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# Infrastructure Needs Assessment

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The Draft Preliminary  
State  
Development  
AND  
Redevelopment  
Man  
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INFRASTRUCTURE NEEDS ASSESSMENT

This technical memorandum quantifies selected state capital infrastructure needs and projected revenue patterns. Infrastructure, as defined in the State Planning Commission Act, includes the following: water, sewer, transportation, solid waste, flood protection/storm water management; shore protections, and education. Capital Improvements can be defined as those sites and facilities which are associated with the expansion or retention of existing physical system. Capital Improvements do not include operational items such as personnel salaries, depreciation of equipment, and debt service.

The information presented in this memo was gathered utilizing a two step process. First, over 20 personal interviews were conducted with representatives of state agencies, educational institutions, and authorities. The purposes of these interviews were to assess the capital planning and revenue distribution process and to assess the cost of infrastructure required report forecasted growth. The second step was to conduct telephone interviews with additional officials and authority-personnel. During both of these steps, data acquired during the oral interviews and additional data was requested in writing. In addition, all preliminary data was reviewed with Office of State Planning personnel.

The data collected during the in-person and telephone interview processes has several weaknesses. First, the planning horizon year of

2010 usually exceeded any agency or authority capital planning or need projections. The gap between projections and the horizon year was filled utilizing a number of techniques which included trend analysis, calculation of ratios between usage levels and capital program/need, and preliminary internal staff projections. The second weakness was that some authorities or agencies do not utilize capital program/need projections. In these cases, trend data was the only basis for projections. A third weakness involved the availability of data on a sub-state basis. For instance, major maintenance cost associated with small public/private water purveyors was not available. For roads/ bridges, water, sewer, and flood control/storm drainage a 1984 report assembled by the State of New Jersey County and Municipal Government Study Commission was utilized to assess need at a sub-state level. A fourth problem involved the inconsistency of projections in terms of years and dollars. Where necessary, projections were redefined in 1985 constant dollars. Also, projections were grouped into short-and long-term periods -- 1983-1993 and 1994-2010. A fifth weakness occurred for those projections not based upon any agency/authority master plan. Agencies such as the Department of Transportation and Department of Environmental Protection (Division of Water Resources; both have adopted plans upon which projections were based. However, many agencies/ authorities do not have adopted master plans. The sixth and last weakness involved the inability of some agencies/authorities to release internal projections or estimates. This makes projecting capital expenditures difficult, if at all possible by outside technicians.

Infrastructure is grouped based upon its relative importance to converting raw land to urban densities. The following is a listing of the groups, ranked in descending order starting with those with the greatest impact on growth:

Transportation  
State/County/local roads and bridges  
NJ Turnpike Authority  
HJ Highway Authority  
NJ TRANSIT  
Aviation  
Freight  
Delaware River Port Authority  
Delaware River and Bay Authority

**Sewer age**  
State program  
Passaic Valley Authority

Hate      Supply/Distribution  
          NJ Hater Supply Authority  
          North Jersey Hater Supply Commission

Flood Protection/Haste Hater Management  
\* State program

Solid Haste  
\* State program

Shore Protection  
\* State program

Education  
\* State program

The following paragraphs summarize projected capital needs and revenues for each of the above Infrastructure types.

#### Transportation

Although the Department of Transportation has the legislative responsibility to develop and maintain a statewide transportation system plan, there are numerous governmental bodies, autonomous authorities, and agencies involved in serving the transportation interests of the

state. The following paragraphs discuss each of these differing group's capital need and revenue projections.

State. County. Local Roads/Bridges

New Jersey's road system is extensive and represents a massive public investment by the citizens of the state. Over the years, the system has grown significantly; today it amounts to over 2,200 miles of state roads and over 31,000 miles of county, municipal and other roads. An integral part of this roadway system is the 6,000 bridges which are located throughout the state, of which almost 2,200 are under state jurisdiction. The replacement cost of this road system is estimated to be more than \$20 billion.-\*/

Local streets and roads are those roads which fall under the jurisdiction of a municipality. Local streets and roads make up the predominant component of the state's road and highway network, accounting for 92 percent of the state's center have miles (linear road miles independent of the number of lanes) and nearly 53 percent of all vehicle miles traveled in New Jersey each year\*/. Over half of all municipal road miles are in suburban municipalities (as defined by the Division of State and Regional Planning), with one quarter in urban municipalities and another in municipalities characterized as rural.

County roads by definition are those roads falling under the<sup>1</sup> jurisdiction of the individual county's. In 1982, County roads totaled

- I/ 1984 New Jersey Transportation Plan.
- II From 1982 Survey of County and Municipal Study Commission of County/Municipal officials.

6,818 center lane tiiles and accounted for 35 percent of all state vehicle miles.

In terms of state roads, and bridges (county, state and agency), this Infrastructure can be defined ln terns of reoccurring and non-reoccurring. Reoccurring need is annual maintenance performed on state roadways (including interstates). Non-reoccurring need is made UD of three components: 1) capacity improvements such as road widenings; 2) non-Interest freeway gaps; and 3) Interstate gaps.

Projected Revenue. Recently the Governor unveiled the Trust Fund Renewal Program, a program of Innovative financing methods designed to pump \$3.2 billion dollars Into New Jersey's transportation infrastructure over a four year period (1988-1991). This rehabilitation and Improvement program would encompass the state highway system, the state public transportation system (NO TRANSIT), and provide aid to local governments for highway and public transit purposes.-/

The sources of revenue supporting this Initiative are presented in Table 1. The bulk of the funds are projected to come from a new five cent gasoline tax. Although this program has not been approved, for the purposes of projecting future revenue, lt has been assumed that this program will be available and that annual funding levels will continue

I/ New Jersey Transportation Trust Fund Proposed Renewal (12/1/86).

to 2010 at a level which equals future need. Between 1988-1993 the Department of Transportation is projected to receive \$5.3 billion or \$875 Billion annually, and between 1994-2010 total revenue is projected to be \$3.98 billion or again \$234 Billion per year.

Table 1. ROAD/BRIDGE REVENUE FORECASTS, NEW JERSEY, 1988-2010

| Revenue Source                         | Trust Fund II <sup>1/</sup> |                  |                  |                  |                  |                  | 1988-1993          |                    | 1994-2010          |                     |
|--|-----------------------------|------------------|------------------|------------------|------------------|------------------|--------------------|--------------------|--------------------|---------------------|
|  | 1988                        | 1989             | 1990             | 1991             | 1992             | 1993             | Total Revenue      | Avg Annual Revenue | Total Revenue      | Avg. Annual Revenue |
| State General Fund                     | \$88,000                    | \$88,000         | \$88,000         | \$88,000         | \$88,000         | \$88,000         | \$528,000          | \$88,000           | \$518,000          | \$30,000            |
| Existing heavy truck registration fees | 30,000                      | 30,000           | 30,000           | 30,000           | 30,000           | 30,000           | 180,000            | 30,000             | 177,000            | 10,000              |
| Toll road authorities <sup>2/</sup>    | 25,000                      | 25,000           | 25,000           | 25,000           | 25,000           | 25,000           | 150,000            | 25,000             | 150,000            | 9,000               |
| New revenues <sup>3/</sup>             | 195,000                     | 195,000          | 195,000          | 195,000          | 195,000          | 195,000          | 1,170,000          | 195,000            | 1,147,000          | 67,000              |
| Trust Fund Authority financing         | 187,000                     | 187,000          | 187,000          | 187,000          | 187,000          | 187,000          | 1,122,000          | 187,000            | 1,102,000          | 65,000              |
| Federal funding                        | 455,000                     | 455,000          | 455,000          | 455,000          | 455,000          | 455,000          | 2,730,000          | 455,000            | 2,678,000          | 158,000             |
| Less NJ TRANSIT Allocation             | 105,000                     | 105,000          | 105,000          | 105,000          | 105,000          | 105,000          | 630,000            | 105,000            | 1,785,000          | 105,000             |
| <b>Total</b>                           | <b>\$875,000</b>            | <b>\$875,000</b> | <b>\$875,000</b> | <b>\$875,000</b> | <b>\$875,000</b> | <b>\$875,000</b> | <b>\$5,250,000</b> | <b>\$875,000</b>   | <b>\$3,987,000</b> | <b>\$234,000</b>    |

Notes: Data in thousands of 1986 constant dollars.

- <sup>1/</sup> Proposed Trust Fund II revenues. Assume annual revenues for 1994-2010 period equal total projected need.
- <sup>2/</sup> Collections from authorities (Trust Fund II):  
 Garden State Parkway \$0.025 on every \$0.25 collected.  
 NJ Turnpike Authority \$0.02 on every \$0.25 collected.  
 Atlantic City Expressway \$0.04 on every \$0.25 collected.
- <sup>3/</sup> Five cent increase on gasoline tax (Trust Fund II).

Sources: New Jersey Department of Transportation and Hamner, Siler, George Associates.

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Table 2. STATE ROAD/BRIDGE CAPITAL REVENUE/NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Need/Revenue               | 1988      | 1989      | 1990      | 1991      | 1992      | 1993      | 1988-1993          |                         | 1994-2010          |                         |
|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------|-------------------------|--------------------|-------------------------|
|                            |           |           |           |           |           |           | Total Revenue/Need | Avg Annual Revenue/Need | Total Revenue/Need | Avg Annual Revenue/Need |
| <b>Recurring Need</b>      |           |           |           |           |           |           |                    |                         |                    |                         |
| State road roads           | NA                 | NA                      | NA                 | NA                      |
| Local/County roads 1/      | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$429,000          | \$71,500                | \$1,216,000        | \$71,500                |
| Subtotal                   | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$429,000          | \$71,500                | \$1,216,000        | \$71,500                |
| <b>Non-recurring Need</b>  |           |           |           |           |           |           |                    |                         |                    |                         |
| State/County bridges 2/    | NA        | NA        | NA        | NA        | NA        | NA        | \$5,597,000        | \$932,833               | \$0                | \$0                     |
| State roads 3/             | NA        | NA        | NA        | NA        | NA        | NA        | \$2,338,000        | \$389,667               | \$2,338,000        | \$138,000               |
| State road construction 4/ |           |           |           |           |           |           |                    |                         |                    |                         |
| Capacity improv.           | NA        | NA        | NA        | NA        | NA        | NA        | \$151,000          | \$21,571                | \$0                | \$0                     |
| Non-Interstate gap         | NA        | NA        | NA        | NA        | NA        | NA        | \$210,000          | \$30,000                | \$431,000          |                         |
| Interstate gap             | NA        | NA        | NA        | NA        | NA        | NA        | \$210,000          | \$30,000                | \$609,000          | \$36,000                |
| Non-recurring Subtotal     | 0         | 0         | 0         | 0         | 0         | 0         | \$8,506,000        | \$1,215,143             | \$609,000          | \$36,000                |
| <b>Total</b>               | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$71,500  | \$8,935,000        | \$1,276,429             | \$3,987,000        | \$235,000               |
| <b>Project revenues 5/</b> | \$875,000 | \$875,000 | \$875,000 | \$875,000 | \$875,000 | \$875,000 | \$5,250,000        | \$875,000               | \$3,987,000        | \$235,000               |
| Surplus (deficit) gap      | \$803,500 | \$803,500 | \$803,500 | \$803,500 | \$803,500 | \$803,500 | (\$3,685,000)      | (\$526,429)             | \$0                | \$0                     |

1/ Defined by Municipal Government Study Commission.

2/ See Appendix Table A-1.

3/ The Governor's Management Improvement Program report cited a current state road rehab backlog of \$2.3 million and projected improvement life to last 13 years. Based upon this schedule this rehab program would need to be repeated during 1994-2010.

4/ Assume completion of 35% of the program in Period I (1988-1993) and 65% completion in Period II (1994-2010).

5/ Derived in Table 1.

Notes: Data in thousands of 1966 constant dollars.

Sources: State of New Jersey County and Municipal Government Study Commission, "New Jersey Local Infrastructure: An Assessment of Needs"; Governor's Management Improvement Program, Inc., "Report to the State of New Jersey"; and Hamner, Siler, George Associates.

Projected Need. Needs can be grouped into recurring and non-recurring. Recurring needs are defined as annual needs required to maintain the system. Non-recurring need is a one-time or periodic expenditure for such items as road completion, bridge rehabilitation or, expressway expansions. These two types of needs are summarized in Table 2.

Recurring local and county road need as projected in a report by the County and Municipal Government Study Commission. In this report total need between 1988-1993 is \$429 million and between 1994-2010 is 1.2 billion.

Non-recurring need can be subdivided into state/county bridge need and state road need. Need for both of these groups is summarized in Table 2. Total state/county bridge need is projected to total over \$5.5 billion between 1988-1993 (see Appendix Table A-1 for calculations). The appendix table presents cumulative bridge need over the period 1988-1998. It is assumed that bridge repairs will be made by on or before 1993.

<sup>1</sup> OSP Editor's Note (1/88);

<sup>1</sup> A Revaluation of local and county bridge and road needs has been prepared in the OSP TRD on "Infrastructure Needs Assessment-Transportation". 1/88 This recalculation yields a higher figure than \$3.9 billion for total road and bridge needs, and for the short-term revenue gap (\$111 billion, and \$5.9 billion respectively).

Table 10. STATE AVIATION CAPITAL NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Revenue Source 1/ 2/ | 1988                | 1989               | 1990               | 1991               | 1992               | 1993               | 1988-1993           |                    | 1994-2010            |                    |
|----------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|----------------------|--------------------|
|                      |                     |                    |                    |                    |                    |                    | Total Need          | Avg Annual Need    | Total Need           | Avg Annual Need    |
| Federal              | \$10,573,447        | \$8,471,386        | \$6,115,950        | \$7,383,060        | \$8,136,000        | \$8,136,000        | \$48,815,643        | \$8,135,974        | \$138,312,000        | \$8,136,000        |
| State                | 877,413             | 644,630            | 529,775            | 520,170            | 643,000            | 643,000            | 3,857,968           | 642,998            | 10,931,000           | 643,000            |
| Local                | 1,501,413           | 592,630            | 1,152,775          | 790,170            | 998,000            | 998,000            | 6,032,968           | 1,005,498          | 16,966,000           | 998,000            |
| <b>Total</b>         | <b>\$12,952,273</b> | <b>\$9,708,646</b> | <b>\$7,798,500</b> | <b>\$8,693,400</b> | <b>\$9,777,000</b> | <b>\$9,777,000</b> | <b>\$58,706,819</b> | <b>\$9,784,470</b> | <b>\$166,209,000</b> | <b>\$9,777,000</b> |

Notes: Data in 1986 constant dollars.

1/ Post 1991 projections based upon average annual 1988-1991 Department capital need projections.  
 2/ See Appendix Table D-1 for listing of projects for 1988-1991.

Sources: New Jersey Department of Transportation -- Division of Aeronautics; and Hamner, Siler, George Associates.

Non-recurring state road needs include capacity improvements, non-Interstate completions, and Interstate completions. It is assumed that total non-recurring state road needs, as defined in the Governor's Management Improvement study, will be phased over the 1988-2010 period, since this total amount is likely to be too ambitious to complete by 1993.

The addition of recurring and non-recurring need equal total need which is projected to total over \$8.9 billion during 1988-1993 and over \$5.2 billion during 1994-2010. This total need is subtracted from projected revenues derived in Table 1 to produce a total revenue deficit of over \$3.6 billion or \$526 million annually. During 1988-1993 a surplus is projected of \$9.6 billion or \$569 billion annually during 1994-2010. It should be noted that the surplus is based upon continuation of Trust Fund II revenue.

#### New Jersey Turnpike Authority

The Authority was created by the State legislature in 1948. Its primary function was to build a 118-mile Turnpike from the Delaware Memorial Bridge to the George Washington Bridge, thereby linking Delaware, New Jersey, and New York. Since its opening in 1952 the Turnpike has been widened to 12 lanes along its northern 35 miles. In its first year of operation 17.9 million vehicles used the Turnpike. By 1984 this figure had increased to 156 million vehicles.

Capital Expenditure Trends. Capital expenditures between 1980-1987 are subdivided into maintenance expenditures and capacity increasing expenditures (see Table 3). During this period the Authority spent a

total of \$208 million dollars or \$26 million annually. During this period capacity Improvements Included the 1966 widening program and the beginning drawdowns of the 1985 \$2 billion widening program.

Table 3. NEW JERSEY TURNPIKE AUTHORITY CAPITAL EXPENDITURE TRENDS, NEW JERSEY, 1980-1987

| Type of Expenditure                   | 1980                | 1981                | 1982               | 1983                | 1984                | 1985                | 1986                | 1987                | 1980-1987            |                     |
|---------------------------------------|---------------------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---------------------|
|                                       |                     |                     |                    |                     |                     |                     |                     |                     | Total Expend         | Avg Annual Expend   |
| Capital Expenditures <sup>1/</sup>    | \$9,486,600         | \$7,361,800         | \$7,635,700        | \$7,735,500         | \$11,561,800        | \$14,109,100        | \$13,208,500        | \$16,000,000        | \$87,099,000         | \$10,887,375        |
| Project Expenditures <sup>2/ 3/</sup> | 11,993,700          | 7,805,300           | 2,062,300          | 2,309,800           | 1,649,500           | 0                   | 46,757,300          | 48,029,300          | 120,607,200          | 15,075,900          |
| <b>Total</b>                          | <b>\$21,480,300</b> | <b>\$15,167,100</b> | <b>\$9,698,000</b> | <b>\$10,045,300</b> | <b>\$13,211,300</b> | <b>\$14,109,100</b> | <b>\$59,965,800</b> | <b>\$64,029,300</b> | <b>\$207,706,200</b> | <b>\$25,963,275</b> |

<sup>1/</sup> For maintenance of existing facilities.

<sup>2/</sup> Between 1980-1984 expenditures made were associated with 1966 widening program. Expenditure in 1986 is for design/engineering associated with 1985 \$2 billion widening program.

<sup>3/</sup> Includes 1984 \$12 million bond issue in addition to 1985 \$2 billion bond issue.

Sources: NJ Turnpike Authority and Hamner, Siler, George Associates

Projected Capital Expenditures/Need. Projected capital expenditures, which in the case of the Authority are synonymous with need, are presented in Table 4. Authority engineers indicated that capital maintenance expenditures during the 1980-1987 period are a good predictor of future expenditures. It is assumed that future maintenance expenditures will continue to increase over 1987 levels at an annual rate of 0.31 percent during 1988-1993 and 1.35 percent during 1994-2010 (see Appendix Table B-1). Authority engineers indicated that given this funding scenario, future needs should not exceed revenue for capital maintenance.

Table 4. NEW JERSEY TURNPIKE AUTHORITY CAPITAL EXPENDITURE/NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Type of Expenditure      | 1988          | 1989          | 1990          | 1991         | 1992         | 1993         | 1988-1993         |                        | 1994-2010         |                        |
|--------------------------|---------------|---------------|---------------|--------------|--------------|--------------|-------------------|------------------------|-------------------|------------------------|
|                          |               |               |               |              |              |              | Total Expend/Need | Avg Annual Expend/Need | Total Expend/Need | Avg Annual Expend/Need |
| Capital Expenditures     | \$16,145,600  | \$16,292,500  | \$16,440,800  | \$16,590,400 | \$16,741,400 | \$16,893,700 | \$99,104,400      | \$16,517,400           | \$313,037,500     | \$18,414,000           |
| 1985 Widening project 1/ | 635,000,000   | 635,000,000   | 635,213,400   | 0            | 0            | 0            | 1,905,213,400     | 317,535,567            | 0                 | 0                      |
| Total                    | \$651,145,600 | \$651,292,500 | \$651,654,200 | \$16,590,400 | \$16,741,400 | \$16,893,700 | \$2,004,317,800   | \$334,052,967          | \$313,037,500     | \$18,414,000           |

Notes: For capital maintenance expenditures Authority engineers indicate that current need is being met by annual expenditures. It is assumed that if expenditures increase at a similar pace to that witnessed during 1980-1987 that capital maintenance need will not exceed expenditures. Engineers could not speculate on future project expenditures beyond the 1985 \$2 billion widening program. (See Appendix Table B-1). Data in constant 1986 dollars.

1/ 1985-1990 highway widening program. Approximately \$94.8 million has been spent in 1986-1987. The remaining balance is projected to be spent in equal portions over the 1988-1990 period.

Sources: NJ Turnpike Authority and Hamner, Siler, George Associates.

The Authority-utilizes toll revenues to fund operations and capital Improvements and secures no state, federal, or local funding. Between capital maintenance expenditures and the existing widening project the Authority is projected to spend slightly over \$2 billion during 1988-1993 and \$313 million during 1994-2010.

New Jersey Highway Authority

The Authority operates the Garden State Parkway, a 173 mile limited access tollroad with connections in the south to U.S. Route 9 near Cape May and in the north to the New York State Thruway near Spring Valley, New York. The first portion of the Parkway was opened in 1954 and the entire road completed in 1957. Vehicular usage of the Parkway has steadily increased to a level of over 35 million in 1984.

Projected Capital Expenditures/Need. The Authority has assembled a five year capital maintenance road Improvement program (1987-1991) of \$571 million or \$114 million annually. Authority personnel indicated that they see this capital maintenance spending program continuing into the future allowing the Authority to meet its future needs (see Table 5).

**Table 5. NEW JERSEY HIGHWAY AUTHORITY CAPITAL REVENUE/NEED FORECASTS, NEW JERSEY, 1988-2010**

| Type of Expenditure               | 1988             | 1989             | 1990             | 1991             | 1992             | 1993             | 1988-1993          |                         | 1994-2010          |                         |
|-----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|-------------------------|--------------------|-------------------------|
|                                   |                  |                  |                  |                  |                  |                  | Total Revenue/Need | Avg Annual Revenue/Need | Total Revenue/Need | Avg Annual Revenue/Need |
| Capital Improvement program 1/ 2/ | \$114,214        | \$114,214        | \$114,214        | \$114,214        | \$114,214        | \$114,214        | \$685,284          | \$114,214               | \$1,941,638        | \$114,214               |
| Bridge renovations                | 10,000           | 10,000           | 10,000           | 0                | 0                | 0                | 30,000             | 5,000                   | 30,000             | 1,765                   |
| Toms River widening               | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                       | 200,000            | 11,765                  |
| Essex County                      | 0                | 0                | 0                | 0                | 0                | 0                | 0                  | 0                       | NA                 | NA                      |
| <b>Total</b>                      | <b>\$124,214</b> | <b>\$124,214</b> | <b>\$124,214</b> | <b>\$114,214</b> | <b>\$114,214</b> | <b>\$114,214</b> | <b>\$715,284</b>   | <b>\$119,214</b>        | <b>\$2,171,638</b> | <b>\$127,744</b>        |

Notes: Data in thousands of 1986 constant dollars. All capital improvement expenditures are paid out of revenue collected by the Authority. NA means not applicable.

- 1/ Authority officials indicate that current need is being met by annual expenditures. It is assumed that if expenditures increase at the present level, capital improvement needs should be met in the future.
- 2/ The Authority's 1987-1991 Capital Improvement program totals \$571.07 million. Authority engineers estimate that this need will continue indefinitely.

Sources: NJ Highway Authority and Hamer, Siler, George Associates.

In addition -to road maintenance program, maintenance will be required on all Authority bridges. Authority personnel have Identified \$25-530 million of needed bridge maintenance. It is assumed that \$30 million will be spent during 1988-1993 and the program will be repeated during 1994-2010. The Authority »ay, at some future point, widen the Tom River portion of the Parkway at a cost of 5200 million. They estimate that this could be done sometime near 1995.

Given these three capital expenditure categories, the Authority is projecting to spend a total of \$715 million or \$119 million annually during 1988-1993 and \$2.2 billion or \$127.7 million annually during 1994-2010. As was the case with the Turnpike Authority, the Highway Authority pays for capital expenditures from toll revenues.

#### NJ TRANSIT

The New Jersey Transit Corporation, called NJ TRANSIT, is. a public corporation created by the State Legislature in 1979. The corporation is charged with coordinating and improving bus and rail services throughout the state. It is one of the nation's largest public transit agencies, providing 170 million passenger trips annually. It has three subsidiaries, NJ TRANSIT Rail, NJ TRANSIT Bus, and NJ TRANSIT Mercer. The rail provides operating subsidies to seven private bus companies and capital assistance to 140 private carriers.

Capital Expenditure Trends. In 1986 NJ TRANSIT spent approximately \$261 million on capital items (see Table 6). Over the 1980-1986 period capital expenditures increased by \$9.4 million annually (1986 constant dollars) or by 4.8 percent.

Table 6. NEW JERSEY TRANSIT CAPITAL EXPENDITURE TRENDS, NEW JERSEY, 1980-1986

| <u>Expenditure</u>                               | <u>1980</u> | <u>1981</u> | <u>1982</u> | <u>1983</u> | <u>1984</u> | <u>1985</u> | <u>1986</u> | <u>1980-1986</u>     |                      |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------|----------------------|
|  |             |             |             |             |             |             |             | <u>Annual Change</u> | <u>Annual Change</u> |
|  |             |             |             |             |             |             |             | <u>Amount</u>        | <u>Percent</u>       |
| Capital expenditures <u>1/</u>                   | \$148,900   | \$275,300   | \$284,600   | \$262,500   | \$212,000   | \$249,200   | \$260,800   | \$16,000             | 10.7%                |
| 1986 growth factor                               | 1.309       | 1.188       | 1.120       | 1.087       | 1.051       | 1.015       | 1.000       | ****                 | ****                 |
| Capital expenditures in<br>1986 constant dollars | \$194,900   | \$327,100   | \$318,800   | \$285,300   | \$222,800   | \$252,900   | \$260,800   | \$9,400              | 4.8%                 |

Notes: Data in thousands of 1986 constant dollars.

1/ Capital maintenance/upgrading of existing facilities.

Sources: NJ TRANSIT and Hamer, Siler, George Associates.

During 1980-1986 NJ TRANSIT received revenue from five separate sources (see Table 7). The largest contributor was the Federal Government which supplied an average of \$165 million in revenue per year. The next largest contributor was the NY/NJ Port Authority.

Table 7. NJ TRANSIT REVENUE TRENDS NEW JERSEY, 1980-1986

| Source of Revenue           | 1980             | 1981             | 1982             | 1983             | 1984             | 1985 1/          | 1986 1/          | 1980-1986          |                    |
|-----------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|--------------------|
|                             |                  |                  |                  |                  |                  |                  |                  | Total Revenue      | Avg Annual Revenue |
| Federal                     | \$135,900        | \$201,500        | \$162,700        | \$205,400        | \$176,200        | \$157,800        | \$118,500        | \$1,158,000        | \$165,400          |
| 1979 Bond                   | 10,100           | 43,100           | 20,600           | 35,100           | 7,800            | 32,000           | ---              | 148,700            | 21,200             |
| Transportation Trust Fund I | ---              | ---              | ---              | ---              | ---              | 29,000           | 50,600           | 79,600             | 11,400             |
| NY/NJ Port Authority        | ---              | 30,700           | 100,800          | 16,100           | 22,300           | 4,600            | 50,000           | 224,500            | 32,100             |
| Other state funds           | 2,900            | ---              | 500              | 5,900            | 5,700            | 8,300            | 600              | 23,900             | 3,400              |
| <b>Total</b>                | <b>\$148,900</b> | <b>\$275,300</b> | <b>\$284,600</b> | <b>\$262,500</b> | <b>\$212,000</b> | <b>\$231,700</b> | <b>\$219,700</b> | <b>\$1,634,700</b> | <b>\$233,500</b>   |

Notes: Data in thousands of 1986 constant dollars.

1/ Balance of funds required are projected to be provided from Trust Fund Renewal II.

Sources: NJ TRANSIT and Hammer, Siler, George Associates.

Projected Capital Expenditures. Future capital expenditures can be subdivided into two categories - capital expenditures associated with Improving and/or Increasing existing system capacity and new Initiatives which represent new projects. Table 8 presents future capital expenditures under both categories. NJ TRANSIT has assembled a six-year capital improvement program (1988-1993). Beyond this period, a plausible scenario would be capital expenditures increasing at a similar annual rate (4.8 percent) as that which occurred during the 1980-1986 period (see Appendix Table C-1).

No projected expenditures have been associated with new initiative projects at this time. New Initiative projects are currently identified only as needed and have not been considered for funding.

Projected Capital Need/Revenue. Projected capital expenditures derived in Table 7 are brought forth and utilized in Table 8. Total projected expenditures are subtracted from projected need to determine the revenue surplus/deficit situation.

Table 8. NJ TRANSIT CAPITAL REVENUE/NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Expenditure/Need                         | 1988        | 1989        | 1990        | 1991        | 1992        | 1993       | 1988-1993          |                         | 1994-2010          |                         |
|--|-------------|-------------|-------------|-------------|-------------|------------|--------------------|-------------------------|--------------------|-------------------------|
|  |             |             |             |             |             |            | Total Revenue/Need | Avg Annual Revenue/Need | Total Revenue/Need | Avg Annual Revenue/Need |
| <b>Need</b>                              |             |             |             |             |             |            |                    |                         |                    |                         |
| Capital requests 1/                      | \$329,000   | \$329,000   | \$329,000   | \$329,000   | \$329,000   | \$329,000  | \$1,974,000        | \$329,000               | \$5,593,000        | \$329,000               |
| New Initiatives 2/                       | 100,000     | 100,000     | 100,000     | 100,000     | 57,900      | 57,900     | 515,800            | 85,967                  | 984,200            | 57,890                  |
| 57,890                                   |             |             |             |             |             |            |                    |                         |                    |                         |
| Subtotal                                 | \$429,000   | \$429,000   | \$429,000   | \$429,000   | \$386,900   | \$386,900  | \$2,489,800        | \$414,967               | \$6,577,200        | \$386,890               |
| <b>Less projected capital revenue 3/</b> |             |             |             |             |             |            |                    |                         |                    |                         |
|  | \$210,690   | \$160,960   | \$126,310   | \$101,020   | \$161,090   | \$330,870  | \$1,090,940        | \$181,823               | \$4,358,600        | \$256,390               |
| <b>Surplus/(deficit) gap</b>             | (\$218,310) | (\$268,040) | (\$302,690) | (\$327,980) | (\$225,810) | (\$56,030) | (\$1,398,860)      | (\$233,144)             | (\$2,218,600)      | (\$130,500)             |

Notes: Data in thousands of 1986 constant dollars.

1/ Provided by NJ TRANSIT.

2/ See Appendix Table C-3 for tentative project list.

3/ Appendix Table C-1.

Sources: NJ TRANSIT and Hamner, Siler, George Associates

Total capital- expenditures are based upon annual funding requests submitted to various departments at NJ TRANSIT. Of the \$438 million of total requests in 1986, approximately 75 percent represent practical and/or fundable need. It is assumed that this annual need of \$329 million will continue out to the horizon year of 2010.

Transit officials also provided cost estimates of new Initiative projects to 2000. Officials could not release prices associated with individual projects, but could estimate the total cost of the program (see Appendix Table C-3 for a tentative list of projects). Officials estimated that if funding were available, \$400 million could be committed to new Initiative projects during 1988-1991. The remaining \$1.1 billion is projected to be spent in equal installments over the 1992-2000 period. No programming of funds is assumed after 2000.

A total revenue deficit is projected for 1988-1993 of \$1.4 billion or \$233 million per year. A total deficit of \$2.2 billion is projected for 1994-2010 or \$131 million per year.

#### Aviation

The Division of Aeronautics is planning and funding the coordinating agency for public and private airports throughout the State except Newark Airport which is under the control of the NY/NJ Port Authority.

The Division of Aeronautics is in the process of completing a new Airport System Plan which will not be available for some time. For the purposes of this report data assembled in connection with the 1975 New Jersey State Airport System Plan. When this report was assembled there was a total of 156 airports in New Jersey with only 75 conventional

airports available, for public use. Of these 75, two were military and twelve were restricted for public use. Therefore, only 61 general aviation airports were open to the public without restriction. Of these airfields, 48 were under private and 13 were under public ownership. The twelve public airports were Included In the State System Plan. Only 23 of the private airports could be included based upon the extent to which they were deemed capable of expansion and adaptable to the overall transportation needs of the state. The following Is a listing of airports Included in the 1975 Plan:

|              |            |                      |
|--------------|------------|----------------------|
| Caldwell     | Princeton  | Trenton/Robbinsville |
| Kupper       | Somerset   | Bader                |
| Lincoln Park | Teterboro  | Cape May             |
| Linden       | Aero Haven | Hammonton            |
| Monmouth     | Albion     | Lakewood             |
| Morristown   | Burlington | Manahawkin           |
| Nairooi      | Cross Keys | Miller               |
| Newark       | Mercer     | NAFEC                |
| Preston      | Red Llon   | Ocean City           |
| Smithville   | Woodbine   | Blairstown           |
| Sky Manor    | Sol berg   | Sussex               |
| Alloway      | LiCalzi    | Millville            |

Projected Capital Expenditure Revenues. Public and private airports typically have three revenue sources, over and above self-generated revenues, to make capital Improvements. These sources Include the Federal Aviation Administration, the State Department of Transportation, and individual municipalities.

Table 9 summarizes projected revenue from these sources for 1988-2010. Projections for federal and state revenue are based on past trends and Division personnel's assessment of future funding. Projections of local revenue (typically the Individual airport undertaking capital Improvements) Is based on the Division's 1988-1991 project and revenue list. During 1988-1993 a total of \$25.9 million is

projected to be available and during 1994-2010 a total 1s \$73.3 million of revenues 1s anticipated. Projections of municipality and Individual airport contributions were not made.

Table 9. STATE AVIATION REVENUE PROJECTIONS, NEW JERSEY, 1988-2010.

| Revenue Source | 1988               | 1989               | 1990               | 1991               | 1992               | 1993               | 1988-1993           |                    | 1994-2010           |                    |
|----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
|                |                    |                    |                    |                    |                    |                    | Total Revenue       | Avg Annual Revenue | Total Revenue       | Avg Annual Revenue |
| Federal 1/     | \$2,500,000        | \$2,500,000        | \$2,500,000        | \$2,500,000        | \$2,500,000        | \$2,500,000        | \$15,000,000        | \$2,500,000        | \$42,500,000        | \$2,500,000        |
| State 2/       | 800,000            | 800,000            | 800,000            | 800,000            | 800,000            | 800,000            | 4,800,000           | 800,000            | 13,600,000          | 800,000            |
| Local 3/       | 1,501,413          | 592,630            | 1,152,775          | 790,170            | 1,009,200          | 1,009,200          | 6,055,388           | 1,009,231          | 17,156,000          | 1,009,200          |
| <b>Total</b>   | <b>\$4,801,413</b> | <b>\$3,892,630</b> | <b>\$4,452,775</b> | <b>\$4,090,170</b> | <b>\$4,309,200</b> | <b>\$4,309,200</b> | <b>\$25,855,388</b> | <b>\$4,309,231</b> | <b>\$73,256,000</b> | <b>\$4,309,200</b> |

Notes: Data in 1986 constant dollars.

1/ Based upon past trends and Division personnel projections.

2/ Based on 1984-1986 trends and the stability of the revenue source (gas tax on plane fuel).

3/ 1988-1991 based on Division's Capital Five Year Program. Revenues after 1991 are projected to be the average of 1988-1991 projections.

Sources: New Jersey Department of Transportation -- Division of Aeronautics; and Hamner, Siler, George Associates.

**Projected Capital Revenue vs. Need.** Projected revenue derived in Table 9 is compared to projected need. Statewide need was assessed by the use of mall surveys and on-site inspections. This need assessment goes into formulating a five year capital budget program (1987-1991). A complete list of projects for these years can be found in Appendix Table 0-1. It is assumed that need beyond 1991 will continue at a similar pace to the annual average projected need during 1987-1991 (see Table 10). Total need during 1988-1993 is projected at \$58.7 million and \$166.2 million during 1994-2010.

When comparing projected revenue against need, a deficit situation results (see Table 11). During 1988-1993, need exceeds projected revenue by \$32.9 million and during 1994-2010 need exceeds revenue by \$93 million. It should be noted that the actual shortages will be slightly less when taking into account potential contributions from municipalities.

**Table 12. RAIL FREIGHT ASSISTANCE CAPITAL EXPENDITURE TRENDS,  
NEW JERSEY, 1983-1986**

| <u>Funding Source</u>               | <u>1983</u>      | <u>1984</u>        | <u>1985</u>        | <u>1986</u>        | <u>1983-1986<br/>Avg Annual<br/>Expend</u> |
|-------------------------------------|------------------|--------------------|--------------------|--------------------|--|
| State Rail Assistance <sup>1/</sup> | \$0              | \$997,921          | \$2,000,000        | \$ 564,658         | \$ 890,645                                 |
| Local Funding Sources <sup>2/</sup> | 153,451          | 670,947            | 4,644,925          | 564,658            | 1,508,495                                  |
| Federal Rail Assistance             | 336,998          | 73,371             | 1,107,664          | 0                  | 379,508                                    |
| <b>Total</b>                        | <b>\$490,449</b> | <b>\$1,742,239</b> | <b>\$7,752,589</b> | <b>\$1,129,316</b> | <b>\$2,778,648</b>                         |

Notes: Data in 1986 constant dollars.

<sup>1/</sup> Prior to 1983 the program only consisted of federal grants.

<sup>2/</sup> Includes municipalities and private industry.

<sup>3/</sup> After 1981 Rail Subsidy Fund was exhausted, a 1985 audit revealed that a number of Conrail lines were profitable. This money was returned to the Federal Government and then returned to New Jersey.

Sources: NJ Department of Transportation, Office of Freight, and Hammer, Siler, George Associates.

## Rail Freight Services

New Jersey's rail freight network consists of 1,133 route miles the majority of which is operated by the Consolidated Rail Corporation (Conrail). Conrail was created by federal legislation in 1976, in the wake of the bankruptcy of the Penn Central and six other northeastern rail carriers. Federal funds recapitalized the physical plant and offset deficits. The legislation also assigned Conrail the responsibility to develop a viable and profitable rail freight system that eventually could be returned to private hands. Conrail has continued to "rationalize" the rail system it inherited, and to modernize that which supported profitable rail freight operations. As a result, New Jersey's active rail freight network has been reduced from the 1,518 route miles conveyed in 1976 to the 1,133 miles which now exists.

The New Jersey Department of Transportation became involved in state rail delivery as Conrail abandoned lines. DOT may acquire abandoned lines which are needed by local industry, or may renovate key lines to improve or maintain a certain level of service.

Capital Expenditure Trends. Between 1983-1986 an average of \$2.8 million was spent annually on rail projects throughout the state (see Table 12). Three revenue sources were used during this period -- state, local, and federal. The largest contributor was local, which includes both municipalities and private industry.

Table 13. RAIL FREIGHT ASSISTANCE CAPITAL REVENUE/NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Funding Source                      | 1988               | 1989               | 1990               | 1991               | 1992               | 1993               | 1988-1993           |                    | 1994-2010           |                    |
|-------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
|                                     |                    |                    |                    |                    |                    |                    | Total Expend        | Avg Annual Expend  | Total Expend        | Avg Annual Expend  |
| State Rail Assistance <sup>1/</sup> | \$2,000,000        | \$2,000,000        | \$2,000,000        | \$2,000,000        | \$2,000,000        | \$2,000,000        | \$12,000,000        | \$2,000,000        | \$34,000,000        | \$2,000,000        |
| Local Funding Sources <sup>2/</sup> | 1,428,571          | 600,000            | 428,571            | 1,111,377          | 1,111,377          | 1,111,377          | 7,219,844           | 1,203,307          | 18,893,000          | 1,111,353          |
| Federal Rail Assistance             | 0                  | 0                  | 0                  | 0                  | 0                  | 0                  | 0                   | 0                  | 0                   | 0                  |
| <b>Total</b>                        | <b>\$3,428,571</b> | <b>\$2,600,000</b> | <b>\$2,428,571</b> | <b>\$3,111,377</b> | <b>\$3,111,377</b> | <b>\$3,111,377</b> | <b>\$19,219,844</b> | <b>\$3,203,307</b> | <b>\$52,893,000</b> | <b>\$3,111,353</b> |

Notes: Data in 1986 constant dollars.

<sup>1/</sup> Projected funding for 1991-2010 based on department 1987-1990 annual average estimates.

<sup>2/</sup> Includes municipalities and private industry.

Sources: NJ Department of Transportation, Office of Freight and Hammer, Siler, George Associates.

Projected Capital Expenditures/Need. The projected expenditures presented in Table 13 originate from the State Rail Plan drafted in 1985 in which expenditures were projected for the period of 1987-1990. Under this scenario federal rail assistance is phased out and is not anticipated to be reestablished. Local funding sources are projected to average \$1.1 million (the annual average funding projections under the 1987-1990 capital program) and State funding is projected to remain at \$2 million per year. Under this scenario \$19.2 million will be needed and spent during 1988-1993 and \$52.9 between 1994-2010.

Departmental personnel indicated that this continuous funding scenario would meet future need. It should be noted that this scenario assumes that significant rail acquisition will not be needed and that the existing rehabilitation program will not expand.

Table 14. DELAWARE RIVER PORT AUTHORITY, BRIDGE/PATCO USE TRENDS, NEW JERSEY, 1981-1986

| Facility             | 1981       | 1982       | 1983       | 1984       | 1985       | 1986       | 1981-1986                    |         |
|----------------------|------------|------------|------------|------------|------------|------------|------------------------------|---------|
|                      |            |            |            |            |            |            | Average Annual Change Actual | Percent |
| <b>Bridges 1/</b>    |            |            |            |            |            |            |                              |         |
| Ben Franklin         | 23,882,849 | 24,433,182 | 25,056,859 | 27,130,042 | 29,608,215 | 28,159,966 | 855,400                      | 3.8%    |
| Walt Whitman         | 34,476,464 | 34,497,647 | 35,568,899 | 35,887,574 | 34,472,524 | 37,719,224 | 648,600                      | 1.9%    |
| Commodore Barry      | 5,667,404  | 5,871,879  | 6,163,895  | 6,809,502  | 7,618,988  | 7,660,532  | 398,600                      | 7.0%    |
| Betsy Ross           | 4,730,866  | 4,847,902  | 5,461,181  | 5,871,725  | 5,958,963  | 7,159,387  | 485,700                      | 10.3%   |
| Subtotal             | 68,757,583 | 69,650,610 | 72,250,834 | 75,698,843 | 77,658,690 | 80,699,129 | 2,388,300                    | 3.5%    |
| <b>Patco Rail 2/</b> | 11,263,926 | 11,132,825 | 10,670,945 | 10,211,589 | 10,230,659 | 10,367,374 | (179,300)                    | -1.8%   |
| <b>Total</b>         | 80,021,509 | 80,783,435 | 82,921,779 | 85,910,432 | 87,889,349 | 91,066,503 | 2,209,000                    | 2.8%    |

1/ Vehicular traffic.  
2/ Passengers.

Sources: Delaware River Port Authority and Hamer, Siler, George Associates.

Delaware River Port Authority

The Authority began in 1919 as a bi-state commission of Pennsylvania and New Jersey. It owns and operates four bridges (Walt Whitman, Benjamin Franklin, Betsy Ross, and Commodore Barry) which link southwestern Pennsylvania and southern New Jersey. It also operates the Lindenwold-Philadelphia Rapid Transit Line (PATCO). The Authority is self-sustaining, operating without tax funds. It supports its activities with revenues from its existing facilities.

Facility Use Trends and Projections. Between 1981-1986 vehicular traffic on all four bridges increased by 2.4 million vehicles per year or 3.5 percent (see Table 14). The PATCO rail line, however, saw annual ridership decline over this period by 179,300 passengers or 1.6 percent.

**Table 15. DELAWARE RIVER PORT AUTHORITY, BRIDGE/PATCO USE PROJECTIONS, NEW JERSEY, 1987-2010**

| Facility                 | 1987              | 1988              | 1989              | 1990               | 1991               | 1992               | 1993               | 1987-1993          |                    | 1994-2000          |                      |
|--------------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|
|                          |                   |                   |                   |                    |                    |                    |                    | Average Annual Use | Total Use          | Average Annual Use | Total Use            |
| Bridges <sup>1/</sup>    | 82,838,000        | 85,903,000        | 88,119,000        | 90,745,000         | 93,449,000         | 96,234,000         | 99,102,000         | 92,259,000         | 553,552,000        | 99,102,000         | 1,684,734,000        |
| PATCO Rail <sup>2/</sup> | 10,518,000        | 11,015,800        | 11,181,000        | 11,349,000         | 11,519,000         | 11,692,000         | 11,867,000         | 11,437,000         | 68,623,800         | 13,524,000         | 229,915,000          |
| <b>Total</b>             | <b>93,356,000</b> | <b>96,918,800</b> | <b>99,300,000</b> | <b>102,094,000</b> | <b>104,968,000</b> | <b>107,926,000</b> | <b>110,969,000</b> | <b>103,696,000</b> | <b>622,175,800</b> | <b>112,626,000</b> | <b>1,914,649,000</b> |

<sup>1/</sup> Vehicles.  
<sup>2/</sup> Passengers.

Sources: Delaware River Port Authority and Hamer, Siler, George Associates.

In 1985 the Authority evaluated current bridge and rail usage and made projections. They projected annual vehicle usage amongst the four bridges to increase by 2.65 percent, 3.7 percent, and 2.58 percent for 1987, 1988, and 1989 respectively. Total vehicular traffic on all bridges during 1988-1993 is projected to be 553 million (see Table 15). Because the bridges have a finite capacity, the usage level for 1994-2010 is projected to continue at the 1993 annual level of 99.1 million vehicles.

Beyond 1988, PATCO ridership is projected to increase by 1.5 percent annually. This projected annual ridership increase rate is projected to continue out to the year 2010.

Table 16. DELAWARE RIVER PORT AUTHORITY, CAPITAL REVENUE/NEED PROJECTIONS, NEW JERSEY, 1988-2010

| <u>Expenditure/Usage</u>          | <u>1988</u>  | <u>1989</u>  | <u>1990</u>  | <u>1991</u> | <u>1992</u>  | <u>1993</u>  | <u>1988-1993</u> |                   | <u>1994-2010</u> |                   |
|-----------------------------------|--------------|--------------|--------------|-------------|--------------|--------------|------------------|-------------------|------------------|-------------------|
|                                   |              |              |              |             |              |              | <u>Total</u>     | <u>Avg Annual</u> | <u>Total</u>     | <u>Avg Annual</u> |
| Total bridge use                  | 85,903,000   | 88,119,000   | 90,745,000   | 93,449,000  | 96,234,000   | 99,102,000   | 553,552,000      | 92,259,000        | 1,684,734,000    | 99,102,000        |
| Total PATCO use                   | 11,015,800   | 11,181,000   | 11,349,000   | 11,519,000  | 11,692,000   | 11,867,000   | 68,623,800       | 11,437,000        | 229,915,000      | 13,524,000        |
| Subtotal                          | 96,918,800   | 99,300,000   | 102,094,000  | 104,968,000 | 107,926,000  | 110,969,000  | 622,175,800      | 103,696,000       | 1,914,649,000    | 112,626,000       |
| Total capital expenditures        | \$33,575,000 | \$14,800,000 | \$15,250,000 | \$9,500,000 | \$17,900,000 | \$18,500,000 | \$109,525,000    | \$18,254,000      | \$260,251,000    | \$15,309,000      |
| Expenditure per vehicle/passenger | \$0.346      | \$0.149      | \$0.149      | \$0.091     | \$0.166      | \$0.167      | \$0.176          | \$0.176           | \$0.136          | -                 |

Notes: Data in constant 1986 dollars. Data provided by Authority for 1988-2000.

Sources: Delaware River Port Authority and Hamer, Siler, George Associates.

The Authority has projected capital expenditures between 1988-2000. These expenditures were ratioed to projected usage levels and the results are presented in Table 16. Capital expenditures per vehicle/passenger are projected to fluctuate during 1988-2000. On average, during 1988-1993, \$0.176 of capital expenditures are expected to be spent for every vehicle/passenger. During the 1994-2000 this figure is projected to decrease to \$0.136 and projected to continue at this amount to 2010. Total capital expenditures during 1988-1993 are projected to total \$109.5 million and during 1994-2010 they are projected to total \$260.3 million.

Table 17. DELAWARE RIVER AND BAY AUTHORITY, RATIO OF CAPITAL EXPENDITURE TO FACILITY USAGE, NEW JERSEY, 1981-1985

| Expenditure/Usage               | 1981               | 1982               | 1983               | 1984               | 1985               | 1981-1985                | 1981-1985        |                   |  |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------------|------------------|-------------------|--|
|                                 |                    |                    |                    |                    |                    | Annual Avg<br>Expend/Use | Annual<br>Actual | Change<br>Percent |  |
| <b>Delaware Memorial Bridge</b> |                    |                    |                    |                    |                    |                          |                  |                   |  |
| Capital expenditure 1/          | \$1,562,934        | \$1,755,100        | \$1,838,142        | \$1,872,066        | \$2,391,544        | \$1,883,957              | \$165,700        | 10.6%             |  |
| Annual usage                    | 18,348,024         | 18,806,960         | 19,633,074         | 20,919,461         | 21,963,896         | 19,934,283               | 723,200          | 3.9%              |  |
| Expenditure per user            | \$0.085            | \$0.093            | \$0.094            | \$0.089            | \$0.109            | \$0.095                  | ****             | ****              |  |
| <b>Cape May-Lewes Ferry</b>     |                    |                    |                    |                    |                    |                          |                  |                   |  |
| Capital expenditure 1/ 2/       | \$0                | \$0                | \$74,357           | \$55,761           | \$25,272           | \$51,797                 | ****             | ****              |  |
| Annual usage                    | 775,399            | 824,485            | 860,300            | 878,089            | 921,026            | 851,860                  | 29,100           | 3.8%              |  |
| Expenditure per user            | \$0.000            | \$0.000            | \$0.086            | \$0.064            | \$0.027            | \$0.061                  | ****             | ****              |  |
| <b>Total</b>                    | <b>\$1,562,934</b> | <b>\$1,755,100</b> | <b>\$1,912,499</b> | <b>\$1,927,827</b> | <b>\$2,416,816</b> | <b>\$1,935,754</b>       | <b>\$170,800</b> | <b>-</b>          |  |

Notes: Data in 1986 constant dollars.

1/ Derived in Appendix Table E-1.

2/ Annual average calculated for 1983-1985 period. Actual and percent change from 1983-1985 not calculated because capital investments (unlike the bridge) are not made on an annual basis.

Sources: Delaware River and Bay Authority and Hamner, Siler, George Associates.

Delaware River and Bay Authority

The Authority was created when the States of Delaware and New Jersey entered into a pact in 1961 for the purpose of planning, financing, constructing and operating river crossings with appropriate connections between Delaware and Pennsylvania. The Authority currently operates the Delaware Memorial Bridge and the Cape May-Lewes Ferry.

Trends in Capital Expenditures and Facility Usage. Table 17 highlights the relationships of capital expenditure trends to facility usage for both the bridge and ferry. During 1981-1985 an average of \$1.9 Billion was spent annually on bridge capital expenditures. For that same period an average of 19.9 million vehicles crossed the bridge annually. On average, \$0.095 of capital expenditures were made for each vehicle crossing. During this same period an average of \$0.061 of capital expenditures was spent per ferry passenger.

Table 10. DELAWARE RIVER AND BAY AUTHORITY CAPITAL REVENUE/NEED PROJECTIONS NEW JERSEY, 1988-2010

| Expenditure/Usage        | 1988        | 1989        | 1990        | 1991        | 1992         | 1993        | 1988-1993    | 1988-1993    | 1994-2010    | 1994-2010    |
|--------------------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|--------------|--------------|--------------|
|                          |             |             |             |             |              |             | Avg Annual   | Total        | Avg Annual   | Total        |
|                          |             |             |             |             |              |             | Revenue/Need | Revenue/Need | Revenue/Need | Revenue/Need |
| Delaware Memorial Bridge |             |             |             |             |              |             |              |              |              |              |
| Capital expenditure 1/   | \$4,800,000 | \$3,350,000 | \$6,000,000 | \$3,300,000 | \$2,781,000  | \$2,786,000 | \$23,017,000 | \$3,836,167  | \$56,100,000 | \$3,300,000  |
| Annual usage             | 25,208,600  | 26,393,400  | 27,317,200  | 28,136,700  | 28,840,100   | 28,897,800  | 164,793,800  | 27,465,633   | 581,804,500  | 34,223,800   |
| Expenditure per user     | \$0.190     | \$0.127     | \$0.220     | \$0.117     | \$0.096      | \$0.096     | ****         | ****         | \$0.096      | ****         |
| Cape May-Lewes Ferry     |             |             |             |             |              |             |              |              |              |              |
| Capital expenditure 1/   | \$4,870,000 | \$4,100,000 | \$2,600,000 | \$3,800,000 | \$30,000,000 | \$96,000    | \$45,466,000 | \$7,577,667  | \$1,782,000  | \$104,800    |
| Annual usage             | 934,900     | 939,600     | 944,300     | 949,000     | 1,041,000    | 1,133,000   | 5,941,800    | 990,300      | 20,965,300   | 1,233,300    |
| Expenditure per user     | \$5.209     | \$4.364     | \$2.753     | \$4.004     | \$28.818     | \$0.085     | ****         | ****         | \$0.085      | ****         |
| Total Expenditures       | \$9,670,000 | \$7,450,000 | \$8,600,000 | \$7,100,000 | \$32,781,000 | \$2,882,000 | \$68,483,000 | \$11,413,834 | \$57,882,000 | \$3,407,800  |

Notes: Data in 1986 constant dollars.

1/ 1987-1991 projected expenditures as reported in Authority's Five Year Program (10/86).

Sources: Delaware River and Bay Authority and Hamner, Siler, George Associates.

Projected Capital Expenditures. Between 1981-1985 traffic on the bridge increased by 3.9 percent annually. The bridge can accommodate forecasted growth according to Authority personnel. This 3.9 percent growth rate is projected to gradually taper off to a one percent annual growth rate during 1994-2010 (see Table 18).

The Authority prepared a five-year capital program covering the 1987-1991. Beyond this period capital expenditures are forecasted to decrease per vehicle crossing to \$.096, a ratio similar to that witnessed during 1981-1985. The decrease reflects the Authority's ambitious 1988-1991 bridge renovation program and the fact that this type of renovation will not be needed again prior to the horizon year of 2010.

Capital expenditures associated with the ferry service are derived using a different set of assumptions. Based on discussions with Authority personnel, the existing five boat fleet in 1986 accommodated 921,026 passengers or 184,000 passengers per boat. A slight Increase in ridership (0.05 percent annually) is projected for 1988-1991 as Cape May continues to become a destination oriented tourist spot. A new ferry is scheduled to be added in 1992 and it is assumed that in two years this ferry will carry 184,000 passengers per year. Slight Increases (0.05 percent annually) are projected in ridership and during 1994-2010 the ferrys are projected to accommodate a total of 21 million passengers. The capital expenditures associated with the ferrys are projected to average \$0.085 per passenger during 1994-2010. Between 1981-1985 the average capital costs associated per passenger per ferry was \$0.0122. The addition of the new ferry will Increase this to \$0.074. This amount has been Increased by 15 percent to account for the new terminal facility and projected increased upkeep costs.

Between the bridge and ferry service, the Authority is forecasted to spend \$68.5 million during 1988-1993 and \$57.9 Billion between 1994-2010.

## Sewerage

The State's wastewater collection and disposal systems are highly decentralized; Made up of several hundred local and regional facilities. The extent of the system was described by the State of New Jersey County »and municipal Government Commission <n their 1984 'infrastructure report:

There Is not a complete Inventory presently Available of the total miles of local wastewater collections systems in New Jersey. However, the size and the overall capital investment represented by these systems is considerable, based. on the fact that approximately 1.3 billion gallons of liquid waste are treated in New Jersey each day, and that these wastes oust be transported to treatment facilities by some sort of collector system.

While an Incomplete picture, It is possible to obtain some Idea of the size of the local collection systems ---- The Department of Environmental Protection estimates that 30 percent of the state's population is served by some type of wastewater treatment facility and that there are approximately 450 publicly owned treatment plants around the state.

Collection and disposal systems are generally eligible for Federal Government Wastewater Construction Grants Program providing a share of the capital costs. The state program is administered out of the Department of Environmental Protection's Water Resources Division. Their primary function is financing and regulatory as opposed to operational. In addition, the Passaic Valley Sewerage Authority is a key provider of sewerage capacity in the state and \*ill be discussed in this section.

### State Sewerage Program

Not only is the state • »major financial contributor in the construction of wastewater disposal facilities, but 3EP officials help to coordinate the planning, and permitting of facilities.

Projected Revenue. During the past 20 years funding for Wastewater disposal systems originated from three sources -- state, federal, and local. State funding originated from the general fund. However, as federal funding became more scarce the State expanded its program. Table 19 summarizes projected future revenue sources and amounts.

As shown, federal funding is projected to dry-up after 1994. The state is projected to continue its moderate level of funding out of the general fund. The local contribution is projected to run through 1991. Two new state programs are proposed - Wastewater Treatment Trust and Wastewater Treatment Trust Fund. The Trust will be operated by an Independent authority which will have bonding capabilities. Although these programs are not proposed to be refunded after 1990, it is assumed that with the absence of direct federal and local funds that refunding will need to occur every third year. These funding sources are projected to generate \$1.3 billion during 1988-1993 and \$703 million during 1994-2010.

Table 19. STATE SEWERAGE CAPITAL REVENUE PROJECTIONS, NEW JERSEY, 1988-2010

| Funding Source                            | 1988             | 1989             | 1990             | 1991             | 1992            | 1993            | 1988-1993          |                    | 1994-2010        |                    |
|---|------------------|------------------|------------------|------------------|-----------------|-----------------|--------------------|--------------------|------------------|--------------------|
|   |                  |                  |                  |                  |                 |                 | Total Revenue      | Avg Annual Revenue | Total Revenue    | Avg Annual Revenue |
| <b>Sewage facility construction 1/</b>    |                  |                  |                  |                  |                 |                 |                    |                    |                  |                    |
| General fund                              | \$15,000         | \$15,000         | \$15,000         | \$15,000         | \$15,000        | \$15,000        | \$90,000           | \$15,000           | \$15,000         | \$882              |
| Federal 2/                                | 103,896          | 52,194           | 52,440           | 104,881          | 79,277          | 53,549          | 446,237            | 55,282             | 27,698           | 1,629              |
| Local 3/                                  | 67,000           | 67,000           | 67,000           | 67,000           | 0               | 0               | 268,000            | 44,667             | 0                | 0                  |
| Subtotal                                  | \$185,896        | \$134,194        | \$134,440        | \$186,881        | \$94,277        | \$68,549        | \$804,237          | \$114,949          | \$42,698         | \$2,511            |
| <b>Mastewater Treatment Trust 4/</b>      |                  |                  |                  |                  |                 |                 |                    |                    |                  |                    |
| Bond                                      | \$150,000        | \$25,000         | \$25,000         | \$50,000         | \$0             | \$0             | \$250,000          | \$41,667           | \$300,000        | \$17,647           |
| Loan repayments                           | 0                | 0                | 0                | 990              | 1,155           | 1,320           | 3,465              | 578                | 41,250           | 2,426              |
| Subtotal                                  | \$150,000        | \$25,000         | \$25,000         | \$50,990         | \$1,155         | \$1,320         | \$253,465          | \$42,244           | \$341,250        | \$20,074           |
| <b>Mastewater Treatment Trust Fund 5/</b> |                  |                  |                  |                  |                 |                 |                    |                    |                  |                    |
| Bond                                      | \$150,000        | \$0              | \$0              | \$50,000         | \$0             | \$0             | \$200,000          | \$33,333           | \$300,000        | \$17,647           |
| Loan repayments                           | 0                | 0                | 0                | 543              | 543             | 543             | 1,629              | 272                | 19,548           | 1,150              |
| Subtotal                                  | \$150,000        | \$0              | \$0              | \$50,543         | \$543           | \$543           | \$201,629          | \$33,605           | \$319,548        | \$18,797           |
| <b>Total</b>                              | <b>\$485,896</b> | <b>\$159,194</b> | <b>\$159,440</b> | <b>\$288,414</b> | <b>\$95,975</b> | <b>\$70,412</b> | <b>\$1,259,331</b> | <b>\$190,798</b>   | <b>\$703,496</b> | <b>\$41,382</b>    |

Notes: Data in thousands of constant 1986 dollars.

1/ Total expenditure reported in August 1986 Annual Capital Improvement Plans as assumed by the NJ Commission on Capital Budgeting and Financing. 2/ Derived in Appendix Table F-1. 3/ After the federal grant expires in 1990, local municipalities share contribution is assumed to reduce to zero since all new funding will be in the form of loans, as in 1985 Trust totals. This principal will be used by the authority to float \$3 million of bonds. HP personnel estimate that \$1 million of financing will be spent in 1988-1990; the remainder over the 1969-1990 period. Loan repayments calculated in Appendix Table F-2. 4/ Loan repayments calculated in Appendix Table F-3.

Sources: K) Commission on Capital Budgeting and Financing; Environmental Protection Agency and Manner, Slier, Geosje Associates.

Projected Capital Need. Every two years the EPA asks states to submit a list of public wastewater disposal project applications for federal funding consideration. Projects are submitted based upon three scenarios: 1) 1986 publicly-owned wastewater treatment needs eligible for federal financial assistance under the Clean Water Act, 2) maximum eligible publicly-owned wastewater treatment needs eligible for federal financial assistance under the Clean Water Act, and 3) design year (2005) needs for publicly-owned wastewater treatment works. The third scenario is used here because it represents needs to the longest horizon year of 2005.

Although this scenario does not represent total state need (Independent regional and private systems do not submit projects) it does represent most needs. In addition, some states like New Jersey, submit proposals which will not qualify for federal funding. This makes the EPA report, in New Jersey's case, more representative of total need.

Table 20 highlights this EPA application process for New Jersey. During 1986-2005 total state need is projected to be \$4.4 billion or \$221 million-per year. The largest cost items are secondary treatment facilities and combined sewers.

**Table 20. STATE WASTEWATER DISPOSAL SYSTEM NEED PROJECTIONS, NEW JERSEY, 1986-2005**

| Facility Type                       | EPA<br>Estimates 1/ | State<br>Estimates 2/ | 1986-2005          |                  |
|-------------------------------------|---------------------|-----------------------|--------------------|------------------|
|                                     |                     |                       | Avg Annual<br>Need | Total Need       |
| <b>Treatment Plants</b>             |                     |                       |                    |                  |
| Secondary treatment                 | \$1,531,000         | \$200,000             | \$1,731,000        | \$87,000         |
| Advanced treatment                  | 188,000             | ****                  | 188,000            | 9,000            |
| Subtotal                            | \$1,719,000         | \$200,000             | \$1,919,000        | \$96,000         |
| <b>Collector/interceptor sewers</b> |                     |                       |                    |                  |
| Infiltration inflow correction      | \$225,000           | ****                  | \$225,000          | \$11,000         |
| Collector pipe                      | 328,000             | ****                  | 328,000            | 16,000           |
| Interceptor pipe                    | 504,000             | ****                  | 504,000            | 25,000           |
| Replacement/rehab of sewers         | 104,000             | ****                  | 104,000            | 5,000            |
| Subtotal                            | \$1,161,000         | \$0                   | \$1,161,000        | \$57,000         |
| <b>Combined sewers/storm drains</b> | \$767,000           | \$600,000             | \$1,367,000        | \$68,000         |
| <b>Total</b>                        | <b>\$3,647,000</b>  | <b>\$800,000</b>      | <b>\$4,447,000</b> | <b>\$221,000</b> |

Notes: Data In thousands of 1986 constant dollars.

1/ EPA's assessment of needs to satisfy the design year (2005) population for facilities which meet the established documentation criteria.

2/ State estimates over and above that qualifying for federal funding.

Sources: New Jersey Department of Environmental Protection -- Division of Water Resources (Construction Grants Administration); Environmental Protection Agency; and Hammer, Slier, George Associates.

Projected Revenue vs. Need. During 1988-1993 need is projected to exceed revenue by \$509 million. This deficit situation is projected to continue and amount to \$3 billion during 1994-2010. Project needs are estimated at over \$5.5 billion for the 22-year period.

Table 21. STATE WASTEWATER CAPITAL REVENUE/NEED  
PROJECTIONS, NEW JERSEY, 1988-2010

| <u>Need/Revenue</u>          | <u>1988-1993</u>   | <u>1994-2010</u>     |
|------------------------------|--------------------|----------------------|
| <b>Revenue 1/</b>            | <b>\$1,259,331</b> | <b>\$731,080</b>     |
| <b>Less need 2/</b>          | <b>1,768,000</b>   | <b>3,757,000</b>     |
| <b>Surplus/(deficit) gap</b> | <b>(\$508,669)</b> | <b>(\$3,025,920)</b> |

Notes: Data in thousands of 1986 constant dollars.

1/ Derived in Table 19.

2/ Derived in Table 20. The EPA need assessment presented in Table 20 only covers the period 1986-2005. To obtain a need assessment for the remaining five years out to the horizon year of 2010, average annual need between 1986-2005 was trended for the period 2006-2010.

Sources: New Jersey Department of Environmental Protection, Division of Water Resources (Construction Grants Administration); and Hanfner, Siler, George Associates.

#### Passaic Valley Sewerage Commissioners

In 1902, the Passaic Valley Sewerage Commissioners (PVSC) was formed as an agency of the state to reduce pollution in the Passaic River and its tributaries. The organization is one of the oldest and largest in the United States. The PVSC operates one main facility which services a heavily industrialized 100-square-mile section of northern New Jersey. Within this service area in 1983, there were 380,000 residential units, 360 large apartment buildings, 2,205 large commercial institutions, and 350 major industries.

Capital Expenditure Trends. PVSC received funding from the state, federal, and local authorities to finance the construction of the secondary treatment facilities (See Table 22). The PVSC, however, funds all operating and capital maintenance expenditures out of operating revenue. During 1977-1987 PVSC spent a total of \$455 million or \$43.9 million annually. Only \$34 million was spent on capital maintenance, the remainder went to construction of the secondary treatment facilities.

**Table 22. PASSAIC VALLEY SEWERAGE COMMISSIONERS REVENUE TRENDS, NEW JERSEY, 1977-1987**

| Funding Source/Project                    | 1977                                      | 1978                | 1979                | 1980                | 1981                 | 1982                | 1983                |
|---|---|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|
|   | <b>Secondary facility Construction 1/</b> |                     |                     |                     |                      |                     |                     |
| Federal                                   | \$12,814,023                              | \$15,661,584        | \$47,459,346        | \$47,459,346        | \$47,459,348         | \$34,170,728        | \$28,475,607        |
| State DEP                                 | 1,474,100                                 | 1,801,775           | 5,459,925           | 5,459,925           | 5,459,925            | 3,931,146           | 3,275,955           |
| Municipalities                            | 4,611,536                                 | 5,636,322           | 17,079,765          | 17,079,765          | 17,079,765           | 12,297,430          | 10,247,858          |
| Subtotal                                  | \$18,899,739                              | \$23,099,681        | \$69,999,036        | \$69,999,036        | \$69,999,038         | \$50,399,304        | \$41,999,420        |
| <b>Capital maintenance 2/ 3/</b>          | \$952,314                                 | \$692,089           | \$3,377             | \$222,346           | \$3,623,434          | \$4,794,482         | \$3,794,715         |
| <b>Total</b>                              | <b>\$19,852,053</b>                       | <b>\$23,791,770</b> | <b>\$70,002,413</b> | <b>\$70,221,382</b> | <b>\$73,622,472</b>  | <b>\$55,193,786</b> | <b>\$45,794,135</b> |
|   |   |                     |                     |                     | 1980-1987            |                     |                     |
|   |   |                     |                     |                     | Total                | Avg Annual          |                     |
|   |   |                     |                     |                     | Revenue              | Revenue             |                     |
| <b>Secondary facility Construction 1/</b> |   |                     |                     |                     |                      |                     |                     |
| Federal                                   | \$22,780,485                              | \$11,390,243        | \$11,390,243        | \$5,695,122         | \$284,756,075        | \$27,194,205        |                     |
| State DEP                                 | 2,620,764                                 | 1,310,382           | 1,310,382           | 655,191             | 32,759,550           | 3,128,537           |                     |
| Municipalities                            | 8,198,287                                 | 4,099,143           | 4,099,143           | 2,049,572           | 102,478,586          | 9,786,705           |                     |
| Subtotal                                  | \$33,599,536                              | \$16,799,768        | \$16,799,768        | \$8,399,885         | \$419,994,211        | \$40,109,447        |                     |
| <b>Capital maintenance 2/ 3/</b>          | \$9,723,095                               | \$5,380,283         | \$5,684,920         | NA                  | \$34,871,055         | \$3,768,749         |                     |
| <b>Total</b>                              | <b>\$43,322,631</b>                       | <b>\$22,180,051</b> | <b>\$22,484,688</b> | <b>\$8,399,885</b>  | <b>\$454,865,266</b> | <b>\$43,878,196</b> |                     |

Notes: Data in 1985 constant dollars. Nft mtans data not available.

1/ See Appendix Table 6-1.

2/ Asswves Interceptor lines are financed out of operatlnr) revenues. 3/ Large Increase in 1961 due to new treatmnt plant. 4/ Wet age expenditures only for 1977-1986 period for capital maintenance.

Sources: Passaic Valley Sewerage Commissioners ark! Hamer, Slier, George Associates.

Capital Expenditure/Need Projections. PSVC personnel Indicated that future capital expenditures Would be used to repair and maintain the treatment facility, repair the Interceptor, and construct an •incinerator. It should be noted that the Incinerator Is not an approved capital expenditure and Us construction Is speculative at this time. Table 23 summarizes these expenditures for the period 1988-2010. During J988-1993, PVSC personnel project capital expenditures it \$42 million, or \$12 million annually. During 1994-2010 expenditures are projected to total \$301 million and average \$18 million annually.

Table 23. PASSAIC VALLEY SEWERAGE COMMISSIONERS CAPITAL REVENUE/NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Funding Source             | 1988-1993          |                    |                    |                    |                    |                    | 1994-2010           |                         |                      |                          |
|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|-------------------------|----------------------|--------------------------|
|                            | 1988               | 1989               | 1990               | 1991               | 1992               | 1993               | Total Revenue/Need  | Avg Annual Revenue/Need | Total Revenue/Need   | Avg. Annual Revenue/Need |
| Repairs and Maintenance 1/ | \$5,500,155        | \$5,500,155        | \$5,500,155        | \$5,500,155        | \$5,500,155        | \$5,500,155        | \$33,000,929        | \$9,428,837             | \$25,500,000         | \$1,500,000              |
| Interceptor                | 1,500,000          | 1,500,000          | 1,500,000          | 1,500,000          | 1,500,000          | 1,500,000          | 9,000,000           | 2,571,429               | 25,500,000           | 1,500,000                |
| Incinerator                | 0                  | 0                  | 0                  | 0                  | 0                  | 0                  | 0                   | 0                       | 250,000,000          | NA                       |
| <b>Total</b>               | <b>\$7,000,155</b> | <b>\$7,000,155</b> | <b>\$7,000,155</b> | <b>\$7,000,155</b> | <b>\$7,000,155</b> | <b>\$7,000,155</b> | <b>\$42,000,929</b> | <b>\$12,000,265</b>     | <b>\$301,000,000</b> | <b>\$17,706,000</b>      |

Notes: Data in 1986 constant dollars.

1/ Represents 1981-1986 average annual expenditures.

Sources: Passaic Valley Sewerage Commissioners and Hamer, Siler, George Associates

## Water Supply and Distribution

New Jersey's water supply system is diverse and interrelated. More than 500 purveyors, both public and private, operate within the State. Approximately 75 percent of the water supplied by these systems is the responsibility of the 25 largest purveyors.

The major coordinating agency is the Division of Water Resources (DWR) operating out of the State's Department of Environmental Protection. The primary responsibilities of DWR were described in the 1983 New Jersey Water Supply Handbook authored by the State of New Jersey County and Municipal Government Study Commission:

The powers currently vested in the DWR have been derived from a number of sources. In addition to succeeding to the authority of the former Division's of Water Policy and Supply, the Division authority concerning various aspects of water resource management has been supplemented by the adoption of subsequent legislation and administrative reorganization within the DEP. The DWR has general responsibility for dams, drainage basins, flood control, flood plains, industrial pretreatment, landfills, NJPDES surface and groundwater discharge permits, portable water systems, septic tanks, sewerage systems, shellfish harvest areas, sludge management, soil conservation and water conservation, stream encroachment, storm water management, water supply planning and allocation and well permits. To perform its responsibilities at the present time, the Division is organized into the following component units: Construction Grants Administration, Enforcement Element, Monitoring and Planning Element, Water Quality Management Element, Water Supply and Watershed Management Administration and the New Jersey Geological Survey Element.

Both surface water and groundwater resources are used extensively in the provision of water throughout the state. Sources include reservoirs, river intakes, well systems, and/or a combination of these. The southern portion of the northern area is dependent upon surface waters. In the densely populated northeast, a complex but inadequate network of interconnections exists for transfer of supplies.

### Capital Expenditure Needs

In 1982, the State of New Jersey County and Municipal Government Study Commission surveyed local engineers and private surveyors about the condition of their water supply and distribution system. The survey revealed annual needs (in 1986 constant dollars) among public surveyors to be \$70.5 million and \$22.4 million amongst private surveyors. The private surveyors require less investment because they were better capitalized. This annual projection has been carried out to the horizon year of 2010. During 1988-1993, total projected capital need for both types of systems is \$558 million and during 1994-2010 total need is projected to be \$1.6 billion (See Table 24). Because this survey took place at the local level, it is felt to be a fairly good representation of total need throughout the state.

**Table 24. STATE WATER SUPPLY CAPITAL REVENUE/NEED PROJECTIONS, NEW JERSEY, 1988-2010**

| <u>Need/Revenue</u>                             | <u>1988-1993</u>       | <u>1994-2010</u>       | <u>1988-2010</u>          |                                    |
|---|------------------------|------------------------|---------------------------|------------------------------------|
|   |                        |                        | <u>Total Revenue/Need</u> | <u>Annual Average Revenue/Need</u> |
| <b>Water distribution need</b>                  |                        |                        |                           |                                    |
| Public purveyor                                 | \$423,600,000          | \$1,200,200,000        | \$1,623,800,000           | \$70,600,000                       |
| Private purveyor                                | 134,400,000            | 380,800,000            | 515,200,000               | 22,400,000                         |
| Subtotal  | \$558,000,000          | \$1,581,000,000        | \$2,139,000,000           | \$93,000,000                       |
| <b>Less scheduled water supply expenditures</b> |                        |                        |                           |                                    |
| State/private 1/                                | \$95,592,000           | \$35,000,000           | \$130,592,000             | \$5,678,000                        |
| NJ Water Supply Authority 2/                    | 62,115,000             | 103,730,000            | 165,845,000               | 7,211,000                          |
| North Jersey Water Supply Comm. 3/              | 1,000,000              | 0                      | 1,000,000                 | 43,000                             |
| Subtotal  | \$158,707,000          | \$138,730,000          | \$297,437,000             | \$12,932,000                       |
| <b>Less proposed NJDEP loan programs</b>        | \$168,000,000          | \$476,000,000          | \$644,000,000             | \$28,000                           |
| <b>Surplus/(deficit) gap</b>                    | <b>(\$231,293,000)</b> | <b>(\$966,270,000)</b> | <b>(\$1,197,563)</b>      | <b>(\$24,040,000)</b>              |

Notes: Data in 1986 constant dollars.

- 1/ Derived in Appendix Table H-1.
- 2/ Derived in Appendix Table H-2.
- 3/ Derived in Appendix Table H-3.

Sources: NJ Department of Environmental Protection; NJ Water Supply Authority; North Jersey Water Supply Commission; and Hammer, Siler, George Associates.

## Projected Capital Revenue

The Division of Water Resources has prepared \*n Action Program for 1985-1989. These are projects where funding »and Implementation 1s scheduled. In addition, the Division has listed potential actions or projects spanning the period 1985-2020. This long range action program only describes potential projects and does not provide costs or assess the projects cost/benefit. These two lists were combined with cost estimates acquired from Division personnel when available (see Appendix Table H-i. Should these projects be Implemented they would reduce the total projected need by \$130.6 million between 1983-2010.

The New Jersey Water Supply Authority 1s Implementing several large scale projects -- the D & R, Spruce Run, Round Valley Reservoirs and the Manasquan Reservoirs. Based on discussions with Authority personnel and their 1987-1991 capital program, these projects are assumed to be constructed over the 1988-2010 period (see Appendix Table H-2). In addition to these projects, Authority personnel were asked to speculate as to the need for future reservoirs. They Indicated that 1t is likely that the D i~R, Sprues Run, and Round Valley Reservoirs will run out of capacity sometime before the horizon year because they service^ three large growth corridors: U.S. Routes 1, 30 and Interstate routes 287/78. Proposals include construction of two new reservoirs (Six Mile Run and Confluence) and an increase of the dam wall height at Round Valley by 25 feet. Based upon recently completed reservoirs, the projected cost of the two new reservoirs, having a capacity to deliver 79 million gallons per day. Is \$69.7 million. Cost estimates associated with modification of dam walls at Round Valley cannot be Hade at this time. It 1s assumed that revenue for the two new reservoirs will be obtained.

The North Jersey District Water Supply Commission has plans to rehabilitate piping associated with the North Wanaque Reservoir prior to 1993. Officials indicate that five miles of pipe will be relined costing \$1 Billion (see Appendix Table H-3). Because the dam walls and surge tanks have recently been renovated, no additional capital expenditures are projected prior to the horizon year of 2010.

Given the implementation of these projects, water supply need will be decreased by 5158.7 million during 1988-1993 and \$138.7 million during 1994-2010. This, however, will still leave a deficit of \$231 million in 1988-1993 and \$966.3 million in 1994-2010, or \$1.2 billion during the period.

#### Flood Control and Storm Water Management

Apart from the flood plain mapping program, flood control and storm water management have not elicited large amounts of funding over the years. The state began to take a more active role in flood control in 1973 when it provided \$22 million of state flood control grants, and \$3 million for flood control planning under the Emergency Flood Control Bond Act. During the first four years of this program, 27 projects costing \$16 million were approved.

Flood control and storm water management is implemented by local governments via two different techniques -- flood control and flood plain management. Flood control addresses an existing or known flooding problem, and includes the design, construction, and maintenance of facilities to channel, divert, or store storm water runoff to allow drainage to occur in a planned and controlled rate. Flood plain management is the technique by which land uses in the flood plain are controlled and regulated to prevent or reduce damage to property and

threats to lives during times of major flooding. In addition, flood plain management plans are designed to encourage the natural control of flooding problems by controlling development on upstream slopes and limiting the amount of ground covered by impermeable materials.

The Division of Water Resources, operated out of the Department of Environmental Protection, oversees the flood control and storm water management program for the entire state. Responsibilities include providing financing, encouraging master planning, and regulating construction or program implementation.

Storm water management is now becoming a more important issue as states are attempting to control both flooding and non-point-source pollution by using retention basins and natural aquifers. In the coming years it is likely that new state programs will be created to help municipalities and counties utilize these techniques to their fullest benefits. Flood control/storm water management need will be compared against revenues to determine future surplus/deficit situations.

#### Projected Capital Revenue

A listing of New Jersey projects to be funded by the Federal Government can be found in Appendix Table 1-1. It should be noted that this legislation does not appropriate funding but does authorize the U.S. Army Corp Engineers to proceed with planning, feasibility studies, and cost estimating. Based upon discussions with Water Supply and Watershed Element personnel, it is likely that the projects will be constructed but the exact year is uncertain. Because of the distant

**horizon year of 2010, It Is assumed that these projects Mill be constructed during- this planning period.**

Federal appropriations for New Jersey projects derived In Appendix Table 1-1 are brought forth Into Table 25. The Hazard Dam Repair Program, Instituted by DEP, 1\$ projected to continue to 2010. Funding under the Emergency Flood Control Act is projected to dry-up during the 1988-1994 period. Mater Supply »and Watershed personnel Indicated that this program will likely be replaced with another program to deal with the storm water management Issue, but Its size and timing are not predictable.

Revenue from county and municipal agencies Is projected to total \$170 million during 1988-1993 and \$480 million during 1994-2010. Future expenditures are based upon 1982 expenditures as reported in the Mew Jersey County and Municipal Government Study report on Infrastructure. These expenditures are projected to be \$331 Billion during 1988-1993 \$1.0 and billion during 1994-2010.

**Table 25. STATE FLOOD CONTROL/STORM WATER MANAGEMENT CAPITAL REVENUE PROJECTIONS, NEW JERSEY, 1988-2010**

| <u>Project Sponsor/Project Name</u>   | <u>1988-1993</u>                                       |  | <u>1994-2010</u>          |                          |
|---|--|--|---------------------------|--------------------------|
|   | <u>Total Expend</u>                                    | <u>Avg Annual Expend</u>                             | <u>Total Expend</u>       | <u>Avg Annual Expend</u> |
| <b>Federal 1/<br/>State</b>   | \$51,300,000   | \$8,550,000  | NA                        | NA                       |
| <b>Contributions on federal projects 1/<br/>  Hazard dam repair program 2/<br/>  1978 Flood Control Act 3/<br/>  Subtotal</b> | 70,800,000<br>30,000,000<br>9,000,000<br>\$109,800,000 | 11,800,000<br>5,000,000<br>1,500,000<br>\$18,300,000 | NA<br>NA<br>0<br>NA       | NA<br>NA<br>0<br>NA      |
| <b>County/Local</b>   | 169,572,000  | 28,262,000   | 480,445,000               | 28,262,000               |
| <b>Total</b>  | <b>\$330,372,000</b>                                   | <b>\$55,112,000</b>                                  | <b>\$1,009,800,000 4/</b> | <b>\$59,400,000</b>      |

Notes: Data In 1986 constant dollars.

1/ Derived In Appendix Table 1-1.

In 1988-1990 Capital Improvement Program assembled by the NJDEP projected funding for this program at \$5 million annually. It is assumed that the program continues at this level to the year 2010.

3/ DEP Capital Improvement Program calls for \$3 million to be spent annually from 1988-1990. No funds have been allocated for flood control beyond this period and it is

assumed that no funds will be allocated for this purpose. 4/ Assume future revenue will equal future need.

Sources: NJ Department of Environmental Protection, Water Supply and Watershed Management Element "The NJ Statewide Flood Control Master Plan, 1985"; and Hammer, Slier, George Associates.

### Capital Revenue vs. Need

Capital revenues derived in Table 25 are brought forth into Table 26 and compared against projected need to determine if a surplus or deficit situation will exist. According to the County and Municipal Study Commission, total flood control/storm water management need in 1982 was \$59.4 million (1986 constant dollars). Because this survey was taken at the smallest planning unit level, the municipality, it is felt to be a reasonable estimate of total state need. Deficits of \$25.7 million during 1988-1993. During 1994-2010, revenues are projected to match need. This assumes implementation of projects introduced in the federal authorization bill H.R.G.

Table 26. STATE FLOOD CONTROL/STORM WATER MANAGEMENT REVENUE/  
NEED PROJECTIONS NEW JERSEY, 1988-2010

| Funding Source                | 1988-1993      |                   | 1994-2010       |                   |
|-------------------------------|----------------|-------------------|-----------------|-------------------|
|                               | Total Expend   | Avg Annual Expend | Total Expend    | Avg Annual Expend |
| <b>Expenditures</b>           |                |                   |                 |                   |
| Federal 1/                    | \$51,300,000   | \$8,550,000       | NA 4/           | NA                |
| State 1/                      | 109,800,000    | 18,300,000        | NA              | NA                |
| County/local 2/               | 169,572,000    | 28,262,000        | 480,454,000     | 28,262,000        |
| Subtotal                      | \$330,672,000  | \$55,112,000      | \$1,009,800,000 | \$59,400,000      |
| Less projected need 3/        | \$356,400,000  | \$59,400,000      | \$1,009,800,000 | \$59,400,000      |
| Revenue Surplus/<br>(deficit) | (\$25,728,000) | (\$4,288,000)     | 0               | 0                 |

Notes: Data In 1986 constant dollars. Derived In Table 25.

1 From County and Municipal Study Commission.  
2 NJ Municipal Government Study Commission.

3 It Is assumed that the total dollar amount of projects approved under H.R.G. will not exceed total need.

Sources: NJ Department of Environmental Protection -- Water Supply and Watershed Management Element; State of New Jersey County and Municipal Government Study Commission, "New Jersey local Infrastructure: An Assessment of Needs"; and Hammer, Slier, George Associates.

Solid Waste

The legislative framework for solid waste management and planning in New Jersey is provided in the Solid Waste Management Act. The division of roles and responsibilities provided by this Act shape the policies of the Department of Environmental Protection. The Act delineates solid waste management districts (all 21 counties and the Hackensack\* Meadowlands District) and provides a framework to plan for the management of solid waste, which includes determining the present and future waste quantities, choices of technology, and new facility locations. The State reviews, approves, and/or modifies district plans. The Department has initiated several major policy initiatives, such as resource recovery and mandatory source separation of recyclable materials.

The state is currently working with the following counties and/or municipalities which have selected new landfill sites:

|                              |                         |
|------------------------------|-------------------------|
| Hamm's Upland White Township | Ocean County, L.F.      |
| Rockaway Township            | Winslow Township South  |
| Bridgewater Township         | Harrison Township       |
| Reclamation Center Expansion | Alloway Township        |
| Mansfield and Florence Twps. | Deerfield Township Cape |
|                              | May County              |

In addition to these, the state is working with the following counties and/or municipalities which have selected resource recovery sites:

|                       |                         |
|-----------------------|-------------------------|
| Hamm's Upland Project | Trenton Freightyards    |
| City of Passaic       | S.W. Facilities Complex |
| Ridgefield Borough    | Lacy Township           |
| Oxford Township       | Pennsauken Township     |
| Sockway Township City | South Camden West       |
| of Newark Koppers     | Deptford Township       |
| Koke Site City of     | Carney's Point Township |
| Rahway                |                         |

### Projected Capital Revenues

Projected revenues available for solid waste facility construction are summarized in Table 27. Of the five sources, only the repayment proceeds from the 1985 Resource Recovery Bond program are projected to run to 2010 (see Appendix Table J-1 for the repayment schedule). Department personnel indicated that only two years worth of funding remain from the 1980 Natural Resources Bond, and four years from the 1985 Resource Recovery Bond. Reauthorization of these funding programs cannot be assumed nor can State Aid and NY/NJ Port Authority funding. With these assumptions in hand, solid waste capital revenues are projected at \$369 million during 1988-1993 and decrease substantially to \$6 million during 1994-2010. It should be noted that it is likely that new State programs will be instituted after the two existing bond programs run out. Thus, the projected revenue totals are likely understated.

Table 27. STATE SOLID WASTE REVENUE PROJECTIONS, NEW JERSEY, 1988-2010

| Revenue Source                 | 1988                 | 1989                | 1990                | 1991                | 1992             | 1993             | 1988-1993            |                     | 1994-2010          |                    |
|--------------------------------|----------------------|---------------------|---------------------|---------------------|------------------|------------------|----------------------|---------------------|--------------------|--------------------|
|                                |                      |                     |                     |                     |                  |                  | Total Revenue        | Avg Annual Revenue  | Total Revenue      | Avg Annual Revenue |
| 1980 Natural Resources Bond 1/ | \$6,250,000          | \$6,250,000         | \$0                 | \$0                 | \$0              | \$0              | \$12,500,000         | \$2,083,333         | \$0                | \$0                |
| 1985 Resource Recovery Bond 2/ | 38,300,000           | 28,300,000          | 28,300,000          | 28,400,000          | 0                | 0                | 123,300,000          | 20,550,000          | 0                  | 0                  |
| State Aid 3/                   | 33,000,000           | 0                   | 0                   | 0                   | 0                | 0                | 33,000,000           | 5,500,000           | 0                  | 0                  |
| NY/NJ Port Authority 4/        | 200,000,000          | 0                   | 0                   | 0                   | 0                | 0                | 200,000,000          | 33,333,333          | 0                  | 0                  |
| Loan repayment on 1985 bond 5/ | 0                    | 0                   | 0                   | 0                   | 117,917          | 235,834          | 353,751              | 58,959              | 6,020,839          | 354,167            |
| <b>Total</b>                   | <b>\$277,550,000</b> | <b>\$34,550,000</b> | <b>\$28,300,000</b> | <b>\$28,400,000</b> | <b>\$117,917</b> | <b>\$235,834</b> | <b>\$369,153,751</b> | <b>\$61,525,625</b> | <b>\$6,020,839</b> | <b>\$354,167</b>   |

Notes: Data in 1986 constant dollars.

1/ \$1.2 billion of the total bill is \$50 million of which \$37.5 million has been authorized in 1987 for the Essex County project, the remaining \$12.5 billion is projected to be spent in 1988-1989. 2/ \$8.3 million has been appropriated in 1988. Based on discussions with Waste Management personnel at LIP, the balance of \$85 million is projected to be appropriated over the 1989-1991 period. 3/ This is an allocation out of discretionary general funds going to the Essex County project. Because this revenue is discretionary, it is not assumed to be a recurring revenue.

4/ This represents a one-time commitment to construct the Essex County project. This revenue is not assumed to be recurring. 5/ Repayments calculated in Appendix J-1.

Sources: New Jersey Division of Environmental Protection -- Division of Waste Management and Interim, George Associates.

### Projected Capital Need

Total State need is based on the 1985-2000 Solid Waste Management Plan drafted by the Department of Environmental Protection's Division of Waste Management and on discussions with Management personnel. They are subdivided into three categories -- resource recovery facilities, land fills, and land fill closures (see Table 28). Management personnel indicated that' the State is in the midst of a 52.2 billion program to construct resource recovery facilities. A total of \$1.3 billion of need still exists under this program.

Table 28. STATE SOLID WASTE NEED PROJECTIONS, NEW JERSEY, 1988-2010

| Type of Facility  | 1988               | 1989             | 1990             | 1991             | 1992             | 1993             | 1988-1993          |                  | 1994-2010          |                  |
|-------------------|--------------------|------------------|------------------|------------------|------------------|------------------|--------------------|------------------|--------------------|------------------|
|                   |                    |                  |                  |                  |                  |                  | Total Need         | Avg Annual Need  | Total Need         | Avg Annual Need  |
| Resource recovery |                    |                  |                  |                  |                  |                  |                    |                  |                    |                  |
| Construction 1/   | \$1,230,000        | \$257,000        | \$367,000        | \$0              | \$0              | \$0              | \$1,854,000        | \$309,000        | \$0                | \$0              |
| Land fill         |                    |                  |                  |                  |                  |                  |                    |                  |                    |                  |
| Construction 1/   | \$126,500          | \$126,500        | \$126,500        | \$126,500        | \$126,500        | \$126,500        | \$759,000          | \$126,500        | \$2,151,000        | \$127,000        |
| Land fill closure |                    |                  |                  |                  |                  |                  |                    |                  |                    |                  |
| Construction      | \$107,700          | \$107,700        | \$107,700        | \$107,700        | \$107,700        | \$107,700        | \$646,200          | \$107,700        | \$754,000          | \$44,000         |
| Maintenance       | 20,000             | 20,000           | 20,000           | 20,000           | 20,000           | 20,000           | 120,000            | 20,000           | 340,000            | 20,000           |
| Subtotal          | \$127,700          | \$127,700        | \$127,700        | \$127,700        | \$127,700        | \$127,700        | \$766,200          | \$127,700        | \$1,094,000        | \$64,000         |
| <b>Total</b>      | <b>\$1,464,000</b> | <b>\$511,200</b> | <b>\$621,200</b> | <b>\$254,200</b> | <b>\$254,200</b> | <b>\$254,200</b> | <b>\$3,379,200</b> | <b>\$563,200</b> | <b>\$3,245,000</b> | <b>\$191,000</b> |

Notes: Data in thousands of 1986 constant dollars.

1/ Maintenance is assumed to be paid for out of tipping fees charged to local trash haulers.

Sources: New Jersey Department of Environmental Protection -- Division of Waste Management and Hazardous Waste, Siller, George Associates.

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Land fill need is projected to be \$759 Billion during 1988-1993 and \$2.2 billion during 1994-2010. This estimate is based upon a total state need of 47 million tons of capacity and an average land fill construction cost of \$35 per ton. Because land fills reach capacity and new fills are required, it is anticipated that this annual need will be recurring out to the year 2010.

Another need involves closure of fills and maintaining abandoned land fills. Management personnel indicated that there are 284 land fills in need of closure. Two cost estimates have been generated -- \$700.9 Billion and \$1.4 billion. The more expensive cost scenario involves lining the land fill to prevent seepage of pollutant condensation into the water table. It is assumed that the more expensive of the two alternatives will be implemented given the political sensitivity of these environmental issues in the state. In addition to closing land fills, the state will also be required to provide maintenance. The total cost of closing and maintaining these 284 land fills is projected to be \$756 million during 1988-1993 and \$1.1 billion during 1994-2000.

Projected need and revenue are brought forth into Table = 29 to determine if a revenue surplus or deficit will occur. As was the case with other infrastructure types, solid waste capital needs are projected to exceed revenue by \$3.0 billion during 1988-1993 and \$3.2 billion during 1994-2010.

Table 29. SOLID WASTE REVENUE VS. NEED FORECASTS, NEW JERSEY, 1988-2010

| <u>Needs/Revenue</u>        | <u>1988</u>      | <u>1989</u>    | <u>1990</u>    | <u>1991</u>    | <u>1992</u>    | <u>1993</u>    | <u>1988-1993</u>     |                           | <u>1994-2010</u>     |                           |
|-----------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------------|---------------------------|----------------------|---------------------------|
|                             |                  |                |                |                |                |                | <u>Total Revenue</u> | <u>Avg Annual Revenue</u> | <u>Total Revenue</u> | <u>Avg Annual Revenue</u> |
| Revenue <u>1/</u>           | \$277,550        | \$34,550       | \$28,300       | \$28,400       | \$117,917      | \$235,834      | \$369,154            | \$61,523                  | \$6,020              | \$354                     |
| Need <u>2/</u>              | <u>1,484,200</u> | <u>511,200</u> | <u>621,200</u> | <u>254,200</u> | <u>254,200</u> | <u>254,200</u> | <u>3,379,200</u>     | <u>563,200</u>            | <u>3,245,000</u>     | <u>191,000</u>            |
| Revenue surplus/<br>deficit | (\$1,206,650)    | (\$476,650)    | (\$592,900)    | (\$225,800)    | (\$136,283)    | (\$18,366)     | (\$3,010,046)        | (\$501,677)               | (\$3,238,980)        | (\$190,646)               |

Notes: Data in thousands of 1986 constant dollars.

1/ Derived in Table 27.

2/ Derived in Table 28.

Sources: New Jersey Department of Environmental Protection, Division of Waste Management and Hamner, Siler, George Associates.

## Shore Protection

New Jersey, like all coastal states provides financial and technical assistance to help communities cope with shoreline erosion. In the early 1940's, legislation authorized the Department of Environmental Protection's predecessor (the Department of Conservation and Economic Development) to repair, reconstruct, or construct bulkheads, seawalls, breakwaters, groins, jetties, beaches, dunes and any or all appropriate structures for shore protection purposes. The annual appropriation for this work has averaged approximately \$1 million dollars. Some \$49 million in State, federal, municipal, and county funds were spent between 1959 and 1974.

In recent years, the need for shoreline protection planning has been heightened by the cumulative effect of minor and major storms (particularly the March 1962 storm) and the tremendous boom in oceanfront development. The New Jersey Commission on Capital Budgeting and Planning recognized that the annual one million dollar appropriation for State Aid to municipalities for shore protection purposes was inadequate and in 1977 the voters of the State approved a \$30 million Beaches and Harbors Bond Issue which provided \$20 million for State Aid for shore protection purposes and \$10 million for harbor cleanup.

Local governments have taken different approaches towards shore protection, with some allowing dunes to be overtaken by development, while others worked to acquire oceanfront lots and rebuild dunes. The Federal Government has also been actively involved in shorefront development through the National Flood Insurance Program. The net

result of these State, Federal and Local activities has been an amalgam reactive approach to shore protection."

Projected Capital Need and Revenue

Projected shore protection need and revenues to meet this need are summarized in Table 30. Need is subdivided into State and federally sponsored projects. State need is based upon a "listing of proposed projects assembled as part of the 1981 New Jersey Shore Protection Master Plan (see Appendix Table K-1). The master plan discusses each project in terms of construction and maintenance costs. The maintenance costs for State projects are projected out to the horizon year 2010 (see Appendix Table K-2).

I/ 1981 New Jersey Shore Protection Master Plan.

**Table 30. STATE SHORE PROTECTION REVENUE/NEED PROJECTIONS,  
NEW JERSEY, 1988-2010**

| <u>Need/Revenue</u>          | <u>1988-1993<br/>Need/Revenue</u> | <u>1994-2010<br/>Need/Revenue</u> |
|------------------------------|-----------------------------------|-----------------------------------|
| <b>State Projects</b>        |                                   |                                   |
| Construction <sup>1/</sup>   | \$83,268,669                      | \$0                               |
| Maintenance <sup>2/</sup>    | 176,660,100                       | 539,114,600                       |
| Subtotal                     | \$259,928,769                     | \$539,114,600                     |
| <b>Federal Projects</b>      |                                   |                                   |
| Construction <sup>1/</sup>   | \$154,100,000                     | *****                             |
| Maintenance <sup>3/</sup>    | 0                                 | 196,000,000                       |
| Subtotal                     | \$154,100,000                     | \$196,000,000                     |
| <b>Total Need</b>            | <b>\$414,028,769</b>              | <b>\$735,114,600</b>              |
| <b>Less Revenue</b>          |                                   |                                   |
| State <sup>4/</sup>          | \$18,310,000                      | \$0                               |
| Federal <sup>5/</sup>        | 107,500,000                       | 196,000,000                       |
| Local                        | 4,103,000                         | 0                                 |
| Subtotal                     | \$129,913,000                     | \$196,000,000                     |
| <b>Surplus/(deficit) gap</b> | <b>(\$284,115,769)</b>            | <b>(\$539,114,600)</b>            |

<sup>1/</sup>

<sup>2/</sup>

<sup>3/</sup>

<sup>4/</sup>

<sup>5/</sup>

Notes: .Data in 1986 constant dollars. Derived in Appendix Table K-1. Derived in Appendix Table K-2. Derived in Appendix Table K-3. It is assumed that the federal government will assume all maintenance costs. Final appropriation from the 1983 Shore Protection Bond program. Coastal Resource personnel estimated federal commitments as they know them at this time. They indicated that federal funds would likely be used to maintain the three scheduled federal projects.

Sources: State of New Jersey Department of Environmental Protection, Division of Coastal Resources and Hammer, Slier, George Associates.

Division of Coastal Resource personnel also provided construction and maintenance information on the three proposed federal projects.

Barnegat Inlet, Sea Bright/Monmouth Beach, and Egg Harbor Inlet. These three projects are estimated to cost \$154 Billion to construct and \$196 million to maintain over the period 1994-2010. Total construction and maintenance need for State and Federal projects for 1988-1993 is projected to total \$414 million and \$735 million for 1994-2010.

Projected shore protection revenues originate \*from one of three sources -- State, federal, or local. Coastal Resource personnel could not provide State forecasts. For this reason, no State appropriations are assumed after the 1983 Shore Protection Bond is depleted. However, it is likely that some State support will be forthcoming to replace this popular program.

To date, no solid commitments have been made regarding federal projects, however Coastal Resource personnel indicate that it is likely that the Federal Government will pay for the majority of construction and maintenance. It is assumed that this will be the case and that federal funding can be considered as revenue to offset total need.

Between 1988-1993 revenue from local sources is projected to be \$4.1 million. Because of the political complexity of local financial involvement it cannot be assumed to be a recurring funding source. More than likely however, some local funding commitments will be made in the 1994-2010 period.

Total revenues are subtracted from total need to yield revenue deficits of \$284 million during 1988-1993 and \$539 million during 1994-2010. Because of this unpredictability of need, due to storms and unforeseen erosion problems, these need projections are at best estimates\*.

## Education

The State of New Jersey has created and maintains an extensive elementary and secondary educational program. As of 1984 there were 1,900 public elementary schools; 425 public secondary schools; 185 private high schools and academies; 77 schools for the handicapped; and a total of 1.246 million students and 96,000 professional staff. Because Individual school districts have taxing authority, over the years local districts have been able to keep pace with capital needs. This trend is projected to continue into the future.

\*

For the purposes of this report only public elementary and secondary facilities are evaluated. Institutions of higher education, in addition to private elementary and secondary (financed independently from the state) are not evaluated.

### Capital Expenditure Trends

Total capital expenditures are made-up of two components - capital outlay and Improvement authorization. Capital outlays are . actual expenditures made to a project within a particular year. Improvement authorizations are usually associated with bonds, whereas payments are made over a period of time. This is not debt service but actual drawdowns on a given project. In 1985 capital outlays were \$58.3 million and improvement authorizations were \$62.7 million (see Appendix Table L-1). These two expenditure categories can be compared to total enrollment to derive capital expenditures per pupil. In 1985, \$107 worth of capital expenditures were made per pupil.

### Enrollment Trends and Projections

Enrollment trends and projections are presented in Table 31. Between 1980 and 1987 total elementary and secondary enrollment declined by over 25,000 students per year or 2 percent (see Appendix Table L-2 for a listing of enrollment by county).

The New Jersey Department of Education has made statewide enrollment projections from 1988-1997. The Department uses a three year moving average to make these projections. During this period, enrollment is projected to increase slightly, by 1.45 percent annually, and state-wide enrollment in 1997 is projected to be 1.24 million. The overall decline in enrollment between 1980-1987 is projected to reverse itself as those in 25-35 year olds now began having children. Enrollment between 1998-2010 is projected to continue to increase at the moderate 1.45 percent level. Total enrollment in 2010 is projected to be 1.5 million (see Appendix Table 1-3 for state-wide enrollment projections distributed by county).

Table 31. ELEMENTARY AND SECONDARY SCHOOL ENROLLMENT TRENDS AND PROJECTIONS, NEW JERSEY, 1980-2010

| <u>1980-1987 Enrollment Trends 1/</u> |           | <u>1988-2010 Enrollment Projections 2/</u> |           |
|---------------------------------------|-----------|--|-----------|
| 1980                                  | 1,288,259 | 1988                                       | 1,099,551 |
| 1981                                  | 1,246,008 | 1989                                       | 1,092,003 |
| 1982                                  | 1,172,718 | 1990                                       | 1,091,484 |
| 1983                                  | 1,172,520 | 1991                                       | 1,010,299 |
| 1984                                  | 1,147,520 | 1992                                       | 1,118,591 |
| 1985                                  | 1,129,223 | 1993                                       | 1,139,062 |
| 1985                                  | 1,115,689 | 1994                                       | 1,161,699 |
| 1987                                  | 1,107,467 | 1995                                       | 1,187,511 |
|                                       |           | 1996                                       | 1,231,250 |
|                                       |           | 1997                                       | 1,240,775 |
|                                       |           | 1988                                       | 1,258,766 |
|                                       |           | 1999                                       | 1,277,018 |
|                                       |           | 2000                                       | 1,295,535 |
|                                       |           | 2001                                       | 1,314,320 |
|                                       |           | 2002                                       | 1,333,378 |
|                                       |           | 2003                                       | 1,352,712 |
|                                       |           | 2004                                       | 1,372,326 |
|                                       |           | 2005                                       | 1,392,225 |
|                                       |           | 2006                                       | 1,412,412 |
|                                       |           | 2007                                       | 1,432,892 |
|                                       |           | 2008                                       | 1,453,669 |
|                                       |           | 2009                                       | 1,474,747 |
|                                       |           | 2010                                       | 1,496,131 |
| <u>1980-1987</u>                      |           |  |           |
| <u>Annual Average Change</u>          |           |  |           |
| Actual (25,828)                       |           |  |           |
| Percent (2.0%)                        |           |  |           |
| <u>1988-2010</u>                      |           |  |           |
| <u>Annual Average Change</u>          |           |  |           |
| Actual 15,943                         |           |  |           |
| Percent 1.45%                         |           |  |           |

!/ See Appendix Table L-2 and 1-3 and for enrollment by County. y  
See Appendix Table L-4 for enrollment by County.  
Projections for years 1988-1997 provided by the Department  
of Education.

Sources: New Jersey Department of Education and Hammer,  
Slier, George Associates.

Projected Capital Expenditures

Projected capital expenditures are derived by multiplying  
state-wide enrollment projections calculated in Table 32 by the average

capital expenditure factor of \$107 per pupil derived in Table 31. During 1988-1993, total \$925 million or \$154 million annually is projected to be needed and expended on capital projects. During 1994-2010, the total is \$2.5 billion or \$145 million per year. Projected capital expenditures by school district are summarized in Appendix Table L-4.

Table 32. CAPITAL EXPENDITURE PROJECTIONS FOR ELEMENTARY AND SECONDARY SCHOOLS. NEW JERSEY, 1988-2010 (1986 Constant Dollars)

| <u>Year</u>                  | <u>Expenditures</u> I/ |
|------------------------------|------------------------|
| 1988                         | \$302,413,389          |
| 1989                         | 158,739,691            |
| 1990                         | 98,786,375             |
| 1991                         | 119,552,225            |
| 1992                         | 121,530,325            |
| 1993                         | 123,755,069            |
| 1994                         | 126,214,380            |
| 1995                         | 129,018,708            |
| 1996                         | 131,815,116            |
| 1997                         | 134,305,635            |
| 1998                         | 136,760,576            |
| 1999                         | 138,743,434            |
| 2000                         | 140,755,289            |
| 2001                         | 142,796,172            |
| 2002                         | 144,866,704            |
| 2003                         | 146,967,378            |
| 2004                         | 149,098,261            |
| 2005                         | 151,260,253            |
| 2006                         | 153,453,550            |
| 2007                         | 155,578,463            |
| 2008                         | 157,935,922            |
| 2009                         | 160,226,030            |
| 2010                         | 162,549,280            |
| 1968-1993                    |                        |
| -Average Annual Expenditures | \$154,146,212          |
| Total Expenditures           | \$924,877,274          |
| 1994-2010                    |                        |
| -Average Annual Expenditures | \$144,379,127          |
| Total Expenditures           | \$2,462,945,151        |

I/ See Appendix Table L-4 for expenditures by county.

Sources: New Jersey Department of Education and Hammer, Slier, George Associates.

### Total Unmet Capital Needs

In the preceding pages capital need projections were made for two periods — 1988-1993 and 1994-2010. Along with need, revenue projections (for non-revenue generating agencies or authorities) were also made. In most cases need exceeded revenue leaving infrastructure groups with unmet capital needs. Unmet needs by Infrastructure group is summarized in Table 33.

Between 1988-2010 a total need of \$48.5 billion has been documented. When compared to the projected revenue for the same period, a deficit of \$19.3 billion exists.<sup>1</sup>

1 OSP Editors Note (1/88) :

If the revaluation of county and local roads prepared in the TRD prepared by OSP on "Infrastructure Needs Assessment-Transportation" 1/88 is used, the need and the revenue gap figures increase by \$2.2 billion respectively

Table 33. STATEWIDE INFRASTRUCTURE NEEDS/REVENUE PROJECTIONS, NEW JERSEY. 1988-2010

| Infrastructure 1988-<br>Cap"       | Need                     |              | Revenue      |            |                |
|------------------------------------|--------------------------|--------------|--------------|------------|----------------|
|                                    | 1994-                    | 2016         | total"       | Potential  |                |
| Roads and Bridges                  | \$8,935,000 <sup>6</sup> | \$3,987,000  | \$12,922,000 | 19,237,000 | 3,685,000      |
| I/<br>N.J. Turnpike Authority      | 2,004,318                |              | \$313,038    | 2,317,356  | 2,317,356      |
| 0 II<br>N.J. Highway Authority     | 715,284                  | 2,171,638    |              | 2,886,922  | 2,886,922      |
| 0 If<br>N.J. Transit               | 2,489,800                | 6,577,200    | 9,067,000    | 5,449,540  | (3,617,460)    |
| Aviation                           | 58,707                   | 166,209      |              | 224,916    | 99,111         |
| Rail freight                       | 19,220                   | 52,893       | 72,113       | 72,113     | 0 3/           |
| Delaware River Port Authority      |                          | 109,525      | 260,251      | 369,776    | 369,776        |
| Delaware River and Bay Authority   |                          | 68,483       | 57,882       | 126,365    | 126,365        |
| Sewerage (State)                   | 1,768,000                | 3,757,000    | 5,525,000    | 1,990,411  | (3,534,589)    |
| Passaic Valley Sewerage Commission |                          | 42,001,301   | 42,001,301   | 343,001    | 0 y            |
| Water Supply                       | 558,000                  | 1,581,000    | 2,139,000    | 941,437    | (1,197,563)    |
| Mood Control/SUM Water             | 356,400                  | 1,009,800    | 1,366,200    | 1,304,472  | (61,728) 4/    |
| Solid Waste                        | 3,379,200                | 3,245,000    | 6,624,200    | 375,174    | (6,249,026) 5/ |
| Shore Protection                   | 414,029                  | 735,115      | 1,149,144    | 325,913    | (823,231)      |
| Education                          |                          |              | 921,871      | 2,462,945  |                |
|                                    |                          | ^3.387.822   | 23.387.822   | 0 2/       |                |
| Total                              | \$21,842,844             | \$26,677,971 | \$48,520,815 |            | 29,226,413     |
| (19,294,402)                       |                          |              |              |            |                |

Note: Data In thousands of constant 1986 dollars.

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I/ Assumes adoption and construction of Trust Fund II funding on an annual basis to 2010 sufficient to pay for needed roads.  
 J Agencies and/or authorities which have revenue generating capabilities (through tolls or taxes). Assumes that revenue collections will be adjusted to pay for Infrastructure needs.  
 3/ A modest capital Improvement program Is projected based on Conrad's continued retention of rail lines. Revenues are projected to meet future needs based upon these assumptions.  
 4/ Assumes federal appropriations for all projects authorized In authorization bill H.R.6.  
 5/ Does not Include hazardous waste disposal or treatment.

Sources: New Jersey agencies and Hammer, Slier, George Associates.

<sup>6</sup>OSP Editor's Note: (I/88)

A recalculation of county and local roads and bridge needs, as appears in TRD prepared by OSP on 1/88 on Infrastructure Needs Assessment on Transportation. yields a higher figure than appears here. This higher figure would increase total needs and the revenue gap by about \$2.billion

Unmet Need In Relation to the State Capital Budget

To provide a reference point from which to assess total unmet need, total need is compared against the 1986 State Capital Budget. According to the New Jersey Commission on Capital Budgeting and Planning, it was \$416.07 million. The projected annual deficit exceeds this budget by over 1.6 times.

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## APPENDIX A

Appendix Table A-1. PROJECTED ANNUAL CAPITAL ROAD MAINTENANCE NEED NEW JERSEY, 1988-2010  
(1986 Constant Dollars 000)

| <u>Jurisdiction</u>    | <u>1988</u>        | <u>1989</u>        | <u>1990</u>        | <u>1991</u>        | <u>1992</u>        | <u>1993</u>        | <u>1988-1993</u>    |                          | <u>1994-2</u>        |
|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------------|----------------------|
|                        |                    |                    |                    |                    |                    |                    | <u>Total Expend</u> | <u>Avg Annual Expend</u> | <u>Total Expend</u>  |
| State <u>1/</u>        | \$2,338,000        | \$2,338,000        | \$2,338,000        | \$2,338,000        | \$2,338,000        | \$2,338,000        | \$14,028,000        | \$2,338,000              | \$39,746,000         |
| Local/County <u>2/</u> | \$6,306,000        | \$6,306,000        | \$6,306,000        | \$6,306,000        | \$6,306,000        | \$6,306,000        | \$37,836,000        | \$6,306,000              | \$107,202,000        |
| <b>Total</b>           | <b>\$8,644,000</b> | <b>\$8,644,000</b> | <b>\$8,644,000</b> | <b>\$8,644,000</b> | <b>\$8,644,000</b> | <b>\$8,644,000</b> | <b>\$51,864,000</b> | <b>\$8,644,000</b>       | <b>\$146,948,000</b> |

- 1/ Derived from Governor's Management Improvement Program Inc. "Report to the State of New Jersey". The following table on page 10 was utilized; "NJ Bridge & Roadway Rehabilitation Accumulated Backlog 15 Year Horizon". Data presented in table is in 1983 dollars. These figures were brought up to 1986 dollars using factor of 1.0873. Assume continuation of need at projected pace to year 2010.
- 2/ Defined in the NJ County and Municipal Government Study Commission's report "NJ Local Infrastructure: An Assessment of Needs". This data comes from Table III-3 on page 21. The methodology of "Unmet capital needs" by "Municipal type" was utilized. Assume continuation of need at projected pace to year 2010.

Sources: State of New Jersey County and Municipal Government Study Commission; Governor's Management Improvement Program, Inc.; and Hammer, Siler, George Associates.

Appendix Table A-2. BRIDGE REHABILITATION NEEDS, NEW JERSEY. 1987  
(1986 Constant Dollars)

|                   | <u>1987 Dollars</u> |
|-------------------|---------------------|
| Atlantic County   |                     |
| State bridges:    | 167,819,000         |
| County bridges:   | 6,072,000           |
| Agency bridges:   | 22,531,000          |
| Bergen County     |                     |
| State bridges:    | 265,956,000         |
| County bridges:   | 48,524,000          |
| Agency bridges:   | 19,346,000          |
| Burlington County |                     |
| State bridges:    | 60,770,000          |
| County bridges:   | 47,253,000          |
| Agency bridges:   | 34,755,000          |
| Camden County     |                     |
| State bridges:    | 37,230,000          |
| County bridges:   | 5,346,000           |
| Agency bridges:   | 230,043,000         |
| Cape May State    |                     |
| bridges: County   | 272,060,000         |
| bridges: Agency   | 10,018,000          |
| bridges:          | 22,693,000          |
| Cumberland County |                     |
| State bridges:    | 2,723,000           |
| County bridges:   | 9,644,000           |
| Agency bridges:   | 0                   |
| Essex County      |                     |
| State bridges:    | 487,116,000         |
| County bridges:   | 43,838,000          |
| Agency bridges:   | 14,633,000          |
| Goucester County  |                     |
| State bridges:    | 52,203,000          |
| County bridges:   | 49,651,000          |
| Agency bridges:   | 8,401,000           |
| Hudson County     |                     |
| State bridges:    | 260,546,000         |
| County bridges:   | 27,104,000          |
| Agency bridges:   | 50,875,000          |

Appendix Table A-2. BRIDGE REHABILITATION NEEDS. NEW JERSEY. 1987

(Continued)

|                  | 1987 Dollars |
|------------------|--------------|
| Hunterdon County |              |
| State bridges:   | 31,996,000   |
| County bridges:  | 129,470,000  |
| Agency bridges:  | 1,799,000    |
| Mercer County    |              |
| State bridges:   | 20,675,000   |
| County bridges:  | 57,965,000   |
| Agency bridges:  | 2,940,000    |
| Middlesex County |              |
| State bridges:   | 340,491,000  |
| County bridges:  | 74,679,000   |
| Agency bridges:  | 48,780,000   |
| Monmouth County  |              |
| State bridges:   | 84,502,000   |
| County bridges:  | 64,356,000   |
| Agency bridges:  | 25,388,000   |
| Morris County    |              |
| State bridges:   | 147,131,000  |
| County bridges:  | 63,817,000   |
| Agency bridges:  | 2,271,000    |
| Ocean County     |              |
| State bridges:   | 32,250,000   |
| County bridges:  | 32,626,000   |
| Agency bridges:  | 9,408,000    |
| Passaic County   |              |
| State bridges:   | 127,644,000  |
| County bridges:  | 76,953,000   |
| Agency bridges:  | 12,389,000   |
| Salem County     |              |
| State bridges:   | 13,387,000   |
| County bridges:  | 17,419,000   |
| Agency bridges:  | 0            |

Appendix Table A-2. BRIDGE REHABILITATION NEEDS. NEW JERSEY. 1987  
(Continued)

|                 | <u>1987 Dollars</u> |
|-----------------|---------------------|
| Somerset County |                     |
| State bridges:  | 72,270,000          |
| County bridges: | 49,173,000          |
| Agency bridges: | 2,109,000           |
| Sussex County   |                     |
| State bridges:  | 5,302,000           |
| County bridges: | 24,800,000          |
| Agency bridges: | 1,031,000           |
| Union County    |                     |
| State bridges:  | 136,557,000         |
| County bridges: | 73,029,000          |
| Agency bridges: | 7,997,000           |
| Harran County   |                     |
| State bridges:  | 21,087,000          |
| County bridges: | 41,858,000          |
| Agency bridges: | 5,610,000           |
| Total           |                     |
| State bridges:  | 2,639,717,000       |
| County bridges: | 953,595,000         |
| Agency bridges: | 542,527,000         |

Source: New Jersey Department of  
Transportation - Division of  
Bridges and Structures; and Hammer,  
Slier, George Associates.

## APPENDIX B

Appendix Table B-1. CAPITAL MAINTENANCE EXPENDITURES PROJECTION  
METHODOLOGY, NEW JERSEY TURNPIKE AUTHORITY,  
1988-2010

| <u>Type of Expenditure</u>                 | <u>1980</u>  | <u>1986</u>  | <u>1980-1986</u> |  |
|--|--------------|--------------|------------------|--|
|  |              |              | <u>Actual</u>    | <u>Annual Change</u><br><u>Percent</u> |
| Actual capital expend                      | \$9,486,600  | \$13,208,500 | \$532,000        | 5.61%                                  |
| 1986 growth factor                         | 1.309        | 1.000        | --               | --                                     |
| Capital expend in<br>1986 constant dollars | \$12,418,000 | \$13,208,500 | \$113,000        | 0.91%                                  |

Notes:

Between 1980-1986 capital expenditures have Increase 6.5% annually. After taking into account Inflation, the actual Increase was 0.91% annually. Because of the \$2 billion widening program, future maintenance is projected to continue to Increase to service Increase road width, in addition to the 1966 road widening program. Future expenditure trends are projected to Increase by .91% annually between 1988-1993. After 1993 facility will be larger and the annual expenditures are projected to Increase between .91-1.0% annually (over 1993 level of \$22.52 million) or 0.95%.

Period I Period II 1988-1993 1994-2010 1.0091 1.0095 Sources: NJ

NJ Turnpike projected annually expenditure Turnpike Authority and  
 Increase Manner, Slier, George

Associates.

## APPENDIX C

Appendix Table C-1. NEW JERSEY TRANSIT CAPITAL EXPENDITURE/REVENUE PROJECTIONS, NEW JERSEY, 1988-2010  
(In 1986 Constant Dollars) 1/

| Type of Expenditure     | 1988             | 1989             | 1990             | 1991             | 1992             | 1993             | 1988-1993         |                    | 1994-2010         |                    |
|-------------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|--------------------|-------------------|--------------------|
|                         |                  |                  |                  |                  |                  |                  | Avg Annual Expend | Total Expend       | Avg Annual Expend | Total Expend       |
| Capital expenditures 2/ | \$210,690        | \$160,960        | \$126,310        | \$101,020        | \$161,090        | \$330,870        | \$181,823         | \$1,090,940        | \$256,390         | \$4,100,000        |
| New Initiatives 3/ 4/   | \$0              | \$0              | \$0              | \$0              | \$0              | \$0              | \$0               | \$0                | \$0               | \$0                |
| <b>Total</b>            | <b>\$210,690</b> | <b>\$160,960</b> | <b>\$126,310</b> | <b>\$101,020</b> | <b>\$161,090</b> | <b>\$330,870</b> | <b>\$181,823</b>  | <b>\$1,090,940</b> | <b>\$256,390</b>  | <b>\$4,100,000</b> |

- 1/ Projected expenditures are projected to equal revenue as was the case during the period 1980-1986 (See Tables 6&7).
- 2/ 1988-1993 expenditure projections provided by NJ TRANSIT in the "NJ TRANSIT Rail Capital Needs -- Basic Program" (8/26/86). See Appendix Table C-2 for methodology for 1994-2010 projections.
- 3/ New projects associated with the expansion of the existing system
- 4/ At this time only "need" has been identified by TRANSIT personnel. Future revenues covering the new initiative program cannot be estimated at this time.

Sources: NJ TRANSIT and Hammer, Siler, George Associates.

Appendix Table C-2. CAPITAL EXPENDITURE PROJECTION METHODOLOGY,  
NJ TRANSIT, 1994-2010  
 (1986 Constant Dollars 000)

| <u>Type Of Expenditure</u> | <u>Annual Expenditures</u>                       |  |  |
|----------------------------|--|--|--|
|                            | <u>1994</u><br><u>Projected</u><br><u>Expend</u> | <u>I</u><br><u>1987-1994</u><br><u>Avg Annual</u><br><u>Expend</u> | <u>II</u><br><u>1994-2010</u><br><u>Total</u><br><u>Expend</u> |
| Maintenance Expenditures   | \$124,010  | \$173,590  | \$4,358,600  |
| New Initiatives            | \$0  | \$0  | \$0  |
| Total                      | \$124,010  | \$173,590  | \$4,358,600  |

Projected Annual Expend increase:  
 Period I Actual data provided by NJ TRANSIT  
 Period II 1.048

Notes:

During 1980-1986 capital expenditures (without Inflation) Increased with 4.8% annually (see Table 1). Authority personnel Indicate that the new equipment and facilities projected to come on line in the future, capital expenditures will likely Increase as facilities require additional maintenance. Assume average annual expenditures (\$173.59 million) that are projected to occur between 1988-1994 to continue and Increase 4.8% annually.

Source: NJ TRANSIT and Hammer, Slier, George Associates.

Appendix Table C-3. PROJECTED NEW INITIATIVE PROJECT LIST.  
NJ TRANSIT. 1988-2000 1?

Project Name

1. Waterfront Transit way
2. PSNY capacity upgrade
3. Secaucus transfer/connection
4. Kearny connection
5. Montclair/Boonton project
6. West Shore rail restoration
7. Monmouth ocean project
8. Reverse Kearny
9. Hew Meadowlands transit
10. One or more bus ways
11. Dual mode locomotive development
12. Substantial park/ride construction (possibly Including garages)

\J It should be noted that this list is not only a tentative but partial list. It is likely that projects will be added and existing projects reevaluated.

Sources: NJTRANSIT and Hammer, Siler, George Associates.

APPENDIX D

**APPENDIX  
D**

Appendix Table D-1. AVIATION CAPITAL EXPENDITURE PROJECTIONS  
BY PROJECT, NEW JERSEY, 1984-1986.  
(1986 Constant Dollars) (Continued)

| <u>Project</u>   | <u>Revenue</u> |              |              | <u>Total<br/>Project<br/>Cost</u> |
|------------------|----------------|--------------|--------------|-----------------------------------|
|                  | <u>FAA</u>     | <u>State</u> | <u>Local</u> |                                   |
| 1989             |                |              |              |                                   |
| Hammonton        | \$45,000       | \$2,500      | \$2,500      | \$50,000                          |
| Mercer County    | \$945,000      | \$52,500     | \$52,500     | \$1,050,000                       |
| R.J. Miller      | \$630,000      | \$35,000     | \$35,000     | \$700,000                         |
| Millville        | \$383,940      | \$21,330     | \$21,330     | \$426,600                         |
| Morristown       | \$1,803,600    | \$100,200    | \$100,200    | \$2,004,000                       |
| Ocean City       | \$499,500      | \$27,750     | \$27,750     | \$555,000                         |
| Teterboro        | \$3,602,312    | \$200,127    | \$200,127    | \$4,002,566                       |
| Woodbine         | \$562,034      | \$31,223     | \$31,223     | \$624,480                         |
| Aeroflex/Andover | \$0            | \$4,000      | \$0          | \$4,000                           |
| Alexandria       | \$0            | \$20,000     | \$0          | \$20,000                          |
| Kupper           | \$0            | \$50,000     | \$30,000     | \$80,000                          |
| Oldmans          | \$0            | \$50,000     | \$0          | \$50,000                          |
| Princeton        | \$0            | \$50,000     | \$0          | \$50,000                          |
| Sky Manor        | \$0            | \$0          | \$92,000     | \$92,000                          |
| Subtotal         | \$8,471,386    | \$644,630    | \$592,630    | \$9,708,646                       |
| 1990             |                |              |              |                                   |
| Hammonton        | \$45,000       | \$2,500      | \$2,500      | \$50,000                          |
| Mercer County    | \$983,250      | \$54,625     | \$54,625     | \$1,092,500                       |
| R.J. Miller      | \$247,500      | \$13,750     | \$13,750     | \$275,000                         |
| Millville        | \$640,800      | \$35,600     | \$35,600     | \$712,000                         |
| Morristown       | \$1,633,500    | \$90,750     | \$90,750     | \$1,815,000                       |
| Ocean City       | \$54,000       | \$3,000      | \$3,000      | \$60,000                          |
| Woodbine         | \$2,511,900    | \$139,550    | \$139,550    | \$2,791,000                       |
| Alexandria       | \$0            | \$50,000     | \$350,000    | \$400,000                         |
| Kupper           | \$0            | \$50,000     | \$50,000     | \$100,000                         |
| Oldmans          | \$0            | \$40,000     | \$48,000     | \$88,000                          |
| Princeton        | \$0            | \$50,000     | \$0          | \$50,000                          |
| Sky Manor        | \$0            | \$0          | \$365,000    | \$365,000                         |
| Subtotal         | \$6,115,950    | \$529,775    | \$1,152,775  | \$7,798,500                       |

Appendix Table D-1. AVIATION CAPITAL EXPENDITURE PROJECTIONS  
BY PROJECT, NEW JERSEY, 1984-1986.  
(1986 Constant Dollars) (Continued)

| <u>Project</u>                | <u>Revenue</u> |              |              | <u>Total<br/>Project<br/>Cost</u> |
|-------------------------------|----------------|--------------|--------------|-----------------------------------|
|                               | <u>FAA</u>     | <u>State</u> | <u>Local</u> |                                   |
| 1991                          |                |              |              |                                   |
| Hammonton                     | \$4,500        | \$250        | \$250        | \$5,000                           |
| Mercer County                 | \$1,736,550    | \$96,475     | \$96,475     | \$1,929,500                       |
| R.J. Miller                   | \$270,000      | \$15,000     | \$15,000     | \$300,000                         |
| Millville                     | \$1,620,000    | \$90,000     | \$90,000     | \$1,800,000                       |
| Morristown                    | \$2,034,000    | \$113,000    | \$113,000    | \$2,260,000                       |
| Ocean City                    | \$135,000      | \$7,500      | \$7,500      | \$150,000                         |
| Woodbine                      | \$1,583,010    | \$87,945     | \$87,945     | \$1,758,900                       |
| Kupper                        | \$0            | \$50,000     | \$0          | \$50,000                          |
| Oldmans                       | 0              | \$10,000     | \$0          | \$10,000                          |
| Princeton                     | \$0            | \$50,000     | \$380,000    | \$430,000                         |
| Subtotal                      | \$7,383,060    | \$520,170    | \$790,170    | \$8,693,400                       |
| Total Expenditures            | \$56,061,291   | \$4,154,533  | \$28,212,533 | \$88,428,357                      |
| Average Annual<br>Expenditure | \$11,212,258   | \$830,907    | \$5,642,507  | \$17,685,671                      |

1/ Includes NY/NJ Port Authority and other non-state and non-federal agencies.

**APPENDIX  
E**

**Appendix Table E-1. TOTAL CAPITAL EXPENDITURES ON FERRY AND BRIDGE, DELAWARE RIVER AND BAY AUTHORITY, NEW JERSEY, 1981-1985**

| <u>Type of Asset</u>                 | <u>1981</u> | <u>1982</u> | <u>1983</u> | <u>1984</u> | <u>1985</u> |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|
| <b>Delaware Memorial Bridge</b>      |             |             |             |             |             |
| <b>Equipment</b>                     | \$1,351,304 | \$1,533,362 | \$1,598,820 | \$1,660,416 | \$1,825,614 |
| <b>Unusual maintenance <u>2/</u></b> | \$211,630   | \$221,738   | \$239,322   | \$211,650   | \$565,930   |
| <b>Subtotal</b>                      | \$1,562,934 | \$1,755,100 | \$1,838,142 | \$1,872,066 | \$2,391,544 |
| <b>Cape May-Lewes Ferry</b>          |             |             |             |             |             |
| <b>Equipment</b>                     | \$0         | \$0         | \$74,357    | \$55,761    | \$25,272    |
| <b>Subtotal</b>                      | \$0         | \$0         | \$74,357    | \$55,761    | \$25,272    |
| <b>Total</b>                         | \$1,562,934 | \$1,755,100 | \$1,912,499 | \$1,927,827 | \$2,416,816 |

1/ Not listed in 1981-1982 Annual Operating Statements.

2/ Predominantly bridge painting.

Sources: Delaware River and Bay Authority and Hammer, Siler, George Associates.

**APPENDIX  
F**

Appendix Table F-1. PROJECTED FEDERAL SEWER REVENUE ALLOCATION, NEW JERSEY, 1987-2010  
(1986 Constant Dollars 000)

| Allocation/Program (000)                             | 1987        | 1988        | 1989        | 1990        | 1991        | 1992        | 1993        | 1987-1993<br>Total | 1994-<br>2010 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------------|---------------|
| National Allocation 1/<br>Construction grant program | \$2,400,000 | \$2,400,000 | \$600,000   | \$600,000   | \$0         | \$0         | \$0         | \$6,000,000        |               |
| Capitalization grant program                         | ***         | ***         | \$600,000   | \$600,000   | \$2,400,000 | \$1,800,000 | \$1,200,000 | \$6,600,000        | \$600,000     |
| Total  | \$2,400,000 | \$2,400,000 | \$1,200,000 | \$1,200,000 | \$2,400,000 | \$1,800,000 | \$1,200,000 | \$12,600,000       | \$600,000     |
| NJ allocation factor 2/                              | 4.329%      | 4.329%      | 4.329%      | 4.329%      | 4.329%      | 4.329%      | 4.329%      | ****               | 4.329%        |
| NJ Allocation  |             |             |             |             |             |             |             |                    |               |
| Construction grant program                           | \$103,896   | \$103,896   | \$25,974    | \$25,974    | \$0         | \$0         | \$0         | \$259,740          |               |
| Capitalization grant program                         | \$0         | \$0         | \$25,974    | \$25,974    | \$103,896   | \$77,922    | \$51,948    | \$285,714          | \$25,974      |
| Loan repayment 3/                                    | \$0         | \$0         | \$246       | \$492       | \$985       | \$1,355     | \$1,601     | \$4,679            | \$1,601       |
| Total  | \$103,896   | \$103,896   | \$52,194    | \$52,440    | \$104,881   | \$79,277    | \$53,549    | \$550,133          | \$27,175      |

- 1/ Construction program scheduled to run through 1990 and the Capitalization program is scheduled to run through 1994.  
 2/ It is assumed that New Jersey's present allocation will continue at the same rate to the horizon year of 2010.  
 3/ Assume that state continues to allocate 1987 and 1988 federal funding on 100% grant basis. Assume that loans are made for 25 years at 3% with payments beginning the following year (see payment schedule below):

| Allocation Year | Principal | 1989  | 1990  | 1991  | 1992    | 1993    | 1994    | 1989-1993<br>Total | 1994-<br>2010 |
|-----------------|-----------|-------|-------|-------|---------|---------|---------|--------------------|---------------|
| 1989            | \$51,948  | \$246 | \$246 | \$246 | \$246   | \$246   | \$246   | \$1,230            |               |
| 1990            | \$51,948  | \$0   | \$246 | \$246 | \$246   | \$246   | \$246   | \$984              |               |
| 1991            | \$103,896 | \$0   | \$0   | \$493 | \$493   | \$493   | \$493   | \$1,479            |               |
| 1992            | \$77,922  | \$0   | \$0   | \$0   | \$370   | \$370   | \$370   | \$740              |               |
| 1993            | \$51,948  | \$0   | \$0   | \$0   | \$0     | \$246   | \$246   | \$246              |               |
| 1994            | \$25,974  | \$0   | \$0   | \$0   | \$0     | \$0     | \$123   | \$0                |               |
| Total           | \$363,636 | \$246 | \$492 | \$985 | \$1,355 | \$1,601 | \$1,724 | \$4,679            | \$1,601       |

Sources: Environmental Protection Agency; NJ Department of Environmental Protection -- Division of Water Resources (Construction Grants Administration); and Hammer, Siler, George Associates.



Appendix Table F-2. WASTEWATER TRUST LOAN PROGRAM REPAYMENT SCHEDULE, NEW JERSEY, 1988-2010  
 (1986 Constant Dollars 000)  
 (Continued)

| Allocation<br>Year | Principal | Annual Payment |         |         |         |         |         |         |         |         |
|--------------------|-----------|----------------|---------|---------|---------|---------|---------|---------|---------|---------|
|                    |           | 1994           | 1995    | 1996    | 1997    | 1998    | 1999    | 2000    | 2001    | 2002    |
| 1988               | \$150,000 | \$990          | \$990   | \$990   | \$990   | \$990   | \$990   | \$990   | \$990   | \$990   |
| 1989               | \$25,000  | \$165          | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   |
| 1990               | \$25,000  | \$165          | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   |
| 1991               | \$50,000  | \$330          | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   |
| 1992               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 1993               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 1994               | \$50,000  | \$0            | \$0     | \$0     | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   |
| 1995               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 1996               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 1997               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$330   | \$330   | \$330   |
| 1998               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 1999               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2000               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2001               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2002               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2003               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2004               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2005               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2006               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2007               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2008               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2009               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| 2010               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     |
| Total              | \$550,000 | \$1,650        | \$1,650 | \$1,650 | \$1,980 | \$1,980 | \$1,980 | \$2,310 | \$2,310 | \$2,310 |

Appendix Table F-2. WASTEWATER TRUST LOAN PROGRAM REPAYMENT SCHEDULE, NEW JERSEY, 1988-2010  
 (1986 Constant Dollars 000)  
 (Continued)

| Allocation<br>Year | Principal | Annual Payment |         |         |         |         |         |         | 1994-2010<br>Total |
|--------------------|-----------|----------------|---------|---------|---------|---------|---------|---------|--------------------|
|                    |           | 2004           | 2005    | 2006    | 2007    | 2008    | 2009    | 2010    |                    |
| 1988               | \$150,000 | \$990          | \$990   | \$990   | \$990   | \$990   | \$990   | \$990   | \$16,830           |
| 1989               | \$25,000  | \$165          | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   | \$2,805            |
| 1990               | \$25,000  | \$165          | \$165   | \$165   | \$165   | \$165   | \$165   | \$165   | \$2,805            |
| 1991               | \$50,000  | \$330          | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   | \$5,610            |
| 1992               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 1993               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 1994               | \$50,000  | \$330          | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   | \$4,620            |
| 1995               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 1996               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 1997               | \$50,000  | \$330          | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   | \$3,630            |
| 1998               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 1999               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2000               | \$50,000  | \$330          | \$330   | \$330   | \$330   | \$330   | \$330   | \$330   | \$2,640            |
| 2001               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2002               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2003               | \$50,000  | \$0            | \$0     | \$330   | \$330   | \$330   | \$330   | \$330   | \$1,650            |
| 2004               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2005               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2006               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$330   | \$330   | \$660              |
| 2007               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2008               | \$0       | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| 2009               | \$50,000  | \$0            | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0                |
| Total              | \$0       | \$2,640        | \$2,640 | \$2,970 | \$2,970 | \$2,970 | \$3,300 | \$3,300 | \$41,250           |

Notes: The following assumptions are made:  
 Repayment terms (beginning third year after loan issued)  
 Interest rate

20  
 5.0%

Source: Hammer, Siler, George Associates.

Appendix Table F-3. WASTEWATER TRUST FUND LOAN PROGRAM REPAYMENT SCHEDULE, NEW JERSEY, 1988-2010  
 (1986 Constant Dollars 000)

| Allocation<br>Year | Principal | Annual Payments |      |      |       |       |       | 1989-1993<br>Total |
|--------------------|-----------|-----------------|------|------|-------|-------|-------|--------------------|
|                    |           | 1988            | 1989 | 1990 | 1991  | 1992  | 1993  |                    |
| 1988               | \$150,000 | \$0             | \$0  | \$0  | \$543 | \$543 | \$543 | \$1,629            |
| 1989               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1990               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1991               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1992               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1993               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1994               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1995               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1996               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1997               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1998               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 1999               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2000               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2001               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2002               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2003               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2004               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2005               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2006               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2007               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2008               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2009               | \$50,000  | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| 2010               | \$0       | \$0             | \$0  | \$0  | \$0   | \$0   | \$0   | \$0                |
| Total              | \$500,000 | \$0             | \$0  | \$0  | \$543 | \$543 | \$543 | \$1,629            |

Appendix Table F-3. WASTEWATER TRUST FUND LOAN PROGRAM REPAYMENT SCHEDULE, NEW JERSEY, 1988-2010  
 (1986 Constant Dollars 000)  
 (Continued)

| Location<br>Number | Principal | Annual Payments |       |       |       |       |       |         |         |         |      |
|--------------------|-----------|-----------------|-------|-------|-------|-------|-------|---------|---------|---------|------|
|                    |           | 1994            | 1995  | 1996  | 1997  | 1998  | 1999  | 2000    | 2001    | 2002    | 2003 |
| 88                 | \$150,000 | \$543           | \$543 | \$543 | \$543 | \$543 | \$543 | \$543   | \$543   | \$543   | \$5  |
| 89                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 90                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$1  |
| 91                 | \$50,000  | \$181           | \$181 | \$181 | \$181 | \$181 | \$181 | \$181   | \$181   | \$181   | \$0  |
| 92                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 93                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$1  |
| 94                 | \$50,000  | \$0             | \$0   | \$0   | \$181 | \$181 | \$181 | \$181   | \$181   | \$181   | \$0  |
| 95                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 96                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$181   | \$181   | \$181   | \$   |
| 97                 | \$50,000  | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 98                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$   |
| 99                 | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$   |
| 100                | \$50,000  | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 101                | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 102                | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 103                | \$50,000  | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 104                | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 105                | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 106                | \$50,000  | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 107                | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 108                | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 1009               | \$50,000  | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| 1010               | \$0       | \$0             | \$0   | \$0   | \$0   | \$0   | \$0   | \$0     | \$0     | \$0     | \$0  |
| Total              | \$500,000 | \$724           | \$724 | \$724 | \$905 | \$905 | \$905 | \$1,086 | \$1,086 | \$1,086 | \$1  |

Appendix Table F-3. WASTEWATER TRUST FUND LOAN PROGRAM REPAYMENT SCHEDULE, NEW JERSEY, 1988-2010  
 (1986 Constant Dollars 000)  
 (Continued)

| Allocation<br>Year | Principal | Annual Payments |         |         |         |         |         |         | 1994-2010 |
|--------------------|-----------|-----------------|---------|---------|---------|---------|---------|---------|-----------|
|                    |           | 2004            | 2005    | 2006    | 2007    | 2008    | 2009    | 2010    | Total     |
| 1988               | \$150,000 | \$543           | \$543   | \$543   | \$543   | \$543   | \$543   | \$543   | \$9,231   |
| 1989               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1990               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1991               | \$50,000  | \$181           | \$181   | \$181   | \$181   | \$181   | \$181   | \$181   | \$3,077   |
| 1992               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1993               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1994               | \$50,000  | \$181           | \$181   | \$181   | \$181   | \$181   | \$181   | \$181   | \$2,534   |
| 1995               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1996               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1997               | \$50,000  | \$181           | \$181   | \$181   | \$181   | \$181   | \$181   | \$181   | \$1,991   |
| 1998               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 1999               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2000               | \$50,000  | \$181           | \$181   | \$181   | \$181   | \$181   | \$181   | \$181   | \$1,448   |
| 2001               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2002               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2003               | \$50,000  | \$0             | \$0     | \$181   | \$181   | \$181   | \$181   | \$181   | \$905     |
| 2004               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2005               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2006               | \$50,000  | \$0             | \$0     | \$0     | \$0     | \$0     | \$181   | \$181   | \$362     |
| 2007               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2008               | \$0       | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| 2009               | \$50,000  | \$0             | \$0     | \$0     | \$0     | \$0     | \$0     | \$0     | \$0       |
| Total              | \$0       | \$1,267         | \$1,267 | \$1,448 | \$1,449 | \$1,448 | \$1,629 | \$1,629 | \$19,548  |

Notes:

The following assumptions are made:

Repayment terms (beginning third year after loan issued) 23  
 Interest rate 0.0%

Source: Hamner, Siler, George Associates.

**APPENDIX  
G**

Appendix Table G-1. SECONDARY TREATMENT FACILITY CONSTRUCTION REVENUE SOURCES, PASSAIC VALLEY SEWERAGE COMMISSIONERS, 1977-1987.

| Funding Source     | 1977         | 1978         | 1979         | 1980         | 1981         | 1982         | 1983         | 1984         | 1985         | 1986         | 1987        | Total / Average / |
|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------------|
| Total Construction | \$10,889,739 | \$23,099,081 | \$69,999,036 | \$69,999,036 | \$69,999,036 | \$70,399,304 | \$41,999,420 | \$33,999,536 | \$16,799,768 | \$16,799,768 | \$8,399,085 | \$419,994,211     |
| Drainage           |              |              |              |              |              |              |              |              |              |              |             |                   |
| Revenue Sources    |              |              |              |              |              |              |              |              |              |              |             |                   |
| Federal            | \$12,814,023 | \$15,051,984 | \$47,499,346 | \$47,499,346 | \$47,499,346 | \$34,170,728 | \$28,475,007 | \$22,780,485 | \$11,390,243 | \$11,390,243 | \$5,695,122 | \$27,194          |
| State              | \$1,474,180  | \$1,001,775  | \$5,499,925  | \$5,499,925  | \$5,499,925  | \$3,931,146  | \$3,275,955  | \$2,620,764  | \$1,310,382  | \$1,310,382  | \$655,191   | \$3,128           |
| Local              | \$4,611,536  | \$5,636,322  | \$17,079,765 | \$17,079,765 | \$17,079,765 | \$12,297,430 | \$10,247,858 | \$8,198,287  | \$4,099,143  | \$4,099,143  | \$2,049,572 | \$9,786           |

(1) Authority personnel could not provide the revenue distribution annually, but instead for the total project cost. To subdivide the three revenue sources amongst project years, the revenue percentage distributions (as seen below) are applied to the projected construction drainages presented in Table 1.

| REVENUE SOURCE | REVENUE       | DISTRIBUTION |
|----------------|---------------|--------------|
| Federal        | \$284,074,085 | 67.8%        |
| State          | \$32,736,702  | 7.8%         |
| Municipalities | \$102,382,624 | 24.4%        |
| Total          | \$419,994,211 | 100.0%       |

Sources: Passaic Valley Sewerage Commissioners and Hamner, Sitter, George Associates

**APPENDIX  
H**

Appendix Table H-1. PROPOSED WATER SUPPLY PROJECTS BY REGION, NEW JERSEY, 1988-2010

| <u>Region/Project</u>                 | <u>1988-1993</u>    |                          | <u>1994-2010</u>    |                          |
|---------------------------------------|---------------------|--------------------------|---------------------|--------------------------|
|                                       | <u>Total Expend</u> | <u>Avg Annual Expend</u> | <u>Total Expend</u> | <u>Avg Annual Expend</u> |
| <b>Region 1</b>                       |                     |                          |                     |                          |
| Manaque South 1/                      | ***                 | ***                      | ***                 | ***                      |
| Round Valley Reservoir 2/             | ***                 | ***                      | ***                 | ***                      |
| Six Mile Run Reservoir 2/             | ***                 | ***                      | ***                 | ***                      |
| Confluence Reservoir                  | ***                 | ***                      | ***                 | ***                      |
| Dunkers Pond                          | \$33,600,000        | ***                      | \$0                 | \$0                      |
| Longwood Valley Reservoirs            | \$26,992,000        | ***                      | \$0                 | \$0                      |
| Monksville Reservoir 4/               | ***                 | ***                      | ***                 | ***                      |
| Hackensack River optimization         | ***                 | ***                      | ***                 | ***                      |
| Raritan-Passaic Diversion 5/          | ***                 | ***                      | ***                 | ***                      |
| Raritan-North Branch Pipeline 5/      | ***                 | ***                      | ***                 | ***                      |
| Raritan-Northeast Branch Pipeline 5   | ***                 | ***                      | ***                 | ***                      |
| Raritan-Passaic Pipeline 5/           | ***                 | ***                      | ***                 | ***                      |
| Washington Valley Reservoir           | ***                 | ***                      | ***                 | ***                      |
| Subtotal                              | \$60,592,000        | \$0                      | \$0                 | \$0                      |
| <b>Region 2</b>                       |                     |                          |                     |                          |
| Manasquan Reservoir 2/                | ***                 | ***                      | ***                 | ***                      |
| <b>Region 3</b>                       |                     |                          |                     |                          |
| Local groundwater projects as req. 6/ | NA                  | NA                       | ***                 | NA                       |
| <b>Region 4</b>                       |                     |                          |                     |                          |
| Local groundwater projects as req. 6/ | ***                 | ***                      | ***                 | ***                      |
| <b>Region 5</b>                       |                     |                          |                     |                          |
| Camden metro water supply 7/          | NA                  | NA                       | NA                  | NA                       |
| Wharton Tract SW groundwater 8/       | \$0                 | \$0                      | \$0                 | \$0                      |
| Delaware River flow augmentation 9/   | \$35,000,000        | \$5,833,300              | \$35,000,000        | \$2,058,800              |
| Subtotal                              | \$35,000,000        | \$5,833,300              | \$35,000,000        | \$2,058,800              |

Appendix Table H-1. PROPOSED WATER SUPPLY PROJECTS BY REGION, NEW JERSEY, 1988-2010  
(Continued)

| <u>Region/Project</u>  | <u>1988-1993</u>    |                          | <u>1994-2010</u>    |                          |
|------------------------|---------------------|--------------------------|---------------------|--------------------------|
|                        | <u>Total Expend</u> | <u>Avg Annual Expend</u> | <u>Total Expend</u> | <u>Avg Annual Expend</u> |
| <b>Region 6 10/</b>    |                     |                          |                     |                          |
| Beaver Run Reservoir   | NA                  | NA                       | NA                  | NA                       |
| Franklin Reservoir     | NA                  | NA                       | NA                  | NA                       |
| Groundwater supplies   | NA                  | NA                       | NA                  | NA                       |
| Hackettstown Reservoir | NA                  | NA                       | NA                  | NA                       |
| Honey Run              | NA                  | NA                       | NA                  | NA                       |
| Petersburg Reservoir   | NA                  | NA                       | NA                  | NA                       |
| Ross' Corner Reservoir | NA                  | NA                       | NA                  | NA                       |
| Shades Reservoir       | NA                  | NA                       | NA                  | NA                       |
| Sussex North Reservoir | NA                  | NA                       | NA                  | NA                       |
| Subtotal               | NA                  | NA                       | NA                  | NA                       |
| <b>Total</b>           | <b>\$95,592,000</b> | <b>\$5,833,300</b>       | <b>\$35,000,000</b> | <b>\$2,058,800</b>       |

- 1/ Described under North Jersey Water Supply Commission program description (see Appendix Table H-3)
- 2/ Described under NJ Water Supply Authority program description (see Appendix Table H-2)
- 3/ At this time expenditures cannot be assessed by period.
- 4/ Part of Wanaque South project.
- 5/ Water Resource personnel indicated that these projects are not economically feasible at this time.
- 6/ Water Resource personnel indicated that this area is dependent upon groundwater. At this time and there are no significant surface water projects proposed.
- 7/ Includes Delanco Intake and Philadelphia-Camden pipeline.
- 8/ Water Resource personnel indicated that there is no foreseeable progress in the future of this project at this time.
- 9/ Cost estimate made in 1982 Master Plan document of \$159 million. Water Resource personnel indicated that most recent costs (1986 dollars) is \$140 million, of which 50% or \$70 million would be paid by NJ.
- 10/ Projections cannot be made for this particular region at this time regarding total water retained on this project.

Sources: The NJ Statewide Water Supply Master Plan (4/82) as prepared by the NJ Department of Environment and Natural Resources, Siler, George Associates.

Appendix Table H-2. NJ WATER SUPPLY AUTHORITY CAPITAL EXPENDITURE PROJECTIONS, NEW JERSEY, 1988-2010

| Source       | 1988         | 1989         | 1990         | 1991        | 1992        | 1993        | 1988-1993    |                   | 1994-2010     |                   |
|--------------|--------------|--------------|--------------|-------------|-------------|-------------|--------------|-------------------|---------------|-------------------|
|              |              |              |              |             |             |             | Total Expend | Avg Annual Expend | Total Expend  | Avg Annual Expend |
| Canal 1/     | \$2,600,000  | \$2,600,000  | \$2,600,000  | \$2,600,000 | \$1,500,000 | \$1,500,000 | \$13,400,000 | \$2,233,300       | \$25,500,000  | \$1,125,000       |
| Reservoir 2/ | \$19,085,000 | \$19,085,000 | \$9,545,000  | \$0         | \$500,000   | \$500,000   | \$48,715,000 | \$8,119,200       | \$8,500,000   | \$1,700,000       |
| facilities   | \$0          | \$0          | \$0          | \$0         | \$0         | \$0         | \$0          | \$0               | \$69,730,000  | \$4,100,000       |
|              | \$21,685,000 | \$21,685,000 | \$12,145,000 | \$2,600,000 | \$2,000,000 | \$2,000,000 | \$62,115,000 | \$10,352,500      | \$103,730,000 | \$6,925,000       |

1/ Authority personnel indicated that the five year capital program (1987-1991) for the D & R Canal, Spruce Run, and Round Valley Reservoirs is \$13 million.

2/ The construction contract is projected to be let in June 1986 and the project scheduled for completion in mid-1990. The total construction cost (anticipating engineering) is projected at \$66.8 million.

Sources: New Jersey Water Supply Commission and Hammer, Siler, George Associates.

ndix Table H-3. NORTH JERSEY DISTRICT WATER SUPPLY COMMISSION CAPITAL EXPENDITURE PROJECTIONS, NEW JERSEY, 1988

| Project                   | 1988 | 1989 | 1990 | 1991 | 1992        | 1993 | 1988-1993    |                   | 1994-2010    |                   |
|---------------------------|------|------|------|------|-------------|------|--------------|-------------------|--------------|-------------------|
|                           |      |      |      |      |             |      | Total Expend | Avg Annual Expend | Total Expend | Avg Annual Expend |
| Wanaque<br>lining of pipe | \$0  | \$0  | \$0  | \$0  | \$1,000,000 | \$0  | \$1,000,000  | \$166,667         | \$0          | \$0               |
| Wanaque 1/                | \$0  | \$0  | \$0  | \$0  | \$0         | \$0  | \$0          | \$0               | \$0          | \$0               |
| Total                     | \$0  | \$0  | \$0  | \$0  | \$1,000,000 | \$0  | \$1,000,000  | \$166,667         | \$0          | \$0               |

1/ This facility is new and the projected life of equipment goes beyond the horizon year of 2010. Thus no capital expenditures (for maintenance) are projected.

Sources: North Jersey District Water Supply Commission and Hammer, Siler, George Associates.

**APPENDIX  
1**

Table I-1. PROJECTED FEDERAL CAPITAL EXPENDITURES FOR FLOOD CONTROL/STORM WATER MANAGEMENT, NEW JERSEY, 1988-2010  
(1986 Constant Dollars)

| Sponsor/Project Name <sup>1/</sup>                               | Federal Appropriations |                    |                      |                     | State Appropriations |                     |                      |                      |
|--|------------------------|--------------------|----------------------|---------------------|----------------------|---------------------|----------------------|----------------------|
|  | 1988-1993              |                    | 1994-2010            |                     | 1988-1993            |                     | 1994-2010            |                      |
|  | Total Expend           | Avg Annual Expend  | Total Expend         | Avg Annual Expend   | Total Expend         | Avg Annual Expend   | Total Expend         | Avg Annual Expend    |
| Authorized for construction                                      |                        |                    |                      |                     |                      |                     |                      |                      |
| Brook sub-basin <sup>2/</sup>                                    | \$0                    | \$0                | \$151,000,000        | \$8,882,000         | \$0                  | \$0                 | \$203,000            | \$203,000            |
| Brook's Branch <sup>2/</sup>                                     | \$0                    | \$0                | \$20,000,000         | \$1,176,000         | \$0                  | \$0                 | \$26,600,000         | \$26,600,000         |
| Brook and Van Winkles Brook <sup>2/</sup>                        | \$0                    | \$0                | \$12,500,000         | \$735,000           | \$0                  | \$0                 | \$17,500,000         | \$17,500,000         |
| Brook Middle River Basin <sup>3/</sup>                           | \$25,700,000           | \$4,283,000        | \$0                  | \$0                 | \$36,500,000         | \$6,083,000         | \$0                  | \$0                  |
| Brook Run's Brook <sup>3/</sup>                                  | \$16,200,000           | \$2,700,000        | \$0                  | \$0                 | \$21,600,000         | \$3,600,000         | \$0                  | \$0                  |
| Brook River at Oakland <sup>3/</sup>                             | \$4,800,000            | \$800,000          | \$0                  | \$0                 | \$6,400,000          | \$1,067,000         | \$0                  | \$0                  |
| Brook and Mahwah Rivers <sup>3/</sup>                            | \$4,600,000            | \$767,000          | \$0                  | \$0                 | \$6,300,000          | \$1,050,000         | \$0                  | \$0                  |
| <b>Total</b>   | <b>\$51,300,000</b>    | <b>\$8,550,000</b> | <b>\$183,500,000</b> | <b>\$10,793,000</b> | <b>\$70,800,000</b>  | <b>\$11,800,000</b> | <b>\$44,303,000</b>  | <b>\$44,303,000</b>  |
| Authorized for constr. in generic provision <sup>2/</sup>        |                        |                    |                      |                     |                      |                     |                      |                      |
| Brook River East bank  | \$0                    | \$0                | \$5,000,000          | \$294,000           | \$0                  | \$0                 | \$6,700,000          | \$6,700,000          |
| Authorized for constr. subject to secretary review <sup>2/</sup> |                        |                    |                      |                     |                      |                     |                      |                      |
| Brook at Deal  | \$0                    | \$0                | \$1,700,000          | \$100,000           | \$0                  | \$0                 | \$2,300,000          | \$2,300,000          |
| Brook Dam at Little Falls  | \$0                    | \$0                | \$15,000,000         | \$882,000           | \$0                  | \$0                 | \$20,000,000         | \$20,000,000         |
| Brook River basin flood area                                     | \$0                    | \$0                | \$50,000,000         | \$2,941,000         | \$0                  | \$0                 | \$66,700,000         | \$66,700,000         |
| <b>Total</b>   | <b>\$0</b>             | <b>\$0</b>         | <b>\$66,700,000</b>  | <b>\$3,923,000</b>  | <b>\$0</b>           | <b>\$0</b>          | <b>\$89,000,000</b>  | <b>\$89,000,000</b>  |
| Authorized for construction <sup>4/</sup>                        |                        |                    |                      |                     |                      |                     |                      |                      |
| Brook River Valley project                                       | \$0                    | \$0                | \$700,000,000        | \$41,176,000        | \$0                  | \$0                 | \$300,000,000        | \$300,000,000        |
| <b>Total</b>   | <b>\$51,300,000</b>    | <b>\$8,550,000</b> | <b>\$955,200,000</b> | <b>\$56,186,000</b> | <b>\$70,800,000</b>  | <b>\$11,800,000</b> | <b>\$440,003,000</b> | <b>\$440,003,000</b> |

Appendix Table I-1. PROJECTED FEDERAL CAPITAL EXPENDITURES FOR FLOOD CONTROL/STORM WATER MANAGEMENT, NEW JERSEY, 1988-2010

Notes:

- ✓ From NJ project Authorizations as defined in Authorization Bill H.R.6. It should be noted that this legislation only authorized these projects and that no funding was made available. It has been assumed that all projects will be funded by the horizon year of 2010.
- ✓ Assume that these projects will all be financed and constructed in by 2010.
- ✓ Assume that these projects, which the state has already set aside funds for, will receive federal appropriations in the 1988-1993 period.
- ✓ This very large project was not included in the Authorization bill H.R. 6. It is assumed, however that it will be financed and constructed by 2010. This is based on the strong support it has received from both state and federal authorities and the overall need for the project. The state is assumed to support 30% of the total project cost, as presented in the DEP's Capital Improvement Program.

Sources: NJ Department of Environmental Protection -- Water Supply and Watershed Management Element, "The NJ Statewide Flood Control Master Plan -- 1985"; and Hamer, Siler, George Associates.

**APPENDIX  
0**

Appendix Table J-1. 1985 RESOURCE RECOVERY LOAN PROGRAM REPAYMENT SCHEDULE, NEW JERSEY, 1988-2010  
(1986 Constant Dollars)

| Allocation Year | Principal    | Annual Payment |           |           |           |           |           |           |           |           |           | 1989-1993 Total | 1994-2010 Total |             |     |
|-----------------|--------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------------|-----------------|-------------|-----|
|                 |              | 1988           | 1989      | 1990      | 1991      | 1992      | 1993      | 1998      | 1999      | 2000      | 2001      |                 |                 | 2002        |     |
| 1988            | \$0          | \$0            | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0             | \$0             | \$0         | \$0 |
| 1989            | \$28,300,000 | \$0            | \$0       | \$0       | \$0       | \$0       | \$0       | \$117,917 | \$0       | \$117,917 | \$0       | \$235,834       | \$0             | \$0         | \$0 |
| 1990            | \$28,300,000 | \$0            | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$117,917 | \$0       | \$117,917       | \$0             | \$0         | \$0 |
| 1991            | \$28,400,000 | \$0            | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0             | \$0             | \$0         | \$0 |
| Total           | \$85,000,000 | \$0            | \$0       | \$0       | \$0       | \$0       | \$0       | \$117,917 | \$0       | \$235,834 | \$353,751 | \$353,751       | \$0             | \$0         | \$0 |
| Allocation Year | Principal    | Annual Payment |           |           |           |           |           |           |           |           |           | 1989-1993 Total | 1994-2010 Total |             |     |
|                 |              | 2004           | 2005      | 2006      | 2007      | 2008      | 2009      | 2010      |           |           |           |                 |                 |             |     |
| 1988            | \$0          | \$0            | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0       | \$0             | \$0             | \$0         | \$0 |
| 1989            | \$28,300,000 | \$117,917      | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917       | \$117,917       | \$2,004,589 | \$0 |
| 1990            | \$28,300,000 | \$117,917      | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917 | \$117,917       | \$117,917       | \$2,004,589 | \$0 |
| 1991            | \$28,400,000 | \$118,333      | \$118,333 | \$118,333 | \$118,333 | \$118,333 | \$118,333 | \$118,333 | \$118,333 | \$118,333 | \$118,333 | \$118,333       | \$118,333       | \$2,011,661 | \$0 |
| Total           | \$85,000,000 | \$354,167      | \$354,167 | \$354,167 | \$354,167 | \$354,167 | \$354,167 | \$354,167 | \$354,167 | \$354,167 | \$354,167 | \$354,167       | \$354,167       | \$6,020,839 | \$0 |

Y The following assumptions were made:

- Repayment terms: 20
- Interest rate: 0.0%
- First payment begins three years from issuance of loan

Sources: New Jersey Department of Environmental Protection -- Division of Waste Management and Hammer, Siler, George Associates.

**APPENDIX  
K**

Appendix Table K-1. PROPOSED STATE AND FEDERAL SHORE PROTECTION PROJECTS, NEW JERSEY, 1982  
(1986 Constant Dollars)

| Reach             | Project Name               | Description 2/ | Construct.<br>Cost | Projected Maintenance 3/ |               | Total<br>Construct/<br>Maint<br>Cost |
|-------------------|----------------------------|----------------|--------------------|--------------------------|---------------|--------------------------------------|
|                   |                            |                |                    | 1988-1993                | 1994-2010     |                                      |
| 1                 | Multiple Projects          | ---            | \$23,757,041       | \$0                      | \$0           | \$0                                  |
| 2                 | Sandy Hook to Long Branch  | M              | \$4,406,292        | \$505,800                | \$1,433,100   | \$1,938,900                          |
| 3                 | Long Branch to Shark River | LR             | \$23,630,508       | \$10,750,400             | \$32,128,600  | \$42,879,000                         |
| 4                 | Shark River to Manasquan   | RD             | \$4,245,912        | \$11,434,100             | \$34,261,000  | \$45,695,100                         |
| 5                 | Manasquan to Mantoloking   | RD             | \$627,264          | \$114,400                | \$9,016,800   | \$9,131,200                          |
| 6                 | Mantoloking to Barnegat    | RD             | \$841,104          | \$484,600                | \$25,914,800  | \$26,399,400                         |
| 7                 | Long Beach Island          | RD             | \$4,321,944        | \$2,687,400              | \$21,535,100  | \$24,222,500                         |
| 8                 | Brigantine Island          | RD             | \$833,976          | \$539,200                | \$9,839,300   | \$10,378,500                         |
| 9                 | Absecon Island             | RD             | Complete           | \$40,950,200             | \$102,409,500 | \$143,359,700                        |
| 10                | Peck Beach                 | RD             | Complete           | \$13,478,400             | \$46,857,200  | \$60,335,600                         |
| 11                | Ludlam Island              | RD             | Complete           | \$47,962,000             | \$120,042,000 | \$168,004,000                        |
| 12                | Seven Mile Beach           | RD             | \$831,600          | \$341,400                | \$17,082,100  | \$17,423,500                         |
| 13                | Five Mile Beach            | RD             | \$883,376          | \$377,600                | \$956,600     | \$1,334,200                          |
| 14                | Cape May to Cape May Point | RD             | \$12,838,672       | \$47,034,600             | \$117,638,500 | \$164,673,100                        |
| 15&1              | Multiple Projects          | ***            | \$6,040,980        | \$0                      | \$0           | \$0                                  |
|                   | Subtotal                   |                | \$83,268,669       | \$176,660,100            | \$539,114,600 | \$715,774,700                        |
| Federal Projects: |                            |                |                    |                          |               |                                      |
| NA                | Barnegat Inlet             | ***            | \$39,100,000       | \$0                      | \$17,000,000  | \$17,000,000                         |
| NA                | Sea Bright/Monmouth Beachs | ***            | \$40,000,000       | \$0                      | \$112,000,000 | \$112,000,000                        |
| NA                | Egg Harbor Inlet           | ***            | \$75,000,000       | \$0                      | \$67,000,000  | \$67,000,000                         |
|                   | Subtotal                   |                | \$154,100,000      | \$0                      | \$196,000,000 | \$196,000,000                        |

1/ From "New Jersey Shore Protection Master Plan -- 10/81", assembled by the State of New Jersey Department of Environmental Protection -- Division of Coastal Resources.

2/ Description: LR = Limited Restoration; M = Maintenance; RD = Recreational Development.

3/ Derived in Appendix Table K-2 and K-3.

Source: Hammer, Siler, George Associates.



**Appendix Table K-2. PROJECTED PERIODIC MAINTENANCE OF STATE SHORE PROTECTION PROJECTS,  
NEW JERSEY, 1968-2010  
(1986 Constant Dollars)**

- 1/ The "reach concept" or approach is the method whereby consistent shore protection engineering plans are developed within areas affected by similar coastal process. Each reach corresponds to a specific coastal areas.
- 2/ No available.
- 3/ Maintenance funding distribution methodology:  
In the Master Plan under each reach, total project cost and subsequent maintenance costs are listed. Usually the required interval between improvements is defined, however, under the category "Maintenance of Existing Functional Structures", interval expenditures for individual cost items are often not defined. In these cases, it is assumed that this projected expenditure item will require attention at a rate equal to the total cost divided by the projected intervals for "Beach Nourishment" or "Beach Fill" projects.

Sources: State of New Jersey Department of Environmental Protection -- Division of Coastal Resources and Hammer, Siler, George Associates.

Appendix Table K-3. PROJECTED PERIODIC MAINTENANCE OF FEDERAL SHORE PROTECTION PROJECTS, NEW JERSEY, 1988-2010 1/  
(1986 Constant Dollars)

| Year  | Projects                  |                       |                       |
|-------|---------------------------|-----------------------|-----------------------|
|       | <u>Barnegat<br/>Inlet</u> | <u>Sea<br/>Bright</u> | <u>Egg<br/>Harbor</u> |
| 1988  | ****                      | ****                  | ****                  |
| 1989  | ****                      | ****                  | ****                  |
| 1990  | ****                      | ****                  | ****                  |
| 1991  | ****                      | ****                  | ****                  |
| 1992  | ****                      | ****                  | ****                  |
| 1993  | ****                      | ****                  | ****                  |
| 1994  | \$1,000,000               | ****                  | ****                  |
| 1995  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 1996  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 1997  | \$1,000,000               | \$7,000,000           | \$9,000,000           |
| 1998  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 1999  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2000  | \$1,000,000               | \$7,000,000           | \$9,000,000           |
| 2001  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2002  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2003  | \$1,000,000               | \$7,000,000           | \$9,000,000           |
| 2004  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2005  | \$1,000,000               | \$7,000,000           | \$9,000,000           |
| 2006  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2007  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2008  | \$1,000,000               | \$7,000,000           | \$9,000,000           |
| 2009  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| 2010  | \$1,000,000               | \$7,000,000           | \$2,000,000           |
| Total | \$17,000,000              | \$112,000,000         | \$67,000,000          |

1/ Coastal Resource personnel at the Department of Environmental Protection provided very rough estimates regarding future maintenance associated with these projects. No formal studies have been done assessing these future costs. It is assumed that the federal government will pay for all maintenance associated with these three projects.

Sources: State of New Jersey Department of Environmental Protection  
-- Division of Coastal Resources and Hammer, Siler, George Associates.

APPENDIX L

Appendix Table L-1. CAPITAL EXPENDITURES FOR ELEMENTARY AND SECONDARY SCHOOLS, NEW JERSEY, FY 1985  
(1986 Constant Dollars)

| <u>County</u> | <u>Capital Outlay 1/</u> | <u>Improvement Authorization 2/</u> | <u>Total Capital Expenditures</u> | <u>Enrollment 3/</u> | <u>Capital Expenditures Per Pupil 4/</u> |
|---------------|--------------------------|-------------------------------------|-----------------------------------|----------------------|--|
| Atlantic      | \$684,279                | \$1,598,901                         | \$2,283,180                       | 30,991               | \$75                                     |
| Bergen        | \$7,187,819              | \$2,583,224                         | \$9,771,043                       | 106,597              | \$93                                     |
| Burlington    | \$2,494,415              | \$1,613,841                         | \$4,108,256                       | 62,017               | \$67                                     |
| Camden        | \$3,961,657              | \$1,850,486                         | \$5,812,143                       | 79,529               | \$74                                     |
| Cape May      | \$644,751                | \$237,923                           | \$882,674                         | 11,666               | \$77                                     |
| Cumberland    | \$550,753                | \$80,326                            | \$631,079                         | 25,425               | \$25                                     |
| Essex         | \$4,304,732              | \$8,755,116                         | \$13,059,848                      | 128,645              | \$103                                    |
| Gloucester    | \$1,462,185              | \$4,777,917                         | \$6,240,102                       | 36,300               | \$174                                    |
| Hudson        | \$3,979,998              | \$13,645,169                        | \$17,625,167                      | 70,983               | \$252                                    |
| Hunterdon     | \$1,099,055              | \$2,184,400                         | \$3,283,455                       | 16,867               | \$198                                    |
| Mercer        | \$2,190,689              | \$6,915,098                         | \$9,105,787                       | 44,164               | \$209                                    |
| Middlesex     | \$5,394,093              | \$1,680,503                         | \$7,074,596                       | 86,555               | \$83                                     |
| Monmouth      | \$5,566,847              | \$1,140,063                         | \$6,706,910                       | 84,019               | \$81                                     |
| Morris        | \$5,650,968              | \$2,045,160                         | \$7,696,128                       | 67,533               | \$116                                    |
| Ocean         | \$3,591,365              | \$449,023                           | \$4,040,388                       | 59,131               | \$69                                     |
| Passaic       | \$1,762,766              | \$8,918,351                         | \$10,681,117                      | 68,598               | \$158                                    |
| Salem         | \$612,234                | \$112,829                           | \$725,063                         | 12,055               | \$61                                     |
| Somerset      | \$1,807,098              | \$753,495                           | \$2,560,593                       | 30,716               | \$85                                     |
| Sussex        | \$1,157,504              | \$2,024,655                         | \$3,182,159                       | 23,982               | \$135                                    |
| Union         | \$3,162,659              | \$1,316,983                         | \$4,479,642                       | 68,226               | \$67                                     |
| Warren        | \$1,002,235              | \$0                                 | \$1,002,235                       | 15,224               | \$67                                     |
| <b>Total</b>  | <b>\$58,268,102</b>      | <b>\$62,683,463</b>                 | <b>\$120,951,565</b>              | <b>1,129,223</b>     | <b>\$107</b>                             |

Appendix Table L-1. CAPITAL EXPENDITURES, FOR ELEMENTARY AND  
SECONDARY SCHOOLS, NEW JERSEY, FY 1985  
(1986 Constant Dollars)  
(Continued)

- 1/ Expenditures on fixed assets such as sites, buildings and equipment which are made from the current year's budget.
- 2/ Expenditures made from the proceeds of bond sales during or prior to the current year's budget.
- 3/ Enrollment as of September 30, 1985.
- 4/ 1986 constant dollars.

Sources: NJ Department of Education -- Division of Finance and Hammer, Siler, George Associates.

Appendix Table L-2. ENROLLMENT TRENDS FOR ELEMENTARY AND SECONDARY SCHOOLS BY COUNTY, NEW JERSEY, FY 1980-1987

| County       | 1980             | 1981             | 1982             | 1983             | 1984             | 1985             | 1986             | 1987             | 1980-1987                   |              |
|--------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----------------------------|--------------|
|              |                  |                  |                  |                  |                  |                  |                  |                  | Average<br>Change<br>Actual | Percent      |
| Atlantic     | 35,070           | 33,482           | 32,583           | 31,767           | 31,320           | 30,991           | 30,882           | 31,025           | (578)                       | -1.6%        |
| Bergen       | 130,627          | 124,813          | 119,002          | 113,889          | 110,120          | 106,597          | 103,860          | 102,094          | (4,076)                     | -3.1%        |
| Burlington   | 71,323           | 68,692           | 66,462           | 64,203           | 62,967           | 62,017           | 61,279           | 61,537           | (1,398)                     | -2.0%        |
| Camden       | 87,755           | 85,104           | 82,876           | 81,279           | 80,259           | 79,529           | 79,772           | 79,833           | (1,132)                     | -1.3%        |
| Cape May     | 11,913           | 12,045           | 11,675           | 11,429           | 11,420           | 11,666           | 12,002           | 12,296           | 55                          | 0.5%         |
| Cumberland   | 28,522           | 27,651           | 26,744           | 26,072           | 25,601           | 25,425           | 25,200           | 25,007           | (502)                       | -1.8%        |
| Essex        | 145,698          | 141,113          | 136,929          | 134,232          | 131,878          | 128,645          | 126,314          | 123,851          | (3,121)                     | -2.1%        |
| Gloucester   | 39,122           | 38,119           | 37,520           | 36,901           | 36,290           | 36,300           | 36,060           | 36,367           | (394)                       | -1.0%        |
| Hudson       | 79,400           | 77,629           | 75,062           | 73,767           | 72,792           | 70,983           | 69,744           | 68,449           | (1,564)                     | -2.0%        |
| Hunterdon    | 18,853           | 18,235           | 17,640           | 17,194           | 16,901           | 16,867           | 16,785           | 16,819           | (291)                       | -1.5%        |
| Mercer       | 49,440           | 47,712           | 46,490           | 45,795           | 44,633           | 44,164           | 44,165           | 44,052           | (770)                       | -1.6%        |
| Middlesex    | 102,705          | 98,527           | 94,226           | 91,291           | 88,367           | 86,555           | 84,996           | 84,463           | (2,606)                     | -2.5%        |
| Monmouth     | 95,891           | 92,500           | 89,067           | 86,495           | 84,584           | 84,019           | 83,356           | 83,199           | (1,813)                     | -1.9%        |
| Morris       | 80,568           | 77,324           | 74,630           | 72,063           | 69,666           | 67,533           | 65,599           | 64,197           | (2,339)                     | -2.9%        |
| Ocean        | 62,325           | 61,340           | 60,225           | 59,039           | 58,826           | 59,131           | 60,004           | 60,714           | (230)                       | -0.4%        |
| Passaic      | 76,209           | 74,588           | 72,150           | 70,290           | 69,147           | 68,598           | 67,224           | 66,139           | (1,439)                     | -1.9%        |
| Salem        | 13,110           | 12,872           | 12,414           | 12,274           | 12,306           | 12,055           | 12,052           | 11,978           | (162)                       | -1.2%        |
| Somerset     | 38,244           | 36,037           | 34,274           | 32,755           | 31,554           | 30,716           | 30,532           | 30,432           | (1,116)                     | -2.9%        |
| Sussex       | 25,010           | 24,798           | 24,447           | 24,131           | 23,981           | 23,982           | 23,886           | 23,973           | (148)                       | -0.6%        |
| Union        | 79,861           | 77,031           | 74,236           | 71,922           | 69,738           | 68,226           | 67,131           | 66,131           | (1,961)                     | -2.5%        |
| Warren       | 16,613           | 16,396           | 16,066           | 15,732           | 15,491           | 15,224           | 14,846           | 14,911           | (243)                       | -1.5%        |
| <b>Total</b> | <b>1,288,259</b> | <b>1,246,000</b> | <b>1,204,718</b> | <b>1,172,520</b> | <b>1,147,841</b> | <b>1,129,223</b> | <b>1,115,689</b> | <b>1,107,467</b> | <b>(25,828)</b>             | <b>-2.0%</b> |

Sources: NJ Department of Education and Hamer, Siler, George Associates.

Appendix Table L-3. RATIO OF COUNTY TO STATE ENROLLMENT TRENDS FOR ELEMENTARY AND SECONDARY SCHOOLS, NEW JERSEY, FY 1983-1987

| County       | 1983 Enrollment  |               | 1984 Enrollment  |               | 1985 Enrollment  |               | 1986 Enrollment  |               | 1987 Enrollment  |               | 1983-1987     |
|--------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|------------------|---------------|---------------|
|              | County           | Ratio 1/      | County           | Ratio         | County           | Ratio         | County           | Ratio         | County           | Ratio         | Avg Ratio     |
| Atlantic     | 31,767           | 2.7%          | 31,320           | 2.7%          | 30,991           | 2.7%          | 30,882           | 2.8%          | 31,025           | 2.8%          | 2.8%          |
| Bergen       | 113,889          | 9.7%          | 110,120          | 9.6%          | 106,597          | 9.4%          | 103,860          | 9.3%          | 102,094          | 9.2%          | 9.5%          |
| Burlington   | 64,203           | 5.5%          | 62,967           | 5.5%          | 62,017           | 5.5%          | 61,279           | 5.5%          | 61,537           | 5.6%          | 5.5%          |
| Camden       | 81,279           | 6.9%          | 80,259           | 7.0%          | 79,529           | 7.0%          | 79,772           | 7.2%          | 79,833           | 7.2%          | 7.1%          |
| Cape May     | 11,429           | 1.0%          | 11,420           | 1.0%          | 11,666           | 1.0%          | 12,002           | 1.1%          | 12,296           | 1.1%          | 1.0%          |
| Cumberland   | 26,072           | 2.2%          | 25,601           | 2.2%          | 25,425           | 2.3%          | 25,200           | 2.3%          | 25,007           | 2.3%          | 2.2%          |
| Essex        | 134,232          | 11.5%         | 131,878          | 11.5%         | 128,645          | 11.4%         | 126,314          | 11.3%         | 123,851          | 11.2%         | 11.4%         |
| Gloucester   | 36,901           | 3.2%          | 36,290           | 3.2%          | 36,300           | 3.2%          | 36,060           | 3.2%          | 36,367           | 3.3%          | 3.2%          |
| Hudson       | 73,767           | 6.3%          | 72,792           | 6.3%          | 70,983           | 6.3%          | 69,744           | 6.3%          | 68,449           | 6.2%          | 6.3%          |
| Hunterdon    | 17,194           | 1.5%          | 16,901           | 1.5%          | 16,867           | 1.5%          | 16,785           | 1.5%          | 16,819           | 1.5%          | 1.5%          |
| Mercer       | 45,795           | 3.9%          | 44,633           | 3.9%          | 44,164           | 3.9%          | 44,165           | 4.0%          | 44,052           | 4.0%          | 3.9%          |
| Middlesex    | 91,291           | 7.8%          | 88,367           | 7.7%          | 86,555           | 7.7%          | 84,996           | 7.6%          | 84,463           | 7.6%          | 7.7%          |
| Monmouth     | 86,495           | 7.4%          | 84,584           | 7.4%          | 84,019           | 7.4%          | 83,356           | 7.5%          | 83,199           | 7.5%          | 7.4%          |
| Morris       | 72,063           | 6.2%          | 69,666           | 6.1%          | 67,533           | 6.0%          | 65,599           | 5.9%          | 64,197           | 5.8%          | 6.0%          |
| Ocean        | 59,039           | 5.0%          | 58,826           | 5.1%          | 59,131           | 5.2%          | 60,004           | 5.4%          | 60,714           | 5.5%          | 5.3%          |
| Passaic      | 70,290           | 6.0%          | 69,147           | 6.0%          | 68,598           | 6.1%          | 67,224           | 6.0%          | 66,139           | 6.0%          | 6.0%          |
| Salem        | 12,274           | 1.1%          | 12,306           | 1.1%          | 12,055           | 1.1%          | 12,052           | 1.1%          | 11,978           | 1.1%          | 1.1%          |
| Somerset     | 32,755           | 2.8%          | 31,554           | 2.8%          | 30,716           | 2.7%          | 30,532           | 2.7%          | 30,432           | 2.8%          | 2.8%          |
| Sussex       | 24,131           | 2.1%          | 23,981           | 2.1%          | 23,982           | 2.1%          | 23,886           | 2.1%          | 23,973           | 2.2%          | 2.1%          |
| Union        | 71,922           | 6.1%          | 69,738           | 6.1%          | 68,226           | 6.0%          | 67,131           | 6.0%          | 66,131           | 6.0%          | 6.1%          |
| Warren       | 15,732           | 1.3%          | 15,491           | 1.4%          | 15,224           | 1.4%          | 14,846           | 1.3%          | 14,911           | 1.4%          | 1.3%          |
| <b>Total</b> | <b>1,172,520</b> | <b>100.0%</b> | <b>1,147,841</b> | <b>100.0%</b> | <b>1,129,223</b> | <b>100.0%</b> | <b>1,115,689</b> | <b>100.0%</b> | <b>1,107,467</b> | <b>100.0%</b> | <b>100.0%</b> |

Sources: NJ Department of Education and Hammer, Siler, George Associates.

ndix Table L-4. ENROLLMENT PROJECTIONS FOR ELEMENTARY AND SECONDARY SCHOOLS BY COUNTY, NEW JERSEY, FY 1988-2010 1/

| 1988   | 1989      | 1990      | 1991      | 1992      | 1993      | 1994      | 1995      | 1996      | 1997      | 1998      | 1999      | 2000      |
|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1,243  | 30,035    | 30,021    | 30,291    | 30,767    | 31,330    | 31,952    | 32,662    | 33,370    | 34,127    | 34,622    | 35,124    | 35,633    |
| 1,913  | 103,199   | 103,150   | 104,078   | 105,712   | 107,647   | 109,786   | 112,225   | 114,658   | 117,259   | 118,959   | 120,684   | 122,434   |
| 1,480  | 60,065    | 60,037    | 60,577    | 61,528    | 62,654    | 63,899    | 65,319    | 66,734    | 68,249    | 69,238    | 70,242    | 71,261    |
| 7,633  | 77,101    | 77,064    | 77,757    | 78,978    | 80,423    | 82,021    | 83,844    | 85,661    | 87,605    | 88,875    | 90,164    | 91,471    |
| 1,441  | 11,362    | 11,357    | 11,459    | 11,639    | 11,852    | 12,087    | 12,356    | 12,624    | 12,910    | 13,097    | 13,287    | 13,480    |
| 4,635  | 24,466    | 24,454    | 24,674    | 25,062    | 25,521    | 26,028    | 26,606    | 27,183    | 27,799    | 28,202    | 28,611    | 29,026    |
| 5,025  | 124,168   | 124,107   | 125,222   | 127,189   | 129,514   | 132,092   | 135,027   | 137,957   | 141,084   | 143,128   | 145,202   | 147,310   |
| 5,301  | 35,058    | 35,042    | 35,357    | 35,912    | 36,569    | 37,296    | 38,125    | 38,951    | 39,835    | 40,412    | 40,998    | 41,593    |
| 8,947  | 68,474    | 68,441    | 69,057    | 70,141    | 71,425    | 72,844    | 74,462    | 76,076    | 77,802    | 78,931    | 80,075    | 81,236    |
| 16,388 | 16,276    | 16,268    | 16,415    | 16,672    | 16,978    | 17,315    | 17,699    | 18,083    | 18,493    | 18,762    | 19,034    | 19,310    |
| 13,218 | 42,921    | 42,901    | 43,286    | 43,966    | 44,771    | 45,660    | 46,675    | 47,686    | 48,768    | 49,476    | 50,193    | 50,921    |
| 34,451 | 83,871    | 83,831    | 84,585    | 85,913    | 87,485    | 89,224    | 91,206    | 93,183    | 95,297    | 96,679    | 98,081    | 99,503    |
| 81,702 | 81,141    | 81,102    | 81,832    | 83,117    | 84,638    | 86,320    | 88,238    | 90,150    | 92,195    | 93,532    | 94,889    | 96,264    |
| 65,758 | 65,307    | 65,276    | 65,863    | 66,897    | 68,121    | 69,475    | 71,019    | 72,558    | 74,204    | 75,280    | 76,372    | 77,479    |
| 57,732 | 57,335    | 57,308    | 57,823    | 58,731    | 59,806    | 60,995    | 62,350    | 63,701    | 65,147    | 66,091    | 67,050    | 68,022    |
| 66,198 | 65,744    | 65,713    | 66,303    | 67,344    | 68,577    | 69,940    | 71,494    | 73,043    | 74,701    | 75,784    | 76,883    | 77,997    |
| 11,770 | 11,690    | 11,684    | 11,789    | 11,974    | 12,193    | 12,436    | 12,712    | 12,987    | 13,282    | 13,475    | 13,670    | 13,868    |
| 30,243 | 30,035    | 30,021    | 30,291    | 30,767    | 31,330    | 31,952    | 32,662    | 33,370    | 34,127    | 34,622    | 35,124    | 35,633    |
| 23,206 | 23,046    | 23,036    | 23,243    | 23,608    | 24,040    | 24,517    | 25,062    | 25,605    | 26,186    | 26,566    | 26,951    | 27,342    |
| 66,528 | 66,071    | 66,040    | 66,634    | 67,680    | 68,919    | 70,288    | 71,850    | 73,407    | 75,073    | 76,161    | 77,266    | 78,386    |
| 14,739 | 14,638    | 14,631    | 14,763    | 14,994    | 15,269    | 15,572    | 15,918    | 16,263    | 16,632    | 16,874    | 17,118    | 17,366    |
| 99,551 | 1,092,003 | 1,091,484 | 1,101,299 | 1,118,591 | 1,139,062 | 1,161,699 | 1,187,511 | 1,213,250 | 1,240,775 | 1,258,766 | 1,277,018 | 1,295,535 |

Appendix Table L-4. ENROLLMENT PROJECTIONS FOR ELEMENTARY AND SECONDARY SCHOOLS BY COUNTY, NEW JERSEY, FY 1988-2010  
 (1986 Constant Dollars)  
 (Continued)

| County     | 2001      | 2002      | 2003      | 2004      | 2005      | 2006      | 2007      | 2008      | 2009      | 2010      |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Atlantic   | 36,150    | 36,674    | 37,206    | 37,745    | 38,293    | 38,848    | 39,411    | 39,983    | 40,562    | 41,151    |
| Bergen     | 24,209    | 126,011   | 127,838   | 129,691   | 131,572   | 133,480   | 135,415   | 137,379   | 139,370   | 141,391   |
| Burlington | 72,294    | 73,342    | 74,406    | 75,484    | 76,579    | 77,689    | 78,816    | 79,959    | 81,118    | 82,294    |
| Canden     | 92,797    | 94,143    | 95,508    | 96,893    | 98,298    | 99,723    | 101,169   | 102,636   | 104,124   | 105,634   |
| Cape May   | 13,675    | 13,874    | 14,075    | 14,279    | 14,486    | 14,696    | 14,909    | 15,125    | 15,344    | 15,567    |
| Cumberland | 29,447    | 29,874    | 30,307    | 30,747    | 31,193    | 31,645    | 32,104    | 32,569    | 33,041    | 33,520    |
| Essex      | 149,446   | 151,609   | 153,805   | 156,041   | 158,301   | 160,596   | 162,925   | 165,287   | 167,689   | 170,118   |
| Gloucester | 42,196    | 42,808    | 43,429    | 44,058    | 44,697    | 45,345    | 46,003    | 46,670    | 47,346    | 48,033    |
| Hudson     | 82,414    | 83,609    | 84,822    | 86,051    | 87,299    | 88,565    | 89,849    | 91,152    | 92,474    | 93,815    |
| Hunterdon  | 19,590    | 19,874    | 20,162    | 20,454    | 20,751    | 21,052    | 21,357    | 21,667    | 21,981    | 22,299    |
| Mercer     | 51,659    | 52,408    | 53,168    | 53,939    | 54,721    | 55,515    | 56,319    | 57,136    | 57,964    | 58,805    |
| Middlesex  | 100,946   | 102,410   | 103,895   | 105,401   | 106,930   | 108,480   | 110,053   | 111,649   | 113,267   | 114,910   |
| Monmouth   | 97,660    | 99,076    | 100,513   | 101,970   | 103,449   | 104,949   | 106,471   | 108,015   | 109,581   | 111,170   |
| Morris     | 78,603    | 79,742    | 80,899    | 82,072    | 83,262    | 84,469    | 85,694    | 86,936    | 88,197    | 89,476    |
| Ocean      | 69,008    | 70,009    | 71,024    | 72,054    | 73,098    | 74,158    | 75,234    | 76,325    | 77,431    | 78,554    |
| Passaic    | 79,128    | 80,276    | 81,440    | 82,621    | 83,819    | 85,034    | 86,267    | 87,518    | 88,787    | 90,074    |
| Salem      | 14,069    | 14,274    | 14,481    | 14,690    | 14,903    | 15,120    | 15,339    | 15,561    | 15,787    | 16,016    |
| Somerset   | 36,150    | 36,674    | 37,206    | 37,745    | 38,293    | 38,848    | 39,411    | 39,983    | 40,562    | 41,151    |
| Sussex     | 27,738    | 28,141    | 28,549    | 28,963    | 29,383    | 29,809    | 30,241    | 30,679    | 31,124    | 31,575    |
| Union      | 79,523    | 80,676    | 81,846    | 83,032    | 84,236    | 85,458    | 86,697    | 87,954    | 89,229    | 90,523    |
| Warren     | 17,618    | 17,874    | 18,133    | 18,396    | 18,662    | 18,933    | 19,208    | 19,486    | 19,769    | 20,055    |
| Total      | 1,314,320 | 1,333,378 | 1,352,712 | 1,372,326 | 1,392,225 | 1,412,412 | 1,432,892 | 1,453,669 | 1,474,747 | 1,496,131 |

1/ State-wide enrollment projections are subdivided by County by multiplying the 1983-1987 average enrollment distribution factor (calculated in Appendix Table L-3) by the total state-wide enrollment projections (calculated in Table 29).

Sources: NJ Department of Education and Hamer, Siler, George Associates.

Appendix Table L-5. CAPITAL EXPENDITURE PROJECTIONS FOR ELEMENTARY AND SECONDARY SCHOOLS BY COUNTY, NEW JERSEY, FY 1988-2010  
(1986 Constant Dollars)

| County       | 1988 1/              | 1989 1/              | 1990 1/             | 1991                 | 1992                 | 1993                 | 1988-1993<br>Avg Annual<br>Expend | 1988-1993<br>Total<br>Expend |
|--------------|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|-----------------------------------|------------------------------|
| Atlantic     | \$35,815,792         | \$38,809,175         | \$1,737,200         | \$2,271,825          | \$2,307,525          | \$2,349,750          | \$13,881,878                      | \$83,291,267                 |
| Bergen       | \$25,958,294         | \$12,868,184         | \$18,463,170        | \$9,679,254          | \$9,831,216          | \$10,011,171         | \$14,468,548                      | \$86,811,289                 |
| Burlington   | \$16,692,700         | \$7,648,000          | \$2,387,750         | \$4,058,659          | \$4,122,376          | \$4,197,818          | \$6,517,884                       | \$39,107,303                 |
| Camden       | \$6,168,090          | \$3,620,650          | \$3,843,650         | \$5,754,018          | \$5,844,372          | \$5,951,302          | \$5,197,014                       | \$31,182,082                 |
| Cape May     | \$6,912,567          | \$2,991,183          | \$2,489,384         | \$882,343            | \$896,203            | \$912,604            | \$2,514,047                       | \$15,084,284                 |
| Cumberland   | \$1,495,600          | \$740,000            | \$1,085,750         | \$616,850            | \$626,550            | \$638,025            | \$867,129                         | \$5,202,775                  |
| Essex        | \$58,584,988         | \$11,970,184         | \$7,568,700         | \$12,897,866         | \$13,100,467         | \$13,339,942         | \$19,577,025                      | \$117,462,147                |
| Gloucester   | \$12,699,440         | \$4,573,100          | \$4,423,496         | \$6,152,118          | \$6,248,688          | \$6,363,006          | \$6,743,308                       | \$40,459,848                 |
| Hudson       | \$1,816,700          | \$4,841,000          | \$1,832,200         | \$17,402,364         | \$17,675,532         | \$17,999,100         | \$10,261,149                      | \$61,566,896                 |
| Hunterdon    | \$6,025,701          | \$983,410            | \$2,856,640         | \$3,250,170          | \$3,301,056          | \$3,361,644          | \$3,296,437                       | \$19,778,621                 |
| Mercer       | \$18,402,300         | \$5,260,660          | \$2,202,310         | \$9,046,774          | \$9,188,894          | \$9,357,139          | \$8,909,680                       | \$53,458,077                 |
| Middlesex    | \$10,741,448         | \$6,646,687          | \$5,309,811         | \$7,020,555          | \$7,130,779          | \$7,261,255          | \$7,351,756                       | \$44,110,535                 |
| Monmouth     | \$11,366,050         | \$10,797,570         | \$14,202,272        | \$6,628,392          | \$6,732,477          | \$6,855,678          | \$9,430,407                       | \$56,582,439                 |
| Morris       | \$7,681,314          | \$7,699,568          | \$5,916,733         | \$7,640,108          | \$7,760,052          | \$7,902,036          | \$7,433,302                       | \$44,599,811                 |
| Ocean        | \$11,941,350         | \$15,408,650         | \$1,543,110         | \$3,989,787          | \$4,052,439          | \$4,126,614          | \$6,843,658                       | \$41,061,950                 |
| Passaic      | \$12,162,198         | \$6,544,230          | \$4,333,032         | \$10,475,874         | \$10,640,352         | \$10,835,166         | \$9,165,142                       | \$54,990,852                 |
| Salem        | \$1,568,175          | \$616,125            | \$1,060,775         | \$719,129            | \$730,414            | \$743,773            | \$906,399                         | \$5,438,391                  |
| Somerset     | \$33,383,325         | \$7,357,700          | \$5,317,700         | \$2,574,735          | \$2,615,195          | \$2,663,050          | \$8,985,284                       | \$53,911,705                 |
| Sussex       | \$3,134,925          | \$1,936,025          | \$786,175           | \$3,137,805          | \$3,187,080          | \$3,245,400          | \$2,571,235                       | \$15,427,410                 |
| Union        | \$18,108,129         | \$5,812,405          | \$9,136,552         | \$4,464,478          | \$4,534,560          | \$4,617,573          | \$7,778,950                       | \$46,673,697                 |
| Warren       | \$1,754,303          | \$1,615,185          | \$2,289,665         | \$989,121            | \$1,004,598          | \$1,023,023          | \$1,445,983                       | \$8,675,895                  |
| <b>Total</b> | <b>\$302,413,389</b> | <b>\$158,739,691</b> | <b>\$98,786,075</b> | <b>\$119,652,225</b> | <b>\$121,530,825</b> | <b>\$123,755,069</b> | <b>\$154,146,212</b>              | <b>\$924,877,274</b>         |

Appendix Table L-5. CAPITAL EXPENDITURE PROJECTIONS FOR ELEMENTARY AND SECONDARY SCHOOLS BY COUNTY, NEW JERSEY, FY 1988-2010  
 (1986 Constant Dollars)  
 (Continued)

| County       | 1994                 | 1995                 | 1996                 | 1997                 | 1998                 | 1999                 | 2000                 | 1994-2000<br>Total<br>Expend |
|--------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|------------------------------|
| Atlantic     | \$2,396,400          | \$2,449,650          | \$2,502,750          | \$2,559,525          | \$2,596,650          | \$2,634,300          | \$2,672,475          | \$17,811,750                 |
| Bergen       | \$10,210,098         | \$10,436,925         | \$10,663,194         | \$10,905,087         | \$11,063,187         | \$11,223,612         | \$11,386,362         | \$75,888,465                 |
| Burlington   | \$4,281,233          | \$4,376,373          | \$4,471,178          | \$4,572,683          | \$4,638,946          | \$4,706,214          | \$4,774,487          | \$31,821,114                 |
| Camden       | \$6,069,554          | \$6,204,456          | \$6,338,914          | \$6,482,770          | \$6,576,750          | \$6,672,136          | \$6,768,854          | \$45,113,434                 |
| Cape May     | \$930,699            | \$951,412            | \$972,048            | \$994,070            | \$1,008,469          | \$1,023,099          | \$1,037,960          | \$6,917,757                  |
| Cumberland   | \$650,700            | \$665,150            | \$679,575            | \$694,975            | \$705,050            | \$715,275            | \$725,650            | \$4,836,375                  |
| Essex        | \$13,605,476         | \$13,907,781         | \$14,209,571         | \$14,531,652         | \$14,742,184         | \$14,955,806         | \$15,172,930         | \$101,125,400                |
| Gloucester   | \$6,489,504          | \$6,633,750          | \$6,777,474          | \$6,931,290          | \$7,031,688          | \$7,133,652          | \$7,237,182          | \$48,234,540                 |
| Hudson       | \$18,356,688         | \$18,764,424         | \$19,171,152         | \$19,606,104         | \$19,890,612         | \$20,178,900         | \$20,471,472         | \$136,439,352                |
| Hunterdon    | \$3,428,370          | \$3,504,402          | \$3,580,434          | \$3,661,614          | \$3,714,876          | \$3,768,732          | \$3,823,380          | \$25,481,808                 |
| Mercer       | \$9,542,940          | \$9,755,075          | \$9,966,374          | \$10,192,512         | \$10,340,484         | \$10,490,337         | \$10,642,489         | \$70,930,211                 |
| Middlesex    | \$7,405,592          | \$7,570,098          | \$7,734,189          | \$7,909,651          | \$8,024,357          | \$8,140,723          | \$8,258,749          | \$55,043,359                 |
| Morrmouth    | \$6,991,920          | \$7,147,278          | \$7,302,150          | \$7,467,795          | \$7,576,092          | \$7,686,009          | \$7,797,384          | \$51,968,628                 |
| Morris       | \$8,059,100          | \$8,238,204          | \$8,416,728          | \$8,607,664          | \$8,732,480          | \$8,859,152          | \$8,987,564          | \$59,900,892                 |
| Ocean        | \$4,208,655          | \$4,302,150          | \$4,395,369          | \$4,495,143          | \$4,560,279          | \$4,626,450          | \$4,693,518          | \$31,281,564                 |
| Passaic      | \$11,050,520         | \$11,296,052         | \$11,540,794         | \$11,802,758         | \$11,973,872         | \$12,147,514         | \$12,323,526         | \$82,135,036                 |
| Salem        | \$758,596            | \$775,432            | \$792,207            | \$810,202            | \$821,975            | \$833,870            | \$845,948            | \$5,638,230                  |
| Somerset     | \$2,715,920          | \$2,776,270          | \$2,836,450          | \$2,900,795          | \$2,942,870          | \$2,985,540          | \$3,028,805          | \$20,186,650                 |
| Sussex       | \$3,309,795          | \$3,383,370          | \$3,456,675          | \$3,535,110          | \$3,586,410          | \$3,638,385          | \$3,691,170          | \$24,600,915                 |
| Union        | \$4,709,296          | \$4,813,950          | \$4,918,269          | \$5,029,891          | \$5,102,787          | \$5,176,822          | \$5,251,862          | \$35,002,877                 |
| Warren       | \$1,043,324          | \$1,066,506          | \$1,089,621          | \$1,114,344          | \$1,130,558          | \$1,146,906          | \$1,163,522          | \$7,754,781                  |
| <b>Total</b> | <b>\$126,214,380</b> | <b>\$129,018,708</b> | <b>\$131,815,116</b> | <b>\$134,805,635</b> | <b>\$136,760,576</b> | <b>\$138,743,434</b> | <b>\$140,755,289</b> | <b>\$938,113,138</b>         |

**CAPITAL EXPENDITURE PROJECTIONS FOR ELEMENTARY AND SECONDARY SCHOOLS BY COUNTY, NEW JERSEY, FY 1988-2010**  
 (1986 Constant Dollars)  
 (Continued)

|         | 2002          | 2003          | 2004          | 2005          | 2006          | 2007          | 2008          | 2009          |
|---------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 01      |               |               |               |               |               |               |               |               |
| 11,250  | \$2,750,550   | \$2,790,450   | \$2,830,875   | \$2,871,975   | \$2,913,600   | \$2,955,825   | \$2,998,725   | \$3,042,150   |
| 51,437  | \$11,719,023  | \$11,888,934  | \$12,061,263  | \$12,236,196  | \$12,413,640  | \$12,593,595  | \$12,776,247  | \$12,961,410  |
| 63,698  | \$4,913,914   | \$4,985,202   | \$5,057,428   | \$5,130,793   | \$5,205,163   | \$5,280,672   | \$5,357,253   | \$5,434,906   |
| 66,978  | \$6,966,582   | \$7,067,592   | \$7,170,082   | \$7,274,052   | \$7,379,502   | \$7,486,506   | \$7,595,064   | \$7,705,176   |
| 52,975  | \$1,068,298   | \$1,083,775   | \$1,099,483   | \$1,115,422   | \$1,131,592   | \$1,147,993   | \$1,164,625   | \$1,181,488   |
| 36,175  | \$746,850     | \$757,675     | \$768,675     | \$779,825     | \$791,125     | \$802,600     | \$814,225     | \$826,025     |
| 92,938  | \$15,615,727  | \$15,841,915  | \$16,072,223  | \$16,305,003  | \$16,541,388  | \$16,781,275  | \$17,024,561  | \$17,271,967  |
| 42,104  | \$7,448,592   | \$7,556,646   | \$7,666,092   | \$7,777,278   | \$7,890,030   | \$8,004,522   | \$8,120,580   | \$8,238,204   |
| 68,328  | \$21,069,468  | \$21,375,144  | \$21,684,852  | \$21,999,348  | \$22,318,380  | \$22,641,948  | \$22,970,304  | \$23,303,448  |
| 178,820 | \$3,935,052   | \$3,992,076   | \$4,049,892   | \$4,108,698   | \$4,168,296   | \$4,228,686   | \$4,290,066   | \$4,352,238   |
| 196,731 | \$10,953,272  | \$11,112,112  | \$11,273,251  | \$11,436,689  | \$11,602,635  | \$11,770,671  | \$11,941,424  | \$12,114,476  |
| 178,518 | \$8,500,030   | \$8,623,285   | \$8,748,283   | \$8,875,190   | \$9,003,840   | \$9,134,399   | \$9,266,867   | \$9,401,161   |
| 910,460 | \$8,025,156   | \$8,141,553   | \$8,259,570   | \$8,379,369   | \$8,500,869   | \$8,624,151   | \$8,749,215   | \$8,876,061   |
| 117,948 | \$9,250,072   | \$9,384,284   | \$9,520,352   | \$9,658,392   | \$9,798,404   | \$9,940,504   | \$10,084,576  | \$10,230,852  |
| 761,552 | \$4,830,621   | \$4,900,656   | \$4,971,726   | \$5,043,762   | \$5,116,902   | \$5,191,146   | \$5,266,425   | \$5,342,739   |
| 502,224 | \$12,683,608  | \$12,867,520  | \$13,054,118  | \$13,243,402  | \$13,435,372  | \$13,630,186  | \$13,827,844  | \$14,028,346  |
| 868,209 | \$870,714     | \$883,341     | \$896,090     | \$909,083     | \$922,320     | \$935,679     | \$949,221     | \$963,007     |
| 072,750 | \$3,117,290   | \$3,162,510   | \$3,208,325   | \$3,254,905   | \$3,302,080   | \$3,349,935   | \$3,398,555   | \$3,447,770   |
| 744,630 | \$3,799,035   | \$3,854,115   | \$3,910,005   | \$3,966,705   | \$4,024,215   | \$4,082,535   | \$4,141,665   | \$4,201,740   |
| 328,041 | \$5,405,292   | \$5,483,682   | \$5,563,144   | \$5,643,812   | \$5,725,686   | \$5,808,699   | \$5,892,918   | \$5,978,343   |
| 180,406 | \$1,197,558   | \$1,214,911   | \$1,232,532   | \$1,250,354   | \$1,268,511   | \$1,286,936   | \$1,305,562   | \$1,324,523   |
| 796,172 | \$144,866,704 | \$146,967,378 | \$149,098,261 | \$151,260,253 | \$153,453,550 | \$155,678,463 | \$157,935,922 | \$160,226,030 |

resented in Department of Education (Facility Planning  
 "Capital Improvement Program For Fiscal Years 1986-1990"

s: NJ Department of Education -- Facility Planning; and Hamer,  
 Siler, George Associates.