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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 9. MARYLAND

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

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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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MARYLAND'S PUBLIC INFRASTRUCTURE NEEDS

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Center for Metropolitan Planning and Research
The Johns Hopkins University

October 1983

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Maryland's Public Infrastructure Needs:

Executive Summary

Public infrastructure needs are a growing concern throughout the nation, and Maryland is no exception. The State conducted a study of infrastructure planning, financing, and programs in 1982 which highlighted the need for more information on actual infrastructure conditions. Based on the limited data that do exist, the condition of Maryland's public infrastructure may be summarized as follows:

1. More than 40 percent of State-maintained highways are deficient in terms of safety, service, or structural condition. The cost of eliminating these deficiencies is estimated at $8.4 billion (see Table 1).
2. More than $5.0 billion of this amount is needed for interstate or primary highways (see Table 2).
3. There is no consistent source of data regarding the condition of county-maintained roads in Maryland. County self-estimates of road conditions range from fair to excellent. About one-quarter of the counties report only fair road conditions (see Table 3).
4. It is estimated that $6.6 billion is needed for county-maintained road systems (see Table 4).
5. Maryland has a more serious problem with bridges than with roads. Self-estimates of county-maintained bridges range from poor to good with nearly half the counties reporting bridge conditions as either poor or fair (see Table 5).

6. It is estimated that eliminating bridge deficiencies in Maryland would cost $674 million (see Table 6).

Water and Sewer Needs

1. Self-estimates of water and sewer system conditions range from fair to excellent (see Table 7).
2. Estimates of water supply system needs in Maryland, including both existing problems and new growth, total $633 million (see Table 8).
3. Estimates of sanitary sewer system needs, also including existing problems and new growth, total $2.5 billion (see Table 9).
4. Estimates of solid waste disposal needs and agricultural runoff control needs total $483 million (see Table 10).

Infrastructure Spending

1. State infrastructure spending, primarily on highways, has declined in current dollars during the last decade. In real dollars, the State now spends less than half of what it spent in 1972 (see Table 11).
2. County spending on infrastructure has increased in the last decade in both current and real dollars. This holds true for all three major infrastructure functions, highways, sewers, and water supply (see Table 12).

3. In the aggregate State and local infrastructure spending has increased since 1972, but only in terms of current dollars. The decline in real State infrastructure spending more than offsets the increase in real local government spending since 1972 (see Table 13).
4. According to Transportation Trust Fund projections, a total of $2.5 to $5.0 billion will be available over the next 20 years for transportation infrastructure investment (see Table 14).
5. Projections of current spending patterns for infrastructure investments would provide $157 million for State highways and bridges, $274 million for county highways and bridges, $102 million for water supply, and $194 million for sewers (see Table 15).
6. Putting all of these pieces together, total infrastructure spending needs between now and the turn of the century are more than $19.3 billion. Revenues from the Transportation Trust Fund and projected current spending levels total only $13.5 billion. The deficit of $5.8 billion amounts to more than $340 million annually during this period (see Table 16).

Implications

The magnitude of this potential revenue shortfall justifies a serious effort to improve the needs data and to begin to plan for closing the gap between needs and resources. With respect to the needs data, these estimates

are based on rather conservative assumptions so the problem could well be even greater. Furthermore, the vast majority of the needs are for correcting deficiencies in existing systems rather than for new growth so sluggish economic development will not resolve the problem.

I. Introduction

This report examines the infrastructure needs of Maryland for the rest of this century. Many authors have noted the declining share of state and local government spending devoted to infrastructure in the U.S. in recent years and there has been widespread publicity regarding the deteriorating condition of our public facilities. Across the nation, public works spending accounted for 4.1 percent of GNP in 1965, but only 1.7 percent in 1980. Like the rest of the nation, Maryland has been reducing its real spending on infrastructure. Between 1971 and 1981 real capital spending by state and local governments in Maryland fell by more than 6 percent despite the continued growth of population, jobs, and income in the state. This trend, combined with continuing cuts in federal infrastructure aid, makes it especially important to assess the magnitude of expenditure needed to maintain the state's infrastructure during the next 18 years.

Broadly defined, infrastructure includes all public investment in physical facilities, but this report will focus more narrowly on transportation facilities, water supply systems, and sewerage systems. Together, these account for the bulk of infrastructure spending needs. In addition, this report will rely on published or previously prepared reports and on interviews with public officials rather than on a direct assessment of infrastructure conditions. For the sake of comparability, all dollar amounts have been converted to 1982 dollars except where explicitly noted.

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Maryland's Population

Maryland's population grew 7.5 percent during the 1970's to 4.2 million. It is expected to rise to nearly 4.8 million by the year 2000, an increase of 13.0 percent over the 20-year period. The Baltimore region accounts for more than half of the state's population and will continue to do so through the year 2000. The Washington, D.C. suburbs of Maryland account for another 30 percent of the state's population so that the two large urban areas of the state encompass four-fifths of its people. Growth between 1980 and the year 2000 will be most rapid in Southern Maryland and in the Frederick region with the Eastern Shore next. Western Maryland is expected to grow most slowly, but none of these growth rates differ by enough to significantly alter the dominant position of Baltimore and the Washington suburbs. Thus, the growth needs of the state will be roughly proportional to existing population patterns.*

Maryland's Economy

Nearly two million people were employed in Maryland in 1980 and that number is expected to rise to 2.2 million by 1990 and to more than 2.3 million by the year 2000. Thus, employment will grow 60 percent faster than population in the 1980's as a larger fraction of the population enters the labor force. This stems largely from two factors: more women are working and children below working age

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* Maryland Department of State Planning, "Interim Population Projection," June 15, 1981.

constitute a smaller proportion of the population. In the 1990's these trends will slow down somewhat but employment will still grow nearly 18 percent faster than population.*

The shift in employment from the manufacturing sector to the service sector will continue through the year 2000 with the government sector's share of jobs declining as well. Although its share declines in the 1980's, total manufacturing employment will continue to grow; only in the 1990's will there be an absolute decline in total manufacturing jobs and then by only 1100 jobs out of 250,000 over the decade. All other sectors except agriculture will show increased employment even where their growth is slower than average so their relative share of jobs declines.

There are also significant differences in the geographic pattern of employment growth. During the 1980's only the Washington suburbs with 13.0 percent and Frederick with 19.1 percent increases will enjoy job growth above the statewide average rate of 11.3 percent. In the 1990's, these two regions will be joined by the Eastern Shore as the areas where jobs are growing faster than the Maryland average. None of these differences in growth rates are significant enough to change the overall distribution of jobs very much. The Baltimore region, which had 55.4 percent of the state's jobs in 1980, will still have 54.2 percent in the year 2000. The Washington suburbs, which had 28.8 percent of Maryland's jobs in 1980, will rise only to 30.0 percent by 2000.

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*Maryland Department of State Planning, Employment in Maryland: Trends and Projections, 1967-2000, July, 1982.

Two other significant aspects of the Maryland economy are worth noting. First, the role of the Port of Baltimore is central to any consideration of Maryland's economy. The Port is responsible for as many as 80,000 jobs in the state and is the indirect stimulus for thousands more.* Second, the situation of the Washington, D.C. suburbs is unique, making them relatively insensitive to recessions, but heavily dependent on national political factors for much of their growth.

In general, Maryland's economy can be described as diversified and relatively stable. Coupled with the projections for moderate growth throughout the state, this pattern makes infrastructure planning considerably easier than in many states.

Maryland's Local Governments

Maryland has a relatively simple structure of local government. The state's 23 counties and Baltimore City (which functions as a county) are responsible for the vast majority of infrastructure decisions as well as most other local government activities. The most significant exceptions are the Washington Suburban Sanitary Commission, which is responsible for sewage in Montgomery and Prince George's Counties, and the Washington Metropolitan Area Transit

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*The Economic Impact of the Port of Baltimore, Booz, Allen and Hamilton, Inc., for The Greater Baltimore Committee, Inc., March 1982.

Authority. The counties vary enormously in their level of sophistication about capital budgeting and infrastructure planning. The populous, urban counties have formally adopted some form of capital planning and budgeting, but in most cases the poorer, rural counties have not.

Infrastructure Planning Efforts

The Maryland Department of State Planning commissioned a survey of local infrastructure planning efforts in 1982. This survey found that the information on capital facilities was poor and that its use in an effective planning framework was weak. According to the report:

> Only one-fourth of the respondents rate overall information on condition of facilities as reliable, complete and updated regularly. Only one-half of the respondents feel capital cost data is reliable. This is so even though most respondents use such data regularly in making decisions about what to do, where, and when.
>
> The data is weak because less than one-fourth of the respondents have annually updated information on the condition of public facilities. Over half prepare annual capital cost data, but only one-third prepare five year cost estimates. Little more than one-third have operating cost data available.
>
> The best-documented facilities are water and sewer systems, followed by roads.*

*Garfield Schwartz Associates, Local Infrastructure Planning in Maryland, 1982, p. v.

As these survey results indicate, local data on infrastructure conditions and needs was not sufficiently reliable or comparable across counties to include in quantitative form in this report. Thus the report is based primarily on state data or on previous compilations of local data which attempted to reconcile different methods of needs estimation for specific types of infrastructure.

II. Transportation

Maryland's transportation system includes 26,000 miles of highways, the Port of Baltimore, the Maryland portions of the bus and subway lines of the Washington Metropolitan Area Transit Authority, the bus and soon-to-be-opened subway lines of the Mass Transit Administration in Baltimore, rail service provided by Conrail, CSX Corporation, Amtrak, and the Maryland Department of Transportation, and the Baltimore-Washington International Airport, in addition to several smaller bus lines and airports. This report will focus primarily on highways because they constitute the bulk of the dollar needs for infrastructure, but mass transit and air travel will also be covered briefly.

Highways

Maryland's highway system is a dual system with state responsibility for some 5,258 miles and county or municipal responsibility for the remainder of the 26,000 total highway miles in the state. There are 367 miles of interstate highways and another 761 miles of primary roads included in the state mileage. Counties are responsible for 16,703 miles of roads, and municipalities other than Baltimore City maintain 1,978 miles. Baltimore City has responsibility for all 1,896 miles of highway within its boundaries, except for 12 miles of interstate and toll roads.

State highway construction and maintenance are financed by the Maryland Consolidated Transportation Trust Fund (TTF). In addition, the TTF provides aid to local governments for their road systems. The TTF is financed by a state gas tax of 13.5 cents per gallon in addition to funds received from the federal government. Baltimore City, with complete responsibility for its highways, receives additional special revenue from motor vehicle registration fees. Local governments supplement their state funds with general revenues to maintain or expand their highway networks.

Because local highways constitute such a large fraction of total highway miles, they are a logical starting place for assessing highway needs. Unfortunately, as noted in the previous section, data on local highway conditions are inadequate. Thus, we begin with the condition of state-maintained highways.

The Maryland Department of Transportation prepared a careful and comprehensive assessment of the state's highway network in 1980. This inventory identified highway improvements needed to "(1) serve existing and projected population and economic activity in the state; and (2) address safety and structural problems that warrant major construction or reconstruction."* It identified more than 2,000 miles of deficient highways and estimated the total cost to

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*Maryland Department of Transportation, Maryland State Highway Needs Inventory, 1980, p. 4.

eliminate these deficiencies at $6.9 billion. (This amount is equivalent to $8.4 billion in 1982 dollars.) In other words, more than 40 percent of state highways are deficient in terms of safety, service, or structural condition. The county by county breakdown of these estimates is presented in Table 1. It is worth noting that this inventory includes the upgrading of existing roads to accomodate projected population growth, but does not include new roads. This procedure accounts for the vast majority of state highway needs, however, because most new roads will be the responsibility of local governments.

The highway needs inventory is a mandated activity in Maryland and is updated on a regular basis.* Its concept of "need" is based on the standards established by the American Association of State Highway and Transportation Officials. It is not financially constrained but is based on technical assessments of highway deficiencies. Cost estimates are based on the application of reasonable design standards. Highway deficiencies fall into three categories: safety, service, and structural. The inventory sets no priorities, but it is clear that safety and structural deficiencies are likely to take priority in the competition for construction dollars except in cases of the most severe congestion.

To get a clearer picture of the nature of Maryland's highway deficiencies, it is useful to separate them by type of highway and by type of construction as is done in Table 2. The needs inventory identifies only 26 miles of new interstate construction needs, but these 26 miles will cost more than $15 million per mile for a total

*The 1982 update just eliminated completed projects and made note of progress on work underway. No new projects were added. The results were not published.

TABLE 1

CONDITION OF STATE-MAINTAINED
HIGHWAYS IN MARYLAND

County	Total Miles	Deficient Miles	Cost to Eliminate Deficiencies*
Allegany	186	94	$ 545
Anne Arundel	341	197	1,429
Baltimore City	12	0	0
Baltimore County	399	181	694
Calvert	114	33	93
Caroline	155	41	64
Carroll	222	116	275
Cecil	229	106	255
Charles	238	78	271
Dorchester	138	48	123
Frederick	368	120	387
Garrett	199	69	173
Harford	285	112	301
Howard	188	89	361
Kent	174	37	42
Montgomery	364	177	1,186
Prince George's	343	224	1,428
Queen Anne's	209	102	181
St. Mary's	197	66	76
Somerset	102	25	22
Talbot	134	62	102
Washington	299	75	154
Wicomico	160	50	148
Worcester	202	50	90
Total	5258	2152	8,400

*Millions of 1982 dollars.

Sources - Maryland State Highway Needs Inventory, 1980, and Survey of Current Business (December, 1981 and September, 1983).

TABLE 2

NEEDS OF STATE-MAINTAINED HIGHWAYS
BY TYPE OF CONSTRUCTION

	Interstate		Primary		Secondary		Total	
	Miles	Cost*	Miles	Cost*	Miles	Cost*	Miles	Cost*
New Construction	26	$ 398	185	$1860	210	$ 894	421	$3146
Reconstruction	126	1349	316	1340	1166	2494	1608	5157
Other	0	0	110	56	13	4	123	60
Total	152	$1745	611	$3256	1389	$3392	2152	$8363

*Millions of 1982 dollars.

Sources - Maryland State Highway Needs Inventory, 1980, and Survey of Current Business (December, 1981 and September, 1983).

of $398 million, while the 1,166 miles of secondary roads in need of reconstruction will cost less than one-seventh as much per mile (only $2.1 million per mile). As a result of such cost differences, secondary roads which account for nearly two-thirds of the total deficient mileage, account for only 40 percent of the costs. It is also worth noting that highways in need of reconstruction constitute three-fourths of the total mileage needs, so that the inventory is by no means dominated by new construction needs to serve new growth.

Turning to local highway conditions, the Garfield Schwartz Associates' survey in 1982 obtained qualitative assessments of highway conditions by local officials. These results are summarized in Table 3. The median response is that local roads are in good condition with a few counties indicating excellent road conditions and several others indicating fair conditions. No county indicated poor overall road conditions.

Based on national estimates of highway deficiencies, nearly three-fourths of Maryland's locally-maintained highways need work, but most of these miles require only resurfacing at a much lower per mile cost than major reconstruction or new construction.* If these national averages are applied to Maryland's local highways, the cost

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*The Road Information Program, State Highway Funding Methods, June, 1983.

TABLE 3

CONDITION OF COUNTY-MAINTAINED HIGHWAYS IN MARYLAND

County	Miles	Overall Condition
Allegany	543	Excellent
Anne Arundel	1,316	Good
Baltimore City	1,884	Fair
Baltimore County	2,208	Good
Calvert	268	Excellent/Good
Caroline	468	Good
Carroll	835	Fair
Cecil	511	na
Charles	441	Good
Dorchester	565	Good
Frederick	1,067	Excellent/Good
Garrett	697	Good
Harford	780	Fair
Howard	565	Good/Fair
Kent	237	na
Montgomery	1,645	Good
Prince George's	1,311	Fair
Queen Anne's	459	Good
St. Mary's	441	na
Somerset	336	Fair
Talbot	344	Good
Washington	718	Good
Wicomico	656	Excellent/Good
Worcester	490	Good
Total	18,786	

Sources - Maryland State Highway Needs Inventory, 1980 and Questionnaire prepared by Garfield Schwartz Associates, Inc. for the Maryland Department of State Planning Infrastructure Study, 1982.

to eliminate deficiencies in the 20,566 miles of local highways totals $6.6 billion (see Table 4). This is a much lower estimate than is derived from applying cost and mileage estimates from the state highway needs inventory, and it can probably be considered as a lower bound on the probable range. In the absence of better data it seems appropriate to use such a conservative estimate.

Bridges

Maryland's bridges, like most other state's, are in worse condition than its highways. Self-assessments from the 1982 Garfield Schwartz survey indicate no counties in the excellent category and five which describe their bridges as being in poor condition (see Table 5). The median response is fair rather than good.

There is better information on bridge conditions at the local level than is the case for highways. In 1982 the Road Information Program conducted a special survey of bridge conditions in Maryland.* According to their survey, 944 bridges in the state were structurally deficient and another 540 were functionally obsolete (see Table 6). The total cost to eliminate these deficiencies is estimated to be $674 million.

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*The Road Information Program, An Assessment of Maryland's Bridge Deficiencies, March, 1982.

TABLE 4

ESTIMATED NEEDS OF LOCALLY-MAINTAINED HIGHWAYS
BY TYPE OF CONSTRUCTION

	Miles	Cost in Millions*
County and Municipal System	20,566	-
New Construction Needs	1,049	$3,715
Reconstruction Needs:		
Major	2,406	1,444
Resurfacing Only	11,661	1,458
Total	15,116	$6,617

*1982 dollars.

Sources - Estimated from Maryland State Highway Needs Inventory and State Highway Funding Methods.

TABLE 5

CONDITION OF COUNTY-MAINTAINED BRIDGES IN MARYLAND

County	Number of Bridges	Overall Condition
Allegany	100	Poor
Anne Arundel	34	Fair/Good
Baltimore City	337	Fair
Baltimore County	300	Fair
Calvert	6	Good/Fair
Caroline	35	Good
Carroll	124	Good
Cecil	na	na
Charles	0	na
Dorchester	22	Poor
Frederick	142	Good
Garrett	124	Poor
Harford	196	Poor
Howard	76	Fair
Kent	na	na
Montgomery	158	Good
Prince George's	na	na
Queen Anne's	36	Fair
St. Mary's	na	na
Somerset	24	Poor
Talbot	na	na
Washington	77	Good
Wicomico	35	Good
Worcester	45	Good
Total	1871	

Source - Questionnaire prepared by Garfield Schwartz Associates, Inc. for the Maryland Infrastructure Study, Department of State Planning, 1982.

TABLE 6

CONDITION OF
BRIDGES IN MARYLAND

	Number Structurally Deficient	Number Functionally Obsolete	Cost to Eliminate Deficiencies*
County Maintained	778	240	$254.5
State Maintained	166	300	419.4
Total	944	540	$673.9

*Millions of 1982 Dollars

Source - An Assessment of Maryland's Bridge Deficiencies. The Road Information Program, 1982.

When the highway and bridge needs are combined for both state and local systems, the total need estimate is $15.7 billion.

The Port of Baltimore*

The Port of Baltimore is the second largest container port on the North Atlantic Coast. In addition, the Port offers a variety of specialized and bulk cargo facilities and ships the second largest tonnage of export coal in the nation. Its primary comparative advantage over other North Atlantic ports is its geographic location closer to the industrial Midwest in both distance and transportation cost.

The Port is the single largest economic asset of the state. Nearly 80,000 Maryland residents are employed by organizations that are related to the Port. In 1980, $1.2 billion in revenues, including $1 billion in personal income to Maryland residents, was generated from Port activities.

To attract containerized cargo it is necessary to invest in modern container handling facilities. The Port presently handles nearly 5 million tons of containerized cargo annually, with over

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*This section draws heavily on Maryland Department of Transportation, State Report on Transportation, December, 1982.

3.5 million moving through state-owned terminals. New container berths at Dundalk are near completion and should begin to handle cargo by the beginning of 1983. The state plans to begin construction of the first berth of the new Seagirt Marine Terminal, which is expected to be operational by 1988.

The state's long term plan calls for the completion of three berths at the Seagirt Marine Terminal with future expansion at Masonville. Together the Seagirt and Masonville facilities will increase the capacity of the publicly owned terminals to 10 million tons.

Between 1983 and the year 2000, these facilities are expected to cost $283 million.

Another issue the Port of Baltimore faces is the deepening of the main ship channel from 42 feet to 50 feet. In 1970, Congress authorized a 50 foot channel for Baltimore Harbor, and its approaches. This project has secured all necessary permits but is being held up because of lack of funding. Estimates of the cost of this deepening range from $300 million upward. Because of the uncertainty of the funding, the tentative nature of the current cost estimates, and the indivisible nature of the project (it is useless to dredge only part of the channel to 50 feet and nearly useless to dredge all of it to 45 or 48 feet if deep-draft ships need 50 feet), dredging has not been included in the total infrastructure

needs calculations. It is difficult to know how it should be treated: historically the federal government has paid all costs of channel dredging -- in which case it is not really a Maryland infrastructure problem. The Reagan Administration has proposed user fee financing. If a compromise is reached, the dredging may very well pay its own way with a combination of federal grants and user fees. Therefore, it is not included here.

Baltimore-Washington International Airport

The Baltimore-Washington International Airport (BWI) continues to experience growth even in a period of national passenger decline. In 1981, BWI served 30,000 more passengers than in 1980, while the national passenger total fell by 15.6 million. Air cargo tonnage at BWI was up 29.4 percent between 1980 and 1981, while it rose only 7.2 percent nationally. The airport's new terminal was completed in the late 1970's and no major new capital needs are expected to arise until federal policy toward BWI's regional competitors (National Airport and Dulles Airport) is settled. National and Dulles are the only civilian airports owned by the federal government, and their future growth depends on federal policy as much as on economic forces. The only new facilities currently planned are an expansion of cargo handling space and the development of a Foreign Trade Zone at the airport. These are expected to cost $31 million.

Mass Transit

Maryland is expected to spend $1,084 million on mass transit between 1983 and the year 2000. Both the Washington Metropolitan Area Transit Authority (WMATA) and the Mass Transit Administration (MTA) in Baltimore are building additional subway mileage, and this accounts for the largest share of these funds. Maryland's share of the WMATA costs if the subway system is completed add up to $740 million. The cost of further work on the Baltimore subway is approximately $200 million. A total of $16 million of these mass transit funds are for railroad improvements for the state-subsidized commuter rail service between Baltimore and Washington. The remaining $128 million is intended for replacement of aging buses and substantial rehabilitation of bus garages in Baltimore. The MTA bus fleet has an average age of 10 years and the oldest buses are 19 years old.

Summary of Transportation Needs

The total cost of highway and bridge needs identified here includes the following:

State Highways	$ 8,400 million
Local Highways	6,617 million
Bridges	674
	$15,691 million

This corresponds to an annual rate of spending of more than $900 million between now and the year 2000. By contrast, actual state and local

spending on highways and bridges in recent years has been less than $500 million, a substantial shortfall.

Other transportation infrastructure needs include:

Mass Transit	$1,068 million
Airports	31 million
Railroads	16 million
Port of Baltimore	283 million
	$1,398 million

At an annual rate this is just over $80 million per year from now until the year 2000. Unfortunately, comparisons with historical spending trends are not helpful. The distortion caused by spending on the Baltimore and Washington subway systems and on the new terminal at BWI airport prohibits meaningful comparisons. Furthermore, these needs estimates for non-highway infrastructure are based on capital budget plans for actual construction. Thus, they differ from the highway needs estimates, which are not constrained by budgetary considerations.

III. Water Supply and Sewage Systems

Water Supply

Maryland is served by some 625 water supply systems which provide water for more than 90 percent of the state's 4.2 million residents. However, the largest 35 of these systems are responsible for 3.6 million residents (87 percent of the state's population), and the largest two, Baltimore and the Washington Sanitary and Sewer Commission, serve 2.9 million people (70 percent of the population). Because of the dramatic differences in scale among these systems, they also differ markedly in the sophistication of their planning efforts as noted by Petzold and Sawyer in their 1981 report on water supply planning in Maryland.*

Water supply is a local responsibility in Maryland, but there are several state assistance programs available. Local governments are generally satisfied with their water supply systems, generally rating them good or excellent (see Table 7). Although three counties described their systems as between fair and good, only Baltimore City, with the oldest system in the state, described its system as fair.

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*Donald Petzold and Stephen Sawyer, The Structure and Status of Water Supply Planning in Maryland.

TABLE 7

CONDITION OF WATER SUPPLY AND
SANITARY SEWER SYSTEMS IN MARYLAND

County	Water Supply System Condition	Sanitary Sewer System Condition
Allegany	Good	Good
Anne Arundel	Good	Fair
Baltimore City	Fair	Fair
Baltimore County	Fair/Good	Fair
Calvert	Fair/Good	Good
Caroline	na	na
Carroll	Fair/Good	Excellent
Cecil	Good	Good
Charles	Good	Good
Dorchester	Good	Good
Frederick	Excellent	Excellent/Good
Garrett	Good	Fair/Poor
Harford	Good	Good
Howard	Good	Good/Excellent
Kent	Excellent	Good
Montgomery	Good	Good/Excellent
Prince George's	Good	Good/Excellent
Queen Anne's	na	Excellent
St. Mary's	Excellent	Good
Somerset	Excellent	Excellent
Talbot	na	Excellent
Washington	Good	Good/Excellent
Wicomico	Excellent	na
Worcester	na	Good

Source - Questionnaire prepared by Garfield Schwartz Associates, Inc. for the Maryland Infrastructure Study, Department of State Planning, 1982.

Local data on both water supply and sewer system needs have been collected and reconciled by the Maryland Department of Health and Mental Hygiene.* They distinguish repairs and improvements to existing systems from new growth needs. The total cost of eliminating existing problems is $117 million, with more than half ($62 million) located in two jurisdictions, Baltimore City and Montgomery County (see Table 8). The cost of water supply for new growth areas is substantially higher at $516 million.

Sewage Systems

Sewage treatment is also a local responsibility in Maryland and Table 7 also identifies the counties' assessments of their sewer systems' conditions. Most sewer systems are perceived as in good condition, but there are a few more counties in the fair category than was the case for water supply systems. Garrett County described its sewer system as between fair and poor. These qualitative self-assessments are difficult to compare or evaluate, but their consistency within counties for different systems is supported by the needs estimates compiled by the Department of Health and Mental Hygiene. Not only do the counties rate their systems worse, but the dollar estimates for sewer system needs for existing problems are considerably greater than for water supply systems. As Table 9

*Maryland Department of Health and Mental Hygiene, Report on Environmental Protection Infrastructure Needs in the State of Maryland, 1983 (draft).

TABLE 8

NEEDS OF WATER SUPPLY SYSTEMS IN MARYLAND

Thousands of Dollars

County	Existing Problem	New Growth
Allegany	$ 8,931	$22,533
Anne Arundel	5,129	80,217
Baltimore City	24,834	65,882
Baltimore County	3,027	91,786
Calvert	2,233	3,376
Caroline	3,142	1,089
Carroll	1,981	16,198
Cecil	1,166	16,040
Charles	1,627	3,445
Dorchester	451	3,945
Frederick	1,391	3,709
Garrett	0	5,792
Harford	983	20,705
Howard	6,238	18,217
Kent	5,781	1,279
Montgomery	37,633	93,801
Prince George's	0	49,908
Queen Anne's	1,362	1,215
St. Mary's	72	1,066
Somerset	4,544	84
Talbot	84	2,129
Washington	1,417	7,796
Wicomico	4,056	2,244
Worcester	539	3,844
Statewide	$116,622	$516,303

Source - Report on Environmental Protection Infrastructure Needs in the State of Maryland. (Draft)

indicates, the statewide total for existing sewage problems is $727 million compared to only $117 million for existing water supply problems (Table 8). New growth needs for sewer systems are also greater -- $882 million compared to $516 million for water supply systems.

Several factors related to sewer systems may affect how much of these needs will be met. Some counties have removed planned sewer systems from their development plans in recent years, particularly where the area planned for inclusion in the system is already developed with septic systems and is not experiencing immediate problems. This reluctance to connect to the system arises from the dramatic increases in sewer construction costs of the 1970's and from upward revisions in cost allocation formulas and hookup fees. If such a trend continues, it may well affect the need estimates reported here. In at least one county in Maryland, however, the courts have required the county to live up to its development plan once it had sold sewer hookup rights to developers.

Other Environmental Infrastructure Needs

In addition to water supply and sewer systems, Maryland has two other significant categories of environmental infrastructure for which data are available. Cost estimates for solid waste disposal are less precise than for water and sewer systems, but

TABLE 9

NEEDS OF SANITARY SEWAGE SYSTEMS IN MARYLAND

Thousands of Dollars

County	Existing Problem	New Growth
Allegany	$ 9,860	$ 627
Anne Arundel	57,726	98,785
Baltimore City	495,000	412,344
Baltimore County	573	66,058
Calvert	3,840	4,010
Caroline	3,418	1,567
Carroll	6,393	17,937
Cecil	6,737	2,820
Charles	1,793	1,154
Dorchester	4,180	1,157
Frederick	20,991	8,878
Garrett	6,808	2,082
Harford	3,198	1,634
Howard	984	13,518
Kent	3,842	5,827
Montgomery	3,115	53,913
Prince George's	37,079	148,931
Queen Anne's	7,531	3,404
St. Mary's	7,286	3,644
Somerset	4,201	3,012
Talbot	7,755	2,024
Washington	17,925	9,591
Wicomico	12,272	3,556
Worcester	4,453	15,074
Statewide	$726,960	$881,550

Source - Report on Environmental Protection Infrastructure Needs in the State of Maryland. (Draft)

the best estimates are that Maryland will need to spend about $323 million on solid waste infrastructure during the rest of this century (see Table 10). This estimate does not include hazardous waste disposal because the estimates were too unreliable. Capital facilities to deal with agricultural runoff are expected to cost another $160 million.

Summary of Water and Sewer Needs

The total cost of water supply system and sewer system needs includes:

Water Supply	$ 633 million
Sewerage	1,609 million
	$2,242 million

In addition, other environmental infrastructure needs include:

Solid Waste Disposal	$ 323 million
Agricultural Runoff Control	160 million
	$ 483 million

These amounts are equivalent to approximately $160 million annually between 1983 and the year 2000, less than half of current spending levels. Reductions in the federal financing share for these projects will significantly reduce this difference, but water and sewer system needs appear to be manageable in Maryland.

TABLE 10

OTHER ENVIRONMENTAL INFRASTRUCTURE NEEDS
IN MARYLAND

Thousands of Dollars

County	Solid Waste	Agricultural Runoff
Allegany	$ 3,800	$ 4,060
Anne Arundel	0	2,124
Baltimore City	6,000	---
Baltimore County	6,000	6,133
Calvert	0	4,239
Caroline	10,000	1,498
Carroll	2,700	12,645
Cecil	0	9,915
Charles	2,000	5,652
Dorchester	10,000	430
Frederick	0	24,482
Garrett	3,000	8,576
Harford	6,500	12,063
Howard	0	4,887
Kent	0	10,188
Montgomery	250,000	13,163
Prince George's	0	5,274
Queen Anne's	10,000	11,510
St. Mary's	0	6,195
Somerset	3,000	440
Talbot	10,000	2,018
Washington	0	12,089
Wicomico	0	2,033
Worcester	0	756
Statewide	$323,000	$160,370

Source - Report on Environmental Protection Infrastructure Needs in the State of Maryland. (Draft)

IV. Revenues

Infrastructure needs must be financed if they are to be met. There is a limited number of sources for these funds in any state. They can come from federal aid, from current revenues, or from borrowing (bonds). While infrastructure needs are relatively high, federal aid has been steadily declining for a decade, and state and local infrastructure spending has declined along with federal aid. It is technically feasible for Maryland to afford all of the infrastructure needs identified here, but the real issue is political not technical. The tradeoff between taxes and the quality of infrastructure is a political question which this section does not try to answer. Instead it looks at historical infrastructure spending trends and makes projections to the year 2000. The following section compares these projections with the infrastructure needs already identified.

Tables 11, 12, and 13 are based on Census of Governments' data. They reflect only capital spending, not current expenditures and they provide the only comprehensive source of information on local government infrastructure spending in Maryland that is both consistent and reliable. Unfortunately, part of the price that must be paid for this consistency is the delay in their availability. The most recent year for which data are published is 1981, so the "real" amounts reported here have been adjusted to obtain their equivalents in 1982 dollars.

TABLE 11

STATE INFRASTRUCTURE CAPITAL OUTLAY

Millions of Current Dollars

	1971-72	1976-77	1980-81
Highway	158.7	160.6	147.0

Millions of 1982 Dollars

	1971-72	1976-77	1980-81
Highway	353.7	241.0	157.4

Sources - Census of Governments and Governmental Finances.
Deflator - State and Local Government Purchases of Goods and Services

TABLE 12

LOCAL INFRASTRUCTURE CAPITAL OUTLAY

Millions of Current Dollars

	1971-72	1976-77	1980-81
Highway	79.0	157.6	255.7
Sewerage	72.2	101.3	181.2
Water Supply	37.8	30.6	95.2

Millions of 1982 Dollars

	1971-72	1976-77	1980-81
Highway	176.1	236.5	273.7
Sewerage	160.9	152.0	193.9
Water Supply	84.3	45.9	101.9

Sources - Census of Governments and Governmental Finances.
Deflator - State and Local Government Purchases of Goods and Services.

TABLE 13

STATE AND LOCAL INFRASTRUCTURE CAPITAL OUTLAY

Millions of Current Dollars

	1971-72	1976-77	1980-81
Highway	237.7	318.2	402.7
Sewerage	72.2	101.4	181.2
Water Supply	37.8	30.6	95.2

Millions of 1982 Dollars

	1971-72	1976-77	1980-81
Highway	529.8	477.7	431.1
Sewerage	160.9	152.2	193.9
Water Supply	84.3	45.9	101.9

Sources - Census of Governments and Governmental Finances.
Deflator - State and Local Government Purchases of Goods and Services

During the past decade the State of Maryland substantially reduced its direct spending on highway infrastructure. In current dollars, Maryland spent $158 million on highway infrastructure in fiscal 1972 (see Table 11). Ten years later, in fiscal 1981, Maryland spent $147 million but those 1981 dollars were worth a lot less because of inflation. In 1972 terms, they were equivalent to only $71 million. In other words, real state spending on highways fell by more than half in this decade. Expressed in 1982 dollars, the 1972 spending was equivalent to $354 million but had fallen to $157 million by 1981.

At the local government level, the pattern was much different. Highway spending rose dramatically, both in current and in real dollars (see Table 12). Local governments in Maryland increased their real spending on highways by more than 50 percent during this period. Water and sewer spending also rose both in current and in real dollars, though the increase was less dramatic and in both cases spending in real terms fell in the middle of the decade.

These tables identify only who spent the final dollars. They do not indicate where the dollars came from. Thus, increases in state highway aid to local governments would not appear as state highway spending in Table 11, but would be counted as local highway spending in Table 12. Because a detailed accounting of state aid to local governments for the past decade was beyond the scope of this study, the best way to get a picture of real spending trends is simply to combine state and local direct spending. Table 13 presents

the combined spending trends, and it can be seen that the reduction in real state highway spending was not completely offset by the increase in real local spending on highway infrastructure.

Part of the reason for the state's reduced real spending on highways was its dependence on the gas tax. When gas prices rose rapidly in the 1970's, users reduced their consumption, thus reducing total revenues to the Transportation Trust Fund (TTF) in a period of rapid inflation. The gas tax rate was increased in 1982 and current TTF revenue projections by the state appear in Table 14. The revenues available for capital investment are presented as ranges because the TTF also supports a variety of current expenditure programs, some of which are of uncertain magnitude. A good example is the Baltimore Subway, which is scheduled to begin service in November, 1983. Until it has been in operation for a period of time, it is difficult to estimate the magnitude of operating subsidy which it will require.

Table 15 presents two alternative projections for infrastructure spending between 1983 and the year 2000. Based on the information in Tables 11 and 12, it indicates the cumulative and annual spending levels if the current level of infrastructure spending is maintained and if the ten-year trend in infrastructure spending is continued until 2000. The current spending assumption has two advantages for our purposes. First, it provides a useful political benchmark. It indicates what will happen in terms of unmet infrastructure

TABLE 14

TRANSPORTATION TRUST FUND PROJECTIONS

Millions of 1982 Dollars

	Capital Program	Revenues Available for Capital	
	1983-1988	1983-1993	1983-2003
Highways	$ 895		
Port	124		
Mass Transit	104	$1,500-$2,500	$2,500-$5,000
WMATA	134		
Aviation	27		
Railroad	9		
Total	$1,293		

Source - State Report on Transportation. December, 1982

TABLE 15

STATE AND LOCAL SPENDING PROJECTIONS

Millions of 1982 Dollars

	At Current Spending Levels		At 10 Year Trend Growth	
	Cumulative 1983-2000	Annual Average 1983-2000	Cumulative 1983-2000	Annual Average 1983-2000
State Highways and Bridges	2,669	157	2,212*	130*
Local Highways and Bridges	4,658	274	6,741	375
Water Supply	1,734	102	1,803	100
Sewerage	3,298	194	3,443	191

*Assumes midpoint of MDOT 20-year revenue estimate and same share of Transportation Trust Fund as planned in the 1983-1988 Capital Program.

Sources - Based on data from Census of Governments and Governmental Finances.

needs if we simply continue our current policies. Second, it turns out to yield a more conservative result so that we do not risk underestimating the magnitude of the problem any more than our conservative estimates of infrastructure needs have already done.

The current assumption may be slightly low for projecting highway spending because the new federal gas tax may increase federal aid to states for transportation. The current level for water and sewer spending, on the other hand, is too high for projections because EPA grants have already been reduced from a 75 percent federal share to a 55 percent federal share with continued pressure for further reductions. Without federal aid, current spending would be much lower.

V. Conclusions

This study has examined Maryland's infrastructure needs for transportation, water supply, and sewer systems. It has also projected the revenues available for infrastructure during the rest of this century. Table 16 combines these results and looks at the shortfall of revenues. The table's first column summarizes the infrastructure needs which total more than $19 billion. More than $1 billion of this is transportation-related. Projected revenues total only $13.5 billion, so there is a net shortfall of $5.8 billion. This is equivalent to $343 million annually, just over 5 percent of a state budget in the $6 billion range.

The revenue projections for water and sewer systems, however, are more than double the needs in those areas, while the shortfall in transportation is more than $8 billion. Thus, the problem is acute for transportation infrastructure and apparently nonexistent for water and sewer systems. As the federal aid share of water and sewer projects shrinks in coming years, local spending levels are very likely to decline substantially, so that surplus may well disappear. Indeed, it could become a shortfall if federal aid is eliminated, if water quality standards rise, or if unforeseen needs arise. In any case, it is not earmarked money like that in the TTF. The revenue projection is based on current spending which is at an historically high level. Unless there is continued need for this level of spending the funds will be quietly reallocated.

TABLE 16

SUMMARY OF CAPITAL INVESTMENT NEEDS AND RESOURCES, 1983-2000

Millions of 1982 Dollars

	Needs	State and Local Revenues*	Revenue Surplus (Shortfall)	Average Annual Revenue Surplus (Shortfall)
State Highways	8,400			
Local Highways	6,617	7,327	(8,364)	(492)
Bridges	674			
Mass Transit	1,068			
Airports	31	1,128	(270)	(15)
Railroads	16			
Port of Baltimore	283			
Water Supply	633	1,734	1,110	65
Sewerage	1,609	3,298	1,689	99
Total	19,331	13,487	(5835)	(343)

*From Table 15, Column 1.

The transportation shortfall is a more serious problem. The gas tax is scheduled to become an ad valorem tax in 1986 so the TTF will be protected from sudden increases in gas prices. But despite that change, the state's projections are inadequate to finance a very large part of the transportation needs identified here. Increased revenues from the new federal gas tax may help to close this gap but it is far too large a deficit to eliminate without an explicit major effort.

Three conclusions emerge most clearly from this analysis. First, considering the potential magnitude of the problem, too little attention has been paid to infrastructure conditions. The local data for Maryland leave much to be desired and make any estimates of needs (such as those presented here) very tentative. Standardized local data would help enormously in formulating a sensible and prudent infrastructure policy.

Second, without a substantial federal role in infrastructure financing, we are virtually certain to see some jurisdictions with serious unmet infrastructure needs and inadequate resources to meet them, while other jurisdictions have their problems well under control. To some extent, careful capital budgeting can protect local governments against overwhelming infrastructure problems, but our older urban centers often start out with the oldest infrastructure stock and the fewest resources. In Maryland, Baltimore City certainly fits that description. Despite a sophisticated capital budgeting system, the City's fiscal resources are hard pressed to cope with the needs of its aging infrastructure.

Finally, it is important that some degree of comprehensive infrastructure planning take place. This is important not only so that the population is well served with all types of infrastructure but because all the expenditures are dependent on the same tax base.

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