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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 5. INDIANA

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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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**INDIANA'S INFRASTRUCTURE REQUIREMENTS  
1982-2000**

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**Division of Research  
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**September 1983**



## Contents

1. Introduction	Page 1
2. Economic Profile, Capital Budgeting and Planning Process	4
3. Indiana Highways	8
4. Airports	51
5. Public Transportation	75
6. Waste Water Treatment	85
APPENDIX	95
i Solid Waste Management	96
ii Railroads	112
iii Water Supply	122
iv Indiana Ports	124

## 1. INTRODUCTION

This study covers the infrastructure requirements for the State of Indiana up to the year 2000. The study is part of a larger effort being conducted by the Joint Economic Committee of the Congress in association with the University of Colorado.

The objective of the study is to aggregate projections of infrastructure needs for the State of Indiana up to the year 2000 and match these needs with projected revenues for the state during the same time period. Only the following sectors of the state's infrastructure have been covered:<sup>1</sup>

- (i) Highways
- (ii) Airports
- (iii) Public Transit
- (iv) Waste water treatment facilities

The study uses published studies dealing with the above subject. No attempt has been made to justify the results of these existing reports. At best this is a first step in evaluating the task faced by the people of the state in identifying future infrastructure requirements and the potential funding problems.

Most of the reports used were published some time ago; in many instances there were major gaps in the availability of the data. The aggregate needs thus identified in this study should be taken as an indication of the effort required rather than the actual requirements of needs.

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<sup>1</sup>Appendices provide brief background material on other selected infrastructure requirements for railroads, water supply and solid waste management, and Indiana ports.

The "gap" of \$28 billion shown in Table 1 between projected needs and revenues is such that it warrants considerable attention of the state leaders and law makers. The state is faced with many decisions affecting it's economy; investment in Indiana's infrastructure could have a great impact on the future prosperity of all Hoosiers.

Readers will find a considerable amount of data in these pages. They are not filler, but a reflection of the frustration researchers have in attaining a comprehensive view of the subject. Perhaps those who follow will find less frustration because these pages have been included.

(NOTE: This study was funded, in part, by a grant from the Cummins Engine Foundation.)

TABLE 1  
 Summary Requirements To Year 2000  
 Millions Of (1982) Dollars

	<u>Requirements</u>	<u>Funds Availability</u>	<u>"GAP"</u>
Highways	\$ 38,983	\$22,907 a)	\$16,076
Airports	1,083	237 b)	846
Public Transport	2,560	524 b)	2,036
Waste water treatment	9,300 c)		9,300
	<hr/>	<hr/>	<hr/>
TOTAL	\$ 51,926	\$23,668	\$28,258

a) Funds availability includes funds expected to be generated by dedicated user taxes operating revenues appropriations from general funds and federal funds.

b) Operating revenues.

c) Approximately \$4.8 billion are eligible for EPA grants.

## 2. ECONOMIC PROFILE, CAPITAL BUDGETING AND PLANNING PROCESS

Indiana is the 12th most populous state in the union with approximately 5.5 million persons. In terms of area it ranks as the 34th largest state. Metropolitan areas have 69.8 percent of the population and the state capital Indianapolis, is the 12th largest city in America.

In the last decade, however, the population growth rate in Indiana has been almost half of the national average and thirty five states experienced a higher growth rate. During 1980-82 there was a net migration of 107,000 people out of Indiana and a population loss of 20,000 persons.

The state is strategically located with almost twenty percent of the nation's population living in Indiana and its contiguous states. It shares the Lake Michigan shoreline with Michigan to the north and Illinois to the west, a land border with Ohio in the east, and the Ohio River with Kentucky in the south .

It is a major industrial and agricultural state; value added by its industry amounted to over \$27 billion in 1980 which ranks it ninth in the nation in terms of value added by manufacture. In agriculture, the state is blessed with highly productive resources of land and manpower and ranks 8th in the nation in terms of cash receipts from its farm produce. Close proximity to markets, abundant water resources and an excellent transportation system, which includes, railroad, highway and river transportation, are major strengths of Indiana's agricultural exports.

In spite of the abundant agricultural resources the major portion (40 percent) of salaries and wages in the state are generated by the manufacturing industries. This compares to a 26 percent figure for the nation as a whole.

Durable goods manufacturing is the dominant sector within the total manufacturing activity. A major part of this sector is the auto industry and other closely related industries. The high concentration of capital goods industries leaves Indiana in a very vulnerable position during recessionary periods as is evidenced by the high unemployment rates in Indiana during the last few years. The state's 11.6 percent unemployment rate of 1982 was well above the national average of 10.8 percent. It is commonly feared that many of the jobs lost in the recession will never be replaced; the dominant industries in Indiana (autos, steel) are thought by some to be declining industries. Coupled with this is the trend of industries to relocate to the sunbelt region leading to a fear that Indiana's full recovery from the recession might take a long time. Currently, state leaders are aggressively seeking the means to diversify the state economy by attracting new industries and firms to locate in Indiana. The task is, however, not an easy one and may require substantial investment in the state's infrastructure before the structural changes can be implemented. Some Hoosiers boast of being the least-taxed people in the U.S.; for example, state revenue per thousand dollars of per capita income was \$149 in 1980 which was the lowest in the country. The low levels of personal taxes may or may not provide incentives for new industries to locate in Indiana, but they do ensure difficulties for the services and infrastructure provided by the state.

In areas in which the state role is large (e.g. highways) there seems to be a better availability of aggregate statewide data and a greater appreciation of the need to develop long range "needs" estimates. In other areas where the local role is predominant (as in solid waste management) lack of data is very apparent. Development of state wide future requirements in many areas is non-existent.

The availability of historic data and needs projections for the future are very poor. Data are present in a meaningful manner usually only from federal sources or where needed in support of a federal grants program. Other data are highly fragmented. Among the various governmental agencies the lack of a strong planning section and the absence of a central data bank make the job of forecasting the future not only hazardous but almost impossible. Most of the state government agencies seem to be technically oriented and confronted with large backlogs of projects. The result is that a need for projecting beyond a few years is not felt.

There would seem to be an aversion to a centralized planning system. Instead, a system is preferred in which a need is developed at the local level, and refined through the political process. Appropriate government agencies pick up these local needs in their budgets after conducting feasibility studies and hearings. If it is approved, the particular need may be satisfied by the implementation of a project. This procedure ensures that at all times the state is faced with fulfilling a backlog of needs. Although this system works in allocating the resources of the state there is definitely a major lag between the time the need is identified and the time when it is finally satisfied.

By the time the need is refined and takes the shape of a project, it sits in a queue along with hundreds of other needs waiting to be funded. The revenue side of the picture cannot anticipate all the needs in advance with the result that there is always a shortage of funds for all the projects. While revenue enhancing measures are sought the backlog of needs mount to staggering proportions.

This system of resource allocation can be supplemented with some kind of long range planning based on professionally recognized standards of service. Total needs of the state could be projected into the future so that the time lag between identification of need and its satisfaction could be reduced. This will allow the state to examine its future needs, to fix priorities, and to focus the attention on necessary revenues. The projection of needs will in no way replace the present system of project identification, approval and execution since most needs projections are based on aggregate data and not on specific projects. Aggregate needs projections can be made periodically, updated say every five years. This would, however, require a central data bank where statewide aggregate data is maintained and updated regularly.

Historically Indiana has made a substantial investment in the states' infrastructure, which has provided Indiana with one of the most efficient transportation systems in the nation. The Transportation Coordinating Board of Indiana estimates the state investment in transportation infrastructure to be over \$10 billion over the past several decades. The replacement value of this investment would of course be many times larger. This investment is summarized in the following sections.



### 3. INDIANA HIGHWAYS

By 1981 Indiana had a total of 91,469 miles of highways, roads and streets of these 11,148 miles were part of the State Highway System (interstate, state routes, U.S. routes) 66,412 miles were part of the county highway system, 13,752 miles belonged to the city street system and 157 miles of toll roads.

The highway network in Indiana is among the best on the national map. With a strategic location, the state has become a highway transportation oriented state. The state capital, Indianapolis, is linked by four interstate highways connecting it to Chicago and Michigan in the north (I-65 and I-69), Ohio to the east (I-70 and I-74), Kentucky to the south (I-65) and Illinois to the west (I-70 and I-74). In addition two east-west interstates cut across the northern part of the state (I-94, I-80-90); the southern portion of the state is served by I64. See Map 1. The state has very appropriately been called the "Crossroads of America".

#### Earlier Studies

In 1965 the Indiana General Assembly directed the Indiana Legislative Advisory Commission to conduct "a comprehensive study of the future needs and finances of public highways, roads and streets in the State of Indiana. The study<sup>1</sup> was published in 1967 and projected the highways needs from 1966 to 1985. The report assessed an average need of \$480 million (in 1965 dollars) per year for construction and maintenance (see Table 1)<sup>2</sup> over the twenty year period.

<sup>1</sup>Guidelines for Progress, Indiana Highways Roads and Streets 1966-1985.  
Cole Williams Engineering Joint Venture, Indianapolis, Indiana.

<sup>2</sup>All tables are at the end of this section.

A 1974 national highway needs report showed the expenditures made during 1970-72 and tabulated the residual needs at \$8.47 billion for capital costs and an average of \$143.8 million annual costs for Maintenance Admin. That study, however, did not develop the full needs for the state and limited their capital improvements program to "reasonable and high priority" level. Thus the needs developed were based on priorities and revenue constraints.

The 1976 Needs Study<sup>2</sup>

The latest<sup>3</sup> needs study was done in 1976 on direction of the Indiana General Assembly (Bill No. 278). The study covered the time period 1976-1995 and developed three need levels:

1. Real Needs
2. Intermediate Needs
3. Minimum Needs

The real needs were based on improvement and associated activities required to ensure the adequacy of all roads and streets for traffic volumes projected for 1995. Both the criteria employed for evaluation of existing and/or future conditions and the standards to which proposed improvements would conform were those employed by the national highway functional classification and needs study (1970-1990)<sup>4</sup>.

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<sup>2</sup>Indiana Highway Needs Study 1976-1995. Clyde E. Williams and Associates, Inc., Nov., 1976.

<sup>3</sup>In January 1982, the Indiana Department of Highways began the development of a long range plan for the period 1985-2005. The department has published an interim report, "Indiana Long Range Highway Plan, Interim Report", January 1983. This report also uses the needs developed in the 1976 study cited above. However, the report focuses on the highways under state jurisdiction.

<sup>4</sup>National Highway Functional Classification And Needs Study Manual 1970-1990, Manual B of National Transportation Planning Study, U.S. Dept. of Transportation, Feb. 1970.

The minimum needs were developed based on certain minimum objectives, the objectives were:

1. Correction of unsafe conditions
2. Restoration and preservation of the existing road and street network
3. Repair and/or replacement of inadequate bridges
4. Accommodation of increased traffic volumes to ensure that during the period 1976-1995 the percentage of capacity deficient mileage for each functionally classified system will not increase between 1976 and 1995, beyond the deficiencies existing upto 1976.
5. Improvement of local access facilities to ensure passability at all times of the year.

The intermediate needs level were in-between the real needs and minimum needs. The actual level was based on fulfilling the "real" needs up to a varying degree for the various classifications as shown below:

<u>System</u>	<u>Percent of Real Needs Fulfilled</u>
Interstate	100
Rural Principal Arterials	75
Rural Minor Arterials	50
Rural Major Arterials	50
Rural Minor Collectors	25
Urban Freeways & Expressways	100
Urban Principal Arterials	75
Urban Minor Arterials	50
Urban Collectors	25

#### Study Projections

The study projected highway needs in mileage according to various classifications up to 1985 and 1995. The total mileage was projected

to grow to 91,740 miles by 1985 and 93,253 miles by 1995. Classifications and jurisdictions over the roads are shown in Table 2 and Table 3. The 1985 projection shows that 80.8 percent of the roads will be in the rural areas. The state will have jurisdiction over 12.4 percent (11,341 miles), county jurisdiction constitutes 72.3 percent (66,303) and cities will control 15.3 percent (14,096 miles) of the total mileage. Similarly the 1995 projection shows rural roads to be 79.2 percent (73,826 miles) while the state jurisdiction will be over 11,454 miles with counties contributing 66,254 miles and the cities with 15,545 miles.

Projection of Needs

Tables 4, 5, and 6 provide the projected needs based on real needs, intermediate needs and minimum needs. The projected needs amount to a staggering \$23.082 billion for real needs and \$14.8 billion for the minimum needs; the intermediate needs amount to \$17.479 billion (in 1975 dollars).

The split among state highways, county roads and urban streets is as follows:

<u>System</u>	<u>Real<sup>a/</sup></u>		<u>Intermediate<sup>a/</sup></u>		<u>Minimum<sup>a/</sup></u>	
	<u>Needs</u>	<u>%</u>	<u>Needs</u>	<u>%</u>	<u>Needs</u>	<u>%</u>
	<u>(000)</u>		<u>(000)</u>		<u>(000)</u>	
State	\$8,794,336	38.1	\$7,731,565	49.2	\$6,113,146	41.2
County	9,255,981	40.1	6,149,019	35.4	5,490,470	37.0
City/Town Streets	5,031,930	21.8	3,563,974	20.4	3,247,622	21.8
TOTAL	23,082,247	100.0	17,474,558	100.0	14,851,238	100.0

<sup>a/</sup>Needs include \$625 million for bridge replacement and repair on county and city roads and \$600 million for bridge replacement on state highways, also included are \$720 million for maintenance repair of state highway bridges.

Updating 1976 To Reflect 1982 Costs

Federal highway statistics were used to reflect current costs and to account for expenditures on highways from 1976-1981. (See Table 7). These expenditures were then deflated to 1975 dollars by using the federal highway agency's construction index (see Table 8). The accumulated expenditures to 1981 based, on 1975 dollars, were subtracted from the estimated needs (see Table 9) to get the net needs from 1982-1995. These figures were then inflated to reflect June 1982 costs. Estimates of the needs based on current costs for the period 1982-1995 are as follows:

	<u>Real</u>	<u>Intermediate</u>	<u>Minimum</u>
	<u>Needs</u>	<u>Needs</u>	<u>Needs</u>
	<u>(000)</u>	<u>(000)</u>	<u>(000)</u>
1982-1995 Needs	35,982,914	23,283,820	19,194,327
1982 \$			
Average Expenditures Per Year	2,570,208	1,663,130	1,371,023

Extending The Study To Year 2000

The 1976-1995 study estimated that, of the total real needs (excluding local access roads and streets) approximately 77 percent represented backlog. If we also assume that 77 percent represents the backlog on the total needs, then the yearly requirement in excess of the backlog can be worked out as below:

Thousands of 1982 Dollars

Total Real Needs 1982-1995	35,982,914
Backlog (77 percent)	<u>27,706,843</u>
Required in excess of backlog	8,276,070
Ave. yearly excess requirements	\$ 591,148

If we further assume that the backlog will be wiped out by the year 1995, then we can arrive at a rough estimate of needs for the following five years (1996-2000) by extending the average yearly requirement of \$592 million over the period 1996-2000 to get a requirement of approximately \$3 billion for that period.

Total Requirements 1982-2000

A rough estimate for the total requirements for highway needs in the State of Indiana for the period 1982-2000 is summarized below:

Thousands of 1982 Dollars

Real needs	
1982-1995 requirement	35,982,914
1996-2000 requirement	<u>3,000,000</u>
Total est. require. 1982-2000	\$38,982,914
Ave. yearly requirement	\$ 2,051,732

The intermediate and the minimum needs can be extended to 2000 by taking the annual average expenditures for the period 1982-1995 and applying them to the following five years. This results in an additional requirement of \$8.3 billion for intermediate needs and \$6.8 billion for minimum needs.

The total requirements up to year 2000 in 1982 dollars are summarized below:

	<u>Real Needs (000)</u>	<u>Intermediate Needs (000)</u>	<u>Minimum Needs (000)</u>
Total Requirement 1982-1995	\$38,982,914	\$31,599,470	\$26,049,442
Yearly Average Requirement	2,051,732	1,663,130	1,371,023

Jurisdiction:

The 1976 study also split the requirements according to highway classifications and identified the jurisdiction of various agencies over the highways. The percentage split is provided below:

<u>Jurisdiction</u>	<u>Percentage Of Annual Total Needs</u>		
	<u>Real</u>	<u>Intermediate</u>	<u>Minimum</u>
State highways:			
a) interstate	3.8	4.7	5.7
b) all others	34.3	39.5	35.5
County Road	40.0	35.4	37.0
City and Town Roads	<u>21.9</u>	<u>20.4</u>	<u>21.8</u>
TOTAL	100.0	100.0	100.0

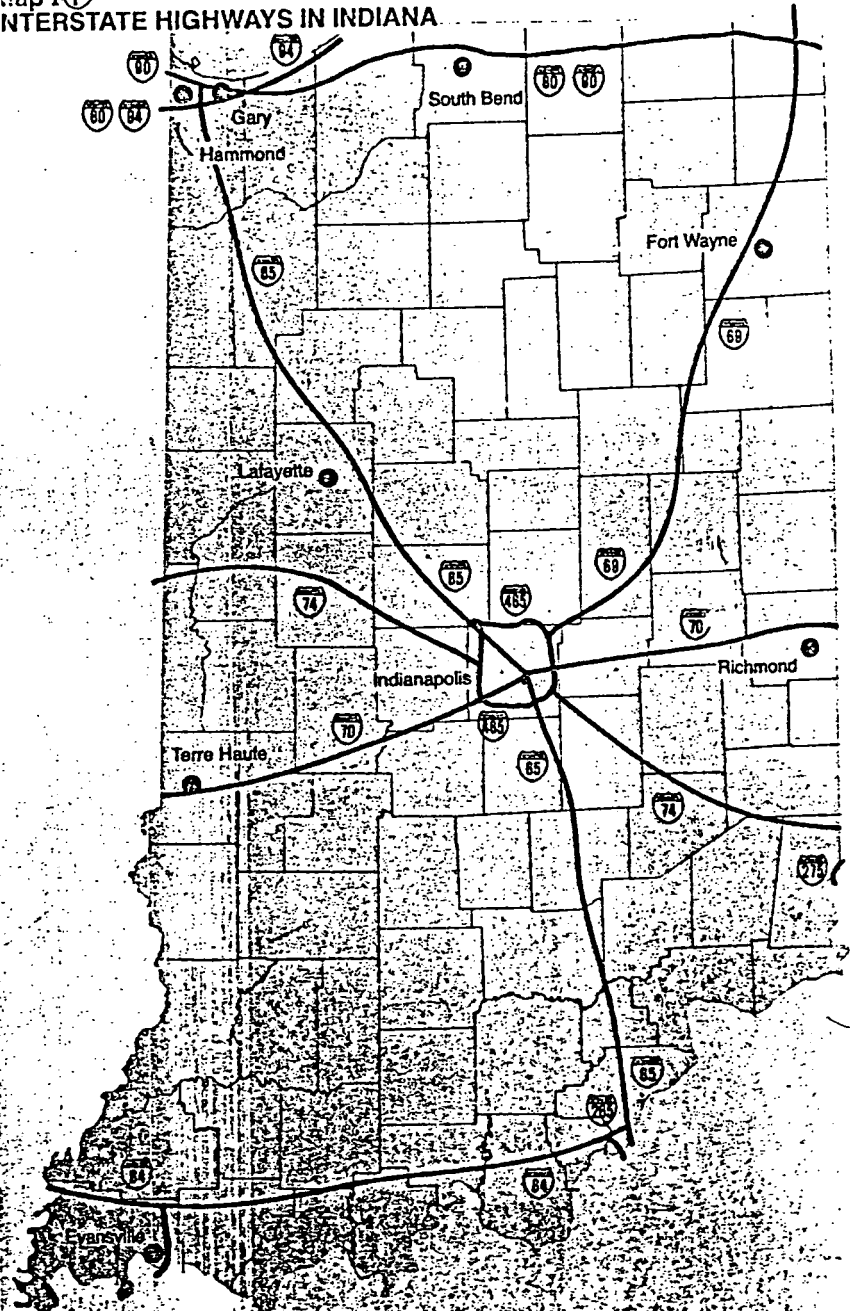
Using the same percentage split we can allocate the needs to the year 2000 as below:

Distribution Of Annual Needs			
Thousands of 1982 Dollars			
	<u>Real</u>	<u>Intermediate</u>	<u>Minimum</u>
State Highways			
a) interstate	77,966	78,167	78,148
b) all others	703,744	656,936	486,714
County Roads	820,693	588,748	507,278
City and Town Streets	<u>449,329</u>	<u>339,279</u>	<u>298,883</u>
	2,051,732	1,663,130	1,371,023

The causes of such a large need for highways in the next two decades is beyond the scope of this study. But a comparison of selected highway statistics for Indiana with those of other states is quite revealing. These statistics are provided in graph form and have been obtained from the FHWA's "Selected Highway Statistics And Charts", 1980. These statistics should be interpreted with care since they are not all encompassing and are only for 1980. They, however, do indicate that during 1980 Indiana spent, relative to other states, a larger amount on maintenance and a smaller amount on capital outlays.

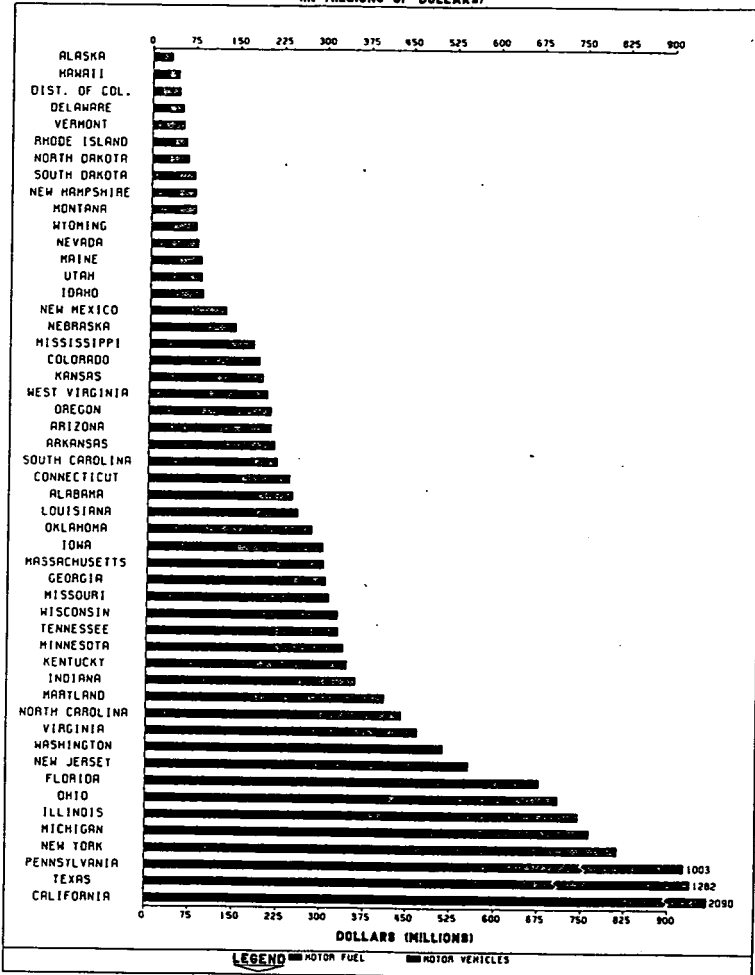


Map 14  
INTERSTATE HIGHWAYS IN INDIANA

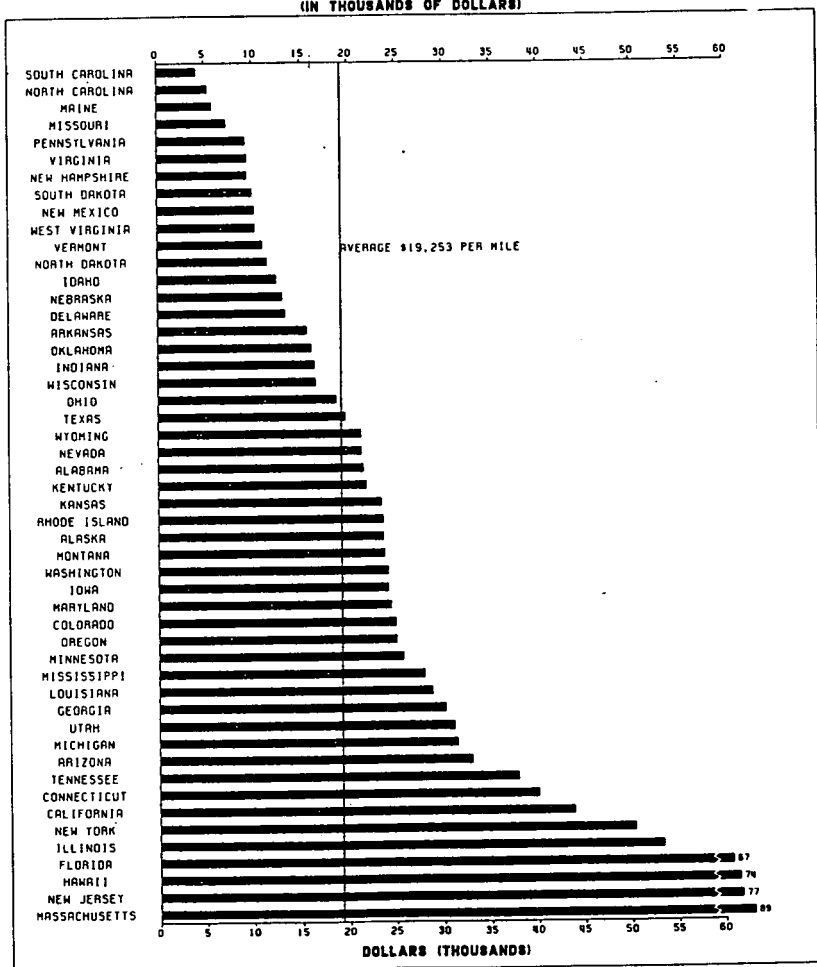


Source: Indiana Department of Highways

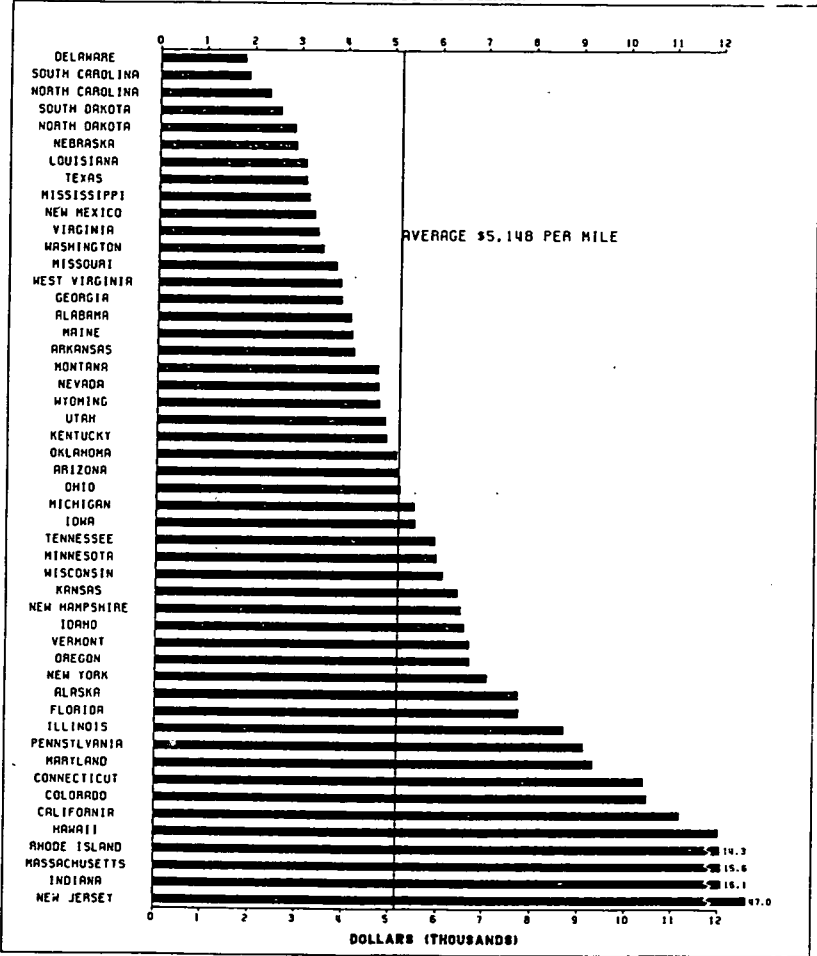
**TOTAL HIGHWAY USER REVENUE  
1980  
(IN MILLIONS OF DOLLARS)**



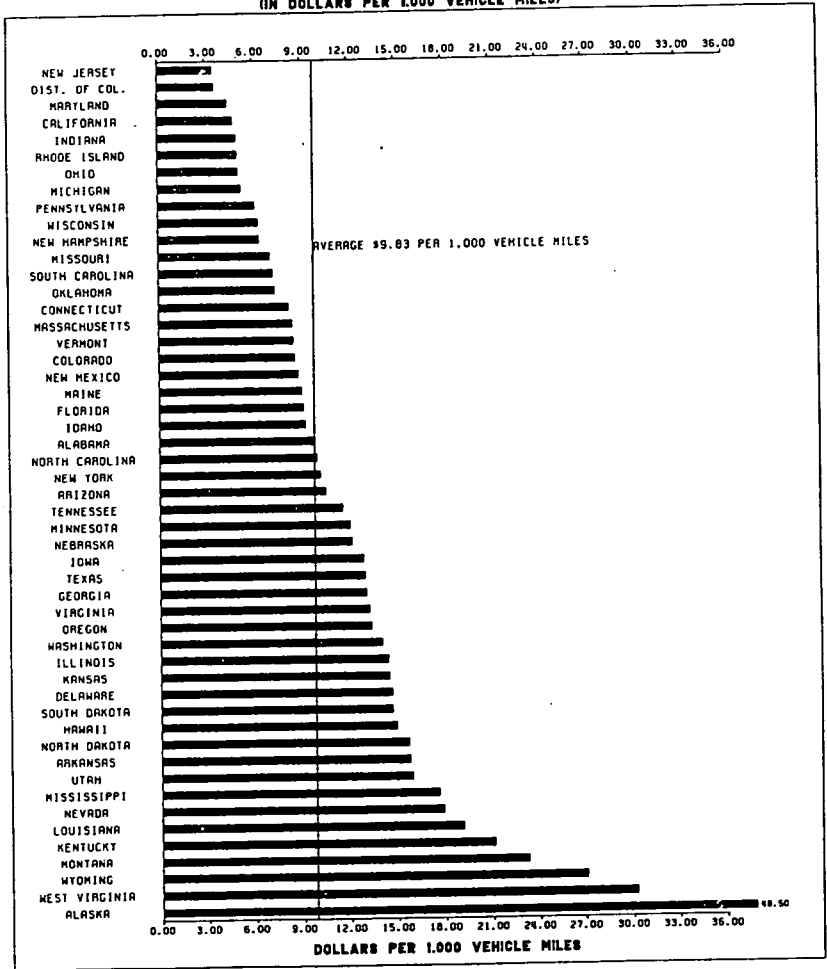
**STATE EXPENDITURES PER MILE FOR  
CAPITAL OUTLAY ON ROADS AND STREETS  
1980  
EXCLUDING TOLL FACILITIES  
(IN THOUSANDS OF DOLLARS)**



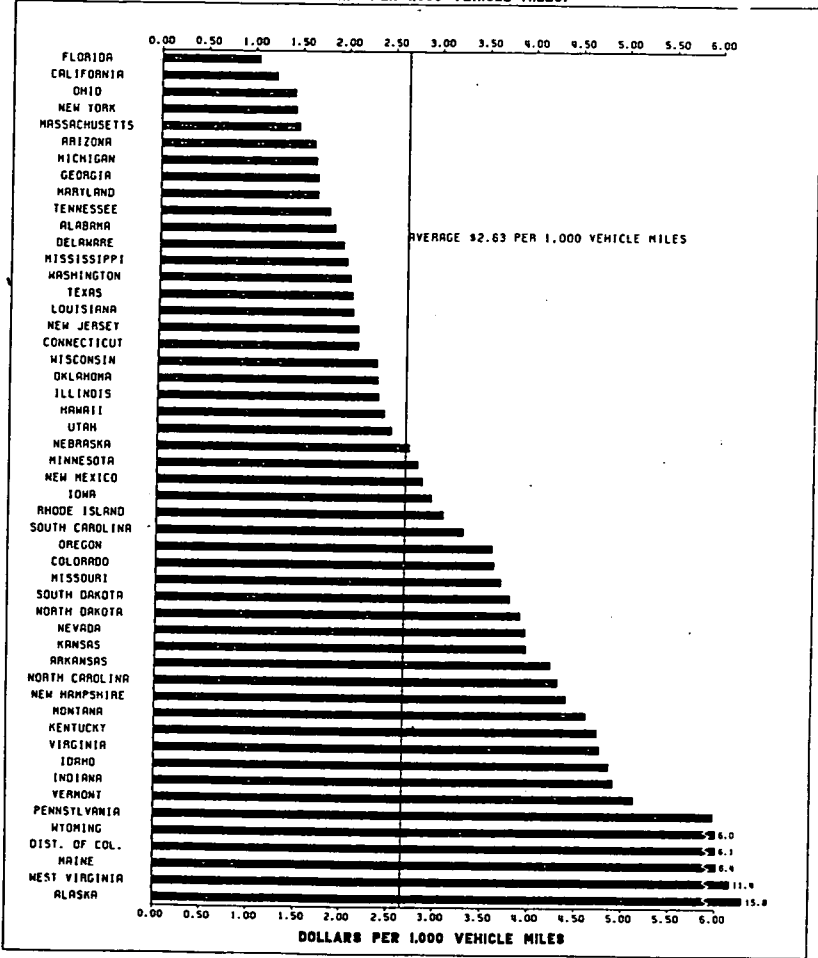
**STATE EXPENDITURES PER MILE FOR MAINTENANCE  
ON ROADS AND STREETS  
1980  
EXCLUDING TOLL FACILITIES  
(IN THOUSANDS OF DOLLARS)**



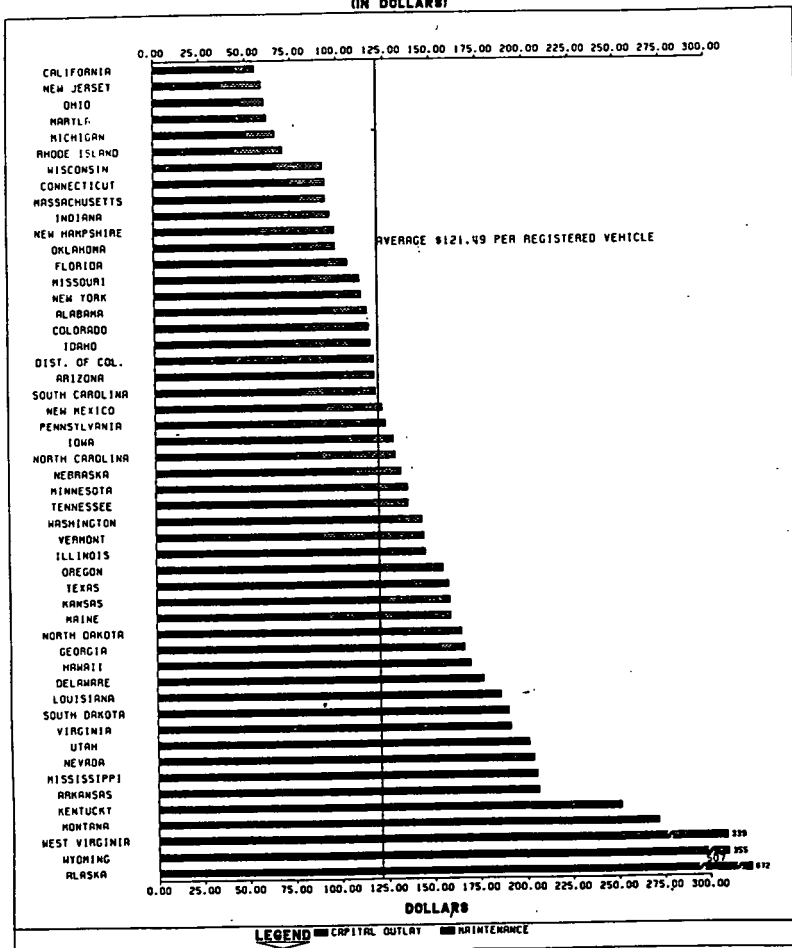
STATE EXPENDITURES PER VEHICLE MILE OF TRAVEL  
 FOR CAPITAL OUTLAY ON ROADS AND STREETS  
 1980  
 EXCLUDING TOLL FACILITIES  
 (IN DOLLARS PER 1,000 VEHICLE MILES)



STATE EXPENDITURES PER VEHICLE MILE OF TRAVEL  
 FOR MAINTENANCE ON ROADS AND STREETS  
 1980  
 EXCLUDING TOLL FACILITIES  
 (IN DOLLARS PER 1,000 VEHICLE MILES)



**STATE EXPENDITURES PER REGISTERED VEHICLE  
FOR CAPITAL OUTLAY AND MAINTENANCE  
ON ROADS AND STREETS  
1980  
EXCLUDING TOLL FACILITIES  
(IN DOLLARS)**



### Revenues For Highway Uses

Historically funds for highways have been generated at all levels of government i.e., the federal, state and the local city or county governments. The scope of the study precludes discussion of the various legislative actions and their impact on highway revenues for Indiana. It is implicitly assumed that the current patterns of funding would not only continue but also grow in the future as they have in the past. If in the future certain changes affecting the role of various governments take place, then it is assumed that the revenue generating authority would simply shift from one level of the government to the other without affecting total revenues.

### Federal Aid To States For Highways

Federal government has been involved in funding highway construction for a very long time. In the near past the federal aid highway act of 1944 heralded an era of major federal participation in highway programs. The act designated a national system of interstate highway not exceeding 40,000 miles in total length to connect the major metropolitan areas, cities and industrial centers. Through subsequent federal aid highway acts the role of the federal government in highway construction has continued to grow.

The Federal Aid Highway Act of 1956 established a federal highway trust fund based on taxes upon motor vehicles, gasoline, tires, tread rubber, etc. Subsequent acts have from time to time increased the tax rates to match the increased needs of highways. The funds provided to states are based on an apportionment formula whereby some states end up as "donor states" i.e., taxes collected within the state are greater than the grants to their states. Indiana is currently a donor state. The new nickel a gallon increase in federal fuel tax, has led to a dramatic increase in federal highway aid to Indiana for the fiscal year 1983 from a low of \$109 million in 1982 the 1983 apportionment amounts to \$237.0 million representing an increase of 116 percent.



### State Funding

State funding for highway purposes comes primarily from gasoline taxes, motor vehicle registrations and appropriations from the general fund. Three funds, a) the motor vehicle highway account, b) highway road and street fund and c) the local road and street accounts provide the funds for construction and maintenance of state and local highways. To keep pace with the expenditures on state roads, taxes have been increased several times in the past thirty years. Historically the state has played a crucial role in the financing of the highway network. However at a time when costs of construction and maintenance have been increasing the revenues from user fees and taxes have been unable to keep up due to the increase in vehicle fuel efficiency and decreased travel by Hoosiers.

### Local Funding

Major parts of county revenues come from the county's share of the motor vehicle highway account and the local road and street account. Other sources of revenues are property tax revenues and appropriations from the county general funds.

The cities and towns also receive major portions of their revenues from the state motor vehicle fund and the local road and street account. Cities and towns also generate revenues from property taxes and city general fund appropriations. Minor sources like parking fees also provide local funding.

### Data For Projections

Projecting revenues from user taxes of various kinds and aggregating them to obtain the total funding availability is a hazardous task. First, data for each user tax can be difficult to obtain; second, user taxes are highly dependent upon vagaries of demand and pricing, and third, tax revenues are based on the tax rates, which are impossible to predict in the future. Nevertheless, an attempt has been made to project the total funds that would be available for highway uses in Indiana to the year 2000.

Projection of Revenues

Instead of projecting each source of revenue separately this study has divided the source of revenues into four major parts:

- i) Federal Grants: The direct grants for highway purposes received by the State of Indiana from the Federal Government.
- ii) State User Taxes: Revenues from all user taxes imposed by the state for highway purposes have been aggregated in this category. Major components of this category are the various motor vehicle and gasoline taxes imposed by the state government.
- iii) Property Taxes and Miscellaneous Revenue Sources: These include the property taxes imposed by county, city and town government for highway purposes, parking fees, and other revenue sources like land sales, income from investments, which may be used for highway purposes.
- iv) Appropriations From General Funds: These funds include funds made available for highway purposes from the state general funds.

Projection Methodology

Regression analysis was employed to project the future funds availability for highway purposes. Each of the above categories was postulated to be directly related to the personal income of Indiana residents. The impact of past tax changes in the state motor fuel taxes was smoothed by the use of dummy variables for each of the tax increases in the past thirty years. Since the requirement of funds from each category is related due to the matching fund requirements the dummy variables for state tax changes were thought to be appropriate for the other categories as well.

Historical data for the past thirty years were obtained for federal grants and state user tax revenues, twenty-five years of data were available for the property tax and appropriations from the general fund. The data were derived from the various issues of the highway statistics published by the U.S.

Department of Transportation, Federal Highway Administration. Data for personal income was obtained from the U.S. Department of Commerce through the Division of Research, School of Business at Indiana University. All data are in current dollars and selected data are shown in Table 10 and 11.

The federal, state and local sources of revenue from 1960 to 1980 have been plotted in graphs I to VI. As can be seen from the graphs the revenues in nominal dollars generally show a rising trend. However when the data are converted into 1982 constant dollars by using the personal consumption deflator, the story is quite different. State revenues for highways, in constant 1982 dollars, have been decreasing since 1972, from a level of over \$600 million to a level below \$400 million.

Similarly real (deflated) federal grants to Indiana decreased from almost \$360 million in 1968 to \$127 million in 1977 and subsequently increased to \$217 million in 1980.

Real appropriations from general funds have been more erratic from a high of \$126 million in 1973 they went down to \$3 million in 1974 to another high of \$176 million in 1977 to a low of \$105 million in 1980.

Funds from property taxes and other miscellaneous sources are somewhat more stable, however these funds also show a declining real trend since a peak of \$150 million in 1971 to \$59 million in 1980. Thus if highway "needs" during the last decade were growing, the people of the state were funding their needs at lower and lower levels. It would then seem that the huge backlog of needs was to a large extent generated in the last decade which saw an erosion of the highway infrastructure.

Projections

Based on the above data the following equations were developed.

## i) Federal grants (in current dollars)

<u>Regression Coefficient</u>	<u>Variables</u>	<u>T-Values</u>
+19176.6	Constant term	1.5
+15.29	Per capita	4.8
	Personal income	
-37772.8	Tax change 1957	-1.16
+26119.0	Tax change 1969	.814
	$R^2 = .616$	

## ii) State user tax revenues

<u>Regression Coefficient</u>	<u>Variables</u>	<u>T-Values</u>
+27838.6	Constant term	1.9
+47.68	Per capita	12.91
	Personal Income	
-14077.6	Motor fuel	-.369
	Tax change 1957	
+27484.0	Motor fuel	.727
	Tax change 1969	
-118042.0	Motor fuel	-2.758
	Tax change 1980	
	$R^2 = .878$	

## iii) Property tax and miscellaneous revenues

<u>Regression Coefficient</u>	<u>Variables</u>	<u>T-Values</u>
-4981.0	Constant term	-1.106
+9.07	Per capita	8.004
	Personal Income	
+1304.0	Motor fuel	.111
	Tax change 1957	
-207.9	Motor fuel	-.179
	Tax change 1969	
-24709.0	Motor fuel	-1.879
	Tax change 1980	

## iv) Appropriations from general funds

<u>Regression Coefficient</u>	<u>Variables</u>	<u>T-Values</u>
-43587.5	Constant Term	-7.76162
+20.01	Per capita	14.1476
7509.0	Personal Income	.5135
-26834.0	Tax change 1957	-1.853
-43280.0	Tax change 1969	-2.638
	Tax change 1980	
	$R^2 = .897$	

Projections of Indiana personal income to the year 2000 were obtained from the Bureau of Economic Analysis, U.S. Dept. of Commerce.

These are provided below:

	1978	1985	1990	1995	2000
Population (000)	5374.2	5680.2	5907.7	6086.8	6198.8
Personal Income 1972\$ (000)	27,598,361	36,180,975	42,872,048	49,024,111	55,989,699
Per capita Personal Income	\$5135	6370	7257	8054	9032

Since the data used to estimate the regression equations were in current dollars, the personal income projections could not be used directly in the equations. Therefore, the personal income projections were converted to current dollars, first the 1972 dollars were converted to 1982 dollars by using the personal consumption deflator, next it was assumed that future inflation would average about seven percent per year to the year 2000. The data were then used to estimate the future revenues. These projections can be termed "revenue projections in future current dollars". To obtain the future revenues in constant 1982 dollars the projections were deflated at an annual rate of seven percent to get projections in constant 1982 dollars.

Part of the highway revenues are devoted to highway police thus it was felt necessary to project the highway police allocations and subtract them from the revenue projections to get the funds available for highway construction, maintenance and administration. The highway police allocation was determined by developing the following regression equation.

v) Highway police allocation

<u>Regression Coefficient</u>	<u>Variables</u>	<u>T-Values</u>
-264640.0	Constant	-4.569
+13.79	Per capita	10.152
	Personal consumption	
+838.89	Tax change 1957	.0597
-13824.2	Tax change 1969	-.9940
+11109.2	Tax change 1980	.705
$R^2 = .847$		

### Projection of Revenues For Highways

Using these equations, projections of revenues for Indiana's highways are provided in Table 12.

A few things should be noted about the projections. First, the data cover two distinct time periods the first period witnessed high growth in revenues while the second period witnessed a general decline in revenues. By using a simple regression equations as we have done, we are implicitly assuming that the growth rate in revenues in the future would be an average of the two time periods mentioned above. Thus, even though revenues have been declining in the immediate past, our projections would show a growth in revenue from 1982 onwards. The realism of this implicit assumption is open to question. If we are to assume that growth in revenues is cyclical, then at least for the next decade we should witness a higher growth rate than in the immediate past, however this growth rate may level off during the '90s. If this happens, then our estimates would be on the high side.

If we were to try to get a better fit of the data by using say a quadratic model, then the weight given to the most recent data would be considerably increased and we would continue to show a decline in revenues over the projection period and ultimately revenues would go to zero. We believe that this is not realistic and even though we might get a higher  $R^2$  for the quadratic model, its results would not be meaningful since the state would at some point act to reverse the decline in revenues. The recent actions of the state and federal government support this contention.

Under the recently enacted Surface Transportation Assistance Act which imposed a nickel a gallon increase in federal full tax and higher truck fees and other excise taxes, Indiana's federal highway apportionment for 1983 fiscal year jumped 116 percent to \$237 million from the low level of \$109 million a year earlier.

A key provision of the new law is that no state be allotted less than 85% of its tax contribution to the highway trust fund. This results in major gains for Indiana which received only 65% of its contribution in 1982. In addition the law allows states to waive matching requirements for a period of approximately two years. This should enable Indiana to use the full amount of federal aid. The new act also has revised the bridge allocation formula which has considerably enhanced Indiana's share from \$8 million to \$38.4 million in 1983. The act has also expanded the interstate resurfacing/rehabilitation program and the F.A. primary road system program. Indiana has considerably benefited from these programs and these continuations would help in meeting the projections of this study.



Matching of needs with availability of funds

To compare the needs with the availability of funds, real needs identified earlier are chosen since they reflect national guidelines and are not based on constraints of funds or priorities. The real needs can be phased over the next two decades as follows:

<u>Requirement</u>	<u>1982-85</u>	<u>1986-90</u>	<u>1991-95</u>	<u>1996-2000</u>	<u>TOTAL</u>
Real Needs 1982\$ (000)	8,206,928	10,258,660	10,258,660	10,258,660	38,982,908

Similarly the revenue projections can also be phased as below:

<u>Revenues</u> <u>1982\$ (000)</u>	<u>1982-85</u>	<u>1986-90</u>	<u>1991-95</u>	<u>1996-2000</u>	<u>TOTAL</u>
State User					
Taxes	2,445,284	3,489,644	3,872,902	4,299,540	14,107,370
Property Tax	428,274	629,950	713,289	801,059	2,572,572
Appropriations from general funds	825,972	1,279,352	1,493,262	1,710,158	5,308,744
Federal Grants	821,384	1,153,487	1,266,559	1,396,366	4,637,796
Less Expenses					
Highway					
Police	<u>(588,809)</u>	<u>(899,949)</u>	<u>(1,042,707)</u>	<u>(1,188,011)</u>	<u>(3,719,476)</u>
TOTAL REVENUE	3,932,105	5,652,484	6,303,305	7,019,112	22,907,006

Thus if the revenues are generated as projected the gap between the requirements and the revenues would be as below:

	<u>1982-85</u>	<u>1986-90</u>	<u>1991-95</u>	<u>1996-2000</u>	<u>TOTAL</u>
Gap 1982\$ (000)	4,274,823	4,606,176	3,955,355	3,239,548	16,075,902

Thus between 1982 and 2000 the fiscal gap would amount to over \$16 billion. It should be noted that this gap is not based on current revenue generating taxes and levies, instead it is based on a projection of future revenue, which in turn is based on the future personal income in Indiana. Thus as the personal income grows in the future it is implicitly assumed that revenue for highways would also grow, this implies that revenue generating taxes might have to be increased as in the past to meet the revenue projected in this study. To meet the revenue gap of \$16 billion mentioned above revenue generation has to be considerably enhanced to a much greater level than any time in the past. As already mentioned the recently enacted Surface Transportation Act is a step in the right direction. The state will have to closely monitor the availability of funds from federal sources and to ensure that local matching requirements are fulfilled.

If we assume that federal grants would not be forthcoming and the revenue lost is not made up from other sources then the gap would be as below:

	<u>1982-85</u>	<u>1986-90</u>	<u>1991-95</u>	<u>1996-2000</u>	<u>TOTAL</u>
Gap without federal grants					
\$1982 (000)	5,096,207	5,759,663	5,221,914	4,635,914	20,713,698

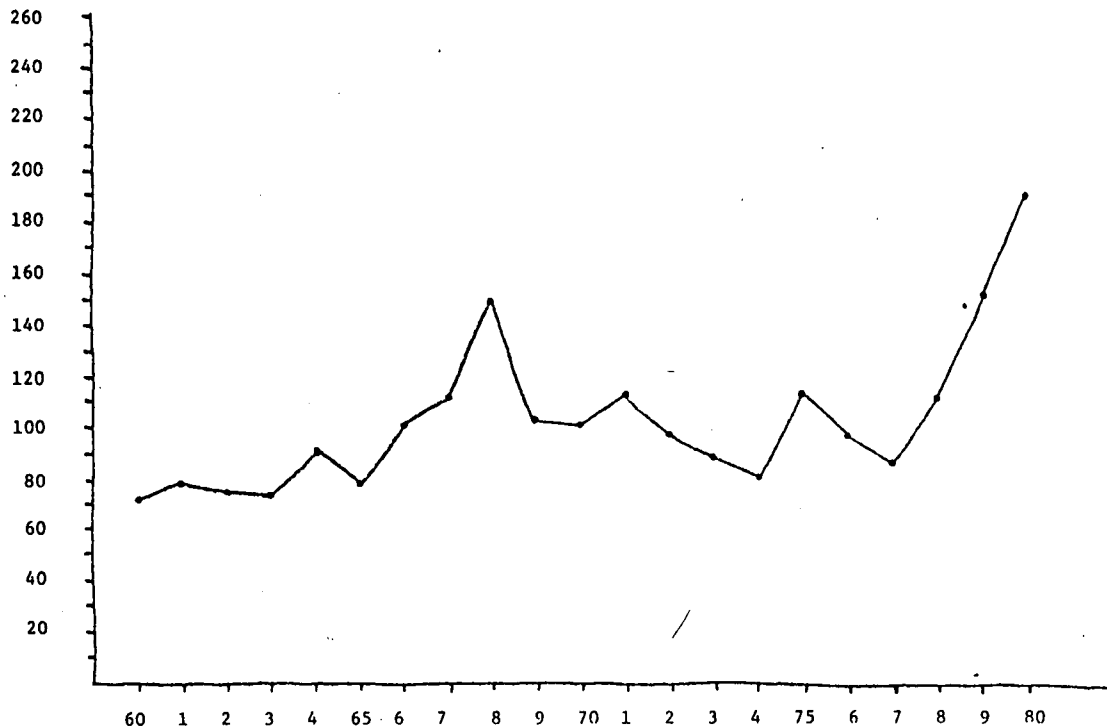
In this case the total gap would amount to almost \$21 billion.

Similarly if along with discontinuation of federal grants the state stops appropriation money from the general fund then the gap would amount to over \$25 billion as shown below:

	<u>1982-85</u>	<u>1986-90</u>	<u>1991-95</u>	<u>1996-2000</u>	<u>TOTAL</u>
Gap without federal grants and general fund appropriations					
1982\$ (000)	5,922,179	7,039,015	6,715,176	6,346,072	26,022,442

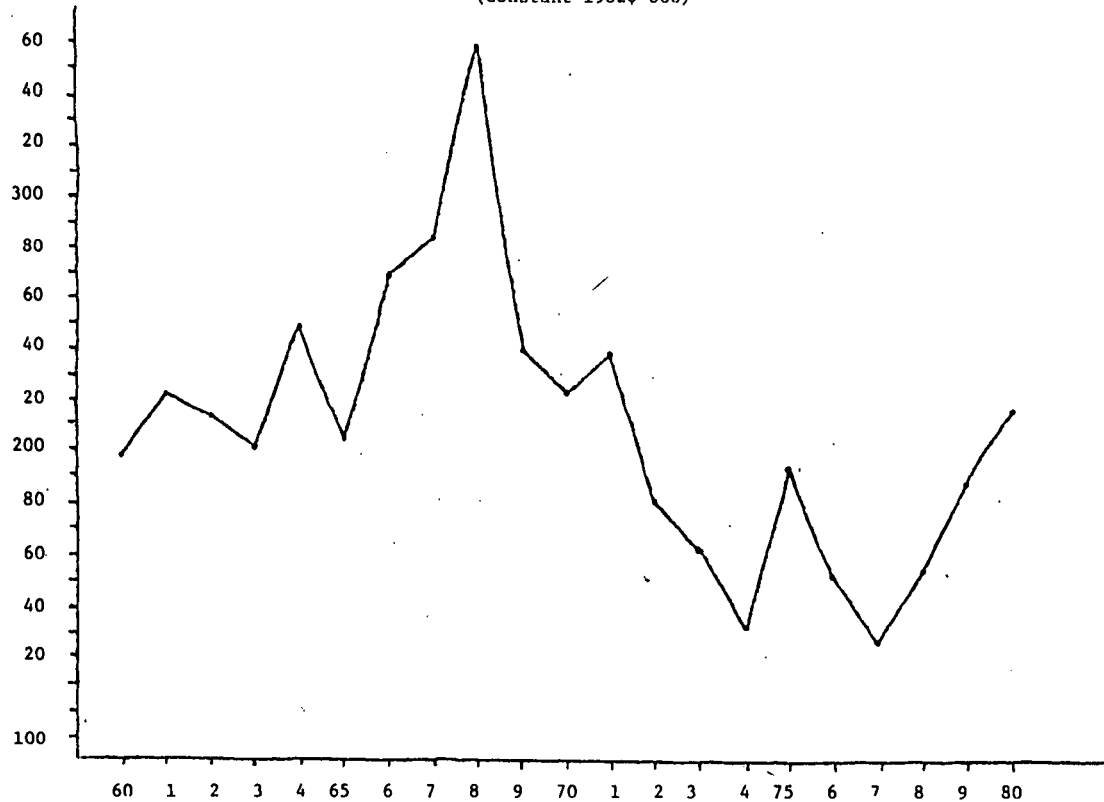
GRAPH I

FEDERAL GRANTS TO INDIANA  
FOR HIGHWAYS  
(nominal \$ 000)



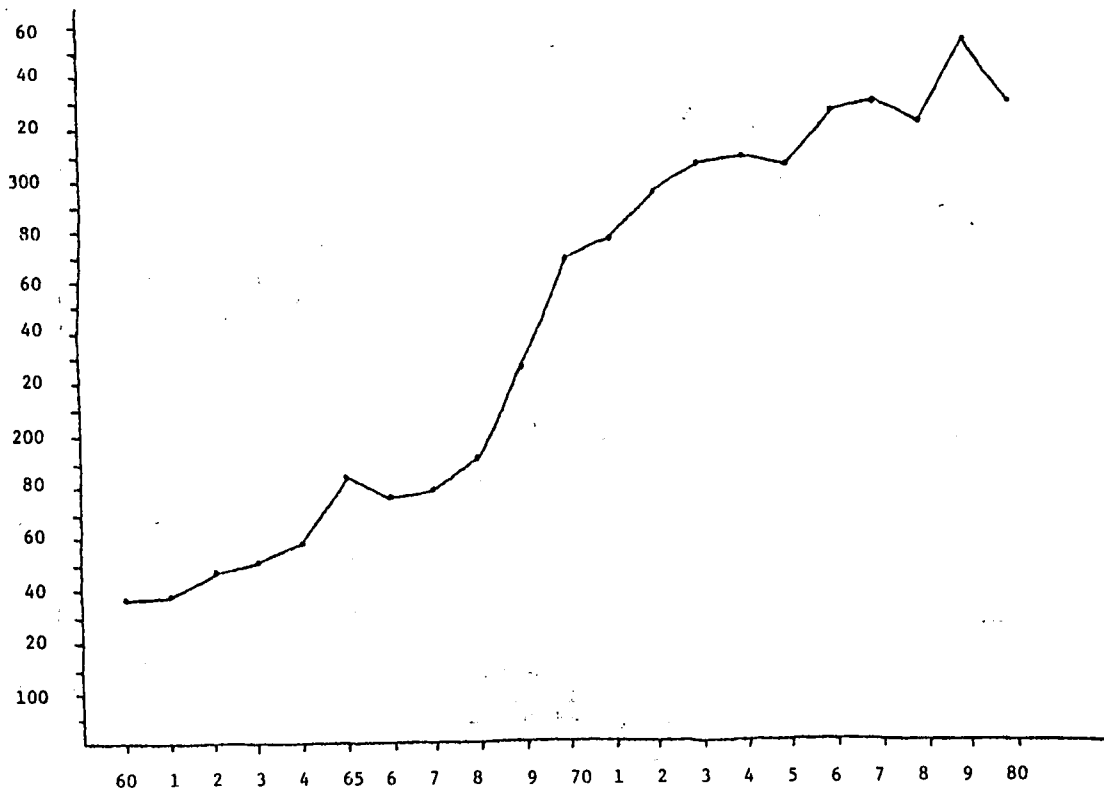
GRAPH II:

FEDERAL GRANTS TO INDIANA  
FOR HIGHWAY  
(constant 1982\$ 000)



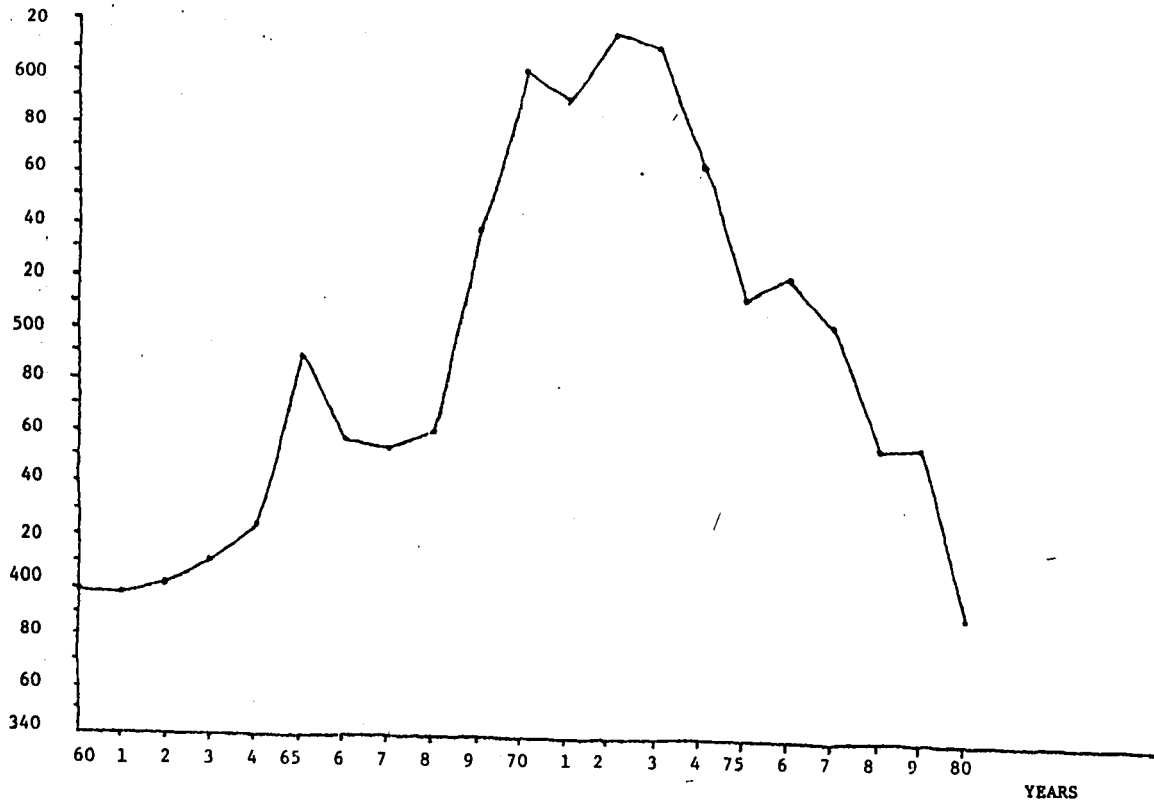
GRAPH III

STATE USER TAXES REVENUE  
FOR HIGHWAYS  
(nominal \$ 000)



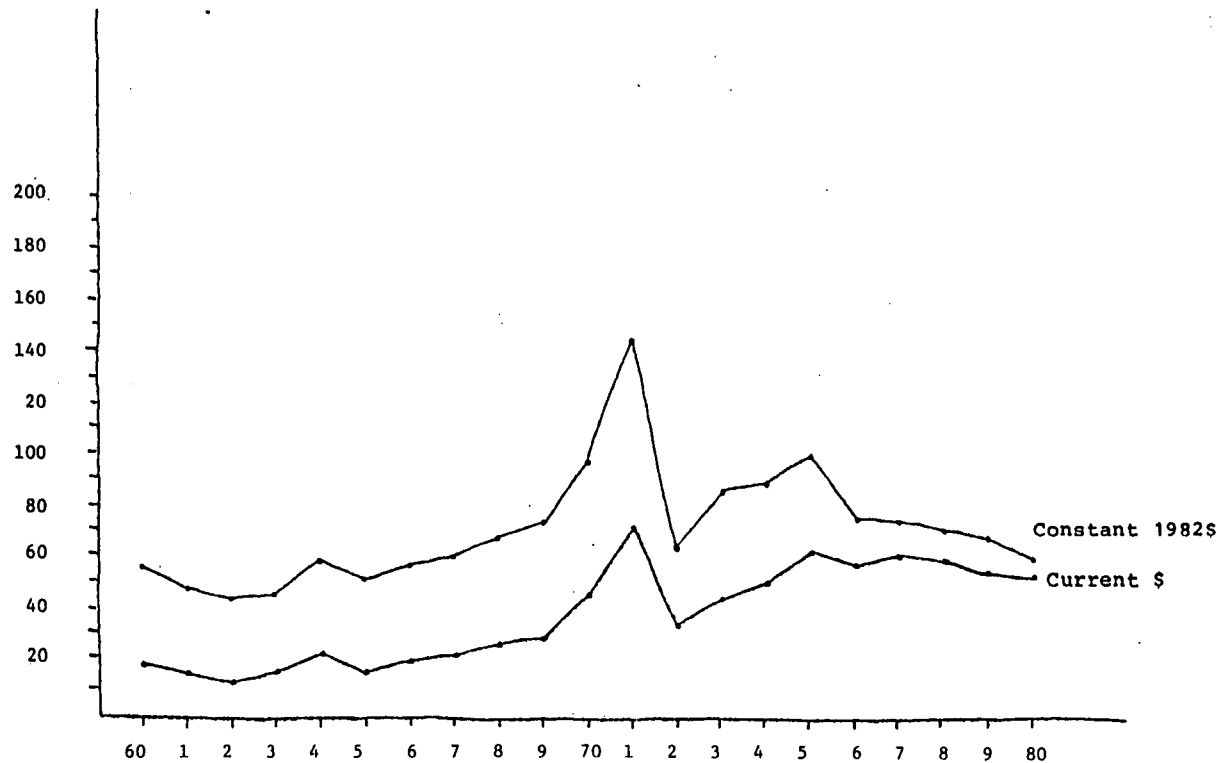
GRAPH IV

STATE USER TAXES REVENUE  
FOR INDIANA  
(constant 1982\$ 000)



GRAPH V

PROPERTY TAXES & MISC. REVENUE  
FOR HIGHWAYS



GRAPH VI

APPROPRIATIONS FROM GENERAL FUNDS FOR HIGHWAYS

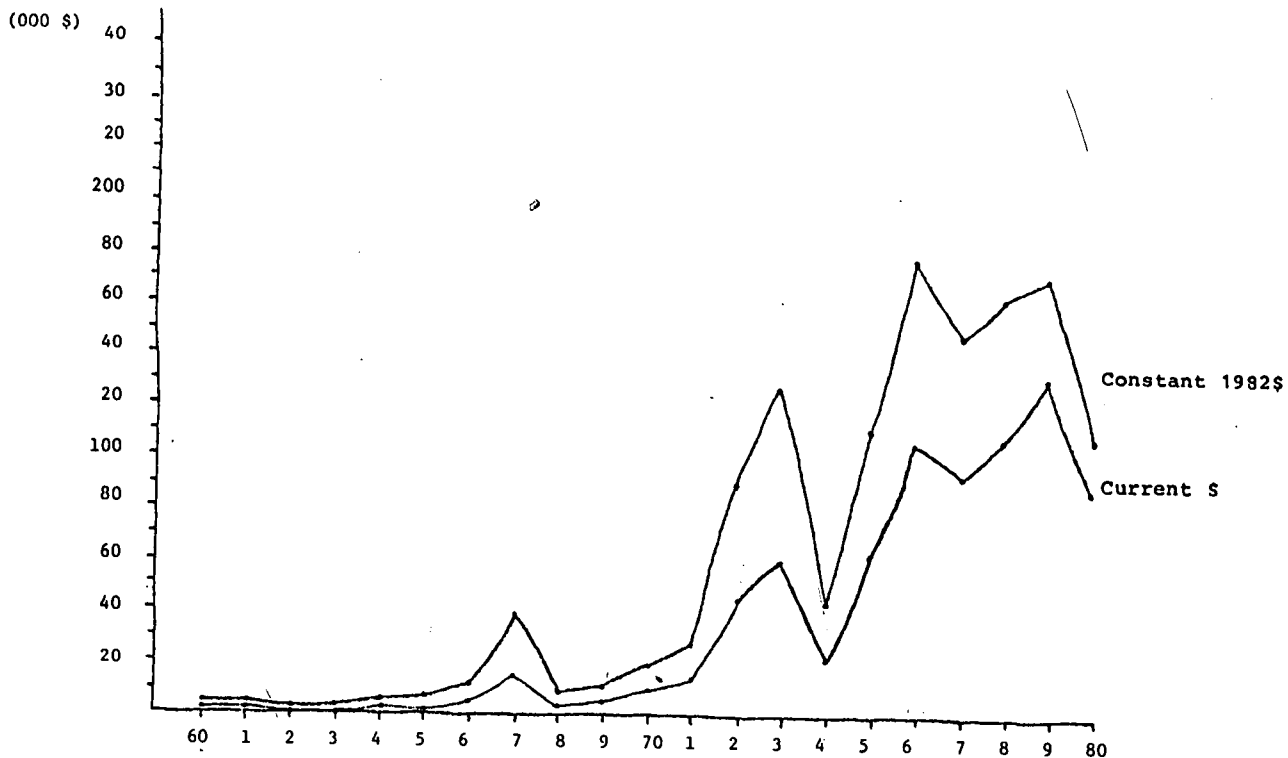




TABLE 2  
Estimates of Future Highway Needs  
(Miles)

1985	State %	Jurisdiction County %	Cities	Total
<u>Rural</u>				
Interstate	874 (100)	-----	-----	874
Principal Arterials	1,188 (100)	-----	-----	1,188
Minor Arterials	3,120 (100)	-----	-----	3,120
Major Collectors	4,504 (51.4)	4,247 (48.6)	-----	8,751
Minor Collectors	25 (.002)	11,309 (100)	-----	11,334
Local Access	12 (.0002)	48,847 (100)	-----	48,859
<b>TOTAL</b>	<b>9,723</b>	<b>64,403</b>	<b>-----</b>	<b>74,126</b>
<u>Urban</u>				
Interstate	259 (100)	---	---	259
Principal Arterials	1,154 (73)	27	323	1,504
Minor Arterials	196 (8)	268	1,863	2,327
Collectors	3	217	1,611	1,831
Local Access	6	1,388	10,299	11,693
<b>TOTAL URBAN</b>	<b>1,618</b>	<b>1,900</b>	<b>14,096</b>	<b>17,614</b>
<b>TOTAL SYSTEM</b>	<b>11,341 (12.4)</b>	<b>66,303 (72.3)</b>	<b>14,096 (15.3)</b>	
91,740				

1976-1995 Indiana Highway Needs Study. Clyde E. Williams & Assoc.

TABLE 3  
 Estimate Of Future Highway Needs  
 (Miles)

1995	Jurisdiction			Total
	State	County	Cities	
<b>Rural</b>				
Interstate	869	----	----	869
Principal Arterial	1,185	----	----	1,185
Minor Arterial	3,107	----	----	3,107
Major Collectors	4,483	4,239	----	8,722
Minor Collectors	22	11,261	----	11,283
Local Access	10	48,650	----	48,660
<b>TOTAL RURAL</b>	<b>9,676</b>	<b>64,150</b>	<b>----</b>	<b>73,826</b>
<b>Urban</b>				
Interstate	260	----	----	260
Principal Arterial	1,310	30	362	1,702
Minor Arterial	208	284	1,978	2,470
Collector	0	226	1,655	1,881
Local Access	0	1,564	11,550	13,114
<b>TOTAL URBAN</b>	<b>1,778</b>	<b>2,104</b>	<b>15,545</b>	<b>19,427</b>
<b>TOTAL SYSTEM</b>	<b>11,454</b>	<b>66,254</b>	<b>15,545</b>	<b>93,253</b>

Jurisdiction classification based on estimates using same percentage split as in 1985 estimate.

Miles Estimate Indiana Highway Needs Study 1976-1995.

TABLE 4

## Estimates Of Future Highway Needs (1976-1995)

(Thousands of 1975 Dollars)

## Real Needs

(Summary)

	a) Identified Needs	b) Stopgaps	c) Pavement Replacement	Main- tenance	Admin- istration	TOTAL
Rural	9,850,515	497,203	1,468,450	2,529,602	968,300	15,304,070
Urban	4,909,316	123,840	924,375	1,207,451	613,195	7,778,177
TOTAL	14,759,831	621,043	2,392,825	3,727,053	1,581,495	23,082,247

- a) Costs of improvements to bring highways adequacy, in terms of safety, physical conditions and operating speeds under peak hour condition, to standards of the national guidelines.
- b) Due to large backlog, stopgap expenses are required until identified needs are fulfilled.
- c) Second generation pavement replacement at end of life of original pavement.

TABLE 5

Estimates Of Future Highway Needs (1976-1995)  
(Thousands of 1975 Dollars)

Intermediate Needs  
(Summary)

	a) Identified Needs	Stop Gaps	Pavement Replacement	Main- tenance	Admin- istration	TOTAL
Rural	6,485,289	356,386	1,468,450	2,396,585	727,114	11,433,822
Urban	3,396,081	106,727	924,375	1,150,460	463,087	6,040,736
TOTAL	9,881,370	463,111	2,392,825	3,547,045	1,190,201	17,474,558

a) Costs of meeting the intermediate needs according to objectives listed in the main text.

TABLE 6

Estimates Of Future Highways Needs (1976-1995)  
(Thousands of 1975 Dollars)

Minimum Needs  
(Summary)

	a) Identified Needs	b) Stop Gaps	c) Pavement Replacement	Main- tenance	Admin- istration	TOTAL
Rural	4,987,434	167,696	1,468,450	232,775	607,935	9,554,290
Urban	2,796,460	46,544	924,375	1,116,277	413,292	5,296,998
TOTAL	7,783,894	214,240	2,392,825	1,349,052	1,021,227	14,851,238

a) Costs of meeting the minimum needs according to objectives listed in the main text.

b) and c) See footnotes in Table 4.

TABLE 7  
Expenditures On Highways  
(Thousands of Current Dollars)

Year	Capital Outlay	Main- tenance	Admin- istration	TOTAL
1970	208,969	112,364	36,301	357,634
1971	252,078	113,644	45,858	411,580
1972	240,819	115,114	41,689	397,622
1973	225,206	111,085	38,974	375,265
1974	253,482	150,327	62,299	466,108
1975	327,145	45,863	71,191	444,199
1976	280,253	171,240	72,488	523,981
1977	201,230	193,270	72,397	466,897
1978	225,611	237,592	72,707	535,910
1979	312,085	286,830	92,516	691,431
1980	NA	NA	NA	600,000 (Est.)
1981	NA	NA	NA	578,000 (Est.)

SOURCE: Federal Highway Statistics, U.S. Dept. of Transportation

TABLE 8

Expenditures On Highways  
(1976-1981)  
(In 1975\$)

Year	Actual Expenditure	Deflator a)	Expenditure in 1975\$ (000)
1976	523,981	$\frac{203.8}{199.3} = 1.0226$	535,823
1977	466,897	$\frac{203.8}{216.4} = .9418$	439,723
1978	535,910	$\frac{203.8}{264.9} = .7693$	412,276
1979	691,431	$\frac{203.8}{308.6} = .6604$	456,621
1980	600,000	$\frac{203.8}{352.7} = .5778$	346,680
1981	578,000	$\frac{203.8}{339.1} = .6010$	347,378
TOTAL			\$2,538,501

a) Deflator based on Federal Highway Agency Construction Composite Index

SOURCE: Survey of Current Business

TABLE 9

Updating 1976 Study Estimates  
To Reflect 1982 Costs

	<u>Real Needs</u> (000)	<u>Intermediate</u> <u>Needs</u> (000)	<u>Minimum</u> <u>Needs</u> (000)
1976 Study Estimate (1976-1995) 1975\$)	23,082,247	17,474,559	14,851,239
Expenditures to 1981 (1976-1981)	2,538,501	2,538,501	2,538,501
Net Needs 1982-1995 (1975\$)	20,543,746	14,936,058	12,312,738
Inflator, $\frac{317.7^*}{203.8} = 1.5589$ (1982\$)	35,982,914	23,283,820	19,194,327
Average Expenditures Per Year (1982\$)	<u>\$2,570,208</u>	<u>\$1,663,130</u>	<u>\$1,371,023</u>

\*Based on Federal Highway Agency Construction Index.



TABLE 10

Revenue Generated For Highways  
Thousands Of Current Dollars

<u>Year</u>	<u>Federal Grants</u>	<u>State User Taxes</u>	<u>Property Taxes &amp; Misc.</u>	<u>Appropriations From General Funds</u>
1960	70,840	137,717	19,704	1,087
61	78,400	138,491	17,119	1,054
62	76,535	144,501	16,580	437
63	72,644	148,374	17,150	674
64	92,139	155,430	22,390	1,940
65	76,989	183,561	18,886	1,840
66	103,955	175,880	20,445	5,366
67	111,203	178,834	21,961	17,506
68	146,298	188,335	25,122	2,274
69	102,156	232,618	28,564	6,005
70	99,791	270,967	44,094	10,038
71	111,093	275,850	70,566	13,171
72	87,154	299,396	31,823	47,869
73	82,392	315,365	45,895	64,773
74	76,658	318,307	50,710	24,519
75	116,357	312,430	62,505	66,056
76	98,685	335,853	49,347	112,613
77	85,683	338,696	51,433	97,805
78	115,387	328,853	52,049	113,826
79	147,816	359,238	52,993	132,627
80	189,187	335,916	51,433	92,013

TABLE 11

Revenue Generated For Highways  
Thousands Of 1982 Dollars

<u>Year</u>	<u>Federal Grants</u>	<u>State User Taxes</u>	<u>Property Taxes &amp; Misc.</u>	<u>Appropriations From General Funds</u>
1960	203,382	395,386	56,570	3,121
61	222,813	393,591	48,652	2,995
62	214,298	404,603	46,424	1,223
63	200,425	409,364	47,316	1,859
64	240,802	423,080	60,945	5,280
65	205,869	490,842	50,501	4,920
66	270,179	457,112	53,136	13,946
67	282,344	454,060	55,759	44,447
68	356,967	459,537	61,297	5,548
69	238,534	543,163	66,696	9,351
70	222,634	604,527	78,373	22,394
71	237,628	590,043	150,941	28,172
72	179,886	617,953	65,683	98,801
73	160,829	615,592	89,587	126,437
74	136,068	564,995	90,010	43,521
75	191,873	515,197	103,071	108,926
76	154,738	526,618	77,376	176,577
77	126,982	501,947	76,223	144,947
78	159,811	455,461	72,088	157,644
79	187,874	456,591	67,354	168,569
80	217,949	386,975	59,250	105,999

TABLE 12

Revenue Projections From Various Sources  
Thousands Of 1982 Dollars

<u>Year</u>	<u>Federal Grants</u>	<u>State User Taxes</u>	<u>Property Taxes &amp; Misc.</u>	<u>General Fund Appropriation</u>	<u>Less Hwy. Police Allocations</u>	<u>Net Funds Available</u>
1982	194,056	573,117	98,829	185,227	-133,082	918,147
83	201,536	598,527	104,339	199,489	-142,567	961,333
84	209,077	624,000	109,819	213,577	-151,939	1,004,530
85	216,716	649,640	115,287	227,489	-161,221	1,047,960
86	221,287	665,603	118,876	237,146	-167,587	1,075,320
87	225,928	681,668	122,447	246,643	-173,865	1,102,820
88	230,634	697,826	126,001	255,993	-180,058	1,130,900
89	235,412	714,116	129,550	265,233	-186,192	1,158,120
1990	240,226	730,431	133,076	274,337	-192,247	1,185,820
91	244,526	795,057	136,253	282,584	-197,725	1,210,690
92	248,876	749,757	139,916	290,715	-203,138	1,235,630
93	253,272	774,523	142,568	298,742	-208,492	1,260,610
94	257,706	789,344	145,710	306,684	-213,798	1,285,650
95	262,179	804,221	148,842	314,537	-219,054	1,210,730
96	267,837	822,730	152,645	323,804	-225,295	1,241,720
97	273,530	841,291	156,439	332,991	-231,490	1,372,700
98	279,237	859,845	160,216	342,093	-237,636	1,403,750
99	284,991	878,494	163,994	351,140	-243,753	1,434,870
2000	290,771	897,180	167,765	360,130	-249,837	1,466,010

4. AIRPORTS NEEDS<sup>1</sup>Background

The Indiana state airport system plan study identified 550 airports in the State of Indiana, 414 airports including 36 heliports are privately owned and not open to the public. The remaining 130 airports and six heliports are open to the public 61 of these are publicly owned while the remaining 69 are privately owned. Indiana ranks seventh in the nation in the number of airports. Only Texas, Illinois, California, Alaska, Pennsylvania and Ohio have a larger number of airports.

Six of the state's cities are served by certified air carriers, these include Elkhart, Evansville, Fort Wayne, Indianapolis, Lafayette and South Bend. In addition seven other cities are serviced by scheduled service by commuter airlines, these include Bloomington, Lawrenceville-Vincennes, La Porte, Michigan City, Muncie, Terre Haute, and Valparaiso.

Deregulation has led to frequent changes in carriers and service. No list of services is stable. Before the 1979-82 recession, there were approximately 2,295,000 passenger enplanements on certificated air carriers in Indiana during 1978. Air Cargo enplanements carried by certificated air carriers in the state totalled 34,400 revenue tons in 1978. Indianapolis International handled the predominate share of this activity.

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<sup>1</sup> This section draws heavily from the Indiana State Airport System Plan, a study prepared by the Aeronautics Commission of Indiana in Association with Howard Weedles Tammen & Bergendoff, Simat, Helliesen & Eichner Inc., and Wetzel Engineers. May, 1981.

There were a total 4,546 general aviation aircraft based in Indiana in 1977 and 4,915 in 1981. These aircraft generate approximately 2.7 million operation (take-offs and landings) annually. In addition the air carriers and commuter generate another 200,000 operations. Some of the historical statistics are provided in Tables 1-8. (All tables are at the end of this section.)

#### Investment Needs

The Indiana State Airport System plan<sup>2</sup> developed estimated needs for airport development in Indiana from 1981 to the year 2000. Three alternative plans were developed, the plans were then evaluated with respect to capital costs, operations and maintenance costs vs. revenues from operations, environmental and socio-economic factors to select the most appropriate plan.<sup>3</sup> The three plans were:

#### Alternative 1:

Necessary development of existing facilities at Indiana's public-use airports, without addition of new airports not already planned. This was a baseline plan for comparison with the other two alternative plans.

#### Alternative 2:

This plan was based upon the concept of upgrading General Aviation (GA) airports to scheduled service role appropriate to deregulation, with emphasis upon facilitating traffic flow in which Indianapolis International Airport becomes a major national and international transfer point. Selected GA airports would be developed and some new airports would be added.

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<sup>2</sup>Ibid, pp. 51.

<sup>3</sup>Each plan was evaluated for each category mentioned above and rated on a scale of 1 to 10. The ratings for each category were then totalled and the highest rated alternative was selected.

The developed system would offer users throughout the state and especially in the northern and northwestern sections an efficient alternative to Chicago's O'Hare Airport for entering the National/International Air Network.

Alternative 3:

This plan was designed to maximize service and accessibility aimed at assuring at least 90% of the population of Indiana that they have no more than 30 minutes driving time to facilities serving General Aviation and no more than 45 minutes driving time to scheduled air service. In general this plan was an expansion of Alternative 2.

Alternative Selected:

The three plans were evaluated using a selection process based on the factors mentioned earlier and Alternative 2 was selected to be the most appropriate for the state's needs.

The estimated total costs of capital improvements recommended in the plan amount to \$557,637,000 in 1977 dollars, of this total \$443,085,000 would be eligible for public financial assistance and \$14,089,000 could qualify for the FAA's NAVAID Program<sup>1</sup>. The total cost is split between airports with certificated air service, commuter service and general aviation air ports as under:

<u>Airports</u>	<u>Amount</u>
Certified air service	\$310,399,000
Commuter service	70,657,000
General aviation	171,103,000
TOTAL	<u>\$557,637,000</u>

The estimated capital costs and possible sources of funds is provided in Table 9. Table 10 breakdowns the cost by type of airport while Table 11 and

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<sup>1</sup> Eligibility was based on regulations prevalent at the time the "Indiana State Airport System Plan" was published in May 1981.

12 provides the phasing of requirements. Operations and maintenance expenses for the chosen alternative were also estimated, these estimates are shown in Table 13. O & M expenses range from just over \$5 million per year in 1980 to approximately \$9.5 million per year by the year 2000. The projected revenues from the operation of the airports are provided in Table 14. Revenues range from \$4.3 million in 1980 to \$11.6 million by the year 2000. Thus while there will be a short fall in revenues until 1985, revenues will cover the operational and maintenance expenses by 1990 onwards.

#### Updating Costs to 1982

To update the estimated cost to reflect 1982 costs it is proposed to adjust 1977 costs by expenditures made on Indiana airports during 1981 on the assumption that these funds were expended on projects identified in the state airport system plan and then to escalate the remaining balance to reflect 1982 costs. The calculations are provided on the next page.

	<u>Amount</u>
	<u>(000)</u>
Capital cost estimate in 1977 dollars	557,637.
Expenditures on airports during 1981 <sup>1</sup>	<u>9,294</u>
Capital costs for period 1982-2000 in 1977 dollars	549,343
Inflator $\frac{157.6}{100} = 1.576^*$	<u>x1.576</u>
Capital cost in 1982 dollars	<u>864,189</u>

\*Based on Dept. of Commerce Construction Cost Composite Index. 1977 = 100, June 1982 = 157.6 Source: Survey of Current Business

The breakdown of capital costs between eligible, ineligible and Nav aids is as below:

	Eligible	Ineligible	Nav aids	Total
(Thousands of 1977 dollars)				
Capital costs	443,085.4	100,462.6	14,089	557,657

If 90% of the eligible projects are financed by the federal government then the state and local government will have to fund the remainder; the ineligible projects will be financed by the private sector. These projects are revenue producing projects like, hangars, parking lots, etc. The total costs can then be split up as below based on source of financing:

Source:	Amount 1977 dollars (000)	Amount spent in 1981 1/ (000)	Remaining Balance (000)	Amount in 1982 dollars (000)
Federal	398,776.9	8,044.3	390,732.6	617,370.6
State & Local	44,308.5	1,249.4	43,059.1	67,861.1
Private	100,462.6	--	100,462.6	158,329.0
Nav aids	<u>14,089.0</u>	<u>--</u>	<u>14,089.0</u>	<u>22,204.2</u>
TOTAL	557,637	9,293.7	548,343.3	864,189

Historically Indiana has received consistently high share of federal participation (see Table 15). The levels of funding has been supported by federal discretionary funding. The receipt by Indiana of discretionary money,

<sup>1/</sup> For historical statistics on airport expenditures see Tables 15 & 16.



combined with the passage of new ADAP legislation authorizing 90 percent federal participation for eligible projects, support a 90 percent federal share for Indiana's eligible projects. The remaining 10 percent of eligible projects is split between state and local government. This comes to about \$49.3 million in 1977 dollars or \$67.9 million in 1982 dollars. If the amount is split evenly then it represents about \$1.79 million per year for each level of government. The exact phasing of monies will however be different. The phasing recommended by the Indiana State Airport System Plan is given in Tables 17 and 18. The total requirements are phased as in Table 11 and 12.

Using the same phasing pattern the total requirements can be phased as below:

	<u>up to 1985</u>	<u>1986-90</u>	<u>1991-2000</u>	<u>Total</u>
Capital Costs 1982\$ (000)	350,000	433,822	80,361	864,189

The operation and maintenance expenses averaged about \$7.3 m (in 1977\$) or \$11.5 m (in 1982\$). therefore, the estimated operations and maintenance expenses up to year 2000 would amount to \$218.5 m in 1982 dollars.

Thus the total requirements in 1982 dollars are as below:

	Millions of 1982 dollars
Capital Costs	864.1
Operation & Maintenance	<u>218.5</u>
<b>TOTAL</b>	<b>1,082.7</b>

Over the same time period operating revenues would amount to \$237 millions of 1982 dollars. Thus the total gap would approximate \$850 million. Of this amount approximately \$617 million worth of projects would be eligible for federal funding. The remaining would be funded from state and private sources. The eligibility of a project for federal funding, however, does not mean that the project can be funded immediately. In fact, during 1982 34 general aviation projects requested federal aid, because of the limitations on Indiana's share of federal funds, only 5 of the 34 projects were funded in FY 1982.

TABLE 1

ENPLANED PASSENGERS IN SCHEDULED AND NON-SCHEDULED AIRLINE SERVICE:  
UNITED STATES AND INDIANA 1/

YEAR	UNITED STATES	INDIANA	INDIANA AS % OF U.S.	INDIANA ANNUAL GROWTH RATE (%)
1962	58,911,587	664,931	1.13	---
1963	67,318,615	751,794	1.12	13.1
1964	76,657,102	834,941	1.09	11.1
1965	89,123,088	950,606	1.07	13.5
1966	102,186,549	1,101,323	1.08	16.2
1967	123,624,098	1,338,835	1.08	21.6
1968	149,935,857	1,485,374	1.05	10.9
1969	148,072,090	1,543,691	1.04	3.9
1970	155,192,358	1,533,885	1.00	(0.6)
1971	152,291,732	1,515,863	1.00	(1.2)
1972	172,263,469	1,712,235	.99	13.0
1973	182,987,738	1,785,440	.98	4.3
1974	189,316,615	1,857,756	.09	4.1
1975	188,495,858	1,798,706	.95	(3.2)
1976	206,664,841	1,949,738	.94	8.4
1977	222,589,589	2,070,570	.93	6.2
1978	253,397,340	2,294,681	.91	10.8
1979	296,132,661	2,488,558	.84	8.4
1980	278,957,991	2,134,376	.76	(14.2)
1981	263,651,797	1,769,214	.67	(17.1)

1/ Data are for 50 states and District of Columbia, domestic traffic only.

2/ All data as of December 31, except 1970, 1971 which are as of June 30.

SOURCE: Civil Aeronautics Board/Federal Aviation Administration, Airport Activity Statistics of Certificated Route Air Carriers: 1962-1981.

TABLE 2

ENPLANED AIR CARGO IN SCHEDULED AND NON-SCHEDULED AIRLINE SERVICE:  
UNITED STATES AND INDIANA (REVENUE TONS) 1/

<u>YEAR 2/</u>	<u>UNITED STATES 3/</u>	<u>INDIANA 3/</u>	<u>INDIANA AS % OF U.S.</u>	<u>INDIANA ANNUAL GROWTH RATE (%)</u>
1962	1,050,239	12,115	1.15	---
1963	1,114,830	14,113	1.15	16.5
1964	1,307,926	18,147	1.39	28.6
1965	1,624,944	22,153	1.36	22.1
1966	1,899,275	22,555	1.19	1.5
1967	2,197,100	26,639	1.21	18.1
1968	2,669,305	34,234	1.28	28.5
1969	2,936,497	37,456	1.28	9.4
1970	3,032,919	41,514	1.37	10.8
1971	2,938,751	32,481	1.11	(21.8)
1972	3,304,708	34,265	1.04	5.5
1973	3,546,956	36,509	1.03	6.5
1974	3,427,165	36,659	1.07	.4
1975	3,182,255	28,029	.88	(23.5)
1976	3,378,679	31,015	.92	10.7
1977	3,587,391	33,155	.92	6.9
1978	3,843,877	34,353	.89	3.6
1979	4,193,865	28,063	.67	(18.3)
1980	5,024,158	19,519	.39	(3.04)
1981	3,804,447	18,730	.49	(4.0)

1/ Data are for 50 states and District of Columbia, domestic traffic only.

2/ All data as of december 31, except 1970, 1971 which are as of June 30.

3/ Cargo is defined as sum of freight, express, and U.S. and foreign mail.

SOURCE: Civil Aeronautics Board/Federal Aviation Administration, Airport  
Activity Statistics of Certificated Route Air Carriers: 1962-1981.

TABLE 3

AIRCRAFT DEPARTURES IN SCHEDULED AND NON-SCHEDULED AIRLINE SERVICE:  
UNITED STATES AND INDIANA <sup>1/</sup>

YEAR 2/	AIRCRAFT DEPARTURES		INDIANA AS % OF U.S.	INDIANA ENPLANED PAS. PER DEPART.	INDIANA TONS AIR 3/ CARGO PER DEPT.	INDIANA DAILY AVERAGE		AIRCRAFT DEPARTURES
	UNITED STATES	INDIANA				ENPLANED PASSENGERS	ENPLANED CARGO (TONS) 3/	
1962	3,198,169	55,041	1.72	12.1	0.2201	1,822	33	151
1963	3,317,967	56,944	1.72	13.2	0.2478	2,060	39	156
1964	3,417,601	57,339	1.68	14.6	0.3165	2,228	50	157
1965	3,634,737	56,992	1.57	16.3	0.3826	2,545	60	156
1966	3,773,678	62,822	1.66	17.5	0.3590	3,017	62	172
1967	4,296,153	70,731	1.65	18.9	0.3766	3,668	73	194
1968	4,606,354	66,908	1.45	22.2	0.5117	4,070	94	183
1969	4,699,273	64,960	1.38	23.8	0.5766	4,229	103	178
1970	4,842,629	64,240	1.33	23.8	0.6442	4,204	114	176
1971	4,680,678	61,044	1.30	24.8	0.5321	4,153	89	167
1972	4,741,495	61,092	1.29	28.0	0.5609	4,691	94	167
1973	4,818,587	59,089	1.23	30.1	0.6179	4,892	100	162
1974	4,452,156	54,721	1.23	33.9	0.6699	4,090	100	150
1975	4,447,559	53,109	1.19	33.8	0.5277	4,926	77	146
1976	4,597,522	54,991	1.20	35.4	0.5640	5,342	85	151
1977	4,771	54,574	1.16	37.9	0.6075	5,673	91	150
1978	4,779,216	55,662	1.16	41.2	0.6172	6,287	94	152
1979	5,094,736	56,912	1.11	43.7	0.4931	6,817	77	155
1980	5,031,204	58,864	1.16	36.2	0.3333	5,847	53	161
1981	4,937,269	58,438	1.18	30.2	0.3205	4,847	51	160

<sup>1/</sup> Data are for 50 states and District of Columbia, domestic traffic only.

<sup>2/</sup> All data as of December 31, except 1970, 1971 which are as of June 30.

<sup>3/</sup> Cargo is defined as sum of freight, express, and U.S. and foreign mail.

SOURCE: Civil Aeronautics Board/Federal Aviation Administration, Airport Activity Statistics of Certificated Route Air Carriers: 1962-1981.

TABLE 4  
 CERTIFICATED AIR CARRIER ACTIVITY BY LOCATION

LOCATION	SCHEDULED AND NON-SCHEDULED ENPLANED PASSENGERS				
	1965	1970	1975	1977	1981
Bloomington	8,074	9,794	--	--	--
Elkhart	--	--	--	--	23,364
Columbus	180	--	--	--	--
Evansville	104,947	166,905	202,846	232,107	156,940
Fort Wayne	87,260	154,924	195,907	230,603	199,551
Indianapolis	604,328	1,003,018	1,232,585	1,395,730	1,257,385
Kokomo/Logansport/Peru	5,486	842	--	--	--
Lafayette	22,971	23,288	651	--	25,172
Muncie/Anderson/New Castle	5,540	6,672	--	--	--
Richmond	382	--	--	--	--
South Bend	91,946	154,110	166,717	212,130	106,802
Terre Haute	<u>19,492</u>	<u>14,442</u>	--	--	--
	950,606	1,533,885	1,798,706	2,070,570	1,769,214

SOURCE: Civil Aeronautics Board, Federal Aviation Administration. Airport Activity  
Statics (1965, 1970, 1975, 1977, 1978 editions).

TABLE 5  
 CERTIFICATED AIR CARRIER ACTIVITY BY LOCATION

LOCATION	SCHEDULED AND NON-SCHEDULED PERFORMED DEPARTURES				
	1965	1970	1975	1977	1981
Bloomington	1,605	1,875	--	--	--
Columbus	473	--	----		--
Elkhart	--	--	--	--	4,035
Evansville	5,383	6,254	5,575	5,637	3,896
Fort Wayne	4,958	6,114	5,165	5,722	11,509
Indianapolis	25,343	36,130	36,783	37,112	29,995
Kokomo/Logansport/Peru	1,939	304	--	--	--
Lafayette	3,330	2,667	109	--	2,307
Muncie/Anderson/ New Castle	1,268	1,146	--	--	--
Richmond		510	--	--	--
South Bend	7,838	7,443	5,477	6,103	6,746
Terre Haute	<u>4,345</u>	<u>2,307</u>	<u>--</u>	<u>--</u>	<u>--</u>
	56,992	64,240	53,109	54,574	58,438

SOURCE: Civil Aeronautics Board, Federal Aviation Administration. Airport Activity Statistics (1965, 1970, 1975, 1977 and 1981 editions)

TABLE 6  
SUMMARY OF COMMUTER AIR CARRIER  
PASSENGER TRAFFIC IN INDIANA

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<b><u>Number of Markets</u></b>									
Intra-State	17	14	11	9	10	6	8	9	9
Inter-State	50	43	40	36	20	19	21	24	24
Total	67	57	51	45	30	25	29	33	33
<b><u>Passengers</u></b>									
Intra-State	17,226	21,050	21,074	27,441	31,576	32,204	38,730	54,080	75,431
Inter-State	101,758	119,351	127,782	180,058	180,228	218,876	262,941	298,052	169,305
Total	118,984	140,401	148,856	207,499	211,804	251,080	301,671	352,132	244,736
<b><u>Passenger Miles</u></b>									
Intra-State	1,979,901	1,439,131	1,418,555	1,835,015	2,101,407	2,235,083	2,181,956	3,357,784	4,814,058
Inter-State	13,389,707	15,496,671	16,454,238	25,031,633	25,389,979	30,216,061	36,826,359	41,522,959	27,526,943
Total	15,369,608	16,935,802	17,872,793	26,866,648	27,491,386	32,451,144	39,008,315	44,880,743	32,341,001
<b><u>Average Trip (Miles)</u></b>									
Intra-State	115	68	67	67	66	69	56	62	64
Inter-State	132	129	128	132	140	138	140	139	162
Total	129	120	120	129	129	129	129	127	132

NOTE: All data as of December 31, except 1973 which is as of June 30.

SOURCE: Civil Aeronautics Board, Bureau of Operating Rights, Standards Division.  
Commuter Air Carrier Traffic Statistics (1971-1979 editions).

TABLE 7  
SUMMARY OF COMMUTER AIR ACTIVITY IN INDIANA

LOCATION	EXPLAINED PASSENGERS		
	1975	1976	1977
Bloomington	13,964	12,953	21,331
Columbus <sup>1/</sup>	--	--	--
Elkhart	19,804	23,256	27,630
Evansville	--	300	1,483
Fort Wayne	226	4,532	14,545
Indianapolis	18,608	19,048	19,206
Kokomo	2,188	426	453
La Porte	--	87	181
Lafayette	20,974	24,307	29,474
Michigan City	3,787	4,030	5,655
Muncie	12,803	14,612	16,445
South Bend	4,132	7,272	1,698
Terre Haute	21,775	26,015	28,086
Valparaiso	<u>1,129</u>	<u>1,500</u>	<u>1,815</u>
	119,390	138,338	168,002

<sup>1/</sup> Columbus, Indiana began to receive service from Indiana Airways in the first quarter of Calendar Year 1979.

SOURCE: Civil Aeronautics Board, Form 298C, Schedule T-1.



TABLE 8

## HISTORY OF REGISTERED AIRCRAFT IN INDIANA AND UNITED STATES

<u>YEAR 1/</u>	<u>NUMBER OF AIRCRAFT IN INDIANA</u>	<u>NUMBER OF AIRCRAFT IN UNITED STATES</u>	<u>INDIANA AS A % OF U.S.</u>
1957	1,953	64,688	3.02
1958	1,933	67,153	2.88
1959	1,991	69,718	2.86
1960	1,889	70,747	2.67
1961	2,145	78,760	2.72
1962	2,378	82,853	2.87
1963	2,479	86,287	2.87
1964	2,494	90,935	2.74
1965	2,560	97,459	2.63
1966	2,799	106,740	2.62
1967	3,036	116,408	2.61
1968	3,182	126,702	2.51
1969	3,373	133,649	2.52
1970	3,305	134,539	2.46
1971	3,346	133,869	2.50
1972	4,048	145,010	2.79
1973	3,677	153,540	2.39
1974	3,769	161,502	2.33
1975	3,787	168,475	2.25
1976	3,985	178,304	2.23
1977	4,546	215,281	2.11
1978	4,901	236,789	2.07
1979	5,019	251,516	2.00
1980	5,063	259,410	1.95
1981	4,915	261,570	1.87

1/1957-1963 is as of January 1.

1964-1977 is as of December 31.

SOURCE: Federal Aviation Administration, Office of Management Systems. Census of Civil Aircraft (1957 through 1977 editions). 1957 through 1964 U.S. aircraft taken from U.S. Active Civil Aircraft.

TABLE 9

ESTIMATED CAPITAL COSTS AND SOURCES  
(Thousands of 1977 dollars)

	<u>Eligible Projects</u>	<u>Ineligible Projects</u>	<u>NAVAID Projects</u>	<u>Total Costs</u>
<u>Certificated Air Carrier</u>	234,536.3	71,212.7	4,650.0	310,399.0
<u>Commuter Service</u>	64,076.1	4,406.9	2,174.0	70,657.0
<u>Reliever</u>	5,310.7	76.3	91.0	5,478.0
<u>General Aviation</u>	139,162.3	24,766.7	7,174.0	171,103.0
GRAND TOTAL	443,085.4	100,462.6	14,089.0	557,637.0
<u>RECOMMENDED SOURCES</u>				
Federal	398,776.9	--	14,089.0	412,865.9
State	22,154.3	--	---	22,154.2
Local	22,154.2	--	---	22,154.2
Private	--	--	--	100,462.6
TOTAL	443,085.4	100,462.6	14,089.0	557,637.0

Source: Indiana State Airport System Plan, May 1981.

TABLE 10  
 CAPITAL COST BREAKDOWN<sup>0</sup>  
 (Thousands of 1977 dollars)

<u>Air Carrier</u>	<u>Eligible</u>	<u>Ineligible</u>	<u>NAVAIDS</u>	<u>TOTAL</u>
1985	68,771.8	6,323.2	1,127.8	76,222.8
1990	160,735.0	63,947.6	3,522.2	228,222.8
2000	5,011.5	941.9	0.0	5,953.4
Subtotal	234,536.3	71,212.7	4,650.0	310,399.0
<u>Commuter</u>				
1985	49,957.9	1,844.4	1,238.0	53,040.3
1990	8,947.0	931.6	477.0	10,355.6
2000	5,171.2	1,630.9	459.0	7,261.1
Subtotal	64,076.1	4,406.9	2,174.0	70,657.0
<u>Reliever</u>				
1985	4,894.4	7.2	91.0	4,992.6
1990	394.7	21.1	0.0	370.8
2000	66.6	48.0	0.0	114.6
Subtotal	5,310.7	76.3	91.0	5,478.0
<u>General Aviation</u>				
1985	79,166.0	9,259.2	3,346.0	91,771.2
1990	35,318.1	4,898.4	491.0	40,707.5
2000	24,678.2	10,609.1	3,337.0	38,624.3
Subtotal	139,162.3	24,766.7	7,174.0	171,103.0
TOTAL	443,085.4	100,462.6	14,089.0	557,637.0

TABLE 11

## SUMMARY OF CAPITAL COSTS BY PROJECT

## TYPE AND TIME PERIOD

(Thousands of 1977 dollars)

<u>Time Period</u>	<u>Eligible</u>	<u>Ineligible</u>	<u>NAVAIDS</u>	<u>Total</u>	
1981 - 1985	202,790.1	17,434.0	5,802.8	226,026.9	40.5%
1986 - 1990	205,367.8	69,798.7	4,490.2	279,656.7	50.2%
1991 - 2000	<u>34,927.5</u>	<u>13,229.9</u>	<u>3,796.0</u>	<u>51,953.4</u>	<u>9.3%</u>
TOTAL	<u>443,085.4</u>	<u>100,462.6</u>	<u>14,089.0</u>	<u>557,637.0</u>	<u>100.0%</u>

TABLE 12

ESTIMATED FEDERAL AND LOCAL GOVERNMENT SHARE FOR ELIGIBLE PROJECTS  
 BY TIME PERIOD ASSUMING 90 PERCENT FEDERAL PARTICIPATION  
 (Thousands of 1977 dollars)

<u>Time Period</u>	<u>Total Eligible Project Costs</u>	<u>90 Percent of Total Eligible Project Costs</u>	<u>Local Government Share</u>
1981 - 1985	202,790.1	182,511.1	20,279.0
1986 - 1990	205,367.8	184,831.0	20,536.8
1991 - 2000	<u>34,927.5</u>	<u>31,434.8</u>	<u>3,492.7</u>
TOTAL	<u>443,085.4*</u>	<u>398,7766.9</u>	<u>44,308.5</u>

- \* For estimating statewide aviation planning funds, 2 percent of total eligible construction costs figure was used. The result of the following calculation produced an annual figure of \$443,100 for planning all airports in the state:  $[\$443,085,400 (0.02)(1/20)] = \$443,085.40$  per year.

TABLE 13

Estimated Operations and Maintenance Expenses  
 Recommend Indiana Airport System Plan  
 1977 Dollars

Planning				
Region	1980	1985	1990	2000
1-A	\$	\$ 100,238	\$ 141,398	\$ 287,822
1-B	156,529	205,613	256,076	326,471
2	884,503	1,017,326	1,137,398	1,443,697
3-A	118,765	193,306	213,865	256,360
3-B	853,366	938,627	1,134,799	1,361,922
4	345,749	410,561	526,033	676,317
5	257,944	319,774	383,983	452,904
6	421,241	536,753	599,907	722,861
7	393,433	472,420	507,543	742,188
9	158,531	255,964	283,261	339,048
10	304,078	314,782	326,802	394,761
11	400,930	480,192	510,135	568,040
12	39,981	96,312	146,034	201,265
13-A	72,081	155,911	205,941	258,230
13-B	518,683	613,102	749,690	978,360
14	22,901	133,153	218,568	294,493
15	<u>135,601</u>	<u>162,768</u>	<u>1908,536</u>	<u>235,087</u>
TOTAL	<u>5,083,816</u>	<u>6,416,802</u>	<u>7,539,969</u>	<u>9,539,826</u>

Revenue	\$4,334,372	\$5,886,666	\$7,618,070	\$11,584,550
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Source: Indiana State Airport System Plan No. IV 1980

Ave. costs/year = \$7,311,800

Ave. rev./year = \$7,959,461

TABLE 14  
 Estimated Operation Revenues  
 Recommended Indiana Airport System Plan  
 1977 Dollars

Region	1980	1985	1990	2000
1-A		70,187	98,882	316,626
1-B	94,543	141,957	192,281	289,023
2	963,935	1,138,202	1,549,484	2,119,676
3-A	85,986	133,448	182,882	277,505
3-B	1,006,545	1,207,976	1,460,250	2,020,069
4	230,978	320,385	525,812	731,108
5	147,373	216,032	278,803	405,873
6	291,027	436,629	573,717	839,596
7	240,980	334,296	430,605	787,849
9	71,544	133,150	173,488	256,472
10	126,653	151,431	175,940	424,395
11	123,994	181,855	239,542	353,016
12	29,407	80,126	138,091	259,829
13-A	49,960	119,490	168,128	254,114
13-B	799,537	1,013,493	1,243,247	1,733,307
14	15,483	105,540	161,646	287,188
15	<u>57,477</u>	<u>102,469</u>	<u>144,772</u>	<u>228,904</u>
Total	4,334,372	5,886,666	7,618,070	11,584,550

TABLE 15  
 Historical Expenditures on Airports  
 (Current Dollars)

Year	Federal	State a)	Local	Total
1970	1,141,371		1,141,371	2,282,742
1971	439,070		109,767	548,837
1972	8,116,570		2,029,142	10,145,712
1973	2,131,674		532,918	2,664,592
1974	5,656,025	272,091	1,586,369	7,514,485
1975	8,527,301	473,732	2,160,580	11,161,613
1976	20,018,529	104,400	2,104,798	22,227,792
1977	9,717,529	436,690	622,182	10,776,401
1976	6,695,280	503,901	516,795	7,715,976
1979	18,334,474	1,085,188	3,492,232	22,911,894
1980	21,564,731	733,961	2,011,967	24,310,659
1981	<u>8,044,254</u>	<u>351,500</u>	<u>897,933</u>	<u>9,293,687</u>
TOTAL	110,386,873	3,961,463	17,206,054	131,554,390

a) State funds represent state matching of federal grants for construction. In addition the state expended \$2,075,727 for planning and construction to match local funds. This additional money was spent between 1973 and March 1981 and is not included in the totals.

Source: Indiana Transportation Fact Book 1982.



TABLE 16  
 Federal Airport Aid Expenditures In Indiana  
 (Current Dollars)

<u>Year</u>	<u>Construction</u>	<u>Airport Master Plans</u>	<u>Regional System Plans</u>	<u>Total</u>
1970	1,141,371			1,141,371
1971	439,070			439,070
1972	7,879,570	137,000		8,116,570
1973	2,000,734	130,940		2,131,674
1974	5,529,025	127,000		5,656,025
1975	7,968,391	145,906	413,004	8,527,301
1976	20,018,594			20,018,594
1977	9,361,151	356,378		9,717,529
1978	6,517,826	177,454		6,695,280
1979	18,171,674	162,800		18,334,474
1980	21,564,371			21,564,731
<u>1981</u>	<u>8,044,254</u>			<u>8,044,254</u>
TOTAL	108,736,391	1,237,478	413,004	110,386,873

Source: Indiana Transportation Fact Book 1982.

TABLE 17

ESTIMATED STATE AND LOCAL GOVERNMENT  
REQUIREMENTS FOR ELIGIBLE PROJECTS BY TIME PERIOD  
(Thousands of 1977 dollars)

<u>Time Period</u>	<u>Total Local Share</u>	<u>State Share</u>	<u>Local Governments Share</u>
1981 - 1985	20,279.0	10,139.5	10,139.5
1986 - 1990	20,536.8	10,268.4	10,268.4
1991 - 2000	<u>3,492.7</u>	<u>1,746.4</u>	<u>1,746.3</u>
TOTAL	<u>44,308.5</u>	<u>22,154.3</u>	<u>22,154.2</u>

TABLE 18

AVERAGE ANNUAL STATE GOVERNMENT SHARE  
OF ELIGIBLE PROJECT COSTS

(Thousands of 1977 dollars)

<u>Time Period</u>	<u>Total State Share</u>	<u>Average Annual State Share</u>
1981 - 1985	10,139.5	2,027.9
1986 - 1990	10,268.4	2,053.7
1991 - 2000	<u>1,746.4</u>	174.6
TOTAL	<u>22,154.3</u>	

5. PUBLIC TRANSPORTATION<sup>1</sup>

In 1980 there were 17 publicly owned transit systems and one commuter railroad in the State of Indiana. Approximately 3 million persons out of a population of 5.5 million are served by these systems. In 1980 these systems carried nearly 37 million passengers. The four largest cities of the state account for approximately 83% of all the ridership:

City	Percent of Ridership 1980
Indianapolis	43.3
Gary	17.8
Fort Wayne	11.8
South Bend	9.9
All Others	<u>17.2</u>
Total	100 = 36,828,030 total ridership

The system had a total of approximately 20 million revenue miles. The fleet size consists of 588 vehicles in active service within the state. The average age of the fleet in 1980 was just over eight years.

Apart from these city bus transit systems, there are 17 intercity bus firms which provide regular service to more than 300 Indiana communities. The intercity bus industry in Indiana receives no financial assistance from local, state or federal government and hence will not be considered further in this report.

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<sup>1</sup> This section is based on:

- a) Indiana Transportation Fact Book, June 1982. Transportation Coordinating Board.
- b) Indiana Public Transportation needs assessment 1981-1985. State planning services agency. Indiana June 1980
- c) Annual reports, Indiana Public Transportation, State Planning Services Agency.

Government Assistance to Public Transportation1) Federal Government

Historically the federal government first got involved in a substantial way in public transit in 1964 by the passage of the Urban Mass Transportation Act of 1964. Indiana's public transit has benefited from the funds provided to the state under the various sections of this act.

Section 3 programs:

Under Section 3 of the Act the federal government funds up to 2/3 of capital costs of buses and related equipment. The Act was amended in 1973 to provide up to 80 percent of the total capital purchases.

Section 5 programs:

These programs were included by an amendment to the Act in 1974, under this section the federal government provides up to 50% of the net operating costs of transit systems of areas with population greater than 50,000. In 1980 alone 10 Indiana system received operating assistance through this program.

Section 18 program:

This program was included in the Act in 1978 and provides both capital and operating assistance to areas with population of less than 50,000. Seven Indiana systems received assistance in 1980 under this program. The program provides up to 80% of capital costs, 80% of administration and 50% of net operating costs. (Total costs less system operating costs.).

State Assistance:

In 1965 the Indiana general assembly passed legislation enabling certain cities to establish public transportation corporations empowered to levy property taxes and issue bonds to support local public transportation services.

The 1975 General Assembly enacted a comprehensive transit legislation package which created a state matching grant program to be funded from an annual appropriation from the general fund. It also allowed towns, counties and cities to create and establish public transportation corporations or authorities and also provides fuel and income tax exemptions for local publicly owned transportation systems.

The 1980 General Assembly shifted the source of state matching funds from an annual appropriation from the general fund to a dedicated 0.95% of the general sales and use tax. The state participation ceiling was changed from 1/2 of the local share to 2/3 of the local share on federal capital and operating grants.

The federal, state and local assistance for capital costs of transit projects for 1979 and 1980 are summarized below.

Federal, State and Local Assistance For  
Capital Costs of Projects 1979-1980

	1979	1980
Federal	\$ 658,989	\$ 9,484,200
State	403,855	266,689
Local	<u>242,528</u>	<u>2,854,361</u>
TOTAL	\$1,305,372	\$12,605,250

Source: 1979 and 1980 Annual Reports - Indiana Public  
Transportation

Operating Costs and Revenues

Even though operating revenues for the transit systems in Indiana have been increasing since 1977 the gap between operating expenses and revenues has been widening primarily due to higher labor, fuel and maintenance costs.

While revenues covered 49.8% of operating expenses in 1976, they only covered 33.2% of expenses in 1980.

	Revenue and Expenditures				
	1976	1977	1978	1979	1980
Passenger Revenue	10,798,342	9,976,957	10,505,239	11,477,727	12,779,600
Operating Cost	21,695,462	23,380,484	28,181,677	31,926,384	38,542,339
Rev. Percentage of Total Operating Expenses	49.77	42.67	37.28	35.95	33.16

Source: Indiana Transportation Fact Book

As a result of the widening gap between passenger revenues and operating expenses, assistance by various levels of governments to public transit has correspondingly increased over the past several years from \$10 million in 1976 to \$23 million in 1980

Transit Operating Assistance By Level  
Of Government

	1976	1977	1978	1979	1980
Government					
Federal	\$ 3,815,817	\$ 5,983,142	\$ 7,406,647	\$ 9,043,963	\$11,445,874
State	1,080,424	1,712,850	1,897,412	2,658,625	5,504,504
Local	<u>5,225,918</u>	<u>5,938,514</u>	<u>6,766,714</u>	<u>6,540,608</u>	<u>6,154,054</u>
TOTAL	\$10,122,159	\$13,634,506	\$16,070,773	\$18,253,196	\$23,104,432

Source: Indiana Transportation Fact Book 1982

Federal role in public transportation is undergoing changes which will have a big impact on public transportation in Indiana. Historically federal government has supported major proportions of transportation expenditures in Indiana. If this role of the federal government is curtailed it could lead to higher fares or disruption of service. Of particular concern is the proposed reduction and gradual elimination of federal operating assistance for public transportation. Elimination of this assistance would place a larger burden on the state and local authorities which would have to make up the difference.

#### Future Public Transportation Needs

The State Planning Services Agency has published an assessment of transportation needs from 1981-1985. Their study represents a summary of the currently existing systems in Indiana and uses projections of the local transit systems authorities. Projection methodology is not disclosed and as such the needs estimate may be somewhat over estimated. On the other hand the survey does not take into account new systems which might be created during this period and on this account the projections would be under estimated. The five years projections are provided in Table 1.

The study estimates a total capital expenditure of approximately \$239 million over the five years period or an average of approximately \$48 million per year. These figures are substantially more than the federal, local and state government capital cost assistance in recent years.

The projected operating expenses are provided in Table 2. The projection of \$29.6 million for 1981 were already outstripped by the actual expenses for 1980. The study projects the operating expenses to increase to \$69.9 million by 1985.



It has not been possible to locate any recent study which assesses the needs to the year 2000. Thus very little can be said about the needs beyond 1985. However, considering that the average age of the fleet is about eight years it can be safely assumed that major capital expenditures would have to be made in the early '90s when the fleet would have to be replaced.

#### Commuter Rail Service

The Chicago Southshore and South Bend Railroad is the only commuter rail service in Indiana. The railroad has been operating a fleet of 43 passenger cars purchased between 1926 and 1929 with new cars recently added to service. Service is provided to 34 stations along 87.8 route miles of electrified track between Chicago and South Bend. 1980 ridership was 2,102,794 and most passengers live in Indiana and use the service to commute to and from downtown Chicago. The railroad also provides freight service in the northwest Indiana Chicago area.

Passenger service has been consistently unprofitable; the railroad filed for abandonment of passenger service in late 1976. In 1977 the Indiana General Assembly created Northern Indiana Commuter Transportation District (NICTD) and empowered it to receive and disburse financial assistance for continuation of the passenger services.

Since its inception, NICTD has initiated more than \$67 million in capital projects. In 1978 NICTD applied for and was awarded \$31 million (80% federal funds) for a major capital improvement programs. Approximately \$25 million was earmarked for purchase of 36 new rail cars some of which have been delivered while others are currently under construction. The passenger service operating revenues for the railroad along with governmental assistance from 1977 to 1980 are presented below.

Passenger Service Operating Revenues

Source:	1977	1978	1979	1980
Passenger	2,778,404	2,386,883	2,470,261	3,252,254
Other Sources	644,601	1,619,967	51,758	74,919
Local Assistance	0	0	562,388	1,733,084
State Assistance	99,960	809,565	0	0
Federal Assistance	0	1,896,639	3,277,612	2,500,000
Total	<u>3,522,965</u>	<u>6,663,054</u>	<u>6,362,019</u>	<u>7,560,257</u>

Source: Indiana Transportation Fact Book 1982

The operating expenses for the passenger services are as follows:

	1977	1978	1979	1980
Total Expenses	\$6,468,311	6,682,982	7,390,113	8,831,224

Source: Indiana Transportation Fact Book 1982.

Capital grants to the rail service by the various levels of government during

1979-80 are presented below:

<u>Level of Government</u>	1979	1980
Federal	699,008	15,000,000
State	50,000	768,000
Local	<u>124,152</u>	<u>2,232,000</u>
Total	873,160	18,000,000

Source: Annual Reports. Indiana Public Transportation

The requirements for the period 1981-85 as reported in the Indiana Public Transportation Needs Assessment 1981-85 are as follows:

Capital Requirements

	1981	1982	1983	1984	1985
Total Capital	42,500,000	24,600,000	0	0	0
Total Operating Expenses	5,400,00	5,500,000	5,700,000	5,900,000	6,100,000

Projecting needs to year 2000:

The capital costs for the public transit system excluding the commuter rail service amounted to \$239 million in 1980 dollars or \$331.0 m in 1982 dollars (based on personal consumption deflator) or an average of \$66 million per year. Similarly the average operating expenses amounted to approximately \$50 million per year in 1980 dollars or \$69 million per year in 1982 dollars.

Thus yearly requirement for both capital and operating expenses amount to \$135 million in 1982 dollars. Assuming these needs will remain constant up to year 2000, then a very rough estimate of total needs for the period 1982-2000 can be obtained by multiplying \$135 million by 19, the number of years between 1982-2000; this amounts to \$2.56 billion in 1982 dollars.

This amount will be slightly offset by operating revenues which have averaged roughly 40% of operating expenses in the last five years. This would imply operating revenues to average \$27.6 million per year or approximately \$524 million to the year 2000 in the aggregate.

Total requirements	=	2,560,000,000
Operating revenues	=	<u>524,000,000</u>
TOTAL GAP		2,036,000,000
Ave. yearly gap		\$107 million

TABLE 1  
 Public Transportation Needs  
 (Capital Expenditure)  
 Thousands of 1980 Dollars

City	1981	1982	1983	1984	1985
Indianapolis	28,148	10,986	7,836	215	---
Gary	4,469	600	11,400	---	---
Clark & Floyd Cty.		2,709	762	661	---
Fort Wayne	106,995	13,148	4,955	---	---
Hammond	64	300	2,700	---	---
East Chicago	225	980	---	---	---
South Bend	8,968	2,091	4,462	---	---
Anderson	1,004	46	30	810	39
Evansville	2,604	1,719	160	250	---
Lafayette	3,050	500	---	---	1,060
Muncie	2,397	3,300	960	---	---
Terre Haute	1,000	48	803	274	25
Bloomington	330	---	---	---	---
Columbus	80	62	---	---	---
LaPort	202	180	---	---	---
Marion	---	---	---	524	---
Michigan City	60	---	---	---	---
Richmond	<u>330</u>	<u>106</u>	<u>610</u>	<u>3,500</u>	<u>---</u>
TOTAL	159,926	36,775	34,678	6,234	1,124

Source: Indiana Public Transportation Needs Assessment 1981-85

State Planning Services Agency

TABLE 2  
Public Transportation Needs  
Operating Expenses  
Thousands of Current Dollars

City	1981	1982	1983	1984	1985
Indianapolis	10,400	10,890	11,797	13,176	15,153
Gary	4,000	4,600	5,290	6,083	6,996
Clark & Floyd Cty.		465	784	1,104	1,166
Fort Wayne	4,795	7,821	11,594	16,549	16,799
Hammond	800	920	2,539	2,920	3,358
East Chicago	500	575	795	913	1,050
South Bend	4,328	4,625	5,025	5,750	6,613
Anderson	1,167	1,262	1,457	1,603	2,518
Evansville	950	1,045	1,867	2,054	2,510
Lafayette	1,378	2,794	3,068	3,391	3,734
Muncie	1,255	1,826	2,497	2,810	3,300
Terre Haute	716	879	1,031	1,474	1,621
Bloomington	771	1,108	1,275	1,657	1,906
Columbus	197	217	239	263	290
LaPorte	187	261	406	467	537
Marion	328	337	434	499	574
Michigan City	258	356	409	470	530
Richmond	<u>382</u>	<u>549</u>	<u>631</u>	<u>726</u>	<u>1,252</u>
TOTAL	29,637	40,530	51,138	61,909	69,907

Source: Indiana Public Transportation Needs Assessment, 1981-85  
State Planning Services Agency

## 6. WASTE WATER TREATMENT

The federal and state governments are heavily involved in the funding of facilities for waste water treatment. In spite of the involvement of these levels of government we have been unable to obtain any comprehensive study of the requirements and issues of waste water treatment or sewage works in the State of Indiana.

Historical funds provided by the federal and state government for sewage works projects are provided in Table 1. Also included in the table are monies allocated to Indiana from the \$2.4 billion fund for construction of municipal sewage works under the amended Clean Water Act of 1981, Section 207.

Future requirements

The only source of information for future requirements to the year 2000 is the surveys conducted every two years by the Environmental Protection Agency. For the purpose of this study we have used the figures projected in the 1980 needs survey of cost estimates for construction of publicly-owned waste water treatment facilities. The 1980 survey reported costs for nine categories. These categories are:

- I Secondary treatment
- IIA Advanced Secondary treatment
- IIB Advanced waste treatment
- IIIA Correction of infiltration/inflow
- IIIB Major rehabilitation of sewers
- IVA New collector sewers
- IVB New interceptor sewers
- V Control of combined sewer overflow
- VI Treatment and/or control of storm waters

Detailed descriptions of these categories are presented at the end of this section.

The projected costs for the various categories is provided in Table 2. The annual operations and maintenance costs are not available. The total requirements for Indiana for the period 1981-2000 amount to \$6.24 billion (in 1980 dollars). These figures include \$4.02 billion for projects which are eligible for EPA grants and 2.22 billion for treatment and/or control of storm water (category VI) which are not eligible for federal grants. Over 82% of the \$6.24 billion requirement is for category V and VI (control of combined sewer overflow and treatment and/or control of storm waters). While category V is eligible for EPA grants category VI is not. It would therefore seem that the state has to decide the degree to which it wants to meet objectives of category VI which involves approximately \$2.2 billion (1980\$). Escalating these costs at 10 percent per year for two years we arrive at a total requirement of approximately \$7.5 billion dollars\*. 64% or \$4.8 billion are eligible for EPA grants.

Apart from these projects the 1980 survey also identified other related needs for domestic waste water collection and treatment. These needs are not EPA grant eligible. In addition the 1980 survey also identified costs of privately financed facilities. Annual operation and maintenance expenses and other annually incurred expenditures like administration expenses, debt servicing etc. were also identified. However the survey only provides these needs on a national basis and thus estimates for individual states are not available.

\* The \$7.5 billion requirement has not been adjusted for expenditures made during 1981. The 1980 survey excluded projects which were approved during the period 1978 and 1980. Thus most expenditures made during 1981 are assumed to be on projects which are not included in the requirements reported above.

These additional needs are by no means trivial and in fact outstrip the needs developed in categories I through V mentioned earlier. For example on a national basis the identified needs for publicly owned facilities are summarized below:

<u>Capital Costs (1981-2000)</u>	<u>Million of 1980 \$</u>
Categories I through V	\$ 119,900
Category VI	113,700
Others	57,071
TOTAL	\$ <u>290,671</u>
 <u>Annual Expenditures (1981-2000)</u>	
Public Operations & Maintenance	\$ 94,980
Other annual costs*	102,695
TOTAL	\$ <u>197,675</u>

\* These include Research & Development, Administration, Debt Servicing, interest during construction, replacement costs etc.



A rough estimate of Indiana's share of these expenditures can be obtained by obtaining the ratio of Indiana's population to the national population increased to reflect Indiana's heavier economic commitment to manufacturing activity. The rationale for the 2.5 percent we have used is less than strong, but we believe the results are appropriately illustrative. If we assume that Indiana's share of these costs are also in the same ratio then the extra needs can be developed as below:

	Millions of 1980 \$	Millions 1982 \$
<u>Capital Costs</u>		
Other needs (57,071 x .025)	\$ 1,426	\$ 1,725
<u>Annual Expenditures</u>		
Operations & Maintenance (94,980 x .025)	2,374	2,872
Other annual costs (102,695 x .025)	2,567	3,106
TOTAL	\$4,941	\$5,978

The total requirements can now be summarized as below:

Publicly Owned Waste Water Treatment Facilities  
(1981-2000)

	CAPITAL COSTS			Aggregate Annual Expenditures	
	Categories I - V	Category VI	Other	O & M	Other
	1	2	3	4	5
Millions of 1980 \$	4,027	2,220	1,426	2,374	2,567
Millions of 1982 \$	4,872	2,686	1,725	2,872	3,106
	<u>Total Capital Costs</u>			<u>Total aggregate Annual Expenditures</u>	
	1+2+3			4+5	
Millions of 1980 \$	7,673			4,941	
Millions of 1982 \$	9,283			5,978	
	GRAND TOTAL			GRAND TOTAL	
				12,614	
				15,261	

Thus the total requirements for waste water facilities may exceed \$15 billion (1982 \$). Apart from state and federal grants many facilities are financed through the issuance of bonds. Most of the facilities also generate

revenues through user fees etc. However, no estimate of future revenue were available. In addition, historical data are also very fragmented thus projecting future revenues was not possible. For the purpose of this study, we will assume that user fees etc. would generate sufficient funds to meet the annual recurring expenditures and thus only the capital costs would require added funding. This amounts to about \$9.0 billion (1982 \$).

WATER TREATMENT FACILITIES

TABLE 1

Federal and State Grant Funds  
for 1983 - 85 Biennial Budget

FY	Millions Dollars		Deobligation	Total	State Funds Required
	Federal Funds Allocated (Authorized)	Recission			
72	49.7			49.7	7.94
73	67.334			67.334	8.98
74	100.986			100.986	13.46
75	63.678			63.678	8.49
76	251.631		-70.0 (1)	181.631	24.21
77	21.713			21.713	2.895
78	124.551			124.551	16.606
79	114.637		+40.0 (1)	154.637	20.61
80	92.801	-34.16002(6/81)	+30.0 (1)	60.34098	8.03
			-28.4 (2)		
81	90.204	-23.46497 (3)	+0.699465(12/80)	67.438495	8.99
82	65.3742		+1.388100(9/82)	95.1623	12.69
83	(58.9584)			58.9584	7.86
84	(58.9584)			58.9584	7.86
85	(58.9584)			58.9584	7.86
		<u>-57.62499</u>	<u>+2.087565</u>		<u>156.481</u>

- (1) Indianapolis Deobligation (A/E overestimate)
- (2) Gary incinerator Deobligation (No construction)
- (3) 2,830,330 December 1980  
20,634,070 June 1981

Source: State Board of Health

TABLE 2  
Publicly Owned Waste Water Treatment Facilities  
Capital Cost (1980 \$ millions)  
(from 1981 to 2000)

	Categories									Excl. VI Total	Total Incl. VI
	I	IIA	IIB	IIIA	IIIB	IV	IVB	V	VI		
Needs 1981-2000	276	188	60	41	19	304	208	2,926	2,220	4,027	6,247
Backlog needs	185	109	43	41	19	266	101	2,926	NA	3,694	NA
Difference	91	79	17	0	0	38	107	0	NA	333	NA
Requirements in 1982 \$ (inflated at 10% per annum)										4,872	7,558

Source: 1980 Needs Survey: Cost Estimates for construction of publicly owned waste water treatment facilities. U.S. Environmental Protection Agency, Feb. 10, 1981 For explanation of categories see end of this section.

## EXPLANATION OF THE SURVEY

A. Cost Categories

The 1980 Survey used the same cost estimate Categories as were used in 1978, with the exceptions of Categories I and II. These Categories are:

Category I - SECONDARY TREATMENT. This included costs for facilities to achieve secondary levels of treatment, regardless of the treatment levels required at the facility site. Incremental costs for treatment levels above secondary were reported in Categories IIA and IIB.

Costs for systems designed to serve individual residences are reported in Category I. For purposes of the Survey, "best practicable wastewater treatment technology (BPWTT)" and secondary treatment were considered synonymous.

Category IIA - ADVANCED SECONDARY TREATMENT (AST). Reported are incremental costs above secondary treatment levels to achieve advanced secondary levels of treatment, for those facilities that must achieve such levels. This requirement generally exists where water quality standards require removal of standard pollutants at higher levels than 85 percent or 30/30; but less than 95 percent removal, or 10/10.

Category IIB - ADVANCED WASTE TREATMENT (AWT). Incremental costs above AST are reported for those facilities which require advanced levels of treatment. This requirement generally exists where water quality standards require removal of such pollutants as phosphorus, ammonia, nitrates, or organic and other substances. In addition; this requirement exists where removal requirements for conventional pollutants exceeds 95 percent.

The definitions of the treatment categories (I and II) were changed from 1978 to 1980 to more accurately reflect the incremental cost of AST and AWT projects, relative to secondary costs. This change affected the split of these costs only, and did not result in the reporting of more or less needs.

Category IIIA - CORRECTION OF INFILTRATION/INFLOW: Included in this category are costs for correction of sewer system infiltration/inflow problems. Costs could also be reported for a preliminary sewer system analysis and for a detailed Sewer System Evaluation Survey.

Category IIIB - MAJOR REHABILITATION OF SEWERS. Requirements for replacement and/or major rehabilitation of existing sewer systems were reported in this category. Costs were reported if the corrective actions were necessary to the total integrity of the system. Major rehabilitation is considered to be extensive repair of existing sewers beyond the scope of normal maintenance programs, where sewers are lapsing or structurally unsound.

Category IVA - NEW COLLECTOR SEWERS. This category included costs of construction of new collector sewer systems and appurtenances designed to correct violations caused by raw discharges, seepage to waters from septic tanks and the like, and/or to comply with Federal, State or local actions.

Category IVB - NEW INTERCEPTOR SEWERS. Included in this category were new interceptor sewers and transmission pumping stations necessary for the bulk treatment of wastewaters. Outfall sewers were also included in this category.

Category V - CONTROL OF COMBINED SEWER OVERFLOW (CSO). Costs reported for this category were for facilities to prevent and/or control periodic bypassing of untreated wastes from combined sewers to achieve water quality objectives and which are eligible for Federal funding. It does not include treatment and/or control of stormwaters in separate storm and drainage systems.

The costs of abating pollution in the urbanized areas from stormwater runoff channelled through sewers and other conveyances used only for such runoff are reported in Category VI. The Category VI estimates are discussed separately in Chapter VI.

The incremental cost for removal of pollutants such as toxic substances are not included in the Needs Survey. The 1980 Survey does not reflect the effects of changes in the Clean Water Act due to the Industrial Cost Exclusion (ICE).

Costs for projects involving goals beyond pollution control are called multiple-purpose projects. Costs for these projects were split into two parts: water pollution costs, which are reported in the Needs totals, and other costs, which are reported separately.

### CATEGORY VI. TREATMENT AND/OR CONTROL OF STORMWATERS

Although stormwater needs are not eligible for Federal grants, the cost required to treat or control pollution from separate storm sewers was estimated during the 1980 Needs Survey. This additional cost category, known as Category VI, includes the costs of abating pollution in the urbanized areas from stormwater runoff channelled through sewers and other conveyances used only for such runoff. The costs of abating pollution from stormwater channelled through combined sewers, which also carry sewage, are included in Category V.

The 1980 national stormwater treatment need to achieve recreation use benefits is estimated at \$114 billion above the \$119 billion for the other types of facilities surveyed. The 1980 need for stormwater control decreases to \$66 billion if water quality improvement is limited to fish and wildlife uses.

The needs to meet recreation uses and the fish and wildlife uses are 57 percent and 93 percent higher, respectively, than those estimated in the 1978 Needs Survey, after adjustment for construction cost increases since January 1, 1978 (Table G). This increase in need is due to the increased cost of basic storage facilities necessary before special control or treatment processes can be applied. Storage costs increased primarily because storage sites could not be found close to overflow points.

The cost estimates for control of stormwater pollution vary greatly depending upon how the problem is approached. Category VI cost estimating methods are tentative at best. However, the estimates are based on a uniform methodology incorporating the state-of-the-art, which is not as advanced as that for combined sewer overflow. The methodology is described in Appendix A, III. Category VI estimates from the 1978 and 1980 Surveys to meet recreation objectives are presented by State in Table 13.

Table G  
COMPARISON OF 1980 SURVEY WITH 1978 SURVEY  
Year 2000 Needs for Treatment and/or Control of Stormwaters  
Category VI  
(1980 Dollars in Billions)

<u>Water Quality Objectives *</u>	<u>1978 Survey</u>	<u>1980 Survey</u>	<u>Difference</u>
Fish and Wildlife	34.23	66.08	+93%
Recreation	72.29	113.70	+57%

\* The estimates shown for the two water quality objectives pertain to two separate alternatives; they are not additive.

## APPENDIX

- i Solid Waste Management
- ii Railroads
- iii Water Supply
- iv Indiana's Ports



### i. SOLID WASTE MANAGEMENT<sup>1</sup>

Solid waste handling traditionally has been a local government affair in Indiana. The involvement of the state government is limited to the enactment of laws concerning the generation and disposal of solid wastes. Most communities in Indiana have municipal or private contract refuse collection.

Apart from the solid wastes generated by households, a major portion of the total solid waste generated in Indiana comes from industrial sources. Indiana ranks high in the concentration of industry with steel, automobile parts and accessories, furniture, pharmaceuticals and cut stone and stone product industries dominating.

The waste generated by these industries can be classified as below:

1. General refuse: Office paper and kitchen and lunchroom wastes
2. Combustible refuse: wood, cardboard, fiber board, pallets, paper packaging, some plastics and rubbers
3. Noncombustible refuse: sand, bricks, slag, clinkers, masonry, construction debris.
4. Non-aqueous liquids: oils and greases, paints, thinners, varnishes, acids, solvents, cleaners, etc.
5. Industrial sludge
6. Hazardous waste

A survey conducted by the solid waste management study is summarized in Table 1 and shows the weekly tonnages of waste generated by some of the industries covered in the survey.

<sup>1</sup> This section is based on "Solid Waste Management Study" State of Indiana, by Cole Associates Inc., Black and Veatch, Aug. 1976.

### Disposal of solid waste

Almost 100 percent of the waste generated in Indiana is disposed of on land. Only seven of the ninety-two counties had no approved sanitary landfill sites in 1976. About 22 percent of the approved landfills in operation in 1976 were publicly owned while the remainder were privately owned. The majority of the landfills in operation in 1976 started operation in the early '70s; a few started in the '60s and one had been in operation since 1953. If we assume a life span of twenty five years for the landfills, then most landfills will have exhausted their capacity by the year 2000 and they would have to be replaced by others during the period 1982-2000.

### Historical costs

The costs of existing solid waste management are not available in a meaningful form. In many communities private contractors are involved in the collection and disposal of solid waste and the costs are not available.

In communities where public collection and disposal exist the costs were combined with other functions making meaningful resolution unpractical.<sup>2</sup>

### Future needs assessment

The solid waste management study mentioned earlier did not estimate the future costs of solid wastes management in Indiana, however, the study estimated the amount of solid waste per capita expected to be generated in Indiana by the year 2000 using regression analysis. A linear relationship between population density per square mile and amount of waste generated was postulated. The following equation was developed:

<sup>2</sup> Solid waste management study. p. III-44

$$T = 1.13p - 4.19$$

where, T = tons/day and P = pop/sqmi. Based on this equation the study estimated that by year 2000 the average daily per capita waste generated would be about 8.29 pounds. Based on a projected population<sup>3/</sup> of 6,132,200 by the year 2000, the total daily amount of waste expected to be generated in Indiana works out to 50,835,938 pounds or 25,418 tons/day; the yearly waste produced would be 9.3 tons.

Based on this projection and using other data developed by the 1976 management study it is possible to develop very rough requirement figures for the year 2000.

The following assumptions are made:

1. All existing landfills would have exhausted their capacities prior to year 2000.
2. All waste generated would be disposed in landfills.
3. The cost figures used in the estimation are obtained from the 1976 study and are assumed to be correct at that time.
4. Landfills have a life of 25 years and will, on average, have a capacity of 250 tons/day. (For description of landfills see Table 4.)
5. Landfills will operate on a six day per week basis.

Based on above assumptions the investment and operating costs for landfills can be obtained as below:

<sup>3.0</sup> Population projections prepared by the Indiana University, School of Business Division of Research, 1978

Landfill capacity/day = 250 tons  
 Landfill capacity/year = 250 x 312 = 78,000 tons  
 Total waste generated = 9,277,570 tons  
 # of landfill required = 9,277,570/78,000 = 119

Investment cost/landfill

Landfill	\$280,000
Site Development	260,000
Equipment	<u>310,000</u>
Total	850,000

Total investment = 850,000 x 119 = \$101,159,000

escalating these costs at 10 percent/year for six years gives 101,150,000 x 1.95 = \$197,242,500 in 1982 dollars.

The 1976 study found that 22 percent of the landfills were publicly owned. These represented approximately 33 percent of total capacity. If we assume the same split between public and private by the year 2000 then investment requirements can be split as below:

	<u>1976 Dollars</u> (000)	<u>1982 Dollars</u> (000)
Public investment (33%)	\$33,379.5	66,000.0
Private investment (67%)	<u>67,770.5</u>	<u>134,000.0</u>
TOTAL (100%)	101,150.0	200,000.0

Operating and maintenance costs: (year 2000 system)

	<u>1976 Dollars</u>	<u>1982 Dollars</u>
Annual labor costs/landfill	70,000	112,399*
Materials and maintenance/ landfill	<u>90,000</u>	<u>153,000 **</u>
TOTAL FOR 119 LANDFILLS	19,040,000	31,582,481

\* escalation @ 7% per annum

\*\* escalation @ 10% per annum

Transportation and collection costs

To estimate the investment costs for collecting and transporting the solid waste to the landfills the following assumptions are made:

- 1) solid waste will be transported directly to the landfill, i.e. there are no intermediate transfer points.
- 2) hauling will be done by rear loading compactor truck of 25 cubic yard capacity having payload of 8 tons.
- 3) one way distance between landfill and collection area is about 30 miles.
- 4) average speed is 30 miles/hour.
- 5) trucks will operate 8 hours a day, 5 days a week.
- 6) on average each truck will make 3 trips/day

Solid waste handled/truck/day =  $3 \times 8 = 24$  tons

Solid waste handled/truck/year =  $24 \times 260 = 6,240$  tons

# of trucks required =  $\frac{9,277,570}{6,240} = 1,487$

$6,240 = 1,500$

Cost/truck = \$40,000 (1976\$)

Total cost =  $1,500 \times 40,000 = \$60,000,000$

Total cost in 1982\$ = \$117,000,000

	<u>1976 Dollars</u> (000)	<u>1982 Dollars</u> (000)
Public investment 33 percent =	19,800	38,600
Private investment 67 percent =	<u>40,200</u>	<u>78,400</u>
Total year 2000 system cost	\$60,000	\$117,000

Operating costs

	<u>1976 Dollars</u>	<u>1982 Dollars</u>
Yearly labor cost/truck	\$22,400	\$35,952*
Other variable cost/truck	<u>9,360</u>	<u>18,252**</u>
	<u>31,760</u>	<u>54,204</u>
Total cost/year for 1500 trucks =	<u>\$47,640,000</u>	<u>\$81,306,000</u>

\* total escalation @ 7% per annum

\*\* escalation @ 10% per annum.

See Table 4 for cost details

Total investment costs

	<u>Total to Year 2000</u>
Landfills (1982\$)	200,000,000
Transportation	<u>117,000,000</u>
Subtotal	317,000,000
Contingency 10%	<u>31,700,000</u>
	<u>348,700,000</u>
	\$350,000,000
Public 33%	115,500,000
Private 67%	<u>234,500,000</u>
Total	\$350,000,000

Total O & M costs

Landfills =	
31,582,481 x 19 (years) =	\$ 600,067,130
Transportation =	1,544,814,000
54,204 x 1500 =	<u>81,306,000</u>
x 19	
TOTAL (1982\$)	<u>2,144,881,130</u>
Say =	2,150,000,000

Total requirements

Investment	350,000,000
O & M	2,150,000,000
TOTAL	2,500,000,000

Funding

As mentioned earlier, solid waste management is primarily a local affair. Most funds are generated at the local level through local taxes and service charges. State laws permit local governments to own or lease facilities or contract for solid waste service.

Financing the investment required for solid waste management can come from current revenues, borrowed funds or government grants. There are several federal government grant programs providing financial assistance to states and local governments. Funds can also be obtained through general obligation bonds, revenue bonds, leases and loans from private financial institutions.

The costs of these borrowed funds will have to be borne by the users of the system through taxes or service charges. Service charges will be increasingly used because of the limits on tax funds due to statutory limitations and uncertainty of future federal revenue sharing funds.

SUMMARY OF INDUSTRIAL QUESTIONNAIRES

TABLE 1

Industry	Weekly Quantity of Refuse				Recovery	(000) \$ Yr Est. Cost of Disposal	Number of Industries Responded	
	Comb. Tons	Non-Comb. Tons	Non-Aqueous Gallons	Ind. Sludge Tons			Total Cost	
Non-Ferrous Metal	145	68	8,000	33	(3)(4)(5)	160,000	5	5
Paper & Paper Products	153	200	50	18	(1)	--	5	0
Heavy Equipment	5,250	4,800	100	28	--	40,000	8	2
Food & Food Products	660	40	185	55	(1)(2)(5)	40,000	6	3
HVAC Equipment	570	95	1,850	38	--	185,000	5	5
Prefab & Mobile Homes	1,550	8	32	5	(1)(4)	24,000	2	1
Glass	60	55	190	--	(5)(6)	47,500	2	2
Petroleum, Chem., Pharm.	650	445	195,200	725	(1)(4)	162,500	5	4
Electric & TV Equipment	820	735	6,000	375	(2)(3)(4)(5)	165,000	15	12
Electric Motors & Wire	145	80	5,700	5	(2)(3)(4)(5)	227,500	7	7
Printing	310	7	2,050	7	(1)(2)	123,000	5	3
Steel	1,250	58,500	2,800,000	8,725	(2)(3)(4)(5)	858,000	11	7
Automotive	1,035	5,400	28,800	580	(2)(3)(4)(5)	516,000	18	10
Ruber & Plastics	550	670	910	39	(5)	260,000	10	6
General Mfg.	680	660	3,065	46	(1)(2)(3)(4)(5)	--	29	--

Materials Recovered

- |                            |                               |
|----------------------------|-------------------------------|
| (1) Cardboard, Paper, etc. | (4) Cleaning Solvents & Acids |
| (2) Ferrous Metals         | (5) Oils, etc.                |
| (3) Non-ferrous Metals     | (6) Glass                     |



TABLE 2

## NUMBER OF LANDFILLS BY ESTIMATED REMAINING LIFETIME \*

Estimated Remaining Lifetime in Years	Number of Landfills
0-2	24
3-5	38
6-8	18
9-11	23
11-19	3
20+	7

\*As of July 1, 1981

SOURCE: Indiana State Board of Health

TABLE 3  
GENERATION RATES

COUNTY	POPULATION			TONS/DAY	#/CAP/DAY	
	1975 Pop.	Pop.	Sq. MI.		1975	2000
Adams	27,500		80	86	5.46	7.04
Allen	290,500		433	485	3.75	4.81
Bartholomew	59,500		148	163	5.48	7.03
Benton	11,000		27	26	4.76	6.10
Blackford	16,100		96	105	*13.0	*16.67
Boone	322,200		75	81	5.03	6.45
Brown	9,800		27	31	6.23	7.99
Carroll	18,300		49	51	5.58	7.16
Cass	40,800		98	107	5.24	6.72
Clark	31,700		83	89	5.62	7.21
Clay	24,500		67	72	5.87	7.53
Clinton	30,800		76	81	5.28	6.77
Crawford	8,700		28	27	6.27	8.04
Daviess	26,800		62	66	4.94	6.34
Dearborn	30,800		101	110	7.11	9.12
Decatur	23,200		63	67	5.75	7.37
DeKalb	32,000		87	95	5.91	7.58
Delaware	130,800		330	369	5.64	7.23
DuBois	32,000		74	79	4.96	6.36
Elkhart	136,900		293	326	4.99	6.40
Fayette	27,600		128	141	*10.21	*13.09
Floyd	55,100		370	414	*14.87	*19.07
Fountain	18,600		47	49	5.24	6.72

TABLE 3 (Continued)

<u>COUNTY</u>	<u>POPULATION</u>		<u>TONS/DAY</u>	<u>\$/CAP/DAY</u>	<u>\$/CAP/DAY</u>
	<u>1975 Pop.</u>	<u>Pop. Sq. Mi.</u>		<u>1975</u>	<u>2000</u>
Franklin	17,600	45	46	5.26	6.76
Fulton	17,900	49	51	5.67	7.27
Gibson	31,600	63	68	4.27	5.48
Grant	84,600	201	223	5.27	6.76
Greene	28,300	52	54	3.82	4.90
Hamilton	66,800	67	84	5.51	7.07
Hancock	41,200	135	148	7.21	9.25
Harrison	23,600	49	51	4.36	5.59
Hendricks	60,900	146	161	5.28	6.77
Henry	53,300	133	146	5.49	7.04
Howard	818,200	301	336	7.62	9.77
Huntington	36,000	98	106	5.89	7.55
Jackson	34,400	66	71	4.10	5.26
Jasper	23,000	41	42	3.66	4.69
Jay	24,200	63	67	5.51	7.07
Jefferson	27,800	76	82	5.87	7.53
Jennings	20,700	55	58	5.59	7.17
Johnson	69,000	219	243	7.05	9.04
Knox	40,800	79	85	4.17	5.35
Kosciusko	52,800	98	106	4.03	5.17
LaGrange	23,200	61	65	5.57	7.14
Lake	550,100	1,072	1,208	4.42	5.67
LaPorte	105,900	175	193	3.64	4.67

TABLE 3 (Continued)

<u>COUNTY</u>	<u>POPULATION</u>		<u>TONS/DAY</u>	<u>\$/CAP/DAY</u>	<u>\$/CAP/DA</u>
	<u>1975 Pop.</u>	<u>Pop. Sq. Mi.</u>		<u>1975</u>	<u>2000</u>
Lawrence	41,200	90	97	4.72	6.05
Madison	139,400	308	344	4.93	6.32
Marion	791,000	2,018	2,276	5.75	7.37
Marshall	38,500	87	94	4.88	6.23
Martin	11,000	32	32	5.79	7.43
Miami	40,500	107	117	5.79	7.43
Monroe	89,100	231	257	5.76	7.39
Montgomery	34,400	68	72	4.21	5.40
Morgan	47,700	117	129	5.39	6.91
Newton	13,200	32	32	4.84	6.21
Noble	33,100	80	87	5.23	6.71
Ohio	4,800	55	58	*24.23	*31.07
Orange	17,400	43	44	5.10	6.54
Owen	13,200	34	34	5.16	6.62
Parke	15,700	35	36	4.54	5.82
Perry	19,100	50	52	5.45	7.00
Pike	12,200	36	37	6.06	7.77
Porter	95,800	225	250	5.23	6.71
Posey	23,000	56	59	5.12	6.57
Pulaski	12,900	30	29	4.61	5.91
Putnam	27,800	57	60	4.31	5.52
Randolph	29,600	65	69	4.66	5.97
Ripley	22,400	51	53	4.74	6.08
Rush	21,100	52	54	5.13	6.58

TABLE 3 (Continued)

<u>COUNTY</u>	<u>POPULATION</u>		<u>TONS/DAY</u>	<u>\$/CAP/DAY</u> <u>1975</u>	<u>\$/CAP/DAY</u> <u>2000</u>
	<u>1975 Pop.</u>	<u>Pop. Sq. Mi.</u>			
St. Joseph	241,900	519	582	4.82	6.18
Scott	18,900	98	106	*11.27	*14.45
Shelby	39,400	96	105	5.31	6.81
Spencer	17,800	99	108	*12.16	*15.60
Starke	21,000	68	72	6.89	8.83
Steuben	22,700	73	79	6.94	8.90
Sullivan	19,400	42	44	4.51	5.78
Switzerland	6,700	12	10	2.87	3.68
Tippecanoe	112,900	226	251	4.45	5.71
Tipton	15,300	59	62	8.11	10.40
Union	6,700	40	41	*12.20	*15.64
Vanderburgh	163,500	678	762	9.32	11.95
Vermillion	17,100	65	69	8.10	10.39
Vigo	112,500	271	302	5.37	6.88
Wabash	35,300	89	96	5.44	6.97
Warren	8,600	23	22	5.17	6.63
Warrick	34,100	87	94	5.53	7.10
Washington	19,900	39	39	3.96	5.08
Wayne	79,300	196	217	5.47	7.01
Wells	25,100	68	73	5.81	7.45
White	22,100	44	46	4.17	5.35
Whitley	25,100	74	80	6.37	8.17
			Averages	6.47	8.29

Data Source: Division of Research/School of Business/Indiana University

\*Unrealistic values are replaced by the State averages in further discussions.

TABLE 4

SANITARY LANDFILL  
ESTIMATED REQUIREMENTS AND COST FACTORS

Line No.	Units	Average Daily Quantity in Tons									
		10	50	100	250	500	750	1,000	2,000	3,000	
1	Operating days per week	days	3	5	5	6	6	6	6	6	6
2	Annual Quantity	tons	2,600*	13,000	26,000	78,000	156,000	234,000	312,000	624,000	936,000
Twenty Year Site Requirements:											
3	Landfill space	acre-feet	65	320	645	1,935	3,870	5,800	7,735	15,470	23,200
4	Land	acres	5	25	50	140	280	440	560	1,120	1,700
5	Fence	lin. ft.	1,800	4,150	5,900	10,000	14,000	17,500	20,000	28,000	34,500
6	Roadway, (allowance)	lin. ft.	150	750	1,500	4,200	8,400	13,200	16,800	33,600	51,000
Buildings											
7	Gate House	ea		1	1						
8	Office and restroom	ea				1	1	1	1	1	2
9	Equipment shelter	ea		1	1						
10	Equipment shelter and shop	ea				1	1	1	1	1	1
Service Facilities											
11	Fuel only	ea		1	1						
12	Fuel and shop	ea				1	1	1	1	1	1
Scales including pit:											
13	Balance arm	ea		1	1						
14	Automatic	ea				1	1	1	2	3	4
Equipment											
Highloaders, track type											
15	32,000 lbs.	ea	1								
16	47,000 lbs.	ea		1							
Dozer											
17	44,000 lbs.	ea			1						
18	70,000 lbs.	ea				1	1	1	2	2	4
Compactor											
19	41,000 lbs.	ea				1					
20	63,000 lbs.	ea					1	2	2	4	5
Scraper											
21	Pulled, 17 cu. yd.	ea			1	1	1	1			
22	Motorized, 20 cu. yd.	ea					1	1	2	3	4
Waterhauling											
23	Truck, 1,000 gal.	ea					1	1	1	1	1
24	Wagon, 10,000 gal.	ea									
25	Grader, motorized	ea					1	1	1	1	1
26	Truck, pickup	ea	1	1	1	1	1	2	2	2	2

Labor:											
27	Supervisor	ea				1	1	1	1	1	1
28	Equipment Operator	ea	3/5	1	1	2	3	4	5	9	13
29	Gateman-Scaleman	ea		1	1	1	1	1	1	2	2
30	Laborer	ea				1	1	2	3	4	5
Costs:											
Investment											
31	Land	\$	10,000	50,000	100,000	280,000	560,000	880,000	1,120,000	2,240,000	3,400,000
32	Site Development	\$	15,000	70,000	110,000	260,000	430,000	560,000	695,000	1,260,000	1,836,000
33	Equipment	\$	70,000	95,000	165,000	310,000	510,000	660,000	985,000	1,400,000	1,980,000
34	Total	\$	95,000	215,000	375,000	850,000	1,500,000	2,100,000	2,800,000	4,900,000	7,200,000
Annual Operating Expense											
35	Labor	\$	8,000	22,000	25,000	70,000	90,000	105,000	135,000	230,000	295,000
36	Materials and maintenance	\$	8,000	18,000	25,000	90,000	100,000	130,000	160,000	285,000	390,000
37	Amortization	\$	10,000	25,000	40,000	95,000	160,000	220,000	280,000	510,000	760,000
38	Total	\$	26,000	65,000	90,000	225,000	350,000	455,000	575,000	1,025,000	1,445,000
39	Average Cost Per Ton	\$	10.00	5.00	3.46	2.88	2.24	1.94	1.84	1.64	1.54

\*5 days per week quantity received in 3 days equals 16-2/3 ton per operating day.

TABLE 5  
TRUCK HAULING  
ESTIMATED COST FACTORS

<u>Truck Type</u>	<u>Truck Rated Capacity cu. yd.</u>	<u>Truck</u>			<u>Annual Labor Cost</u>	
		<u>Initial Investment</u>	<u>Annual Fixed Cost</u>	<u>Variable Cost</u>	<u>Driver</u>	<u>Laborer</u>
<b>Compaction</b>						
Rear-loading	20	31,000	7,200	0.20	11,400	11,000
Rear-loading	25	39,000	9,200	0.25	11,400	11,000
Front-loading	25	42,000	9,600	0.25	11,400	--
Front-loading	30	43,000	9,800	0.26	11,400	--
<b>Noncompacting</b>						
Dump-open	10	32,000	8,700	0.25	11,400	--
Dump-semitrailer	33	37,000	8,800	0.30	11,600	--
Dump-container*	20-40	42,000	9,700	0.25	11,400	--

\*excluding containers



ii. RAILROADS<sup>1</sup>

Indiana's rail map changes rapidly and is in a state of flux. Most route maps and mileage figures become less than accurate almost from the time they are published. Nevertheless, the Indiana freight railroad system amounts to over 6,000 route miles. Over the past several years a number of rail lines have been abandoned, mergers have reshaped the system, new shortlines have taken hold throughout the state.

Table 1 shows most of the currently operating rail lines within the state. Some of the major interstate railroads serving Indiana are:

1) CSX -- Chessie, Seaboard C L & N

CSX is the holding company for the recently merged Chessie and family line system and operates about 1700 miles of lines within Indiana.

The chief components are:

Chesapeake & Ohio	501 miles
Baltimore & Ohio	587
Louisville & Nashville	560
Chicago South Shore & South Bend	67
US & O Chicago Terminal	6

2) Norfolk and Western Railway

Norfolk and Western operates 1735 miles of line primarily through the north and central portion of the state. Coal, coke and ore are the predominate commodities carried by N & W.

3) Southern Railway

Southern operates 293 miles of track in Indiana's Ohio River borderlands. It has recently been consolidated with Norfolk and Western.

<sup>1</sup>This section is based on:

- a) Indiana Railroad System, William J. Nall, Walt & Associates Inc., Indianapolis, IN 1981
- b) Indiana State Rail Plan, 1983 update, Division of Regional Transport Research, Dept. of Geography, Indiana University, Aug. 1982.

4) Consolidated Rail Corporation:

Conrail Operates about 1800 miles of lines in Indiana. Created by Congress with passage of the regional rail reorganization act of 1973. Conrail operates throught the state, major commodities carried by Conrail includes coal, coke, ore, farm products, automotive products, iron and steel.

5) Chicago, Milwaukee, St. Paul and Pacific Railroad

Currently under federal bankruptcy reorganization, the Milwaukee road operates 279 miles of track in Indiana. The stations which serve the bulk of the traffic suggests coal and stone to be the main commodities carried by the Milwaukee road in Indiana.

6) Grand Trunk Western Railroad

TRW is owned by Canadian National Railways and operates about 80 miles of line in Northwest Indiana between Chicago and South Bend. The Railroad originates or terminates vary with freight in Indiana.

7) Illinois Central Gulf Railroad

IGG operates 176 miles in Indiana primarily hauling coal.

8) Elgin, Joliet and Eastern Railway Company

Controlled by United States Steel Company, E, J & E owns about 58 miles in the northwestern corner of Indiana.

9) Toledo, Peoria & Western Railroad

T P & W operates a 55 mile line in west central Indiana. T P & W is a wholly owned subsidiary of Santa Fe.

State and Federal Assistance to Railroads (1976-1981)

Beginning in 1976 the state provided local rail service operating assistance for rail lines that would have been abandoned otherwise. This assistance included operating subsidies, accelerated maintenance and the leasing of right-of-ways. This program of local rail service assistance was a matching grant program that initially (1976) involved 100 percent federal funds. The federal role however, decreased to 70% during the five years that followed.

Table 2 provides the non-federal match required for projects during this period.

Table 2

<u>Time Period</u>	<u>Nonfederal Match</u>
April 1, 1976 - June 30, 1977	0%
July 1, 1977 - June 30, 1978	10%
July 1, 1978 - September 30, 1980	20%
Oct. 1, 1980 onwards	30%

Source: Indiana Transportation Fact Book, June 1982

The program was terminated at the federal level in 1981; the state did not step in with a program of its own to fill the void. The state and federal assistance provided railroads during this period is shown in Table 3.

Federal funds have been provided under the local rail service assistance act of 1978 for subsidies, acquisition, rehabilitation, substitute service and new construction. Although the state has participated in the subsidy and rehabilitation program, it has not been directly involved in acquisition, substitute service or new construction projects. It is the state policy not to become involved in acquisition projects, state involvement, for new construction and substitute service has been negligible since there has been a lack of potential projects.

Indiana also has an industrial rail service loan program which was enacted during the 1982 session of the Indiana General Assembly. This program provides low interest loan monies to eligible short line railroads and port authorities for rehabilitation or acquisition.

#### Rail Policy of Indiana

Rail freight transportation is viewed as a major segment of the infrastructure supporting the state's economy. The vast majority of products in the state are bulky or weight intensive and most suitable for rail transportation. These include agricultural grains, coal, limestone, and steel products.

The Indiana State Rail Plan, 1983 update has introduced the concept of a core rail system. This system identifies key stations at which the state should attempt to preserve service. In accordance with this core rail system the plan lists the rail policy of Indiana as:

- 1) The continued existence of available private sector railroad system is the state's highest priority.
- 2) The state will not object to abandonments necessary to maintain the profitability of railroads unless such abandonments will effect the state's core rail system, or the result in significant economic disruption in a community or region.
- 3) In the event that part of the state's core rail system is abandoned it shall be the policy of the state to seek interim operating assistance for continued rail service for not more than two years in order to mitigate the social and economic impacts of such an abandonment.

In addition state policy is:

Operating assistance for continued rail service for not more than two years in order to mitigate the social and economic impacts of such an abandonment.

AN ALTERNATIVE MODE IS GENERALLY AVAILABLE FOR COMMODITIES WHICH MOVE ON LIGHT DENSITY LINES AND ITS UTILIZATION SHOULD BE ENCOURAGED IN CASES OF APPROVED AND CONSUMATED ABANDONMENTS.

NEW CONSTRUCTION OR NEW CONNECTIONS BUILT BY RAILROADS OR RAIL USERS AIMED AT INCREASING THE EFFICIENCY OF THEIR RAIL OPERATIONS SHOULD BE ENCOURAGED. HOWEVER, IT IS ASSUMED THAT SUCH EFFICIENCIES ARE SUFFICIENT TO MERIT THE PRIVATE SECTOR UNDERTAKING SUCH INVESTMENTS.

STATE PROVISION OF LOAN OR MATCHING GRANT FUNDS FOR REHABILITATION SHOULD BE RESERVED FOR THOSE SITUATIONS WHERE SUCH FUNDS WILL RESULT IN VIABLE RAIL SERVICE AT LEAST OVER THE LIFE OF THE PROJECT.

OVER THE LAST DECADE, IT HAS BEEN THE POLICY OF THE STATE OF INDIANA NOT TO ACQUIRE RAIL PROPERTIES FOR RAIL USES AND THIS SHALL CONTINUE TO BE THE STATE'S POLICY.

IN AREAS WHERE EXISTING CLASS I RAILROADS WISH TO TERMINATE SERVICE, THE STATE SHOULD GIVE THOROUGH CONSIDERATION TO THE USE OF A SHORT LINE RAILROAD TO PRESERVE THE SERVICE.

IT IS THE POLICY OF THE STATE TO PROVIDE LOW INTEREST LOAN FUNDS TO SHORT LINE (CLASS III) RAILROADS AND PORT AUTHORITIES FOR ACQUISITION AND REHABILITATION.

THE STATE WILL NOT OPPOSE THE MERGER OF RAILROADS WITHIN ITS BOUNDARIES PROVIDED SUCH MERGERS DO NOT RESULT IN A LOSS OF RAIL SERVICE TO ITS CORE SYSTEM OR THREATEN SIGNIFICANT ECONOMIC DISRUPTION.

ALTHOUGH IT IS TOO EARLY TO KNOW THE METHOD OF DISPOSITION OF CONRAIL, THE STATE FAVORS KEEPING THE RAILROAD TOGETHER AS A SINGLE UNIT AND TRANSFERRED IN THAT MANNER.

ALTHOUGH FEDERAL RAIL PLANNING REQUIREMENTS MAY SOON BE CANCELLED, THE STATE WILL CONTINUE TO PREPARE ANNUAL RAIL PLANS SO THAT IT REMAINS AWARE OF THE SYSTEM'S PROBLEMS AND NEEDS.

THE STATE BELIEVES THAT FUNDED PROJECTS SHOULD BE EVALUATED ON THE BASIS OF SEVERAL CRITERIA, INCLUDING COST BENEFIT ANALYSES, PROJECTED ECONOMIC BENEFITS, LONG-TERM VIABILITY OF THE RAIL SERVICE, AND LONG-TERM COMMITMENTS OF THE RAIL USER.

IT IS THE POLICY OF THE STATE TO COOPERATE IN ALL FEDERAL RAIL PLANNING AND ASSISTANCE PROGRAMS, AND THE STATE SHOULD CONTINUE TO MONITOR ACTIVITY IN THIS AREA.

IT IS THE POLICY OF THE STATE TO PARTICIPATE TO THE GREATEST EXTENT POSSIBLE IN FOSTERING THE DEVELOPMENT OF HIGH SPEED RAIL CORRIDORS IN INDIANA AND MONITOR THEIR DEVELOPMENT IN OTHER STATES.

Future Public Investment Requirements

The complexity of the rail situation in Indiana makes projections of future requirement of public funds for rail assistance a hazardous job. To the best of our knowledge such a projection does not exist at this time. In the absence of any reliable forecast, a very rough estimate of future public funding is made by taking the average of the last six years of public assistance as shown in Table 3. The total federal and state assistance for railroads from 1976-1981 amounted to \$21.56 million or an average of \$3.6 million per year. Federal and state assistance for railroads does not depict any trend reflecting increased recognition of needs or costs. The \$3.6 million assessment is based on actual dollars. For our purposes, we assume that this level of support continues in constant (1982) dollars, which would be an improvement on historical performance. Thus, we assume that these funding levels persist in the future, a total of only \$68.4 million would be available for the period 1982-2000. However, keeping in mind the Indiana rail policy enumerated above, this amount could be underestimating the actual needs if the rail policy is strictly enforced.

TABLE 1: Operating Railroads and Mileages in the State of Indiana

<u>Railroad</u>	<u>ROUTE MILES</u>		
	<u>Over 5 M-GTM*</u>	<u>Over 3 but less than 5 M-GTM*</u>	<u>3 M-GTM* and Under</u>
Algers, Winslow & Western Railway Company Route 2, P.O. Box 188 Oakland City, IN 47660		16	
The Baltimore and Ohio Railroad Company 2 North Charles Street Baltimore, MD 21201	403.30	54.1	129.99
The Baltimore and Ohio Chicago Terminal 13600 So. Halsted Street Chicago, IL 60627	6.03		
The Chesapeake and Ohio Railway Company 100 North Charles Street Baltimore, MD 21201	449.2		52.73
Chicago, Milwaukee, St. Paul and Pacific Railroad Company 861 Union Station, 516 W. Jackson Blvd. Chicago, IL 60603	22.5	84.8	
Chicago Short Line Railway 9746 Avenue N Chicago, IL 60617			
Chicago South Shore and South Bend Railroad Carroll Avenue Michigan City, In 46360	9.10	28.09	30.22
City of Auburn Port Authority 500 W. Seventh Street Auburn, IN 46706 (CAPA owns the track, the B&O operates this track as an industrial siding)			1.5
City of Madison Port Authority 511 State Street Madison, Indiana			25.8
Consolidated Rail Corporation 6 Penn Center Plaza, Room 1712 Philadelphia, PA 19104	1,155.7	36.9	616.8

<u>Railroad</u>	<u>ROUTE MILES</u>		
	<u>Over 5 M-GTM*</u>	<u>Over 3 but less than 5 M-GTM*</u>	<u>3 M-GTM* and Under</u>
Elgin, Joliet and Eastern Railway Company P.O. Box 899 Gary, IN 46401	27.61		26.08
Ferdinand Railroad Co. P.O. Box 10 Corydon, IN 47112			7.0
Grand Trunk Western Railroad Company 131 West Lafayette Boulevard Detroit, MI 46226	80.8		
Hillsdale County R.R. 50 Monroe Street Hillsdale, MI 49242			15.85
Illinois Central Gulf Railroad Company 233 N. Michigan Avenue Chicago, IL 60601			150.1
Indian Creek R.R. Lynwood Road Anderson, IN 47012			4.1
Indiana and Ohio R.R. P.O. Box 208 Brookville, IN 47012			26.2
Indiana Eastern R.R. 406 E. Warrick Street Knightstown, IN 46148			21.55
Indiana Harbor Belt Railroad Company 2721 161st Street Hammond, IN 47331			4.77
Indiana Hi-Rail Corporation RR 1 Box 242 Connersville, IN 47331			6.7
Kentucky and Indiana Terminal Railroad Company 2910 Northwestern Parkway Louisville, KY 40212	0.85		
Lake Erie and Fort Wayne Railroad 2302 West Taylor Street Fort Wayne, IN 46804			4.0



Railroad	ROUTE MILES		
	Over 5 M-GTM*	Over 3 but less than 3 5 M-GTM*	M-GTM* and Under
Louisville and Nashville Railroad Company 500 Water Street Jacksonville, FL 32202	202	298	60.85
Louisville, New Albany and Corydon Railroad Company P.O. Box 10 Corydon, IN 47112			8.0
Muncie and Western Railroad Company 1425 E. Twelfth Street Muncie, IN 47302	0.75		2.97
New Jersey, Indiana and Illinois R.R. Company 8 N. Jefferson Street Roanoke, VA 24042			11.0
Norfolk and Western Railway Company 8 N. Jefferson Street Roanoke, VA 24042	716.5	24	989.1
Southern Indiana Railway, Inc. 622 Chamber of Commerce Building Indianapolis, IN 46204			5.4
Southern Railway System 125 Sprint Street, S.W. Atlanta, GA 30303	118.54	29.54	95.56
Tippecanoe R.R. P.O. Box 68 Monterey, IN 46960			31.0
Toledo, Peoria and Western R.R. Company 2000 E. Washington Street East Peoria, IL 61611		55.2	
Yankeetown Dock Corp Fredonia Road Evansville, IN			23.0
<b>TOTAL</b>	<b>3,192.88</b>	<b>610.63</b>	<b>2,338.94</b>

NOTE: M-GTM\* = Million Gross Tons Per Mile

Table 3  
 State and Federal Assistance To Railroads  
 (1976-1981)

	Federal	State	Local a)	TOTAL
1976	5,811,205	---	---	5,811,205
1977	3,394,804	339,480		3,734,284
1978	1,456,502	323,899		1,780,401
1979	3,982,537	541,936	453,698	4,978,171
1980	3,128,837	741,313	391,104	4,261,254
1981	1,654,892	185,558	418,193	2,258,643
<b>TOTAL</b>	<b>19,428,777</b>	<b>2,132,186</b>	<b>1,262,995</b>	<b>22,823,958</b>

a) represents funds provided by local shippers and railroad companies, not local units of Government.

Source: Indiana Transportation Fact Book.

## iii. Water Supply

Indiana is blessed with an abundant water supply. Average annual precipitation is 38.0 inches which varies from 36.0 inches in the north to 44 inches in the south.

Major withdrawal of the water resources can be classified into public water supply, industrial water supply, rural water supply not supplied by a public utility, irrigational water supply and energy production. The public share in the requirement of funds for public water supply, rural water supply and irrigational water supply. The government role in these categories is very limited since responsibility of water supply is a local affair and apart from municipally owned water supply utilities many utilities are active in providing water supply. Consequently there is a complete lack of any meaningful financial data.

In a recent report prepared by the Governor's water resource study commission, a projection of water usage in Indiana by the year 2000 has been made. This projection is reproduced in Table 1.

It has not been possible to convert these projections into financial numbers due to the complexity of the problem. However, the withdrawal of water for public water supply is expected to increase by 31% from 1980 to year 2000, rural water is expected to increase by 35% and water withdrawal for agricultural purposes is expected to increase by 92% by the year 2000.

It is not possible to quantify the amount of funds that would be required to meet these needs and the share of the state in the provision of such funds. However, considering the large projected increases the subject is of considerable importance. It should however, be noted that currently most communities in Indiana are being served by public water supply systems do not foresee any supply problems since most systems are operating below their capacities.

**Table 1**  
The current and projected water withdrawals and consumption  
in million-gallons-per-day within Indiana.

<i>Water Use</i>	<i>1977</i>		<i>1980</i>		<i>1990</i>		<i>2000</i>	
	<i>Withdrawn</i>	<i>Consumed</i>	<i>Withdrawn</i>	<i>Consumed</i>	<i>Withdrawn</i>	<i>Consumed</i>	<i>Withdrawn</i>	<i>Consumed</i>
Public Water Supply <sup>a</sup>	553.69 <sup>b</sup>	68.75 <sup>b</sup>	577.91	72.30	670.07	84.41	757.64	96.07
Industrial Self-Supply	3,456.94	146.71	3,286.29	154.69	3,317.45	201.71	3,430.35	256.53
Rural Water	147.27	147.27	155.36	155.36	182.42	182.42	209.37	209.37
Irrigation <sup>c,d</sup>	196.77	196.77	234.42	234.42	341.60	341.60	451.65	451.65
Energy <sup>e</sup>	9,492.88	48.13	9,490.68	77.73	9,359.18	204.73	4,705.33	203.88
Unallocated Energy <sup>f,g</sup>	0.00	0.00	0.00	0.00	15.40	7.50	308.00	150.00
Coal Processing	9.20	9.20	11.30	11.30	21.03	21.03	31.20	31.20
Oil Well Injection <sup>h</sup>	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
<b>Total</b>	<b>13,857.75</b>	<b>617.83</b>	<b>13,756.96</b>	<b>706.80</b>	<b>13,908.15</b>	<b>1,044.40</b>	<b>9,894.54</b>	<b>1,399.70</b>

<sup>a</sup>Public water supplies projections are from the "13 Cities" projection series.

<sup>b</sup>Figures for 1975 calendar year with exception of Region 10 which is 1977 data.

<sup>c</sup>Represents irrigation for an average year of precipitation during the irrigation season of July through August for croplands and golf courses.

<sup>d</sup>1980 and 1990 values by interpolation.

<sup>e</sup>Represents values attributed to existing and announced energy facilities.

<sup>f</sup>Represents withdrawal and consumption for future electric power generating stations. Sites for these stations have not yet been identified. No allowance has been made for coal classification or liquification.

<sup>g</sup>Projections are based on the midrange growth rate of 5 percent.

<sup>h</sup>Insufficient data to project trend.

iv. INDIANA PORTS<sup>1</sup>

Water borne transportation has played an important role in the development of Indiana. The Ohio River was an important route of migration into Indiana and river trade led to the growth of commercial and manufacturing centers in Madison, New Albany, and Evansville. Access to the Great Lakes through Lake Michigan made an important contribution to the industrial and agricultural development of northern Indiana.

There are several public and private ports in the State of Indiana. The majority of private ports are owned by major corporations operating in Indiana. These include the Gary harbor on Lake Michigan operated by U.S. Steel. Jones and Laughlin Steel and Inland Steel have facilities at Indiana harbor. Standard Oil maintains a facility at Whiting and Atlas Cement owns a port at Buffington harbor.

Privately owned facilities on Ohio River include the Port of Madison, Port of Aurora and the barge construction and repair facility of Jeffboat, Inc. in Jeffersonville.

The public facilities owned and operated by the Indiana Port Commission include the Burns Waterway Harbor on Lake Michigan and the Southwide Maritime Center at Mt. Vernon on the Ohio River. The Clark Maritime Center, a Ohio River port, has been approved for construction since 1971. Construction has, however, been delayed since then due to delays in obtaining federal government approval of environmental requirements and litigation at federal, district and appeals courts. These issues have been resolved and construction is now underway.

<sup>1</sup> This section is based on the Indiana Transportation Fact Book. Transportation Coordinating Board. State of Indiana, June 1982

The Indiana Ports Commission has been granted authority to establish port user charges at a level adequate to recover the costs of operation, maintenance and repair of the facilities. The commission directs its efforts at providing of water transport facilities which the private sector cannot provide. General public use facilities like port, roads, sewers, waterlines and docks etc. which do not benefit a specific firm or group of firms are developed and financed through state appropriations and users fees are not intended to recover these costs. Other facilities for specific private users have to earn a reasonable return over the useful life of the facility.

The revenue and expenses of the Indiana Port Commission from 1976 to 1980 are provided below. The commissions revenues have covered expenses over this time period.

	1976	1977	1978	1979	1980
Revenues	1,218,023	1,371,136	1,637,451	1,729,150	4,082,347
Expenses	<u>776,122</u>	<u>1,052,316</u>	<u>1,325,570</u>	<u>1,600,785</u>	<u>1,870,864</u>
Net Income	441,901	318,820	311,881	128,865	2,211,483*

\*Includes \$799,348 from interest earned on bond proceeds not immediately needed for construction purposes

Appropriations from State of Indiana upto December 31, 1980 for the three public owned facilities are provided in Table VI-12. Total appropriations amount to over \$37 million. The port commission also raised \$19 million in long-term bonds in 1980.

The balance sheet of the Commission ending December 31, 1980 is provided in Table VI-13.

The total future requirements of funds for expansion of current port facilities or construction of new ports to meet the demand for water transportation to the year 2000 is not available.

**Table VI-12  
SCHEDULE OF APPROPRIATIONS FROM STATE OF INDIANA AS OF  
DECEMBER 31, 1980**

**Burns Waterway Harbor**

Acts of General Assembly:

1961, Chapter 298; 1963, Special Session, Chapter 35 (Special appropriations - administrative expenditures)	\$ 28,400
1957, Chapter 286; 1959, Chapter 114; 1961, Chapter 11; 1963, Special Session, Chapter 35 (Acquisitions of land and other expenditures)	2,000,000
1965, Chapter 192 (Construction of port project)	15,000,000
1965, Chapter 225 (Appropriation from State of Indiana Cigarette Tax Fund for construction of port project):	
July 1, 1965 to June 30, 1966	5,285,000
July 1, 1966 to June 30, 1967	5,285,000
1979 Appropriation from State of Indiana	1,500,000
1980 Appropriation from State of Indiana	4,500,000
	<u>\$33,598,400</u>

Deduct: Construction cost reimbursements by the U. S. Army Corps of Engineers to the State of Indiana

\$13,364,285  
\$20,234,115

**Southwind Maritime Centre**

Public Law 478, effective July 1971:

Feasibility study	\$ 50,000
Land acquisition and related costs	1,000,000
1972 appropriation equal to 1972 receipt from U.S. Army Corps of Engineers	1,086,714
Public Law 340, Approved April 26, 1973 (Construction of port project)	3,700,000
1974 appropriation equal to 1974 receipt from U. S. Army Corps of Engineers	190,415
Public Law 344, effective July 1, 1975 (Construction of port project)	6,000,000
1975 appropriation equal to 1975 receipt from U. S. Army Corps of Engineers	136,424
1979 appropriation from State of Indiana	1,000,000
	<u>\$13,163,553</u>

**Clark Maritime Centre**

Public Law 478, effective July 1, 1971 - for

feasibility study	\$ 50,000
Public Law 340, approved April 26, 1973 (Land acquisition and related costs)	3,850,000
1977 appropriation from State of Indiana received in 1979	400,000
	<u>\$ 4,300,000</u>
<b>TOTAL</b>	<b>\$37,697,668</b>

SOURCE: Indiana Port Commission, 1980 Annual Report.

Table VI-13

**INDIANA PORT COMMISSION CHANGES IN FINANCIAL CONDITION,  
COMBINED TOTALS ALL FUNDS, DECEMBER 31, 1975-1980\***

Assets	1975	1980
Cash	\$ 78,895	\$ 290,331
Investments at cost	11,464,929	21,038,952
Accrued interest on investments	87,609	96,161
Accounts receivable - trade (less allowance for doubtful accounts) <sup>b</sup>	75,075	322,020
Accounts receivable, lessee - cost reimbursement - current portion	19,987	-0-
Bond interest receivable - Cargill, Inc.	-0-	550,003
Prepaid items <sup>c</sup>	18,371	88,283
	<u>\$11,744,866</u>	<u>\$22,385,750</u>
Deferred charges (lease commissions and bond costs, net	\$ 141,924	\$ 271,179
Accounts receivable lessee - cost reimbursement	11,168	-0-
Ports and terminal facilities - at cost	22,867,143	50,844,105
Less: accumulated depreciation (straight line method)	<u>(1,137,164)</u>	<u>(3,966,370)</u>
	<u>\$21,883,071</u>	<u>\$47,148,914</u>
<b>TOTAL ASSETS</b>	<u><b>\$33,627,937</b></u>	<u><b>\$69,534,664</b></u>
<b>Liabilities, Appropriations, Contributed Capital and Fund Balances</b>		
Accounts payable and accrued expenses	\$ 311,068	\$ 1,892,216
7% Port Revenue Bonds, Series 1971 - current portion	5,000	5,000
Accrued interest on bonds	7,678	620,482
	<u>\$ 323,746</u>	<u>\$ 2,517,698</u>
7% Port Revenue Bonds, Series of 1971, less amount due within one year	\$ 400,000	\$ 375,000
Port Revenue Bonds, Series 1980, due February 1, 2010	-0-	17,000,000
Port Revenue Bonds, Series 1980, due February 1, 2000	-0-	2,000,000
Deferred income	-0-	1,215,267
	<u>\$ 400,000</u>	<u>\$20,590,267</u>
Appropriations from the State of Indiana		
Repayable	\$14,205,715	\$14,205,715
Not repayable	13,397,953	23,491,953
Fund balances	<u>5,300,523</u>	<u>8,729,031</u>
	<u>\$32,904,191</u>	<u>\$46,426,699</u>
<b>TOTAL LIABILITIES, APPROPRIATIONS, CONTRIBUTED CAPITAL AND FUND BALANCES</b>	<u><b>\$33,627,937</b></u>	<u><b>\$69,534,664</b></u>

\*Funds include 1) Port Facilities Funds of Burns Waterway Harbot, Southwind Maritime Centre, and Clark Maritime Centre; 2) 1971 Revenue Bonds Funds (3 Funds);

3) the Leased Improvement Fund and leased Dock Fund of the Cargill, Inc. Project; and 4) Operating Fund.

<sup>b</sup>Allowance for doubtful accounts was \$212,937 in 1980 and \$73,111 in 1975.

<sup>c</sup>Includes insurance.

SOURCE: Indiana Port Commission, *Annual Reports*, 1975 and 1980.