NJ TRANSIT

SOUTH JERSEY TRANSIT PLAN

Travel Demand and Transit Potential

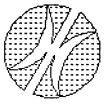
May 1989

Prepared By

DELAWARE VALLEY REGIONAL PLANNING COMMISSION
Bourse Building, Philadelphia, Pennsylvania

This report, prepared by the Transportation Planning Division of the Delaware Valley Regional Planning Commission, was financed by the NJ TRANSIT Corporation. The authors, however, are solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agency.

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, Strategic Planning, and Finance and Administration. DVRPC's mission for the 1980's 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: May 1989
NJ TRANSIT SOUTH JERSEY PLAN Travel Demand and Transit Potential	Publication No. 89010

Geographic Area Covered:

The nine counties of South Jersey, including Burlington, Camden, Gloucester and Mercer from within the DVRPC region and Atlantic, Cape May, Cumberland, Ocean and Salem from the area outside the DVRPC region.

Key Words:

Transit, planning, travel demand, population and employment projections, ridership estimation, trip generation and distribution, NJ TRANSIT, South Jersey

ABSTRACT

This report summarizes the work performed by DVRPC as part of NJ TRANSIT's study of South Jersey to estimate the potential transit market in 1995. The report is divided into chapters which pertain to the major tasks performed by DVRPC. These tasks involve: the estimation of the level of growth that reasonably can be expected to occur between now and 1995 in the various analysis areas of South Jersey; the estimation of the number and distribution of work trips between each analysis area; and, the estimation of the ridership potential of certain services in high travel demand corridors.

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I. INTRODUCTION

In June 1987, New Jersey Governor Thomas Kean formally endorsed NJ TRANSIT's commitment to a comprehensive study of transit needs in southern New Jersey. As part of the South Jersey Transit Study, NJ TRANSIT contracted DVRPC to provide technical planning data on population, employment, and travel patterns in the study area for 1995. This transit plan will cover all of the nine counties of southern New Jersey, as designated in Figure 1.

NJ TRANSIT's overall study has two major goals:

- Identify the potential areas for expanded transit service in South Jersey
- Identify innovative services that NJ TRANSIT could adopt to meet the area's travel needs.

In pursuit of these general goals, the study recognized a number of more specific objectives:

- Maximize the attractiveness of the Atlantic City Rail Line for commuters and
- Discover ways to serve commuters who travel to new suburban work sites from older urban areas. The objective is to attract a significant share of these travel markets to transit while at the same time relieving suburban congestion in those corridors that have had high rates of growth.
- Examine NJ TRANSIT bus routes to find the best configuration of routes to serve riders' needs in South Jersey.
- Identify railroad rights-of-way that could be used by future transit services or other public purposes.

Work began in August 1987 at a grassroots level when NJ TRANSIT staff began a series of interviews with numerous transit and planning professionals in southern New Jersey and the region's elected officials. An Advisory Committee was formed providing a forum for issues to be debated and mutual interests to be discussed. DVRPC, in its role as transportation planning coordinator for much of the study area, participated as an active member of the committee.

DVRPC's specific technical role in the South Jersey Transit Study was to compile a database of population and employment information for all areas covered by the study. Estimates of travel demand by commuters in 1995, identification of potential transit corridors, and an assessment of the feasibility of new transit services were also included in DVRPC's tasks.

Other tasks in the South Jersey Transit Study performed by NJ TRANSIT and its consultants included a market research effort to determine casino employee preferences and attitudes toward the Atlantic City Rail Line and operational analyses of options for connecting that line to rail service in North Jersey.

This report summarizes the work of DVRPC to estimate the potential transit market in 1995 for proposed NJ TRANSIT services. The report is divided into chapters which pertain to the major tasks performed by DVRPC. These tasks involve: the estimation of the level of growth that reasonably can be expected to occur between now and 1995 in the various analysis areas of South Jersey; the estimation of the number and distribution of work trips between each analysis area; and, the estimation of the ridership potential of certain services in high travel demand corridors.

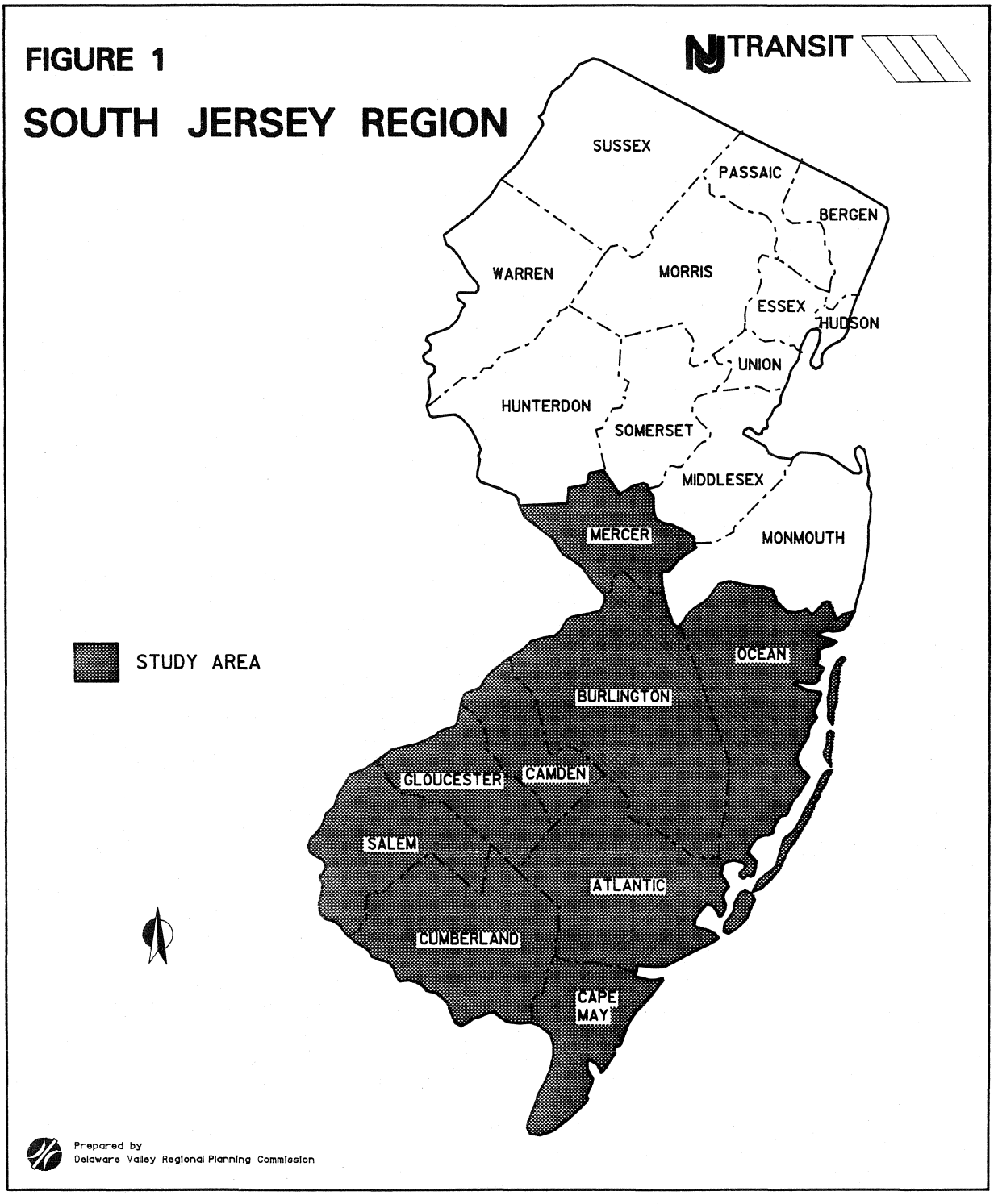


FIGURE 1
SOUTH JERSEY REGION
NJTRANSIT
SUSSEX
PASSAIC
BERGEN
WARREN
MORRIS
ESSEX
HUDSON
UNION
HUNTERDON
SOMERSET
MIDDLESEX
MERCER
MONMOUTH
OCEAN
BURLINGTON
GLOUCESTER
CAMDEN
SALEM
ATLANTIC
CUMBERLAND
CAPE MAY
STUDY AREA
Prepared by
Delaware Valley Regional Planning Commission

II. ESTIMATION OF 1995 DEMOGRAPHIC AND EMPLOYMENT DATA

The first step in the estimation of travel demand is to determine the number of people who desire to make a trip and the number of possible destinations to which they could travel. For modelling the potential demand for commuter travel by transit, it is best to estimate the number of employed persons within the resident population and the number of jobs available in each of the study areas.

Analysis Area System

DVRPC determined that for a study with such a broad geographic scope, the smallest study unit, referred to as an analysis zone, would be the minor civil division (MCD) or aggregations of very small MCD's. The nine counties of South Jersey are divided into 213 separate MCD's. These range in size from over 100 square miles to under 1/4 square mile in size. In keeping with the purposes of this study, some of the smaller MCD's have been combined with their larger neighbors to form a single analysis area zone. A total of 127 internal study area zones were created. To permit analysis of travel to and from those places outside of the South Jersey study area, an additional 19 external zones were created.

Population and Employment Projections

To arrive at the most reasonable and generally acceptable estimates of employed residents and employment (jobs) at the MCD level, DVRPC invited the county planning departments of the study area to review the most recent population and employment projections and "sign off" on their use for this study.

For the counties within the DVRPC region, the most recent projections were the decennial estimates approved by the DVRPC Board in July 1988. For Salem, Cumberland, Cape May and Atlantic counties, the most recent projections were those made in the NJ DOT "South Jersey Highway Improvement Study". Since Ocean County was not a participant in the NJDOT study nor does it have a formal MPO process for developing long range projections, the county planning department staff was asked to develop 1995 estimates specifically for this study.

For the MCD's in the DVRPC counties, the 1995 population and employment values were derived by a straight line interpolation between the Board approved 1990 and 2000 estimates. For the counties covered by the NJ DOT study, adjustments were made by the counties to the allocation of population and employment growth among the MCD's within a county based on more recent development data. For all MCD's, 1995 Employed Residents were estimated by applying the 1980 ratio of employed residents per capita (factored to account for increased labor participation rates) to the 1995 estimate of population.

Figure 2 shows the 1980 and 1995 Population, Employed Residents and Employment Estimates for each county in the study area. The table also shows the percentage growth for comparison purposes.

Overall, the South Jersey area is expected to experience in excess of 20% growth in population between 1980 and 1995, with a slightly higher growth in employed residents. The rate of growth will be more than twice as rapid in the non-DVRPC portion of South Jersey as in the already more densely developed DVRPC urban core. In terms of absolute growth, nearly half a million new residents are expected to populate the South Jersey area by 1995. Sixty percent of that growth will occur in the coastal counties of South Jersey.

Employment is expected to grow nearly twice as fast as population as South Jersey becomes more of a workplace in its own right, rather than bedroom communities for Philadelphia and North Jersey/New York. However, the addition of one third of a million new jobs in South Jersey is not projected to follow the same pattern as the population growth. Nearly sixty percent of the job growth will occur in the DVRPC portion of South Jersey.

Figures 3, 4 and 5 graphically portray the expected growth by county and sub-region for each of the three basic data elements: population, employed residents and employment. Moderate increases in population

are projected for each county except Ocean (Figure 3), where pressure from the north is expected to continue to intense development of its northern tier and coastal communities. Five of the nine counties are projected to experience sizable jumps in employment, with Atlantic County taking the largest gains followed by Camden, Burlington, Ocean and Mercer.

A comparison was made between the county planning department and unpublished employment projections made by the NJ Department of Labor (DOL). Because of definitional differences, the method of analysis chosen compared the rates of growth implied by each set of projections.

Figure 6 shows the growth rates for each county and sub-region. As can be seen in the graph, the DOL growth rate for the whole DVRPC sub-region is about 7 percentage points higher than the DVRPC estimate while the DOL rate for the non-DVRPC area is about 7 points lower than the DVRPC projected growth rate. These rates are not too significantly different. However, at the county level there are some rather striking differences. DOL projects much higher rates of employment growth for Burlington, Mercer and Salem counties and much lower rates of growth for Gloucester, Atlantic, Cape May and Ocean counties. But even these projections by DOL are problematic in that there is an implied constant growth rate over their 24 year horizon.

Figure 7 is a table of the MCD level base data for 1980 and 1995 arrayed by county. For the DVRPC sub-region, an ongoing program of MCD level data projection has provided a consistent set of population and employment numbers for transportation planning purposes. In the non-DVRPC counties, it is more typical to find MCD level projections only for population. For these counties, the employment projections at the MCD level are less consistent and contain notable deficiencies. For instance, in Atlantic County only 5 of 23 municipal employment projections differ from 48% growth. While there is bound to be employment growth in most MCD's, it is highly unlikely to be exactly the same rate of growth for each. The same situation occurs in Cape May, Ocean, Salem and to a lesser extent in Cumberland counties. It is far more likely that most of a county's employment growth will occur in certain key development areas and that the rates of growth by MCD will vary widely.

Atlantic County Planning staff gave particular attention to the projection of casino employment and, therefore, Atlantic City employment. These projections appear to be reasonable, despite the tremendous increases, based on the expected number of casinos now open and expected to be open in 1995. In 1980 when there were only four casinos open, casino employees numbered 16,300. In 1985 when there were 11 casinos open, casino employees numbered 38,400. By 1995 there could be 15 to 17 casinos open. The county estimates that the casinos will be employing 60,600 at that time. Both the actual data and the estimates imply an average of just over 4000 employees per casino.

Furthermore, in 1985 the total number of jobs in Atlantic City was 1.6 times the number of casino jobs. On that basis alone, it could be expected that 96,000 total jobs could exist in Atlantic City in 1995. The county estimate of less than 91,000 implies either a decreasing number of spin-off jobs or a limit to the number of jobs the City can support and that must locate on the mainland.

Figure 2 Demographic and Employment Projections - County Summary

COUNTY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
BURLINGTON	817.64	362,534	165,874	121,771	432,785	207,964	180,619	19.4%	25.4%	48.3%
CAMDEN	220.71	471,611	192,336	183,974	530,590	229,639	249,510	12.5%	19.4%	35.6%
GLOUCESTER	328.36	199,917	82,046	61,722	236,065	101,761	87,510	18.1%	24.0%	41.8%
MERCER	226.00	307,863	138,963	180,107	346,100	165,645	234,150	12.4%	19.2%	30.0%
DVRPC REGION	1592.71	1,341,925	579,219	547,574	1,545,540	705,009	751,789	15.2%	21.7%	37.3%
ATLANTIC	566.97	194,195	82,915	86,397	250,501	113,039	165,224	29.0%	36.3%	91.2%
SALEM	350.88	64,664	25,315	25,840	69,400	28,635	26,426	7.3%	13.1%	2.3%
CUMBERLAND	504.35	132,878	52,866	55,380	154,284	64,481	59,816	16.1%	22.0%	8.0%
CAPE MAY	263.37	82,266	28,561	25,153	121,110	44,653	37,185	47.2%	56.3%	47.8%
OCEAN	637.09	346,038	119,996	76,004	515,750	184,439	123,702	49.0%	53.7%	62.8%
NON-DVRPC REGION	2322.66	820,041	309,653	268,774	1,111,045	435,246	412,353	35.5%	40.6%	53.4%
SOUTH JERSEY AREA	3915.37	2,161,966	888,872	816,348	2,656,585	1,140,256	1,164,142	22.9%	28.3%	42.6%

Figure 3

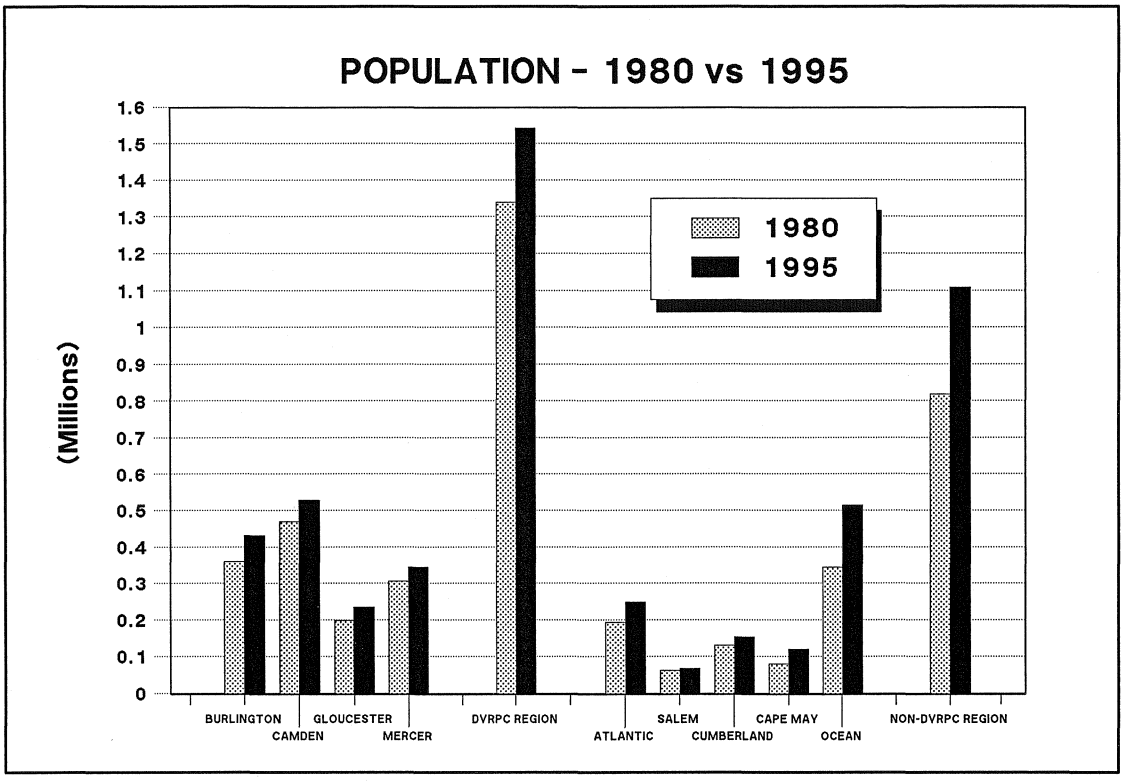


Figure 4

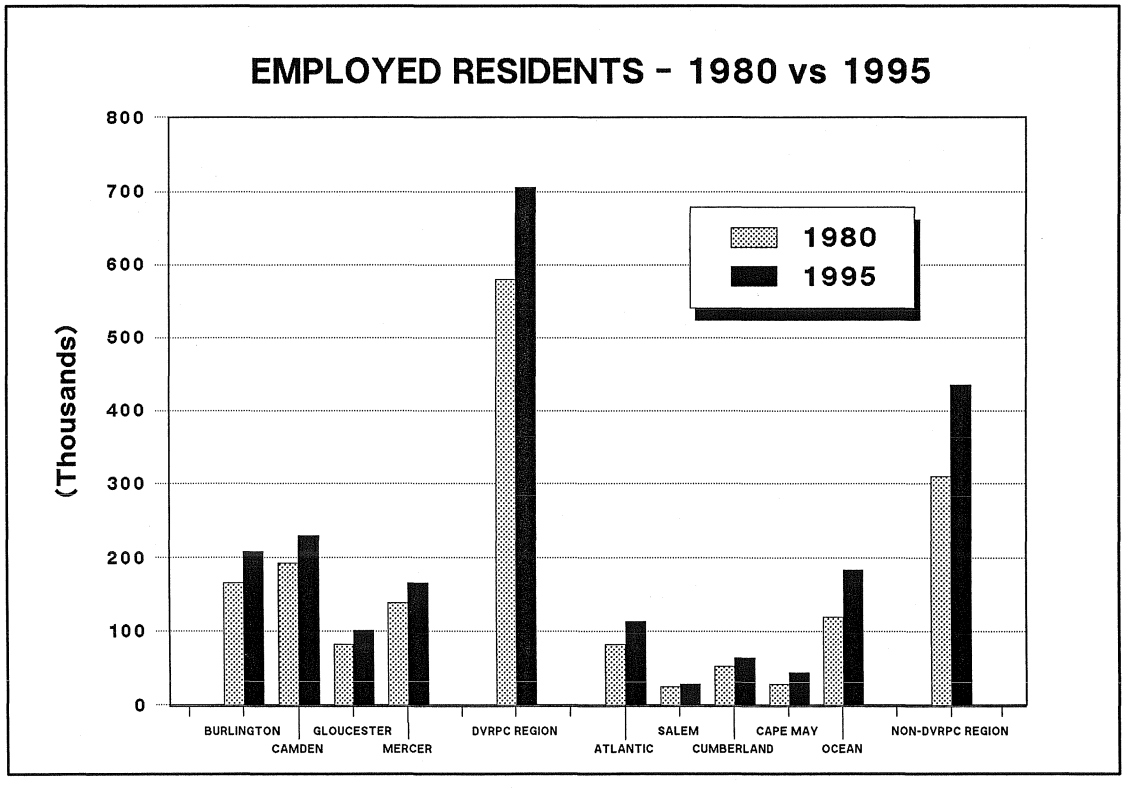


Figure 5

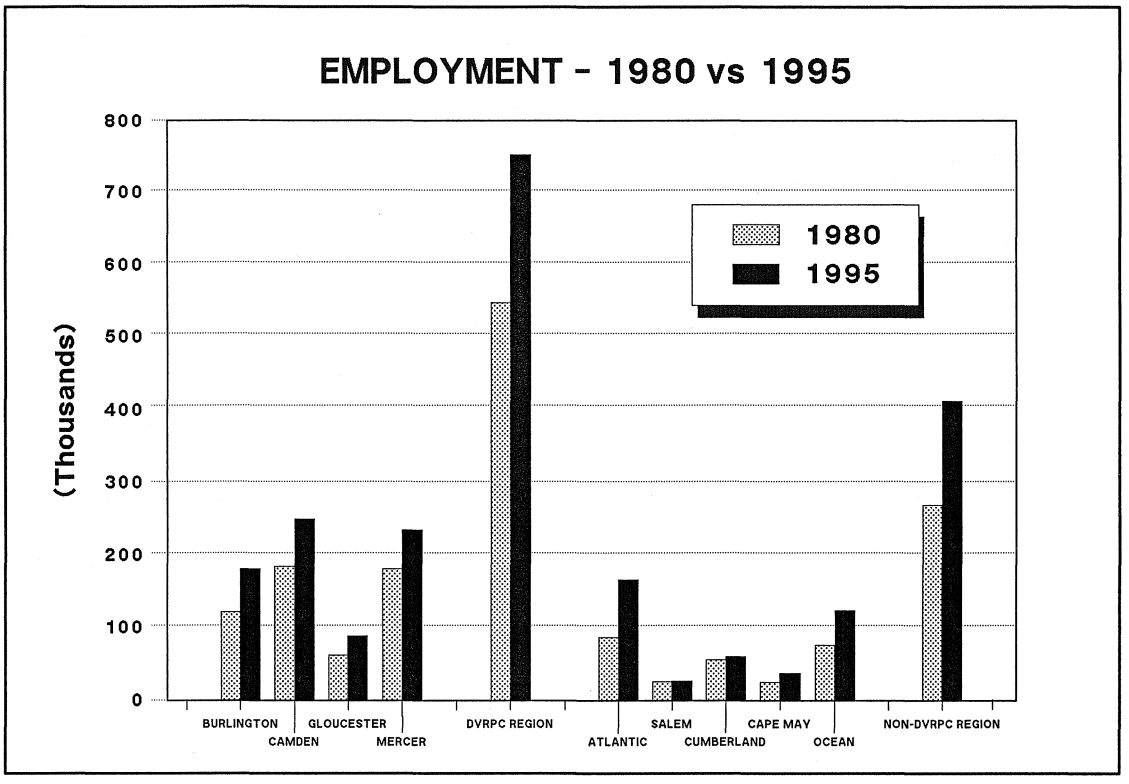


Figure 6

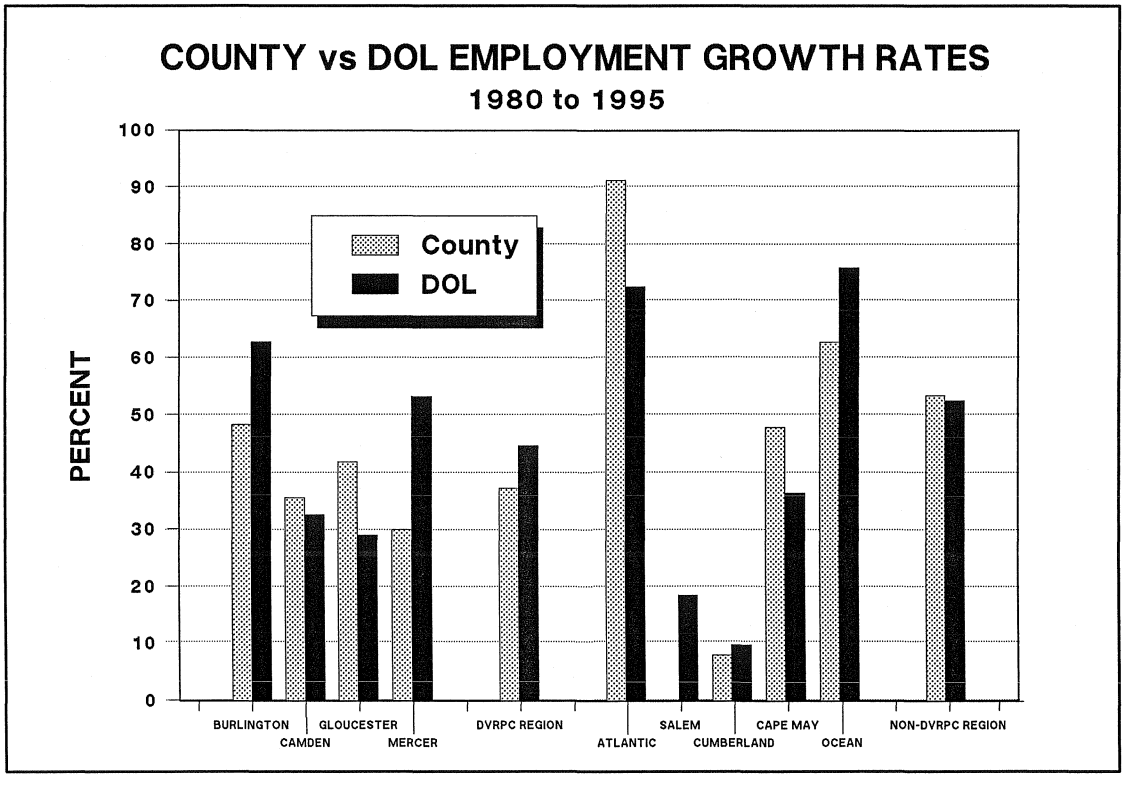


Figure 7 Population and Employment Projections by Municipality

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
BURLINGTON COUNTY											
16	BASS RIVER	77.35	1,322	443	145	1,655	582	220	25.2%	31.4%	51.7%
17	BEVERLY	0.54	2,919	1,068	1,025	2,965	1,139	1,365	1.6%	6.7%	33.2%
18	BORDENTOWN CITY	0.94	4,441	2,041	1,476	4,565	2,203	1,925	2.8%	7.9%	30.4%
18	BORDENTOWN TWP	7.41	7,175	3,478	4,606	8,460	4,306	7,245	17.9%	23.8%	57.3%
19	BURLINGTON CITY	3.44	10,246	4,276	7,497	10,705	4,691	8,555	4.5%	9.7%	14.1%
19	BURLINGTON TWP	14.20	11,527	5,116	4,999	13,220	6,161	8,790	14.7%	20.4%	75.8%
25	CHESTERFIELD	21.81	3,867	1,070	539	4,865	1,413	765	25.8%	32.1%	41.9%
20	CINNAMINSON	7.57	16,072	7,552	6,266	16,345	8,064	9,110	1.7%	6.8%	45.4%
34	DELANCO	2.16	3,730	1,668	1,082	3,695	1,735	1,270	-0.9%	4.0%	17.4%
21	DELRAN	6.91	14,803	7,028	3,243	16,215	8,083	5,135	9.5%	15.0%	58.3%
29	EASTAMPTON	5.63	3,814	2,005	69	4,740	2,616	85	24.3%	30.5%	23.2%
17	EDGEWATER PARK	2.86	9,273	4,702	1,497	9,815	5,226	2,365	5.8%	11.1%	58.0%
22	EVESHAM	29.65	21,543	10,317	4,559	35,240	17,720	9,020	63.6%	71.8%	97.9%
18	FIELDSBORO	0.30	592	230	100	625	255	110	5.6%	10.9%	10.0%
23	FLORENCE	9.65	9,115	4,206	4,541	10,175	4,930	6,125	11.6%	17.2%	34.9%
24	HAINESPORT	6.58	3,236	1,456	1,367	3,695	1,746	2,135	14.2%	19.9%	56.2%
24	LUMBERTON	13.34	5,236	2,542	1,463	6,255	3,189	2,075	19.5%	25.4%	41.8%
25	MANSFIELD	23.09	2,492	1,145	730	3,415	1,648	865	37.0%	43.9%	18.5%
26	MAPLE SHADE	3.72	20,525	10,340	5,701	20,515	10,852	8,485	-0.0%	4.9%	48.8%
27	MEDFORD TWP	40.29	17,622	7,557	3,902	25,375	11,426	7,310	44.0%	51.2%	87.3%
27	MEDFORD LAKES	1.25	4,958	2,310	673	5,340	2,612	1,040	7.7%	13.1%	54.5%
28	MOORESTOWN	15.18	15,604	6,634	13,978	17,460	7,794	20,525	11.9%	17.5%	46.8%
29	MOUNT HOLLY	2.91	10,818	4,431	7,032	11,200	4,817	9,260	3.5%	8.7%	31.7%
30	MOUNT LAUREL	22.15	17,614	8,115	5,920	29,780	14,406	10,250	69.1%	77.5%	73.1%
31	NEW HANOVER	21.85	14,258	12,001	6,973	16,765	14,817	11,309	17.6%	23.5%	62.2%
31	NORTH HANOVER	17.38	9,007	3,804	8,082	10,690	4,741	11,270	18.7%	24.6%	39.4%
32	PALMYRA	1.92	7,085	3,400	2,734	8,040	4,051	3,930	13.5%	19.2%	43.7%
33	PEMBERTON BORO	0.76	1,198	528	575	1,220	565	890	1.8%	6.9%	54.8%
33	PEMBERTON TWP	64.67	29,720	11,655	2,152	35,605	14,661	3,145	19.8%	25.8%	46.1%
34	RIVERSIDE	1.54	7,941	3,595	3,760	8,195	3,895	5,190	3.2%	8.4%	38.0%
32	RIVERTON	0.70	3,068	1,450	1,068	3,005	1,491	1,515	-2.1%	2.8%	41.9%
35	SHAMONG	46.61	4,537	1,891	666	6,390	2,796	1,090	40.8%	47.9%	63.7%
36	SOUTHAMPTON	43.31	8,808	2,999	816	11,210	4,008	1,150	27.3%	33.6%	40.9%
25	SPRINGFIELD	29.34	2,691	1,192	724	3,485	1,621	955	29.5%	36.0%	31.9%
37	TABERNACLE	47.64	6,236	2,500	422	8,290	3,490	760	32.9%	39.6%	80.1%
16	WASHINGTON TWP	107.32	830	311	116	965	380	195	16.3%	22.1%	68.1%
29	WESTAMPTON	11.04	3,383	1,654	1,660	6,495	3,334	2,500	92.0%	101.6%	50.6%
38	WILLINGBORO	7.60	39,912	17,494	7,217	40,185	18,494	9,285	0.7%	5.7%	28.7%
39	WOODLAND	95.38	2,285	472	451	2,285	496	560	0.0%	5.0%	24.2%
31	WRIGHTSTOWN	1.65	3,031	1,198	1,945	3,640	1,511	2,845	20.1%	26.1%	46.3%
		817.64	362,534	165,874	121,771	432,785	207,964	180,619	19.4%	25.4%	48.3%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
CAMDEN COUNTY											
40	AUDUBON	1.48	9,533	4,052	2,119	9,510	4,244	2,690	-0.2%	4.7%	26.9%
40	AUDUBON PARK	0.15	1,276	493	770	1,295	525	1,035	1.5%	6.6%	34.4%
41	BARRINGTON	1.59	7,418	3,490	2,583	7,385	3,648	3,620	-0.4%	4.5%	40.1%
42	BELLMAWR	2.99	13,721	5,988	4,055	13,785	6,317	4,845	0.5%	5.5%	19.5%
43	BERLIN BORO	3.56	5,786	2,460	4,144	7,455	3,328	6,225	28.8%	35.3%	50.2%
43	BERLIN TWP	3.27	5,348	1,991	410	6,040	2,361	555	12.9%	18.6%	35.4%
48	BROOKLAWN	0.49	2,154	843	661	2,060	847	895	-4.4%	0.4%	35.4%
44	CAMDEN	8.68	84,910	22,585	42,812	83,545	23,333	48,930	-1.6%	3.3%	14.3%
45	CHERRY HILL	24.18	68,785	31,439	38,221	78,325	37,589	52,345	13.9%	19.6%	37.0%
58	CHESILHURST	1.72	1,590	538	334	1,955	695	520	23.0%	29.1%	55.7%
46	CLEMENTON	1.91	5,764	2,427	1,785	6,305	2,788	2,495	9.4%	14.9%	39.8%
47	COLLINGSWOOD	1.86	15,838	7,020	4,438	15,905	7,402	6,200	0.4%	5.4%	39.7%
56	GIBBSBORO	2.16	2,510	1,147	980	2,755	1,322	1,510	9.8%	15.2%	54.1%
48	GLOUCESTER CITY	2.32	13,098	4,842	4,471	13,385	5,196	5,775	2.2%	7.3%	29.2%
49	GLOUCESTER TWP	23.14	45,156	20,040	8,754	57,505	26,796	15,420	27.3%	33.7%	76.1%
41	HADDON HEIGHTS	1.58	8,361	3,615	1,517	8,315	3,775	2,240	-0.6%	4.4%	47.7%
51	HADDON TOWNSHIP	2.60	15,875	7,007	3,306	16,335	7,571	4,170	2.9%	8.0%	26.1%
50	HADDONFIELD	2.78	12,340	5,452	5,178	12,425	5,764	7,065	0.7%	5.7%	36.4%
55	HI-NELLA	0.23	1,250	551	66	1,290	597	90	3.2%	8.4%	36.4%
53	LAUREL SPRINGS	0.45	2,239	1,031	406	2,325	1,124	590	3.8%	9.0%	45.3%
52	LAWNSIDE	1.43	3,042	1,259	842	3,285	1,428	1,155	8.0%	13.4%	37.2%
53	LINDENWOLD	3.82	18,206	9,245	2,602	19,825	10,570	4,375	8.9%	14.3%	68.1%
52	MAGNOLIA	0.98	4,881	2,380	902	4,950	2,534	1,295	1.4%	6.5%	43.6%
54	MERCHANTVILLE	0.61	3,972	1,738	1,357	4,060	1,865	1,825	2.2%	7.3%	34.5%
42	MOUNT EPHRAIM	0.90	4,863	2,151	987	4,835	2,246	1,200	-0.6%	4.4%	21.6%
40	OAKLYN	0.63	4,223	1,851	964	4,280	1,970	1,300	1.3%	6.4%	34.9%
54	PENNSAUKEN	10.56	33,761	14,753	29,994	35,290	16,192	37,135	4.5%	9.8%	23.8%
46	PINE HILL	3.97	8,688	3,633	649	10,565	4,639	985	21.6%	27.7%	51.8%
42	RUNNEMEADE	2.00	9,461	3,923	2,158	9,505	4,138	2,970	0.5%	5.5%	37.6%
55	SOMERDALE	1.36	5,900	2,616	1,728	6,030	2,807	2,545	2.2%	7.3%	47.3%
55	STRATFORD	1.59	8,005	3,601	2,485	8,470	4,001	3,720	5.8%	11.1%	49.7%
56	VOORHEES	11.61	12,919	6,582	6,196	26,495	14,174	12,045	105.1%	115.3%	94.4%
57	WATERFORD	36.11	8,126	3,038	2,472	12,625	4,956	4,580	55.4%	63.1%	85.3%
58	WINSLOW	57.78	20,034	7,573	3,265	29,870	11,856	6,620	49.1%	56.6%	102.8%
47	WOODLYNNE	0.22	2,578	982	363	2,605	1,042	545	1.0%	6.1%	50.1%
		220.71	471,611	192,336	183,974	530,590	229,639	249,510	12.5%	19.4%	35.6%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
GLOUCESTER COUNTY											
78	CLAYTON	7.26	6,013	2,171	1,492	6,750	2,559	2,135	12.3%	17.9%	43.1%
79	DEPTFORD	17.58	23,473	9,868	8,761	26,310	11,614	12,590	12.1%	17.7%	43.7%
80	EAST GREENWICH	14.89	4,144	1,593	1,111	4,990	2,014	1,495	20.4%	26.4%	34.6%
81	ELK	19.60	3,166	1,076	152	4,405	1,572	315	39.1%	46.1%	107.2%
82	FRANKLIN	56.47	12,396	4,773	1,653	17,245	6,972	2,700	39.1%	46.1%	63.3%
83	GLASSBORO	9.37	14,574	6,014	6,374	16,100	6,976	8,005	10.5%	16.0%	25.6%
88	GREENWICH	9.44	5,404	2,376	2,930	5,435	2,509	3,520	0.6%	5.6%	20.1%
84	HARRISON	19.08	3,544	1,556	858	4,335	1,998	1,310	22.3%	28.4%	52.7%
85	LOGAN	23.42	3,078	1,370	1,660	4,765	2,227	3,100	54.8%	62.5%	86.7%
86	MANTUA	15.96	9,193	3,771	3,550	10,705	4,611	5,360	16.4%	22.3%	51.0%
87	MONROE	46.96	21,639	8,728	3,620	26,900	11,393	5,610	24.3%	30.5%	55.0%
93	NATIONAL PARK	1.00	3,552	1,112	229	3,525	1,159	340	-0.8%	4.2%	48.5%
82	NEWFIELD	1.71	1,563	699	657	1,675	787	1,005	7.2%	12.5%	53.0%
88	PAULSBORO	2.09	6,944	2,564	3,476	6,275	2,433	4,635	-9.6%	-5.1%	33.3%
89	PITMAN	2.26	9,744	4,016	3,473	9,420	4,077	3,880	-3.3%	1.5%	11.7%
91	SOUTH HARRISON	15.63	1,548	621	99	2,040	859	185	31.8%	38.4%	86.9%
90	SWEDESBORO	0.77	2,031	805	1,237	1,965	818	1,885	-3.2%	1.6%	52.4%
92	WASHINGTON	21.65	27,878	11,630	3,465	40,180	17,600	5,510	44.1%	51.3%	59.0%
79	WENONAH	0.99	2,303	1,005	381	2,130	976	505	-7.5%	-2.9%	32.5%
93	WEST DEPTFORD	16.18	18,002	8,343	4,008	20,880	10,161	6,730	16.0%	21.8%	67.9%
94	WESTVILLE	1.21	4,786	1,948	2,295	4,320	1,846	3,050	-9.7%	-5.2%	32.9%
95	WOODBURY	2.13	10,353	4,111	7,736	10,270	4,282	9,220	-0.8%	4.2%	19.2%
95	WOODBURY HEIGHTS	1.23	3,460	1,469	1,658	3,240	1,444	2,305	-6.4%	-1.7%	39.0%
90	WOOLWICH	21.48	1,129	427	847	2,205	876	2,120	95.3%	105.1%	150.3%
		328.36	199,917	82,046	61,722	236,065	101,761	87,510	18.1%	24.0%	41.8%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
MERCER COUNTY											
98	EAST WINDSOR	15.60	21,041	10,160	8,315	24,450	12,396	11,590	16.2%	22.0%	39.4%
96	EWING	15.13	34,842	16,856	29,452	36,050	18,312	33,095	3.5%	8.6%	12.4%
97	HAMILTON	39.38	82,801	40,904	25,304	94,005	48,761	31,975	13.5%	19.2%	26.4%
98	HIGHTSTOWN	1.23	4,581	2,221	3,386	4,700	2,393	4,285	2.6%	7.7%	26.6%
99	HOPEWELL BORO	0.75	2,001	1,045	414	2,200	1,206	595	9.9%	15.4%	43.7%
99	HOPEWELL TWP	58.00	10,893	5,303	2,767	12,100	6,185	3,800	11.1%	16.6%	37.3%
100	LAWRENCE	21.87	19,724	9,674	14,887	25,945	13,361	25,515	31.5%	38.1%	71.4%
99	PENNINGTON	0.99	2,109	1,025	1,964	2,310	1,179	3,120	9.5%	15.0%	58.9%
101	PRINCETON BORO	1.76	12,035	5,903	11,178	12,855	6,620	16,430	6.8%	12.2%	47.0%
101	PRINCETON TWP	16.25	13,683	6,695	10,722	16,250	8,349	11,665	18.8%	24.7%	8.8%
102	TRENTON	7.50	92,124	33,211	63,765	92,295	34,936	69,040	0.2%	5.2%	8.3%
103	WASHINGTON TWP	20.70	3,487	1,726	851	6,950	3,612	2,740	99.3%	109.3%	222.0%
104	WEST WINDSOR	26.84	8,542	4,240	7,102	15,990	8,334	20,300	87.2%	96.6%	185.8%
		226.00	307,863	138,963	180,107	346,100	165,645	234,150	12.4%	19.2%	30.0%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
ATLANTIC COUNTY											
1	ABSECON	5.70	6,859	3,203	2,293	7,877	3,862	3,390	14.8%	20.6%	47.8%
2	ATLANTIC CITY	11.84	40,199	15,257	36,424	46,641	18,587	90,830	16.0%	21.8%	149.4%
3	BRIGANTINE	6.39	8,318	3,907	961	14,798	7,298	1,420	77.9%	86.8%	47.8%
4	BUENA	7.40	3,642	1,764	1,719	3,797	1,931	2,541	4.3%	9.5%	47.8%
4	BUENA VISTA	41.83	6,959	2,643	583	7,221	2,880	862	3.8%	9.0%	47.9%
6	CORBIN CITY	8.30	252	115	130	269	129	192	6.7%	12.1%	47.7%
11	EGG HARBOR CITY	10.89	4,618	1,815	638	5,053	2,085	943	9.4%	14.9%	47.8%
5	EGG HARBOR TWP	67.94	19,381	8,573	7,308	28,000	13,005	10,803	44.5%	51.7%	47.8%
6	ESTELL MANOR	53.75	850	353	82	1,268	553	121	49.2%	56.6%	47.6%
9	FOLSOM	8.40	1,892	764	505	2,021	857	747	6.8%	12.2%	47.9%
7	GALLOWAY	91.75	12,176	5,580	4,118	25,501	12,271	6,088	109.4%	119.9%	47.8%
8	HAMILTON	113.40	9,499	4,236	3,068	18,795	8,801	5,368	97.9%	107.8%	75.0%
9	HAMMONTON	41.80	12,298	5,309	6,725	13,216	5,991	9,641	7.5%	12.8%	43.4%
10	LINWOOD	3.80	6,144	2,790	2,782	6,605	3,149	4,113	7.5%	12.9%	47.8%
15	LONGPORT	0.30	1,249	430	77	1,335	483	100	6.9%	12.2%	29.9%
15	MARGATE	1.40	9,179	4,245	1,883	10,296	5,000	2,783	12.2%	17.8%	47.8%
11	MULLICA	56.50	5,243	1,953	529	5,931	2,320	783	13.1%	18.8%	48.0%
12	NORTHFIELD	3.50	7,795	3,543	3,424	7,867	3,755	5,062	0.9%	6.0%	47.8%
13	PLEASANTVILLE	5.80	13,435	5,388	8,227	17,479	7,360	12,162	30.1%	36.6%	47.8%
7	PORT REPUBLIC	8.10	913	436	111	869	436	164	-4.8%	-0.1%	47.7%
14	SOMERS POINT	4.08	10,330	4,623	2,922	11,015	5,176	4,320	6.6%	12.0%	47.8%
15	VENTNOR	2.10	11,704	5,501	1,788	13,314	6,571	2,643	13.8%	19.4%	47.8%
6	WEYMOUTH	12.00	1,260	487	100	1,333	541	148	5.8%	11.1%	48.0%
		566.97	194,195	82,915	86,397	250,501	113,039	165,224	29.0%	36.3%	91.2%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
SALEM COUNTY											
117	ALLOWAY	34.35	2,680	1,022	340	2,837	1,136	348	5.9%	11.2%	2.4%
118	ELMER	0.89	1,569	686	1,231	1,661	763	1,258	5.9%	11.2%	2.2%
125	ELSINBORO	13.00	1,290	587	69	1,366	653	71	5.9%	11.2%	2.9%
119	LOWER ALLOWAY CK.	47.70	1,547	622	2,022	1,613	681	2,067	4.3%	9.5%	2.2%
120	MANNINGTON	38.10	1,784	614	596	1,889	683	610	5.9%	11.2%	2.3%
121	OLDMANS	20.08	1,847	713	868	1,955	792	888	5.8%	11.1%	2.3%
122	PENNSGROVE	0.90	5,760	1,820	1,662	5,445	1,806	1,700	-5.5%	-0.7%	2.3%
123	PENNSVILLE	24.40	13,804	5,452	7,630	14,116	5,854	7,801	2.3%	7.4%	2.2%
127	PILESGROVE	37.40	2,810	1,258	39	3,277	1,540	41	16.6%	22.5%	5.1%
118	PITTSGROVE	46.50	6,954	2,770	469	8,571	3,585	480	23.3%	29.4%	2.3%
124	QUINTON	25.30	2,887	1,199	230	3,056	1,333	235	5.9%	11.1%	2.2%
125	SALEM	2.70	6,959	2,438	7,776	7,368	2,710	7,952	5.9%	11.2%	2.3%
122	CARNEY'S POINT	17.90	8,384	3,460	852	8,873	3,845	872	5.8%	11.1%	2.3%
126	UPPER PITTSGROVE	40.10	3,139	1,383	421	3,932	1,819	430	25.3%	31.5%	2.1%
127	WOODSTOWN	1.56	3,250	1,291	1,635	3,441	1,435	1,673	5.9%	11.2%	2.3%
		350.88	64,664	25,315	25,840	69,400	28,635	26,426	7.3%	13.1%	2.3%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
CUMBERLAND COUNTY											
68	BRIDGETON	6.50	18,795	6,999	11,863	19,200	7,507	12,600	2.2%	7.3%	6.2%
69	COMMERCIAL	34.00	4,674	1,598	539	5,200	1,867	545	11.3%	16.8%	1.1%
70	DEERFIELD	16.70	2,523	985	457	2,900	1,189	462	14.9%	20.7%	1.1%
69	DOWNE TOWNSHIP	54.35	1,803	652	326	1,940	737	329	7.6%	13.0%	0.9%
71	FAIRFIELD	46.02	5,693	2,183	427	6,400	2,577	782	12.4%	18.0%	83.1%
72	GREENWICH	19.00	973	403	133	1,000	435	135	2.8%	7.9%	1.5%
73	HOPEWELL	31.40	4,365	1,895	197	4,800	2,188	199	10.0%	15.5%	1.0%
71	LAWRENCE	37.35	2,116	769	350	2,458	938	355	16.2%	22.0%	1.4%
74	MAURICE RIVER	94.70	4,577	1,442	1,528	6,186	2,046	1,700	35.2%	41.9%	11.3%
75	MILLVILLE	43.00	24,815	10,745	12,795	29,300	13,321	13,800	18.1%	24.0%	7.9%
73	SHILOH	1.18	616	271	141	620	286	143	0.6%	5.7%	1.4%
72	STOW CREEK	18.90	1,365	585	124	1,480	666	126	8.4%	13.8%	1.6%
76	UPPER DEERFIELD	31.75	6,810	2,931	955	8,300	3,751	1,040	21.9%	28.0%	8.9%
77	VINELAND	69.50	53,753	21,408	25,545	64,500	26,973	27,600	20.0%	26.0%	8.0%
		504.35	132,878	52,866	55,380	154,284	64,481	59,816	16.1%	22.0%	8.0%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
CAPE MAY COUNTY											
59	AVALON	5.02	2,162	797	900	3,800	1,471	1,331	75.8%	84.6%	47.9%
60	CAPE MAY	2.54	4,853	1,105	3,638	5,850	1,399	5,378	20.5%	26.6%	47.8%
60	CAPE MAY POINT	0.30	255	92	44	385	146	65	51.0%	58.5%	47.7%
61	DENNIS	64.97	3,989	1,439	423	6,600	2,500	626	65.5%	73.7%	48.0%
62	LOWER TOWNSHIP	29.81	17,105	5,362	2,136	24,750	8,146	3,158	44.7%	51.9%	47.8%
63	MIDDLE TOWNSHIP	74.02	11,373	4,214	4,805	17,850	6,945	7,103	57.0%	64.8%	47.8%
67	NORTH WILDWOOD	1.70	4,714	1,404	721	6,150	1,923	1,066	30.5%	37.0%	47.9%
64	OCEAN CITY	5.83	13,949	5,758	4,012	21,250	9,210	5,931	52.3%	60.0%	47.8%
65	SEA ISLE CITY	2.39	2,644	958	646	4,750	1,807	954	79.7%	88.6%	47.7%
59	STONE HARBOR	1.24	1,187	431	512	1,400	534	757	17.9%	23.8%	47.9%
66	UPPER TOWNSHIP	63.70	6,713	2,731	1,380	11,250	4,806	2,040	67.6%	76.0%	47.8%
60	WEST CAPE MAY	1.30	1,091	387	101	1,550	577	149	42.1%	49.2%	47.5%
67	WEST WILDWOOD	0.40	360	132	24	500	193	36	38.9%	45.8%	50.0%
67	WILDWOOD	1.12	4,913	1,618	3,580	5,800	2,006	5,292	18.1%	24.0%	47.8%
67	WILDWOOD CREST	1.03	4,149	1,366	620	5,875	2,031	917	41.6%	48.7%	47.9%
61	WOODBINE	8.00	2,809	767	1,611	3,350	960	2,382	19.3%	25.2%	47.9%
		263.37	82,266	28,561	25,153	121,110	44,653	37,185	47.2%	56.3%	47.8%

Figure 7 Population and Employment Projections by Municipality (continued)

ZONE	MUNICIPALITY	AREA	1980 POP	1980 EMP RES	1980 EMP	1995 POP	1995 EMP RES	1995 EMP	1980 - 1995 PERCENT GROWTH POP	EMP RES	EMP
OCEAN	COUNTY										
113	BARNEGAT TWP	34.90	8,702	3,058	308	15,225	5,618	946	75.0%	83.7%	207.6%
105	BARNEGAT LIGHT	0.70	619	233	353	925	366	410	49.4%	56.9%	16.0%
107	BAY HEAD	0.60	1,340	585	281	1,700	779	492	26.9%	33.2%	75.3%
105	BEACH HAVEN	1.00	1,714	593	1,170	2,400	872	1,711	40.0%	47.0%	46.2%
106	BEACHWOOD	2.80	7,687	3,100	649	8,750	3,705	1,061	13.8%	19.5%	63.4%
106	BERKELEY	41.90	23,151	5,760	1,798	42,000	10,972	2,761	81.4%	90.5%	53.6%
107	BRICK	26.40	53,629	20,917	8,622	72,500	29,691	13,970	35.2%	41.9%	62.0%
108	DOVER	41.62	64,455	25,311	22,595	80,000	32,986	36,274	24.1%	30.3%	60.5%
115	EAGLESWOOD	16.50	1,009	389	211	2,500	1,012	229	147.8%	160.2%	8.8%
105	HARVEY CEDARS	0.55	363	151	144	500	218	138	37.7%	44.6%	-4.3%
108	ISLAND HEIGHTS	0.60	1,575	653	91	1,825	794	182	15.9%	21.7%	100.9%
110	JACKSON	100.30	25,644	9,699	5,049	45,500	18,069	7,221	77.4%	86.3%	43.0%
112	LACEY	84.60	14,161	4,530	1,991	23,750	7,977	4,432	67.7%	76.1%	122.7%
109	LAKEHURST	0.95	2,908	1,034	1,022	3,550	1,325	1,378	22.1%	28.2%	34.8%
111	LAKEWOOD	24.40	38,464	12,068	12,902	50,500	16,636	21,299	31.3%	37.9%	65.1%
108	LAVALLETTE	0.65	2,072	746	605	2,575	973	1,268	24.3%	30.5%	109.6%
115	LITTLE EGG HARBOR	49.50	8,483	2,783	235	14,350	4,943	530	69.2%	77.6%	125.7%
105	LONG BEACH TWP	4.30	3,488	1,199	843	6,250	2,256	1,445	79.2%	88.1%	71.3%
109	MANCHESTER	82.50	27,987	4,411	1,499	49,500	8,192	2,811	76.9%	85.7%	87.5%
107	MANTOLOKING	0.44	433	189	116	525	241	168	21.2%	27.3%	44.7%
113	OCEAN TWP	20.62	3,731	1,187	533	9,150	3,057	533	145.2%	157.5%	-0.1%
106	OCEAN GATE	0.50	1,385	517	38	1,600	627	89	15.5%	21.3%	132.5%
106	PINE BEACH	0.60	1,796	732	256	2,300	984	444	28.1%	34.5%	73.1%
116	PLUMSTED	40.70	4,674	2,080	353	10,500	4,906	572	124.6%	135.9%	61.8%
107	POINT PLEASANT	3.70	17,747	7,278	4,433	21,350	9,193	7,352	20.3%	26.3%	65.9%
107	POINT PLEASANT BCH	1.50	5,415	2,340	2,335	6,550	2,972	3,705	21.0%	27.0%	58.7%
108	SEASIDE HEIGHTS	0.35	1,802	673	1,717	2,050	804	440	13.8%	19.5%	-74.4%
108	SEASIDE PARK	0.60	1,795	671	778	2,600	1,021	2,182	44.8%	52.1%	180.3%
105	SHIP BOTTOM	0.71	1,427	558	812	2,000	821	1,027	40.2%	47.2%	26.6%
106	SOUTH TOMS RIVER	1.20	3,954	1,375	338	4,000	1,461	1,387	1.2%	6.2%	310.2%
114	STAFFORD	47.05	10,385	3,832	2,824	23,750	9,202	4,766	128.7%	140.1%	68.8%
105	SURF CITY	0.65	1,571	568	365	1,825	693	737	16.2%	22.0%	102.0%
115	TUCKERTON	3.70	2,472	776	736	3,250	1,071	1,742	31.5%	38.0%	136.6%
		637.09	346,038	119,996	76,004	515,750	184,439	123,702	49.0%	53.7%	62.8%
INTERNAL ZONE TOTALS		3915.37	2,161,966	888,872	816,348	2,656,585	1,140,256	1,164,142	22.9%	28.3%	42.6%

III. WORK TRIP ESTIMATION

Once the basic data of persons and jobs have been estimated, the next step involves estimating the number of trips each area will generate and how many of those trips will go to each of the other areas. These tasks are generally referred to as "trip generation" and "trip distribution".

DVRPC has done extensive research into the trip making characteristics of its resident population and has developed a series of models to describe this behavior. These models require a very detailed level of data and a mathematical representation of the transportation network.

The resources needed to develop the level of data required by the DVRPC models for the entire South Jersey Transit Plan Study area are too extensive. Therefore, a simplified version of these models was developed that embodies many of the same concepts but which takes advantage of the focus of the study: determining transit potential.

Area Types

The DVRPC approach to work trip generation, referred to as a disaggregate trip model, is to apply trip production and attraction rates based on area types to the estimated number of employed residents or employees in an analysis zone. The area type of a zone is defined by the density of "activity" in that zone. The density function is a weighted combination of population and employment per acre.

DVRPC assigns area type codes, from 1 to 6, to ranges of densities. For instance, a zone in the Philadelphia Central Business District might have a density value of 413.00 and would be assigned an area type code of 1. A zone in the Pinelands might have a density value of 0.02 and would be assigned an area type code of 6.

For the South Jersey study, DVRPC found that the DVRPC area type model did not adequately differentiate the zones. Instead, a better stratification was derived by using employment density as an area type descriptor. Ranges were established for six area types, yielding area types for each zone. For example, Trenton is Area Type 1, Camden is 2, Woodbury is 3, Lakewood is 4, Evesham is 5 and Upper Township is Area Type 6.

Trip Productions and Attractions

Trip production rates for an area type are determined by dividing the total number of trips for a given purpose produced in the area by the total of an appropriate base data element related to trip making. In the case of commuter trips, the total number of work trips made by the residents of all the zones in an area type would be divided by the total number of employed residents in those zones.

Trip attraction rates for an area type are similarly determined by dividing the number of trips attracted to an area by the appropriate base data element. In the case of commuter trips, the total number of work trips made to an area by the employees would be divided by the total number of employees in the area.

With both trip productions and attractions, only trips made on vehicular modes are counted (walk, taxi, school bus, bicycle, motorcycle trips are not included). Therefore, trip rates are always less than 1.00. Rates will be lowest where residents can walk or taxi to a vast number of jobs, typically in the most dense areas.

Using the 1980 Census Journey-to-Work data, the South Jersey zones were classified by area type and the production and attraction rates determined. The resulting work trip production rates (trips per employed resident) ranged from 0.876 for the Philadelphia CBD to 0.931 in the Pine Barrens, while the work trip attraction rates (trips per employee) ranged from 0.780 for the City of Camden to 0.985 around Woodstown.

Trip Distribution

The process of connecting the trips produced in one zone with the trips attracted to another zone is called the trip distribution analysis. The theory most often applied to this process is a variation of the gravity model from the physical sciences. Simply stated, the magnitude of the force between two zones (trips) is directly related to the product of their masses (productions and attractions) and inversely proportional to the physical separation between them (impedance to travel) raised to some power.

In the application of this principle to travel flow theory, the impedance to travel is often represented by the time it takes to travel between two zones. The combined effect of raising the inverse of the travel time to a power is treated by the creation of a value called the "friction factor". These factors, which represent the propensity to travel, are determined for each one minute increment of travel time from studies of the travel behavior of the trip makers of an area. DVRPC has calibrated a set of friction factors for its region which were used in this study.

In the DVRPC modelling process, travel time between two zones is determined by summing the time it takes to traverse the links of the minimum impedance path across a transportation network. To perform this task requires a mathematical network representing the transportation facilities available in the study area. The development of such a network is costly and time consuming.

Instead, a simplified method was devised to calculate the travel time between pairs of zones based on the straight line distance between them. To account for travellers being able to use higher speed facilities over a greater proportion of a long trip, the model employs a speed-by-distance look-up table which was partly derived from the Census data. Short trips are assumed to be made at relatively slow average speeds since a great proportion of such trips are made over local streets. Intermediate length trips are assumed to be made at a slightly higher speeds since they can generally use some of the higher speed facilities, while the longest trips have the highest average speeds since they can use higher speed facilities for proportionately more of the trip.

For the South Jersey Plan Study, DVRPC developed a microcomputer program called "AGMCD" which combines the tasks of trip generation and trip distribution (including the calculation of travel impedance). The program allows the analyst to specify trip production and attraction rates by area type, the year of the analysis and other application specific parameters. The output of the program includes a file of zone-to-zone work trips, a file of zone-to-zone travel impedances (optional) and a series of reports summarizing the input data, resulting trip origins and destinations, trip length frequencies, and a county-to-county trip summary. The program can also provide a report of the number of trips and the calculated impedances from any selected zone to all other zones. Figure 8 is a flow chart showing the inputs and outputs of the "AGMCD" program.

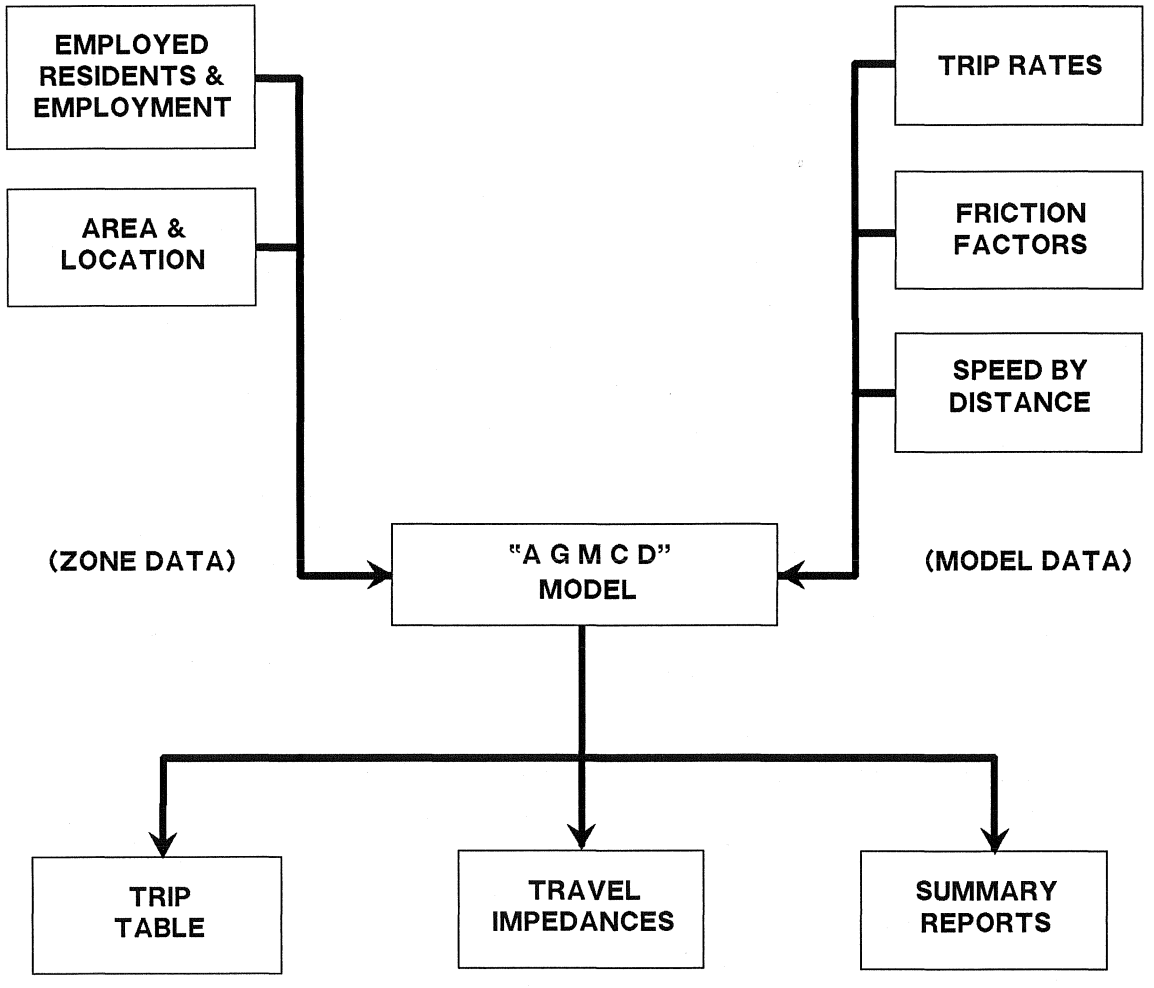
Initial development and testing of the simplified model concepts were done using the data from the DVRPC regional simulation process. The magnitude of productions and attractions and the trip length frequency distribution resulting from the simplified model were compared with those from the DVRPC models. The DVRPC regional travel model data sets, which are based on census tracts as zones, had to be aggregated to the MCD level to be consistent with the ultimate application of the model in the South Jersey study.

Once the simplified model concepts were finalized, data sets were constructed for the South Jersey study zones. Figure 9 is a listing of input zonal data used in the AGMCD model. Calibration data sets were also assembled from the 1980 Census Journey-to-Work files. Adjustments were made to the impedances calculated by the model. These adjustments took into account the additional aid to travel provided by the PATCO line and the Atlantic City Expressway. The AGMCD program was calibrated to the Census data with very reasonable results.

Figure 10 presents the County-to-County trip table summaries from the calibration effort. The upper table is the output of the AGMCD simplified model while the lower table is the summary of the Census Journey-to-Work survey.

FIGURE 8

TRAVEL MARKET MODEL



Delaware Valley
Regional Planning Commission

Figure 9 Input Data to the Travel Market Model

Zone Name	Zone No.	Area	1980 Data Pop	1980 Data Emp Res	1980 Data Emp	1995 Data Pop	1995 Data Emp Res	1995 Data Emp	Location X	Location Y
ABSECON	1	5.70	6859	3203	2293	7877	3862	3390	57.8	35.0
ATLANTIC CITY	2	11.84	40199	15257	36424	46641	18587	90830	60.9	30.8
BRIGANTINE	3	6.39	8318	3907	961	14798	7298	1420	64.7	34.1
BUENA AREA	4	49.23	10601	4407	2302	11018	4811	3403	35.6	41.6
EGG HARBOR TWP	5	67.94	19381	8573	7308	28000	13005	10803	51.8	32.6
WEYMTH-CORB-ESTELL	6	74.05	2362	955	312	2870	1223	461	42.2	31.7
GALLOWAY-PT REP	7	99.85	13089	6016	4229	26370	12707	6252	57.5	40.8
HAMILTON	8	113.40	9499	4236	3068	18795	8801	5368	44.5	40.0
HAMMONTON-FOLSOM	9	50.20	14190	6073	7230	15237	6847	10388	42.1	50.0
LINWOOD	10	3.80	6144	2790	2782	6605	3149	4113	53.7	29.5
MULLICA-EGG CITY	11	67.39	9861	3768	1167	10984	4405	1726	49.6	46.0
NORTHFIELD	12	3.50	7795	3543	3424	7867	3755	5062	54.6	31.5
PLEASANTVILLE	13	5.80	13435	5388	8227	17479	7360	12162	56.5	33.0
SOMERS PT	14	4.08	10330	4623	2922	11015	5176	4320	52.0	27.8
VENT-MAR-LONG	15	3.80	22132	10176	3748	24945	12053	5526	57.5	28.9
BASS RV-WASH	16	184.67	2152	754	261	2620	962	415	56.4	52.0
BEV-EDGWATER PK	17	3.40	12192	5770	2522	12780	6365	3730	34.9	78.6
FIELD-BORDEN AREA	18	8.65	12208	5749	6182	13650	6764	9280	45.7	84.1
BURLINGTON AREA	19	17.64	21773	9392	12496	23925	10852	17345	38.6	79.6
CINNAMINSON	20	7.57	16072	7552	6266	16345	8064	9110	30.8	74.0
DELRAN	21	6.91	14803	7028	3243	16215	8083	5135	33.1	75.3
EVESHAM	22	29.65	21543	10317	4559	35240	17720	9020	36.0	65.3
FLORENCE	23	9.65	9115	4206	4541	10175	4930	6125	41.6	81.2
HAINES-LUMBERTON	24	19.92	8472	3998	2830	9950	4934	4210	40.1	72.2
MANS-SPRING-CHEST	25	74.24	9050	3407	1993	11765	4682	2585	46.7	80.0
MAPLE SHADE	26	3.72	20525	10340	5701	20515	10852	8485	30.8	71.0
MEDFORD AREA	27	41.54	22580	9867	4575	30715	14038	8350	40.3	64.9
MOORESTOWN	28	15.18	15604	6634	13978	17460	7794	20525	33.8	73.2
MT HOLLY-E-W AMPTN	29	19.58	18015	8090	8761	22435	10768	11845	41.4	75.1
MT LAUREL	30	22.15	17614	8115	5920	29780	14406	10250	35.4	71.0
NEW-NO HAN-WRIGSTN	31	40.88	26296	17003	17000	31095	21068	25424	52.6	77.4
PALMYRA-RIVERTON	32	2.62	10153	4850	3802	11045	5542	5445	29.1	75.0
PEMBERTON AREA	33	65.43	30918	12183	2727	36825	15226	4035	49.4	72.1
RIVERSIDE-DELANCO	34	3.70	11671	5263	4842	11890	5630	6460	33.2	77.8
SHAMONG	35	46.61	4537	1891	666	6390	2796	1090	45.0	59.0
SOUTHAMPTON	36	43.31	8808	2999	816	11210	4008	1150	45.0	68.6
TABERNACLE	37	47.64	6236	2500	422	8290	3490	760	49.4	62.2
WILLINGBORO	38	7.60	39912	17494	7217	40185	18494	9285	36.3	76.7
WOODLAND	39	95.38	2285	472	451	2285	496	560	56.5	63.6
AUDUBON-PK-OAKLYN	40	2.26	15032	6396	3853	15085	6739	5025	26.6	67.2
BARRINGTON-HAD HTS	41	3.17	15779	7105	4100	15700	7423	5860	27.5	66.0
BELMWR-MT EPH-RUNN	42	5.89	28045	12062	7200	28125	12701	9015	25.9	65.0
BERLIN AREA	43	6.83	11134	4451	4554	13495	5689	6780	34.3	60.7
CAMDEN	44	8.68	84910	22585	42812	83545	23333	48930	24.7	70.1
CHERRY HILL	45	24.18	68785	31439	38221	78325	37589	52345	30.4	68.4
CLEMENTON-PINE HILL	46	5.88	14452	6060	2434	16870	7426	3480	31.5	60.4
COLLNGSWD-WDLYN	47	2.08	18416	8002	4801	18510	8444	6745	26.3	68.8
GLOUC CITY-BRKLWN	48	2.81	15252	5685	5132	15445	6042	6670	24.2	66.9
GLOUCESTER TWP	49	23.14	45156	20040	8754	57505	26796	15420	28.5	60.1
HADDONFIELD-TAV	50	2.78	12340	5452	5178	12425	5764	7065	28.6	67.4
HADDON TWP	51	2.60	15875	7007	3306	16335	7571	4170	27.5	68.1
LAWNSIDE-MAGNOLIA	52	2.41	7923	3639	1744	8235	3962	2450	28.9	65.1
LINDENWD-LAUREL SP	53	4.27	20445	10276	3008	22150	11695	4965	31.0	62.2
PENNSKN-MERCHANTVL	54	11.17	37733	16491	31351	39350	18058	38960	27.7	72.0
SOMERDL-STRATFD-HI	55	3.18	15155	6768	4279	15790	7405	6355	29.6	63.3
VOORHEES-GIBBSBORO	56	13.77	15429	7729	7176	29250	15496	13555	33.0	63.6

Figure 9 Input Data to the Travel Market Model (continued)

Zone Name	Zone No.	Area	1980 Data Pop	1980 Data Emp Res	1980 Data Emp	1995 Data Pop	1995 Data Emp Res	1995 Data Emp	Location X	Location Y
WATERFORD	57	36.11	8126	3038	2472	12625	4956	4580	40.1	57.0
WINSLOW-CHESTILHST	58	59.50	21624	8111	3599	31825	12550	7140	35.7	54.5
AVALON-STONE HARBR	59	6.26	3349	1228	1412	5200	2005	2088	44.5	11.4
CAPE MAY AREA	60	4.14	6199	1584	3783	7785	2122	5592	34.9	1.8
DENNIS-WOODBINE	61	72.97	6798	2206	2034	9950	3460	3008	40.6	19.9
LOWER TWP	62	29.81	17105	5362	2136	24750	8146	3158	35.7	4.8
MIDDLE TWP	63	74.02	11373	4214	4805	17850	6945	7103	39.5	12.0
OCEAN CITY	64	5.83	13949	5758	4012	21250	9210	5931	51.9	23.7
SEA ISLE CITY	65	2.39	2644	958	646	4750	1807	954	47.4	17.0
UPPER TWP	66	63.70	6713	2731	1380	11250	4806	2040	46.5	23.5
WILDWOODS AREA	67	4.25	14136	4520	4945	18325	6152	7311	40.2	4.8
BRIDGETON	68	6.50	18795	6999	11863	19200	7507	12600	18.0	35.0
COMMERCIAL-DOWNE	69	88.35	6477	2250	865	7140	2603	874	25.2	24.8
DEERFIELD	70	16.70	2523	985	457	2900	1189	462	23.4	37.1
FAIRFIELD-LAWRENCE	71	83.37	7809	2952	777	8858	3515	1137	18.7	30.1
GREENWICH-STOWE	72	37.90	2338	988	257	2480	1101	261	10.7	34.6
HOPEWELL-SHILOH	73	32.58	4981	2166	338	5420	2474	342	15.1	36.1
MAURICE RIVER	74	94.70	4577	1442	1528	6186	2046	1700	33.9	26.4
MILLVILLE	75	43.00	24815	10745	12795	29300	13321	13800	27.4	32.6
UPPER DEERFIELD	76	31.75	6810	2931	955	8300	3751	1040	18.7	39.9
VINELAND	77	69.50	53753	21408	25545	64500	26973	27600	29.8	38.0
CLAYTON	78	7.26	6013	2171	1492	6750	2559	2135	26.2	51.3
DEPTFORD-WENONAH	79	18.57	25776	10873	9142	28440	12590	13095	24.1	61.8
EAST GREENWICH	80	14.89	4144	1593	1111	4990	2014	1495	17.9	60.3
ELK	81	19.60	3166	1076	152	4405	1572	315	22.6	51.3
FRANKLIN-NEWFIELD	82	58.18	13959	5472	2310	18920	7759	3705	29.5	46.0
GLASSBORO	83	9.37	14574	6014	6374	16100	6976	8005	24.9	54.1
HARRISON	84	19.08	3544	1556	858	4335	1998	1310	19.6	55.7
LOGAN	85	23.42	3078	1370	1660	4765	2227	3100	11.9	60.3
MANTUA	86	15.96	9193	3771	3550	10705	4611	5360	21.5	58.3
MONROE	87	46.96	21639	8728	3620	26900	11393	5610	32.5	51.5
PAULSBORO-GREENWICH	88	11.53	12348	4940	6406	11710	4942	8155	15.9	62.7
PITMAN	89	2.26	9744	4016	3473	9420	4077	3880	23.7	56.2
SWEDESBORO-WOOLWICH	90	22.25	3160	1232	2084	4170	1693	4005	13.7	56.7
SOUTH HARRISON	91	15.63	1548	621	99	2040	859	185	16.6	53.6
WASHINGTON	92	21.65	27878	11630	3465	40180	17600	5510	26.8	57.0
W DEPTFORD-NAT PK	93	17.18	21554	9455	4237	24405	11319	7070	20.9	64.1
WESTVILLE	94	1.21	4786	1948	2295	4320	1846	3050	23.8	65.7
WOODBURY CITY-HTS	95	3.36	13813	5580	9394	13510	5726	11525	22.3	62.8
EWING	96	15.13	34842	16856	29452	36050	18312	33095	40.9	92.9
HAMILTON	97	39.38	82801	40904	25304	94005	48761	31975	47.3	89.1
HIGTSTWN-E WINDSOR	98	16.83	25622	12381	11701	29150	14789	15875	55.3	92.6
PENNGTN-HOPEWELLS	99	59.74	15003	7373	5145	16610	8570	7515	41.2	98.5
LAWRENCE	100	21.87	19724	9674	14887	25945	13361	25515	45.0	94.5
PRINCETON AREA	101	18.01	25718	12598	21900	29105	14969	28095	48.0	98.5
TRENTON	102	7.50	92124	33211	63765	92295	34936	69040	42.7	90.0
WASHINGTON	103	20.70	3487	1726	851	6950	3612	2740	52.2	89.5
WEST WINDSOR	104	26.84	8542	4240	7102	15990	8334	20300	49.8	94.9
LONG BCH ISLAND	105	7.91	9182	3302	3688	13900	5226	5468	73.5	51.0
BERKELEY AREA	106	47.00	37973	11484	3080	58650	17749	5742	74.8	68.8
BRICK AREA	107	32.64	78564	31309	15787	102625	42876	25687	79.3	79.9
DOVER AREA	108	43.82	71699	28054	25787	89050	36579	40346	75.3	73.0
MANCHESTER AREA	109	83.45	30895	5445	2521	53050	9517	4189	65.3	73.4
JACKSON	110	100.30	25644	9699	5049	45500	18069	7221	65.0	82.0
LAKEWOOD	111	24.40	38464	12068	12902	50500	16636	21299	72.5	81.0
LACY	112	84.60	14161	4530	1991	23750	7977	4432	73.0	64.0

Figure 9 Input Data to the Travel Market Model (continued)

Zone Name	Zone No.	Area	1980 Data Pop	1980 Data Emp Res	1980 Data Emp	1995 Data Pop	1995 Data Emp Res	1995 Data Emp	Location X	Location Y
BARNEGAT-OCEAN	113	55.52	12433	4245	841	24375	8674	1479	72.1	57.9
STAFFORD	114	47.05	10385	3832	2824	23750	9202	4766	69.6	54.5
LITTLE EGG AREA	115	69.70	11964	3948	1182	20100	7026	2501	66.3	49.2
PLUMSTED	116	40.70	4674	2080	353	10500	4906	572	57.8	77.3
ALLOWAY	117	34.35	2680	1022	340	2837	1136	348	13.2	44.5
ELMER-PITTSGROVE	118	47.39	8523	3456	1700	10232	4347	1738	23.3	43.0
LOWER ALLOWAYS CR	119	47.70	1547	622	2022	1613	681	2067	6.1	37.8
MANNINGTON	120	38.10	1784	614	596	1889	683	610	7.7	48.4
OLDMANS	121	20.08	1847	713	868	1955	792	888	8.3	56.6
PENNSGROVE-CARNEYS	122	18.80	14144	5280	2514	14318	5651	2572	6.1	53.8
PENNSVILLE	123	24.40	13804	5452	7630	14116	5854	7801	2.8	48.8
QUINTON	124	25.30	2887	1199	230	3056	1333	235	9.6	42.1
SALEM-ELSINBORO	125	15.70	8249	3025	7845	8734	3363	8023	3.6	43.0
UPPER PITTSGROVE	126	40.10	3139	1383	421	3932	1819	430	19.1	47.9
WOODSTOWN-PILESGRV	127	38.96	6060	2549	1674	6718	2976	1714	13.3	51.0
External Zones *										
NJ NORTHERN TIER	130	0.00	0	5302	13571	0	5461	16421	75.0	128.0
WARREN/HUNTERDON	131	0.00	0	2946	854	0	3388	1196	33.0	118.0
SOMERSET/MIDDLESEX	132	0.00	0	11074	16669	0	12957	22336	59.0	107.0
MONMOUTH	133	0.00	0	9991	19193	0	11290	27254	74.0	95.0
NY CITY	134	0.00	0	1484	9474	0	1484	9474	85.0	130.0
NY STATE	135	0.00	0	67	382	0	67	382	92.0	154.0
CONNECTICUTT ST	136	0.00	0	0	244	0	0	244	115.0	154.0
DELAWARE STATE	137	0.00	0	2644	3471	0	3173	4165	-2.0	53.0
PA STATE	138	0.00	0	61	970	0	61	970	-15.0	120.0
UNITED STATES	139	0.00	0	188	3523	0	188	3523	-30.0	35.0
BUCKS COUNTY	140	0.00	0	19242	8526	0	23860	12107	36.5	85.5
CHESTER COUNTY	141	0.00	0	885	677	0	1053	948	0.0	79.0
DELAWARE COUNTY	142	0.00	0	3415	5109	0	3517	5978	12.0	67.0
MONTGOMERY COUNTY	143	0.00	0	2924	5029	0	3216	7041	20.0	83.5
Philadelphia *										
PHILA CBD	145	2.52	0	558	30471	0	541	32604	22.2	71.3
LOWER NE PHILA	146	27.88	0	3193	6484	0	3065	6549	25.7	75.3
UPPER NE PHILA	147	27.50	0	1595	2301	0	1531	2669	29.5	79.5
N/NW & W PHILA	148	58.29	0	4028	16632	0	3867	16632	20.0	73.2
W & SW PHILA	149	28.00	0	1984	12384	0	1905	12756	19.0	68.0

* Note: For the external zones, employed residents and employment are actually the predetermined productions and attractions.

Figure 10 Comparison of Estimated and Census Work Trips - 1980

PART A - 1980 CENSUS DISTRICT-TO-DISTRICT TRIP TABLE SUMMARY

		1	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL
BURL	1	82299	22958	1411	10659	1178	18	216	1155	299	8107	9904	7941	4322	150467
CAMDEN	2	13871	104030	8752	1100	2481	91	811	221	986	16836	20578	7272	2016	179045
GLOU	3	1895	15655	36152	199	1632	89	2826	45	2640	5404	6602	3568	546	77253
MERCER	4	2300	361	56	100616	90	0	14	282	14	413	507	4010	16507	125170
ATLANTIC	5	510	1630	604	120	61694	1572	2522	384	222	531	654	715	351	71509
CAPE MAY	6	66	243	96	33	4111	18642	593	11	77	299	367	411	325	25274
CUMB	7	65	526	983	67	2142	336	40411	27	1732	115	142	352	72	46970
OCEAN	8	1665	336	49	2645	2223	126	99	66160	45	220	265	920	36207	110960
SALEM	9	131	464	1735	63	201	31	2205	19	15312	140	173	2310	41	22825
CBD	10	115	362	42	45	18	6	3	10	11	0	0	0	0	612
PHILA	11	2188	6873	796	860	341	112	61	196	202	0	0	0	0	11629
PA SUB	12	3137	5651	1536	16150	390	181	241	211	2096	0	0	0	0	29593
No. JER	13	1231	662	632	18518	711	190	1076	7730	114	0	0	0	0	30864
TOTAL		109473	159751	52844	151075	77212	21394	51078	76451	23750	32065	39192	27499	60387	882171

PART B - 1980 AGMCD MODEL DISTRICT-TO-DISTRICT TRIP TABLE SUMMARY

		1	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL
BURL	1	80975	23876	1623	12698	1339	41	336	1055	291	5460	9134	7584	7550	151962
CAMDEN	2	12203	100513	13011	1484	1782	50	874	113	725	18487	17396	5184	1724	173546
GLOU	3	1529	14112	34142	487	1429	66	3115	54	2103	4893	8004	4670	632	75236
MERCER	4	3637	470	63	100633	56	0	33	278	32	389	806	3203	15060	124660
ATLANTIC	5	707	1331	817	425	63948	1502	3465	309	335	497	833	664	628	75461
CAPE MAY	6	45	106	61	18	3487	21129	804	19	105	79	117	123	51	26144
CUMB	7	155	484	937	146	1294	432	39673	22	2637	318	561	2080	66	48805
OCEAN	8	2838	706	217	3263	2326	79	230	61578	71	650	1073	950	35541	109522
SALEM	9	73	426	1507	86	146	20	1897	3	14787	372	705	3317	30	23369
CBD	10	55	408	60	21	2	0	4	0	8	0	0	0	0	558
PHILA	11	1857	6366	1273	870	88	5	89	36	205	0	0	0	0	10789
PA SUB	12	5495	4298	2163	13709	174	13	353	152	2987	0	0	0	0	29344
No. JER	13	2344	1088	212	21790	185	0	14	5192	10	0	0	0	0	30835
TOTAL		111913	154184	56086	155630	76256	23337	50887	68811	24296	31145	38629	27775	61282	880231

Travel Projections

To project the number of work trips that will be made on an average weekday in 1995 is the next step in the process. The 1995 population, employed residents and employment data gathered and agreed upon by the counties was submitted to the AGMCD travel simulation model. The results of this process were the zone-to-zone work trip estimates for 1995.

For 1995, the AGMCD model was run using the same parameters and impedance table as had been used for 1980. Doing this permitted the isolation of the effects of growth in population and jobs. However, there were some differences between the 1980 and 1995 runs. Most importantly, since the model dynamically determines the future area type of each zone based on the projected densities, some zones "moved" from one area type classification to another (ie, from rural to suburban). The result of this re-classification meant that trips would be produced and attracted at different rates than they were in the base year 1980.

Figure 11 shows the results of the 1995 simulation of work trip travel on a county-to-county basis (Part A). Also shown are the amount and percentage change in trip movements (Parts B and C, respectively). The model predicted a total growth in home to work trips for the study area of more than 237,000 trips. The growth in trip origins from a county (row totals) reflects the growth in population, while the growth in trip destinations to a county (column totals) reflects the growth in jobs.

The largest increases in work trip travel (home to work) can be identified in Part B of the figure. In all cases, except Cumberland and Salem Counties, the largest gains will be in intra-county travel. This follows the normal pattern where most county residents work within their home county. However, in the case of Cumberland and Salem Counties, the pattern is much different. Cumberland will experience less growth in intra-county trips and, in fact, will see more new trips being made to Atlantic County than new trips to the "home" county. Salem County will actually experience a very slight decrease in intra-county work trips, with all of its work trip growth being distributed to every one of the other areas except Cumberland County. In both cases, the cause of this variance from the normal pattern is the lack of growth in jobs within the county.

The largest increases in inter-county work trip travel will occur between the following county pairs:

Ocean to Atlantic	8,000
Burlington to Camden	6,900
Cape May to Atlantic	6,800
Gloucester to Camden	5,600
Camden to Burlington	4,900
Cumberland to Atlantic	3,500
Camden to Gloucester	3,300
Ocean to Burlington	2,600
Ocean to Mercer	2,500

Atlantic County appears as a destination three times in this list, drawing large numbers of new workers from Ocean, Cape May and Cumberland counties. Ocean County also appears as an origin three times, sending its new residents to work in Burlington and Mercer counties, in addition to Atlantic County. Also to be noted is the exchange of workers between the Camden, Gloucester and Burlington counties as both employment and population expand in these counties.

Two other pairings will experience considerable growth in work trip travel. More than 10,000 new workers living in Ocean County will commute to the counties north of them by 1995. This represents the largest single inter-county cell in the growth matrix, but must be viewed with the understanding that this destination represents all of northern New Jersey, including numerous dense counties near Ocean County. The other significant pairing is between the North Jersey counties and Mercer County. Two-thirds of the growth in work trips from the northern counties into the study area (over 2500 trips) will be destined to Mercer County.

Figure 11 1995 Estimated Trips and Trip Growth

PART A - 1995 AGMCD MODEL DISTRICT-TO-DISTRICT TRIP TABLE SUMMARY

		1	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL
BURL	1	106129	30765	2153	14454	3486	51	218	1251	190	5392	8500	9103	7912	189604
CAMDEN	2	17101	124324	16299	1683	5092	68	570	144	484	17592	15653	5676	1898	206584
GLOU	3	2288	19742	44742	623	3278	85	2430	82	1653	5098	7747	4888	738	93394
MERCER	4	4803	592	86	121522	207	1	18	332	19	395	779	4029	15820	148603
ATLANTIC	5	620	1359	793	304	94965	1063	1917	202	149	312	494	484	378	103040
CAPE MAY	6	76	159	102	18	10324	29141	637	25	93	77	110	134	57	40953
CUMB	7	408	1153	1989	299	4749	794	42883	55	2907	554	909	2794	108	59602
OCEAN	8	5478	1227	378	5801	10278	138	196	95519	63	893	1373	1618	45703	168665
SALEM	9	179	796	2799	150	541	36	1779	9	14665	528	927	3998	43	26450
CBD	10	59	387	61	18	6	0	1	0	3	0	0	0	0	535
PHILA	11	1958	5961	1281	762	203	7	41	35	109	0	0	0	0	10357
PA SUB	12	7524	5166	2772	15920	464	19	245	185	2743	0	0	0	0	35038
No. JER	13	2660	1231	243	24336	477	1	5	5650	3	0	0	0	0	34606
TOTAL		149283	192862	73698	185890	134070	31404	50940	103489	23081	30841	36492	32724	72670	1117431

PART B - 1980 TO 1995 ESTIMATED GROWTH IN DISTRICT-TO-DISTRICT TRIPS

		1	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL
BURL	1	25154	6889	530	1756	2147	10	-118	196	-101	-68	-634	1519	362	37642
CAMDEN	2	4898	23811	3288	199	3310	18	-304	31	-241	-895	-1743	492	174	33038
GLOU	3	759	5630	10600	136	1849	19	-685	28	-450	205	-257	218	106	18158
MERCER	4	1166	122	23	20889	151	1	-15	54	-13	6	-27	826	760	23943
ATLANTIC	5	-87	28	-24	-121	31017	-439	-1548	-107	-186	-185	-339	-180	-250	27579
CAPE MAY	6	31	53	41	0	6837	8012	-167	6	-12	-2	-7	11	6	14809
CUMB	7	253	669	1052	153	3455	362	3210	33	270	236	348	714	42	10797
OCEAN	8	2640	521	161	2538	7952	59	-34	33941	-8	243	300	668	10162	59143
SALEM	9	106	370	1292	64	395	16	-118	6	-122	156	222	681	13	3081
CBD	10	4	-21	1	-3	4	0	-3	0	-5	0	0	0	0	-23
PHILA	11	101	-405	8	-108	115	2	-48	-1	-96	0	0	0	0	-432
PA SUB	12	2029	868	609	2211	290	6	-108	33	-244	0	0	0	0	5694
No. JER	13	316	143	31	2546	292	1	-9	458	-7	0	0	0	0	3771
TOTAL		37370	38678	17612	30260	57814	8067	53	34678	-1215	-304	-2137	4949	11388	237200

PART C - 1980 TO 1995 PERCENTAGE GROWTH IN DISTRICT-TO-DISTRICT TRIPS

		1	2	3	4	5	6	7	8	9	10	11	12	13	TOTAL
BURL	1	31%	29%	33%	14%	160%	24%	-35%	19%	-35%	-1%	-7%	20%	5%	25%
CAMDEN	2	40%	24%	25%	13%	186%	36%	-35%	27%	-33%	-5%	-10%	9%	10%	19%
GLOU	3	50%	40%	31%	28%	129%	29%	-22%	52%	-21%	4%	-3%	5%	17%	24%
MERCER	4	32%	26%	37%	21%	270%	0%	-45%	19%	-41%	2%	-3%	26%	5%	19%
ATLANTIC	5	-12%	2%	-3%	-28%	49%	-29%	-45%	-35%	-56%	-37%	-41%	-27%	-40%	37%
CAPE MAY	6	69%	50%	67%	0%	196%	38%	-21%	32%	-11%	-3%	-6%	9%	12%	57%
CUMB	7	163%	138%	112%	105%	267%	84%	8%	150%	10%	74%	62%	34%	64%	22%
OCEAN	8	93%	74%	74%	78%	342%	75%	-15%	55%	-11%	37%	28%	70%	29%	54%
SALEM	9	145%	87%	86%	74%	271%	80%	-6%	200%	-1%	42%	31%	21%	43%	13%
CBD	10	7%	-5%	2%	-14%	200%	0%	-75%	0%	-63%	0%	0%	0%	0%	-4%
PHILA	11	5%	-6%	1%	-12%	131%	40%	-54%	-3%	-47%	0%	0%	0%	0%	-4%
PA SUB	12	37%	20%	28%	16%	167%	46%	-31%	22%	-8%	0%	0%	0%	0%	19%
No. JER	13	13%	13%	15%	12%	158%	0%	-64%	9%	-70%	0%	0%	0%	0%	12%
TOTAL		33%	25%	31%	19%	76%	35%	0%	50%	-5%	-1%	-6%	18%	19%	27%

IV. TRANSIT POTENTIAL

The process of determining the transit potential of existing and new service areas begins with a close examination of the projected travel flows in the year 1995. The work trip table produced in the preceding tasks serves as the foundation for this analysis since commuter trips represent between 60% and 85% of the trips on a typical line-haul transit route. Where there exists a significant number of work trips being made to a concentrated location from a series of zones along a linear corridor, there exists the potential for successful transit service.

The simulated trip tables were analyzed from a number of different perspectives to identify high potential service areas. To efficiently examine the commuter flows embodied in these trip tables, realizing there are over 20,000 different possible combinations, the study focused its attention on four factors. The first three concentrate on where people are trying to go, the fourth on where they are coming from. In looking at where people are going, attention is given to those zones expected to experience the most significant growth in new work trips, those areas with the largest amounts of work trip destinations, and those areas with the highest densities of commuter travel. Finally, a close look is taken at the zones that send their workers to the high intensity work zones.

By making such an examination, the study hopes to recognize an underlying pattern of commuter travel which can help define a conceptual plan for a new transit system structure for South Jersey.

Most Trip Growth

First, the zones were ranked according to the magnitude of trip origins, destinations, growth in origins, growth in destinations, and density of destinations. These rankings focus attention on those locations with the greatest intensity of commuter activity. The top 20 zones in the categories of Total Work Trip Destinations, Growth in Destinations, and Density of Destinations are listed in Figure 12.

One way of looking for new service areas or where service should be strengthened is to identify where the largest numbers of new jobs will be located. Part A of Figure 12 shows that Atlantic City will be by far the single largest location of new work trip destinations between 1980 and 1995. With nearly 42,000 new commuters to serve, this is a location that should attract considerable attention.

The next biggest "gainer" of new work trips will be the Dover Township - Toms River area of Ocean County. Though this area is projected to gain a fourth of the Atlantic City increase, it is nearly four times the size of the Atlantic City zone. This means that the trips are likely to be far less concentrated than in Atlantic City. However, three of the other top 20 zones are in the Dover area, known as the Route 9 Corridor. These zones represent a significant amount of the job growth of South Jersey.

The third largest attractor of new work trips will be Cherry Hill in Camden County. Even more significant than the 8,400 new commutes into this zone is the observation that five other zones in the top 20 are adjacent to Cherry Hill along the Route 73 Corridor.

The other large growth zones are scattered about each of the other counties except Cape May, Cumberland and Salem. A point of curiosity: since this data was generated, Congress has acted to close Fort Dix. The large growth in work trips projected for that zone will, in actuality, become a significant loss.

Greatest Total Trips

Looking at job growth will not tell the full story of where transit service is needed. Areas which gain significant new jobs may still be smaller employment areas than more established areas. Therefore, it is still important to look at those locations with the greatest total jobs. Part B of Figure 12 shows that in 1995

Atlantic City will be the single largest employment site in all of South Jersey. The two other locations, Cherry Hill and the Dover area, discussed above also show up near the top of this listing.

Three new locations are brought into focus when looking at total trip destinations: South Jersey's other two large cities, Trenton and Camden, and the Philadelphia Central Business District (CBD). These three cities have long been the primary employment locations for South Jersey residents. This table indicates that they will continue to be important economic centers into the future.

Most of the remaining zones in Part B are the same zones that were in Part A. Apparently, those that have will be those that get, in this case new jobs. This indicates that employment growth is mostly a matter of adding to existing centers and expanding at their peripheries.

Highest Trip Densities

Transit functions best in areas of sufficient density where the travel needs of many can be satisfied by the limited path of the transit vehicle. Therefore, Part C of Figure 12 ranks the zones in order of work trip destinations per square mile. Though this is a crude measure when applied to zones of such large areas as is the case with some of the South Jersey zones, it does help to focus attention on certain very high density areas.

Here can be seen the significance of the Philadelphia CBD as the transit center of the region. It is nearly twice as dense as Atlantic City in work trip destinations and that is only considering the trips projected to be made by New Jersey residents. Such densities, in the confined space of 2.5 square miles, increase the probability tremendously that there will be a significant number of trips coming form the same locations and that they can be served by transit service. Furthermore, with more than 280,000 jobs in the CBD, the potential for trip growth is a real possibility. This study has assumed a certain proportion of the CBD jobs will be filled by New Jersey residents based on prior trends. A significant change in travel access to these jobs from New Jersey would significantly alter the number of work trips and increase the density even more.

The three South Jersey cities also top the list in Part C. Each has had a history of transit service. Each has concentrations of employment within limited subsections of the city that rival the density noted for the Philadelphia CBD (ie, NJ commuters only). The same observations made can be applied to these cities, including the potential for attracting new transit trips.

The other zones in Part C are all served by NJ TRANSIT and/or PATCO (though Bridgeton is not well served). However, it is interesting to note that each is served more as a residential work trip origin rather than an non-residential work trip destination. Pennsauken contains vast industrial and commercial business parks, Woodbury is a bustling county seat and regional center, Collingswood and Haddonfield and older town centers with gentrified business districts, and Gloucester City is an older port/factory center making the transition in a changing business climate.

Figure 12 Work Trip Destination Rankings

Part A - Top 20 Zones by Trip Growth - 1995 to 1980 Change in Work Trip Destinations

1	Atlantic City	42,200	11	Gloucester Twp	4,200
2	Dover Area	10,200	12	Pennsauken-Merchantvl	3,800
3	West Windsor	9,700	13	Hamilton (Mercer)	3,800
4	Cherry Hill	8,300	14	Mt Laurel	3,400
5	Lawrence	7,600	15	Evesham	3,400
6	Brick Area	7,000	16	Medford Area	3,200
7	Lakewood	6,000	17	Burlington Area	3,100
8	Voorhees-Gibbsboro	4,700	18	Winslow-Chesilhst	3,000
9	New-No Han-Wrigstn	4,500	19	Deptford-Wenonah	2,600
10	Moorestown	4,400	20	Higtstw-E Windsor	2,600

Part B - Top 20 Zones by Total Trips - 1995 Work Trip Destinations

1	Atlantic City	71,100	11	Princeton Area	21,000
2	Trenton	55,100	12	Brick Area	20,800
3	Cherry Hill	39,500	13	Lawrence	20,600
4	Camden	36,100	14	New-No Han-Wrigstn	20,600
5	Dover Area	32,700	15	Lakewood	17,200
6	Phila CBD (NJ only)	30,800	16	Moorestown	16,700
7	Pennsauken-Merchantvl	29,400	17	West Windsor	16,400
8	Hamilton (Mercer)	25,800	18	Burlington Area	14,100
9	Ewing	24,800	19	Higtstwn-E Windsor	12,800
10	Vineland	24,100	20	Gloucester Twp	12,500

Part C - Top 20 Zones by Trip Density - 1995 Trips Per Sq. Mile

1	Phila CBD (NJ only)	12,200	11	Maple Shade	1,700
2	Trenton	7,300	12	Audubon Pk-Oaklyn	1,700
3	Atlantic City	6,000	13	Ewing	1,600
4	Camden	4,200	14	Cherry Hill	1,600
5	Pennsauken-Merchantvl	2,600	15	Palmyra-Riverton	1,600
6	Woodbury-City-Hts	2,600	16	Pleasantville	1,500
7	Collingswood-Wdlyn	2,500	17	Somerdl-Stratfd-Hi Nel	1,500
8	Haddonfield-Tav	1,900	18	Bridgton	1,500
9	Westville	1,900	19	Barrington-Had Hts	1,400
10	Glouc City-Brklwn	1,800	20	Riverside-Delanco	1,300

Significant Commuter Flows

The next step in determining the transit potential of South Jersey looked at the top 20 zones which feed workers to the high intensity employment zones. The zones chosen for this analysis include the Atlantic City, Trenton, Camden, Cherry Hill, the Dover area, and the Philadelphia CBD. Figure 13 lists the top 20 origin zones for each employment location and the projected number of work trips in 1995.

It should be noted immediately that the number one "supplier" of workers to any of these zones is the zone itself. Referred to as intrazonal trips, they represent the workers who are able to live in close proximity to their jobs. Most commuters would like to minimize the distance they have to travel every day to work. If work is available in the area and housing is suitable and sufficient then there will always be a significant proportion of intrazonal work trips. The following discussion will, therefore, address the non-intrazonal trip flows.

To help explain the commuter flows, Figures 14 through 19 display the flows as "desire lines" on close-up maps of each high intensity zone.

Atlantic City workers are projected to be coming from the surrounding shore communities of Atlantic County, from the north in Ocean County and south in Cape May County along the Garden State Parkway, and from the west along the Black and White Horse Pikes, the AC Rail Line and the Expressway. There is also a significant number of trips coming from the Vineland zone.

Based on the population forecasts developed by the county for use in this study, there appears to be a sufficiency of employed residents to meet a sizable proportion of the demands for labor in the growing Atlantic City economy. Eighty-five percent of the nearly 71,000 employee trips projected to be made to the city are shown in this data. However, that still leaves over 10,000 work trips not satisfied by this area which will be made from even longer distances.

One limitation of the data for Atlantic City is that the methodology and data resources used in this study do not permit the estimation of travel flows by skill level of worker or by job type. If affordable housing is not available to Atlantic City workers in the communities identified, then the work trips will be less from these areas and greater from other communities farther away.

Trenton workers are projected to come from the surrounding communities of Mercer County and Bucks County in Pennsylvania, along the Route 1 Corridor into North Jersey, and from each of the counties adjacent to Mercer County. However, nearly 60% of the work trips into Trenton will be made by residents of either Trenton itself or one of the three neighboring townships of Hamilton, Ewing or Lawrence. Another 20% are projected to come from beyond the study area, most notably Bucks County and areas up along US 1.

One limitation of the data for Trenton derives from the location of the city in relation to the rest of the study area. Trips from areas beyond the study area had to be aggregated into large zones representing vast and diverse populations and jobs in order to make the task of forecasting travel flows manageable. This makes it less clear where trips to/from these areas are actually based. Because Mercer County is nearly surrounded by non-study areas and the proximity of Trenton to the edge of the study area, great detail is not available on Trenton's tripmaking. Fortunately, NJ TRANSIT is conducting other studies which focus on Mercer County.

Work trips to Camden City come from all across Camden County, as well as northern Gloucester and western Burlington counties. Camden also receives a number of work trips from sections of Philadelphia. There are two notable groupings of trips coming into Camden. The largest comes from neighboring Pennsauken and Cherry Hill townships, thirty to forty year old communities which spread out along Routes 70, 38 and 130 (north). The other group is comprised of older, more densely developed, suburban communities clustered along Routes 30 and 130 (south). However, the list only totals to 75% of Camden's work trip origins, indicating that there are many more zones which contribute workers to its economy.

Figure 13 Feeder Zones to High Intensity Employment Zones

Work Trips to Atlantic City in 1995

1	Atlantic City	10,900	11	Mullica-Egg City	1,800
2	Vent-Mar-Long	7,600	12	Stafford	1,500
3	Galloway-Pt Rep	6,800	13	Upper Twp	1,500
4	Brigantine	5,600	14	Somers Pt	1,500
5	Egg Harbor Twp	5,000	15	Northfield	1,200
6	Pleasantville	3,300	16	Linwood	1,000
7	Ocean City	2,700	17	Barnegat-Ocean	900
8	Little Egg Area	2,500	18	Hammonton-Folsom	800
9	Hamilton	2,200	19	Winslow-Chesilhrst	700
10	Absecon	1,900	20	Vineland	700

Work Trips to Trenton in 1995

1	Trenton	15,900	11	New-No Han-Wrigstn	700
2	Hamilton	10,600	12	Pemberton Area	600
3	Bucks County	6,900	13	Warren/Hunterdon	600
4	Ewing	3,900	14	Burlington Area	600
5	Lawrence	1,700	15	Princeton Area	500
6	Somerset/Middlesex	1,500	16	Mans-Spring-Chest	500
7	NJ Northern Tier	1,200	17	Higtstwn-E Windsor	500
8	Field-Borden Area	1,000	18	West Windsor	400
9	Monmouth	900	19	Florence	400
10	Penngtn-Hopewell	900	20	Willingboro	400

Work Trips to Camden City in 1995

1	Camden	7,600	11	W Deptford-Nat Pk	700
2	Cherry Hill	2,800	12	Barrington-Had Hts	600
3	Pennskn-Merchantvl	2,400	13	Deptford-Wenonah	600
4	Collngswd-Wdlyn	1,900	14	Lower NE Phila	600
5	Glouc City-Brklwn	1,200	15	Evesham	600
6	N/NW & W Phila	1,100	16	Washington	500
7	Belmwr-Mt Eph-Runn	1,100	17	Voorhees-Gibbsboro	500
8	Gloucester Twp	1,100	18	Maple Shade	500
9	Audubon-Pk-Oaklyn	900	19	Bucks County	500
10	Haddon Twp	900	20	W & SW Phila	500

Figure 13 Feeder Zones to High Intensity Employment Zones (continued)

Work Trips to Cherry Hill in 1995

1	Cherry Hill	9,100	11	Camden	900
2	Maple Shade	2,300	12	Lindenwd-Laurel Sp	900
3	Evesham	2,100	13	Medford Area	900
4	Voorhees-Gibbsboro	1,800	14	Somerdl-Stratfd-Hi	800
5	Gloucester Twp	1,500	15	Belmwr-Mt Eph-Runn	800
6	Pennskn-Merchantvl	1,400	16	Lawnside-Magnolia	700
7	Haddonfield-Tav	1,300	17	Audubon-Pk-Oaklyn	600
8	Mt Laurel	1,200	18	Collngswd-Wdlyn	600
9	Barrington-Had Hts	1,000	19	Washington	600
10	Haddon Twp	1,000	20	Cinnaminson	500

Work Trips to the Dover Area in 1995

1	Dover Area	15,900	11	NJ Northern Tier	200
2	Berkeley Area	8,300	12	Somerset/Middlesex	60
3	Brick Area	3,100	13	Plumsted	50
4	Lacy	1,200	14	Little Egg Area	50
5	Manchester Area	800	15	NY City	50
6	Lakewood	800	16	New-No Han-Wrigstn	50
7	Monmouth	600	17	Pemberton Area	50
8	Barnegat-Ocean	400	18	Long Bch Island	40
9	Jackson	400	19	Bucks County	30
10	Stafford	200	20	Hamilton	20

Work Trips to the Phila. CBD in 1995

1	Camden	2,700	11	Deptford-Wenonah	800
2	Cherry Hill	2,100	12	Audubon-Pk-Oaklyn	700
3	Pennskn-Merchantvl	1,500	13	Washington	700
4	Collngswd-Wdlyn	1,400	14	Haddonfield-Tav	700
5	Lindenwd-Laurel Sp	1,300	15	Evesham	600
6	Gloucester Twp	1,200	16	Barrington-Had Hts	600
7	Haddon Twp	1,000	17	Maple Shade	500
8	W Deptford-Nat Pk	900	18	Somerdl-Stratfd-Hi	500
9	Belmwr-Mt Eph-Runn	900	19	Glouc City-Brklwn	500
10	Voorhees-Gibbsboro	900	20	Mt Laurel	500

The limitations to Camden's data are somewhat similar to the limitations with the Trenton data. That is, the proximity of Camden to the edge of the study area restricts the detail of trips beyond the border. Fortunately, Camden lies at the heart of the DVRPC region and is, therefore, well covered by an ongoing planning process.

The work trip desire lines for Cherry Hill radiate around the zone like a star burst, somewhat evenly distributed in all directions. The township absorbs workers from communities all around. This diffuse pattern, combined with the large area of the zone, helps explain the high levels of traffic experienced on area roadways. It also shows the difficulty of trying to provide traditional transit service to even a large suburban work center like Cherry Hill.

One limitation of the Cherry Hill data might have been the large size of the zone masking a possible high density concentration of employment. In fact, however, Cherry Hill's jobs are spread across most every section of the township. It is this lack of a concentrated employment center that makes it nearly impossible for traditional transit to attract a sufficient number of riders from their private autos to make a noticeable decrease in traffic congestion.

The work trip desire lines for the Dover area are very different than Cherry Hill's. Fewer in number with any appreciable magnitude, these lines indicate a very limited source of origins. Whereas Cherry Hill receives 75% of its work trips from the top 20 zones, Dover receives 84% from just three zones: the Dover Area itself, the Berkeley Area, and the Brick Area. However, these zones are quite large and actually represent a comparable total land area.

What is striking about the Dover data is the orientation of the commuter travel desire lines along the Parkway and County Route 549. It is such linear development patterns that tend to complement transit service.

New Jersey residents working in the Philadelphia CBD come from all over South Jersey. The top 20 zones of origin are heavily dominated by Camden County zones, reflecting the high concentration of population, the historical relationship to Philadelphia, and the presence of the PATCO Lindenwold High Speed Line. However, three major zones in Gloucester County along the freeways of I-295 and NJ 42, West Deptford, Deptford and Washington townships, are also among the top contributors. Burlington County also is represented by three zones in the list, two "young" townships, Evesham and Mount Laurel, and the more established community of Maple Shade.

The list of Philadelphia CBD origins in Figure 13 accounts for only 65% of the New Jersey based work trips. The remaining 35% fill-in most of the zones in the urban core.

One limitation of the data for the Philadelphia CBD is that for this study the total number of work trip destinations to that location was predetermined based on prior trends. The number is reasonable given the data sources used and assuming no change from current conditions. However, if there were a significant change in accessibility to the CBD from South Jersey, such as another high speed line or major freeway, then New Jersey residents could be expected to hold a larger proportion of Center City jobs than projected.

Pattern of Commuter Travel

What emerged from this investigation of zonal trip projections is an understanding of the limited number of high intensity commuter corridors with significant amounts of daily travel and the abundance of much smaller commuter flows throughout the remainder of the study area. The predominant characteristic of commuter travel in South Jersey is that the vast majority of trips are made within the vicinity of the home zone. This is not an unusual characteristic. Rather it is to be expected that most people will try to live as close to their jobs or work as close to their homes as possible. This is generally modified by two circumstances: the presence of a major city or other employment concentration that will draw workers from longer distances or the lack of jobs near the home which forces workers to travel longer distances to seek employment.

FIGURE 14

NJ TRANSIT

MAJOR WORK TRIP FLOWS - 1995
TO ATLANTIC CITY (in thousands)

.5 - 1	4 - 5	8 - 9
1 - 2	5 - 6	9 - 10
2 - 3	6 - 7	
3 - 4	7 - 8	10 - 11

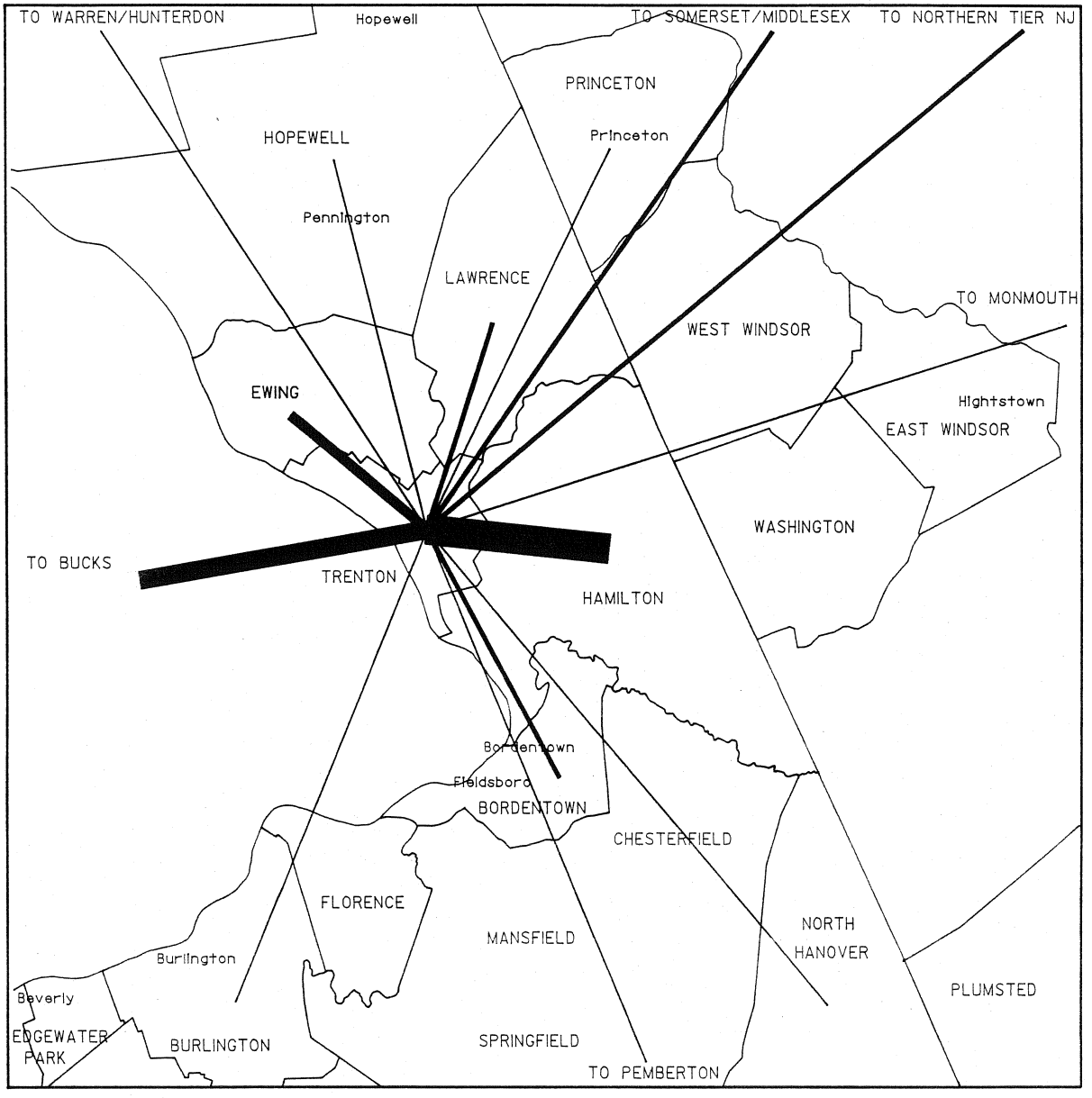


FIGURE 15

NJ TRANSIT

MAJOR WORK TRIP FLOWS - 1995
TO TRENTON (In thousands)

.5 - 1	4 - 5	8 - 9
1 - 2	5 - 6	9 - 10
2 - 3	6 - 7	
3 - 4	7 - 8	10 - 11

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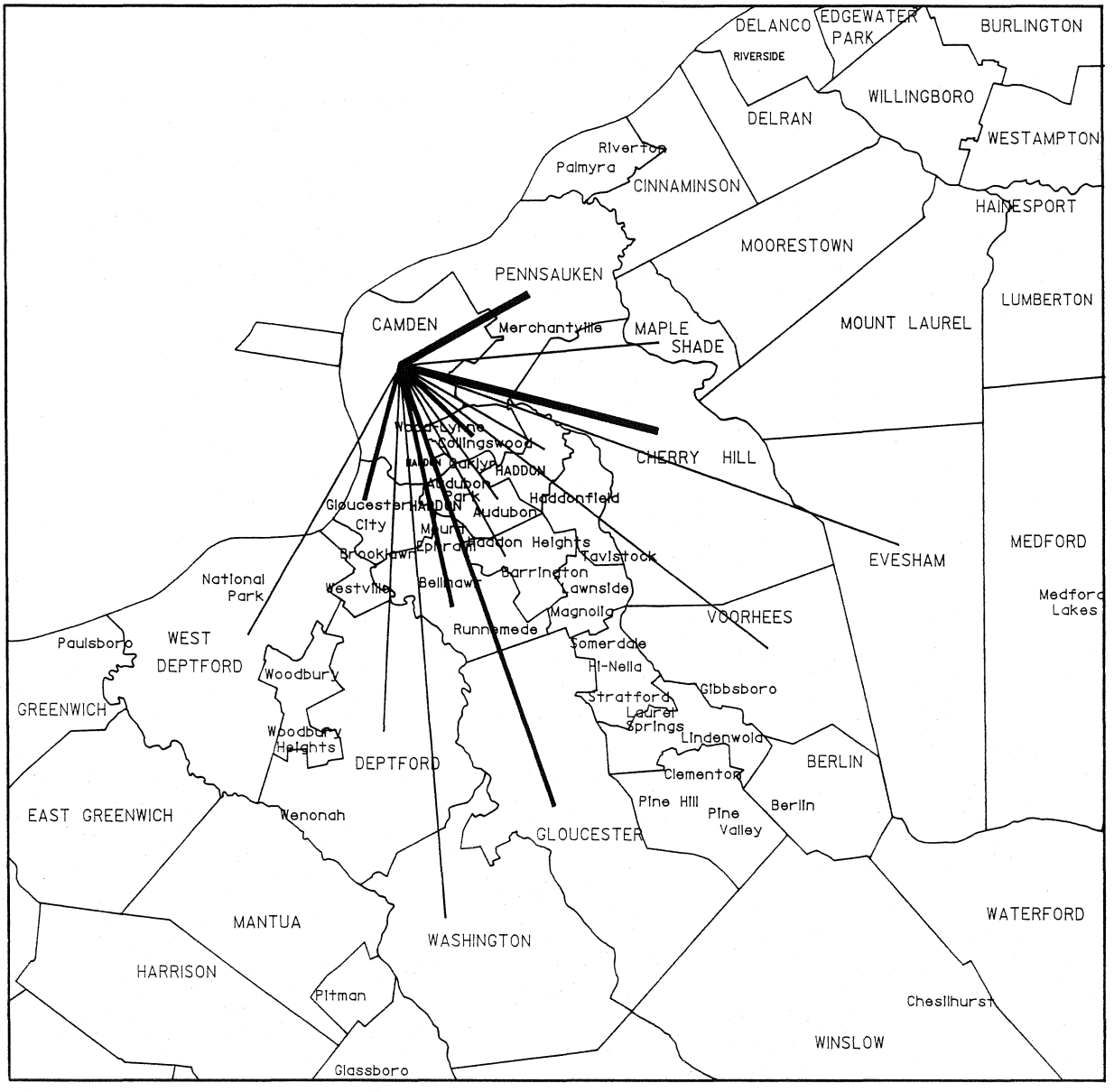

FIGURE 16

NJ TRANSIT

MAJOR WORK TRIP FLOWS - 1995
TO CAMDEN (in thousands)

.5 - 1	4 - 5	8 - 9
1 - 2	5 - 6	9 - 10
2 - 3	6 - 7	
3 - 4	7 - 8	10 - 11

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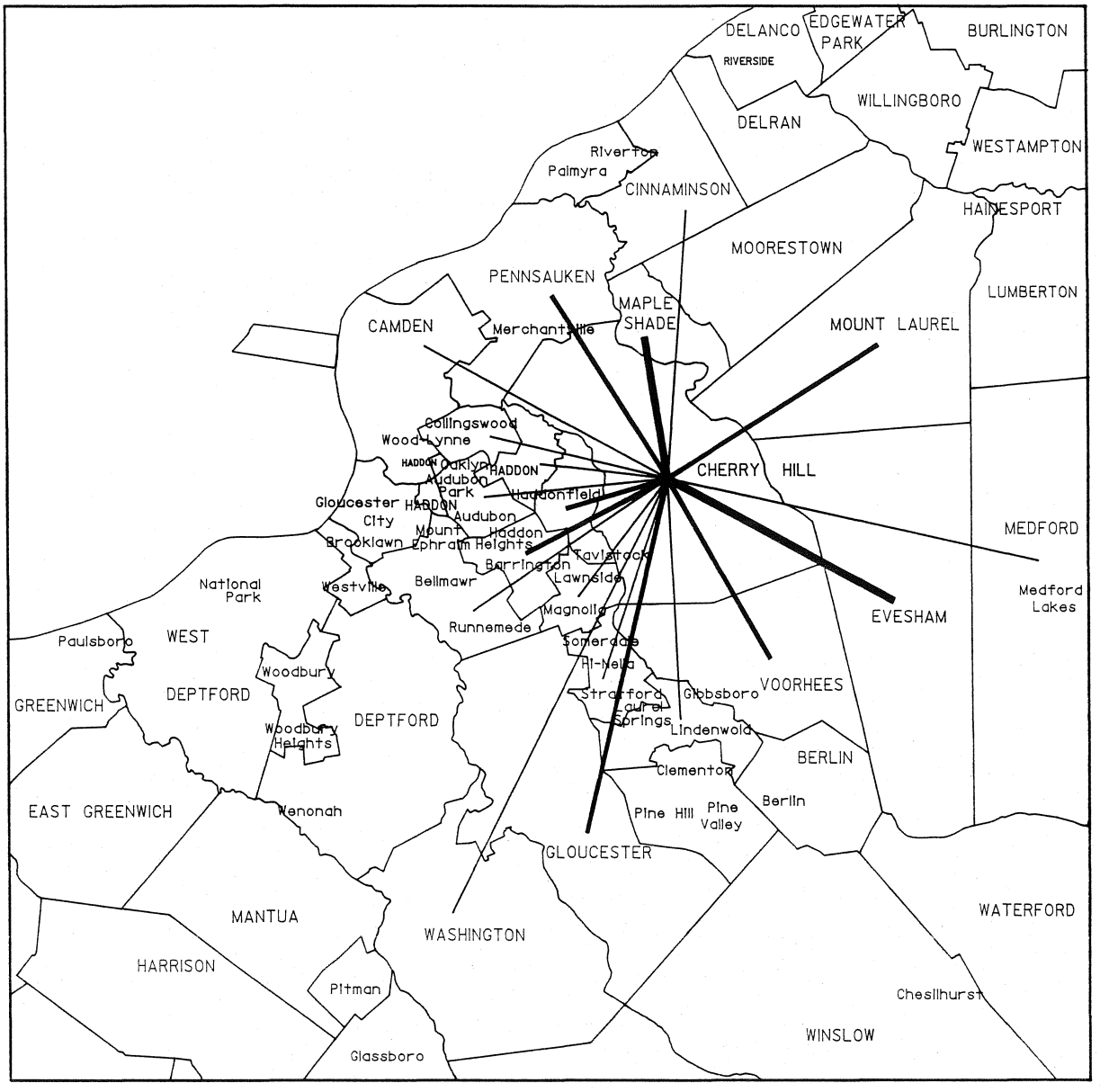

FIGURE 17

NJ TRANSIT

MAJOR WORK TRIP FLOWS - 1995
TO CHERRY HILL (in thousands)

.5 - 1		4 - 5		8 - 9	
1 - 2		5 - 6		9 - 10	
2 - 3		6 - 7			
3 - 4		7 - 8		10 - 11	

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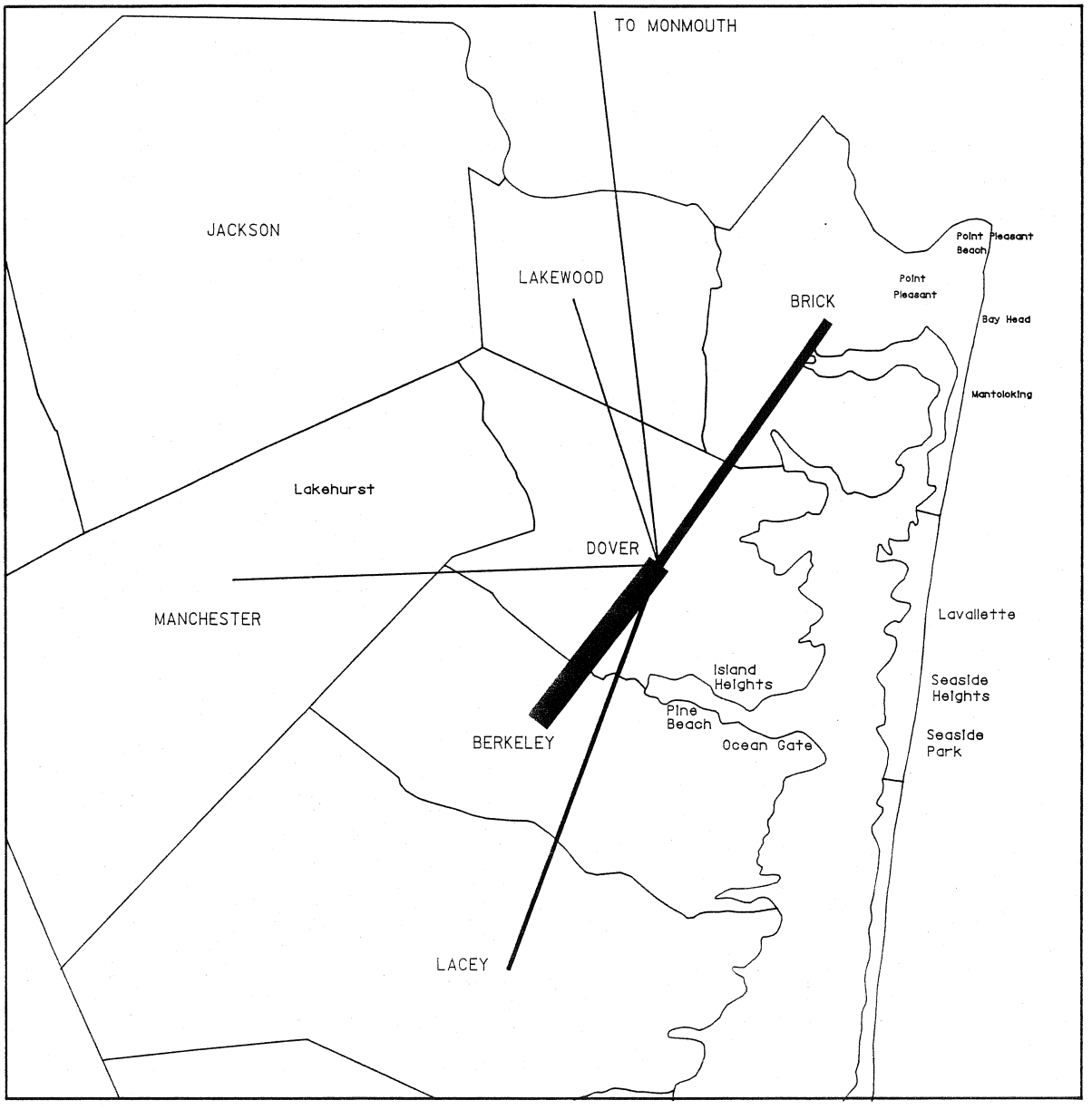

FIGURE 18

NJ TRANSIT

MAJOR WORK TRIP FLOWS - 1995
TO DOVER (in thousands)

.5 - 1	4 - 5	8 - 9
1 - 2	5 - 6	9 - 10
2 - 3	6 - 7	
3 - 4	7 - 8	10 - 11

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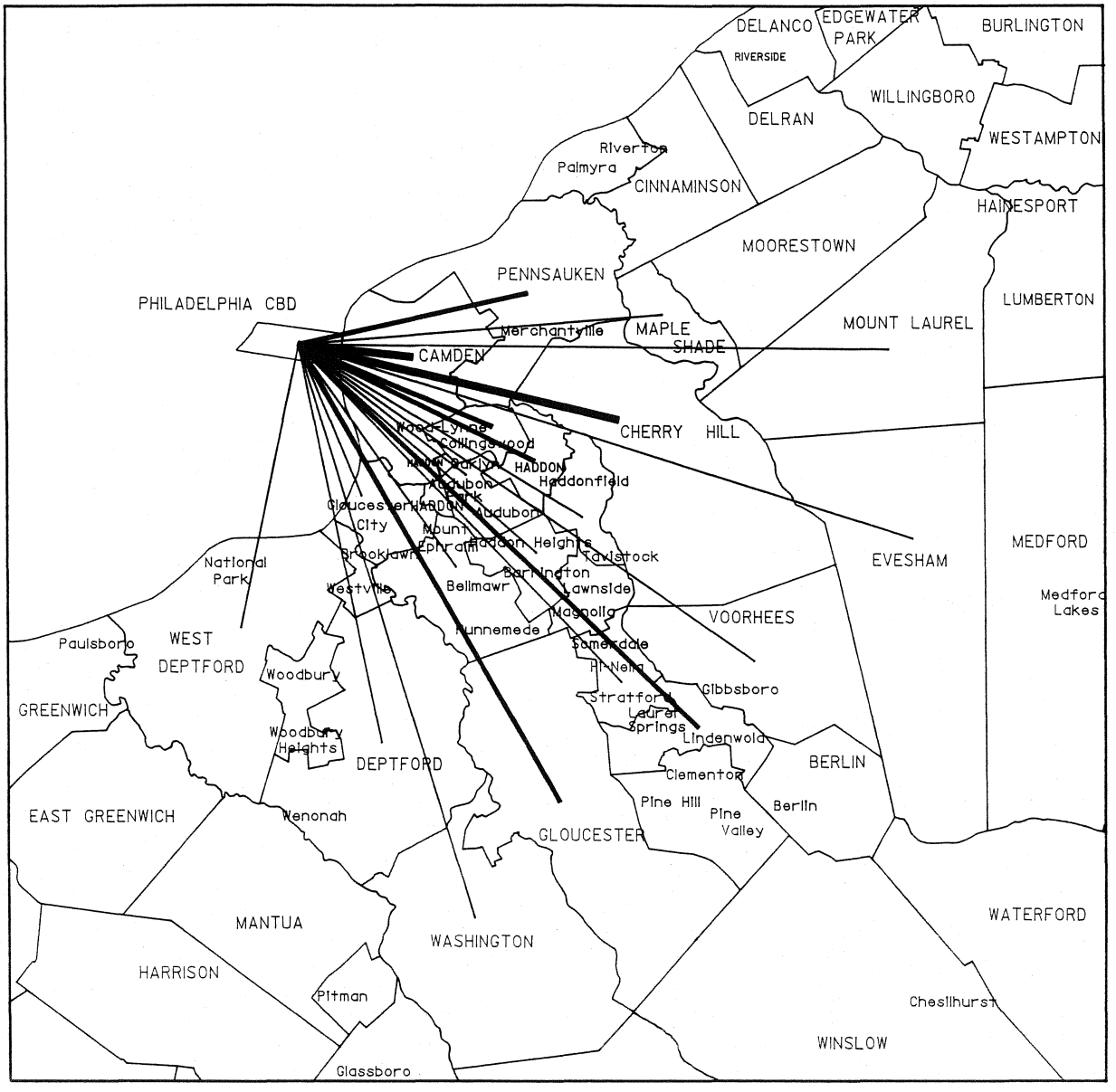


FIGURE 19

NJ TRANSIT

MAJOR WORK TRIP FLOWS - 1995
TO PHILADELPHIA CBD (in thousands)

.5 - 1	4 - 5	8 - 9
1 - 2	5 - 6	9 - 10
2 - 3	6 - 7	
3 - 4	7 - 8	10 - 11

PREPARED BY
DELAWARE VALLEY REGIONAL PLANNING COMMISSION

From the various examinations of commuting patterns discussed above comes the recognition of three major categories of zones from the viewpoint of commuter destinations. The first tier includes the major cities of Atlantic City, Trenton, Camden and the Philadelphia central business district that appear near the top of each list, where very significant numbers of trips are destined to concentrated locations and where sizable numbers of new trips are expected to be made. The second tier encompasses those other regional centers with somewhat lower, but still appreciable, concentrations of work trip destinations which also will experience new trip growth. Included in this group are places like Cherry Hill, Toms River, Pennsauken, Princeton, and Woodbury. These two tiers also contain much of the region's shopping, cultural and entertainment opportunities. To this group should be added the major regional shopping malls. The third tier is comprised of all those locations with low, yet recognizable, concentrations of trip destinations: the scattered new development complexes, the struggling older towns, the strip development corridors, and other more isolated job sites.

Providing effective transit service to these three tiers may require that three different approaches be taken. Whatever the approach, the objectives remain the same. Service should be targeted to each market in a manner that meets the accessibility needs of the commuter, getting from one point to another at the desired time, while offering the trip at a price and speed that is reasonably competitive with making the trip by auto. The extent that these objectives are met will determine whether a sufficient proportion of riders who can afford to choose their mode of travel will to be attracted to the service. The final objective is that the service should be provided in a cost effective manner by an operator who can match the demands of the commuter with both the riders' and taxpayers' ability to pay.

Applying this target market approach to service planning might suggest the following three types of service:

1. Point-to-point line haul routes operating over exclusive rights-of-way or on major arterial highways providing high speed, limited stop service at a premium fare. These routes could be either rail (PATCO-type rapid transit, light rail or commuter rail) or express bus (in busway, designated lanes or mixed traffic). Service, operated from the suburban regional centers and park & ride facilities to the major cities, would be peak period intensive and targeted to the longer distance commuter.

   Service might be provided as an express bus lane on the Route 42 Freeway, rail service along the Conrail right-of-way between Camden-Woodbury-Glassboro or between Camden-Moorestown-Mt Holly, an I-295/I-195 express bus route between Woodcrest-Trenton or between Trenton-Dover.

2. Corridor line haul routes operating along major radial highways or a well defined circumferential highway providing frequent, highly visible, continuous service. Similar to portions of some existing NJ TRANSIT routes (ie, F,7,G, etc), these routes would operate between regional hubs, supplying mid-distance and local service limited to the route corridor. At the regional hubs, these routes would make connections with the point-to-point routes.

   This service could operate along such corridors as Route 537 between Moorestown-Camden, on Route 551 between Woodbury-Camden, on Route 168 between Camden-Blackwood, on Route 30 between Berlin-Camden or many other arterial corridor roads which connect regional centers.

3. Local collector/distributor routes operating on minor arterial roads providing service between compact neighborhoods, isolated villages, activity centers, government centers, etc. These short routes also provide the connecting links to the point-to-point and corridor routes. These routes serve the great need for purely local transport and might best be designed, operated and partly subsidized by the localities they serve.

   Parts of many NJ TRANSIT routes provide some of this service today. However, it may not be prudent to burden a statewide transit operator with these responsibilities. Rather, some of these route segments could be combined with expanded versions of the many county and municipal shuttle services or possibly contracted to private carriers. Coordination of these services with the point-to-point and corridor services is critical to the implementation of a complete transit system.

V. ESTIMATION OF RIDERSHIP POTENTIAL

Throughout the course of DVRPC's work on this NJ TRANSIT study, it was obvious that the orientation of travel toward the Philadelphia CBD and central Camden City from the suburbs remains a significant factor in the region. Therefore, a closer examination was undertaken to see if there might be sufficient ridership potential to warrant the construction of one or more fixed guideway facilities. This section of the report discusses the results of that examination for the two corridors radiating outward from the CBD toward Burlington and Gloucester Counties. Also examined was the corridor extending from the Cherry Hill area toward Trenton.

In planning studies of this nature, the objectives are to determine which corridors might warrant a fixed guideway transit facility and the potential of that system to achieve certain thresholds of ridership. Therefore, the terminology of estimating ridership potential, rather than estimating actual ridership, is used. Ridership potential seeks to determine the type of system (rail, bus, etc.) and the scale of service that could be supported by a new facility. The estimates of potential are given as order of magnitude ranges rather than specific ridership numbers. Detailed ridership estimates are then developed in follow-up Alternatives Analysis / Draft Environmental Impact Statement (AA/DEIS) studies for those corridors where high capital cost, fixed guideway facilities are contemplated. For bus system and other non-fixed facility proposals, the order of magnitude estimates are sufficient to guide implementation since the service generally can be easily tailored to match the actual demand.

Each of the corridors examined has unique attributes that warrant individualized analyses. A number of different approaches were applied to understand the ridership potential of a given corridor. These included:

- assessing the corridor in light of the ridership levels experienced in similar corridors,
- modelling the market share for transit in relation to the distance from a transit route and the distance from the destination,
- varying the market share for transit with respect to the type of transit service that is offered, and
- adjusting the estimates of prior studies based on new projections for corridor population and employment.

In each of the discussions that follow, the term ridership is used. To avoid confusion that often occurs when stating ridership figures, the term is defined to mean the number of transit system boardings made on an average weekday. This definition also means the number of trips taken on the system. The numbers, therefore, represent twice the number of persons using the system.

Gloucester County Corridor

This corridor had been the focus of a 1984 study by the New Jersey Department of Transportation and the DVRPC titled the "Gloucester County Corridor Study". The corridor extended from Gloucester City to below Glassboro. That study concluded that a PATCO-type rail line extending from Camden to the Deptford Mall via NJ 42/55 would attract an average weekday ridership of 16,000 in the year 2000, more than one third (40%) the ridership on the Lindenwold line (40,000).

A comparison of the population and employment projections developed by this study with those used in the 1984 study (adjusted to the common year of 1995) revealed that the corridor population is now expected to be about 4.9% less than forecasted earlier, while employment in the Philadelphia CBD may be as much as 10% less. Simply applying these factors to the original ridership estimate would yield a revised estimate of 13,700 average weekday riders. Though this revised estimate would be

86% of the 1984 estimate, the line might still be expected to carry about one third (34%) as many riders as the Lindenwold line.

A second approach to reviewing the 1984 ridership estimate was employed. Using 1980 Census Journey-to-Work data, a relationship was established between the distance from a commuter's home to the nearest rail station versus the percent of work trips reportedly using rail. This relationship was further stratified by the overall distance between the commuter's home and the place of work. The data showed that the closer one lives to a rail service, the higher the likelihood of using transit. In addition, the further the commuter lives from the work place, the greater the probability of using the transit facility. Figure 20 graphically depicts this relationship.

This method was applied to the travel demand data forecasted by the current study for both the Gloucester Corridor and for the PATCO Lindenwold corridor. With this approach, the ridership on a PATCO-type line to Deptford Mall was estimated to be slightly more than a third (34%) of the Lindenwold line ridership or 13,600 daily riders.

The percent-by-distance method was also used to estimate the ridership that might be attracted to the facility if it were extended to Glassboro, either via NJ 55 or via the Conrail right-of-way. In both of these cases, ridership would approach half of the Lindenwold ridership (18,700 - 47% and 19,700 - 49%, respectively).

Based on these analyses, it is likely that a PATCO-type facility extended into the Gloucester County Corridor could attract between 13,000 and 20,000 daily riders, depending on the alignment.

Burlington County (Route 38) Corridor

This corridor had been the subject of a study by NJ DOT and DVRPC in 1984 titled the "Burlington County Corridor Study". This was a companion study the Gloucester County Corridor Study discussed above which employed the same methodologies and database. The 1984 study concluded that a PATCO-type rail line extending from Camden to the Moorestown Mall via the old PRSL right-of-way and certain new right-of-way sections would attract an average weekday ridership of 12,500 in the year 2000, or just less than one third (31%) of the Lindenwold line ridership.

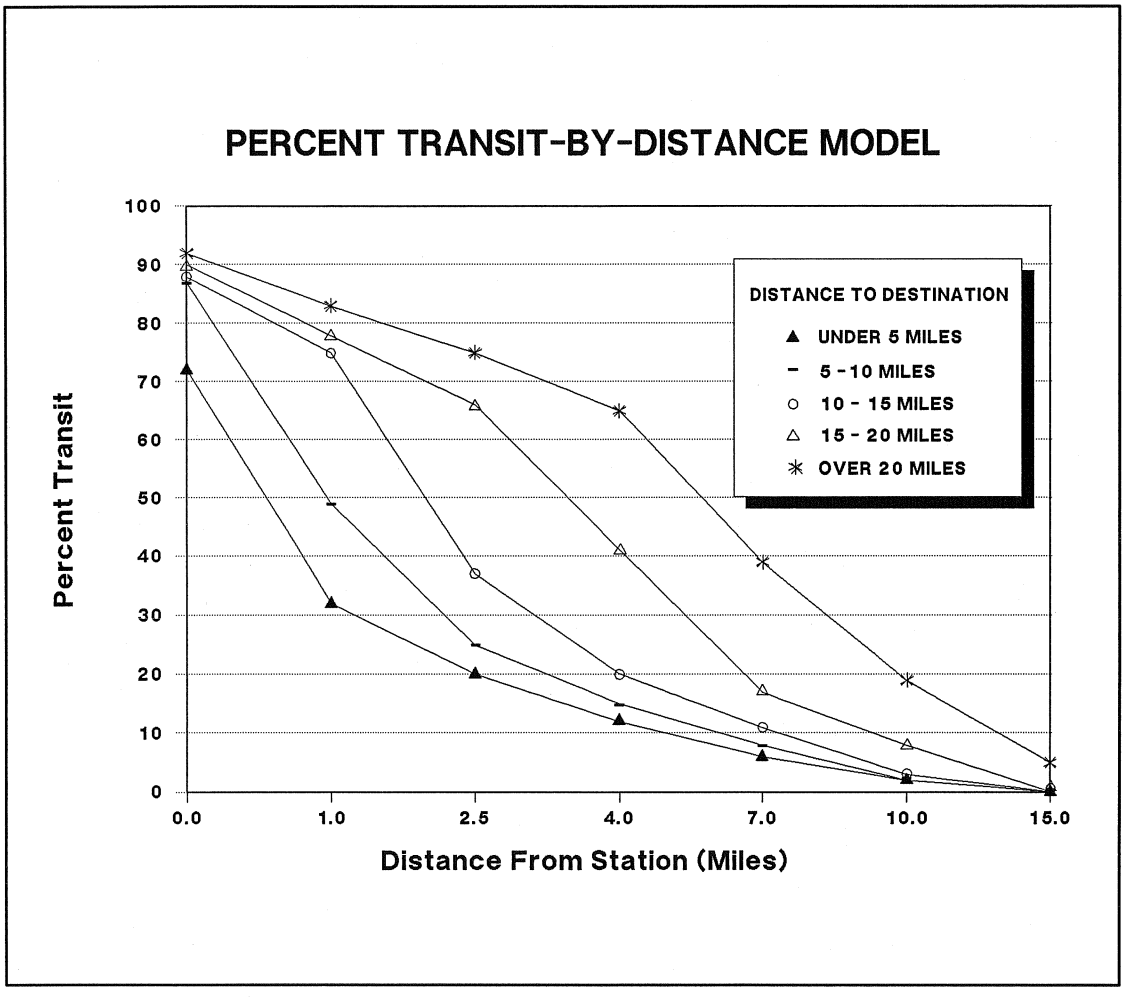
A comparison of the population and employment projections developed by this study with those used in the 1984 study (adjusted to the common year of 1995) revealed that the corridor population is now expected to be about 1.5% less then forecasted earlier, while employment in the Philadelphia CBD, as mentioned above, may be as much as 10% less. Simply applying these factors to the original ridership estimate would yield a revised estimate of 11,100 average weekday riders. Since this revised estimate would be 89% of the 1984 estimate, the line might be expected to carry less than one third (28%) as many riders as the Lindenwold line.

The percent-by-distance method (discussed above) was applied to the travel demand data forecasted by the current study for the Route 38 Corridor and compared to that for the PATCO Lindenwold corridor. With this approach, the ridership on a PATCO-type line to Moorestown Mall was estimated to be more than a third (35%) of the Lindenwold line ridership or 13,900 daily riders.

The percent-by-distance method was also used to estimate the ridership that might be attracted to if the line were extended to the Mount Holly area. In this case, ridership would exceed half (52%) of the Lindenwold ridership or 20,700 daily riders.

Based on these analyses, it is likely that a PATCO-type facility extended into the Burlington County (Route 38) Corridor could attract between 11,000 and 21,000 daily riders depending on the length of the extension.

Figure 20


PERCENT TRANSIT-BY-DISTANCE MODEL
Percent Transit
100
90
80
70
60
50
40
30
20
10
0
0.0
1.0
2.5
4.0
7.0
10.0
15.0
Distance From Station (Miles)
DISTANCE TO DESTINATION
UNDER 5 MILES
5 - 10 MILES
10 - 15 MILES
15 - 20 MILES
OVER 20 MILES

Cherry Hill to Trenton Corridor

This corridor was suggested by members of the study advisory committee. Later, interest in the corridor arose as an outgrowth of an operational analysis of the Atlantic City Rail Line (ACRL) that was seeking to connect the ACRL with North Jersey rail service. At issue in the operational analysis was whether it was more cost effective to use the AMTRAK Northeast Corridor tracks via a new connection at Frankford Junction in Philadelphia just over the Delair Bridge or to use Conrail's Bordentown secondary tracks along the New Jersey side of the Delaware River via new connections at Delair and Trenton. The suggested added advantage of the Bordentown route was the opportunity to provide rail service to the communities along the line between Pennsauken and Trenton.

DVRPC examined the 1995 trip table for the corridor to determine the order of magnitude of trips that may utilize rail service. Not surprisingly, the work trips destined to Trenton are very heavily weighted to zones in Mercer and northeastern Burlington counties. One third of the trips are projected to come from the Bordentown - Fieldsboro area, while less than 10% would come from the Cherry Hill - Pennsauken area.

Three different approaches were applied to estimate the level of ridership that might be expected on rail service run over the Bordentown line. The percent-by-distance method was adjusted to account for the lower level of service to be offered compared to a PATCO-type service. This procedure estimated that less than 1000 daily trips would be attracted to the line.

A second approach looked at potential percent transit adjusted by the proportion of the origins and destinations served. This crude method presumes that someone living next to a station and travelling to a work location next to another station would have some theoretical probability of taking the train based on the distance to the destination and the level of service. The method factors this probability by the estimated proportions of origins and destinations within the "service envelope", ie, one quarter to one half mile of the destination station, one half to one mile of the origin station. This somewhat subjective method estimated that 500 daily trips might be made on the line.

Finally, the ridership levels on other rail lines were examined in order to make a comparative estimate. In particular, the SEPTA Trenton Line (R7) was examined. That line, with more service to Trenton from a corridor more dense than the Bordentown Line corridor, only carried 800 riders in 1980 between Torresdale and Trenton. The 18 mile trip took 24 minutes for an effective speed of 44 mph. Twenty-one trains served each direction daily. DVRPC compared station boardings to service area population for the R7 corridor. Applying those rail trips per capita rates to the Bordentown corridor yielded an estimated 650 daily trips. However, this level of ridership assumes the same level of service as provided on the R7 line, three times the service contemplated for the Bordentown line.

Therefore, it might be expected that rail service operating over the Bordentown secondary between Cherry Hill and Trenton, with its extended travel time of 85 minutes, three stations and low frequency, would attract at most 500 to 1000 riders daily. This estimate also presumes that duplicative bus service along the corridor would be terminated. It should be noted that the present bus service offers a higher frequency than that proposed for the rail line and with comparable travel times.

Summary of Ridership Potential

	Average Weekday Ridership Potential
Gloucester County Corridor	13,000 - 20,000
Burlington County (Route 38) Corridor	11,000 - 21,000
Cherry Hill to Trenton Corridor	500 - 1,000