INDIANA HIGHWAY NEEDS 1976-1995

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DEVELOPMENT OF 20-YEAR NEEDS STUDY

The 1976-1995 Indiana Highway Needs Study was mandated by the Indiana General Assembly, which adopted a bill in 1976 directing the Legislative Council in cooperation with the Transportation Advisory Commission to conduct a study of both the financing of Indiana's roads and streets and of the state's role in the financing of various transportation modes.

The study was to be organized into two coordinated studies, the first phase of which was devoted mainly to highway finance and needs and was completed last November. The second phase will be devoted to determining the state's role in the financing of air, water, rail, and public transportation and is to be completed by November 1, 1977.

The study that was conducted indicated that Indiana's highway system, which has provided Hoosiers a large degree of mobility and has supported the movement of goods and services in and through Indiana, is in trouble. Rapidly rising traffic and heavier trucks have taken their toll on the system. Decreasing revenues and increases in the cost of construction and maintenance have reduced the effectiveness of the highway program.

STATE, COUNTY, AND CITY ROADS IN JEOPARDY

Not only is the state highway system in jeopardy, but the county roads and city streets are also in bad shape. Hearings conducted throughout the state last year have echoed the public's concern. The same story was heard in all reaches of the state and at all levels.

The problem is not going to fade away. It has to be faced head on with good planning and much foresight. To rebuild the same system of roads that Indiana has now would take over $27 billion, not including the cost of right-of-way. To protect this investment, we are

currently spending about $480 million at all levels of government or 1.8% of the replacement cost annually.

The bulk of road and street funding in Indiana is derived from the eight cent/gallon tax on motor fuels and from vehicle registration fees. The future looks gloomy for a system financed primarily by gallonage tax. Due to federal regulations mandating a 27.5 mpg fleet average for vehicles manufactured in 1985, Indiana will experience a decrease in revenue from this source even though population and annual travel per capita will continue to increase. The "effective" revenues will decrease even more sharply as the dollar continues to buy less and less due to inflation and spiraling construction costs.

STEPS IN DEVELOPING HIGHWAY NEEDS

The process of developing highway needs is of necessity a logical, organized process. The first step is to develop pertinent projections of population, motor vehicle registration, potential drivers, travel, and fuel consumption.

Population Projections

Projections for Indiana indicate a population of approximately 6.34 million in 1995, an increase of 18% over 1975. These projections indicate an annual increase of 0.85% which is considerably less than the 1.13% experienced in the last 20 years. (Figure 1)

By 1995 more than half, or 53%, of the population will live in 15 urbanized areas having populations of 50,000 or more. This compares to approximately 40% in the 1970 census. An additional 17%

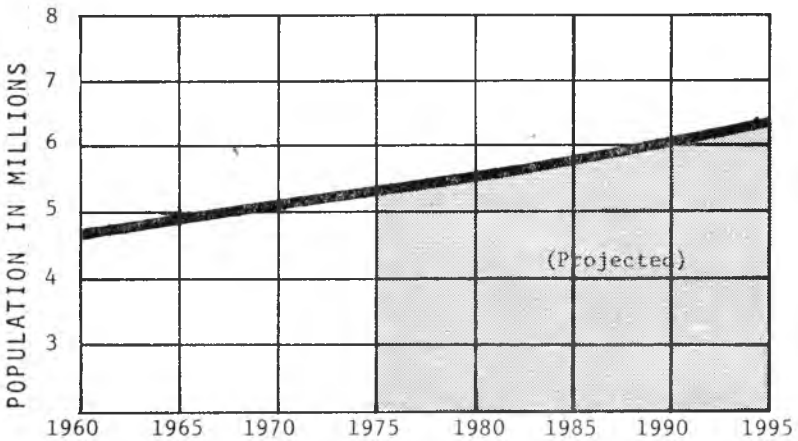

Figure 1. Indiana Population Trends, 1960-1995

will reside in urban areas with populations between 5,000 and 50,000. The remainder of the population, or 30%, will reside in rural areas and towns having populations of less than 5,000. This is a drop from 43% in 1970.

Number of Motor Vehicles Projected

Passenger car and truck registration has been increasing at a faster rate than the population. There will be 3.5 million passenger cars and 1.1 million trucks registered in 1995. This is an increase of 35% and 51% respectively over 1975. Car ownership will increase to 0.56 passenger car per capita as compared to 0.49 in 1975. (Figure 2)

Number of Potential Drivers Projected

There will be approximately 4.1 million drivers in Indiana by 1995. Hoosiers will also be driving more per capita than they do now. Daily miles of travel per capita will increase 20% to 23.21 miles.

Amount of Travel and Fuel Consumption Projected

During the 20-year period, 1975 to 1995, statewide travel is expected to increase. Before these projections were developed our staff did extensive research on the subject of energy and fuel availability. Two assumptions were used:

1. Barring any major political changes in our relations with the oil producing countries in the Middle East, fuel will continue to be available in sufficient supply over the next 20 years. Figure 3

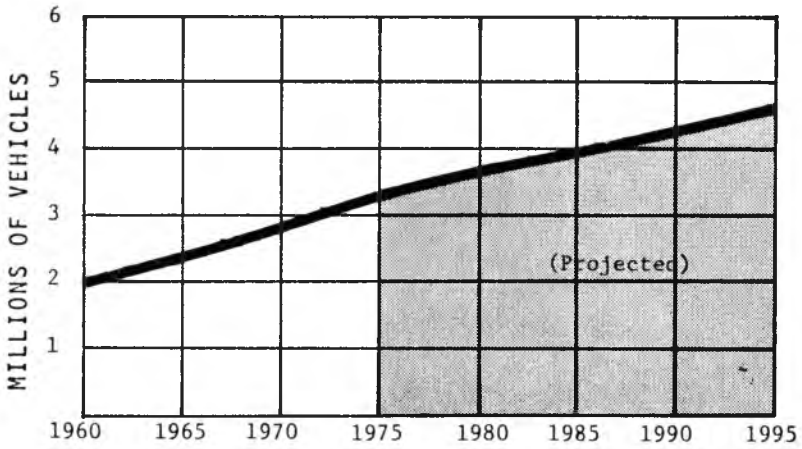

Figure 2. Total Registered Vehicles—Private and Commercial

shows that although local production will be fairly constant, imports will remain available.

2. Fuel prices will continue to increase at a rate not vastly different from the inflation rate of other commodities. Recent developments among the OPEC countries point in this direction. One can conclude, therefore, that the cost of vehicle operation will increase at a rate similar to that of other commodities. (Figure 4)

Using the above assumptions and considering the effects of the other factors mentioned, projections for travel were developed that showed an increase in annual travel over the next 20 years from 37.8 billion miles to a projected 53.7 billion miles, an increase of 42%. This indicates that Hoosier travel will increase to 147 million miles daily in 1995. (Figure 5)

SOURCES OF REVENUE

Fuel Consumption—Basis of Government Income for Highway Disbursements

Using these projections, estimates of fuel consumption were developed, since fuel consumption forms the basis of government income for highway dispersements.

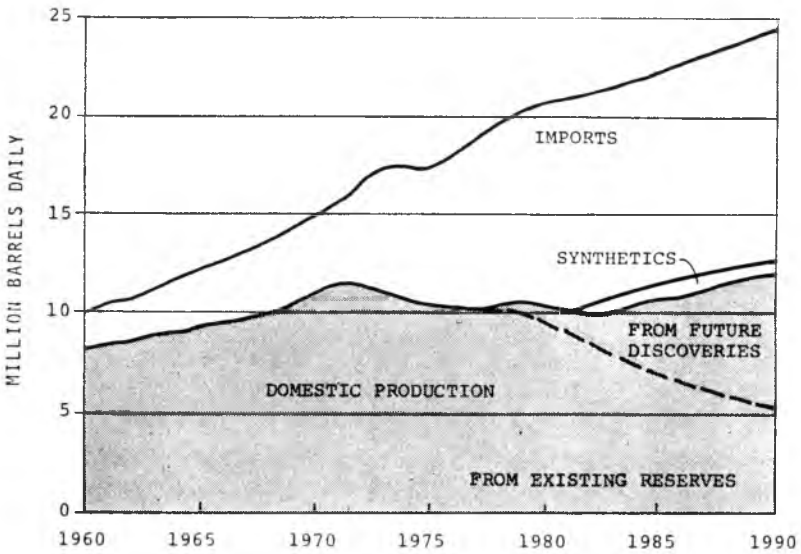

Figure 3. U. S. Oil Supply—Millions of Barrels Daily
Source—Exxon Company U.S.A.

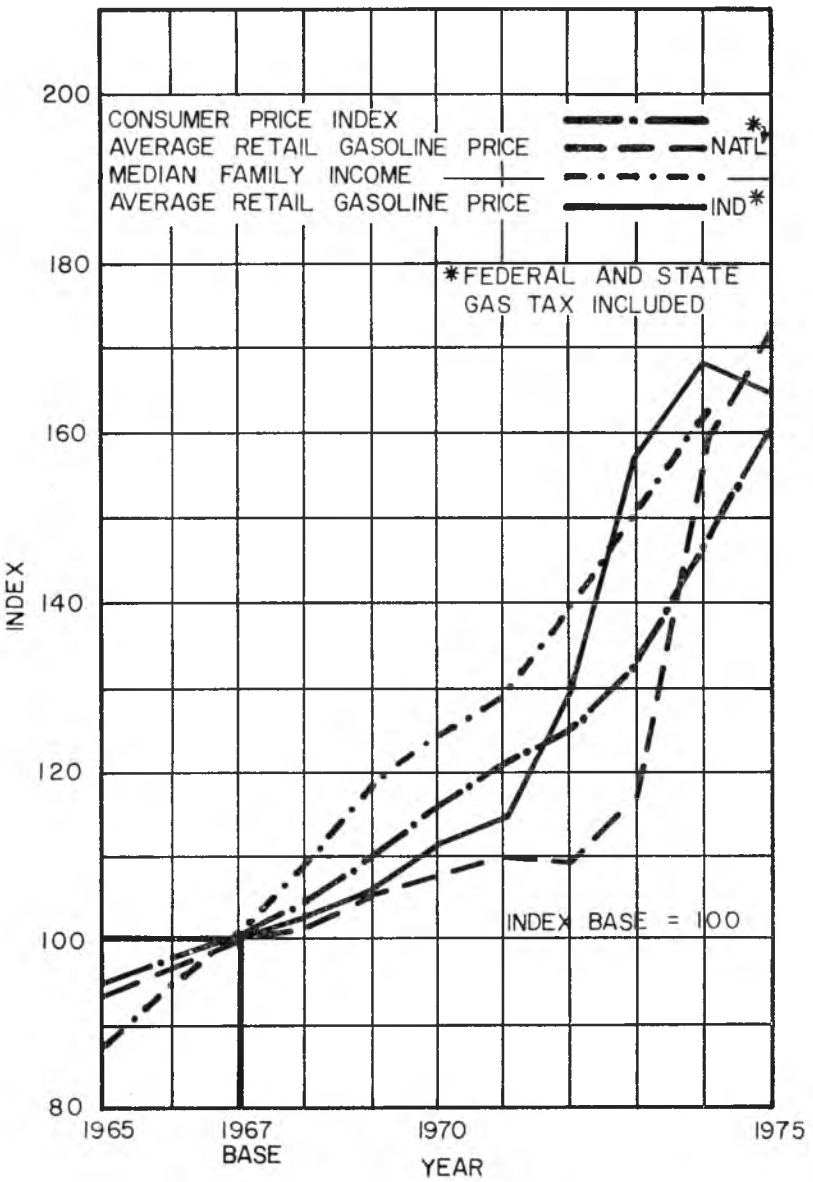

Figure 4. Gasoline Price Index 1965-1975

Motor fuel consumption in Indiana has been gaining steadily in the past, going from 1 billion gal in 1950 to 2.625 billion in 1970,

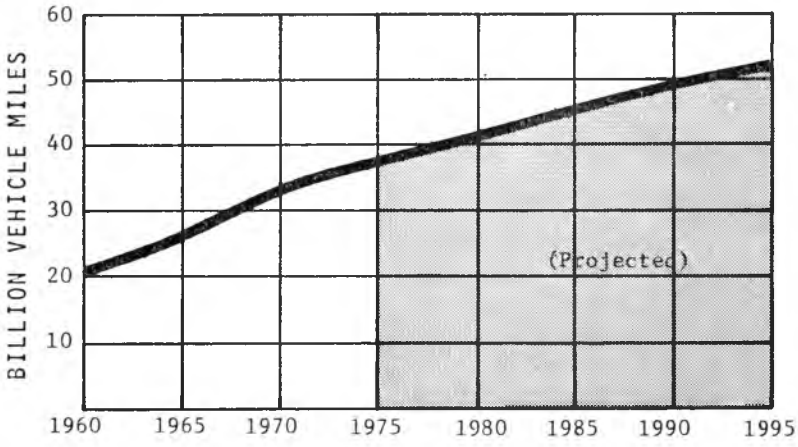

Figure 5. Indiana Travel Trends

In 1973 the increase in gasoline prices and the oil embargo late that year dropped consumption from 3.12 billion gal in 1973 to 2.99 billion in 1974. At present fuel consumption is climbing back at the same rate as before.

In the past, increases in travel coupled with increases in fuel consumption due to larger cars and government mandated antipollution devices kept income from fuel taxes increasing so that it paralleled highway needs. Income never did reach the annual needs, but it was not falling behind either.

Since 1970, the cost of construction and maintenance has been increasing at an equal or greater rate than inflation while fuel consumption has been increasing at a slower rate. Consequently, income started lagging further and further behind highway needs.

The Energy Policy and Conservation Act added a new dimension to the fuel consumption picture. It mandated that by 1985 the average car must meet a 27.5 mi./gal. standard. As a result of this legislation, a fleet fuel economy of 21.53 mpg in 1995 was projected as compared to 14.33 mpg in 1975. This indicates a little over 50% improvement. Moderate improvement in truck economy can also be expected. An analysis on a year by year basis was formulated to evaluate the effect of this legislation on fuel consumption. The study revealed that from 1976 to 1995, fuel consumption will drop from 3.127 billion gal. to 3.045. Figure 6 shows the income from gasoline consumption in the next 20 years using the present 8¢/gal. tax.

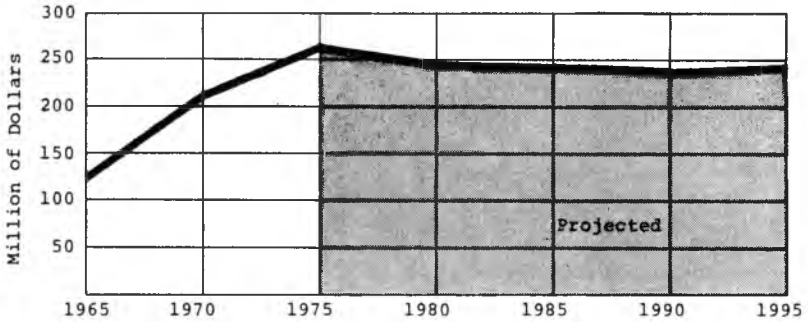

Figure 6. Revenue from Motor Fuel Tax 1965-1995

Revenue from Vehicle Registration

The other main source of revenue for our road network comes from registration of cars and trucks. The increase in registrations will increase income from this source by about 50%. (Figure 7) If one combines the two main sources of income, the following picture emerges indicating that income will increase from $311 million to $339 million from 1975 to 1995, a modest increase of 9%. (Figure 8)

Federal Funds

Adding to these figures $80 million from federal funds, the total users income is going to be almost constant with $391 million in 1975 and $419 million in 1995.

Projections Show Need for New Method and Rates of Taxation

With these projections, the magnitude of the highway dilemma become more apparent. In the next 20 years, Indiana will have more people, more drivers, more cars, and more travel and will pay more

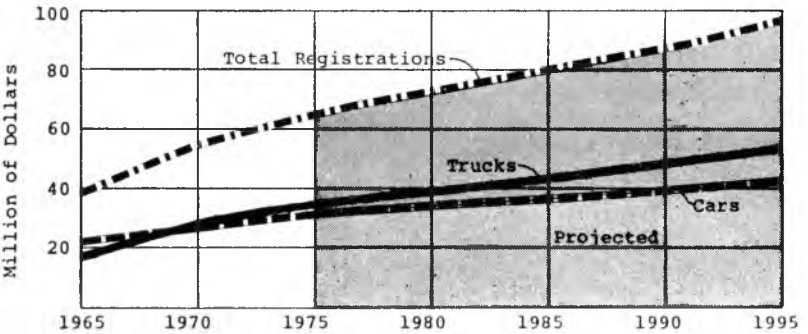

Figure 7. Revenue from Motor Vehicle Registrations 1965-1995

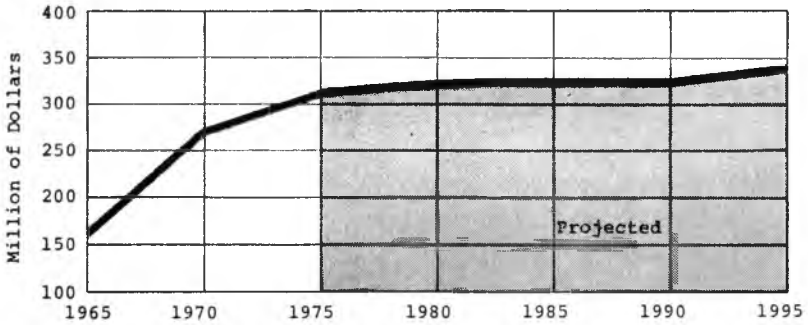

Figure 8. Total Revenue from Motor Vehicle Registrations and Motor Fuel Tax 1965-1995

for construction and maintenance but will receive less revenue than now if Indiana continues with the same method and rate of taxation.

HIGHWAY NEEDS

Primary Purpose of Needs Study

The primary purpose of the highway needs study was to provide a basis for proper fiscal planning for the improvement and maintenance of an adequate road and street system in the state of Indiana.

Levels of Needs Developed and Defined

To achieve these objectives and offer the legislature some options, three levels of needs were developed. These levels are identified as "real needs," "minimum needs," and "intermediate needs."

Functional classifications and projections were used to develop highway needs throughout the state over the next 20 years. For each functional classification there exists a set of standards for desirable and minimum tolerable conditions.

An evaluation of existing and future conditions on selected sections of each functionally classified system was undertaken and deficiencies were identified where minimum tolerable conditions are not met. In some cases deficiencies do not exist at the present time but were expected to develop during the 20-year study period. Cost estimates were then developed based on the nature and time of occurrence of deficiencies. From these samples, costs were projected for the identified needs on the total system.

The "real needs" are those expenditures that are needed now in addition to projects that are needed in the next 20 years (1976-1995). These needs, if fulfilled, will put the total system, state highways,

county roads, and city streets in acceptable shape within 20 years so that by the end of this time the entire system will be adequate for the projected traffic needs. This development of needs follows existing national guidelines and standards. Both the 1967 and 1970 studies were developed on this basis.

The "minimum needs" include very little major construction on new locations or bypass type construction. A few reconstruction projects are included that are badly needed at the present time. These improvements, however, will only be such that in 20 years they will be in the same shape they are in at present, i.e., again needing work. The "minimum needs" level can be characterized as a bare-bone level below which the system will degenerate further. It represents the level of expenditure needed to maintain the system we have now.

The "intermediate level of needs" is a compromise between the two extremes. It is predicated on the assumption that, while some roads and streets can be deficient and may be neglected without hurting the network, the interstate highways and other arterial roads should be maintained properly. The unfulfilled needs, which are the gap between the real and minimum needs, will be fulfilled at a varying scale between 100% for the interstate and 25% on the rural and urban collectors.

Real, Minimum and Intermediate Annual Dollar Needs

Table 1 details the real, minimum, and intermediate annual needs for each system and for each political jurisdiction, and reflects the total annual expenditures required from all sources to satisfy these needs.

TABLE 1—AVERAGE ANNUAL NEEDS IN MILLIONS OF 1975 DOLLARS

Needs Level	*State*	*County*	*City*	*Total*
REAL				
($)	442	464	253	1,159
(%)	38	40	22	100
INTERMEDIATE				
($)	386	309	178	874
(%)	44	35	21	100
MINIMUM				
($)	306	275	162	743
(%)	41	37	22	100

It must be pointed out that the minimum maintenance costs including patching, shoulder repair, mowing, bridge repair, and painting are constant for all three need levels in this analysis. The administrative cost which is a function of all other expenditures was not held constant for the three levels of needs.

Dollar Needs for 20-Year Period

Figure 9 graphically illustrates the composition and level of expenditures required to satisfy the total needs for the 20-year study period for each of these three levels.

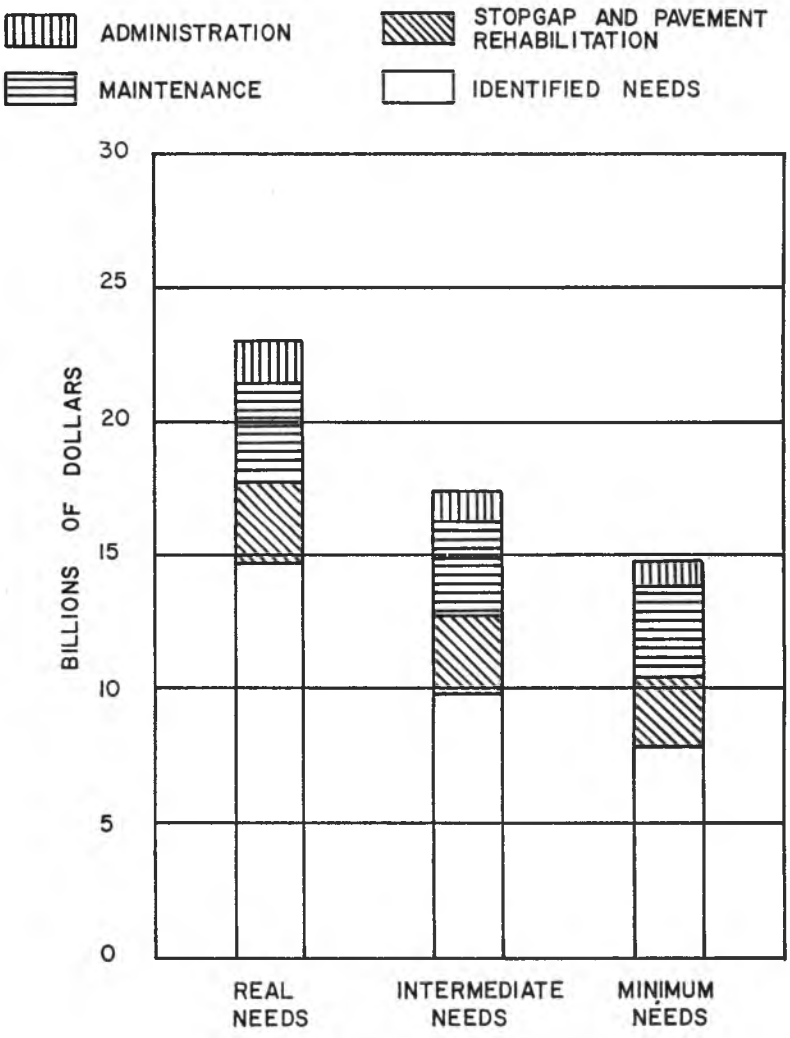

Figure 9. Total Highway Needs 1965-1995

Bridge Needs—County and State—Repair and Replacement Costs

The crisis situation of the bridges throughout the state needs action and warrants special mention here. Of the 13,200 bridges on the county system, 55% are one lane and totally inadequate. An additional 20% are too narrow. Only 25% have adequate geometric configuration. Of the total number, 57% need immediate repairs. The total needs on county bridges amount to $625 million in the 20-year study period.

The picture is also gloomy for the state highway's 4,658 bridges, with 21% of the total needing replacement now. The estimated 20-year needs for repair and replacement of bridges on the state system amounts to $1,320 million.

USER AND NONUSER SHARE OF HIGHWAY COSTS

Cost responsibility for highway construction has been a matter of legislative policy. There are many different logical methods of establishing cost responsibility. Each basically divides the costs between highway users who operate motor vehicles and the general public who require access to their properties and benefit from highways.

Historically, highway users have borne the major cost of all highway facilities. The initial costs of building local access roads and streets, particularly in subdivisions, are generally considered the responsibility of property owners.

In the development of the user-nonuser shares, the user share of the higher functional classifications was larger than it was in the lower systems. Table 2 reflects the responsibility for each of the three levels of needs considered, indicating a user share of the real needs of 61%, while the user share was 66% of the intermediate and 63% of the minimum needs. A breakdown of the user share for each system is also indicated.

TABLE 2—AVERAGE ANNUAL NEEDS IN MILLIONS OF 1975 DOLLARS

Needs Level	*Responsibility*	*ISHC* *Needs*	*%*	*County Roads* *Needs*	*%*	*Cities/Towns* *Needs*	*%*	*Total* *Needs*	*%*
Real	User	401	91	195	42	111	44	707	61
	Nonuser	41	9	269	58	142	56	452	39
	Total	442	100	464	100	253	100	1,159	100
Intermediate	User	352	91	136	44	93	52	581	66
	Nonuser	35	9	173	56	85	48	293	34
	Total	387	100	309	100	178	100	874	100
Minimum	User	278	91	112	41	78	48	468	63
	Nonuser	28	9	162	59	84	52	274	37
	Total	306	100	274	100	162	100	742	100

AVERAGE ANNUAL DOLLAR NEEDS AND REVENUE

A breakdown of available monies (user and nonuser) in fiscal 1977 to the Indiana State Highway Commission, the county roads system, and the cities' streets is shown on Figure 10. The term "average annual needs" is misleading at best. Costs were projected using 1975 prices, with the total costs for the 20-year study period then divided by 20 years to obtain an "average annual need." If costs and prices do not increase beyond the 1975 level, these figures will be accurate, but if inflation continues at a 6% rate as it has been doing, these needs will be increased 95%.

THE GAP BETWEEN DOLLAR NEEDS AND INCOME

To illustrate this, Figure 11 shows the user share of the three levels of needs with 1975 as a starting point. The needs were then increased at the 6% rate over the next 10 years. Superimposed on the same curve is the projected income from present user sources. This is the bottom red line, and includes the present 8¢/gal. fuel tax plus motor vehicle registrations and federal aid.

The difference between the income curve and the inflated real needs represent the shortfall between needs and available money that must be

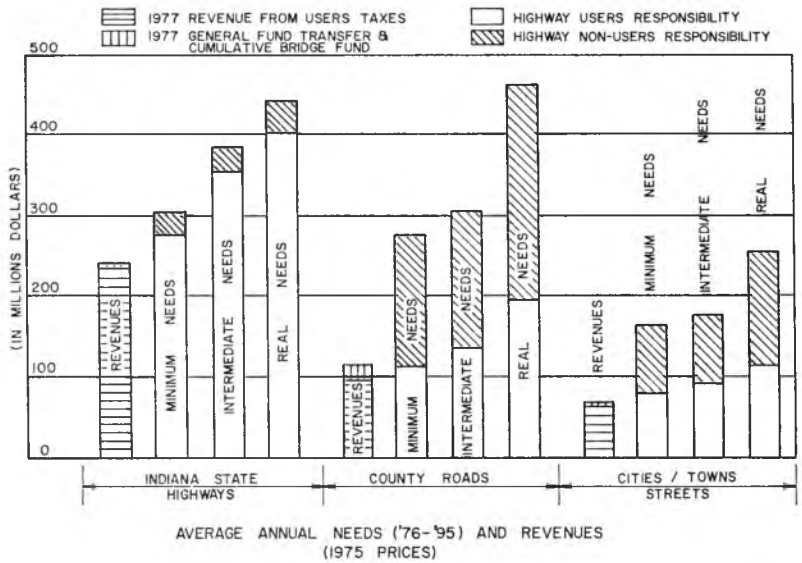

Figure 10. Average Annual Needs and Revenues*—1975 Prices (*Annual Needs 1976-1995)

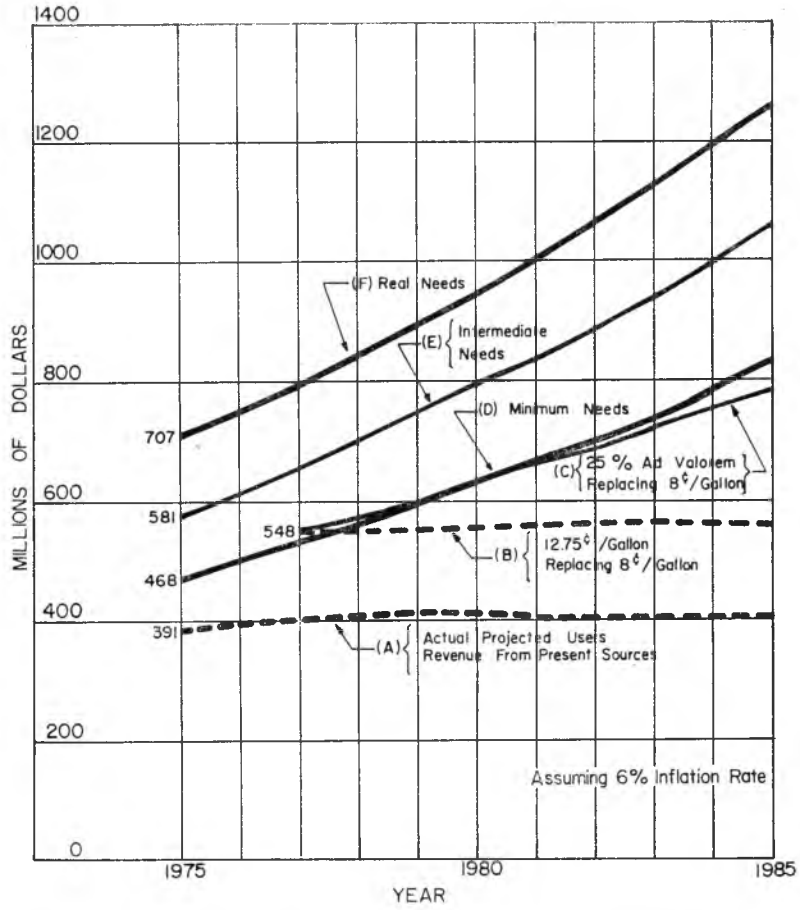

Figure 11. Average Annual Need and Income Users Responsibility (Assuming 6% Inflation Rate)

raised to finance the unsatisfied needs. The difference between the minimum needs curve and the available money represents the amount of further deterioration the highways, streets, and roads are going to suffer in any year. The area between the two curves represents the accumulated damage the system will be allowed to sustain under present policies. When a system of taxation does not adjust itself to the increases in construction costs, both labor and materials, the gap will be widened further.

INCOME FROM 25% AD VALOREM TAX

The study investigated the income from possible ad valorem taxes on motor fuels. A 25% ad valorem tax was computed as a substitute for the 8¢/gal. tax for presentation purposes. This 25% ad valorem tax is presently equivalent to 12.75¢/gal. The middle dashed line reflects income from a constant 12.75¢/gal. tax, together with projected motor vehicle registration fees and federal aid. If the 25% ad valorem tax were added to projected motor vehicle registration fees and federal aid, a curve would emerge. It can be seen that this curve is not parallel to the minimum need curves but is close to it.

POSSIBLE SOURCES OF ADDITIONAL REVENUE

In addition to the ad valorem tax, other possible sources of additional revenue were investigated and are listed in Table 3.

CONCLUSION

This highway needs study has revealed the magnitude of the highway problems that face Indiana citizens in the coming years. It is obvious that the present structure for obtaining funds for highway improvements and maintenance must be revised. At present the total annual expenditures on highways by all units of government and from all user and nonuser sources is approximately $480 million.

TABLE 3—POSSIBLE SOURCES OF ADDITIONAL REVENUE

New or Increased Highway Users Taxes	*1976-1995 Average Annual Revenue*
Each 1¢ increase in motor fuel taxes	$34 million
Each 1¢ differential tax on diesel	3.5 million
Each $1 increase in passenger car fee	3.1 million
Each $1 increase in the annual driver license and permit fee	3.7 million
Each 10% in truck registration fee	4.3 million
*Add 10% ad valorem tax on net cost	1976 - 150.58 m
	1985 - 248.86 m
	1995 - 443.41 m
Transfers	
* 4% Sales tax on motor fuel without business exemptions	1976 - 75.25 m
	1985 - 114.24 m
	1995 - 192.00 m

* Assuming 6% annual increase in fuel prices.

The real needs average about $1,159 million. The intermediate level of needs indicate that with a moderate level of improvements these annual needs are $874 million. The minimum annual expenditures required to prevent the collapse of the backbone of our state's economy, the highway system, amounts to $743 million.

In recent years the state of Indiana has been receiving less than an equitable return in federal highway funds, and no significant changes are expected in the future. The state of Indiana will have to rely basically on its own resources to pay for its highways and streets.

An adequate and efficient highway system properly maintained and expanded is not only a good investment from the standpoint of increased employment and productivity, but also it is an absolute necessity when the safety of children and the general public becomes involved. Hoosiers can no longer tolerate having school buses stop at unsafe bridges to let the children cross on foot. Obsolete bridges and dangerous roads are a threat to the entire population and have a serious effect on the state's agricultural and industrial products and livelihood. Bad roads waste 25% more fuel and hasten the depletion of this valuable natural resource.

Mobility is essential to the continued economic growth of this nation. It has become an American life-style. Personal freedom is at the core of the American character. The car is an extension of this character, and this is the main reason why the private automobile has been and will remain the public's choice for personal transportation.

The maintenance of an adequate energy supply is a national problem and must be recognized as such. Work must continue on the development of new and alternative sources of power for vehicles. But even the availability of other power sources will not eliminate the needs for improved highways and bridges. Indiana must protect its highway system against further deterioration.