

Concepts of and Approaches to Capital Budgeting

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What is capital budgeting? In terms of industry, capital budgeting is allocating or setting aside specific funds for purchasing or constructing specific fixed property, such as heavy machinery, buildings, heavy construction and other physical property used to produce the products of the organization. In highways, capital budgeting is allocating funds for constructing specific highway facilities necessary for the adequate, safe, and fast movement of traffic on the highways.

Money spent for capital purposes is distinguished from money spent for current operating functions because of the difference in time duration that the products of the expenditures serve their functions. Expenditures for operations are for the administrative chores, the maintenance of the physical highways, and the operation of traffic and other daily services essential to transportation over the highway. Financially, it is as important to seek the best decisions in making one type of expenditure as the other. Capital expenditures for identical functions or purposes are not repetitive, but the expenditure for maintenance and operating functions are generally repetitive, month after month.

Expenditures for maintenance and for capital purposes each are important. Expenditures for maintenance and operating functions produce, primarily, immediate benefits and serve immediate needs. (Recognition is given to the function of maintenance for the purpose of preserving capital property against deterioration from weather and wear.) Expenditures for capital property produce benefits and satisfactions lasting far into the future.

Within capital budgeting, there is a choice of many projects or properties to construct or to buy. This choice is what makes allotting money to construction projects a most difficult administrative responsibility.

FINANCING—ITS RELATION TO CAPITAL BUDGETING

Although the financing of capital improvements in itself is not a part of programing the improvements, the program does depend upon how much money is available and when. Selecting specific projects to construct is therefore controlled to some extent by the total sum allocated to construction for a specific time period.

Financing for families, for public works, and for industry has much similarity. To aid in understanding later discussions on capital budgeting, some methods of financing are presented in Table 1.

TABLE 1
METHODS OF FINANCING EXPENDITURES

Family	Public Works	Corporation
1. Cash on hand	1. Cash on hand	1. Cash on hand
2. Open account	2. Open account (future current income)	2. Open account
3. Personal interest bearing notes	3. Short-term interest bearing notes	3. Short-term interest bearing notes
4. Mortgage or other liens	4. Bonds, secured by tax income	4. Mortgage bonds
		5. Sale of stock shares

The decisions of a family, a public agency, or a corporation as to capital budgeting

are conditioned upon not only the desirability of acquiring the fixed assets through capital expenditure, but by the amount of money it is thought wise to raise through one source or other to finance the expenditure for the capital property.

So frequently, the desires and the needs for capital improvements exceed the moneys available or that amount which could be wisely raised by borrowing or extending current credit. In industry, for example, the management usually finds it desirable to spend less for capital investment than could be spent with good prospects of earning a reasonable profit. For this reason, the purchases or improvements to which money is committed are those proposals selected from the upper range of prospective rates of return. The shortage of money to finance all desirable improvements forces this selection from among those that offer the greater probable returns.

The same principle of financial management applies to public highways. Those projects which show the promise of rendering the greatest benefit are those that should be included in next year's construction program within the sum of money available for capital improvements. It is often unfortunate, however, particularly in public works, that a compromised decision is made whereby a second or third choice of capital improvement gets into the program because of insufficient financial resources to finance the No. 1 choice. In the long run, such procedure is costly to the public, but because of public opinion and pressure, there are occasions when a solution of lesser benefits is followed.

CAPITAL BUDGETING FOR FAMILIES, PUBLIC WORKS, AND CORPORATIONS

Let us take a look at the budget decision responsibility from a personal family viewpoint, from the top executive officer or commission of a highway department, and from the chair of the general manager or board of directors of an industrial corporation.

Consider yourself as head of your family, or at least as an equal voting partner in its financial management. Here are proposals now facing you. Buy a new automobile for \$3,000, a household freezer for \$350, wall-to-wall carpeting for \$1,000, and take an \$800 vacation in Florida. These needs and desires represent day-by-day considerations in American families, and decisions must be made as to how much money to spend for what. The automobile, the freezer, and the carpeting are capital improvements of reasonably long life. They are likewise nonrepetitive in successive years. The vacation trip is an operating expense rather than a capital investment, but in this case it is one of the alternative uses of the limited family funds. Considerations involve (a) cash on hand and immediate future earnings, (b) money needed for operating and maintaining the family activities for a future period, (c) what items will bring to the family the greatest benefits and satisfactions, (d) to what extent will these benefits and satisfactions warrant borrowing immediate money, or delaying reduction of existing debts, and (e) within the total money available, which of the several wants (you cannot finance all of them) will render the greatest satisfaction in the long run. The decision process is handicapped because of the lack of any tool to convert the anticipated benefits into money values so they can be laid out on a yardstick of dollars and compared to the readily calculated costs in dollars. But you do reach a decision—wise or unwise.

Now, look at a highway department. The commission, or commissioner thereof, has before it identically the same problems as you have as head of your family. Shall the highway commissioners build a bridge over the North Fork River costing \$2,000,000, repave the urban arterial route on 10th street for a cost of \$3,500,000, relocate Route 16 around Centerville at a cost of \$1,500,000, install \$500,000 worth of lighting at heavily traveled intersections, or catch up on long delayed roadway maintenance. The commissioners may first decide that \$16,000,000 is required for maintenance and operations, leaving an anticipated \$45,000,000 for capital construction for the calendar year 1962.

Unlike the head of the family, the highway commissioners do not have under their control the decision of whether to borrow money. The decision to borrow money lies with the people at large. Therefore, the highway department is compelled, in its 1962 program, to stay within its estimated receipts from the existing rates and modes

of taxation, or from action of the legislature which appropriates these highway user revenues to highway purposes. In any case, there is a limit to the amount of money available. The commissioners' responsibility is to determine, within the amount of money available, a specific listing of construction projects to which to allocate the limited resources of \$45 million. The decision is theirs to make; the process by which they reach the decision is also theirs to make.

Let us now turn to private industry. The board of directors of the XYZ Manufacturing Corporation has these propositions before it: (1) Construct a new plant at a cost of \$3,000,000, (2) purchase new automatic machinery at \$1,500,000, (3) spend \$2,500,000 on development of a new product which shows possibility of reaching a profitable sales volume, (4) repair and repaint the central office building at a cost of \$300,000:

Here we find that the board of directors has before it the same basic problem as does a family and a highway department. Each must estimate the probable short-range and long-range benefits. Industry is concerned with making a reasonable rate of return on its investment in order that it can continue to attract the necessary capital funds at reasonable rates. But, unlike the family management, this industry management can translate its benefits from each choice of expenditure to dollars without too much uncertainty. If it misjudges the future unfavorably the company will lose money, lose financial backing, and ultimately the stockholders may lose their investment. Presumably, any bondholders will take over and recoup what can be salvaged on their mortgages. The first decision of the board of directors is to determine how much money is to be spent for capital improvements and how much is to be reserved for current operations. But within the amount of money provided for capital improvements comes many different levels of decisions as to what capital improvements are desirable next year, the year following, and so on, and the adoption of an orderly, reasonable long-range program. At the same time, the method of financing the capital investments is decided.

Fundamentally, the family, the highway department, and the corporation make the same type of decisions, for the same basic purposes, and by the same general processes of weighing the sacrifices against the benefits. The differences lie within the ease, completeness, and reliability that the benefits can be forecasted and compared with the costs.

The family is without a dollar yardstick for estimating its benefits on most of its decisions and is forced to use judgment without reliance on monetary comparisons of benefits and costs. Its situation is simplified, however, because it need consider no others whom may be affected by its decisions. The highway department is in an improved situation over the family, because dollar benefits and dollar costs, current and future, can be supplied for many of its proposals. However, many intangibles and nonreducibles are involved in reaching final decisions, and its decisions must be made in light of the consequences to whomsoever they may accrue. The corporation is in the most favorable situation because it can reduce most of its proposals to comparable and reliable money values. Also, it is concerned only with its own future. It can ignore the consequential effects upon its competition and society in general.

Each of these three economic units, however, is required to practice capital budgeting—formulate a program of expenditures for long-term investment in physical property. Each must allocate its limited resources to specific current improvements. How well the job is done depends upon their skills, conceptual abilities, degrees of exactness, and pains with which they examine all factors involved, present, immediate future, long-range future, tangible, and intangible.

ECONOMIC AND SOCIAL EFFICIENCY

A fair question to ask is, "Why budget for capital improvements?" As a responsible family member it is our desire to invest our financial income so that we can get the maximum of satisfaction (benefit or return) from our expenditures—currently as well as in the long run. Certainly, should we choose the wall-to-wall carpeting over the other items, it is because, all factors considered, the carpeting will return to us

the greater benefit or return commensurate with cost. Money for operation and maintenance comes first; the family must be fed, clothed, and housed. But here also, choices prevail which control the total amount available for capital goods. What is left, plus borrowings, is available for capital purposes.

Public works services (highways) result in no monetary profits which may be used as a measure of the wisdom of their construction. Highways do produce benefits, however, which can be reduced to money values, and other benefits which cannot be readily or reliably reduced to money terms. But the same principles prevail—the obligation to construct public works projects—highways—only when, (a) the benefits have greater value than the cost to obtain them, and (b) to construct projects in chronological order following the order of decreasing satisfactions, or rate of benefits as related to cost.

Turning to private industry, we find the same basis for our decision—return on the investment and over-all long-time benefit to the company. But, herein, unlike within a family and a highway department there is a tangible measure of the benefits—monetary profits. These predictable profits (returns) are a quantitative guide to the probable benefits from alternate choices of capital investments.

The following quotation states and enlarges upon these principles:

Economic efficiency, accordingly, is defined as a situation in which productive resources are so allocated among alternative uses that any reshuffling from the pattern cannot improve any individual's position and still leave all other individuals as well off as before. Of course, any change in the pattern of resource employment may improve the conditions of some people, but if this is done at the expense of others it may be only a redistribution of income. Income redistribution can be regarded as more efficient only when those whose positions have been improved by the changes have gained more than enough to compensate the losses suffered by others. Economic efficiency implies that, given his income, every individual will allocate his expenditures in such a way as to maximize his satisfaction. It implies also that, given the demand for the resulting goods and services, productive resources will be so employed that no reallocation could achieve the same level and composition of output with a smaller expenditure of resources. When these conditions are fulfilled, the economy is operating with maximum efficiency.¹

Another quotation from Krutilla and Eckstein is appropriate to explain the economic behavior of an individual:

Accepting the assumptions of the competitive model, we begin by focusing on the individual in a free society. Our assumption of rational behavior requires that he make the following allocations: On the one hand, he allocates his time between work and leisure so as to equate his marginal valuation of his productive services to the market rate of remuneration in the occupation of his choice. On the other hand, he allocates his income between consumption and saving so as to equate the market rate of interest on his saving to the sacrifice of current satisfaction entailed by the marginal dollar of saving. The portion of income left after savings becomes his consumption budget. His purchases of alternative goods and services are so budgeted as to equate his marginal valuation of each to its market price.²

Now we can answer the question, "Why budget our resources for capital improve-

1/ John V. Krutilla, and Otto Eckstein, "Multiple Purpose River Development," pp. 16-17, The Johns Hopkins Press, Baltimore 18, Maryland, 1958.

2/ Ibid., p. 40

ments?" The answer is: So that we can be reasonably assured, (a) that we are maximizing our benefits, and (b) that we have so allocated our resources to specific functions and projects that any other allocation "cannot improve any individual's position and still leave all other individuals as well off as before."

The inclusion of a specific highway improvement project in a specific year's construction program will result in benefiting certain individuals certain amounts. Omit the project and these benefits are not received; include a substitute project and the benefits are conferred upon a different set of individuals. But is this substitution a wise one? The answer is found in the successive testing of all proposals against each other until that combination is found which leaves all individuals with the maximum benefits measured in mass. Important to keep in mind is that the word "benefits" includes all net favorable consequences, that is the intangible, social, and community benefits as well as those easily measured in dollars.

HIGHWAYS VS OTHER PUBLIC CAPITAL IMPROVEMENTS

It is desirable to look further into the field of public works than to the immediate highway department. As a matter of public policy, highway officials are custodians of the financial resources provided for highway functions. But as agents of the public, highway officials have a responsibility to advise the public and the legislature as to elements of public policy. Taxes for highway purposes could become unduly large so that taxes and budgets for governmental activities such as health, public welfare, and education would become too small. The public at large must make a decision as to what proportion of its resources it wants allocated to each of the functions of government, including highways. It is, therefore, important in the budgeting of money for capital construction in highways that this money is budgeted to those projects which have the highest rate of return and which serve the real economic and social needs of the public—not merely desires.

The public should give serious attention to allocating its resources to priority needs. Taxing and budgeting for public purposes have to be realistic and effective under those controls and incentives that are desirable in producing the most good for the greatest number of citizens. Beyond this, government officials have a responsibility in the expansion of the economy of the nation in order to maintain adequate employment and proper fulfillment of the needs of its citizens.

Needless to say, any public works program of a large scale, such as the current national highway program, does affect the financial market and the over-all economic activity of the Nation. This is illustrated by the simple statement that if we were not spending \$6.7 billion a year on capital outlay for highway construction, what would we be spending the \$6.7 billion for? Or perhaps we would not be spending it all. If we are not spending it all, what would be the consequences on the economic activity of the Nation, including the earnings of its 68.6 million workers?

TANGIBLE AND INTANGIBLE FACTORS WEIGHED BY JUDGMENT

When it comes to the budgeting of funds for capital improvements, the highway administrator may find himself without many of the tools and guides he desires to have. The fields of science and technology have developed many specific tools through which specific things are accomplished. Highway engineers know how to design an adequate highway, utilizing the natural resources of earth, wood, minerals, and metals. This design and its construction utilizes the well-known laws of science and engineering. Although we cannot say that the process is wholly exact, it certainly is reliable. The end results are predictable within narrow tolerances. On the other hand, science and technology have not yet found the method of solving with certainty problems in economy, in sociology, in government, and in the problems which involve judgments pertaining to human behavior.

By reasonably reliable studies of engineering and economy, we can predict that Project A will cost 1 million dollars more than Project B, and that the tangible money based benefits from Project A will likely be equivalent to a rate of return on the investment of 12 percent per year, as compared to Project B with an estimated rate of

return of only 8 percent on the investment. Sufficiency ratings and maintenance costs are also available. The administrator can rely upon these figures as being reasonably sound, but such factual answers are only part of the foundation on which his decision must rest. Unanswered questions are: What are the consequences in health and safety on the areas affected by Projects A and B? What are the long-range consequences socially on the population affected? What are the consequences in the changes of land use in the areas affected? What are the comparative advantages of Projects A and B in the utilization of materials and labor? What are the comparative availabilities of materials and labor? What are the respective rankings of Projects A and B in the defense facilities for the Nation? Would greater benefits accrue to the public by building Project B, and one or two other small ones, with the million dollars difference in cost of Project A less B?

These factors and others face the administrator who must make the choice between Projects A and B. Thus, it becomes not solely a question of financial disbursement, of economic cost, of engineering economy, but of factors pertaining to health, morale, and social activity, as well as over-all governmental responsibilities.

We hear a lot today about electronic computers. True, electronic computers are available to solve all mathematical problems that man can devise. On the other hand, no computer today has yet developed an ability to reason. This statement is made notwithstanding that the electronic computer is on the way to becoming the world's champion chess player. Such championship will be achieved only through progress by trial; the computer learns not to repeat a play under a given set of conditions which in its past experience led to loss of the game.

It is desirable to apply electronic computers to the management decision process, and already the electronic experts have penetrated fairly deeply into computer programming toward this objective. Such development with computers will not replace management decision, but it will come a long way in disclosing to management the possible consequences of the many possible decisions, and the effects of variation in weights placed upon the several factors on which decisions are based. When many choices of decision are available, the computer can eliminate the less desirable ones and thus leave the decision maker fewer proposals for which to select his choice. The allocation of scarce resources to multiple needs can be made more dependable through linear programming methods.

To translate this thinking into highway programming responsibilities requires a computer program by which such factors as financial cost, economy, traffic served, land area served, available labor, available materials, land use, pavement conditions, and road-user benefits can be studied in such a way that the factors having the greatest effect on the consequences can be easily isolated. The decision maker then has a much better guide for final decision than he would have otherwise.

THE RESULT OF SOUND CAPITAL BUDGETING

Capital budgeting is a necessary device of good management, whether it be in household finance, public works or industrial manufacturing. Capital budgeting for highways is just one of those management tools by which control and strategy are applied to the process of investing the dollar in orderly construction of improvements which will serve the public for years ahead. Without orderly, well-designed capital budgeting, the highway improvement program would degenerate into a hodgepodge, catch-as-you-can, politically dominated, fluid operation reaching toward a fluctuating unknown goal. The over-all construction program must have a long-range objective, and a long-range detailed plan. Yet this long-range program must be variable enough to permit short-range moves to meet the changing of times, to take advantage of the newer and better ideas that evolve, and to provide for overcoming omissions which are bound to occur as we judge the long distant future.

A systematic study of the construction needs for a highway system, when preparing a construction program for a specific year, may raise the question of the benefits that would accrue from an accelerated construction program.

The list of proposed projects may be greatly in excess of what can be programmed

for the immediate future, because of limited funds. When this situation prevails, a study would be in order of the advantages and cost of financing a heavier program through the proceeds of a bond issue or an increase in highway user tax rates.

The objectives to be gained by planning a highway construction program are as important to the city, to the county, and to the state, as they are to capital budgeting by any organization. There is practically no difference in concept and in basic procedure and objectives between such construction programming in the city, county, and state. The magnitudes of the program, their involvements and complications will vary, of course, but once we understand and put into practice a good workable procedure for developing short- and long-range programs, any highway department—city, county, state or special authority—will have a working tool well suited to its responsibilities.

In the field of planning ahead for highway capital improvements, we are assured of the certainty of uncertainties. But by adhering to those procedures and judgments known to be sound when applied systematically to the construction programming function, these uncertainties will reduce to a minimum; the likelihood of rendering the most possible service to the greatest number of people will rise to a maximum.

Discussion

Morf.—I believe that your presentation of this is such an over-simplification of the case that for a group of working people it is apt to be somewhat deceptive.

For example, the Congress Street Expressway in Chicago, which would carry 160,000 vehicles a day, with other portions of the Interstate System in Illinois, which would carry perhaps 5,000 to 6,000 vehicles a day.

Are we to say that we should only build "Congress Streets," because their return for the dollar spent is more? Should we never build bridges? Should we never think in terms of anything except this return?

It becomes a matter of how you are going to measure your return. So far, your discussions on Krutilla and Eckstein have been equating this in terms of dollars. There are other factors that should be considered also. We are not just beginning to build a highway system. During the last eight years we built many miles of road in Illinois and have increased our mileage by 200. We are stuck with a large mileage of roads that we have to continue to maintain and service at various levels of service. And there is no doubt that when some of these roads are to be re-built, their return, measured in the terms that you have been speaking about here, will be far less than that of other roads.

I would like to have you amplify on this aspect of it.

Winfrey.—We have to weigh the benefits and they have to be greater than the cost. Those projects whose benefits are far greater than the cost are those that should receive top priority. All of these benefits are not measurable in dollars, but nevertheless, the benefits are there.

Because of our position, as highway administrators, we must make a decision as to which projects to build first, and every decision that you make to build a highway facility, whether it is the installation of a permanent traffic signal at an intersection, or a system of signals, or whether it is on the widespread scale of highway lighting, or whether it is building the Congress Street Expressway at \$10 million a mile, you have made the decision that the benefits from that expenditure of money is greater than the benefits that the public would receive from the construction at that time of any other highway facility.

If you did not make that decision on that premise, you did not make the right decision. And I say that with all sincerity, because you should be trying to achieve the greatest return for the money you expend.

We cannot always reduce those returns to dollars. But still the benefits accruing from that capital expenditure of money must be greater than the benefits that could be achieved by any other expenditure of money for that year. When we are dealing with

the future we cannot always see it as it turns out to be; but at the time the decision is made, it must be made on the premise that the expenditure of money will offer the greatest benefit today and in the future.

When we come to reconstruction, there is a tremendous amount of it to do. But nevertheless, the benefits achieved by the traveling public and by our social forces in the country, which are affected by highways, must be greater because of that reconstruction or repaving or whatever it may be, than could be achieved through some other expenditure of money.

That is an ideal situation. But why should we not have ideals? Why should we not set our goals at the moon? The moon is not so far off nowadays. We are going to get there. And you can get there in construction program if you set your objectives accordingly.

But as long as we are swayed by pressure groups, and as long as we give in to them to get rid of them we will not make it. But if we have this kind of a program, and we stand behind it, then we have a chance of so programing these scarce resources of money to construction that we will come a long ways toward this ideal that is mentioned in the quotation from Eckstein and Krutilla.

Wiley.—Would this apply, then, that every section of road that any work is done on must be self-supporting and that work should always be done on perhaps the one that carries the biggest volume, because it does the most good, even if there are isolated communities that have perhaps one road connecting them to the outside world with a low traffic volume but no work would be done on that road because it would not do as much good as on the heavier traveled road? Or is there another value that is immeasurable at the present that you would assign to that type of a road?

Winfrey.—You can spend your money on the most expensive piece of road, and yet do less good than could be done in another locality spending one-tenth of the money. And I say this on a quantitative basis; not a rate or percentage basis.

If it is put on a rate basis, on percent return, or a benefit-cost ratio, or some other basis, it is being comparatively indexed. But when the benefits received from many of our local roads and streets are measured, they are tremendous per dollar of outlay.

I do not know how to measure the benefit to the nation of daily delivery of mail, or the five-day-a-week transport of children to school. But certainly those benefits are great, are they not? Even though they apparently return little of a tangible nature, the value of those benefits must be tremendous.

But it must be admitted that we do not know how to quantify many of them in terms of dollars. But a basis must be established for making the final decisions and that basis must include the social function, and education.

R. Johnson.—I am not going to argue with the fact that long-range planning should be performed in a way to maximize benefits through the power of allocation; but I think there is a factor which becomes far more crucial than that. A basic objective of highway departments is the development of an adequate highway system.

Without long-range plans, we have no assurance of developing an adequate system, since highway funds are limited. It is inconceivable that we will ever have sufficient funds to do the entire job, to cover every minor inadequacy, and even some major inadequacies.

Therefore, we have to have an objective so far as adequacy is concerned and allocate our resources specifically to attain the objective. And if we do not do this, there is not much chance that we ever will obtain an objective.

This poses some very specific problems to us in the whole realm of highway programing: What level of highway development is adequate? Have we specifically set a standard of adequacy which can be applied to each section of the state highway system? Has the standard been accepted by the public and been given public support? What progress is being made in obtaining the adequate level of highway development at the current rate of highway expenditures? Do we have a procedure for making a constant assement of progress in terms of standards of desired adequacy? Do we have a method

of determining the rate of obsolescence and its effect on the attainment of the desirable level of adequacy? Does the method that we use give a rate of obsolescence in dollars? Are the data developed by any foregoing procedures clearly summarized by the guidance of the highway department, for the information of the public and the legislature? And does our planning activity provide estimates of cost to give full development of adequate roads in each of the systems for which the highway departments are responsible?

A planning unit can perform the data gathering function, and a budgeting unit can perform a similar function so far as the allocation or termination of financial resources and the coordination with the planning function is concerned. But neither one of these agencies can properly establish the plan or unilaterally make important decisions. This should be done and can be done only by top management, with representation of all the functional units in the department.

Winfrey. — I do not have the answers to those questions. Those are the issues that face the administrators of highway departments. But yet, the answers to those questions have to be found within the framework of the philosophy just given you. We have only certain tools to help us measure that maximum. A large part of it has to be by judgment.

We speak of a section of highway. Well what is a section of a highway? Nobody knows. It is just what the individual thinks it is. It can vary from a foot of a highway up to a hundred miles. It is a section of a route. So, when it is broken down to workable sections, inequality in sections and in conditions is created.

But if there was a bottleneck in Section C, along a generally adequate route from A to H, and traffic could not get through this restricted section, that should become a highly important section.

Those are the problems that we have to weigh. In other words, one of the factors involved in programing is what you might call continuity of development.

We come back to an objective. Where are we going? Now, if you have an objective, then every decision that you make must move toward that objective. And if it is this section, then that section has great value, maybe far out of proportion than could be calculated on a dollar and cents basis.

Livingston. — If you take the Congress Streets, expressways which have high rates of return, because of their high volumes, you have got to compare them, with the feeders that build those high volumes.

How do you, from a budget standpoint, figure out the balance between the high potential and the low potential feeder? Because if you put all of your high earnings roads under contract and build those and neglect these low earning roads, finally you will dissipate the high earnings of the main arterial, because it will not have anything feeding into it, and it will be completely obliterated. There has to be a balance between this low earning road that has actually been amortized by the earnings on the high volume road.

How do you get at this problem from a budgetary standpoint? This is in earning rate. You forget all the sociological advantages one way or another.

Winfrey. — That is a very important question. It is a question that the airlines, the railroads, and the telephone companies are faced with; because if the feeders do not exist in any of the communication systems, then the trunk line does not get any business. The feeders themselves may operate at a paper loss in the way that at least can be calculated.

In the highway field, we can do the same thing. We can calculate our traffic and reduce that traffic to revenue and expenses, that is, expenses in maintaining and constructing the highway, and revenue earned from the users.

Feeder routes exist in the highway system. They are routes in which the allocated tax earnings, fuel tax and license fees, do not equal the cost of keeping the highway in operation. But we cannot dispense with them. We have to keep them in our system. We have take care of them. And they are profitable.

There is some scheme that could be developed on an arithmetical or allocation basis to make an intelligent analysis of the feeder routes importance. We cannot

forget our so-called feeder systems. They are essential. They are profit-making in the end.

Granum. —At the highway cost committee meeting in January, several people made the point that one of the most severe problems confronting the state highway departments in the development of primary road systems was how to finance the local road systems, that is, the township roads, or the lowest volume routes in the rural areas; their point being that legislators are very conscious of the problems of these local roads and are frequently convinced of the importance and the profits that can be returned from the expenditure of state-collected revenue on local roads.

Part of the problem that is facing us generally is to develop techniques and procedures which will help define the desirable level of expenditures on local road systems as well as on others.

This may seem a far cry from formulating construction programs, particularly for a state highway system, but it is a beginning point, among others, where the legislature makes a determination of how much money they are going to make available for the development of any road system.

Burnes. —Legislators certainly set the amount of money available in some cases for secondary road improvement. They also set the number of miles of road which are included in a highway system. And perhaps that is one of the real problems in highway programing.

For example, out of a 12,000 mile system, you have traffic volumes ranging from 25 or 30 thousand cars a day on some roads to under 400 cars a day on others. That is quite a range of roads to consider for improvement. Every system is made up of earners and subsidy routes, and improvements must be balanced out.

Certainly we cannot completely disregard improvement of the so-called subsidy routes. And that is what makes it difficult in trying to sort out the benefits from the top to the bottom.

On the other hand, if the benefits are on the basis of systems, the answer might be easier to get at.

Swanson. —Sometimes we are inclined to think of highway benefits and forget about some of the broader benefits. The philosophy of broader benefits is particularly applicable where we get into our bigger urban areas, where not only the selection of a project but the method of design can result in increased or decreased benefits to the city.

We have a case right in our own area. Should we build an elevated road or a depressed road? The difference in cost is \$12 million. To what extent can that additional expenditure of \$12 million be justified on the basis of increased tax ratables over the year, or by increased city development? Certainly it is a factor, that has to be considered along with highway benefits.