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REPORT ON REVIEW OF THE ALLOCATION OF HIGHWAY USERS' TAXES

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The Joint Legislative Audit Committee
of the California State Legislature:

In the accompanying report we present our review of the allocation of highway users' taxes in response to a request from the Assembly Transportation Committee to the Joint Legislative Audit Committee.

Because users' taxes are dedicated to road purposes, the primary objective of the almost 500 street and road programs of the cities, counties, and state is to invest these funds to produce the greatest amount of user benefits as possible. After setting aside a part of users' revenues to maintain the road system, the balance is available for road improvement. Those investments which will produce the greatest yield of benefits are preferred over investments which yield a lower rate of benefits per dollar invested.

The present method of allocation of users' revenues impedes the uniform development of the total street and road system in the following ways:

- Although both federal and state policy is to promote regional planning and development, by making the primary allocation to level of government, (1) all cities join together and (2) all counties join together, although widely separated geographically, in competition with (3) the Division of Highways for revenue.

- Because the secondary allocation is made by inflexible formulas which cannot reflect changing needs, material inequities among the individual political entities are evident. While some entities finance most of their road costs from users' taxes, others are forced to finance most of their road costs from nonusers' taxes.
- While local communities may accept or reject federal and state plans, considerable pressure is exerted to accept these plans because rejection will usually result in the funds being transferred to some other area rather than being available for alternative solutions.
- Arbitrary restrictions on revenue utilization (e.g., North-South split and county minimums) are necessary to allay fears of regional favoritism because a rational basis of needs determination and priority planning is not used.
- The substantial variations in need determination and planning practices among the street, road, and highway agencies require that the decisions regarding the rates and distribution of users' taxes be based on political compromise rather than the amount of user benefits that can be produced.

To eliminate these impediments to judicious road investment, we recommend the adoption of a method of allocation of highway users' taxes with the following features:

- Provide to each city and county an amount for nonproject costs (administration, maintenance, etc.) so that the same percentage of these costs are paid from users' taxes for all local governments.
- Make the primary allocation of users' revenues available for systems improvement to the eleven regional areas of the state represented by the Division of Highways' districts on the basis of returning to each area the revenue generated by vehicle usage therein.
- Establish priorities within each regional area for all city, county, and state projects primarily on the basis of the amount of benefits anticipated per dollar invested.
- Provide that policy decisions and the control of the needs determination and priority planning system for each region be by representatives for all political entities including the state. The Division of Highways' district engineer could represent the State Highway Commission in each area.

Because the proposed change is of major proportion, a considerable lead time is necessary. Legislation to implement this method of allocation should provide a minimum of three years for systems development and implementation before being fully operational.

Our comments are presented in nine chapters as shown in the table of contents. Also, a bibliography is included at the end of the report.

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I. INTRODUCTION

Federal and state highway users' taxes currently provide all of the funds for state highway purposes, approximately 73 percent of county road costs, and approximately 33 percent of city street costs. The allocation of these funds and the limitations placed on their use is probably the most important aspect of state transportation policy. Local governments can augment subvened users' taxes only from nonusers' taxes, for which there is much competition, particularly in urban areas. Therefore, the state's role in shaping urban development (to the extent development is affected by transportation) is substantially greater than the role of local governments. In the past decade the expenditures by the Division of Highways in urban areas was approximately 5 times greater than the amount of users' taxes provided to the cities.

While it has been observed that the effects of transportation development on economic growth and stability evidence no marked difference between urban and rural areas, the effects of transportation on the so-called quality of life are greatest in urban areas. The use of revenue derived from the aggregate highway investment to date does not just influence the economic growth and stability of our urban areas. It influences also the locational structure of urban society as to both individuals and businesses, the private sector's costs of mobility, land usage, and the environment.

Of all the states, California has both the greatest number and probably the highest percentage of its total population living in urban areas. Therefore, the present exercise of authority whereby most major transportation decisions are made in Washington and state capitols has its greatest impact in California.

Because users' taxes are dedicated to highway purposes, the user is in the unique position of being both investor and consumer. A portion of the operating capital provided by usage must be dedicated to maintain the plant (the transportation system). The remainder is available for additional plant improvement, and it is essential that sound investments be made in order to yield the greatest return. In effect, dividends on these capital investments are derived from time savings, decreased vehicle operating costs, and improved safety to the road user. The following conclusions may be drawn from this concept.

- The existing plant must first be preserved (maintained).
- Capital improvements producing the most benefits are to be preferred.
- No capital improvement should be made which yields less return than can be realized on other investments that users could make privately.

One additional concept is involved.

Article 26 of the State Constitution limits the use of most users' taxes to road maintenance and improvement. For transportation, congestion is the product of excess demand for facilities over the supply thereof. The rationale for the use of Bay Area bridge tolls, for example, to finance the BART tube is that bridge users will be benefitted by reduced congestion on the bridges resulting from BART usage. In the same manner, a change in Article 26, enabling the use of highway users' revenues for capital investment in rubber tire and fixed rail mass transit systems, could provide benefits to road users in the form of reduced congestion. Thus, a change in Article 26 merely enables some

funds now restricted to creating more highway supply to be used to diminish highway demand. (It requires approximately 5 to 9 times more right-of-way space to move commuters in private vehicles than in buses.)

This report examines the various impediments which restrict the ability of the cities, counties, and the state to make the soundest investments in transportation facilities, and it contains our recommendation to eliminate these impediments.

II. PRESENT METHOD OF ALLOCATION OF HIGHWAY USERS' TAXES

The present method of allocation of highway users' taxes developed over a considerable period of time by superimposing formula upon formula with the result that the amounts currently allocated to almost 500 political entities (cities, counties, and the state) reflect the composite of political compromises dating back over five decades.

Conspicuous by its almost complete absence in the statutes prescribing the fund allocation is any reference to needs. Indeed, the inability to establish a reliable basis for determination of needs is probably the principal factor which produced the existing series of inflexible formulas. Ironically, the only flexible formula came about as a consequence of the so-called San Francisco freeway revolt. Prior to 1961, the State Highway Commission was required to allocate a percentage of the funds for capital improvements in accordance with stated county percentages (referred to as the Mayo formula). However, in that year this formula was abandoned, and in lieu thereof percentages are specified for each of the 11 district areas of the Divisions of Highways. Every four years these percentages are changed based upon revised need determinations made by the Division of Highways.

The primary division of funds is: fixed portions of individual users' taxes to level of government with secondary allocations to specific entities.

The State Highway Fund receives:

- All of the use fuel tax (motor vehicle fuel other than gasoline)
- All of the gross truck receipts tax (except 1970-71)
- The balance of the motor vehicle registration and weight fees in excess of the expenditures of the Department of the California Highway Patrol and the Department of Motor Vehicles
- All but approximately 3 percent of the federal aid
- Approximately 52 percent of the gas tax.

The counties receive:

- Approximately 27 percent of the gas tax
- Approximately 3 percent of the federal aid.

The cities receive approximately 21 percent of the gas tax.

A small part of the state highway share of revenue is spent on local roads. The following factors are given various weights in the several formulas by which allocations are made to the cities and counties:

- Number of registered vehicles
- Population
- Assessed valuation of property
- Miles of roadway
- Fixed percentages
- Fixed amounts
- Agreements reached between cities and counties
- Physical area
- Mileage of rural mail delivery routes
- Percentages of snow removal costs.

It might be concluded that by using a large number of factors in making the fund allocations, an equitable and rational division results. However, the following additional considerations show that this is not true.

- The primary, and hence the most important, division of funds is by level of government. This allocation is primarily the result of earlier political compromises which cannot reflect current and future needs.
- All political entities report needs in excess of anticipated revenues. However, there are material variations among the individual entities in the relationships between anticipated revenues and amounts reported as needs.
- The state has not explicitly defined and probably cannot define, the extent of its responsibility for local transportation. However, the substantial variations in the extent that users' revenues finance local transportation costs among the various areas of the state reflect an inconsistency with the user-benefit principle which is the main support for preserving the dedication of users' revenues to road purposes.
- Both federal and state policy is to promote regional transportation planning and development. Providing a relatively fixed amount of funds to each of the almost 500 political entities impedes meaningful implementation of this policy.

III. HISTORY OF FINANCIAL POLICY

Originally, both federal and state responsibility for roadways was limited to rural areas. The private motor vehicle brought about modification of county road geometric factors and created the need for better surfacing of both county roads and city streets. However, the greatest impact was the creation of a need for a new system--long distance trunk routes. The early extension of both federal and state aid to counties attests to the popularity of the user-benefit principle incorporated in the dedication of the various federal and state taxes paid by the street and road user.

The limitation of state responsibility to rural areas operated to the advantage of primarily rural Northern California and to the disadvantage of primarily urban Southern California interests. Large amounts of revenue produced by city street usage in Los Angeles and San Diego could not judiciously be spent in the sparsely inhabited mountainous and desert areas in Southern California and, therefore, these amounts were expended in rural areas in the North. Various restrictions on the expenditure of state and federal users' revenues were enacted in an attempt to satisfy regional interests. Some were temporary, such as the designation and appropriations of funds for (1) a state primary road system which for the most part was to serve statewide purposes and (2) a state secondary road system which primarily served regional purposes. Other restrictions have remained to the present time, such as the so-called North-South split of the state and federal users' taxes expended for state highway improvement.

The rapid urbanization occurring in recent decades has required substantial increases in the amount of users' taxes expended in urban areas.

Under federal aid programs developed decades ago, no particular share of total costs is provided by federal funds. The decisions by Congress (1) to finance a high percentage of the total interstate system's costs and (2) to include substantial urban segments in this system has enabled California to receive substantially larger percentages of the federal users' revenues than are received under other federal road programs. The formulas by which the federal funds are allocated to the states for these other programs were developed decades ago and favor rural states. Assembly Joint Resolution 59, 1969 session, took note that only 80 percent of the federal users' taxes paid by Californians is expended within the state and requested that greater consideration be given to population in the formulas by which federal funds are allocated to the states.

While substantial increases have been made in the amounts of federal and state users' revenues expended in urban areas, the amounts of revenue generated by use of urban facilities continue to exceed the expenditures thereon. Thus, in the last decade over a billion dollars of federal and state users' revenues generated in Los Angeles County was transferred to other states and rural areas of California for expenditure. This evidences a carryover from the past when the federal and state transportation interests were directed almost exclusively to rural roads. Also evidencing the carryover of the idea that users' revenues are primarily provided for rural roads is the differences in the percentages of local road costs paid by federal and state users' revenues. Currently, approximately 73 percent of the counties' road costs are paid from users' revenues, while only approximately 33 percent of the maintenance and improvement costs of city streets are paid from users' revenues.

The equity of present street and road financial policy is described in the following section.

IV. EQUITY OF FINANCIAL POLICY

The following two questions are the subject of repeated investigation and analysis:

- What are the appropriate amounts of total costs that should be collected from the various road users (autos, buses, and trucks)?
- How should the costs of roads be shared between user and nonuser?

The latter question is of particular importance in the review of the allocation of users' revenues because the state and federal governments have pre-empted the levy of users' taxes, leaving the cities and counties only the ability to raise nonusers' revenues for road purposes. Therefore, the allocation of users' taxes dictates the sharing of costs between users and nonusers.

Because of the substantial variations in the amount of the total road costs that nonusers pay, it is impossible to conclude that a solution has been reached regarding how costs are to be shared between the user and the nonuser. Among the cities, the range varies from nonusers providing less than 5 percent of total street costs to providing more than 95 percent of costs. Among the counties, the range varies from nonusers providing less than 5 percent of total road costs to providing more than 55 percent of costs.

The share of total costs that the nonusers bear is a consequence of independent decisions regarding the following:

- The rate of federal and state users' taxes,
- The portions of users' taxes to be subvened and the factors considered, and relative weights assigned thereto, in making the allocations to the individual political subdivisions, and
- The urgency of proposed work determined by local elected and administrative personnel.

It is possible to adopt a method of allocation which would minimize or eliminate the substantial differences in the amounts nonusers now pay. However, if this is the only objective of users' tax allocation revision, a rather significant arbitrary decision would be required as described below.

Several studies which have attempted to determine the allocation of benefits, and hence the appropriate sharing of costs, of roadways between users and nonusers have as a primary consideration the presumed increase in value of improved access to abutting property. The difficulty of attempting to determine this value is revealed by the fact that fourteen separate studies produced as many different conclusions regarding the proper assignment between users and nonusers. For city streets the percentage of benefits assigned to nonusers varied from a low of 27 percent to a high of 85 percent. From this large variation, it is apparent that it is impossible to objectively evaluate all relevant factors to establish an equitable basis of sharing.

The burden resulting from the failure of users' taxes to finance all road costs affects urban areas disproportionately. The cost of initial street construction either is paid by subdividers and recovered in their prices, or is financed by assessments against adjacent property. During the last decade, only approximately 63 cents of every dollar of federal and state users' taxes generated by vehicle usage in Los Angeles County was expended therein. Approximately 7 cents was transferred for expenditure in other states and approximately 30 cents was transferred for expenditure in rural areas within California.

To make up for the transfer of funds from urban to rural areas, substantially larger percentages of total road costs are provided by nonusers' taxes being committed to road purposes in the urban areas compared to rural areas. Considering that most transportation problems are associated with urban areas and that large amounts of users' taxes generated in urban areas are transferred from these areas, the nonuser is primarily financing the deficit created by the failure to reflect needs and priorities in the allocation of users' taxes.

V. EVALUATION OF PRESENT METHOD

The principal advantages of the present method of allocation which provides fixed portions of specific users' taxes to level of government with secondary allocations by several formulas to individual cities and counties are as follows:

- Is easy to administer
- Enables long-range planning

While the number of factors listed on page 5, which are considered in the formulas to make allocations, may appear to indicate a rather complicated process, the method is rather simple with the same series of computations made monthly to determine and pay each political entity's share of receipts. Because future projections of both revenue and the factors (e.g., population) in the formulas have been reasonably accurate, each of the almost 500 separate street and road agencies receiving funds can determine probable future apportionment amounts with a high degree of precision. This facilitates long-range planning.

The principal disadvantages of the present method of allocation are as follows:

- The division of the street and road responsibility among the cities, counties, and the state primarily facilitates the administration of the total system. Road users have little concern for the division of jurisdictional responsibility, and they have the right to assume that a primary objective is to promote the uniform development of the total system. However, allocation by fixed formulas impedes this objective.

Thus, the Senate Resolution 154 (1968 regular session) report reveals that based on present funding, the county road needs can be met in as little as seven years in one county but will require 175 years in two counties. Because allocation formulas provide relatively fixed amounts, the needs of the latter two counties can only be met within a reasonable time by a substantial increase in nonusers' taxes.

- Transportation problems are generally identified by geographic areas rather than by levels of government or road systems (e.g., state highway system, interstate system). By allocating funds first to levels of government and then to specific entities by fixed formulas, it is impossible to distribute funds so that the amounts provided are relative to the magnitude of the problems to be solved.
- While both federal and state policy is to encourage regional transportation planning and development, providing each political entity with a relatively fixed amount of funds does not promote implementation of this policy. Thus, when planned urban freeway construction is precluded by the absence of local acceptance, the funds which would have been expended are usually transferred to some other area for other freeway construction rather than applied to the solution of the local problem by some other means.

Under the present method of allocation it is unlikely that, and only fortuitious if, the amount of revenue being applied to the problems of an area corresponds to the relative magnitude of these problems as compared to those of other areas. Originally, the present method of allocation was reasonable. When the cities were exclusively responsible for urban roadways, the counties were responsible for the local farm-to-market roadways, and the Division of Highways was solely responsible for the rural long distance trunk routes, needs could be identified with level of government. However, urban sprawl into unincorporated areas in several counties has materially changed the nature of the transportation problems of these counties. The transfer of the responsibility for the extensions of the rural state highways into and through cities from city governments to the Division of Highways reduced the responsibility of the cities. However, it is impossible to measure the amount of the responsibility transferred.

Although it is not possible to measure the respective amounts of responsibility of the state and cities, there are large variations among the cities in the amount of responsibility retained which the present formulas do not consider. For example, if two cities have the same population, they will receive essentially the same amount of users' taxes. This is true even though in one city the majority of the vehicle mileage may be driven on roadways which are the responsibility of that city, while in the other city the majority of the vehicle mileage may occur on roadways which are the responsibility of the state. In comparing the percentage of users' taxes provided to each city with its total expenditures for street maintenance and improvement, the range varies from a low of users' taxes providing less than 5 percent of the total city's cost to a high of users' taxes providing more than 95 percent of the city's cost.

For the 10-year period ended June 30, 1968, state and federal users' taxes provided 66 percent of the total county road expenditures and 28 percent of the city road expenditures. For fiscal year 1968-69, users' taxes provided 72 percent of county expenditures and 33 percent of city expenditures. In general, users' taxes provided a substantially greater part of total costs in rural areas than in urban areas. This difference could be lessened by changing the formulas along the lines that Assembly Joint Resolution 59 of the 1969 session requested Congress to do, that is, give greater consideration to population in the formulas. However, only nominal benefit would be realized by such a change because of the following:

- The primary allocation would still be to level of government rather than to area, and problems are identified by area, not by level of government.
- The change would be limited to the local government portion of funds while there would be no effect on the major portion, the state's share.
- While such change would direct more revenue to the urban areas, there would be no recognition of the fact that the state has assumed varying amounts of responsibility among the cities. Therefore, the substantial variations which now exist in the percentage of the total street costs paid from users' taxes would not be materially changed.

The other disadvantages outlined in the beginning of this chapter and described in the following paragraphs would not be eliminated by such change.

The present division of authority among federal, state, and local governments reflects the historical development of responsibility for streets and roads, but it is not necessarily the best framework in which to solve current problems. Since 1965, federal funds cannot be used in urban areas of more than fifty thousand population unless a continuing comprehensive transportation planning process is carried on cooperatively by the several states and local communities. In recent years several bills have been presented in the California Legislature to enable the creation of regional transportation agencies. There is growing recognition of the benefits to be derived from regional transportation planning and development; however, within most urban areas, many separate cities, frequently more than one county, the state, and transit authorities are all planning, designing, constructing, or operating separate transportation facilities.

One of the most formidable barriers to the development of meaningful regional transportation planning is the present allocation method. Statements of federal and state policy supporting regional cooperation do not constitute sufficient incentive to overcome bureaucratic self-interest which is fostered by providing relatively fixed amounts of revenue to each road agency. As indicated earlier, when local action which precludes the construction of planned freeways, results in the funds which would have been expended being transferred to another area rather than being made available for alternative solutions, doubt is cast upon the credibility of the federal-state policy of promoting regional planning. Users' taxes are available to solve regional problems, but only if the solution to be implemented agrees with the predesignated federal-state plan.

Under the concept described in the introduction of this report, the road user is both investor and consumer who should receive benefits in the form of reduced travel time, lower vehicle operating costs, and improved safety in return for the funds he provides. Restrictions on the use of funds which result in making some investments with lower benefit yields earlier than other investments with higher benefit yields are to be avoided to maximize benefits. However, this presumes that (1) it is possible to determine, in advance of investment decisions, what the yield of each investment will be, and (2) there is a general commitment to utilize the resources necessary to undertake these improvements wherever needed.

Because these conditions have not been fulfilled, restrictions on fund utilization (e.g., North-South split) and inflexible allocation formulas are used to regulate expenditures which impede sound investment. As a consequence, needs grow at a faster rate than governments' ability to satisfy them. Thus, the highway needs report, required every four years by Section 188.8 of the Streets and Highways Code, reflects state highway needs in 1964 for the then ensuing decade of $7,368,512,000, while the 1968 report reflects needs for the then ensuing decade of $12,565,961,000. Although substantial sums are invested annually and the responsible agencies report many accomplishments, a substantial increase in users' tax rates will be necessary to approximately meet current needs if the method by which needs are determined is sound.

As will be described in detail later in this report, there are substantial variations among the road agencies in the methods of determining financial needs and planning proposed improvements. The present method of allocation by a

series of inflexible formulas with several restrictions on revenue utilization cannot be materially changed until confidence can be established in the needs determination and planning practices of all involved agencies. These practices not only should control the expenditures for road improvements, but also they should be the major consideration in decisions regarding users' tax rates and the commitment of nonusers' revenue to road purposes.

The three bases for allocation of users' taxes are described in the following chapter. Because the determination of financial needs is vital to both establishing users' tax rates and allocating these funds, the various methods in use are described and analyzed.

VI. BASES FOR ALLOCATION

Three basic policy choices regarding allocation are available to the state. All three are given some weight in the present allocation formulas so that an almost infinite number of variations are possible. The three bases for allocation are as follows:

(1) Governmental interest in roadways

(2) Needs

(3) Regional generation of revenue

Originally, federal and state funds were used only for rural state highways. Over the years the counties have been more successful than the cities in obtaining state and federal assistance, and for the fiscal year 1968-69, highway users' taxes provided for all state highway expenditures, 73 percent of county road expenditures, but only 33 percent of city street expenditures. This reflects the changes in, and current status of, federal and state interest in the various type roadways, item number (1) above. Although the so-called North-South split is the product of a political compromise, the annual legislative consideration of the various bills introduced to change this part of the allocation structure usually devotes considerable discussion to the amounts of income generated by region, item number (3) above. The adjustment every four years of the required expenditures by Division of Highways district areas as provided for in Section 188.8 of the Streets and Highways Code is based on a determination of needs, item number (2) above.

Each of these three items are described below.

ALLOCATION BASED ON GOVERNMENTAL INTEREST IN ROADS

If it were possible to identify and quantify the interest of the various levels of government in roadways, money could be allocated on the basis of defined systems of roadways. Thus, for example, if it could be stated that the federal and state governments have a 100 percent interest in the state highway system, a 73 percent interest in county roads and a 33 percent interest in city streets, funds could be apportioned to each political entity, including the state, on this basis. The above percentages would be applied to the needs of each political entity and users' taxes apportioned so that each county received 73 percent of its needs and each city received 33 percent of its needs from the state. Although there has been no expression of the amount of state and federal interest in the various types of roads, this has been the historical guideline for the distribution of highway users' revenue. This can be the only basis to explain the fact that during fiscal year 1968-69, users' taxes paid all of the state's costs, 73 percent of the counties' costs and 33 percent of the cities' costs. Unfortunately, some cities and counties depart radically from these average percentages, but this could be corrected by a statement by the federal and state governments of their respective interests in roadways.

The difficulties with this approach to allocation are summarized as follows:

- Although governmental interest has been the historical guideline for allocation, the fact that no government has explicitly expressed its interest in various types of roads indicates that this is impractical. The extent

that federal and state support of local roadways has changed over the years evidences that this interest is not static.

- Even though the federal and state interest in local roadways has materially increased, the idea still persists that these levels of government are primarily responsible for roadways which serve through, long distance, statewide, or interstate traffic as opposed to local traffic.

The fallacy with this concept is that although routes are designated as being part of the state and federal system, the predominant use in many areas is local traffic. (The average freeway trip in Los Angeles is under 10 miles.) Even though highway user tax rates do not distinguish between local and long distance trips, a lower level of service (a general measure of the amount of users' benefits provided) is considered adequate in urban areas compared with rural areas. Thus, the same level of congestion which is regarded as intolerable if occurring on a rural freeway is regarded as acceptable if occurring on an urban freeway.

The transfer of over a billion dollars of federal and state users' taxes during the last decade from Los Angeles County results from:

(1) The persistence of the idea that the primary federal and state responsibility is for rural long distance travel, and

(2) The use of a double standard regarding level of service for rural and urban facilities.

Neither of these ideas is in accord with the user-benefit principle of road finance.

- Because the federal and state governments have pre-empted the collection of users' taxes, with local governments having only the authority to levy nonusers' taxes, allocation based on governmental interest in roads constitutes an indirect determination of how costs are to be shared between users and nonusers. As described earlier, the many attempts to determine the share of benefits realized by users and non-users have proved unsuccessful because of the absence of objective criteria. Congressional inaction in response to an extensive study by the federal Bureau of Public Roads is indicative of the reluctance to adopt governmental interest as the basis for allocation.

The principal support for the imposition of highway users' taxes is the equitability of charges based on relative use. However, it is inconsistent that users' taxes are derived from, and are proportional to, the use of all

streets and roads, but the allocation of the revenue derived therefrom may be directed primarily to the interests of the particular government which collects the revenue. Over the years as federal and state support of local roads has increased, the interest in particular systems has diminished. However, this has fostered competition rather than cooperation among the levels of government. The cities organize and lobby collectively as do the counties primarily because the fiction is maintained by the method of allocation that the federal and state governments have varying interests in different types of roads.

ALLOCATION BASED ON NEEDS

Although the allocations which are primarily the result of political compromise have retained the vestige of varying governmental interest in different types of roadways, the engineer has preferred needs as the basis for distribution. The advantages of this basis are as follows:

- If the amounts determined as needed have a high degree of accuracy, this is the simplest method to operate in that arbitrary allocation formulas and limitations on the use of funds are eliminated.
- Being nonpolitical, engineering determinations are developed through calculations rather than political compromise and, therefore, presumably are more rational.
- Allocations by any other method will eventually produce surplus in some areas while unsatisfied needs will still exist in other areas.

While the engineering profession has obtained a high degree of standardization in the methods of accomplishing its technical responsibility and in its finished products, the determination of needs and the priority planning of proposed improvements appears to defy discipline. On one extreme, total reliance is placed on the personal observations and judgments of technical and administrative personnel with only nominal guidelines established which may or may not be followed. On the other extreme, objective data is supplied to computer-based systems which:

- Evaluate alternative improvements, including doing nothing, for every road segment according to predetermined criteria, and
- Establish priority lists of the most acceptable alternative improvements on the basis that the proposed work which will produce the greatest amount of user benefits should be performed first.

Factors which cannot be quantified (e.g., community values) or objectively evaluated are then applied to modify the system's determinations.

Systematized methods of needs determination and priority planning are grouped as follows:

- Sufficiency rating system
- Capacity adequacy system
- Investment opportunity rating system

Each of these systems is described below.

Sufficiency Rating System

A sufficiency rating system is a means of measurement of road features employing a numerical index (e.g., 0 to 100 or 0 to 1,000) whereby deficiencies or inadequacies reduce the rating from the maximum points based on the degree of inadequacies present. The system was developed in 1946 by the Arizona Department of Highways in cooperation with the federal Bureau of Public Roads, and it has been applied to rural roads by several states for a number of years. The Division of Highways does not use this method, although several California counties do. One of the first applications to urban roadways was made by the City of Vallejo. Among larger cities, San Diego, Phoenix, Arizona, and Nashville, Tennessee, were early users. The League of California Cities provides a description of the system and sets forth the following ways that it can be used advantageously:

> "To aid in the assignment of priorities to construction and replacement and maintenance by evaluating the relative adequacy of each street according to certain prescribed standards.
>
> "To evaluate the street's ability to carry present and future traffic safely, rapidly, and economically.
>
> "To hold to a minimum, political and community pressure in highway planning and construction.
>
> "To minimize or eliminate the element of personal judgment in the expenditure of road funds.
>
> "To keep the city council, planning commission and city manager advised as to the current status of the street and highway plant and the funds that will be required to achieve a given standard of improvement on a city-wide basis.
>
> "To measure at intervals the average rating of the street system so the rate of progress of the highway program can be determined.
>
> "To budget funds for street improvements in the relative order of need, thus protecting the public's investment in streets and highways."

While the primary use of this system is to identify and quantify the relative sufficiency of road sections, the system is also used by some jurisdictions to establish the priority list of pending improvement projects. The other factors necessary to establish a priority list are (1) the estimated cost of each project and (2) the amount of usage, usually expressed as vehicle miles per day. If two proposed projects have the same sufficiency rating and estimated costs, obviously the section with the highest usage should have the highest priority. If two projects have the same rating and usage, the project with the lowest cost should have the highest priority. Thus, the simple formula sufficiency rating times costs divided by vehicle mileage enables comparison of all projects regardless of rating, costs, or usage. However, this assumes either that all proposed projects will eliminate all deficiencies or that they will reduce deficiencies to the same extent. This is not a good assumption. This, together with the following deficiency, has limited the application of this method.

Considerable variation exists among the various applications of this system in the assignment of the point values. Following are the differences:

- Major Elements--Most applications measure three major factors: (1) road condition (e.g., surface condition, drainage, age), (2) safety, and (3) level of service (e.g., congestion). However, some political entities consider only two items.
- Weight Given Major Elements--Some applications use the above three factors and assign equal weight to each, while others assign varying weights to each.

- Subelements--Variations exist both as to the number of items under major elements and the particular items included.
- Weight Assigned to Subelements--For example, under the element of safety the following variations exist:
  - -- Total weight given to accident rates
  - -- Part of weight given to accident rates and part to other factors such as width of shoulders, sight distances, amount of side traffic
  - -- Total weight given to factors other than accident rates.

It is apparent that a substantial amount of personal choice is involved in this system. Those who assign the total weight under safety to accident rates assert that accident rates are the only measure of comparative safety. Those who assign no weight to accidents assert that it is not possible to segregate those accidents which could be prevented by some improvement of the facilities from those that result from drivers' errors; consequently, the inclusion of accident rates interjects a factor over which there is an undeterminable amount of governmental responsibility and control.

Because of the substantial variations in the factors measured and the relative weights assigned thereto, extensive studies were conducted in the cities of Phoenix and Nashville and the State of Idaho (the latter financed jointly by the federal Bureau of Public Roads and the State of Idaho) to determine which

combination of factors and relative weights produces the most reliable information. Although a few states use the same factors and weights for both rural and urban roads, the majority view is that this is arbitrary because of significant differences (e.g., shoulder widths are only applicable to rural roads, while the presence or absence of parking is applicable only to urban roads, but both are factors regarded as affecting safety).

These studies were limited to urban roads and were conducted as follows:

- A number of road sections with substantial differences in structural conditions, safety experience, and level of service were selected.
- A number of different combinations of factors and weights were developed for testing.
- The necessary information was gathered and the sufficiency rating determined for each road section for each of the several combinations of factors and weights.
- A group of individuals experienced in determining road needs and planning priorities were supplied all of the data except the various rates resulting from the various combinations of factors and weights. They were asked to use this data, make personal inspections of each facility, and to rank all the sections in the order of need for improvement (except in the Idaho study individuals assigned points similar to the sufficiency rating index).

It was intended to compare the sufficiency rating indexes of each of the various combinations of factors and weights with the priority lists of the individuals and thereby determine which combination of factors and weights most closely fitted the average of all of the individuals' evaluations.

The Idaho study was conducted independently of the others, while the Phoenix and Nashville studies were a cooperative undertaking with a single finding representing a compromise between the separate findings of the two cities. The following tabulation compares the recommended sufficiency rating point assignment of these studies.

	Phoenix and Nashville		Idaho	
Structural conditions		15		25
Safety:				
Accident experience	15		15	
Other factors	0	15	20	35
Service:				
Delay rate	50		20	
Traffic capacity	20	70	20	40
Total points		100		100

There is no need to speculate as to the reason for the substantial variation in the findings because the published results defined the problem encountered. Not only were substantial variations found among the individuals' rankings but, also, in the Nashville study in which the same individuals rated the same roads twice, approximately 4 1/2 months apart, there were substantial variations in the ratings of the same roads by the same individuals.

In the Phoenix study one section was rated first or second in priority by most individuals but last, or 25th by one individual. In the Nashville study, one rater established a fifth priority for a section the first time but four months later rated it the 26th priority. The same section was rated 28th the first time by another rater who on the second rating assigned it 10th.

These differences not only reduce the credibility of the conflicting recommendations regarding the factors and relative weights of these items which are a necessary part of a sufficiency rating system, but they also raise the question whether such system can possibly be made reliable. Further, inasmuch as it is generally recognized that different factors should be considered for urban and rural roads, these necessary differences would provide a basis for continuing dispute if a sufficiency rating system were to be used for an area containing both types of roads. However, the substantial variations in the ratings assigned by the experienced personnel involved in these studies evidence the need to develop an objective method of determining needs and priorities.

Capacity Adequacy System

In response to a request from the State of Nevada regarding the use of a sufficiency rating system in California, the State Highway Engineer responded on September 8, 1967, in part, as follows:

> "California Division of Highways does not use sufficiency ratings. Several considerations make the use of sufficiency ratings impractical in this State. First, the State Legislature established a formula which requires that certain minimum percentages of the State Highway Funds be expended in each of the various State highway districts within a fixed time period. A further limitation established by the Legislature provides for a minimum expenditure in each of the various counties within a fixed period of time. Second, a very large share of the State highway dollar needs in this State are for freeways in urban areas. These urban freeways relieve congestion on many streets which are in the traffic corridor but not on the State Highway System. No generally accepted sufficiency rating method adequately evaluates this situation. And third, the California State Highway System includes over two thousand miles of unconstructed 'paper' routes. Most of this mileage is in highly congested urban areas and in sparsely populated rural areas. The evaluation of needs on these routes must include the route relation to other routes in the area, local land use plans, the effect on community development, and numerous other factors which are not easily included in sufficiency rating methods.
>
> "One of the major deficiencies on the California Highway System is the lack of capacity. For the past several years we have maintained a project by project inventory of State highways and their needs for the future. Ratings for capacity adequacy or years to reach capacity have been used as an aid in long-range planning studies and are carried as a part of this inventory.
>
> "Enclosed for your information is a brochure explaining the Adequacy Rating method which the Division uses as an aid in determining ten and twenty-year needs by administrative districts and for guiding the selection of project priorities for highway improvement programs both rural and urban."

This answer requires further explanation.

The statement that California does not use sufficiency ratings depends upon how one classifies various planning practices. In accord with this statement is a federal summarization of all the states' methods of determining adequacy of urban

highways. This publication, which reveals that approximately one-half of the states use some formal method, classifies California as using no method. However, the Idaho study of urban sufficiency rating methods described above classifies California as having an urban sufficiency rating system with the following characteristics:

- Gives no weight to the element of road condition or safety
- Total weight given to the element of service and further to the single subelement (of the seven subelements) of capacity to volume ratio
- Same method applied to both urban and rural roads.

Not only are there material differences in the need determination and planning methods and the way these systems are classified, but also considerable variation exists in the amount of reliance the various road agencies place on their systems.

At one extreme, there are street and road departments that maintain no formal means of determining needs and priorities. Among small political entities, this absence is excused on the grounds that benefits do not justify costs. Among larger entities, justification is on the grounds of lack of confidence in such systems. As one county road administrator cautioned us, regardless of how sophisticated and complex an agency's formal planning system may appear, if one digs deep enough, he will find that the decisions are still made on the basis of personal knowledge and professional judgment.

At the other extreme, some agencies appear to place substantial reliance upon their formal systems, continue to attempt to minimize subjective factors, and require documentation of reasons for departing from the formal systems' results.

As indicated in the above quotation ("...uses as an aid in determining...needs...and for guiding the selection of project priorities..."), the Division of Highways is somewhere between the two extremes described above in the amount of reliance it places on its system. As described later, the reasons for using this information only "...for guiding the selection of project priorities..." are well founded. However, this language could imply that this information is used approximately to the same extent both for priority determination and determining needs. This is not the case. In making priority determinations not only is the capacity adequacy information available, but also a substantial amount of other information, although not as precisely quantified, is available and presumably used in the planning process. This is not true for needs determination.

The determination of needs is of primary importance to the Legislature both for determination of users' tax rates and for decisions regarding the allocations of this revenue among the political entities. Unfortunately, little reliance can be placed on the information presented because of inconsistencies in the methods used to determine needs. Every four years the Division of Highways, in accordance with Section 2156 of the Streets and Highways Code, prepares a report of street and road needs of the cities and counties. The information is supplied by the local governments, but instructions, adjustments, and assembly of the information are under the control of the division. At the same time, the Division of Highways, in accordance with Section 188.8 of the Streets and Highways Code, prepares a report of state highway needs for the same period as for the cities and counties. In addition, more detailed reports of state highway needs are prepared periodically. The report issued in March, 1969, in response to Senate Resolution 154 of the 1968 Regular Session is an example.

With only nominal exception, the Section 188.8 reports and special reports are prepared from the information provided by the capacity adequacy system. Therefore, the primary source of information provided to the Legislature in regard to users' tax rates and the allocation of these funds is the capacity adequacy system for state highways and the Division of Highways' report of local governments' needs. The measure of efficiency, safety, and pleasure provided by the total street and road system is of greater significance than the measure provided by any component of the total system. The degree of consistency in determining needs can affect the total systems performance. This is because significant variations in methods can result in (1) funds being provided to construct improvements with little potential for producing significant benefits and (2) the amount of funds provided to construct improvements with a high potential for producing benefits being insufficient. Because the capacity adequacy system is used only for state highways, the difference between this method and that used to determine local street and road needs is of major significance.

The capacity adequacy system is not a method of rating deficiencies or establishing the priority of proposed work, but it is a method for indicating when road sections will become congested. The system operates as follows. A computation is made for each road section of the maximum number of vehicles per hour that can be accommodated without the level of service (a general designation of the level of users' benefits provided with the relation between actual travel speed and the facility's designed speed the principal considerations) dropping below the desired level. Frequent traffic counts are made and tabulated by hours. The widely applied engineering convention of using the thirtieth highest annual hour's traffic volume for each section as the basis for evaluation and design capacity is generally employed in the system. A rate of growth in traffic volume

is estimated and applied to the latest thirtieth highest hour determination. This is then used to estimate equivalent volumes for the ensuing twenty years. At the point in time when the projected thirtieth highest hour volume exceeds the computation of the maximum number of vehicles per hour for the desired level of service, a need is shown. If this occurs within the next ten years, the estimated cost of proposed improvement is included in the Section 188.8 report of highway needs.

Following are the three principal deficiencies of this system, which are described in the paragraphs which follow.

(1) The relative priority of proposed projects is not indicated.

(2) The system promotes differences rather than lending assistance in lessening differences between urban and rural facilities.

(3) The resulting reports of state highway needs are not consistent with the reported local government needs.

(1) Project Priority--The most current Section 188.8 report issued in December, 1968, reflects a financial need for state highways during the next decade of more than double the amount of funds that can be expected to become available for highway construction. Assuming that these figures are fairly accurate, obviously a considerable amount of priority planning will be necessary to select the proposed work which will provide the most benefits to users. While many jurisdictions that use the sufficiency rating system, which was described above, develop project priority plans from the system, the capacity adequacy system does not enable

priority determination. The information necessary for priority planning which is not provided in the capacity adequacy system is as follows:

- Cost of all alternative proposed solutions for each location
- Identification and quantification of the anticipated benefits to be realized from each alternative solution
- Valuation of the out-of-pocket cost to, and savings realized by, highway users.

Although the capacity adequacy system does not provide the information necessary for priority planning, a subsequent part of this report entitled, Investment Opportunity Rating System, describes how most of the information developed for the capacity adequacy system can be used for priority planning.

(2) Urban-Rural Difference--The capacity adequacy system operates better for rural roads because improvement thereof does not generate substantial increased usage. In large urban areas new freeways draw substantial amounts of traffic from the city arterial streets which are not a part of the state highway system, so that new urban facilities are frequently congested soon after they are opened. If the Division of Highways applied the same criteria for capacity adequacy determination to both urban and rural facilities, most new urban facilities would be classified as inadequate soon after they are opened to traffic. To overcome this problem a lower level of service is applied to the suburban and urban portions of routes than is applied to the rural portions.

The decisions regarding the minimum level of service for each road section which are made by administrative and engineering personnel of the Division

of Highways have a material effect on need determination and priority planning, and hence determine the following:

- How available funds will be utilized,
- Which roadways will generate revenue in excess of their costs and hence will provide funds for other roads, and
- How much of the benefits of reduced travel time and vehicle operating costs and improved safety will be realized by different groups of street and road users.

Because revenue is generated by and is in proportion to the amount of usage of existing facilities, the assignment of different levels of service is inconsistent with the user-benefit principle which is the main support for the dedication of users' taxes.

By specifying that urban and suburban roadways have a lower level of service than rural roadways, the following results:

- Urban and suburban roadways will always be more congested than rural roads and, as a consequence, they will produce less benefits to the individual users.
- However, because of congested usage, the urban facilities will generate substantially more revenue than rural facilities, and because higher levels of service are designated for rural facilities, before the amount of rural usage reaches the point of generating revenue in excess of costs the capacity adequacy system will indicate that a rural improvement is necessary.
- The revenue generated by the congested usage of urban facilities will continue to be transferred to rural

facilities to maintain the higher levels of service and produce rural benefits of reduced travel time and vehicle operating costs and improved safety.

- Urban problems are perpetuated by transferring funds generated by congestion to rural areas to be expended.

In addition to the effects of assigning lower levels of service, the urban areas are also adversely affected by the failure to quantify and evaluate the benefits anticipated to result from proposed improvements. Thus, the convention of using the thirtieth highest hour volumes as the basis for determining the adequacy of road sections can equitably be applied to both urban and rural facilities, but only if the anticipated benefits from proposed improvements are compared to project costs to establish priorities. A fundamental difference between urban and rural facilities is the distribution of the total annual usage by hours. For urban facilities, because the higher usage hours usually are during commuting periods which repetitiously occur throughout the year, there is substantially less variation in volumes for the highest, thirtieth, hundredth, or even thousandth highest hour than is the case for rural facilities. Therefore, the conditions for any of the higher usage hours is fairly representative of the conditions for many other hours for urban facilities. However, rural facilities are not subject to the daily repetitious usage, and therefore the conditions at any hour do not necessarily reflect the conditions for many other hours. The only way to overcome this difference is to identify, quantify, and compare the anticipated benefits to the cost of each proposed improvement. Merely identifying all the road sections that fail to operate at a desired level of service, or will fail in the future, does not allow the determination of the relative merits of the proposed improvements.

During the last decade, a period of unprecedented road expenditure in urban areas, the level of service has generally improved in rural areas, but has

remained static or deteriorated in urban areas. Thus, the fatal and injury accident rate per vehicle mileage has decreased 7 percent on rural state highways while increasing 8 percent on city streets and freeways. Based on the above described method of determining need, the current Division of Highways planning program reflects increased rural and decreased urban needs for the next decade compared with the last decade. The implementation of this spending plan will increase the disparity in the rates at which urban and rural benefits are provided.

(3) Difference in Determining State and Local Needs--The only information available which is of assistance to evaluate users' tax rates and the allocation of this revenue are the reports prepared every four years as required by (1) Section 188.8 of the Streets and Highways Code for state highway construction needs and (2) Section 2156 of the Streets and Highways Code for local government needs. The former report serves as the basis to establish minimum expenditures for the eleven district areas, while there is no stated purpose for the latter report. Although the code sections do not link these reports to each other, there is an implication that these reports can be used to evaluate users' tax rates and the allocation of this revenue because of the following:

- Both reports are required to be submitted at the same time and cover the same future period.
- Both reports reflect financial needs for road improvement.
- No other information is provided to evaluate users' tax rates and the allocation of the revenue.
- No indication is provided that different methods are used to determine need.

The Division of Highways' instructions to the local governments regarding the development of the information for the Section 2156 report contains the following:

> "A road or street will be considered deficient if, in the best judgment of the responsible local officials, it is now (or will be in the periods set up in the study) inadequate for the traffic needs and would be reconstructed or improved if a reasonable amount of money were available. Variation from standards alone is not considered a valid deficiency for the purposes of this study..."

Evidence that the local governments complied with the requirement to include only improvements that would be made if a reasonable amount of money were available is provided by the total amount reflected in the Section 2156 report. Assuming a continuation of the present level of sharing local road costs between users' revenues and local nonusers' revenues only a modest increase in users' taxes would be necessary to finance the total needs reported.

However, this is not true for the state highway needs as reflected in the Section 188.8 report. The most current report issued in December 1968 contains the following provision which is similar to the above-quoted instructions to local governments.

> "...the Department included only those deficient projects which would be improved if a reasonable (but not unlimited) amount of money were available."

In our review for the preparation of this report, we noted that the capacity adequacy system provides the source of information for this report. This system contains no provision that excludes projects because unreasonable amounts of funds would be necessary to perform the work. Many adjustments were made whereby both the cost of projects on facilities which will become inadequate within the next decade were removed from the needs computation and the costs of projects on facilities which will not become inadequate within the next decade were added into the

total needs. The net effect of these adjustments was less than a two percent reduction in state highway needs. While only a modest increase in users' tax rates would finance all local government needs, in order to finance all reported state highway needs all users' taxes would have to be more than doubled.

If needs determinations had been prepared consistently, it could then be concluded that there are substantially more unfinanced state highway needs than unfinanced local road needs. However, it is not practical to assess the effect of the failure to consistently determine needs. Thus, the above-quoted instruction to local government contains the provision: "Variation from standards alone is not considered a valid deficiency...". However, included in the state highway needs are the costs of improving roads only because they are currently designated as state highways. Thus, the latest Section 188.8 report states:

> "...If such roads are to remain in the State Highway System they should be improved to a minimum acceptable standard."

It is not possible to determine the dollar amount of difference resulting from inconsistencies such as: local governments are instructed that variations from standards do not constitute a deficiency while the costs of improving roads only because they are state highways are included.

* * * *

We have indicated above that the limited use by the Division of Highways of its capacity adequacy system is well founded. Only limited usage is justified because of the following shortcomings:

- The system provides no assistance in identifying the relative merits of alternative improvements at each location, and it has only limited use in establishing

project priorities because anticipated benefits are not identified and measured.

- Rather than promote equality, the system fosters an uneven distribution of benefits relative to rural and urban usage.
- Rather than enabling the presentation of comparable street and road need information, the state highway needs appear inflated in relation to local road needs.

In the next part of this report we describe the investment opportunity rating system which we believe can overcome the above deficiencies.

Investment Opportunity Rating System

The three principal limitations of sufficiency rating systems were defined above. These limitations are:

- The assignment of maximum point values to major elements and subelements is arbitrary and subjective,
- The inherent differences between rural and urban roads is not overcome, and
- There is an implied assumption, which is usually not true, that all improvements will provide the desired condition or will approach this condition to the same degree.

The Division of Highways' capacity adequacy system overcomes the first limitation above but not the others, and in addition has the following limitations:

- The system provides only one piece of information--the year each road section will become obsolete in reference to the single factor--the desired level of service.
- Evaluation of alternative solutions, if made, is conducted independently of the system.
- Inequity between urban and rural areas is promoted.
- Only limited assistance is provided for project priority determination.
- Financial needs information provided is not consistent with that developed for local governments.

In the introduction of this report we defined the unique position of the highway user as being both the investor in and consumer of road services. After setting aside a portion of the revenue provided by users necessary to maintain the existing facilities, the balance is available for improvement of the road transportation system. Because capital is always scarce in relation to need, a primary responsibility is to make investments which yield the greatest amount of returns. In effect, dividends on these capital investments are provided in the form of time savings, decreased vehicle operating costs, and improved safety to the road user; costs which otherwise he is paying directly out of the pocket.

The following limitations do not allow the best investments of these available funds.

- Making the primary allocation to level of government - This fosters competition among the levels of government regarding revenue sharing and precludes comparison of all alternative solutions.
- Making the secondary allocation to specific political entities - This promotes separatism, and because changing needs cannot be adequately reflected in a formula distribution, material differences continue to exist among the individual political entities in the percentage of total costs financed by users' taxes.
- Imposing restrictions such as the North-South split, county and district area minimum expenditures - Fears regarding sectional favoritism are allayed by political compromises which are then used to excuse placing reliance on formal planning methods. (Note the first reason given for not using a sufficiency rating system in letter of the State Highway Engineer quoted on page 31).

While these limitations restrict the opportunity for making the best investments, they are necessary because existing needs determination and planning practices do not provide assurance that improvements which yield the highest returns of time savings, decreased operating costs, and improved safety will have priority over investments with lower yields.

In theory, all city street, county road, and state highway proposed improvements should be evaluated together on the same basis, and those projects

which will produce the largest amount of benefits per dollar invested should be performed first regardless of jurisdictional responsibility or geographic area. However, as described later under the caption Allocation Based on Generation of Revenue, several factors warrant making the primary allocation of the total funds available for systems improvement to large geographic areas such as the eleven Division of Highways' districts on a basis other than investment opportunity.

In the following paragraphs we describe the use of the investment opportunity sufficiency rating method for need determination and priority planning within each area.

The three major factors considered in most sufficiency rating systems are (1) structural conditions, (2) safety, and (3) service. Safety is the most vexatious factor because (1) separation of accidents which result from drivers' errors from those which result from road deficiencies is not possible, and (2) no direct cause and effect relation can be established between accident rates and the other subelements (e.g., shoulder widths and sight distances) usually included under the element of safety. However, at least in part, the evaluation of structural sufficiency (road conditions) and functional sufficiency (service) in themselves reflect the safety consideration; if less directly, perhaps more accurately. In addition, since this method requires the comparison of costs of proposed improvements and monetarily quantified yields from road investment, the inclusion of safety as a major factor would require the difficult assignment of value to human life. While assignments have been made for the purpose of cost-benefit analysis of road projects, the practice is subject to question. The Division of Highways does not assign a value to life but assigns a value of $95,000 per rural fatal accident, and $76,000 per urban fatal accident, the difference reflecting the higher average number of victims per rural

fatal accident. Because of these considerations, the factor of safety is considered to be not susceptible of monetary quantification; but the safety benefits are, in effect, accounted for through the direct accounting for structural and functional factors.

The principal features of the investment opportunity sufficiency rating system are as follows:

- All roadway sections (city streets, county roads, and state highways) are handled in the same manner and are accounted for in the system by jurisdiction only to identify the entity which is responsible for each road section's operations.
- Because priority determination is based on the rate of benefits returned per dollar invested, variation in size of proposed projects is of no consequence. Major freeway improvement projects are handled the same as minor widening projects or traffic signalization projects.
- All roadways eventually become obsolete, frequently with substantial differences between (1) the time when structural deterioration warrants major expenditures and (2) the time when continuing congestion warrants major expenditures. The system evaluates and selects the less costly to users of (a) continuing congestion compared with (b) increased amortized annual cost of building additional capacity into the system.

- Multiple alternatives are usually available for improvement of any section, and each alternative will yield its peculiar rate of return of dollars saved by the user for his dollars invested. The alternative yielding the greatest acceptable incremental rate of return is the best investment opportunity.

From the above the following three discrete but interdependent decision categories evolve:

(1) Select the optimum improvement for each existing and planned road section.

(2) Select the optimum time for making improvements because it is not practical to eliminate all congestion and because projects to eliminate specific congestion frequently make obsolete some remaining structural life of existing facilities.

(3) Select the projects to be constructed during each time period which involves modifying the priority determinations by such factors as federal aid program requirements, decisions by local governments to finance projects, in part, from nonusers' funds, and non-quantifiable effects such as impacts on neighborhoods.

Each of these three items is described in the following paragraphs.

(1) Optimum Improvement Selection--The typical highway planning process is conducted with a minimum of formal economic analysis. While the professional literature contains examples of various applications of cost-benefit analysis, concern is also expressed therein that applications may be, in many instances, an exercise to bolster credibility for decisions already made rather than a necessary part of the decision process. The desire to avoid economic analysis in the planning process is evidenced by the following quotation from the forward summary of the Senate Resolution 154 (1968 Regular Session) report issued in March, 1969:

> "The establishment of sound program objectives and priorities is basic to maximum efficiency in highway development. Most highway programs are open-ended; that is, a general idea of the magnitude of the problem is determined, some kind of financing is authorized, and highway agencies then proceed as best they can, reporting occasionally on progress.
>
> "We believe this process could be improved by adoption of various fixed-term programs, similar to the one under which the Interstate System is being developed. Within the F. & E. System, (California Freeway and Expressway System), for example, ultimate objectives for a full freeway network, its rate of development and a corresponding finance plan would be firmly established at the outset. ..."

The above report laments the fact that the legislation which created the California Freeway and Expressway System neither:

- Specified design standards,
- Specified a completion date, nor
- Provided a financial plan.

The need for, and usefulness of, economic analysis of highway investments is inversely proportional to the extent that the above-quoted suggestion is implemented. Obviously, performing economic analysis of any portion of the interstate

system is futile; Congress has specified when the system shall be built and has provided the funds, the federal Bureau of Public Roads in conjunction with the state highway departments have established the necessary detailed standards, and, if inflation can be contained, the system will be completed on schedule. The fact that there may be many more urgent needs than completing interstate route 5 along the western edge of the lower Sacramento Valley is unfortunate, but little can be done to redirect the funds committed to this work.

Our purpose is not to criticize the methods by which major transportation decisions have been made in the past. Instead, it is to draw attention to the fact that if future investments are to provide the largest amounts of benefits possible, rather than promote conventional highway programs (such as the interstate program) which by their nature preclude investment choice, a system should be implemented which enables evaluation of all possible investment opportunities.

The first investment decision is the choice of one of the several alternative improvements for each existing and planned facility. One of the reasons cited in the quotation on page 31 for not using the sufficiency rating system for state highways is the large amount of unconstructed routes. While this may be a valid reason for not using that method, it is not applicable to the investment opportunity rating system, which places primary emphasis on measuring the anticipated benefits to be realized from almost all types of street and road improvements. While the sufficiency rating system is primarily concerned with measuring existing deficiencies, the investment opportunity rating system requires decisions to be made on the basis of anticipated benefits to be realized.

In comparing the various possible alternatives for each road section, the most economical alternative for the responsible government is to do nothing.

The reason this is always the first alternative considered will be explained later. However, for a government to do nothing can be the most expensive alternative for the road user. Therefore, the first objective is to determine which alternative with the least cost to the government will produce the most benefits to users per dollar invested.

The variations in vehicle operating costs per mile under different conditions have been extensively studied and are well documented. For commercial usage the value of the vehicle operator's time is a part of costs and can easily be estimated. However, for noncommercial usage the value of time to motorists is not as easily determined. Studies have been conducted to determine the average value of time to travelers. For example, in 1967, Stanford Research Institute reported an average value of $2.82 per person per hour. The users' costs of the do-nothing alternative are the excessive vehicle operating costs and the value of excessive travel time caused by congestion and the failure to improve antiquated facilities. Because streets and roads have a useful life extending over several decades, it is appropriate to include the users' costs resulting from congestion and inadequate facilities over the normal life of facilities. Regardless of the type of improvement (e.g., betterment of an existing facility, replacement of an existing facility, or construction of a new facility) under consideration, the costs to users of taking no action is estimated by (1) identifying the amounts of time delay, (2) determining the number of vehicles and persons subject to delay, (3) using growth projections to extend the computations over the useful life of improvements, and (4) applying appropriate dollar rates. The benefits realized by each alternative improvement is the amount of savings of these direct costs to users anticipated to be realized by each alternative.

Because the additional description of the investment opportunity rating system is of necessity technical, the following comparison with the Division of Highways' capacity adequacy system is provided here to summarize the advantages of the former:

- The capacity adequacy system merely determines the time period when the amount of vehicle usage of each road section will exceed a capacity which reflects a desired level of service. The investment opportunity rating system determines the annual out-of-pocket costs to users of failing to eliminate congestion and to improve antiquated facilities.
- Because the entire street and road system is included in the investment opportunity rating system, the following benefits are realized which cannot be provided by the capacity adequacy system:
  - -- The consequence of various users' tax rates is discernable because the fundamental objective of the system is to compare out-of-pocket users' costs and savings with the cost of improvements. Needs will probably continue to exceed revenue. The out-of-pocket costs to users resulting from not financing all improvements should be a primary consideration in establishing users' tax rates.

-- Because initial priorities will be established on the assumption that only users' revenues will be used to finance all improvements, a rational basis is provided for local government decisions to commit nonusers' revenues to specific projects. The incentives for, and the effect of, application of nonusers' revenues to road improvement will be described later.

-- Because the system measures all out-of-pocket costs to users, it assists in making major policy decisions. Monetary values are not assigned to such factors as community values and environmental considerations. However, these nonuser considerations can more rationally be evaluated in light of quantified monetary information regarding users' out-of-pocket costs and savings identified with each alternative.

- Structural obsolescence is not a factor in the Division of Highways' capacity adequacy system, and therefore, it is only subjectively considered. By inclusion in the investment opportunity rating system, structural life is objectively considered in alternative evaluations and priority planning.

The unique requirements of the investment opportunity rating system compared with other planning methods are as follows:

- All facilities, state highways, county roads, and city streets, are included, and
- The users' out-of-pocket costs of vehicle operating expenses and the value of personal travel time must be estimated.

The large number of facilities that would be included in a single planning system for all streets and roads is not a problem. An important function for a substantial part of the total road mileage is to provide access to abutting property, and congestion can only occur on such facilities after their use has been changed to either a collector or arterial facility. Therefore, functional obsolescence (congestion) usually does not occur on a substantial part of the total system, and for such facilities only structural adequacy records are necessary.

However, functional obsolescence occurs not only as a consequence of increased usage but also by a decision to raise the desired level of service that a facility provides. A low usage rural state highway or county road constructed to standards now regarded as obsolete provides a level of service below that which is currently desirable. The establishment of the desired level of service is at present the exclusive responsibility of the governmental entity responsible for each particular facility. This is true for (1) road agencies that formally designate levels of service in accordance with the Highway Capacity Manual published by the National Academy of Science-National Research Council and (2) road agencies which only by implication designate service levels.

It does not follow that because each political entity is exclusively responsible for the design, construction, and maintenance of its own facilities

that the responsibility for establishing levels of service must also be so diffused. The importance of service level designation is indicated by the consequences of a decision to narrow the existing differences in the assigned service levels desired for rural and urban state highways. Such a decision could require the transfer of location of billions of dollars of future state highway work. We believe the following considerations support a conclusion that the assignment of desired service levels should be a joint undertaking of all political entities within each area rather than the exclusive responsibility of each entity for its own facilities.

> (Separate service levels are provided for each type of facility. Thus, the service level described as free flow for a freeway with a designed speed of 70 MPH is an operating speed of at least 60 MPH, while the same service level, free flow, for most urban and suburban arterial streets is an average overall travel speed of at least 30 MPH. Service levels primarily define the quality of service provided to users, giving recognition to the characteristics of each type of facility.)

- Users probably either are unaware of or attach little significance to the jurisdictional assignment of road responsibility. Therefore, it cannot be assumed that users desire or approve of differences in levels of service by jurisdiction.

- Because most trips are in reference to the user's residence (probably about 85 percent of all vehicle mileage occurs within the county of vehicle registration), the conditions of the facilities used rather than the conditions of the components by jurisdiction is of interest to users. The only users' group having an interest in levels of service by jurisdictional assignment is probably long-distance haulers.
- Joint determination of road service levels would be a major step in implementing the federal and state policy to promote regional transportation planning.
- Local opposition to state plans results in part from a lack of local involvement during the early planning stage. Joint responsibility for service level determination would provide local leadership a voice in all major transportation policy determinations.
- The need to relate local planning to state facilities increases because the greatest increase in vehicle mileage by trip type is local trips in part on state facilities. For the vast majority of state highway usages, access is obtained from local government facilities. From this mutual dependence it follows

that joint area determination of service levels promotes more rational planning of all facilities than can be provided by separate determinations by each governmental unit.

The method of enabling joint responsibility for level of service decisions is described in the subsequent chapter entitled Regional Structure.

The designation of the desired level of service for each existing and planned street and road section does not provide a description of the facility. Each level of service defines a range of operating conditions referenced primarily to travel speed, and within each range there is a considerable amount of latitude regarding the facility specifications (e.g., roadway width, sight distance, type of intersections).

In order to provide the greatest amount of benefits per dollar invested, the following two determinations must be made: (1) the alternative improvements for each location are analyzed to evaluate their relative merits, and (2) the selected alternates for all locations are compared with each other to establish the priority of proposed work. While the amount of benefits to be realized per dollar invested is the basis for both determinations, the analysis of alternatives for each location to evaluate their relative merits requires more than a simple comparison of costs and benefits.

The useful life of street and road improvements usually extends over several decades with the result that investment decisions have long-range effects. The annual improvement program of most street and road agencies is characterized as making major improvement to a small portion of its total facilities.

In addition to the long-term consequence of road investment, the following considerations also evidence that each investment dollar rather than only total costs by alternatives should be subjected to analysis.

Because funds for road improvements are usually in short supply, it is frequently necessary to delay making improvements until serious problems are present. All rational alternatives will generally eliminate or minimize the most serious problems so that the most economical solution will generally produce the most benefits per dollar expended. However, over a long time period, a greater amount of funds for road improvements would probably be necessary if the alternative with the best ratio of benefits to costs is selected in all cases. This conclusion is based on the following:

- Tests conducted by the Pennsylvania Department of Highways reported in Highway Research Record Number 87 show that alternatives which produce the greatest rate of return often resulted in designing facilities which did not provide the desired level of service. This appears to result because these alternatives tend to provide only the minimum level of service, with the result that a minor underestimation of future traffic demand results in the level of service dropping below the minimum.
- It is the general practice to design facilities to accommodate the traffic volumes anticipated 20 years in the future. However, the structural life of facilities is frequently more than 20 years, with the result that facilities become functionally obsolete (are congested or have antiquated design standards) but have remaining structural life.

Projects to eliminate the functional obsolescence frequestly destroy part of all of the remaining structural life.

These factors evidence the need to analyze the returns to be realized from each road investment dollar.

This analysis is provided by comparing not only the total returns of each alternative but also the incremental returns of each alternative over the alternative with the best rate of return. Thus, in an array of alternatives from the least costly (do nothing) solution to the most costly, while the least costly after the do nothing solution will frequently provide the greatest rate of return, some other alternative may have an incremental rate of return which is greater and, therefore, is the preferred solution. The following example of one consideration of urban freeway planning illustrates this method of analysis.

It has been observed that if fewer freeway access facilities were provided in urban areas, more local traffic would continue to use arterial streets with the result that freeway users would thereby be provided with a higher level of service because of less congestion. In the analysis of alternative freeway solutions, the one with the least number of access facilities would probably be the least costly after eliminating the do nothing solution and in many instances would have the highest rate of benefits per dollar invested.

Alternatives which successively add more access facilities would:

- Increase the cost of construction,
- Increase the number of freeway users but lower the amount of benefits each user realizes, and
- Increase the benefits to those who continue to use arterial streets because congestion is lowered thereon by more drivers selecting the freeway.

At some point between the first alternative after the do nothing solution and the most expensive solution, the above mix of factors could provide an increment of benefits over costs greater than that between the do nothing solution and the most economical alternative.

The application of the user-benefit concept precludes segregating types of users (local versus long distance) in the economic analysis and would result in selecting the alternative which yields the greatest increment of benefits to costs and hence is the best investment.

It is apparent that the determination of the users' out-of-pocket costs and savings is a vital factor to the operation of this system. Because valuation of vehicle operating costs and particularly the value of time to road users is at best an approximation, the system may appear to be based on doubtful grounds in this regard. However, all streets, roads, and highways are considered in the system on the same basis, so that any differences between actual vehicle operating costs and the value of users' time (if such could actually be determined) and that used within the system will have little or no effect on the comparison of alternatives or the determination of priorities.

However, the accuracy of these valuations is important for determining the appropriate users' tax rates. If these valuations are too low, the rate of benefits returned per dollar invested will be lower than they actually are, and improvements which should be made will be omitted or deferred. Conversely, if these valuations are too high, the rate of benefits returned per dollar invested will be higher than actual and unnecessary work will be performed. For this reason the improvement of these valuations should be an ongoing activity.

(2) Selecting Optimum Timing--Under ideal circumstances roads would become functionally and structurally obsolete at the same time; however, this infrequently occurs. More often a considerable time period intervenes between the two events. Whenever a road section becomes functionally obsolete (congested or design features outdated) but has remaining structural life, improvement to eliminate the functional obsolescence will often destroy part or all of the remaining structural life of the existing facility. It is difficult to determine the period during which services at a level below the desired level should be continued in order to use up the remaining structural life.

Roads do not provide a uniform level of service for a period of time and then at a readily descernible point in time become obsolete. Rather, both functional and structural obsolescence increase with the passage of time with personal judgment required to establish the conclusion that a facility is obsolete and therefore warrants the expenditure of funds. The allocation of users' taxes by formula to almost 500 separate street and road agencies does not promote the uniform exercise of this required judgment. Because of the substantial variations among the local governments in the percentages of total roadway costs provided by state subventions, the decision that a given roadway is obsolete will cost the

local non-user taxpayer in some areas only 3 percent of the total cost of improvement, while such a decision in other areas will cost the local taxpayer 95 percent of the total cost of improvement. Such variation serves as a major impediment to the uniform development of the street and road network. While the method of allocation outlined herein will eliminate these variations, its successful operation is dependent upon the development of statewide or areawide criteria for the exercise of judgment regarding road conditions.

As stated above, the first alternative to any road improvement is to do nothing. While this is at all times a valid alternative for every existing and "paper" road section, the continued selection of this alternative for all sections will produce no improvement of the street and road system. The obvious time to make improvements is when they will produce the greatest return on the investment. However, funds for street and road improvement are always in short supply so that it is necessary to select only the most needed projects, those producing the greatest return on the investment, and leave the remainder for the future. This backlog of projects will be merged into the project priority list of the succeeding year and, although the system provides a priority list for each of several future years, these lists will be consolidated so as to indicate the probable time each project can be undertaken by reference to revenue projections.

No priority planning system can or should attempt to eliminate human judgment. One of the objectives of any systematized planning method is to replace subjective intuition with objective judgments as the basis for decision. Differences of opinion will always exist regarding the relative priority of various agencies' projects. To enable these differences to be given effect in the scheduling of work, the system would include the following provisions. The priority lists of projects based on the rate of benefits returned per dollar invested

assumes that all work will be financed from users' taxes. These lists would be prepared for several future years so that by considering the backlog of unfinanced projects and estimating future user tax projections, the probable period in which each project will be undertaken can be determined. Because the benefits per dollar invested are based on all projects being financed from users' taxes, a local government can determine what effect the payment of part of a project's cost from non-users' taxes will have on advancing the starting time of that particular project. By financing part of a project from nonusers' revenues, the users' tax benefits per dollar invested will be increased, with the project in question thereby taking priority over some other projects and an adjusted priority list resulting. Inasmuch as this provision interjects some uncertainty because all other project starting dates would be affected whenever any project's priority is changed, some restriction would be necessary. For example, no project for which priority is advanced could be started sooner than one year from the date the change is authorized, regardless of the amount of nonusers' taxes to be provided.

It would appear from the above that if a considerable number of local governments offered to pay a part of their project costs from nonusers' revenues, a considerable period of time could elapse with all, or nearly all, of the users' revenues being applied to local projects with little or no funds available for state highway projects. However, this would not be possible because over half of the funds now expended by the Division of Highways for capital outlay are federal funds designated for state highway work. These federal funds plus the necessary state matching funds constitute approximately 75 percent of the highway improvement expenditures. Provision would be made that a sufficient amount of state users' revenues to recover all federal aid would be available for that purpose.

Projects for which federal aid may be recovered would be included in the system on the same basis as all other projects. However, projects under federal aid programs for which the state has discretion as to the recovery of federal aid (currently all programs except interstate) which have the highest rate of return per dollar invested would be given preference to the extent necessary to recover all federal aid. In addition, all interstate projects would be given preference regardless of their rate of return per dollar invested because the federal government participates in all of the costs of this program, which must be completed by a designated date.

(3) Priority Determination--The basic planning questions that this system seeks objective answers to are:

- Which of the various alternative road investments for each location will produce the largest amount of benefits per dollar invested, and
- In what order should the best alternatives be undertaken?

The amount of benefits anticipated to be provided per dollar invested furnishes the basis for these decisions. However, for some types of work the primary benefits do not permit monetary quantification. Thus, projects with the primary objective of improved safety cannot be evaluated and compared with other types of work. Minor improvement and betterment projects, resurfacing of asphalt roadways, and upgrading signs and safety devices are activities classified as road construction, but they primarily involve minor upgrading and restoration of existing facilities which do not produce measurable benefits that can be compared to major improvement benefits.

Even though these activities cannot be evaluated on the same basis as major improvement activities, consistent development of the total road system is enabled by planning these activities for the total system. The determination of both the amount of funds to be appropriated annually and the specific work to be authorized would involve the consideration of the following objectives:

- To decrease or defer other more expensive work
- To improve the quality of services provided.

For the second objective, the amount of usage of the facilities establishes the priority of proposed work because the greatest number of users possible should be permitted to realize these benefits. Because the amount of funds available is limited, an annual appropriation for each of these activities is necessary. Because these activities are not susceptible of economic analysis, the annual fund allocation is primarily a product of professional judgment. However, if this judgment is exercised independently within each of the almost 500 road agencies, variations can be substantial. These variations are eliminated by total systems planning. The next chapter entitled Regional Structure describes the organization that would be responsible for these decisions.

For actions which are performed to reduce or defer more expensive actions, the dollar value of the deferred or eliminated work, if available, would establish the priorities. However, for a system which would include the entire street and road network, the determination of costs that would be incurred for each individual location, if other action was not timely, would be a costly exercise of questionable value. With tens of thousands of miles of roadways to be considered, the system must be adaptable to mass data processing and therefore, subject to the use of averages with the consideration of specifics reduced to major issues.

The remaining structural life of facilities cannot usually be determined with reasonable accuracy except where some failure already exists. It is therefore appropriate that the average life expectancy by pavement type, together with the date of last construction, be used as the basis for predicting the structural retirement date for each road section until field examination indicates a more accurate date which would then replace the computed date of retirement.

If unlimited amounts of funds were available, priority determination would be unnecessary and all facilities would be corrected as structural obsolescence occurs. Because funds are in short supply, decisions are required regarding the extent that structural obsolescence is to be tolerated. These decisions being primarily based on professional judgment can vary substantially if exercised independently, but only nominally if they are a part of total systems planning. Because the primary reason any action is taken in response to structural failure is to defer or reduce costs, the amount of usage has no direct bearing on determining which facilities should and which should not be corrected. However, structural obsolescence is the result of both the passage of time and usage. Therefore, of the total road sections determined to be structurally obsolete in any year, the greater damage done by the failure to take timely corrective action will be to the higher usage facilities. Priority is therefore determined by the amount of usage. However, facilities not corrected within the appropriate year should have some priority during later years over other facilities becoming structurally obsolete. Determining how deferred correction work should be handled in priority determination together with the annual allocation for such work is another appropriate consideration of the regional organization described in the next chapter entitled Regional Structure.

Because the financial needs for streets and roads continues to increase rather than decrease as more funds are provided therefor, there is a need to establish a limiting factor which uniformly identifies those improvements which should not be made. The investment opportunity rating system, by determining the economic value of improvements, makes it possible to establish such a limit. Savings in vehicle operating costs and the value of time to users are expressed as an annual rate of return on investments. The Pennsylvania Department of Highways determined that if all projects which did not produce an annual rate of return of at least 20 percent on the total construction costs over the useful life of the improvement were eliminated as not being prudent investments, there would still remain a backlog of projects for many future years. Establishing such a limit provides the following benefits:

- Simplifies alternative considerations by eliminating the alternatives which do not provide the minimum return
- Identifies the road sections and entire traffic corridors where there may be needs, but the cost of any improvement will not yield the established minimum rate of return and, therefore, the proper solution is to do nothing
- Improves the accuracy of needs determination by excluding projects which will not provide minimum returns.

Summary of Allocation Based on Needs

In a report on the allocation of highway users' revenues, it may appear that an inordinate amount of consideration has been given to description and evaluation of road improvement planning practices; however, these practices dictate the method of allocation. The allocation of users' revenues by inflexible formulas and the restrictions on the use of these funds (e.g., North-South split, county minimums) are the consequence of the absence of a system which will provide for the judicious investment in streets and roads. The reliance placed on subjective judgments, as opposed to objective analysis, dictates the retention of these arbitrary and inflexible devices as the only means of allaying fears of sectional favoritism in the expenditure of users' revenue. The practice of specifying work in terms of conventional street and road programs (e.g., interstate) diminishes the value of investment analysis. Variations in needs determination and planning practices precludes an accurate determination of street and road financial needs.

Promoting regional planning is a major element of both federal and state transportation policy; however, because the primary allocation of funds is to level of government, (1) all cities join together and (2) all counties join together, although widely separated geographically, in competition with (3) the Division of Highways for revenue. Substantial amounts of users' revenues are available to facilitate regional problem solution, but only if local communities accept the federal-state solution. Bureaucratic self interest and the concerns of each political entity, nourished by the present method of allocation, operate to postpone meaningful regional planning.

The periodic compilation of all cities' needs, all counties' needs, and state highway needs provides no indication of the amount of benefits that road users

could be expected to realize if all or any part of these so-called needs were to be financed. Accomplishments and the lack thereof are expressed in terms of dollars spent, miles of road constructed and maintained, and status of conventional programs with only fragmentary information regarding the benefits realized.

Although the absence of a method of insuring wise investment decisions requires arbitrary measures to calm fears of sectional favoritism, the latter is cited as one of the reasons for the former (see first reason in quotation on page 31). For the administrator the restrictions on resource utilization lessens the significance of investment planning, while for the policy maker the absence of investment planning requires arbitrary fund utilization restrictions. The impasse is complete.

The widely used sufficiency rating system requires a considerable amount of subjective and arbitrary judgment, fails to overcome differences inherent in rural and urban roads, and assumes that all improvements will approach the perfect condition to the same degree.

The Division of Highways' capacity adequacy system provides only one piece of information--the year each road section will become obsolete with reference to level of service, does not provide the basis for determining the priority of proposed improvements, and does not provide financial need information comparable to the local government financial need information. While the Division of Highways does prepare some cost/benefit analyses for route planning, this information is not used for need determination or priority planning.

Investment opportunity rating offers the opportunity to overcome all of the above deficiencies; however, application has been limited to testing in one

state. While the system could be applied to the needs determination and priority planning within individual regional areas of the state, application on a single statewide basis would be cumbersome. The size of the state and the large number of local governments would hamper reaching decisions regarding operations.

The next section evaluates the allocation of users' revenues to regional areas on the basis of the generation of these funds.

ALLOCATION BASED ON GENERATION OF REVENUE

Because the needs basis of allocation provides considerable uncertainty concerning the amounts of users' taxes to be provided to each political entity, little support would be developed for this basis of allocation unless:

- Some limiting factors could be applied which would minimize the uncertainties, and
- Each political entity was provided a share of the control of the process by which needs and priorities are established.

A method of effecting the first requirement would be to make the primary allocation of the funds which are available for capital expenditure to regional areas on the basis of the amounts of revenue generated within each area. If only large regions such as the geographic areas of the Division of Highways' eleven districts were used for the primary allocation, the following considerations support this method:

- Subsequent allocations for particular work could be made on a needs basis by a policy group consisting of the Division of Highways district engineer

representing the State Highway Commission and representatives of the local governments within the district area.

- By using annual vehicle mileage, population, vehicle registration or some combination of these factors, a predictable and relatively stable distribution would be made to each highway district.
- Complaints regarding discrimination between areas would be reduced, if not eliminated.
- This method of primary allocation is consistent with the user-benefit principle, which is the primary reason for the dedication of users' taxes to road purposes.
- Since needs change in proportion to change in usage, this method, in the long run, should produce an allocation very close to the needs basis.
- Since decisions regarding priorities would be made primarily within each region, this method is the most positive way of implementing the federal and state policy of promoting regional planning and development.

The equity of the user-benefit principle is the primary reason for the popular appeal of the dedication of users' taxes to road purposes. However, the

present method of allocation of this revenue is inconsistent with this principle because inequity between groups of users is promoted. The following section describes how this inequity would be eliminated if the primary allocation were made to large geographic areas on the basis of revenue generation.

User-Benefit Principle

The primary advantage of, and reason for, the widespread dedication of users' taxes to street and road finance is: Revenue is provided in proportion to use, and equity is provided by linking the demand for roads with the means of paying for them. Since pay-as-you-go financing eliminates interest costs, the popular appeal of highway finance also includes economy. If road needs and users' taxes are proportional to the amount of usage, then revenue is provided as the need for it arises.

Full acceptance of the user-benefit and pay-as-you-go concept would appear to dictate that users' revenues should be returned to their geographic source, where they would be expended for the benefit of those who paid them. By making the primary allocation to large geographic areas on this basis, charges to highway users could then be regarded as the actual costs incurred in providing the road facilities.

Obviously it would be irrational to return funds for expenditure on the particular roads where they were generated or to the particular governmental entity responsible for these roads. Urban freeways under the responsibility of the state can be developed only by using revenue earned from usage of streets under the responsibility of the cities. While the following list of factors denote that there are substantial differences in the cost of providing road services, over a large

area (the smallest of the Division of Highways' district areas is larger than several eastern states) these factors tend to blend and offset each other so that the variations of costs in relation to the volume of traffic are relatively constant.

- Lightly traveled rural roads have substantial unused capacity with additional vehicles handled at low additional costs. However, maintenance costs per unit of service are high on these facilities.
- At the other extreme, the costs of providing additional capacity on high-density routes, such as urban arterial streets, are substantial, but maintenance costs per unit of service are low because of the great amount of usage.
- Highway costs are closely related to level of service, with the cost of the most economical, the congested urban street, being offset by the cost of the most expensive, the uncongested freeway.

There are substantial differences in size, physical topography, population density and distribution, and the other factors affecting road costs among the states. It follows that if these factors did not blend and tend to offset each other, substantial differences in the various users' tax rates of the states would be necessary. The relative uniform rates of users' taxes among the states is indicative of the high degree of blending and offsetting.

Although there are substantial differences among the eleven regions of the state represented by the Division of Highways' districts, these differences

can be no greater than the differences among all of the states. It follows, then, that the user-benefit principle can be extended to making the primary allocation of users' revenues to geographic area.

Urban-rural considerations are described in the next section.

Urban-Rural Considerations

Each of the eleven regions which constitute the Division of Highways' districts contain both urban and rural roads. However, the differences in the numbers of people and the degree of urbanization vary materially. Therefore, consideration must be given to urban and rural differences in evaluating the equity of allocation on the basis of earnings by regions. The roadway system in any region consists of the following three basic types of facilities:

- Limited mileage of extensively used arteries for which travel speed is a primary consideration
- Large mileage of roads primarily serving as access to abutting property
- Intermediate mileage of multi-purpose roads which perform both functions.

In rural areas where the amount of usage is low, the flow of traffic is seldom obstructed by vehicles negotiating access to or egress from abutting property and other road facilities. However, as the traffic flow increases and the density of land use rises, the interference increases, with the level of service decreasing for both "through" and "local" users.

The controlled-access concept of freeways and expressways evolved out of the need to separate the two types of users to improve the level of service to both

by minimizing interference. As the size of the urban area grows, the multi-purpose road becomes increasingly less efficient in supplying both "access" and "through" services. The high direct costs to the state and the high indirect costs to the local community of providing separate controlled-access facilities in urban areas results in the demand for such facilities always exceeding supply. This, in turn, gives rise to the generally accepted policy of designating a lower level of service on state urban facilities than that for comparable rural facilities.

The significant difference in the cost-traffic relations between rural and urban roads promotes two conflicting theories of road finance. In rural areas the cost per unit of service provided is relatively low for the highly used facilities with costs per unit rising as usage decreases. In an area which includes only rural roads some revenue derived from usage of highly used facilities would be expended on the lesser used facilities.

The situation in the urban areas is quite different. Although urban controlled-access facilities are more costly than rural controlled-access facilities, urban usage is substantially greater (approximately 7 times), so that the costs per unit of service are comparable. However, because of the extensive usage of city streets which are for the most part paid for by subdividers or by assessments against adjacent property, considerably more users' tax revenues are generated than has been expended thereon in the past.

Those concerned with promoting rural and/or statewide interests maintain that the high-cost, little-used rural roads (primarily county roads) are a statewide problem and should be financed to the extent possible from users' taxes. The earnings from the high-use rural roads should be used for their improvement with the

deficit on the low-usage roads made up from the urban surplus. In support of this position reference is made to needs for transporting agricultural and natural resource products and for recreational area access.

On the other hand, urban interests can point to a host of statistics demonstrating that transportation problems are almost exclusively urban problems. They further maintain that until the present practice of transferring large amounts of urban generated users' taxes to rural areas for expenditure is discontinued, no meaningful decrease in the seriousness of these problems can be realized.

While the above may represent an oversimplified description of rural-urban differences, it does bring forth the central issue regarding fund allocation. It is not possible to support the present practice of transferring large amounts of urban generated users' revenues to rural areas on the basis that major transportation problems are being solved by such transfer and expenditure. The policy issue evolves: To what extent should highway users' tax allocations reflect the magnitude of transportation problems? The following three basic alternatives are available:

- Allocations can reflect or even be based on the relative magnitude of problems.
- Allocations can be neutral in regard to the magnitude of problems.
- Allocations can be in an inverse relation to the relative magnitude of problems.

While few would support the last alternative openly, this appears to be the present state policy because of the following:

- State support of rural local roads is considerably higher than for urban local roads.

For the decade ended June 30, 1968, users' revenues provided 66 percent of county road costs but only 28 percent of city street costs. For the fiscal year 1968-69 users' revenues provided 72 percent of county road costs but only 33 percent of city street costs.

- The Division of Highways' needs determination for the next decade reflects an increased rural need and a decreased urban need compared with the expenditures of the past decade, even though urban problems are increasing and rural problems are decreasing.

The present method of primary allocation to level of government with secondary allocation by inflexible formulas avoids resolution of the urban-rural differences regarding financial policy. However, in view of the high percentage of the total vehicle mileage driven within each regional area by the residents of the same area, this policy issue is more appropriately resolved at the regional level than in Washington or Sacramento.

Suggesting that users' revenues should be allocated to regional areas and that an investment opportunity rating system could be developed to enable needs determination and priority planning for all political entities including the state, assumes that a regional structure can be created. The following chapter considers this organization.

VII. REGIONAL STRUCTURE

Although the California Highway Commission, the Department of Public Works, and the Division of Highways usually work cooperatively with local governments and interested community groups, the present reality is that highway planning is primarily done at the federal and state level with local plans molded to fit the "bigger" plan. Considerable pressure to accept these bigger plans is exerted. Over a third of the users' taxes generated are from city street usage but only approximately 10 percent of the revenue is returned to city governments. Rejection of federal and state solutions to urban problems usually results in the funds which would have been expended being transferred to some other area rather than being made available for alternative solutions. Only when a large portion of an urban population clearly perceives the community's values can the loss of users' revenues occasioned by a freeway rebellion be regarded as a net savings to the community.

Ninety-three years ago A. M. Wellington in his classic work "The Economic Theory of Railway Location" observed:

> "...It is assumed that whoever is competent to design the railway structures is competent to design the railway system as a whole. ..."

Almost a century later, the same observation can generally be made for the California street and road system with the added qualification that the system is subdivided into almost 500 segments which are administered as separate entities.

Who does the designing is of no great consequence. What is designed is of primary importance. Who determines what is to be designed is overriding. With relatively fixed shares of the revenue provided to each of almost 500 street and

road agencies, each with discrete authority for specific roadways and no responsibility for others, major policy cannot be explicitly proclaimed by anyone. It can only be discerned by piecing together the fragmentary and sometimes conflicting actions of all.

The following fictions are perpetuated by the present method of fund allocation:

- Levels of government have discrete interest in, and hence particular revenues are primarily provided for, specific types of travel trips. The percentages that users' taxes finance of the total road costs of each level of government evidences the idea that the federal and state governments are primarily interested in long distance through trips, have a somewhat lesser interest in local rural trips, and have the least interest in intra-urban trips. The general practice of designating a lower level of service for urban portions of state highway routes is in accord with this idea.
- The mere statement of federal and state policy, which requires cooperative planning, will somehow change things even though the authority, responsibility, and autonomy of each entity in regard to fund utilization remains unchanged.

In recent decades the amount of federal and state users' taxes committed to the problem of local congestion has increased substantially.

Following are the two principal factors which dictate the amount of effort committed to this problem in each area:

- The relative significance assigned to the problem of congestion compared to other objectives as determined in Washington and the state capitol, and
- The degree of acceptance by the local community of the federal-state or state predetermined solution to the problem.

After federal and state funds are committed to a proposed solution, the local community has the authority of acceptance or rejection. If the latter choice is selected, the funds which would have been expended had the solution been accepted are not made available for any alternative solutions to the problem. Instead, they are transferred to some other area for the solution of a different problem. Thus, when planned interstate routes in San Francisco were rejected, federal legislation was enacted which enabled the addition of mileage to the interstate system in Los Angeles to offset the decrease in San Francisco. No additional users' revenues were made available for the San Francisco congestion problem to offset the funds that were transferred to Los Angeles because the federal-state plan was not accepted. The federal and state governments are thus in the position of having developed and being willing to completely finance one of several solutions to the most serious transportation problem, urban congestion, but it is necessary to find local communities that will accept this particular solution. The penalty for failing to accept the federal-state solution is that the local community will have to find another source of funds to implement any alternative solution.

Appropriating funds for a particular method of solving a problem and then seeking communities that will permit implementation of this single solution is the

antithesis of national planning. If the primary transportation objective is to build as many miles of freeway as possible, the present method of allocation, which directs the majority of funds available for systems improvement to this purpose, is adequate. However, if the primary objective is to solve transportation problems, the method of allocation should enable meaningful total systems planning, which requires the following two major changes:

- Rather than each separate government having exclusive responsibility for planning only its own facilities, all governments should share the responsibility for total systems planning within their area.
- Rather than allocating funds to level of government which results in predesignation of solutions (only the state builds freeways), the primary allocation should be to each geographic area with a minimum of restrictions regarding methods of solution.

The significance of the difference in the expected results from cooperative planning compared with total systems planning is evidenced by military and defense organization. If cooperative planning could produce meaningful results, there would have been no need to create the Supreme Allied Command during World War Two. Similarly, there would be no need to combine the Departments of the Army, Navy, and Air Force in the Department of Defense.

The current efforts to implement program budgeting also evidence the weakness of cooperative planning. The first goal identified by the Division of

Highways in its booklet entitled, Planning Programming Budgeting System for Highway Program, issued in November 1969, is as follows:

> "To plan the State Highway System as an integral part of a comprehensive State Transportation System such that it best serves the needs of all people and communities of the State of California."

To plan a part of a system when there is neither a plan nor responsibility for the total system will produce independent components of varying quality primarily determined by the amount of funds provided for each part, while the effectiveness of the total system is left to chance.

The primary objective sought by the application of program budgeting to the highway activity is the same as the objective of the investment opportunity rating system, that is, to provide the greatest amount of benefit per dollar expended. However, the present method of allocation precludes realizing significant benefits from the application of program budgeting to the highway activity because of the following:

- By providing a relatively fixed amount to each of the almost 500 governmental entities, the comparison of alternative improvements can only be made within each of the almost 500 arbitrary subdivisions of the total system.
- Because both the type of facility and the type of improvement can be identified with level of government (only state highways are converted to freeways), the allocation to level of government predesignates on a statewide basis both the significance of types of facilities (streets, roads, and highways) and the relative merit of improving these facilities.

The following tabulation relates the total federal and state users' taxes made available by government level, the total noncapital outlay costs including non-users' taxes, and the remaining users' taxes available for systems improvement for the fiscal year 1968-69:

Type of Facility	Users' Taxes Made Available	Total Noncapital Outlay Costs	Available for Systems Improvement
State highways	$770,895,159	$107,865,565	$663,029,594
County roads	166,574,101	102,792,467	63,781,634
City streets	126,695,626	176,429,261	-

Although no determination has been made which indicates the superiority of improving the state highway system as compared with county road and city street improvements, the allocation formulas by designating that the preponderance of users' taxes available for systems improvement shall be expended on the state highway system presumes substantial superiority. Obviously, no constant level of rating for improving any one type of facility over another exists, and the determination of the relative merits of any improvement is on an individual basis with objectivity the primary requisite.

The use of the investment opportunity rating system can improve the objectivity of the planning decisions. However, total systems planning requires that all governmental units with road responsibility be adequately represented, because determining the relative merits of alternative improvements and the priority of major projects is only a part of this process. Sharing responsibility for total systems planning requires that all participants operate from the same source of revenue and that all will be affected by the planning decisions.

Economy of operations is lost if the transition from (1) independent planning by each governmental unit of its own facilities only to (2) joint planning of the total system is not accompanied by a change in the method of allocation. Thus, in response to charges that federal and state planning practices have failed to give adequate recognition to local considerations, federal and state legislation together with State Highway Commission actions have sought to provide more local involvement in freeway planning. There has been no change in the method of allocating funds, and when those who have no financial interests at stake are provided a voice in the planning process, the most obvious result is often increased costs. More expensive alternative freeway routes, if adopted, will temporarily contribute to the local economy but cost the local community nothing. Therefore, to obtain the necessary local freeway agreements and avoid state-local friction, it is necessary to subordinate the cost/benefit attributes of alternatives.

The above described situation can be avoided by making the primary allocation of funds available for systems improvement to regions on the basis of revenue generated with all political entities including the state sharing both the revenue and the responsibility for determining its use. However, the benefits to be realized by total systems planning are not limited to the financial aspects. Perhaps the most significant improvement would be in the consideration of the non-financial consequence of transportation.

While the application of an analytical system such as the investment opportunity rating system to the total transportation system can provide the necessary objective basis for evaluation of the financial consequence of investments, the non-economic consequences defy systematic analysis free of personal bias. The membership of the organization responsible for decisions is most critical for the

non-economic factors. In a recent study of freeway planning practices (A. Bruce Bishop, Socio-Economic And Community Factors In Planning Urban Freeways, Stanford University, October 1969) marked differences were found in the relative significance associated with the various non-economic factors by Division of Highways' planners, community officials, and citizens. Thus, the planners gave greater consideration than either community officials or citizens to the effects of freeways on other public facilities such as parks and recreational, cultural, and religious facilities. However, both community officials and citizens attached greater significance to noise, air pollution, effects on the tax base, community services, commercial activities, and employment than do highway planners. Only a regional planning organization composed of all governments can effectively and economically provide the necessary synthesis of differences in socio-economic valuations.

A proposed change in Article 26 of the State Constitution permitting the use of highway users' tax revenue to facilitate public transit would increase the need for regional planning including the control of revenue utilization. Because mass transit systems development would probably involve several sources of funds (federal, state highway users' taxes, local, and perhaps fare-box revenue) for debt retirement, relatively fixed commitments affecting several future decades must be made prior to the sale of bonds. The pay-as-you-go traditional method of financing street and road improvements does not require financial commitment beyond two or three years. This difference in funding can be accommodated in the investment opportunity rating system, and it is appropriate to analyze alternative transit developments together with road development in the same system. However, because the nature of the future development of large urban areas is linked closely to the transportation system, the socio-economic factors predominate in major transporta-

tion decisions. Large urban areas with developed fixed rail mass transit systems, such as London, Tokyo, New York, and Moscow, have both more consistent land use patterns and higher density land usage than urban areas such as Los Angeles with no fixed rail mass transit system. To preclude a change in Article 26 from being interpreted as being a mandate to use highway users' taxes for fixed rail mass transit (as opposed to providing an option to the use of highway users' taxes for fixed rail mass transit), the following is necessary.

- The economic analysis of all proposed transportation developments should be combined in the same analytical system.
- The composition of the planning body should include all entities affected financially by decisions.

The substantial growth in suburban areas increases the difficulty for the traditional governments (city, county, and state) to provide the framework for making major decisions. This difficulty gives rise to creating area planning associations of government such as SCAG (Southern California Association of Governments) and ABAG (Association of Bay Area Governments). While this type of organization can provide the framework for planning both transportation and other services, the need for regional transportation planning is no more acute in large urban areas than for the rest of the state. Indeed, people living outside of large urban areas are more affected by the area's transportation system because: (1) the average distance between origin and destination points is greater, (2) the areas' commercial activities are more dependent upon transportation facilities, and (3) the average amount of traveling per person is greater. Although alternative modes are not a major issue outside of the large urban areas, the allocation of funds among the various types of facilities is of concern to all area residents.

The advantages of using the eleven regions of the state represented by the districts of the Division of Highways as the basis for area planning are as follows:

- Every part of the state would be included in a region.
- These boundaries do not appear to create any arbitrary divisions.
- At present the major portion of the funds expended for systems improvement is for state highways with these funds allocated within the Division of Highways to the eleven districts. Allocation on the basis of revenue generated within areas would require only (1) including all users' revenues available for systems improvement and (2) changing the basis of allocation with the areas remaining the same.
- Rather than creating new planning organizations (e.g., Bay Area Transportation Study Commission), the technical staff within the Division of Highways would provide the principal source of qualified planning personnel.
- Although variations would exist, the average number of governmental units within each region would be less than the present membership of ABAG or SCAG.
- The inherent problem in the present urban area associations that voting representation must reflect a composite averaging of the interests in all subject matters (e.g., the state has material responsibility for transportation but almost none for sewage treatment) is avoided.

The composition of the voting member group can be made to reflect the relative importance of parts of the area's total transportation system.

- The ability of the appointed voting members to direct the technical staff is increased by the former group having responsibility only for transportation.

Perhaps one of the most serious problems of the present method of allocation is the inequity of the burden resulting because the user-benefit revenues do not finance all urgent needs. If local governments are expected to contribute nonusers' taxes to road purposes, a rational basis should be provided to enable investment decisions for nonusers' taxes instead of the existing basis of just not providing enough users' revenues to meet needs. This requires the following:

- Local governments should be able to influence the various policies which control road financing within their areas.
- Local governments should be enabled to clearly perceive what determines the area's project priorities for users' revenue utilization.
- A method of modifying the project priorities when some part of costs will be provided from nonusers' revenues must be agreed to.

Considerable differences exist among the eleven regions in the relative importance of each level of government's facilities. Thus, the cities' streets are of major importance in regions with large urban populations, while counties' roads would be of greater importance in the district areas with small urban populations.

However, such differences are not critical if each area is required to establish its project priorities primarily on the basis of the relation of costs of improvements to users' benefits anticipated to be realized by proposed work. Also, differences in areas' policies would not materially affect the state highway system because provision would be made to undertake all federal aid projects, the total of which constitutes a major portion of the state highway program.

The primary responsibility of each area's transportation association would be as follows:

- Establish each area's policies which regulate the funding of transportation improvement
- Administer and supervise the needs determination and priority planning by the investment opportunity rating system
- Designate and approve the commitment of users' revenues to purposes not susceptible of valuation by the investment opportunity rating method (e.g., freeway landscaping)
- Establish area standards for such factors as:
  - -- Level of service
  - -- Levels of functional and structural obsolescence to be tolerated
- Supervise the review of the individual entities' project planning, including return on investment information and alternative evaluation methods
- Determine, consolidate, and synthesize the non-monetary community and environmental factors to be considered in planning.

A primary function of the State Transportation Board created during the 1969 Session of the Legislature is to establish state transportation policy. In accord with this responsibility, the board should review each area's actions on the above matters and receive and evaluate any political entity's complaints regarding the practices of its area's association.

For the following reasons the detail records of the investment opportunity rating system for all eleven areas should be centralized and maintained by the state:

- The State Legislature is primarily concerned with need determination because users' taxes are the principal source of finance.
- Several different factors may be used as the basis for determining amounts to be allocated to areas on the earnings basis (e.g., registered vehicles, annual vehicle mileage, or various combinations thereof). From time to time adjustment of the weight given such factors may be necessary.
- Operations require computer application and centralization provides economy.
- Determination of the best application of federal funds can only be made on a statewide basis.

The State Transportation Board would prescribe the road inventory and project information to be supplied by each political entity and determine the valuations of benefits to be used by all for cost/benefit analysis. Funds would be distributed monthly to each political entity by the State Controller based on (1) each area's

schedule of authorized projects and (2) the nonproject allocations explained in the subsequent section or, to improve cash utilization, the State Controller could make disbursements directly for all project costs.

VIII. ALLOCATION FOR NONPROJECT COSTS

The Streets and Highways Code requires each political entity to maintain a separate fund for road purposes. Users' tax allocations together with local funds appropriated for road purposes are deposited in this fund. The principal costs accounted for therein, in addition to expenditures for road improvements, are administration, maintenance, general planning, and acquisitions of equipment and facilities. The combined expenditures of the cities, counties, and state for these purposes for the 1968-69 fiscal year were approximately $385 million.

Because of the substantial variations in the percentages of total road costs provided for by users' taxes, some local governments finance all nonproject costs from state allocations while others provide a considerable amount of local nonusers' revenues for these purposes. Substantially higher amounts of nonusers' taxes are provided in areas with the most serious traffic problems so that the nonusers are paying primarily for the failure of the users' tax allocation to finance the most serious problems. The allocation of funds for systems improvement to regional areas on the basis of the amounts of users' taxes generated with secondary allocation to projects primarily on the basis of the amount of users' benefits to be realized will contribute to the correction of this inequity.

The method of allocation of funds for these other costs can then eliminate the inequity almost completely.

While an allocation based on paying the same stated percentage of each entity's costs would be equitable, the following conflicting considerations are involved:

- Unless the percentage that users' taxes will pay of such costs is set rather high, the nonusers' taxes per individual would be high in rural, sparsely settled areas.
- The higher the percentage is set, the greater the need for controls to insure that only necessary costs are incurred.

A method of ameliorating these conflicting considerations would be to provide for a high base payment, such as 80 percent or 90 percent of the average of the last 3 years' costs, with a lower percentage applied to amounts above the average. This would not eliminate the need to establish statewide uniform budgetary and accounting practices; however, local governments would be less inclined to expand services to a questionable level if a higher percentage of costs were paid initially from nonusers' revenues.

Some minor inequities would not be eliminated by the proposed method of allocation. The more rapidly growing urban areas would bear a higher percentage of nonproject costs because a lower percentage of users' taxes would be provided for expanded services. Rural areas where adverse weather conditions require additional maintenance expenditures would bear a higher percentage of increased costs over prior averages. However, it is unlikely that a completely equitable system with reasonable costs of operations involving almost 500 separate political entities could be developed.

The conversion to a method of providing users' revenues (1) for systems improvement by returning amounts earned to regional areas to be allocated to projects on the basis of the benefits to be realized thereby and (2) for other costs on the basis of paying a particular part thereof, would require an extended period for implementation. The considerations of this conversion are described in the following chapter.

IX. IMPLEMENTATION ACTION

The present method of allocation by a series of inflexible formulas with several restrictions on fund usage developed from the inability to establish reliability on needs determination and planning practices of the various road agencies. The jurisdictional responsibility for particular road facilities is of little concern to users but of paramount concern to each political entity. The continuing problem of relinquishments by the Division of Highways and additions to and deletions from the state highway system result because no transfer of funds accompany these road responsibility transfers. The financing of all local government nonproject costs by a high uniform percentage of these costs from users' revenues and making investment decisions without regard to jurisdictional responsibility would almost eliminate these problems. However, unless some systems development work is accomplished before the passage of legislation authorizing the described method of allocation, the system could not be fully operational for a minimum of three years after passage.

While much value is gained from the years of development and testing of the investment opportunity rating system by the Commonwealth of Pennsylvania, the system's implementation in California will require cooperation by every political subdivision after design requirements have been refined and informational needs are specified. Although much of the information accumulated by the Division of Highways for its capacity adequacy systems can be used by the investment opportunity rating system, the extent that local governments have developed comparable information varies substantially.

If a relatively high, uniform percentage of local governments' nonproject costs are to be financed from state collected users' taxes, a uniform needs deter-

mination, budgetary system, and accounting system should be developed and implemented by all political subdivisions. A performance budgetary system would facilitate financing comparable levels of maintenance service on a statewide basis.

In the course of these systems development, several major policy issues should be resolved. Following are examples:

- Should users' taxes finance the local government cost of buildings such as maintenance facilities and administrative offices? If so, to what extent?
- Should local government equipment acquisition be financed directly by users' revenues or recovered through depreciation charges in the accounting systems?
- Should users' revenues be made available to local governments for the advanced acquisition of right of way? If so, to what extent?
- What limits should be established on the degree of variation of policy and practices adopted by the eleven regional areas?

The appropriate body to supervise both the development of the necessary systems and the resolution of the above type of policy issues is the State Transportation Board.

Because a considerable time period will be necessary for systems development and implementation, the following question arises: Should enabling legislation be passed which designates the new method of allocation but provides that full operations will not begin for three years? Or should enabling legislation merely designate and finance the necessary studies, leaving legislative adoption until this work is completed? Although both courses offer advantages, the former

provides the greatest resolution; and if additional time is necessary, it could be provided in a later session.

RECOMMENDATION

We recommend that legislation be proposed to adopt a method of allocation of highway users' taxes with the following features:

- Provide to each city and county an amount for nonproject costs (administration, maintenance, etc.) so that the same percentage of these costs are paid from users' taxes for all local governments.
- Make the primary allocation of users' revenues available for systems improvement to the eleven regional areas of the state represented by the Division of Highways' districts on the basis of returning to each area the revenue generated by vehicle usage therein.
- Establish priorities within each regional area for all city, county, and state projects primarily on the basis of the amount of benefits anticipated per dollar invested.
- Provide that policy decisions and the control of the needs determination and priority planning system for each region be by representatives for all political entities including the state. The Division of Highways' district engineer could represent the State Highway Commission in each area.