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# HARD CHOICES

## A Report on the Increasing Gap Between America's Infrastructure Needs and Our Ability To Pay for Them

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Appendix 8. MAINE

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## A CASE STUDY

PREPARED FOR THE USE OF THE

SUBCOMMITTEE ON ECONOMIC GOALS AND INTERGOVERNMENTAL POLICY

OF THE

JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

FEBRUARY 25, 1984

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## Preface

Infrastructure problems are widespread. They do not respect regional or state boundaries. To secure a better data base concerning national and state infrastructure conditions and to develop threshold estimates of national and state infrastructure conditions, the Joint Economic Committee of the Congress requested that the University of Colorado's Graduate School of Public Affairs direct a twenty-three state infrastructure study. Simultaneously, the JEC appointed a National Infrastructure Advisory Committee to monitor study progress, review study findings and help develop policy recommendations to the Congress.

In almost all cases, the studies were prepared by principal analysts from a university or college within the state, following a design developed by the University of Colorado. Close collaboration was required and was received from the Governor's staff and relevant state agencies.

Because of fiscal constraints each participating university or college agreed to forego normal overhead and each researcher agreed to contribute considerable time to the analysis. Both are to be commended for their commitment to a unique and important national effort for the Congress of the United States.

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# MAINE'S INFRASTRUCTURE NEEDS, 1982-2000

## A Case Study

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## SUMMARY

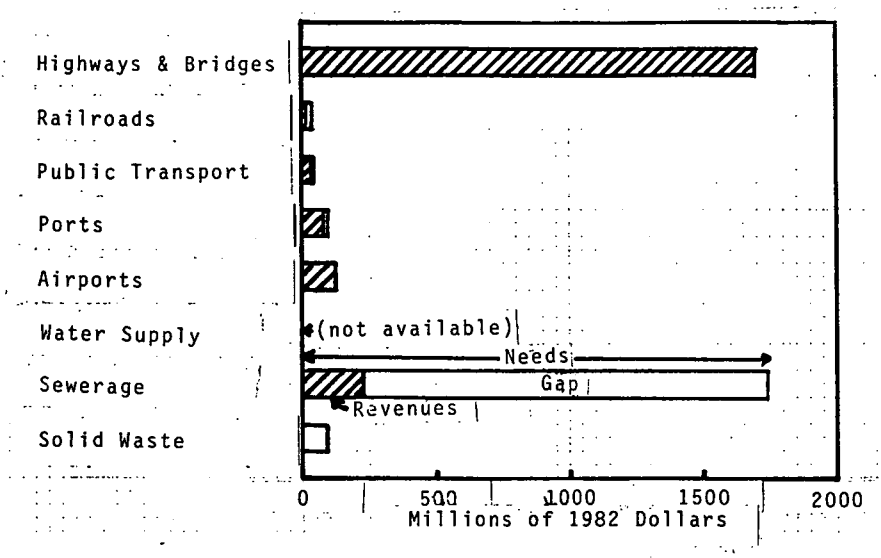
Infrastructure is a term now commonly used to describe the basic public works or structures needed to support all economic, governmental, and recreational activities. The growing deterioration of many of the country's highways, bridges, sewers, water supply and other public facilities has led to rising advocacy of remedial measures. This report shows an initial attempt to measure Maine's infrastructure needs, as a part of a nationwide effort coordinated by the University of Colorado at Denver. The general conclusion is that there will be a severe revenue gap in respect to needed sewerage facilities and some other state and local needs.

Costs Will Rise

Needs identified by relevant State and federal agencies for all types of infrastructure will rise (in constant dollars) from a total of $229 million during 1982-83 to $1,428 million between 1984 and 1989, and then jump to $2,182 million during the 1990-2000 decade. Total identified infrastructure capital needs for the entire period 1982-2000 therefore equal the impressive total of $3.8 billion. In addition, operation, maintenance, and administration of these facilities will cost more than the capital outlays. If construction is delayed, costs will rise because of accelerating prices.

Although objective standards have been employed to determine needs for highways, bridges, airports, and sewers, needs for public transportation, ports, water, and solid waste have been based on ad hoc studies. In any case, legislative bodies must weigh needs for infrastructure against needs for other facilities and services.

MAINE'S INFRASTRUCTURE NEEDS AND REVENUES
1982-2000



At present, there is an inadequate basis on which legislative bodies can make these decisions. Although no projections have been made by state agencies for annual operation and maintenance of infrastructure facilities, this report includes rough estimates for highways and bridges, public transportation, and sewers, based on past ratios.

Revenues Will be Insufficient

Tenuous projections of revenues available to finance the identified capital needs of $3.8 billion during the period of 1982 - 2000 indicate that federal funds will total about $1.2 billion (in 1982 dollars) and state and local revenues approximately $1.0 billion. There will therefore be a substantial revenue gap of $1.6 billion. Most of this gap is caused by the extensive sewerage projects recommended by the U.S. Environmental Protection Agency for which no funding has been programmed.

Although the State has recently raised the tax on gasoline, user charges for other modes of transportation, water, sewer, and sanitation may also be increased. A bond issue of $24,600,000 for highways was passed earlier this year, and another bond issue of $18.4 million for additional infrastructure projects will be on the ballot in November. "Privatization" also may be considered for certain facilities, under which private industry may build and finance infrastructure projects at reduced costs to municipalities.

Administrative Changes Are Needed

During this era of federal cutbacks and tax revolts, it is imperative that state and local governments improve their capital budgeting mechanisms in order to meet needs for maintaining and improving essential infrastructure facilities. The first step should be the establishment of a

reasonably uniform system of accounts, so that all revenues and expenditures by federal, state, and local governments for infrastructure in Maine could be tracked adequately. Then all unidentified infrastructure capital and maintenance needs should be determined, if only by rough methods. A long-range, comprehensive capital planning structure should next be instituted by the State, in collaboration with federal and local governments. This is an essential mechanism to assist the State Legislature and municipal governments in assigning priorities and making hard financial choices. Most states now have such systems already in place. Various ways of establishing a capital planning and budgeting function by the State of Maine are now being explored by a Cabinet Committee on Capital Planning. Because needs indicators are often based on arbitrary rules-of-thumb or subjective factors, there is need for a clear cabinet-level policy decision mechanism.

Outlays Fell in Recent Years

Maine's capital outlays by state and local governments for highways, other transportation , water supply, sewerage and sanitation averaged over $100 million per year (in 1977 dollars) between 1960 and 1973. Spending dipped to $85 million in 1974 and 1975, peaked in 1977 (largely because of a big federal infusion of funds for sewage treatment plants), and then dropped drastically to a new low of only $70 million in 1981. Per capita outlays for infrastructure, as well as outlays measured as a share of gross state product, followed a similar pattern and are now at new lows.

During the 1977-1981 period, capital outlays for infrastructure averaged $143 million in current dollars per year, while operation and maintenance of those facilities averaged an additional $158 million. Identifiable revenues

for infrastructure averaged $290 million per year, of which 31% came from federal sources. Outstanding long-term debt, mostly for the types of infrastructure investigated in this report, plus education, rose from $936 million in 1977 to $1,402 million in 1981. This debt was issued by the State, municipalities, and special districts. There is no readily available source to determine annual debt service payments on the different types of infrastructure for both state and local governments.

Transportation Outlays Must Rise

Based on nationally-accepted standards, the Department of Transportation estimates that 63% of the miles of highway evaluated throughout the state need improvements costing about $428 million in 1982 dollars. In addition, part of the state's 4,079 bridges need reconstruction or rehabilitation costing $170 million. Rough estimates of additional needs for highways and bridges from 1990 to 2000 total almost $1 billion.

Highway program revenues during the years 1977-1981 came 24% from the federal government, 51% from the State Highway Fund, 8% from Turnpike tolls, and 17% from local excise taxes. The Department believes that the recently enacted 5¢ increase in the gasoline tax, plus increased user charges, will finance the proposed improvements during the 1984-85 biennium. Although no revenue projections have been made by the Department for succeeding years, we estimate that federal funds for highway purposes will total $892 million in 1982 dollars during the entire period 1982 - 2000, and that state and local governments will provide $810 million -- sufficient to meet total estimated capital needs of $1.7 billion.

Railroads were provided with modest public funds for rehabilitation of lightly used lines, plus grade crossing improvements. Although no assessment of needs beyond 1985 has been made, it is estimated that the need for further rehabilitation will total $35 million in 1982 dollars for the period 1982 - 2000, and that revenues will equal $22 million. There will then be an estimated revenue gap of $13 million for the period.

Most of the funds utilized for public transportation are used to help urban and regional bus systems. Identified capital needs for 1984 and 1985 include buses, a ferry on Penobscot Bay, and a Casco Bay ferry terminal. Although no survey of needs beyond 1985 has been made, it is estimated that capital needs for the period 1982 -2000 will total about $40 million in 1982 dollars, of which $35 million will be covered by prospective revenues. There will therefore be a revenue gap of $5 million for the entire period.

State and Federal governments also are financing various port developments, including fish piers, a shipbuilding facility, and cargo piers now under construction, planning, or those which have been proposed. It is estimated that the identified capital needs of $96 million in 1982 dollars will be covered by revenues of $85 million, leaving a gap of $11 million for the period 1982 - 2000.

Estimated needs for airports total about $125 million in 1982 dollars for the period 1982 - 2000. It is believed that outlays of this magnitude can be covered by foreseeable revenues.

The Department of Transportation has made the most thorough assessment of needs of any of the state agencies responsible for programs discussed in this report.

Water Supply Needs Have Not Been Evaluated

Only 61% of Maine's housing units and a fraction of our industries are served by water utilities, 75% of which are publicly-owned and 25% private. These utilities spent $197 million during the years 1977 to 1981, of which $112 million represented capital improvements. Both the State and federal governments have contributed little to water supply improvements. Although potential shortages of water in Southern Maine and elsewhere have been identified, no cost estimates have been made for needed improvements. No estimates have been made of needed maintenance and rehabilitation of water works, or of revenues to finance improvement.

Waste Treatment Needs Have Been Partially Explored

The State Department of Environmental Protection has estimated priority needs for sewerage of $102 million in 1982 dollars for the years 1983-87, and additional needs of $119 million by the end of the Century. Furthermore, the U. S. Environmental Protection Agency has indicated additional needs totalling $1.5 billion by the end of the century, primarily for segregating sanitary and storm sewers, constructing more treatment facilities and collectors, and rehabilitating existing sewers. Although it is estimated that the needs of $221 million identified by the State could be financed by prospective state and federal revenues, the additional needs recognized by the EPA cannot be funded under existing programs, and thus constitute a revenue gap of $1.5 billion.

Although the State has identified needs for municipal solid waste facilities for the next five years ranging from $32 million in 1982 dollars (if regional landfills alone are built) to $96 million (if 11 regional energy recovery facilities are constructed), no State or federal funding has been proposed. Therefore the entire $96 million represents a revenue gap.

## FOREWORD

"Infrastructure" is a relatively new term now commonly employed to describe the basic public (and sometimes private) structures needed to support all economic, governmental, and recreational activities. These "public works" generally include all transportation facilities and public utilities, and sometimes schools, hospitals, prisons, recreational facilities, and other public buildings.

In recent years, there have been a number of publications citing the growing deterioration of America's infrastructure. For example, America in Ruins and Rebuilding America, both published by the Council of State Planning Agencies, and special articles in Business Week (October 26, 1981), Newsweek (August 2, 1982), and the Conservation Foundation Letter (October 1981) have pointed out the serious deficiencies in the nation's highways, bridges, subways, sewers, and water supply facilities, among others. A study by the Urban Institute estimated that maintenance investment alone in these neglected facilities will require over $660 billion during the next fifteen years. A recent report by the Congressional Budget Office estimates that annual capital outlays by all levels of government would have to increase from $36 billion to roughly $53 billion between 1983 and 1990 to remedy current problems in the infrastructure (1).

For this reason, the University of Colorado at Denver, with the support of the Joint Economic Committee of the U. S. Congress, several states, foundations, and corporations, is coordinating a series of case studies of the infrastructure needs during this century of a number of diverse states, including Maine. This study focuses only on facilities needed for

transportation (highways and bridges, railroads, mass transit, ports, and airports), water (supply and storage, treatment and distribution), and waste treatment (sewage, solid waste, and hazardous waste). Excluded are structures related to electric and telephone utilities, education, hospitals, prisons, parks and recreation, and other public buildings.

In this report, past expenditures and revenues related to Maine's infrastructure (narrowly defined), needs for new construction proposed by appropriate agencies, and revenue projections are analyzed from published and unpublished data and interviews. The shortness of time for composing this report precludes the collecting of any more original information.

Although various state agencies have been relied on extensively as data sources for past expenditures and revenues, in some instances conflicting figures have been published by certain state and federal agencies. These variances may have been due in part to different definitions of capital outlays or fiscal years, figures on authorizations rather than disbursements, or the exclusion of certain functions or levels of government. These differences could be resolved only be means of a detailed audit, which is beyond the scope of this report. In lieu of an audit, we have generally utilized data of the U.S Bureau of the Census in instances where there were significant differences among sources.

Projections of capital outlays for each function have been made by appropriate agencies. However, when they have been incomplete, we have estimated the missing data, generally be extrapolation of earlier figures. Because projections of revenues usually have not been made for each function by appropriate agencies, we have projected them on a per-capita or other basis.

This project is part of the State Planning Office's effort to formulate a new capital budgeting program and public facilities fund for the State of Maine.

## I. INTRODUCTION

### 1. Geography, Demography, and Economy

Maine is not a "typical" northeastern state. It is largely wooded (90%), rural (52.5%, according to the current U. S. Census definition), sparsely settled (only 36 persons per square mile in 1980), and poor (83.2% of U. S. per capita income in 1982). These figures are in marked contrast to those of the heavily urbanized states of southern New England and Middle Atlantic.

Since the Civil War, Maine has experienced a relatively slow growth in population. Decennial increases between 1870 and 1970 averaged less than 6%, and fell to a recent low of only 2.5% between 1960 to 1970. However, during the most recent decade, the state's population jumped a remarkable 13.2%, due in large part to an influx of persons leaving crowded, northeastern urban areas in search of a more agreeable life style. (2) The most recent projection indicates that Maine's population will rise to 1,229,000 persons by 1990 and to 1,308,000 by the end of the century. (See Table 1.)

Table 1
RECENT PROJECTIONS OF MAINE'S POPULATION
(Thousands of Persons)

| Source | 1980 | 1990 | 2000 |
|---|---|---|---|
| Maine State Planning Office (3) | 1,125 | 1,216-1,266 | na |
| National Planning Association (4) | 1,125 | 1,198 | na |
| U. S. Department of Commerce (5) | 1,125 | 1,208 | 1,317 |
| U. S. Bureau of the Census (6) | 1,125 | 1,229 | 1,308 |

na - not available

The U. S. Department of Commerce also has projected Maine's total personal income in millions of 1972 dollars: $3,357 in 1969, $4,589 in 1978, $7,260 in 1990, and $9,914 in 2000. (5)



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Maine's economy is characterized by a relatively high dependence on natural resources, including forests (yielding lumber, paper, and furniture), agriculture (potatoes, eggs, dairy products), fisheries (finfish and shellfish), mining (sand, gravel, limestone), water, and scenery (for tourism). Although the manufacture of textiles has diminished, shoes have reached stability and there have been recent increases in apparel, metal products, electronics, and shipbuilding. Services, particularly finance, insurance, and professional, have grown rapidly within the last decade. Recent projections of employment by sector to 1990 are shown in Table 2.

Table 2
EMPLOYMENT IN MAINE, 1970-1990
(Thousands of Persons)

| Sector | 1970 | 1980 | 1990 | 2000 |
|---|---|---|---|---|
| Total: | 425 | 513 | 570-600 | na |
| Natural resource | 69 | 72 | 70- 73 | na |
| Construction | 20 | 21 | 21- 23 | na |
| Clothing | 40 | 34 | 36- 38 | na |
| Metals & electronics | 17 | 27 | 34- 38 | na |
| Other manufacturing | 7 | 9 | 10- 10 | na |
| Government | 84 | 97 | 96-100 | na |
| Trade & services | 157 | 213 | 251-267 | na |
| Nonfarm & nonfish proprietors | 32 | 41 | 52-52 | na |

na - not available
Source: (3) op. cit.

2. Existing Infrastructure

Maine's infrastructure facilities also are not typical of the northeastern states. Maine has an extensive highway network needed to serve scattered population and industrial centers. Passengers rely more heavily on automobiles because of the absence of rail service and the limited

availability of interstate and urban bus systems. There are only a few air carrier airports. A high percentage of freight moves by water (mainly incoming petroleum) and truck, while railroads carry mainly lumber and paper products.

Although 61% of all housing units in the state are served by public water systems, only 50% are connected to public sewers. The state as a whole has an ample water supply, but parts of southern Maine may have shortages in the future. Although open dumps are gradually being supplanted by sanitary landfills, there are few municipal waste recycling facilities and only one waste incinerator which provides steam for commercial use. According to a recent survey of 292 rural municipalities, 176 indicated problems with solid waste disposal, 109 had difficulties with sewage treatment and disposal, and 31 were concerned about pollution of ground or surface water supplies. (7)

Capital outlays by state and local governments in Maine for infrastructure (as defined in this report) rose from a total of only $45.1 million in current dollars during 1960 to a peak of $164.6 million in 1977, after which they slid to $106.1 million in 1981. (8) (See Appendix Table 1.) However, after these outlays have been adjusted for price rises by using appropriate construction price indexes, it appears that the drop in constant dollars since 1977 has been even greater (57.5%, as shown in Figure 1). Analysis of several components of capital outlays reveals that highways rose gradually (in constant dollars) from 1960 to 1972 and then fell 61% by 1981; outlays for sewerage surged in 1977 and then dropped 80% by 1981; and

outlays for water supply had a much lower peak in 1978, after which they fell 66%. Outlays for other utilities and transit remained at a relatively low level throughout the 21-year period, except for a brief rise in 1978. (See Figure 2 and Appendix Table 2.)

Per capita capital outlays for all types of infrastructure in Maine fell from $127 (in 1977 dollars) in 1960 to $100 in 1970, then rose to $152 in 1977 and sank to only $62 in 1981. Capital outlays for highways, by far the largest component of infrastructure (except in 1977), slid gradually from $102 per capita in 1965 to $40 in 1981. Per capita outlays for sewerage remained relatively steady throughout the entire period, except for a tremendous jump in 1977 and a rapid fall afterward. Per capita outlays for water supply have gradually declined, with the exception of a bulge between 1977 and 1980. (See Table 3 and Figure 3.)

Capital outlays for infrastructure as a share of gross state product fell steadily from about 2% in 1960 to 1% in 1981, except for a jump to 2.4% in 1977. Trends for highways, sewerage, and water supply outlays as shares of gross state product generally are similar to the per capita trends described above. (See Table 3 and Figure 4.)

Figure 1
TOTAL CAPITAL OUTLAYS BY STATE AND LOCAL GOVERNMENTS
FOR INFRASTRUCTURE IN MAINE

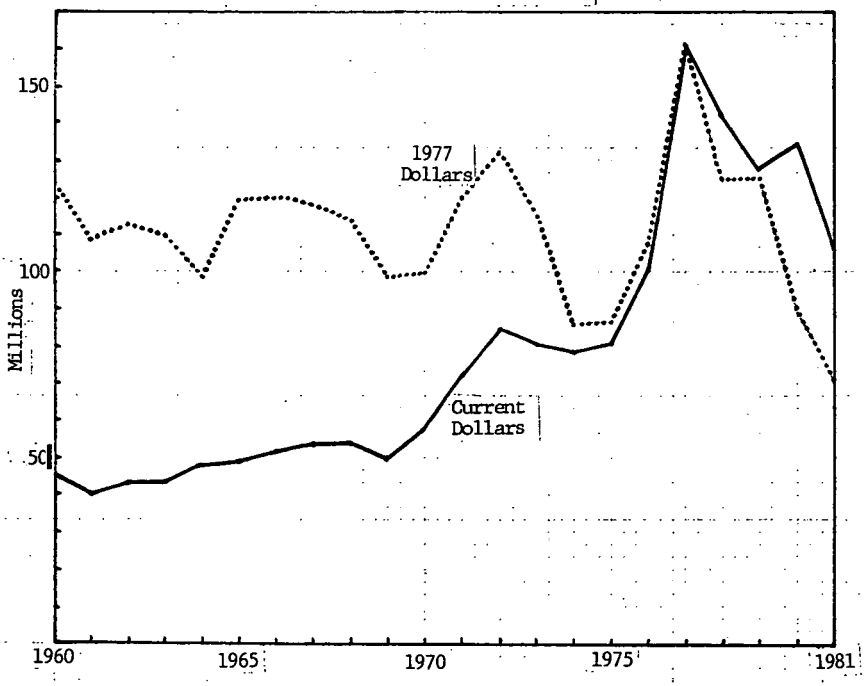

Figure 2

SELECTED CAPITAL OUTLAYS BY STATE & LOCAL GOVERNMENTS IN MAINE

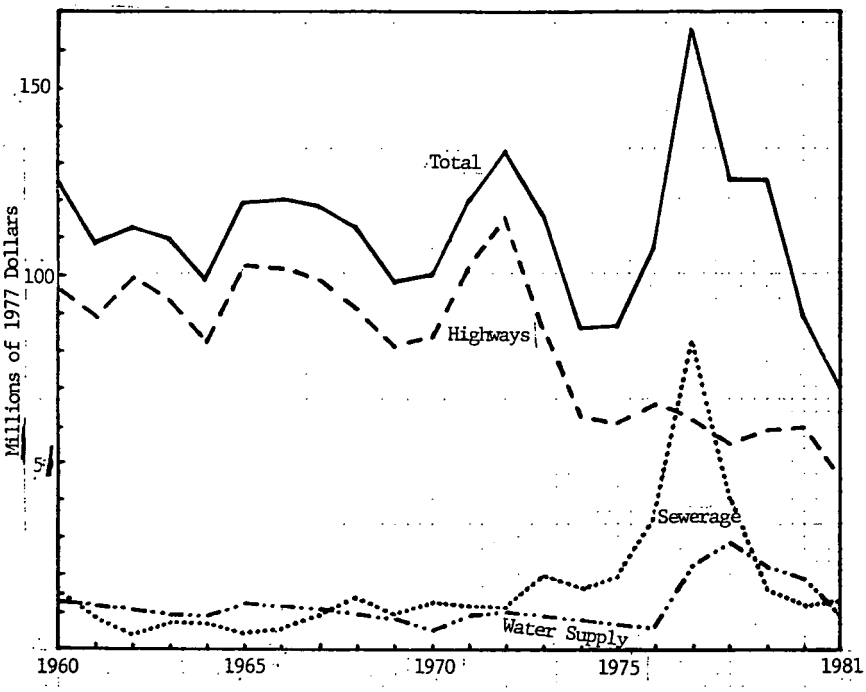

Figure 3

PER CAPITA OUTLAYS FOR INFRASTRUCTURE IN MAINE

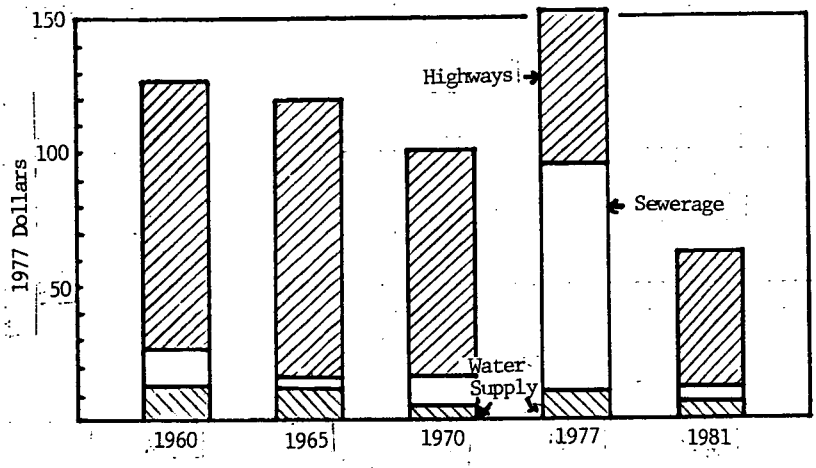


Figure 4

INFRASTRUCTURE OUTLAYS AS SHARE OF GROSS STATE PRODUCT IN MAINE

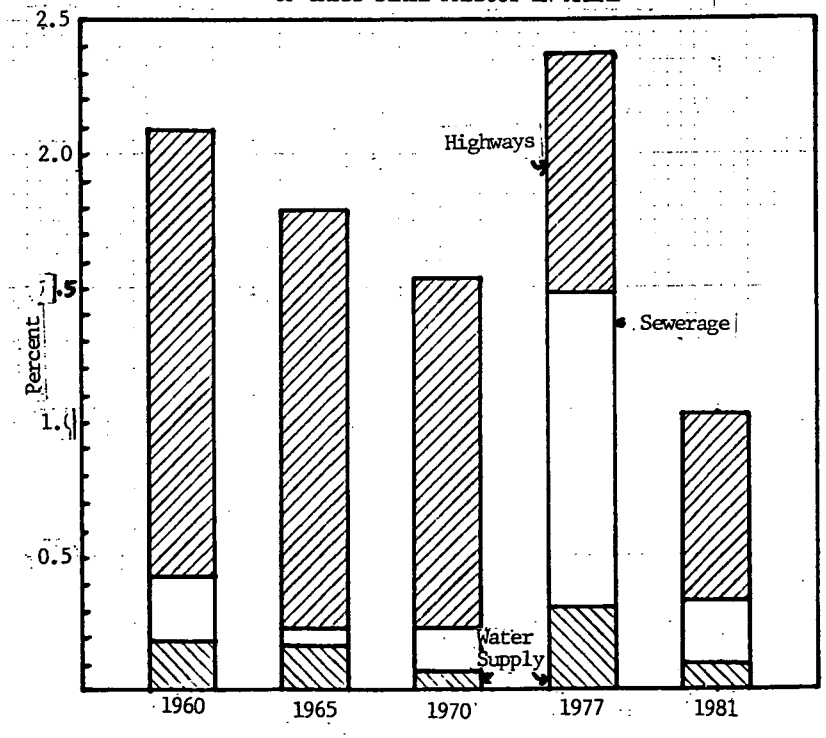

Table 3
SELECTED CAPITAL OUTLAYS BY STATE AND LOCAL GOVERNMENTS IN MAINE
Per Capita and Share of Gross State Product

| Function | 1960 | 1965 | 1970 | 1977 | 1981 |
|---|---|---|---|---|---|
| | (1977 Dollars Per Capita) | | | | |
| Total: | 127 | 119 | 100 | 152 | 62 |
| Highways | 99 | 102 | 83 | 56 | 40 |
| Sewerage | 14 | 4 | 12 | 75 | 15 |
| Water Supply | 13 | 12 | 5 | 20 | 7 |
| | (% of Gross State Product) | | | | |
| Total: | 2.09 | 1.80 | 1.53 | 2.38 | 1.04 |
| Highways | 1.65 | 1.56 | 1.30 | 0.88 | 0.69 |
| Sewerage | 0.24 | 0.06 | 0.16 | 1.18 | 0.23 |
| Water Supply | 0.18 | 0.17 | 0.07 | 0.32 | 0.10 |

Sources: Capital outlays - (8) op. cit.; population - U. S. Bureau of the Census; gross state product - Federal Reserve Bank of Boston

More detailed data for the years 1977-1981 are shown in Table 4 for the types of infrastructure considered in this report. They indicate that total expenditures by state and local governments for these functions in Maine have remained close to $300 million per year (in current dollars) since 1977. By far the largest are those for highways (averaging 61% of the total), sewerage (16%), and water supply (13%), with the remaining 10% distributed mainly among transit, other sanitation, and airports. About 42% of all infrastructure expenditures were made by the State and 58% by local government. Expenditures for infrastructure represent about 17% of the total for all governmental functions.

Capital outlays for these functions, on the other hand, have gone steadily downward in current dollars from $164.6 million in 1977 to $106.1 million in 1981. The largest average shares of reported capital outlay are devoted to highways (55%), sewerage (27%), and water supply (17%). 47% of

these outlays were by the State and 53% by local governments. During the same period, expenditures for the operation, maintenance, administration, and interest on the debt related to these facilities rose steadily in current dollars from $125.3 million in 1977 to $206.7 million in 1981. These expenditures are now double those for capital outlays.

Table 4
EXPENDITURES FOR INFRASTRUCTURE BY STATE AND LOCAL GOVERNMENTS IN MAINE, 1977 to 1981
(Millions of Current Dollars)

| Function | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| Total Expenditures: | 289.9 | 294.1 | 297.4 | 316.7 | 312.8 | 1510.9 |
| Highways | 158.8 | 169.2 | 194.7 | 211.0 | 193.2 | 926.9 |
| Airports | na | 5.0 | 9.5 | 10.0 | 18.0 | 42.5 |
| Water transport | na | 1.6 | 1.3 | 2.8 | 1.5 | 7.2 |
| Transit/other util. | 2.0 | 13.7 | 8.6 | 0.7 | 12.1 | 46.1 |
| Sewerage | 88.5 | 54.6 | 32.6 | 30.5 | 40.6 | 246.8 |
| Other sanitation | 4.7 | 9.1 | 8.2 | 9.0 | 13.6 | 44.6 |
| Water supply | 35.9 | 40.9 | 42.5 | 43.7 | 33.8 | 196.8 |
| Capital Outlay: | 164.6 | 141.7 | 127.1 | 134.0 | 106.1 | 673.5 |
| Highways | 60.9 | 64.4 | 81.3 | 94.3 | 70.6 | 371.5 |
| Airports | na | na | na | na | na | na |
| Water transport | na | na | na | na | na | na |
| Transit/other util. | 0.2 | 2.9 | 0.4 | 0.6 | 1.3 | 5.4 |
| Sewerage | 81.4 | 44.3 | 19.6 | 15.4 | 23.7 | 184.4 |
| Other sanitation | na | na | na | na | na | na |
| Water Supply | 22.1 | 30.1 | 25.8 | 23.7 | 10.5 | 112.2 |
| Other Expenditures:* | 125.3 | 152.4 | 170.3 | 182.7 | 206.7 | 837.4 |

na - not available; * operation, maintenance, administration, interest on debt

Source: (8) op. cit.

Total State and local revenues allocated to infrastructure in Maine more than doubled (up 121% in current dollars) between 1977 and 1981, as shown in Table 5. Almost half (48%) of the total spent in the latter year for

infrastructure came from the federal government, one-third (34%) from the State, and only 17% from local governments. (These revenues are considerably overstated because of the unavoidable inclusion of various non-infrastructure functions under "federal to state and local governments," "state to local governments," and current charges." A closer approximation of revenues for infrastructure, computed from a variety of sources shown throughout the text, is $1,439.4 million for the 5-year period or $290 million per year, of which 31% came from federal sources.) Because of Maine's relatively low tax base, the possibility of substantial cutbacks in future revenues from the federal government would have a profoundly negative effect on meeting Maine's infrastructure needs.

Maine's total revenues allocated to infrastructure rose from 5.2% of the state's total personal income in 1978 to 6.0% in 1980 and then slid to 4.3% in 1981. At the same time, revenues for infrastructure which were collected by state and municipal governments fell from 2.7% of total personal income in 1978 to 2.2% in 1981.

Table 5
REVENUES FOR INFRASTRUCTURE FROM STATE AND LOCAL GOVERNMENTS IN MAINE, 1977 to 1981
(Millions of Current Dollars)

| Source | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| Total Revenues: | 188.9 | 368.7 | 394.3 | 413.4 | 416.6 | 1781.9 |
| Federal to state & local govt's* | na | 178.0 | 199.0 | 201.7 | 201.8 | 780.5 |
| State to local govt's* | na | 48.7 | 42.0 | 41.3 | 38.3 | 170.3 |
| Tax on motor fuels | na | 56.4 | 57.3 | 51.7 | 49.2 | 214.6 |
| Motor vehicle licenses | na | 22.7 | 22.4 | 34.1 | 32.1 | 111.3 |
| Current charges | na | 49.8 | 52.1 | 60.1 | 67.4 | 229.4 |
| Utilities - water | 13.0 | 13.1 | 21.5 | 24.5 | 27.8 | 99.9 |

e - estimated; na - not available; * other than education, public welfare, and general revenue sharing

Source: (8) op. cit.

Maine's outstanding long-term debt (mostly for infrastructure, including schools and hospitals, as well as the transportation, water, and sewer facilities analyzed in this report) rose 50% in current dollars or from $936.4 million in 1977 to $1402.4 million in 1981. About 59% of the current indebtedness was incurred by the State and 41% by municipalities. Annual payments for interest on the general debt (mostly schools, highways, and sewers) and utility debt (water supply and transit) jumped 52%, or from $47.3 million in 1977 to $71.9 million in 1981. Over half (56%) of the latter amount was paid by the State and 44% by local governments. (8)

## II. TRANSPORTATION

### 1. Introduction

One of the most significant areas of shared responsibility between state and local government is transportation. Bridges, highways, air, public transportation and railroads are highly capital intensive, requiring careful planning and long-term maintenance if a quality system is to be achieved.

Passenger transportation in Maine is carried on primarily by automobiles. Of the 455,375 persons employed within the state in 1980, 84% utilized cars, trucks, or vans on their journeys to work (59% drove alone and 25% carpooled), while only 1.5% used public transportation (buses and ferries), 9.4% walked, 1.9% employed other means, and 3.2% worked at home. (10) Intercity transportation also is predominantly by automobile, with the addition of several bus lines, air carriers, and passenger-ferry boats. There is no rail passenger service remaining in the state.

Intercity cargo in Maine in 1977 was hauled primarily by regulated motor carriers (66% of all outbound traffic by weight and 57% of all inbound shipments), railroads (21% of all outbound and 11% of all inbound movements), private trucks (12% of all outbound and 11% of the inbound shipments) and water carriers (20%, of all inbound shipments plus practically all petroleum receipts). (11)

### 2. Highways and Bridges

Maine's highway mileage in 1981 totalled 21,921, of which 19,699 miles were classed as "rural" and 2,203 miles as "municipal." (12) This state's total mileage is 0.56% of that for the nation as a whole, although our share

of the country's total population is somewhat less - 0.49%. Maine's greater proportion of highways is, of course, a reflection of this state's low population density. Detailed mileages are shown in Table 6.

Table 6
MAINE'S HIGHWAY SYSTEM, 1981
(Miles)

| | |
|---|---|
| Federal Aid System: | 5,707 |
| Primary, incl. interstate | 2,314 |
| Urban | 652 |
| Secondary | 2,741 |
| State Aid System | 4,571 |
| Maine Turnpike | 105 |
| Town Ways | 12,941 |

Source: (12) op. cit.

Estimated vehicle-miles on all rural, urban, and municipal highways in the state fell from 7,792 million in 1977 to 7,458 million in 1981.

The responsibility for maintaining and improving highways rests with either the state or local government depending on the highway classification as determined by the Commissioner of Transportation in accordance with state law. Effective July 1, 1982, these responsibilities are as follows:

State highways include an integrated system of the more heavily traveled routes providing a connected system of main highways. The planning, design, construction, operation and maintenance of the state highway system is the entire responsibility of the State, except in certain designated urban areas. There the State may construct with its own funds, or in cooperation with the cities and towns, but the maintenance is entirely the responsibility of the respective towns, with certain exceptions, such as controlled access highways.

State-aid highways are those that provide a collector function feeding traffic to the state highways but which are not included in the system of state highways. The State now has the same responsibility for these as they do for state highways, except local governments are responsible for snow and ice control on the entire state-aid system. Prior to July 1, 1982, the state and local governments were jointly responsible for construction of both rural and urban portions of the state aid system. The State was responsible for the summer maintenance of the improved sections of the state aid system in rural areas, and local governments were responsible for maintenance of unimproved sections and for snow and ice control on the entire state aid system.

Town ways primarily serve local traffic and make up all of the remaining public roads and streets, with the exception of a few miles of respective towns, or counties in unorganized areas. The State does, however, provide a block grant based on a needs formula to communities for their use in meeting their road responsibilities.

There are approximately 4,200 bridges in the State of Maine. Of these, approximately 2,800 are the responsibility of the State, 1,000 the responsibility of local government, and the remaining 400 are primarily the responsibility of the Maine Turnpike Authority or Maine railroads.

The emphasis on highway programs today both at the state and local level is shifting from construction of new and expanded facilities to the maintenance and rehabilitation of existing facilities.

Funding continues to be the major problem in the highway program, both at the state and local level. As a result of legislation passed in 1981, the State is currently involved in a cost allocation study which is designed to assess the relative use made of the highway system by various classes of vehicles and to compare that with their relative contribution to the highway fund. The findings and recommendations of this study are to be presented to the Legislature in January 1983. (9)

a. Past expenditures - Data in Table 7 indicate that capital outlays for highways and bridges in Maine now constitute only 36.5% of all expenditures for those facilities, the remaining 63.5% being utilized for operation, maintenance, and administration. (Interest on highway debt is not included here.) Also, expenditures in current dollars for the latter functions rose considerably faster (25%) from 1977 to 1981 than did capital outlays (16%). This may be an indication of rapidly rising efforts to maintain deteriorating highways and bridges.

The data also reveal that direct total expenditures for highways by the State (from federal and state sources) have remained about twice as high as those by municipalities during the last five years. However, State payments for capital outlay averaged over five times those by local governments, while the latter paid out almost as much as the State for operation, maintenance, and administration.

It is significant that total expenditures for highways by state and local governments in Maine amounted to 2.16% of the state's total personal income in 1981. This figure was considerably higher than the national average of 1.60% that year, due to the greater degree of population dispersion in Maine.

Table 7
DIRECT EXPENDITURES FOR HIGHWAYS BY STATE AND LOCAL GOVERNMENTS IN MAINE, 1977 to 1981
(Millions of Current Dollars)

| Item | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| Total Expenditures: | 158.8 | 169.2 | 194.7 | 211.0 | 193.2 | 926.9 |
| State government | 107.3 | 108.4 | 128.7 | 146.5 | 126.6 | 617.5 |
| Local governments | 51.5 | 60.8 | 66.0 | 64.6 | 66.6 | 309.4 |
| Capital Outlay: | 60.9 | 64.4 | 81.3 | 94.3 | 70.6 | 371.5 |
| State government | 51.9 | 51.6 | 69.0 | 83.9 | 59.5 | 315.9 |
| Local governments | 9.0 | 12.8 | 12.3 | 10.4 | 11.1 | 55.6 |
| Other Expenditures*: | 97.9 | 104.8 | 113.4 | 116.7 | 122.6 | 555.4 |
| State government | 55.4 | 56.8 | 59.7 | 62.6 | 67.1 | 301.6 |
| Local governments | 42.5 | 48.0 | 53.7 | 54.2 | 55.5 | 253.8 |

*Operation, maintenance, administration (interest on debt not included)
Source (8) op. cit.

b. Investment needs - The Maine Department of Transportation has just completed a highly detailed analysis of the state's highway and bridge needs. (14) Of the 8,688 miles of highway evaluated in this study, it was found that pavement on 27% was rated very good (smooth and free of cracks), 10% good (with some rutting and fine cracks), 20% fair-good and 23% fair (extensive rutting, load cracking and patching), 15% poor-fair and 4% poor (need heavy resurfacing), and 2% very poor (need major reconstruction). If these highways were not resurfaced or rehabilitated in any way within two years, their condition would deteriorate so that 52% would then be poor or

fair (in contrast to 43% in this condition now, and only 33% if the recommended capital improvement program were carried out.) The budget for 1984-1985 will treat 2,032 miles or 37% of the 5,430 miles of highway in need of attention at a cost of $151.3 million, plus $23.2 in town block grants. The remaining 3,398 miles would be treated within the next two bienniums at an additional cost of about $253 million. (See Table 7.) In addition, a new "haul roads" program has been conceived to restore a number of highways being pounded to pieces by heavily-loaded logging trucks. No cost estimates have been prepared for this program yet.

The Department also has evaluated the present condition of the state's bridges. Of the 4,079 bridges analyzed, 8% have sufficiency ratings of only 0 - 25 (requiring reconstruction), 9% have ratings of 26 - 50 (needing replacement), 34% have ratings of 51 - 80 (needing rehabilitation), and 49% have ratings of 81 - 100 (good). Under a comprehensive formula included in the National Bridge Inspection standards, structural adequacy and safety accounts for 55% of the rating, serviceability and functional obsolescence for 30%, and essentiality for public use 15%. The Department has proposed a $141.5 million program to bring the worst structures up to a sufficiency level of at least 50, of which $51.8 million would be spent during the next biennium. (See Table 8). $9.4 million has been proposed for wearing surface rehabilitation for bridges with sufficency ratings over 51 during the next biennium and $18.8 million for the two succeeding bienniums, so that these above-average structures do not deteriorate further.

The estimates of needs for both highway and bridge rehabilitation for the period 1990-2000 which are shown in Table 7 were derived by extrapolating annual averages for 1984-89 (based on the DOT needs studies).

Table 8
ESTIMATED CAPITAL NEEDS FOR HIGHWAYS AND BRIDGES
MAINE DEPARTMENT OF TRANSPORTATION

(Millions of 1982 Dollars)

| Program | 1982-83 | 1984-85 | 1986-89 | 1990-2000 | Total 1990-2000 |
|---|---|---|---|---|---|
| All Programs: | 109.2* | 226.3* | 370.9e | 996e | 1703 |
| Highways: | 94.1* | 174.5* | 253.0e | 713e | 1235 |
| Federal aid interstate | 29.5 | 32.6 | na | na | |
| Federal aid primary | 23.6 | 43.5 | na | na | |
| Federal aid secondary & state aid | 13.4 | 30.6 | na | na | |
| Federal aid urban | 8.1 | 16.7 | na | na | |
| Non-federal aid state highways | na | 23.3 | na | na | |
| Hazard elimination | 1.5 | 2.1 | na | na | |
| Rail/highway crossings | 2.3 | 2.5 | na | na | |
| Others | 4.1 | - | na | na | |
| Town block grants | 11.6 | 23.2 | na | na | |
| Haul roads | - | - | na | na | |
| Bridges: | 15.1 | 51.8 | 117.9 | 283e | 468 |
| On federal aid and state highway system | 9.6 | 31.3 | 50.4 | na | |
| Off federal aid and state highway system** | 5.5 | 11.1 | 48.7 | na | |
| Wearing surface rehabilitation | - | 9.4 | 18.8 | na | |

* - Including town block grants; ** - including town ways
e - estimated by CRAS; na - not available

Source:(14) Maine Department of Transportation, Transportation Improvement Program, 1982-1983, Maine's Highway Needs - 1982 and Maine's Bridge Needs - 1982, February 1983

Based on past ratios of operation, maintenance and administration expenditures that are 1.5 times as large as capital outlays, total expenditures are likely to amount to $273 million in 1982-83, $566 million in 1984-85, $927 million in 1986-89, and $2,490 million in 1990-2000.

c. Revenues - Federal funds are available to states on a matching basis for capital improvements on limited highway systems. These federal funds are available from highway user taxes which contribute to the federal highway trust fund. The primary source of these highway user taxes is the federal

excise tax on gasoline which has been 4¢ per gallon since 1959, and was raised recently to 9¢. There are also other taxes imposed on users of the highway system that contribute to the federal trust fund.

The state highway program is also supported by a dedicated highway fund. Maine's first gas tax of 1¢ per gallon was put into effect in 1923. The gas tax was increased to 3¢ in 1925, 4¢ in 1927, 6¢ in 1947, 7¢ in 1955, 8¢ in 1969, 9¢ in 1971, and 14¢ in 1983. The dedicated highway fund was established in 1931 and a constitutional amendment which prevented diversion of highway funds became effective in 1944. The other major sources of revenue to the highway fund are derived from motor vehicle registrations, driver license fees and other miscellaneous highway user fees.

Funding for those roads and bridges that are the responsibility of local government is generally derived from the property tax. Over the years, limited state funds have been available for specific categorical programs including snow removal reimbursement, town road improvement, and the so-called state-aid program. As a result of the new local road assistance program approved in 1981, these categorical programs are being phased out and will be replaced by the block grant program.

The recent trend towards smaller, more fuel-efficient automobiles has resulted in reduced revenues derived from the motor fuel tax, and has also increased the risk of severe accidents on Maine roads.(9)

Recent trends in revenues available to state and local governments in Maine for highway transportation are shown in Table 9. They reveal that total revenues (in current dollars) earmarked for highway improvements, operation, and maintenance gradually increased since 1977. However, they actually decreased 22% in purchasing power (falling from $244 million in 1977 to $191 million in 1981 when measured in 1982 dollars). Federal revenues, limited to capital outlays, now form about 24% of the total available, while the State Highway Fund supplies around 51%, the Maine Turnpike 8%, and local excise taxes 17%. Over half (53%) of State Highway Fund revenues come from the tax on gasoline, collections of which have been falling since 1979, 32% are derived from motor vehicle fees and drivers' licenses, and the remaining 15% from a variety of sources. Local government auto excise taxes and appropriations from the State, though much smaller, are rising gradually.

In 1983, the Legislature passed a bond issue of $24,600,000 to fund highway and bridge improvements during the current biennium.

Table 9

REVENUES USED FOR HIGHWAY TRANSPORTATION PURPOSES IN MAINE, 1977 TO 1981

(Millions of Current Dollars)

| Source | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| Total: | 164.4 | 173.5 | 178.5 | 183.3 | 178.4 | 878.1 |
| Federal government | 38.2 | 44.5 | 45.5 | 43.3 | 41.0 | 212.4 |
| State Highway Fund | 84.6 | 88.5 | 89.9 | 95.2 | 91.3 | 449.5 |
| Gasoline tax | 49.9 | 50.4 | 50.7 | 45.3 | 42.8 | 239.1 |
| Motor vehicle fees & driver's licenses | 23.0 | 24.9 | 24.8 | 35.8 | 34.2 | 142.7 |
| Use fuel & motor carrier taxes | 4.3 | 4.7 | 5.0 | 5.0 | 5.1 | 24.1 |
| Service charges | 1.3 | 1.8 | 2.2 | 2.8 | 2.7 | 10.8 |
| From local governments | 3.2 | 3.3 | 4.1 | 3.8 | 3.6 | 18.0 |
| All other | 2.9 | 3.4 | 3.1 | 2.5 | 2.9 | 14.8 |
| Turnpike tolls (CY): | 13.5 | 13.8 | 13.2 | 13.4 | 14.0 | 67.9 |
| Local Governments: | (32.3) | (30.6) | (34.3) | (36.3) | (36.5) | (170.0) |
| State Government | (4.2) | (3.9) | (4.4) | (4.9) | (4.4) | (21.8) |
| Local excise taxes | 28.1 | 26.7 | 29.9 | 31.4 | 32.1 | 148.2 |

Sources: (15) Maine Department of Finance and Administration, Financial Reports (annual-State Highway Fund); (16) Community Services Administration, Geographic Distribution of Federal Funds in Maine (annual)

The Department has proposed that part of the described needs for highway and bridge improvements be undertaken during the 1984-85 biennium, when a recently enacted increase of 5¢ in the state gasoline tax plus increased user charges will be able to finance the indicated outlays. The remaining needs would be covered during the two succeeding biennia. Although the Department has made no projections of State Highway Fund or federal highway revenues beyond the 1984-85 biennium, we estimate that federal funding will

supply about half (52%), or $802 million in 1982 dollars, of total revenues utilized for proposed capital outlays to cover assumed needs during the entire 1982 - 2000 period. If state and local revenues for this purpose continue at about $40 per capita per year in 1982 dollars, then they will fill the remaining balance of $810 million. On the basis of these tenuous assumptions, it appears that there will be no revenue gap during the period from 1982 to 2000.

Table 10
NEEDS AND REVENUES FOR HIGHWAY TRANSPORTATION IN MAINE
(Millions of 1982 Dollars)

| | 1982-85 | 1986-89 | 1990-2000 | Total 1982-2000 |
|---|---|---|---|---|
| Total needs | 335 | 371 | 996 | 1,702 |
| Federal funds | 209 | 185 | 498 | 892 |
| State & local funds | 126 | 186 | 498 | 810 |
| Gap | - | - | - | - |

3. Railroads

The railroads in Maine operated 1,731 miles of road in 1975. Of this amount, 44% was owned by the Maine Central, 31% by the Bangor and Aroostook, 14% by the Canadian Pacific, and the remaining 11% by four other carriers. The latter carriers are all private corporations, although one (the Belfast and Moosehead Lake) is controlled by the City of Belfast. Revenue freight carried by the two largest railroads in Maine (Maine Central and Bangor & Aroostook) fell slightly from 11.5 million tons in 1977 to 11.1 million in 1981. The State, through the Department of Transportation, administers the assistance programs of the Federal Railroad Administration. This responsibility includes operating assistance for service on marginal lines and assistance in the rehabilitation of light density lines that might

otherwise be abandoned. The State is also responsible for rail safety. It is expected that the "New Federalism" will phase out the federal rail assistance program.

a. Past Expenditures - Data in Table 11 indicate that expenditures by the state government for railroads in Maine totalled $19.4 million from 1977 through 1981. About 64% of this total was utilized for rehabilitation of light-density lines, with the balance of 36% used for highway crossing improvements. Two-thirds (67%) of the entire program was financed by the federal government and one-third by the State.

Table 11
EXPENDITURES FOR RAILROADS BY FEDERAL AND STATE GOVERNMENTS IN MAINE, 1977-1981
(Millions of Current Dollars)

| Programs and Source | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| All Programs: | 2.7 | 5.7 | 4.3 | 4.3 | 2.4 | 19.4 |
| Federal | 1.8 | 4.0 | 2.6 | 2.6 | 2.0 | 13.0 |
| State | 0.9 | 1.8 | 1.7 | 1.7 | 0.3 | 6.4 |
| Crossing Improvements: | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 7.0 |
| Federal | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 | 6.3 |
| State | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.7 |
| Rehabilitation: | 1.3 | 4.3 | 2.9 | 2.9 | 0.9 | 12.3 |
| Federal | 0.6 | 2.7 | 1.3 | 1.4 | 0.7 | 6.7 |
| State | 0.8 | 1.6 | 1.5 | 1.5 | 0.2 | 5.6 |

Source: (17) Maine Department of Transportation, Rail Transportation & Engineering Division, Proposed Program and Budget, July 1, 1982 - June 30, 1985

b. Investment needs - Estimates of publicly - funded future improvements in Maine's rail network have been outlined in the Proposed Program and Budget of the Rail Transportation and Engineering Division of the Maine Department

of Transportation for the 1984-85 biennium, which is based in part on a Rail Transportation Plan updated in 1977. These figures, summarized in Table 12, indicate that proposed total expenditures by the Division will fall from $2.5 million in 1982 to $1.8 million in 1985. However, rehabilitation outlays for five light-density lines will rise from $699,000 in 1982 to $1,625,000 in 1985. Part of the cost would be assumed by carriers and/or towns, and part by the State. The State expenditures have been justified on the basis that (1) the private carriers who own the lines cannot afford the entire cost, and (2) if these outlays were not made the lines might be abandoned, to the detriment of the economies of the areas served. The Division has not yet identified any additional lines which may need rehabilitation in the future. The Division also has budgeted $100,000 per year for acquision of three rail lines, one of which has already been abandoned and the other two are likely to be. No other branch lines are threatened with abandonment at this time.

Expenditures of $2.5 million for townway crossing and bridge improvements in 1984 and 1985 have been included in the highway budget for those years. This budget would provide four automatic signals, minor improvements at 12 other grade crossings, and one bridge improvement. The Division has not yet identified which of the hundreds of other townway crossings throughout the state may need improvement. The Division's adopted budget also includes modest amounts for planning, safety, inspection, and administration. Although no assessment of future needs has been made beyond 1985, we have projected further expenditures in 1990 and 2000 at about the same level.

Table 12
BUDGET FOR RAIL TRANSPORTATION OF MAINE DEPARTMENT OF TRANSPORTATION
(Thousands of 1982 Dollars)

| Program | 1982 | 1983 | 1984 | 1985 | 1986-89 | 1990-2000 |
|---|---|---|---|---|---|---|
| All Programs: | 2,524 | 565 | 1,800 | 1,825 | 8,000e | 20,000e |
| Planning | - | - | 40 | 40 | na | na |
| Rehabilitation projects | 699 | 565 | 1,600 | 1,625 | na | na |
| Acquisition | - | - | 100 | 100 | na | na |
| Safety | - | - | 18 | 18 | na | na |
| Regulatory | - | - | 10 | 10 | na | na |
| Townway crossings | 1,825 | - | - | - | na | na |
| Administration | - | - | 32 | 32 | na | na |

na - not available; e - estimated by CRAS
Source: (17) op. cit.

c. Revenues - The federal share of the totals expended will drop from 79% in 1982 to zero in 1985, while municipalities will supply $700,000 or 30% in 1984 and $1,125,000 or 48% in 1985, according to the Division's adopted budget. The Division has suggested that the State Rail Program be developed in the future at a figure that approximates the annual amount the carriers pay the State in the form of an excise tax ($1.2 million in 1981), plus a variable match to be paid by the carriers and local communities. On the assumption that the latter proposal is carried out, state revenues will total $19 million in 1982 dollars during the entire 1982-2000 period. Federal revenue will total $3 million, leaving a gap of $13 million to be made up by municipalities, if total assumed capital needs of $35 million are to be met during those years.

4. Public Transportation

Due to the relatively sparse and scattered population of Maine, public transportation is limited to a few intercity bus lines, four urban transit systems, two ferry systems, and thirteen private non-profit bus carriers which were designed primarily to serve the elderly, handicapped, and low-income population.

Public transportation services in Maine traditionally were provided by private sources. Gradually, as large concentrated urban settlements emerged, the need for public transit systems developed. Several communities in Maine operated trolley systems until the advent of the automobile. A few communities operated bus transportation systems, but with the increased cost of gasoline, these systems have been marginal, at best.

State involvement in public transportation is largely a result of federal initiatives in this area. The responsibility of the State has been to assist in the development and maintenance of a permanent and effective public transportation system with particular regard to low income, elderly and the handicapped. The federal government has made funding available to plan, design, and evaluate public transportation projects. Funds are also available for capital and operating assistance for public transportation in rural and urban areas. The "New Federalism", however, proposes to phase out federal assistance for operating subsidies.

The State operates a ferry service in Penobscot Bay. The Maine State Ferry Service started in 1960. It provides daily service to Vinalhaven and North Haven from Rockland, Isleboro from Lincolnville, and Swans and Long Island from Bass Harbor. It also provides monthly service to Matinicus and maintains the Casco Bay Island terminals. Approximately 50% of the cost to operate the service comes from fees and the other 50% is subsidized by the state general fund.

The State, itself, has incurred problems with running a financially solvent operation. A series of rate increases were required during the 1970's to keep up with fuel and labor costs. The State is currently carrying out a cost reduction program to stabilize funding of the service and is working on energy savings measures to help defray expenses. (9)

a. Past expenditures - The figures in Table 13 reveal that the primary expenditures for public transportation in Maine have been for operation of bus service in four urbanized areas (Portland, Lewiston/Auburn, Bangor, and Kittery/Portsmouth) and for the eight systems serving rural and small urban areas. In addition, there was a capital grant of $2.2 million in 1981 for buses needed by five transportation regions. Relatively heavy expenditures for planning in the late 1970s were utilized to follow up a Surface Passenger Transportation Needs Study completed in 1976.

Table 13
EXPENDITURES FOR BUS TRANSPORTATION BY ALL LEVELS OF GOVERNMENT
IN MAINE, 1970 - 1981
(Thousands of Current Dollars)

| Program | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| All Programs: | 368 | 365 | 316 | 3,401 (476) | 6,252 | 11,178 |
| Planning | 139 | 105 | 100 | 38 | 32 | 414 |
| Rural & small urban | - | - | - | 1,143 | 1,781 | 2,924 |
| Urbanized areas | na | na | na | 2,169 | 2,180 | 4,349 |
| Intercity service | - | - | - | 51 | 71 | 122 |
| Elderly & handicapped | 229 | 260 | 216 | ←-----476-----→ | | 1,181 |
| Capital grant | - | - | - | - | 2,188 | 2,188 |

na - not available
Source: (18) Maine Department of Transportation, Bureau of Transportation Services, Public Transportation Division, Proposed Program and Budget, July 1, 1983 - June 30, 1985

Although the level of future federal funding for transit is uncertain, the Department has applied for $715,000 for 1984 and $835,000 for 1985, under provisions of the Surface Transportation Assistance Act of 1982. This is approximately twice the rate of current state funding for these programs. Additional funds are anticipated for acquisition of equipment and other capital items. The new federal law also continues operating assistance at the 1982 level.

The Ports and Marine Transportation Division of the Maine Department of Transportation operates passenger-vehicular ferry service in Penobscot Bay and maintains most of the piers utilized by the Casco Bay passenger-vehicular service. The latter was formerly operated by a private carrier, which was purchased by the Casco Bay Island Transit District in 1982. Deficits absorbed by the State for all ferry service totalled $97,000 in 1981. No capital expenditures were made during the period from 1977 to 1981.

b. Investment needs - Estimated public transportation expenditures for the next biennium are shown in Table 14, along with expenditures for the previous two years. (The Surface Passenger Transportation Needs Study of 1976 has not been updated.) These figures indicate that outlays for the two largest programs--in urbanized areas and in rural and small urban places--will drop substantially. Although federal payments are budgeted at 81% of the total during 1984 and 1985, the announced policy of the federal government to eventually eliminate operating subsidies will have a serious impact on the finances of the State and communities which also support local and some intercity bus service. A State bond issue containing $900,000 for a new ferryboat will be on the ballot this November.

The Ports and Marine Transportation Division also has budgeted $3.2 million for a new ferry to be built during the 1984-85 biennium. In addition, the City of Portland intends to build a new $2.7 million terminal for the Casco Bay ferries, with assistance from the federal Urban Mass Transit Administration.

Table 14
PROPOSED BUDGET FOR PUBLIC TRANSIT OF MAINE DEPARTMENT OF TRANSPORTATION
(Thousands of 1982 Dollars)

| Program | 1982 | 1983 | 1984 | 1985 | 1980-89 | 1990-2000 |
|---|---|---|---|---|---|---|
| All Programs: | 6,271 | 3,436 | 6,950 | 8,156 | 40,000e | 100,000e |
| Planning | 54 | 50e | 133 | 133 | na | na |
| Rural & small urban | 2,101 | 693 | 1,600 | 1,583 | na | na |
| Urbanized areas | 2,241 | 2,357 | 2,890 | 3,479* | 32,000 | 80,000 |
| Elderly & handicapped | - | - | 300 | 293 | na | na |
| Ridesharing & vanpooling | - | 236 | - | - | na | na |
| Other | - | 100e | 27 | 68 | na | na |
| Capital grant | 1,875 | - | 2,000 | 2,600 | 8,000e | 20,000e |

e - estimated by CRAS; * Block Grant; na - not available
Source: (18) op. cit.

c. Revenues - Although no assessment of capital needs beyond 1985 has been made, we have assumed that capital needs will continue at about $2 million per year in 1981 dollars, and that total expenditures (for capital, operations, and maintenance) will average about $10 million per year until 2000. If federal support continues at 80% of total capital needs for bus transit, then it will supply $27 million for this purpose during the 1982 - 2000 period, plus an additional $4 million for a ferry boat and a ferry terminal. The State will furnish about $4 million, leaving a gap of $6 million to be filled by state or local governments, if identified capital needs are to be met during that time span.

5. Ports

Sparked initially by the Committee on Coastal Development and Conservation, the State Department of Transportation, supported by Coastal program and state funds, sponsored a series of reports leading to the commitment of almost $69 million in State, federal, and local funds for the development of port facilities. Seven fish piers totalling $19.3 million are now at some stage of planning or construction. The largest of these facilities is the $16.6 million Portland fish pier, now under construction. Others are located at Stonington, Eastport, Rockland, Kennebunkport, Vinalhaven, and Saco. It is intended that these piers will revitalize the fishing industry and induce much greater fish processing activity on shore.

The Department also has spurred the development of the $46.7 million shipbuilding facility of the Bath Iron Works in Portland. A proposed container cargo pier for Portland was shelved in lieu of the Bath Iron Works project. However, about $18 million has been proposed so far for development of a cargo pier and causeway on Sears Island. Although the

Central Maine Power Company has indefinitely postponed development of a generating facility on the island, the Bangor and Aroostook Railroad is planning an industrial district on the half of the island which they still own. A State bond issue containing $10 million in port facilities for Portland, Searsport, and Eastport will be voted on in November.

Other port developments now in progress include the $3 million rebuilding of the terminal at Bar Harbor by CN Marine for its ferry service to Nova Scotia, a proposed $20 million cargo pier at Eastport, and the privately-financed coal pier of Merrill Industries in Portland. The Department recently completed a study of coal use in Maine, which forecast a jump from 136,000 tons in 1981 to about 3 million tons in 1995, most of which would arrive by water. Growth of this magnitude is likely to be contingent on a substantial rise in the price of fuel oil. It is proposed that a container facility be built in Portland at an estimated cost of $7 million by the end of the present decade.

Capital needs of about $96 million for port facilities have been identified so far. Approximately $14 million of this total will be supplied by the federal government and $71 million by state and local governments, leaving a gap of $11 million to be met presumably by state and local governments.

### 6. Airports

The rising importance of air commerce, and the availability of federal funds for improvements at civil airports prompted state involvement in air transportation in 1939. The state's role was primarily regulatory in nature; the Aeronautics Commission was established to administer laws

relating to aeronautics and to make rules and regulations concerning aeronautical activity in the State. The responsibilities of the Aeronautics Commission were assumed by the Department of Transportation when it was created in 1972.

With the exception of the Augusta State Airport, public airports within the State are owned and/or operated by county and local governments. Local and county governments expend the greater resources to maintain air transportation facilities. However, a large proportion of expenditures for airport development and improvements is federal dollars, over $10 million in 1980. The State matches local dollars on a one-for-one basis for development activities.

Federal Aid for airports became available in 1940 but did not reach significant proportions until the Airport Development Aid Program in 1970. Federal funds are dedicated; state funds were dedicated until the early 1970's. General fund revenues and bond issues have also been used. During the last ten years all state funds have come from the General Fund or bond issues.(9)

Maine now has a total of 178 airports, including 8 air carrier airports, 30 publicly owned commercial airports, 11 privately owned commercial airports, 24 commercial seaplane bases, 93 non-commercial airports, 38 non-commercial seaplane bases, 7 heliports, and 2 military airports. Airline passenger enplanements and deplanements at the 8 air carrier airports rose from 923,000 in 1977 to 1,118,000 in 1979 and then slid to 917,000 in 1981. During the latter year, 53% of the airline passengers were located at Portland, 33% at Bangor, and the remaining 14% were scattered at Presque Isle, Augusta, Waterville, Rockland, Bar Harbor, and Auburn/Lewiston.

a. Past expenditures - According to the data shown in Table 15, total public expenditures for airports in Maine rose from $5.0 million to $18.0 million in 1981. Most of these expenditures were made directly by local governments, although much of the funding came from state and federal governments. No breakdown of capital outlay and operation and maintenance expenses is shown.

Table 15
DIRECT EXPENDITURES FOR AIRPORTS BY STATE AND LOCAL GOVERNMENTS IN MAINE, 1977 to 1981
(Millions of Current Dollars)

| Level of Government | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| All Governments: | na | 5.0 | 9.5 | 10.0 | 18.0 | 42.5 |
| State | na | 0.3 | 0.2 | 0.6 | 1.7 | 2.8 |
| Local | na | 4.7 | 9.2 | 9.4 | 16.3 | 39.7 |

na - not available

Source: (8) op. cit.

b. Investment needs - The anticipated capital improvements for 1982-85 shown in Table 16 were based in part on the Maine Airport Systems Plan of 1977. They are concentrated primarily at the air carrier airports in Portland, Bangor, Auburn/Lewiston, Bar Harbor, and Knox County, plus a substantial figure for general aviation airports during 1984-85. The further development needs anticipated for 1986-89 include a $9.8 million major land acquisition and runway construction project at the Auburn/Lewiston air carrier airport, $1.2 million in capital improvements at Waterville, and smaller projects at the air carrier airports in Augusta and Bangor. Anticipated needs for general aviation facilities include new airports at Tri-County ($4.0 million) and Katahdin Valley ($1.2 million), a new runway at Biddeford ($2.0 million), and smaller projects at 25 other public airports. All these projects were ranked according to three criteria: safety, preservation, and expansion.

Table 16
PROPOSED AIRPORT IMPROVEMENT PROGRAM OF MAINE DEPARTMENT OF TRANSPORTATION
(Millions of 1982 Dollars)

| Program | 1982-83 | 1984-85 | 1986-89 | 1990 - 2000 |
|---|---|---|---|---|
| All Programs: | 6.0 | 15.0 | 29.5 | 74e |
| Air carrier airports | 5.3 | 10.1 | 12.1 | na |
| General aviation airports | 0.5 | 4.7 | 17.4 | na |
| Master plans & safety | 0.2 | 0.2 | 0.0 | na |

na - not available; e - estimated by CRAS
Source: (19) Maine Department of Transportation, Bureau of Transportation Services, Aeronautics Division, Air Carrier and General Aviation Airport's Development Needs Anticipated, FY 1986-89

The Department proposed that part of the identified needs be carried out during 1984-85 by appropriations from the General Fund. A State bond issue containing $1.0 million for airports will be on the ballot in November. The remaining needs would be undertaken during succeeding biennia. Although DOT has not projected needs for the 1990-2000 period, we extrapolated the average annual outlays proposed for 1984 to 1989 to reach the projection of $74 million in 1982 dollars.

c. Revenues - The federal government supplied 53% of the revenues for airport improvements in Maine during the period 1977-81. State and local governments paid for the remaining 47% million. It is anticipated that the federal government will supply 90% or $112 million of the assumed capital needs of $125 million (in 1982 dollars) from 1982 to 2000. The remaining $12 million should be well within the fiscal capability of state and local governments.

## III. WATER SUPPLY

### 1. Facilities

Maine is now served by 141 water utilities, three-fourths of which are public water districts or departments and 25% are privately owned water companies. All water utilities in 1979 served 210,000 customers -- a growth of only 1% since 1970. (20) During the same period, surface ground water used by these utilities grew 7.2% to 84.2 thousand gallons per day (MGD), while ground water used by them increased only 0.5% to 18.0 MGD. The volume of surface water is now almost five times that of ground water as a supply source for these utilities.

About 261,000 housing units or 61% of the state's total in 1980 are served by public water systems. (21) Although there was an increase of 42,000 housing units or 19% served by public water since 1970, the number of new units without public water grew even faster -- by almost 47,000 units or 39%. In other words, there was a higher housing growth rate in suburban or rural areas not served by public water systems, than in urban areas served by municipal systems.

Of the 137.1 billion gallons of water used by industry in Maine during 1977, only 5.6 billion gallons or 4% came from public systems. (22) The balance of 96% came from company systems -- primarily surface water. Over half (55%) of this water was used in industrial processes (mainly pulp and paper production), 29% for cooling and condensing (in generating electricity), and 4% for boiler feed. 85% of all industrial water was recirculated, and about 60% was treated before discharge into streams and rivers.

2. Finances

a. Past expenditures -- As shown in Table 17, total expenditures for water supply by public utilities in Maine amounted to $196.8 million between 1977 and 1981. More than half (57%) of this amount was for capital outlay, and the remaining 43% was for operation, maintenance, and administration.

Table 17
DIRECT EXPENDITURES FOR WATER SUPPLY BY LOCAL GOVERNMENTS*
IN MAINE, 1977 to 1981
(Millions of Current Dollars)

| Item | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| Total Expenditures: | 35.9 | 40.9 | 42.5 | 43.7 | 33.8 | 196.8 |
| Capital outlay | 22.1 | 30.1 | 25.8 | 23.7 | 10.5 | 112.2 |
| Other expenditures** | 13.8 | 10.8 | 16.7 | 20.0 | 23.3 | 84.6 |

*No expenditures were made directly by State government
**Operation, maintenance, administration

Source: (8) op. cit.

b. Investment needs - No dollar estimates of water supply investment needs have been published. However, a recent survey (20) indicates that of the many towns served by municipal water systems, 22 have problems with quantity, 26 with turbidity, 8 with iron, 15 with pollution, 22 with other quality problems, 14 with low pressure, 20 with inadequate mains, 8 with storage, and 10 with other distribution problems. Of the rural towns depending on ground water, 16 have problems with quantity, 30 with saltwater intrusion, 9 with road salt, 50 with iron or manganese, 6 with sulfur, 11 with hardness, and 15 with pollution.

Over the past decade we have learned much about how our surface waters can become polluted, how they can be cleaned up, the immense costs associated with maintenance and restoration of water quality, and the

complex institutional structure necessary to safeguard the public's interests. We have not made comparable strides with respect to ground water management. Streams flow in defined channels, are open to view, and respond to degredation or improvement on a time scale measured in days and months. Ground water moves in complex pathways at widely varying rates of flow, is hidden from view until withdrawn, and once polluted may require decades to centuries for improvement.

The Legislature, recognizing the threats to Maine's ground water resources, created a Ground Water Protection Commision to review the laws dealing with ground water and report its findings and recommendations to the 110th Legislature.(23)

The Commission recommended, among other things, that aquifers be mapped, domestic ground water supplies and aquifers be better protected, and the effects of pollutants on health be better evaluated.

A survey of 81 places in Maine during 1978 indicated that 30 places, or 37% of the total, were using 70% of more of their capacity for water treatment. (20) There is the presumption that these systems should be expanded in order to ensure adequate quantities of water to consumers.

A study of Maine's 132 coastal communities in 1978 revealed that about 57% either experience, or are likely to experience during the next decade, some kind of potable water supply problem. (24) The most frequently listed problems include low quantity, high levels of turbidity and iron or manganese, low water pressure, and high degrees of saltwater intrusion and pollution.

Another study (25), now being revised, indicates that there are very serious water supply problems in a number of communities in southern Maine. The most significant seasonal (summer) peak deficits are and will be located along the southern coastal area from Kittery to Arundel. The combined peak seasonal demand for these communities, projected without conservation measures, will total over 18.2 MGD in the year 2030. Implementation of

conservation measures can reduce this demand to 16.0 MGD. Conversely, the combined safe yield of their current supply sources is 9.2 MGD, not including the 1.0 MGD now purchased from the Biddeford and Saco Water Company. This indicates that even if extensive conservation measures are taken, the area will face a peak seasonal demand deficit of 6.8 MGD, and an even greater maximum day demand. Suggested solutions include reducing water consumption at the Naval Shipyard in Kittery, expanding water distribution from the Saco River, and creating a regional water supply system. The cost estimates for expanding supplies and distribution in this area have not yet been made. Neither have any estimates of needed maintenance or rehabilitation of water works been made.

c. Revenues - The only published data (8) on revenues of public water (and the few municipal electric utilities) indicate that about $100 million was received during the period from 1977 to 1981. Annual revenues of these local utilities totalled $13.0 million in 1977, $13.1 million in 1978, $21.5 million in 1979, $24.5 in 1980, and $27.8 million in 1981. In addition, the federal government supplied about $7 million, and municipal taxes presumably made up the balance of approximately $90 million. No projections of revenues have been made for future years.

## IV. WASTE TREATMENT

1. Sewage

The treatment of waste water was initially a local responsibility. In most cases in Maine, the municipality provided a collection system which encompassed the densely settled town center and discharged the waste water into a convenient waterway. Residents of outlying areas were left to their own devices.

In Maine, and elsewhere, however, these practices resulted in severely polluted waterways and prompted federal involvement. In 1956, national legislation was enacted to address point sources of water pollution and federal aid was provided to construct municipal sewage treatment facilities. Funding was limited, however, and by 1970, the State was still receiving less than $5 million annually for such facilities.

In 1972, with the passage of the Clean Water Act, the federal government began funding sewage treatment on a large scale. A formula was established whereby the federal government, through the Environmental Protection Agency, funded 75% of a municipal project, with the State and municipality left to fund the remaining 25%.

The state role has been to provide the state's funding share, administer the federal construction grants, review project designs, assist in assessing needs, and monitor constructed facilities. The State has been responsible for setting funding priorities and disbursing all funds to municipalities. (9)

Approximately half of all housing units in the state are now served by public sewers. (21) There was an increase of 44,000 units with sewers or 26% between 1970 and 1980. There also was an almost identical increase in housing units built during the decade in suburban or rural areas without sewers.

A survey of 57 places in Maine which was undertaken in 1978 indicated that 20 places, or 57% of the total, were using 80% or more of their capacity for wastewater treatment. (20) It is presumed that these systems require expansion to ensure adequate future treatment.

a. Past expenditures - Data in Table 18 reveal that capital outlays for sewerage facilities have gone down drastically since 1977, while operating and maintenance expenditures have risen continuously.

Table 18
DIRECT EXPENDITURES FOR SEWERAGE BY STATE AND LOCAL GOVERNMENTS
IN MAINE, 1977 to 1981
(Millions of Current Dollars)

| Item | 1977 | 1978 | 1979 | 1980 | 1981 | Total |
|---|---|---|---|---|---|---|
| Total Expenditures: | 88.5 | 54.6 | 32.6 | 30.5 | 40.6 | 246.8 |
| Capital outlay | 81.4 | 44.3 | 19.6 | 15.4 | 23.7 | 184.4 |
| Other* | 7.1 | 10.3 | 13.0 | 15.1 | 16.9 | 62.4 |

*Operation, maintenance, administration
Source: (8) op. cit.

In addition to the projects shown above, federal Urban Development Action grants (UDAGs) are being employed to construct sewers in Portland and South Portland costing a total of $2,150,000. Community Development Block Grants may also have been employed to finance sewer connections.

b. Investment needs

The Maine Department of Environmental Protection has prepared the priority lists for municipal wastewater treatment projects shown in Table 19. They have listed 11 projects costing $39.9 million for FY 1983, which were chosen on the basis of the following ranking system:

| | |
|---|---|
| Priority 1 - water supply protection - | 30 points |
| Priority 2 - shellfishery protection - | 25 points |
| Priority 3 - nuisance conditions - | 20 points |
| Priority 4 - fisheries protection - | 15 points |
| Priority 5 - facility needs - | 10 points |

The same system also was utilized to select the 18 projects costing $61.8 million for the Extended List in FY 1984 to 1987, as well as the 49 projects costing $118.9 million on the list of Additional Needs. The total eligible cost of projects on all three lists is $220.6 million in 1982 dollars, of which 68% would be funded by the federal Environmental Protection Agency, if funding is available. The Department has suggested that the most urgent

projects be carried out during FY 1983 from proposed General Fund appropriations, and that remaining needs be undertaken during following biennia.

Table 19
ESTIMATED NEEDS FOR MUNICIPAL WASTEWATER TREATMENT FACILITIES FOR MAINE

| | Projects (Number) | Total Eligible Cost (Thousands of 1982 Dollars) | Est. EPA Assistance (Thousands of 1982 Dollars) |
|---|---|---|---|
| Total: | 78 | 220,621 | 149,785 |
| FY 83 priority list | 11 | 39,949 | 25,429 |
| Extended list FY 84-87 | 18 | 61,808 | 46,460 |
| Additional needs | 49 | 118,864 | 77,896 |

Source: (26) Maine Department of Environmental Protection, Municipal Construction Grants Program, FY 1983

If the past ratio of capital outlays to total expenditures (1.34) is maintained, then the annual totals will be about $14 million in 1990 and $16 million in 2000.

The 1982 Needs Survey of the Environmental Protection Agency, prepared with the assistance of the Maine Department of Environmental Protection, has identified the additional projects shown in Table 20. They estimate the state's total wastewater treatment needs by the end of the century at $1.5 billion. Major projects would include the segregation of sanitary and storm sewers ($830 million), major sewer system rehabilitation ($359 million), secondary treatment facilities ($197 million), and provision of more stormwater runoff ($113 million). Their goal was to provide facilities capable of achieving the relevant State - designated stream use classifications. No provisions yet have been made to finance these projects, which are beyond the fiscal capacities of the State and municipalities without federal assistance.

Table 20
MAINE'S WASTEWATER TREATMENT NEEDS FOR YEAR 2000
(Millions of 1982 Dollars)

| Category | Total Needs |
|---|---|
| Total | 1,524 |
| I - Secondary treatment facilities | 197 |
| II - Advanced secondary treatment | 2 |
| III - Infiltration inflow correction | 23 |
| IV - Sewer system rehab, new collectors & interceptors | 359 |
| V - Segregating combined sewers | 830 |
| VI - Stormwater runoff | 113 |

Source: (27) Environmental Protection Agency, 1982 Needs Survey - Maine, February 1983

c. Revenues

Reported federal revenues for sewerage for the period 1977-81 totalled $183.2 million. Presumably the balance of $63.6 million came from municipal user charges and taxes.

The voters of the State have, since 1964, authorized three bond issues totalling $105 million for the construction of waste water treatment facilities. Of this amount, almost $61.5 million has been spent as the state's share of funding such facilities. State law currently authorizes the bond money to be used to fund up to 25% of the total cost of any local project, even if no federal dollars are involved. Moreover, if the total cost of the project is less than $100,000, the state's share can by law cover up to 90% of the expense.(9)

Total needs for sewage treatment facilities as identified by the State Department of Environmental Protection in Table 19, total $221 million in 1982 dollars. $150 million is eligible for financing by the federal Environmental Protection Agency, with the remaining $70 million to be supplied by state and local governments. The additional needs identified by the EPA in Table 20 would cost $1,524 million, for which no financing has been provided either by the federal or state governments. This amount therefore is listed as a revenue gap.

2. Solid and Hazardous Waste

Solid waste disposal traditionally has been a local and individual responsibility as well. The familiar backyard throw-away piles of rural areas grew into community open dumps in more settled locales. Municipal and private refuse collection and burning at convenient sites---usually in ready-made sand and gravel excavation pits and near fire-controlling surface water---were the common practices of the day.

Growing environmental problems again, however, prompted governmental intervention. Through the 1970 Clean Air Act and the 1972 Clean Water Act, the Congress assumed a regulatory role in solid waste disposal practices. The State adopted a direct regulatory role with the passage of Solid Waste Management Act in 1973. Efforts were made through education, technical assistance and prosecution to locate and develop environmentally sound disposal sites and to put an end to dumping and burning.

Federal and state solid waste regulations have in recent years dramatically altered solid waste disposal practices in Maine. Between 1977 and 1980, the number of solid waste disposal facilities being utilized by Maine's 498 municipalities declined by 27%, while at the same time an additional 29% of the state's population came to be served by facilities operating in substantial compliance with existing environmental regulations (see Table 21). The disparity between the percentage of sites in compliance and the percentage of the state's population served by those sites gives evidence of the fact that the smaller municipalities of the State are lagging behind larger municipalities in locating and operating more environmentally acceptable disposal facilities.

Table 21
STATUS OF SOLID WASTE DISPOSAL FACILITIES *

| | 1977 | 1980 |
|---|---|---|
| Number of Disposal Sites | 454 | 334 |
| Number of Sites in Compliance | 25 | 53 |
| Percent of Sites in Compliance | 5.5% | 15.9% |
| Number of Municipalities Served by Sites in Compliance | N.A. | 109 |
| Percent of State's Population Served by Sites in Compliance | 12% | 41% |

NOTE: * DEP Solid Waste Management Regulations become effective February 1, 1976.

Source: Adapted from Arthur Lerman associates, A Review of Maine's Municipal Solid Waste Management Program, March, 1981.

The most common type of solid waste disposal facility is the sanitary landfill. Many municipalities utilize landfills within their own borders, while other municipalities transport solid wastes either directly or via transfer collection-compaction stations to neighboring landfills.

Furthermore, sanitary landfills are regarded at best only as temporary solutions to the solid waste problem, due to their costs and limited life expectancy. Fortunately, alternatives to traditional dumping practices do exist. Many municipalities are discovering that resource recovery and recycling can generate needed municipal revenues while prolonging the life of landfill facilities. Fourteen municipalities have recently joined with Auburn in transporting solid waste to that city's new waste incinerator, which is now producing steam for sale to a local industry. In its first year of recycling, Brunswick received $18,700 in revenues from 734 tons of corrugated cardboard and paper, while at the same time it saved an estimated $6,000 in avoided disposal costs. The Town of Farmington reports that its recycling operation has extended the usable life of its landfill by one-third. Maine's Returnable Container Law has boosted recycling efforts and has reduced by about 5% the volume of solid waste generated in the state. The law has also significantly reduced the visual pollution from roadside litter.

The volume of municipal wastes is increasing. However, DEP has estimated that, on average, 6.66 tons of solid waste are generated per week by each 1,000 citizens. Between 1970 and 1980, Maine grew by 130,938 permanent residents and the eighties are expected to bring more. An estimated one million wet tons of sludge will be generated in 1987, sludge that will have to be landspread or landfilled. New technologies and expanded recycling efforts will thus be needed just to keep pace with the growing magnitude of our solid wastes, and the costs will be great.

Wastes that are of a particularly hazardous nature have been increasing with the advent of new technology. Relatively small amounts of these wastes have been generated and disposed of by the general public, while large quantities have resulted from industrial activities. In the past, industries usually disposed of wastes at municipal or private dumps, or through discharges into waterways and along roadways.

The Federal Clean Water Act of 1972, however, prohibited the discharge of harmful quantities of oil or hazardous substances, and established civil fines for the discharge of such wastes that could not be removed from the environment. The state has concentrated its efforts on public education, the establishment and management of a Coastal Protection Fund, and the supervision of the clean up of hazardous materials spills.

Hazardous waste disposal has become a major public concern in the wake of such environmental disasters as the Love Canal in New York. Here in Maine, 40 private wells tapping ground water were found in 1977 to be contaminated by improperly dumped waste oils and petroleum byproducts. In Gray, a water main extension, funded in part by a federal grant of $550,000, was required to provide a safe water supply to the families affected by contaminated ground water; fortunately, the character of this geologic formation prevented the contamination of Gray Water District's aquifer. Recently, local concerns have prompted an investigation to determine whether the Winthrop landfill contains hazardous wastes. An EPA grant of up to $450,000 has been allocated for this study.

Federal and state laws and regulations have led to "cradle-to-grave" tracking of hazardous materials and the creation of the Bureau of Oil and Hazardous Materials Control at DEP. A federal superfund has been established to help clean up the most critical hazardous waste sites nationwide. In 1981, the Maine Legislature established a Hazardous Waste Fund. Through this Fund, fees will be assessed to those who generate or transport hazardous materials, or who operate hazardous waste disposal facilities; and, $600,000 will be available for hazardous waste response equipment and personnel and for the removal of unlicensed discharges.

Hazardous wastes will certainly be a major issue in the future. The true magnitude of the contamination potential may not be known for some time, and clean up is enormously expensive. In addition, the disposal of hazardous waste is a politically sensitive and locally explosive issue. Currently, no landfills in the State are licensed to accept hazardous materials. The more environmentally sound alternatives of disposal by incineration or purification through recycling raise public concerns about long-term health effects, and short-term contamination through equipment malfunctions or operator carelessness.(9)

As stated previously, a recent survey of rural development and investment needs reported that 176 rural municipalities (60% of those which replied) have solid waste problems confronting their communities.(7)

a. Past expenditures - Past state and federal financial support for solid waste management has been limited. In recent years, technical assistance has been made available by DEP and EPA to assist municipalities in developing sound waste disposal practices, in investigating alternative disposal sites and techniques, and in implementing recycling programs. The State also appropriated $500,000 as a Solid Waste Management Subsidy that was apportioned in 1980-81 to municipalities found to be in substantial compliance with State solid waste regulations. The largest source of state support was embodied in Maine's 1979 Solid Waste Management Plan, which proposed a $16 million general fund bond issue for the planning and processing, resource recovery, and disposal system and facilities for municipal solid wastes. This bond issue did not receive legislative approval. A recent development, however, has been the approval of the Maine Resource Recovery and Recycling Grant, that will provide $1 million in matching funds to municipalities and quasi-municipal entities to assist in the startup of recycling programs and in the evaluation of resource recovery systems. (9)

Data from a federal source (8) indicate that total expenditures for sanitation, other than sewerage, by local governments in Maine totalled $44.6 million between 1977 and 1981. Annual expenditures were $4.7 million

in 1977, $9.1 million in 1978, $8.2 million in 1979, $9.0 million in 1980, and $13.6 million in 1981. No breakdown was shown between capital outlays and expenditures for operation and maintenance. The State made no contribution to municipalities during this period.

b. Investment needs - In order to evaluate the condition of each municipal solid waste facility in the state, the Department of Environmental Protection devised a solid waste enforcement priority list with the following criteria:

| Criteria | Points |
|---|---|
| 1. Population served (more people generate more waste) | -20 to -10 |
| 2. Immediate life threat (possible fatalities) | -100 |
| 3. Public water threat (leachate reach public water supply) | -50 |
| 4. Private water threat (leachate reach private water supply) | -25 |
| 5. 300-foot law (leachate reach surface water) | -20 |
| 6. Open burning (recent fire at dump) | -20 |
| 7. Cover (used as required) | +15 |
| 8. Compaction (proper compaction for volume reduction) | +10 |
| 9. Attendant present (during operational hours) | +10 |
| 10. Access limited (closed by gate during non-operating hours) | +10 |
| 11. White goods segregated (separate area for washing machines, etc.) | +5 |
| 12. Drainage control (avoid ponding or contact of trash and water) | +10 |
| 13. Litter control (prevent blowing trash) | +10 |

On the basis of these criteria, in 1980 no municipality scored lower than -70 of the possible -195 points. At the other end of the scale, one town received a +60 score, only 10 points below the highest possible rating. A great majority (81%) of the towns had scores between +30 and -30. (28) Some of the facilities evaluated here have been improved since 1980.

Total solid waste capital costs over the next five years are expected to range from a low of $32 million (if regional landfills alone are built) to $96 million (if 11 regional energy recovery facilities are constructed). The latter facilities alone would cost a total of $62 to $69 million.

c. Revenues - Although a bond issue of $11.3 million was proposed by the Department to assist municipalities close unsuitable dumps, evaluate and design solid waste facilities, and construct rural solid waste disposal facilities and transfer systems, this bond issue was not authorized by the Administration. So far, the State has granted municipalities $114,000 for the construction of new recycling facilities or the expansion of existing programs. In addition, $428,000 was awarded for the planning and design of energy recovery systems in 1982. However, the State has not furnished the towns with funds for constructing these more expensive energy recovery systems.

No projections of capital needs for solid waste handling have been made beyond 1990, nor have any estimates or projections of operation and maintenance expenditures or revenues been made. In the absence of any firm financing of solid waste capital needs by the federal or state governments, the entire burden could fall on municipalities, which are unlikely to have sufficient resources. The total cost, ranging from $32 million to $96 million in 1982 dollars, will therefore be considered as a revenue gap.

## V. SUMMARY AND RECOMMENDATIONS

### 1. Summary of Findings

The capital needs identified by the appropriate state agencies, as reported in previous sections of this report, are summarized in Table 22. Data in the table indicate that identified needs in the 1982-83 biennium average $115 million per year in 1982 dollars (except for unidentified municipal outlays for water supply and hazardous waste). Between 1984 and 1989, for needs identified by state agencies would range from $132 to $143 million per year, of which the figures for 1984-85 are backed by budgeted revenues and the figures for 1986-89 might be classed as a "wish list" of desirable projects. A very rough estimate of needs during the 1990-2000 period would average $123 million per year. In addition, $95 million per year might be included for sewerage projects recommended by the U. S. Environmental Projection Agency, for which no funding has been provided by either the federal or state governments.

Table 22
SUMMARY OF INFRASTRUCTURE CAPITAL NEEDS IN MAINE
(Millions of 1982 Dollars)

| Type of Facility | 1982-83 | 1984-85 | 1986-89 | 1990-2000 | Total 1982-2000 |
|---|---|---|---|---|---|
| All Facilities: | 229.1 | 465.4 (93.8-157.8)* | 804.4 | 2,182 | 3775-3839 |
| Highways and bridges | 109.2 | 226.3 | 370.9e | 996e | 1702 |
| Railroads | 3.1 | 3.6 | 8.0e | 20e | 35 |
| Public transit & ferry | 1.9 | 10.5 | 8.0e | 20e | 40 |
| Ports | 69.0 | 20.0 | 7.0e | na | 96 |
| Airports | 6.0 | 15.0 na | 29.5 | 74e | 125 |
| Water supply | na | na na | na | na | na |
| Sewerage - state | 39.9 | ----- 61.8*----- | | 119 | 221 |
| EPA | - | 190.0 | 381.0 | 953 | 1524 |
| Solid & hazardous waste | na | ----- 32-96*---- | | na | 32 - 96 |

* FY 1984-87; na - not available; e-estimated by CRAS
Sources: See previous text

Total identified capital needs are estimated at $793 to $857 million in 1982 dollars between 1984 and 1989 (plus $571 million if EPA recommendations for additional sewers are carried out). During the last decade of this century capital needs are projected to rise to $1,229 million, plus $953 million for possible EPA projects. The grand total of identified needs for the period 1982-2000 thus reaches $3,839 million. Expenditures for operation, maintanance, and administration of these facilities will exceed capital outlays. Any delays in carrying out capital projects will escalate costs due to rising prices for construction.

It should be noted that the definition of needs is somewhat arbitrary. Although the "needs" mentioned in this report regarding highways, bridges, airports, and sewers were determined largely by application of nationally-accepted professional standards, the needs specified for public transportation, ports, and solid waste were based on ad hoc studies or estimates. There are no quantitative estimates of needs for water supply facilities at all. No projections have been made for infrastructure to serve expanding population and industry. Even in the case of national standards set by professional associations, there may be considerable latitude. In any case, assumed needs for infrastructure must be weighed against needs for other public facilities and services by state and local legislative bodies in determining their budgets.

Furthermore, consideration of infrastructure needs should not be limited to capital outlays. Adequate regular maintenance of these facilities is equally important. To be complete, a study of infrastructure requirements should include a detailed analysis of preventive maintenance levels needed to avoid further deterioration of existing facilities. Due to the lack of time and resources, this report does not address this vital problem.

It should be emphasized that the data for the years 1977 to 1981 from various sources are sometimes contradictory or incomplete. Although the annual figures from the U. S. Bureau of the Census (8) appear to be most inclusive, they do not show sufficient detail for budgetary analysis. It appears that no one individual or agency of State Government has complete knowledge of all federal, state, and municipal programs being carried out in Maine. In fact, many municipal outlays are missing from the published figures cited throughout this report. The shortness of time precluded us from canvassing towns individually. This gap will be filled in small part by the results of a survey of Maine's seven largest cities which is now being undertaken by the National League of Cities. However, the remaining 491 municipalities will not be covered, since they do not report their expenditures to any State agency. Their annual reports do not employ a uniform accounting system whereby detailed data could be aggregated on a statewide basis.

Projections of state and local government revenues were made for the Blaine House conference on State and Local Relations held on May 10 and 11, 1982.(9) However, these projections were too broad in scope to be employed in this study. Consequently, we have made tenuous projections of federal, state, and local government revenues and gaps for each type of infrastructure facility. The derivation of individual projections has been described throughout the text. In summary, it is estimated that identified capital infrastructure needs of $3,839 million (in 1982 dollars) during the entire period of 1982-2000 could be financed in part by federal revenues of $1202 million and state and local revenues of $986 million, thereby leaving a gap of $1,649 million.

As shown in Table 23, most of this funding gap is induced by the inability of existing programs to finance the extensive sewerage improvements recommended by the U.S. Environmental Project Agency. Other shortfalls are likely in the cases of solid and hazardous waste facilities, railroads, ports, and public transportation. It should be emphasized that these projections are tenuous, and that much more rigorous analysis on prospective expenditures and revenues should be carried out.

Table 23
SUMMARY OF INFRASTRUCTURE NEEDS, REVENUES, AND GAP
IN MAINE, 1982 - 2000
(Millions of 1982 Dollars)

| Type of Facility | Needs | Revenues | Gap |
|---|---|---|---|
| All Facilities: | 3,839 | 2,190 | 1,649 |
| Highways & bridges | 1,702 | 1,702 | - |
| Railroads | 35 | 22 | 13 |
| Public transit & ferry | 40 | 35 | 5 |
| Ports | 96 | 85 | 11 |
| Airports | 125 | 125 | - |
| Water supply | na | na | na |
| Sewerage | 1,745 | 221 | 1,524 |
| Solid & hazardous waste | 96 | - | 96 |

na - not available

Sources: See previous text.

A large part of Maine's annual expenditures for infrastructure are met by user charges. For example, in 1981 about 55% of state and local government revenues used for highways came from gasoline tax, licenses, service charges, and Turnpike tolls. Water utilities received a similar proportion of their expenses from user charges. Sewerage, transit, airport, and port agencies also obtain a significant part of their revenues from

fares, fees, rentals, etc. The balance of revenues for all the functions described above is derived from federal grants, the State General Fund, or municipal property taxes. As was mentioned earlier in this report, the State recently raised the gasoline tax from 9¢ to 14¢ per gallon. User fees for other modes of transportation, water, sewer, and sanitation may be raised in the future. The main impetus for these proposals has been the impending cuts in federal revenues, which averaged about $91 million per year for infrastructure alone between 1977 and 1981.

Bonding by state and local agencies is the principal means of financing very large capital outlays. Although small projects may be financed out of annual revenues, particularly by a large agency such as the Department of Transportation, smaller state and local agencies usually must resort to bonding. A bond issue of $24,600,000 for highway and bridge improvements was passed this year, and another bond issue of $18,400,000 for other infrastructure projects will appear on the ballot next November. States and municipalities elsewhere are considering such innovations in capital financing as zero coupon bonds, corpound interest bonds, stripped coupon bonds, stepped coupon bonds, tender option ("put") bonds, super sinker bonds, floating rate bonds or flexible interest bonds, detachable warrant bonds, tax-exempt commercial paper, tax-exempt leveraged lease financing, tax-exempt master notes, and tax-exempt certificates of participation. (29)

Consideration also may be given to "privatization" of infrastructure construction, under which private industry could undertake construction and financing for municipalities under arrangements such as sale-leaseback, sole-operating contract, and turnkey. Investment bankers, engineering companies, and real estate investment partnerships may agree to build

facilities for municipalities, in return for tax credits, accelerated depreciation allowances and allowable profits. Under such arrangements, the total cost to municipalities (and hence to ratepayers) can often be reduced significantly because of less paperwork, financing delays, regulatory provisions, and labor costs. Many other innovative techniques are now being tried by municipalities to acquire necessary capital, speed up projects, and cut costs.

2. Recommendations

During this era of federal cutbacks and tax revolts, it is imperative that state and local governments in Maine establish a mechanism for coordinating capital budgeting for infrastructure and including all sources of revenue (federal, state, and municipal). Although capital programming was employed by the State in the late 1960s, it has not been used since that time. This would seem to provide the most practicable means of setting priorities for the allocation of scarce dollars to meet our future needs for infrastructure, without which our society and economy cannot function.

The first part of this process would be the establishment of a reasonably uniform system of accounts whereby incoming revenues from the federal, state, and local governments could be tracked as they are spent for construction, operation, and maintenance of existing facilities owned by the State, municipalities, and certain private corporations (e.g. water suppliers). Implementation of such an accounting system would reduce the incidence of contradictory figures and frequent data gaps.

The next step would be the identification of infrastructure capital and maintenance needs which have not yet been examined in detail. Primary examples are municipal water supply, solid and hazardous waste, and public transportation. Although some capital needs have been identified, many have

not been costed out. Furthermore, adequate maintenance standards have not been determined in many cases. In both instances, the State would have to work closely with municipalities.

Long-range capital planning for infrastructure then should be instituted by the State, in collaboration with the federal and local governments. Program priorities could be proposed, along with alternate means of financing. In this way, the State Legislature and municipal governments could be greatly assisted in making the hard financial choices needed to maintain our essential infrastructure adequately, rather than make expensive repairs to facilities after they have broken down. Various ways of establishing a capital planning and budgeting function by the State will be explored by a Cabinet Committee on Capital Planning.

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Appendix Table 1
SELECTED CAPITAL OUTLAYS BY STATE AND LOCAL GOVERNMENTS IN MAINE, 1960 - 1981
(Millions of Current Dollars)

| Year | Total | Highways | Sewerage | Water Supply | Other Utilities & Transit |
|---|---|---|---|---|---|
| 1960 | 45.1 | 35.7 | 5.3 | 4.0 | 0.1 |
| 1961 | 39.8 | 33.0 | 3.0 | 3.8 | 0.0 |
| 1962 | 43.3 | 38.2 | 1.4 | 3.6 | 0.1 |
| 1963 | 43.3 | 37.2 | 2.8 | 3.2 | 0.1 |
| 1964 | 47.8 | 41.6 | 2.8 | 3.3 | 0.1 |
| 1965 | 49.1 | 42.6 | 1.6 | 4.6 | 0.3 |
| 1966 | 52.6 | 45.1 | 2.7 | 4.6 | 0.2 |
| 1967 | 53.8 | 45.3 | 4.0 | 4.2 | 0.3 |
| 1968 | 53.9 | 43.2 | 6.2 | 4.1 | 0.4 |
| 1969 | 50.3 | 41.5 | 4.7 | 4.0 | 0.1 |
| 1970 | 56.9 | 48.1 | 6.2 | 2.6 | 0.0 |
| 1971 | 72.6 | 62.5 | 4.6 | 5.5 | 0.0 |
| 1972 | 84.8 | 73.0 | 4.7 | 6.8 | 0.3 |
| 1973 | 81.1 | 61.2 | 12.9 | 6.6 | 0.4 |
| 1974 | 78.6 | 59.8 | 12.5 | 6.1 | 0.2 |
| 1975 | 81.8 | 58.3 | 17.6 | 5.7 | 0.2 |
| 1976 | 100.5 | 61.0 | 33.4 | 5.9 | 0.2 |
| 1977 | 164.6 | 60.9 | 81.4 | 22.1 | 0.2 |
| 1978 | 141.7 | 64.4 | 44.3 | 30.1 | 2.9 |
| 1979 | 127.1 | 81.3 | 19.6 | 25.8 | 0.4 |
| 1980 | 134.0 | 94.3 | 15.4 | 23.7 | 0.6 |
| 1981 | 106.1 | 70.6 | 23.7 | 10.5 | 1.3 |
| Total | 1,708.8 | 1,198.8 | 310.8 | 190.8 | 8.4 |

Source: (8) op. cit.

Appendix Table 2
SELECTED CAPITAL OUTLAYS BY STATE AND LOCAL GOVERNMENTS IN MAINE, 1960 - 1981
(Millions of 1977 Dollars)*

| Year | Total | Highways | Sewerage | Water Supply | Other Utilities & Transit |
|---|---|---|---|---|---|
| 1960 | 123.2 | 96.4 | 14.0 | 12.5 | 0.3 |
| 1961 | 108.0 | 88.7 | 7.8 | 11.5 | 0.0 |
| 1962 | 112.5 | 98.2 | 3.6 | 10.5 | 0.2 |
| 1963 | 109.6 | 93.2 | 7.1 | 9.1 | 0.2 |
| 1964 | 97.9 | 81.7 | 7.0 | 9.0 | 0.2 |
| 1965 | 118.9 | 102.1 | 3.9 | 12.2 | 0.7 |
| 1966 | 119.8 | 101.5 | 6.3 | 11.5 | 0.5 |
| 1967 | 117.6 | 98.0 | 8.9 | 10.0 | 0.7 |
| 1968 | 113.5 | 90.5 | 13.1 | 9.1 | 0.8 |
| 1969 | 98.1 | 80.4 | 9.5 | 8.0 | 0.2 |
| 1970 | 99.7 | 82.9 | 12.0 | 4.8 | 0.0 |
| 1971 | 119.7 | 102.7 | 8.0 | 9.0 | 0.0 |
| 1972 | 132.4 | 114.4 | 7.6 | 10.0 | 0.4 |
| 1973 | 115.4 | 86.4 | 19.6 | 8.9 | 0.5 |
| 1974 | 85.9 | 62.0 | 16.0 | 7.7 | 0.2 |
| 1975 | 86.5 | 60.2 | 19.5 | 6.6 | 0.2 |
| 1976 | 107.2 | 65.3 | 35.4 | 6.3 | 0.2 |
| 1977 | 164.6 | 60.9 | 81.4 | 22.1 | 0.2 |
| 1978 | 124.8 | 53.9 | 40.4 | 27.9 | 2.6 |
| 1979 | 124.8 | 57.0 | 16.2 | 22.1 | 0.3 |
| 1980 | 88.7 | 57.8 | 11.7 | 18.8 | 0.4 |
| 1981 | 70.1 | 45.0 | 16.6 | 7.6 | 0.9 |

*Deflators: highways - Federal Highway Administration index;
sewerage - Environmental Protection Agency sewage treatment index;
water supply and other utilities & transit - Engineering News Record general construction index

Source: (8) op. cit.