Source: Highway Capacity Manual, Transportation Research Board, Special Report 209, 1985

TABLE 2: LEVEL OF SERVICE CRITERIA - UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE A - Little or no delay. Reserve capacities equal 400 or more passenger cars per hour.

LEVEL OF SERVICE B - Short traffic delays. Reserve capacities between 300 to 399 passenger cars per hour.

LEVEL OF SERVICE C - Average traffic delays. Reserve capacities between 200 to 299 passenger cars per hour.

LEVEL OF SERVICE D - Long traffic delays. Reserve capacities between 100 to 199 passenger cars per hour.

LEVEL OF SERVICE E - Very long traffic delays. Reserve capacities between 0 and 99 passenger cars per hour.

LEVEL OF SERVICE F - Extreme traffic delays. Reserve capacities less than 0. When demand volume exceeds the capacity of the lane queuing may result causing congestion and affecting other traffic movements in the intersection.

Source: Highway Capacity Manual, Transportation Research Board, Special Report 209, 1985

TABLE 3: ASSUMED TRAFFIC IMPROVEMENTS - EXISTING TRAFFIC VOLUMES

INTERSECTION WITH
WILLIAMSTOWN-NEW FREEDOM ROAD (CR 536 SPUR):

1) Taunton Road (approach roadway to NJ 73) and Tansboro-Cedarbrook-Blue Anchor Road (CR 561) -
   a) None.

2) Berlin-New Freedom Road (CR 720) / Factory-Hayes Mill Road (CR 710) -
   a) None.

3) New Freedom Road (CR 720) -
   a) Realign and provide widened northbound CR 720 approach, restripe for separate left and right turn lanes.

4) Blenheim-Erial-New Brooklyn Road (CR 706) -
   a) None.

5) Sicklerville Road (CR 705) -
   {a) Realign northbound and southbound approaches.}
   b) Provide full width separate southbound left turn and through / right lanes.
   c) Retime signal.

6) Erial-Williamstown Road (CR 704) -
   a) None.

7) Atlantic City Expressway Westbound Off and On Ramps -
   a) None.

8) Atlantic City Expressway Eastbound Off and On Ramps -
   a) None.

9) Holiday City Boulevard -
   a) None.

10) Kent Road and Radix Road -
   a) Retime signal.

11) Black Horse Pike (NJ 42 / US 322) -
   a) Provide center left turn lanes on the Black Horse Pike (i.e., eliminate jughandles).
   b) Update traffic signal.

{Note: Items within the braces {} above are improvements which cannot be justified through level of service analysis procedures. On the other hand, they would benefit traffic flow and can be justified using published warrants and / or were judged to be logical extensions when constructing the identified improvements. As such, they are identified herein.}

TABLE 4: SUMMARY OF STUDY INTERSECTION LEVEL OF SERVICE ANALYSIS - EXISTING TRAFFIC VOLUMES (WITH AND WITHOUT IMPROVEMENTS)

INTERSECTION WITH WILLIAMSTOWN-NEW FREEDOM ROAD CR 536 SPUR:	LEVEL OF SERVICE			
	CURRENT CONDITIONS		POTENTIAL CONDITIONS	
	AM	PM	AM	PM
1) CR 561	C	C	No changes suggested	
2) CR 720 / CR 710	C	B	No changes suggested	
3) CR 720	D (side street stop conditions)	A	D&D (side street stop conditions)	E&A
4) CR 706	B	B	No changes suggested	
5) CR 705	B	D	B	C
6) CR 704	D&A (side street stop conditions)	E&B	No changes suggested	
7) AC Exp. Wb Off / On Ramps	B	B	No changes suggested	
8) AC Exp. Eb Off / On Ramps	B	B	No changes suggested	
9) Holiday City Boulevard	D&A (side street stop conditions)	E&B	No changes suggested	
10) Kent Road and Radix Road	B	D	B	C
11) NJ 42 / US 322	C	E	C	D

4 FUTURE TRAFFIC CONDITIONS

Future traffic conditions for the design year (2020) are predicated upon formulating future peak hour traffic demands and determining the highway network necessary to serve them through level of service (LOS) analysis. The development of future traffic demands includes estimating volume associated with identifiable developments within the study area and background traffic growth resulting from ongoing regional development from outside the study limits.

FUTURE LAND DEVELOPMENT

Projected land development expected to occupy the general area surrounding the study highway network was provided by Camden County and Gloucester County planning staff and supplemented with in-house information at DVRPC . Thirty seven (37) developments were identified as a result of those efforts. Figure 5 displays the general location of each identified development. Eighteen proposed developments are located in Camden County and nineteen are located within Gloucester County. The variety and magnitude of the future development includes: one elementary school and one day care center; 5,916 residential units; 547,600 square feet of office and corporate space, and; 243,000 square feet of retail / shopping center space.

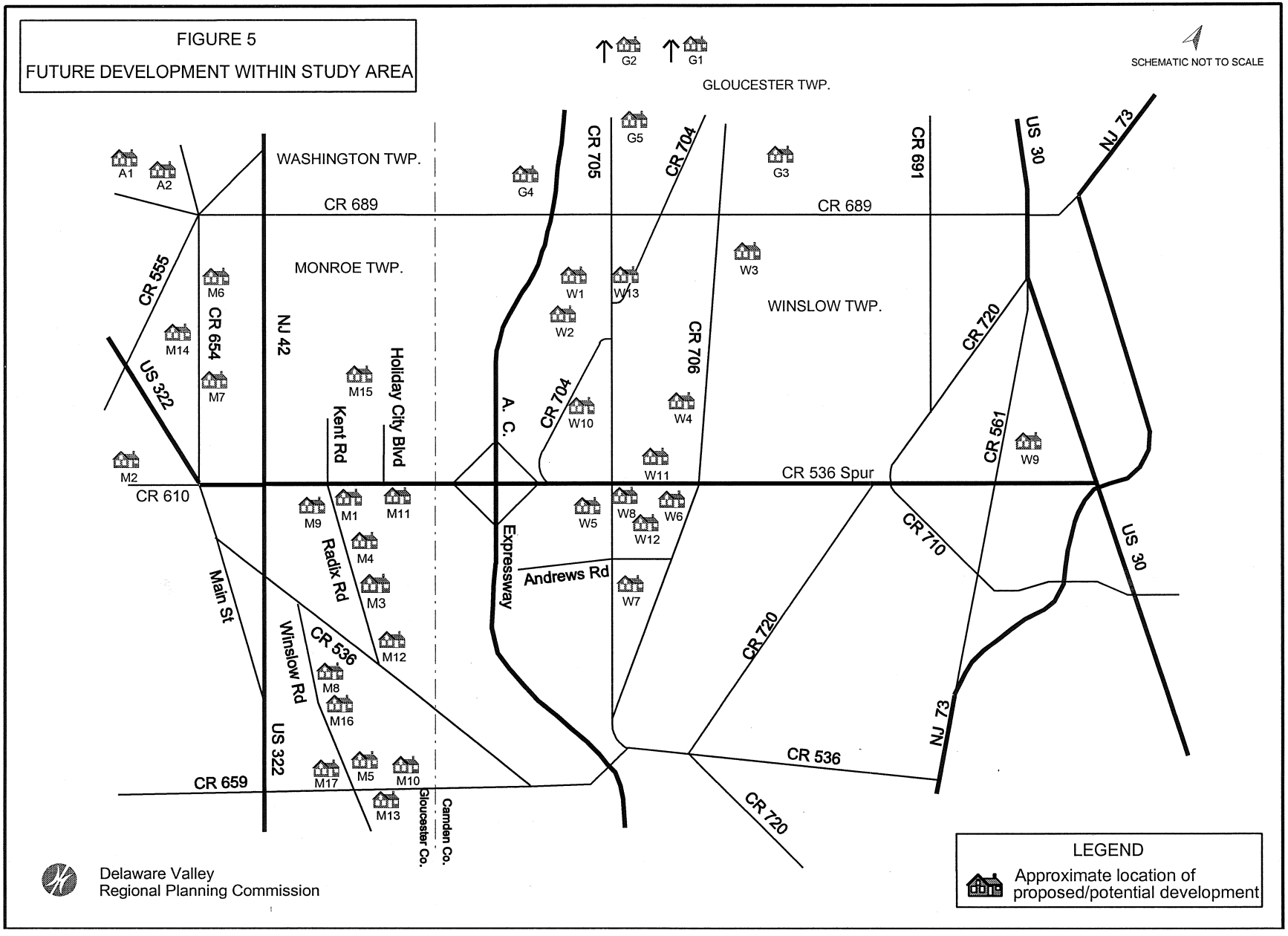
FUTURE TRAFFIC VOLUMES

Estimates of future peak hour traffic volume were prepared to assess traffic conditions within the corridor for the study horizon year of 2020. Two components of new future traffic volume were estimated: background growth applied to through traffic, and study area development oriented traffic.

Background traffic growth occurs as a consequence of ongoing regional development. Based upon projected changes in population and employment between 1990 and the year 2020, for this portion of the region, it is estimated that through travel within the immediate study area will increase at 1.25 percent per year. As a result, existing through peak hour traffic volumes were factored upward by 38 percent to account for the area-wide traffic growth anticipated to occur by the year 2020.

FIGURE 5

FUTURE DEVELOPMENT WITHIN STUDY AREA



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Development expected to take place within the corridor will also generate new travel demand upon the study area highways. Vehicular trip activity associated with that development was formulated by applying trip generation rates and / or formulas (obtained from: Trip Generation, 5th edition, Institute of Transportation Engineers, January 1991) to the future land development scenario described above. Table 5 summarizes the trip generation.

It should be noted that the trips shown in Table 5 are the volume of new trips[1] expected to be added to the surrounding roadways by the year 2020.

As a summary of Table 5, it is estimated that approximately 67,800 total new vehicular trips will be added throughout the study area over the course of a typical weekday. During the a.m. peak hour about 5,300 total trips are anticipated to be drawn to / from the study area. In the p.m. peak hour, when the strongest effects of retail shopping traffic are felt, approximately 6,800 new vehicular trips will be generated within the study area. Over half of the expected trips will be generated from developments within Winslow Township, Camden County.

The directional distribution of development traffic was estimated giving due consideration to: the patterns of existing peak hour traffic volume; the dispersion of employment and population anticipated in twenty to twenty five years, and; traffic data obtained from other traffic studies performed within the general study area. Immediately following is a summary of the directional distribution of development traffic volume used in the analysis.

	to / from the:			
Use	North	East	South	West
Residential	45%	15%	25%	15%
Retail (new)	50%	15%	25%	10%
Office	40%	20%	20%	20%

The routes that development traffic will use depends upon: the location of the development site; the network of roadways serving the site, and; the quantity and quality of the transportation

[1]Only new trips generated to/from retail developments which would impact surrounding public roadway systems are included (passby trips -- which will have their highest impact at proposed driveway locations are assumed to come from the volume of traffic which will be on surrounding roadways by 2020). Trips emanating to/from developments which contain complementary uses have been discounted for the trip internalization effects of multi-use sites.

TABLE 5: NEW TRIPS GENERATED BY FUTURE DEVELOPMENT WITHIN THE WILLIAMSTOWN-NEW FREEDOM ROAD STUDY CORRIDOR

MAP CODE	DEVELOPMENT DESCRIPTION (ITE CODE)	AVERAGE WEEKDAY TOTAL	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
CAMDEN COUNTY								
GLOUCESTER TOWNSHIP								
G1	FREEWAY CORPORATE CENTER: 200,000 square feet (770)	2,870	275	49	324	68	242	310
G2	DUNLEIGH: 73 Single Family (210)	770	16	45	61	53	28	81
G3	SPRING VALLEY: 84 Single Family (210)	880	18	51	69	60	32	92
G4	WOOD HILL: 64 Single Family (210)	680	14	41	55	49	27	76
G5	ANN MULLIN SCHOOL 140,000 sq ft (520)	1,500	230	154	384	22	17	39
Sbttl	**Gloucester Township**	6,700	553	340	893	252	346	598
WINSLOW TOWNSHIP								
W1	OLD ORCHARD: 168 Single Family (210)	1,660	33	93	126	112	60	172
W2	PARK SIDE TOWNHOUSES: 40 Townhouses (230)	300	4	21	25	19	10	29
W3	WILTON'S CORNER:							
	771 Single Family (210)	7,360	150	428	578	506	273	779
	564 Townhouses (230)	3,310	42	206	248	205	105	310
	580 Apartments (221)	3,820	55	218	273	222	114	336
	158,000 sq ft Office[1] (710)	1,980	231	30	261	44	206	250
	[1] Office trips reduced to account for interaction with retail							
	103,000 sq ft Retail (820) {40% passby traffic}	4,320	62	37	99	200	201	401

TABLE 5: NEW TRIPS GENERATED BY FUTURE DEVELOPMENT WITHIN THE WILLIAMSTOWN-NEW FREEDOM ROAD STUDY CORRIDOR

MAP CODE	DEVELOPMENT DESCRIPTION (ITE CODE)	AVERAGE WEEKDAY TOTAL	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
W4	MORELAND FARMS: 281 Townhouses (230)	1,650	21	103	124	102	52	154
W5	COUNTY HOUSE SHOPPING CENTER: 140,000 sq ft (820) {40% passby traffic}	5,230	75	44	119	244	244	488
W6	WOODLANDS: 174 Single Family (210)	1,720	34	96	130	114	64	178
W7	THE MEADOWS: 184 Townhouses (230)	1,090	14	69	83	68	35	103
W8	PROFESSIONAL OFFICE CONDO 100,000 sq ft (710)	1,400	170	21	191	32	154	186
W9	KDS BUILDERS: 85 Single Family (210)	890	18	52	70	60	33	93
W10	K. SCARBOROUGH: 500 Single Family (210)	4,540	85	241	326	300	161	461
W11	WEST JERSEY MEDICAL OUTPATIENT CARE: 18,600 sq ft (720)	500	47	14	61	21	50	71
W12	ALBERTO PROFESSIONAL / OFFICE CONDO: 71,000 sq ft (710)	1,080	130	16	146	24	120	144
W13	BUILDING BLOCKS LEARNING CENTER: 5,400 sq ft (565)	430	34	29	63	34	40	74
Sbttl	**Winslow Township**	41,280	1,205	1,718	2,923	2,307	1,922	4,229

TABLE 5: NEW TRIPS GENERATED BY FUTURE DEVELOPMENT WITHIN THE WILLIAMSTOWN-NEW FREEDOM ROAD STUDY CORRIDOR

MAP CODE	DEVELOPMENT DESCRIPTION (ITE CODE)	AVERAGE WEEKDAY TOTAL	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
GLOUCESTER COUNTY								
MONROE TOWNSHIP								
M1	SABLE ESTATES: 46 Twins (210)	500	11	30	41	35	19	54
M2	RUGBY PLACE: 48 Townhouses (230)	350	5	24	29	23	11	34
M3	TWEED FARM ESTATES: 107 Single Family (210)	1,100	22	64	86	75	40	115
M4	SCHOOLHOUSE GATE: 148 Single Family (210)	1,480	29	84	113	100	54	154
M5	WOODS AT MALAGA: 116 Single Family (210)	1,180	24	68	92	80	43	123
M6	THE CLOISTERS: 90 Townhouses (230)	600	8	39	47	38	19	57
M7	MONROE TWP. INVESTMENT GROUP: 107 Townhouses (230)	690	9	45	54	44	22	66
M8	KIMBERLY EAST: 97 Single Family (210)	1,000	20	59	79	68	37	105
M9	MINK LANE PARTNERS: 58 Twins (210)	630	14	39	53	43	23	66
M10	DUCK LAKE PARTNERS: 271 Single Family (210)	2,590	50	142	192	172	93	265
M11	TANBARK ASSOC: 118 Townhouses (230)	750	10	48	58	47	24	71
M12	NEW BROOKLYN RD PARTNERS: 55 Single Family (210)	600	12	36	48	41	22	63

TABLE 5: NEW TRIPS GENERATED BY FUTURE DEVELOPMENT WITHIN THE WILLIAMSTOWN-NEW FREEDOM ROAD STUDY CORRIDOR

MAP CODE	DEVELOPMENT DESCRIPTION (ITE CODE)	AVERAGE WEEKDAY TOTAL	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
M13	OAKLAND RIDGE:							
	163 Single Family (210)	1,620	32	91	123	109	59	168
	218 Townhouses (230)	1,280	16	80	96	79	41	120
M14	IRV CYZNER:							
	19 Single Family (210)	220	5	14	19	16	8	24
M15	HOLIDAY CITY:							
	420 Elderly Housing (230)	2,460	31	154	185	152	79	231
M16	TAYLOR'S MILL:							
	23 Single Family (210)	270	6	17	23	19	10	29
M17	PNP ASSOCIATES:							
	49 Single Family (210)	540	11	32	43	36	20	56
Sbttl	**Monroe Township**	17,860	315	1,066	1,381	1,177	624	1,801
WASHINGTON TOWNSHIP								
A1	ACKERMAN TRACT:							
	178 Single Family (210)	1,760	35	98	133	118	64	182
A2	WHISPERING OAKS:							
	17 Single Family (210)	200	5	12	17	14	8	22
Sbttl	**Washington Township**	1,960	40	110	150	132	72	204
GRANDTOTAL								
	CR 536 SPUR CORRIDOR	67,800	2,113	3,234	5,347	3,868	2,964	6,832

network serving the study area. It has been assumed for the purposes of this study that vehicular access would take place via the highway(s) immediately surrounding each development site.

The traffic assignment process follows the trip generation and trip distribution steps. As part of that process, peak hour development traffic is "loaded" onto the study highway network guided by the distribution percentages (trip assignment = trip generation * trip distribution). Total future peak hour traffic volumes were then calculated by summing existing peak hour traffic volumes plus peak hour background traffic growth volumes plus development oriented peak hour traffic assignments.

Two future peak hour traffic volume scenarios were prepared and analyzed within this study. The scenarios were identified at the outset of the study, and were chosen to investigate the ramifications of an interchange connecting the Atlantic City Expressway and Cross Keys Road (proposed interchange #41). The first future traffic volume scenario assumes that "present" traffic circulation patterns are maintained along the study area highway network. This serves as a baseline for comparison with existing conditions and the future interchange scenario. The second scenario assumes that a full interchange is constructed between Cross Keys Road and the Atlantic City Expressway

A brief description of the future traffic volume scenarios are presented below.

Future Traffic Volumes - Without Cross Keys Road Interchange:

Traffic volumes developed under the premises of this scenario, assume the present roadway system's circulation pattern will exist in the year 2020, and are shown on Figures 6a and 6b for the a.m. peak hour and Figures 7a and 7b for the p.m. peak hour traffic hour. The following summaries are offered of the illustrated volumes along Williamstown-New Freedom Road.

- East corridor (east of Camden County CR 706) - Future volumes are approximately 60% higher than existing peak hour demands.

- Central corridor (between CR 706 and the Atlantic City Expressway interchange) - Future volumes are approximately 85% higher than existing peak hour volumes.

FIGURE 6a
FUTURE AM PEAK HOUR TRAFFIC VOLUMES

WITHOUT CROSS KEYS ROAD INTERCHANGE

SCHEMATIC NOT TO SCALE

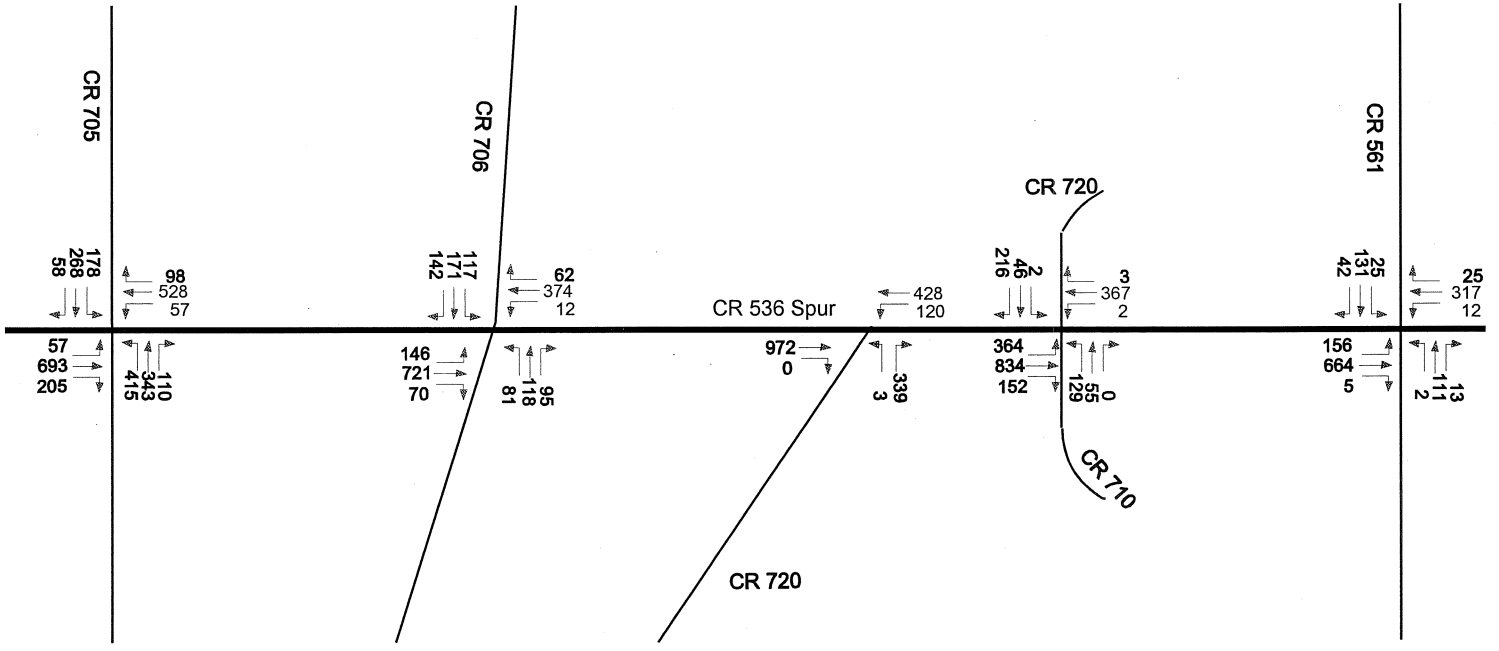

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FIGURE 6b
FUTURE AM PEAK HOUR TRAFFIC VOLUMES

WITHOUT CROSS KEYS ROAD INTERCHANGE

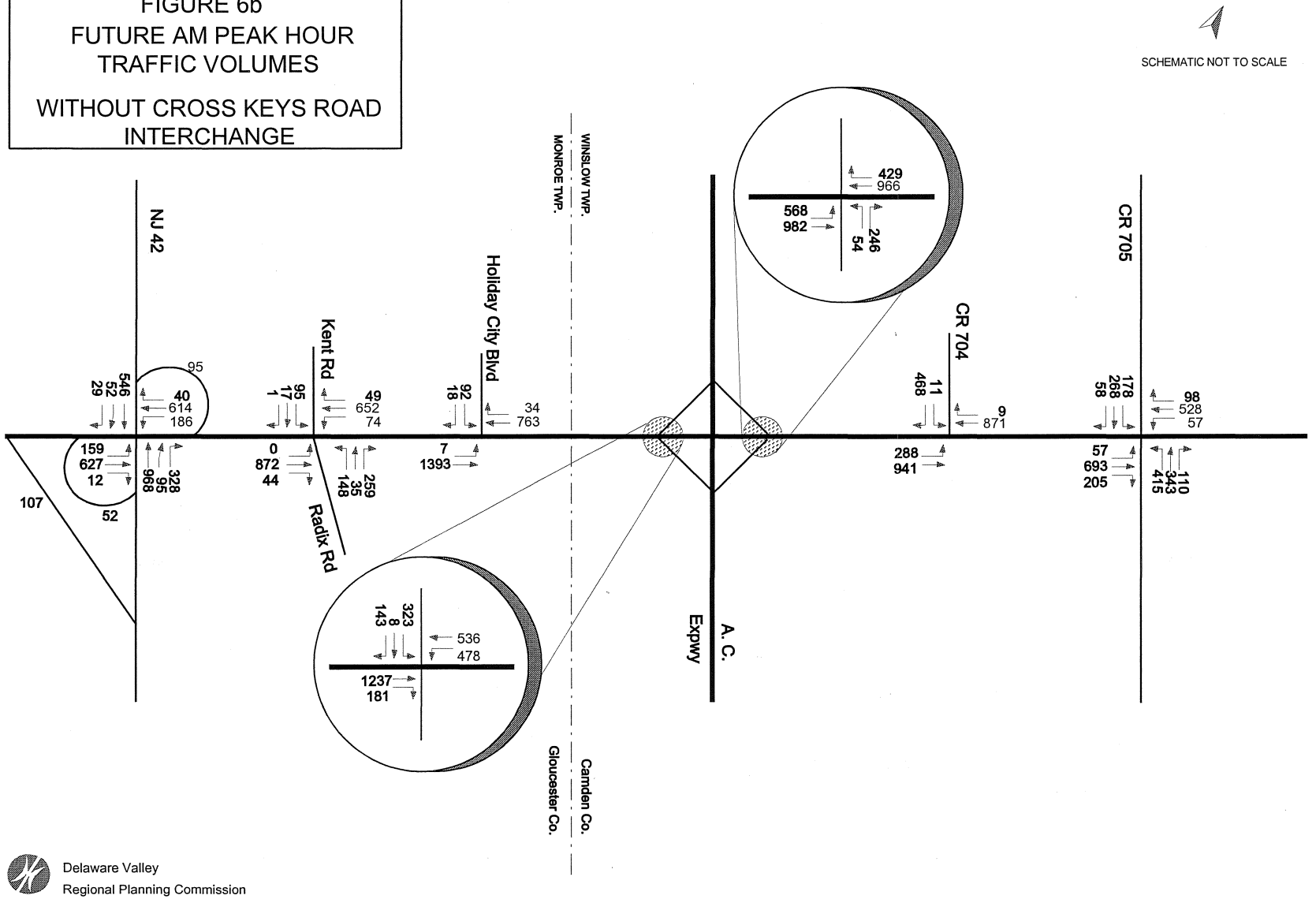

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FIGURE 7a
FUTURE PM PEAK HOUR TRAFFIC VOLUMES

WITHOUT CROSS KEYS ROAD INTERCHANGE

SCHEMATIC NOT TO SCALE

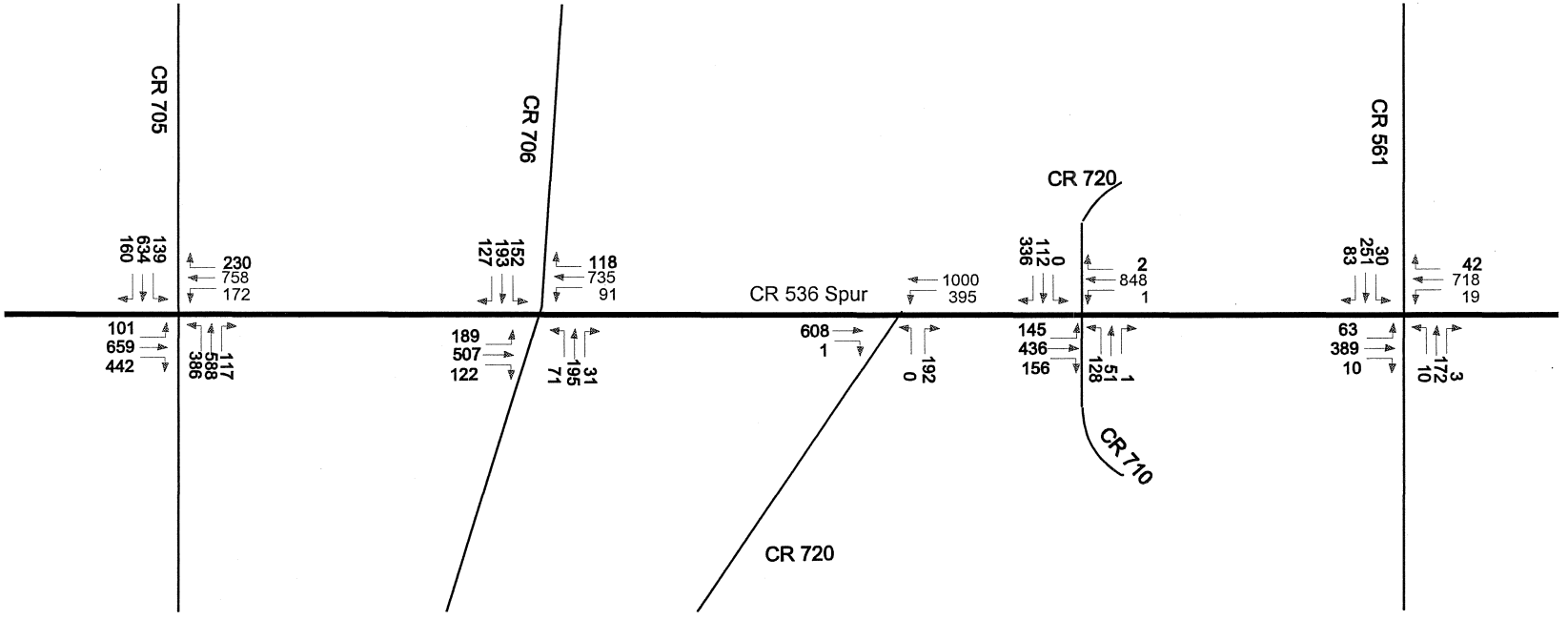

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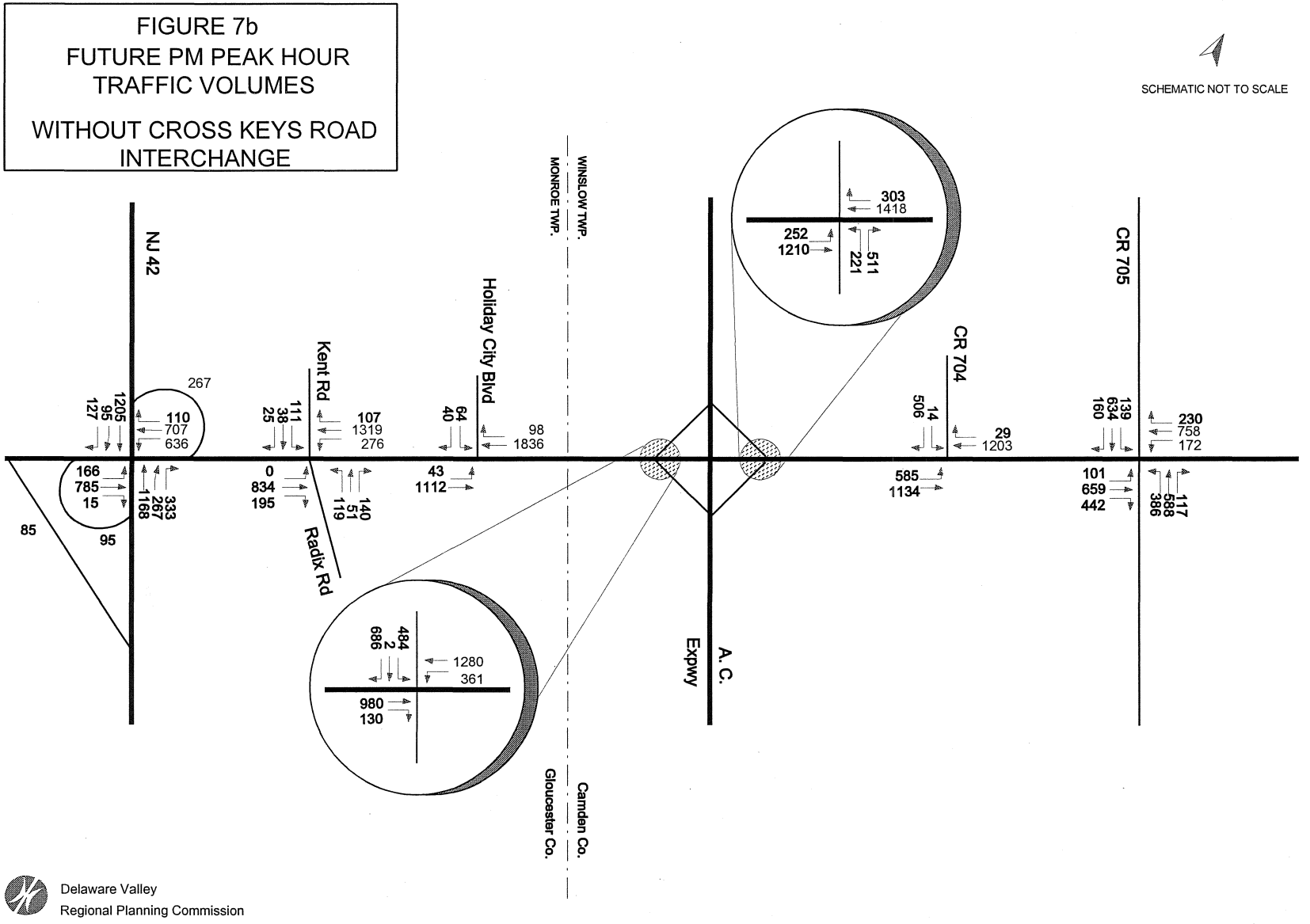
FIGURE 7b
FUTURE PM PEAK HOUR TRAFFIC VOLUMES

WITHOUT CROSS KEYS ROAD INTERCHANGE



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- The Atlantic City Expressway interchange - Total volume on all of the ramps is 150% higher than existing flows (representing an annual increase in traffic equal to about 6%). Volume on the ramps to / from Camden and Philadelphia is projected to increase about 100% (representing a 3.80% annual change)[2]. The ramps oriented to and from Atlantic City will increase about 300% (representing an annual traffic growth rate of 12.2%).

- West corridor (west of the Atlantic City Expressway interchange) - Future volumes are approximately 70% higher than existing peak hour demands.

Future Traffic Volumes - With Full Cross Keys Road Interchange:

The traffic volumes which result from the assumption that a full interchange between Cross Keys Road and the Atlantic City Expressway is provided, are shown on Figures 8a and 8b for the a.m. peak traffic hour and Figures 9a and 9b for the p.m. peak. Estimated diversions away from the Williamstown interchange — to the full interchange at Cross Keys Road — assume travel time savings as a result of more convenient access to the Atlantic City Expressway (to and from the north and to and from the south). The following summaries are offered of the illustrated volumes.

- East corridor (east of Camden County CR 706) - Future volumes are equal to the no-build interchange scenarios' traffic volumes.

- Central corridor (between CR 706 and the Atlantic City Expressway interchange) - Future volumes in the segment are on average 13% less than the volumes shown for the no- build scenario's peak hour volumes.

- The Atlantic City Expressway interchange - Traffic declines of 20% are estimated for the ramps oriented to / from Camden and Philadelphia versus the no-build interchange scenarios. Traffic declines of 30% are estimated for the ramps oriented to / from Atlantic City, versus the no-build scenario. The changes are attributable to traffic diversions to the completed, full interchange at Cross Keys Road.

- West corridor (west of the Atlantic City Expressway interchange) - Future volumes are equal to the no-build interchange scenario's traffic volumes.

[2]By comparison, South Jersey Transportation Authority (SJTA) data indicates annual traffic at the Williamstown toll of the AC Expressway increased about 15% between 1989 and 1994, this is an annual traffic growth rate of 3% per year.

FIGURE 8a
FUTURE AM PEAK HOUR TRAFFIC VOLUMES

WITH FULL CROSS KEYS ROAD INTERCHANGE

SCHEMATIC NOT TO SCALE

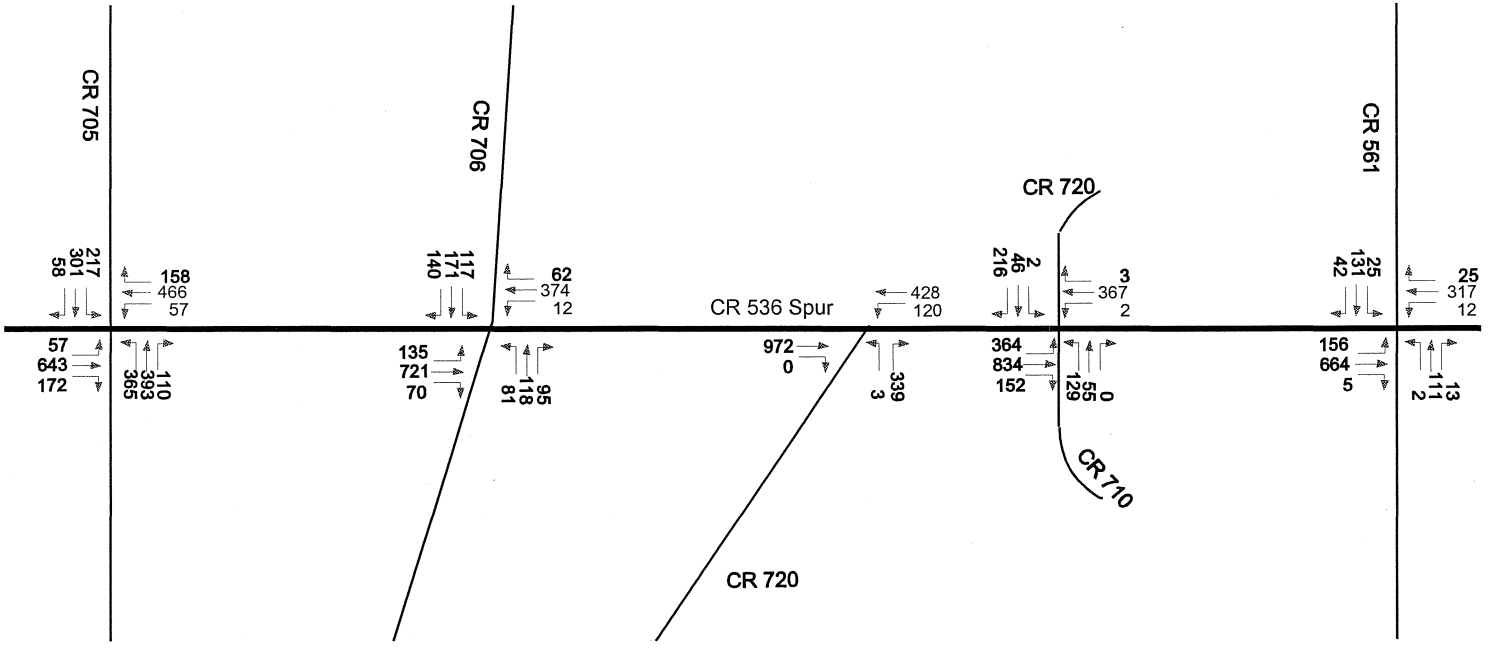

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FIGURE 8b
FUTURE AM PEAK HOUR TRAFFIC VOLUMES
WITH FULL CROSS KEYS ROAD INTERCHANGE

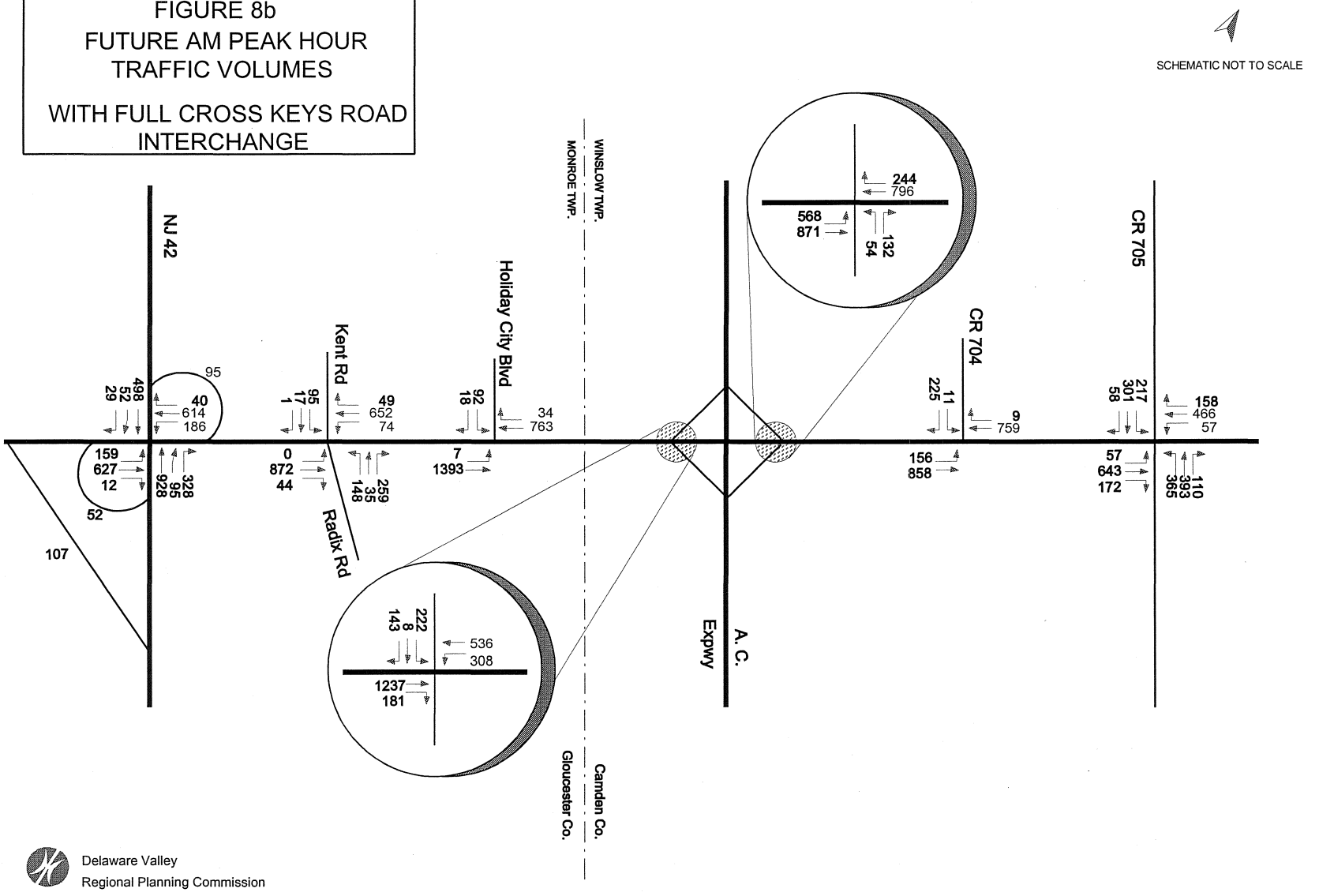

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FIGURE 9a
FUTURE PM PEAK HOUR TRAFFIC VOLUMES

WITH FULL CROSS KEYS ROAD INTERCHANGE

SCHEMATIC NOT TO SCALE

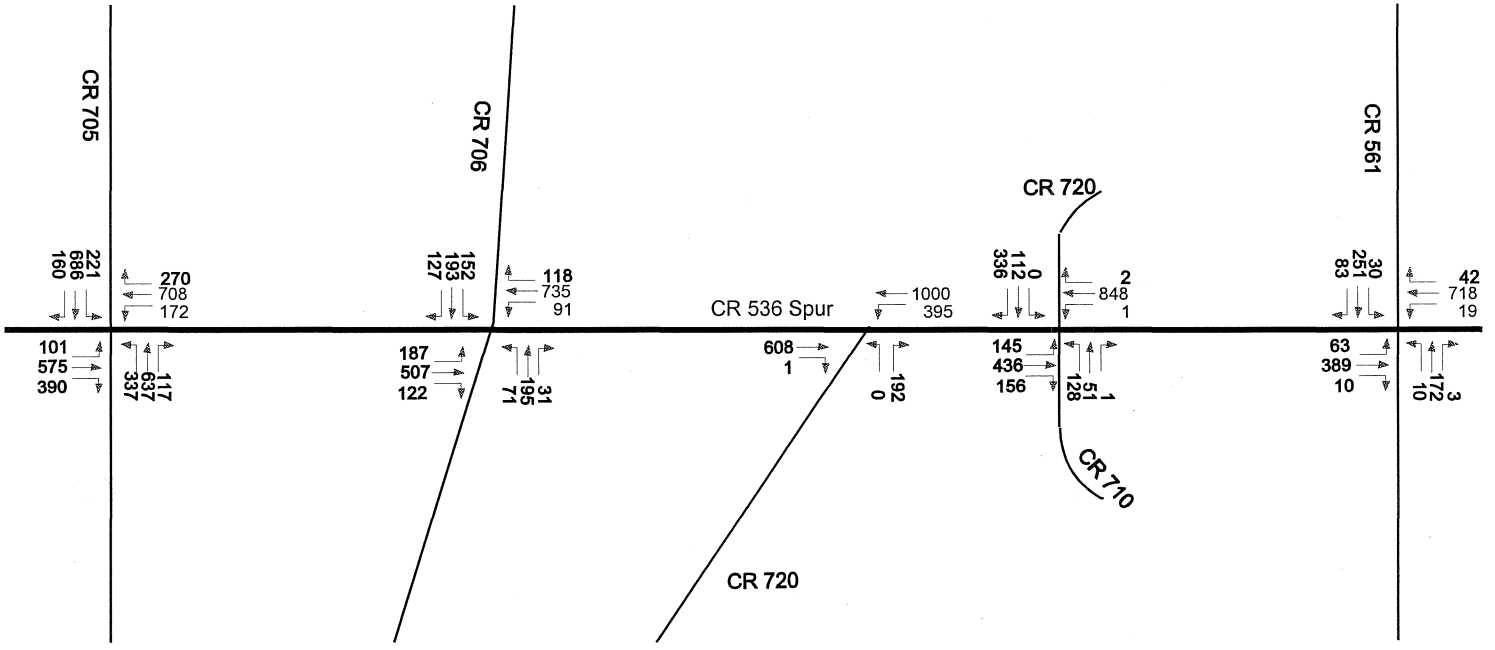

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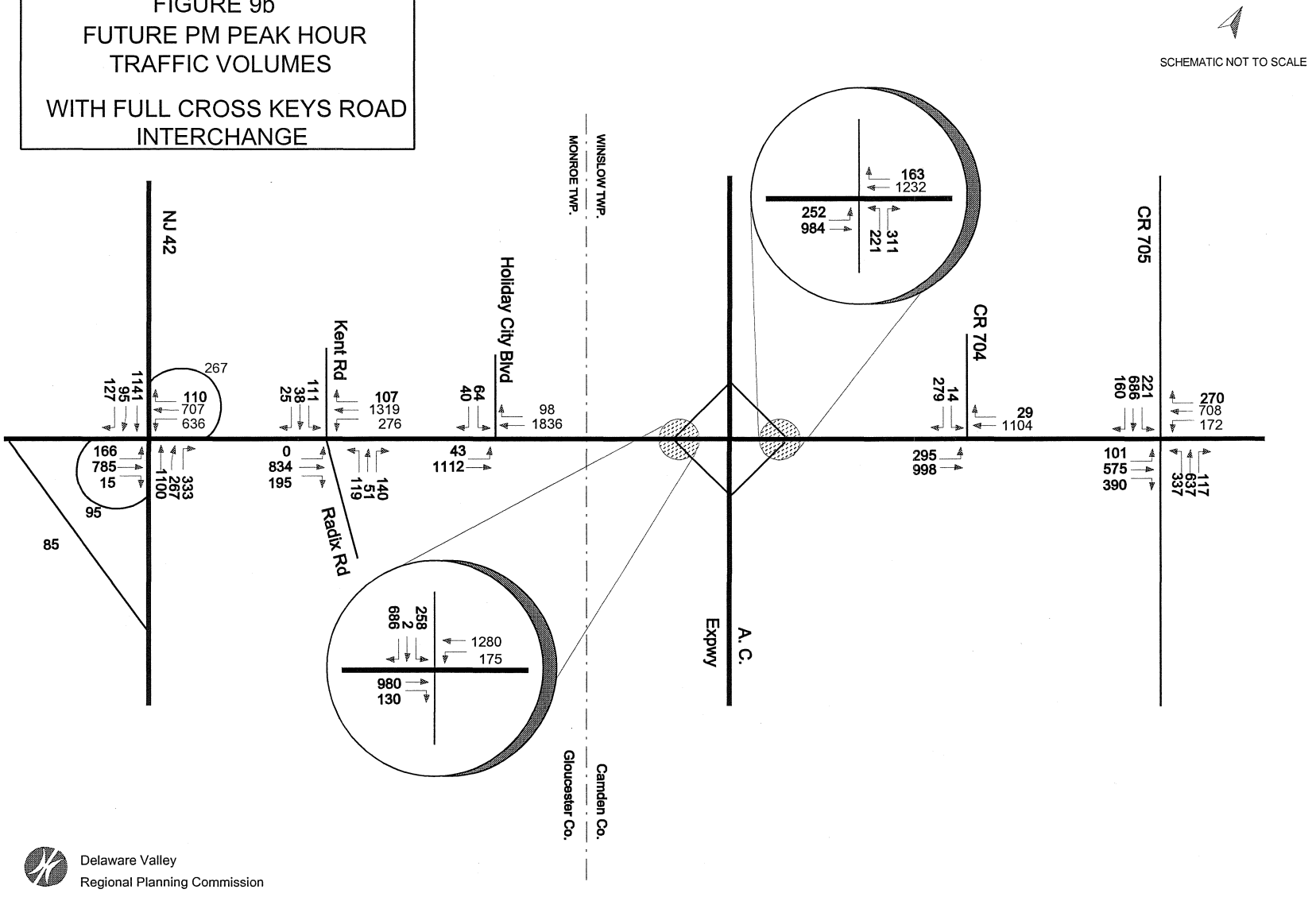
FIGURE 9b
FUTURE PM PEAK HOUR TRAFFIC VOLUMES

WITH FULL CROSS KEYS ROAD INTERCHANGE



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TRAFFIC SIGNAL WARRANT ANALYSIS - HOLIDAY CITY BOULEVARD

Currently, the intersection of CR 536 Spur and Holiday City Blvd. operates as an unsignalized intersection. CR 536 Spur carries one travel lane in each direction. A left turn lane has been added in the eastbound direction and a right turn lane has been added in the westbound direction to assist turning movements from CR 536 Spur. The Holiday City Blvd. approach to the intersection is wide enough to easily permit right turns and left turns to queue up in separate lanes. Holiday City Blvd. provides access to a residential development for adults aged 55 or over. This development of single family units and twins is expected to include 735 homes when completed. At the writing of this report, 233 units still remained to be built. The other entrance road to this development leads directly to NJ 42 and provides access for through traffic traveling within the development between CR 536 Spur and NJ 42. This provides a defacto bypass route for traffic wishing to avoid the traffic conditions in the western end of the corridor.

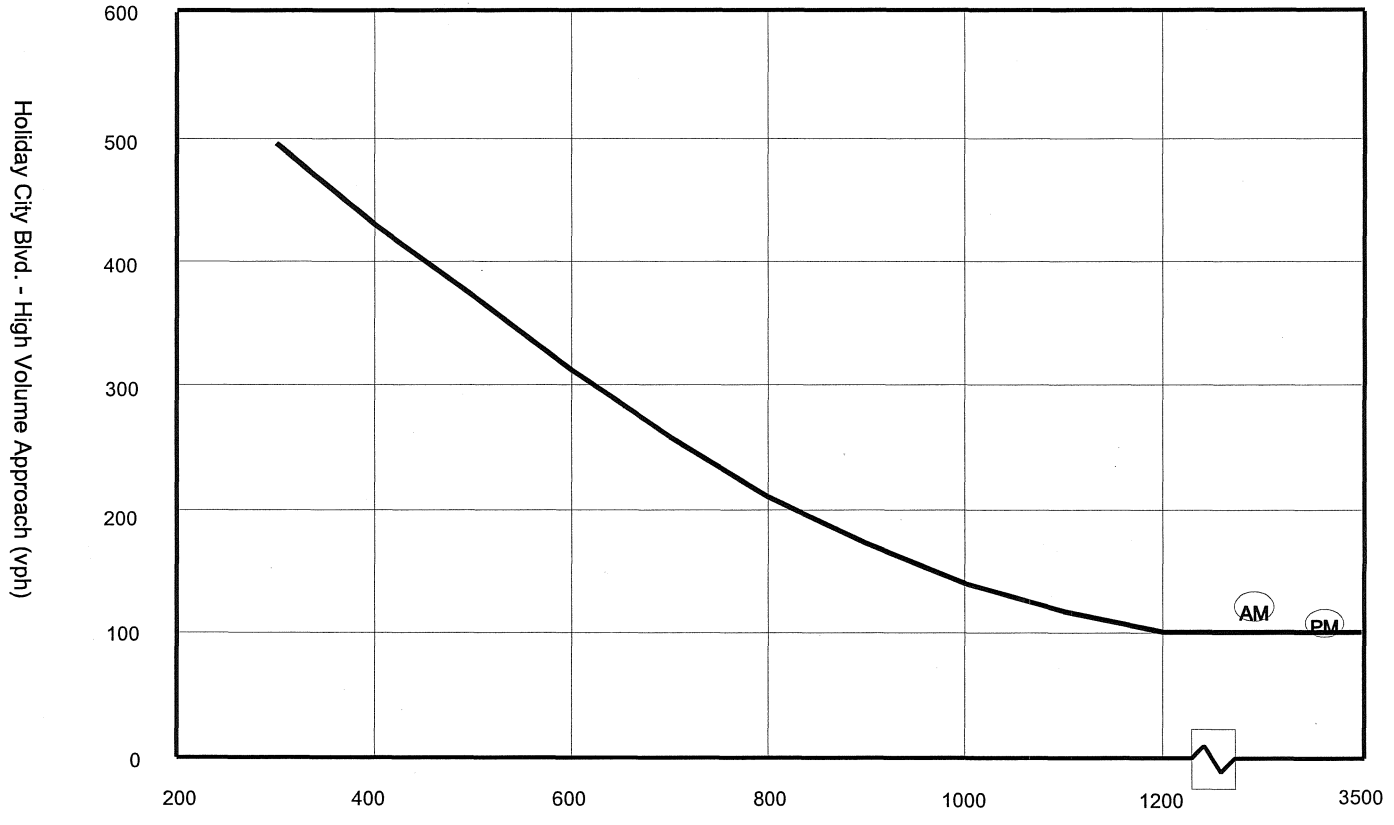
According to New Jersey statues, when evaluating locations for the installation of traffic signals, the Manual on Uniform Traffic Control Devices (MUTCD) must be used. This manual sets forth a series of eleven warrants based on traffic / pedestrian levels, accident histories or combinations thereof that must be met before an intersection is legally eligible for signal installation.

Within the conduct of this study only Warrant 11, the Peak Hour Volume Warrant, was evaluated at the unsignalized intersection of Holiday City Blvd. and CR 536 Spur. The peak hour volume warrant is intended for application when traffic conditions are such that for one hour of the day minor street traffic may suffer undo delay in entering or crossing the major street. This warrant is satisfied when, for any hour of an average day, the plotted points representing the vehicles per hour on both approaches of the major street and the corresponding vehicles per hour on the higher volume minor street approach all fall above the curve in Figure 10. The curve on the graph represents minimum vehicular volumes that must be met or exceeded for an intersection with two lane approaches.

As can be seen, the future volumes in both the a.m. peak (110 on Holiday City Blvd. and 2,197 on CR 536 Spur) and p.m. peak (104 on Holiday City Blvd. and 3,089 on CR 536 Spur) hours are expected to exceed the minimum requirements for this warrant, indicative that a traffic signal will be justified for installation at the location.

FIGURE 10
TRAFFIC SIGNAL WARRANT ANALYSIS
CR 536 Spur and Holiday City Boulevard
(Assumes: Future Traffic Volumes)

LEGEND:
—— 2 or More Lanes & 2 or More Lanes
(AM) AM Peak Hour Traffic Volume
(PM) PM Peak Hour Traffic Volume



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FUTURE LEVEL OF SERVICE ANALYSIS

Level of service analyses were performed for the study intersections for both future traffic volume scenarios (with and without Cross Keys Road Interchange). This effort resulted in the identification of traffic improvements required to accommodate future peak hour traffic demands. Both scenarios assumed the installation of a traffic signal at Holiday City Blvd. The complete set of traffic improvements necessary to accommodate future traffic demands along CR 536 Spur are summarized in Table 6. The results of the LOS analysis for the future conditions without a Cross Keys Road interchange are illustrated on Figures 11a and 11b and the future conditions with a Cross Keys Road interchange are illustrated on Figures 12a and 12b. Correspondence with the South Jersey Transportation Authority indicated that it was their intention to have a full interchange in operation at Cross Keys Road by our future design year. Therefore, throughout the remainder of this report, all discussion and improvement recommendations will assume a full Cross Keys Road interchange in the future scenario. An intersection-by-intersection summary of the findings of the level of service analysis (with a Cross Keys Road interchange) follows:

Taunton Road (approach roadway to NJ 73) and Tansboro-Cedarbrook-Blue Anchor Road (CR 561) - the CR 536 Spur approaches operate with desirable or better levels of service during both peak hours. Southbound CR 561 experiences LOS E in the p.m. peak. Overall intersection performance is level C in the morning and D in the evening.

Berlin-New Freedom Road (CR 720) / Factory-Hayes Mill Road (CR 710) - All approaches operate with good levels of service during both peak hours except the northbound CR 710 left turns. Overall intersection operations are level B during the a.m. peak and level C in the p.m. peak.

New Freedom Road (CR 720) - lengthy delays are encountered on the northbound CR 720 approach during both peak hours. Traffic movements along CR 536 Spur operate at acceptable levels.

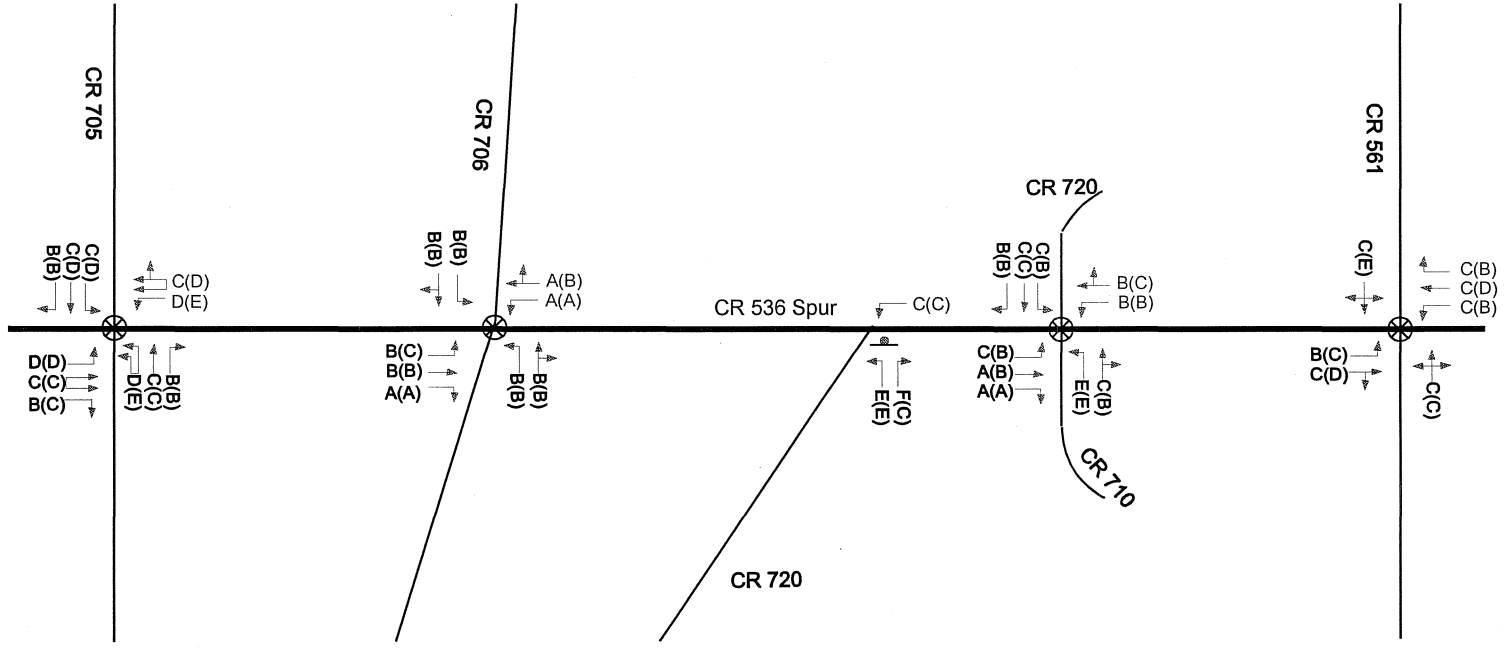
Blenheim-Erial-New Brooklyn Road (CR 706) - All approaches to the intersection operate with good levels of service during both peak traffic hours. Overall intersection performance is level B in the morning and in the evening.

Sicklerville Road (CR 705) - All approaches to the intersection operate reasonably well during the morning peak except for the southbound left turn lane which experiences moderate delays. During

FIGURE 11a
FUTURE PEAK HOUR LEVEL OF SERVICE

WITHOUT CROSS KEYS ROAD INTERCHANGE

SCHEMATIC NOT TO SCALE



LEGEND

A(A) AM(PM) PEAK HOUR LEVEL OF SERVICE

TRAFFIC SIGNAL

STOP SIGN OR YIELD SIGN

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FIGURE 11b
FUTURE PEAK HOUR LEVEL OF SERVICE

WITHOUT CROSS KEYS ROAD INTERCHANGE

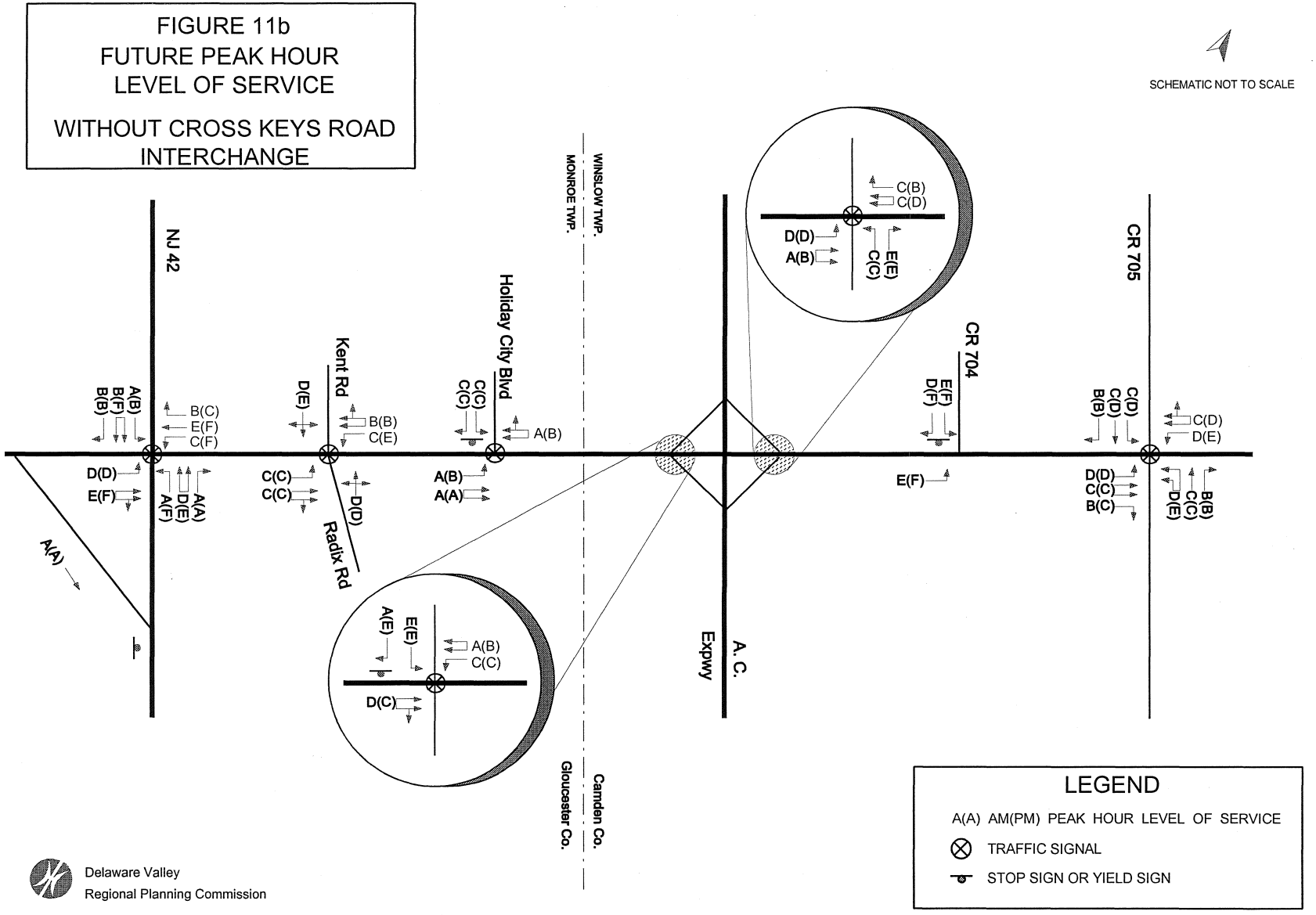
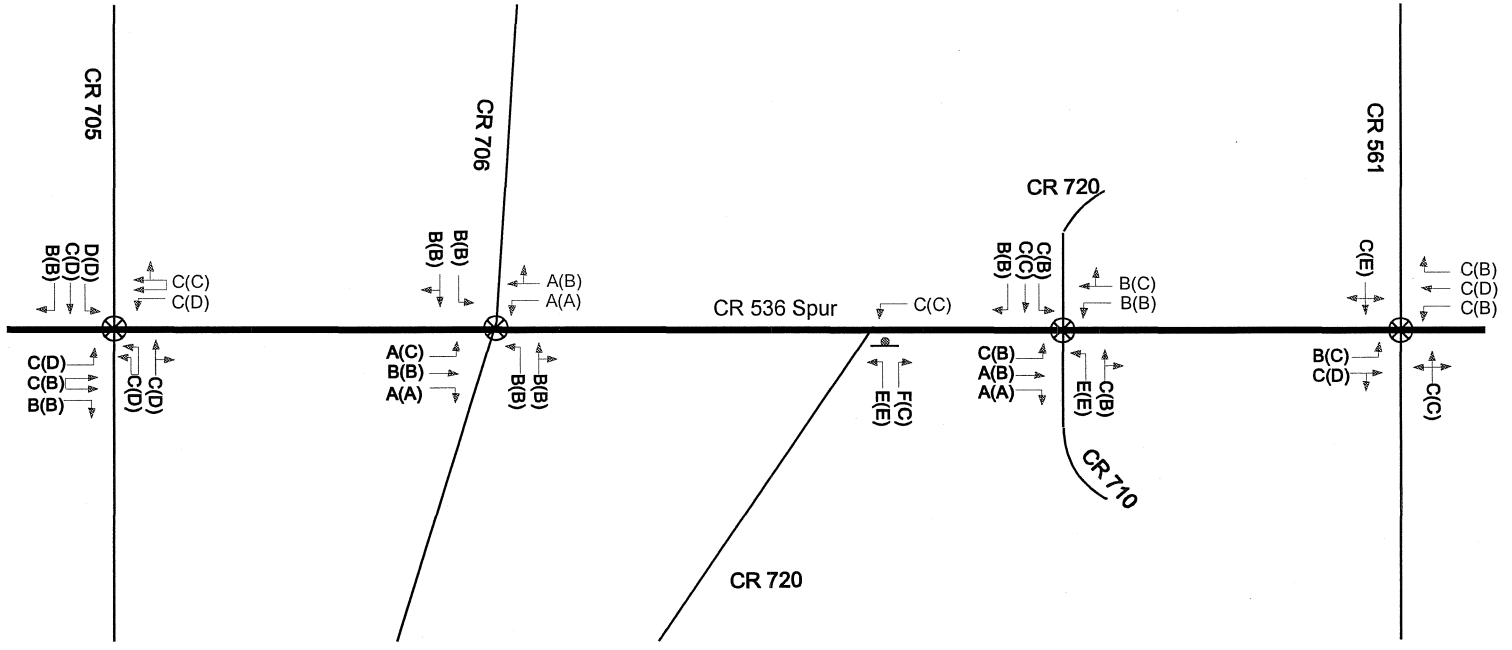


FIGURE 12a
FUTURE PEAK HOUR LEVEL OF SERVICE

WITH FULL CROSS KEYS ROAD INTERCHANGE

SCHEMATIC NOT TO SCALE



LEGEND

A(A) AM(PM) PEAK HOUR LEVEL OF SERVICE

TRAFFIC SIGNAL

STOP SIGN OR YIELD SIGN

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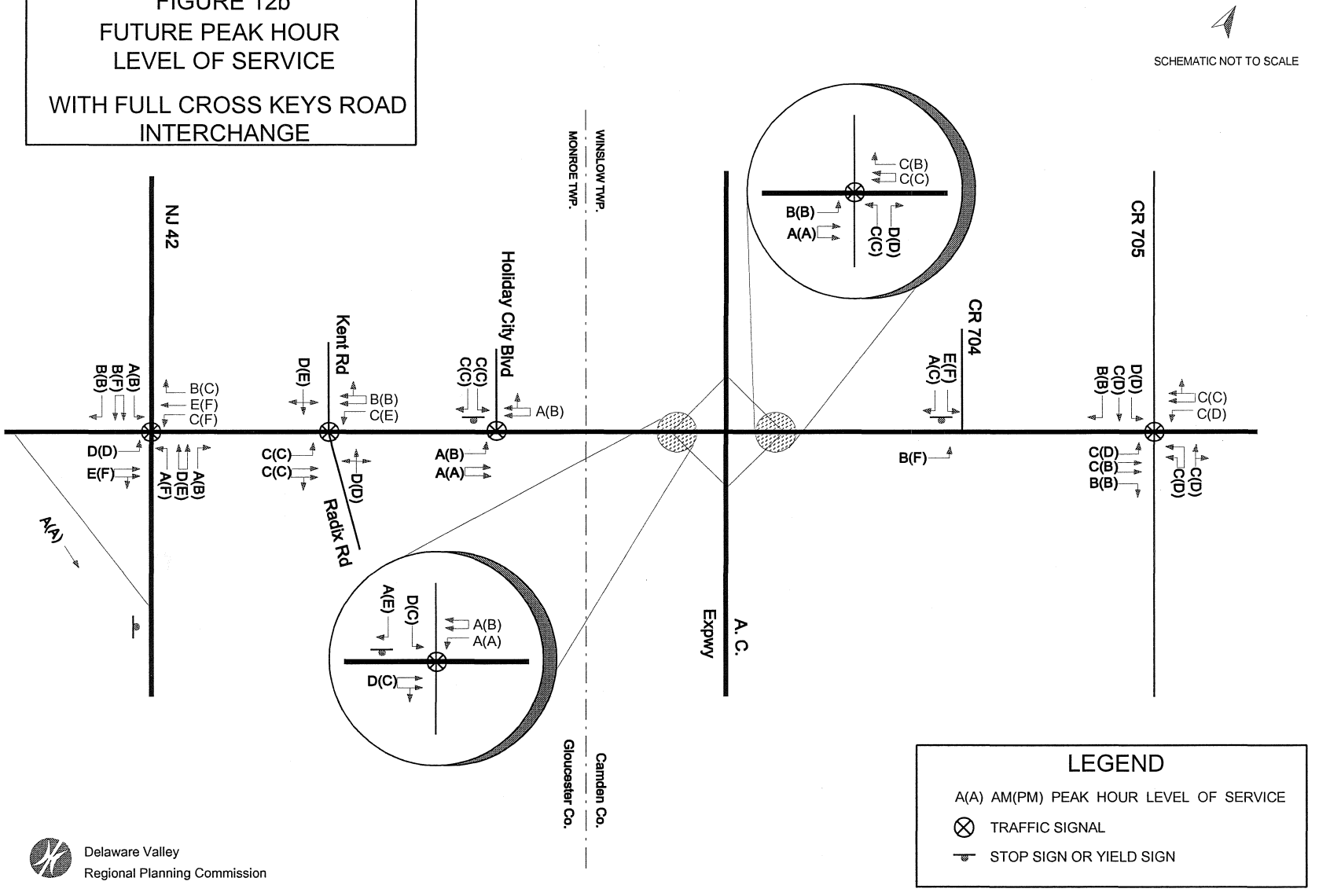
FIGURE 12b
FUTURE PEAK HOUR LEVEL OF SERVICE

WITH FULL CROSS KEYS ROAD INTERCHANGE



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the evening rush hour, all approaches operate at acceptable or better levels. Overall intersection operations are level C in both the morning and evening peak hours.

Erial-Williamstown Road (CR 704) - Left turns from the CR 704 southbound stop sign controlled approach have considerable difficulty during both peak hours. However, the higher volume right turning movement on the same approach experiences little delays. Left turn operations from CR 536 Spur fail in the p.m. peak. Based on the expected future traffic volumes alone, this location meets warrants for the installation of a traffic signal, however the proximity (200 feet) of the adjacent signalized intersection for the westbound AC Expressway ramps prohibits the effective use of a traffic signal at this location.

Atlantic City Expressway Westbound Off and On Ramps - the CR 536 Spur traffic movements operate at good conditions during both peak hours. The right turn lane on the westbound off ramp is expected to experience moderate delays. Overall intersection performance is level B during both the a.m. and p.m. peaks.

Atlantic City Expressway Eastbound Off and On Ramps - Considerable delays are encountered by right turns exiting the expressway ramp during the evening rush. Moderate delays are encountered by left turns exiting the expressway ramp during the morning rush. All remaining movements operate at acceptable levels of service or better in both peak periods. Overall operating conditions at this intersection are LOS C during the a.m. and LOS B during the p.m. peak hours.

Holiday City Boulevard - All approaches operate with good levels of service during both peak hours. Overall intersection operations are level A during the a.m. peak and level B in the p.m. peak.

Kent Road and Radix Road - During the a.m. peak hour, the CR 536 Spur approaches operate at good levels of service. The Kent Road/Radix Road approaches operate with acceptable levels of service. In the p.m., moderate delays are expected on the westbound CR 536 Spur left turn lane and the Kent Road approach. Overall intersection operations are computed at level C in the a.m. and at level C in the p.m. peak hour.

Black Horse Pike (NJ 42 / US 322) - Traffic operations along the Black Horse Pike approaches are acceptable during the a.m. peak travel hour. Significant delays are expected to occur on the Black Horse Pike in the p.m. peak period. Long delays are encountered for most movements

along the westbound (CR 536 Spur) and eastbound (US 322) approaches during the peak hours. Overall intersection performance is level D in the morning peak hour and level F in the evening peak.

In summary of the level of service analyses of future peak traffic volumes, it is concluded that — while long delays may be encountered on selected intersection approaches during the morning or evening peak traffic hours — the assumed traffic improvements are expected to produce stable and predictable traffic conditions for the set of study intersections along the Williamstown-New Freedom Road (CR 536 Spur) study corridor.

The resultant traffic improvements suggested to achieve minimum preferred operating conditions for the future scenario are described on Table 6. A summary of the expected overall intersection levels of service for each of the study intersections are summarized on Table 7.

TABLE 6: ASSUMED TRAFFIC IMPROVEMENTS - FUTURE TRAFFIC VOLUMES

INTERSECTION WITH
WILLIAMSTOWN-NEW FREEDOM ROAD (CR 536 SPUR):

1) Taunton Road (approach roadway to NJ 73) and Tansboro-Cedarbrook-Blue Anchor Road (CR 561) -
   a) Revised cycle length and timing.

2) Berlin-New Freedom Road (CR 720) / Factory-Hayes Mill Road (CR 710) -
   a) Revised cycle length and timing.

3) New Freedom Road (CR 720) -
   a) Realign and provide widened northbound CR 720 approach, restripe for separate left and right turn lanes.

4) Blenheim-Erial-New Brooklyn Road (CR 706) -
   a) Three lane cross section on CR 536 Spur with the eastbound right turn lane maintained.
   b) Three lane cross section on CR 706.

5) Sicklerville Road (CR 705) -
   a) Five lane cross section on CR 536 Spur and auxiliary turning lanes on CR 705

6) Erial-Williamstown Road (CR 704) -
   a) None.

7) Atlantic City Expressway Westbound Off and On Ramps -
   a) Five lane cross section on CR 536 Spur.

8) Atlantic City Expressway Eastbound Off and On Ramps -
   a) Five lane cross section on CR 536 Spur.

9) Holiday City Boulevard -
   a) Five lane cross section on CR 536 Spur.
   b) Install traffic signal

10) Kent Road and Radix Road -
   a) Five lane cross section on CR 536 Spur.

11) Black Horse Pike (NJ 42 / US 322) -
   a) Five lane cross section on CR 536 Spur.
   b) Provide center left turn lanes on the Black Horse Pike (i.e., eliminate jughandles).

TABLE 7: SUMMARY OF STUDY INTERSECTION LEVEL OF SERVICE ANALYSIS - FUTURE TRAFFIC VOLUMES (WITH FULL INTERCHANGE AT Cross Keys Rd)

Intersection with Williamstown-New Freedom Road CR 536 Spur:	Level of Service	
	AM	**PM**
1) CR 561	C	D
2) CR 720 / CR 710	B	C
3) CR 720	E&F (side street stop conditions)	E&C
4) CR 706	B	B
5) CR 705	C	C
6) CR 704	E&A (side street stop conditions)	F&C
7) AC Exp. Wb Off / On Ramps	B	B
8) AC Exp. Eb Off / On Ramps	C	B
9) Holiday City Boulevard	A	B
10) Kent Road and Radix Road	C	C
11) NJ 42 / US 322	D	F

5 CONCLUSIONS

The increasing traffic demand along this corridor, which is due both to the general background growth in traffic and the concentration of expected development, requires that improvements be made to the existing highway network. The level of service analyses performed as part of this report indicate that CR 536 Spur will require two travel lanes in each direction between NJ 42 and CR 706 as well as turning lanes at the study intersections to adequately serve demand for travel in this area (these improvements have been previously outlined in Table 6). Other significant highway improvements in this area which will have an impact on the operations of this corridor include: the construction of a full interchange along the Atlantic City Expressway at Cross Keys Road (CR 689) and the improvements to Sicklerville Road (CR 705) identified in the Sicklerville Road Traffic Study (DVRPC, 1996). These improvements taken in total will greatly enhance the mobility of this growth area of Camden and Gloucester Counties.

IMPROVEMENT STAGING

The improvements identified in this study can be phased-in over time to meet the demand as this area continues to grow. Although some improvements may not be called for immediately, the appropriate local and county officials should keep them in mind as they make land use decisions in this corridor. A staging schedule is presented below which assumes a straight line growth in vehicular traffic throughout the corridor. The staging is assumed to coincide with the start of this study which began in 1996.

Within Two Years

1. Replace the jughandles at NJ 42 with center left turn lanes.
2. Retime the traffic signal at Kent Road/Radix Road.
3. Install a traffic signal at Holiday City Blvd.

Within Eight Years

1. Widen CR 536 Spur to two through lanes in each direction from NJ 42 to CR 704.
2. Add a southbound left turn lane on CR 705 and realign both approaches on CR 705.

Within Fifteen Years

1. Widen CR 536 Spur to two through lanes in each direction from CR 704 to CR 706.
2. realign the northbound CR 720 approach and restripe it for separate left turn and right turn lanes.