Fiscal Management and Control—
A Symposium

I. The Place of Financial Management in the State Highway Department

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• THE PLACE of financial administration and of the financial manager in the modern state highway department is far different from that implicitly suggested by one state highway official in the 1920's who said, "The finance man is all right. I do wish, however, that he would stick to his bookkeeping and stay out of the engineers' hair while they build and maintain highways." This view of the fiscal management job as that of a bookkeeper was somewhat antiquated in the 1920's; it would be far more archaic if held today. One would err (a) to infer that the accounts can be fully meaningful in the absence of adequate reports from those persons who "build and maintain highways"; (b) to assume that records are kept primarily for someone other than the people who see to the construction and upkeep of highways; and (c) to conclude that the only function of fiscal management—or even a principal one—is bookkeeping. What then is the place of fiscal administration and of the finance officer in a state highway department?

The present report seeks to answer this query in two distinct ways. The first part inquires into the basic fiscal administration assignment and the position of the principal finance officer among other administrators. In search of satisfactory answers, business experience generally, and highway administration experience in particular, contribute.

The second part of the report seeks an answer in terms of the interrelationships involved in financial administration as projected in the literature and as practiced in the states. The principal relationships referred to are those tying financial management to highway planning, however administered; those providing the nexus with construction-oriented and maintenance personnel; those assisting top management; and those relating highway finances to the total finances of the state and to state (as distinguished from departmental) policy. The analysis in the second part, although it includes those principal relationships that are the sole concern of the highway department, omits some highly significant finance administration interconnections.

From these two approaches one may secure sufficient evidence to justify a firm hypothesis as to the place of fiscal management in total state highway administration. The analysis may also tell something of the role of the highway finance admin-

istrator in the operating department of the future.

FINANCE ADMINISTRATION IN PRACTICE

Administrative arrangements in business and changes in them may suggest analogies with those in state highway departments. The parallel seems especially close in the instance of businesses in which engineering functions bulk large.

The Business Analogy

In business circles there has been recent pointed comment (*1*) on the choice of finance specialists as chief executive of each of several large, engineering-type corporations. For instance, Gerald L. Phillippe was named president of General Electric Company; Lynn A. Townsend, of Chrysler Corporation; Frederick G. Donner, chairman and chief executive officer of General Motors; and Ernest R. Breech, former board chairman of Ford Motor Company, board chairman of Trans World Air Lines. Developments such as these raise question as to what in the finance man's background renders him especially eligible for such preferment.

Recently, some careful statistical studies (*2-6*) of corporations generally indicate (a) that, despite the comparatively few new recruits in finance, more corporate executives have begun their work in that field than in any other (*3*) and (b) that corporate top executives are increasingly drawn from the financial management field (*2, 7*). Each of these phases of the situation needs to be examined briefly for its analogy with the highway department placement of financial management.

A recent comprehensive survey (*5*) shows a great deal about nearly 2,800 finance officers of corporations in the United States and Canada. Of those identified by line of work 1,471 were in manufacturing; 158 in banking, finance, and insurance; 197 in public service businesses; 180 in construction, extractive, and related refining; 183 in distribution; and 72 in all other fields reported. Seventy-one percent were employed by the corporation board of directors rather than by a corporate executive, though over half reported directly to the president or board chairman and a fourth to the board itself. Typically, accounting, office management, corporate management planning (forecasts, long-range planning, budgeting), property administration, insurance, contract negotiations (but not ordinary purchasing), and often aspects of traffic management are within the purview of the fiscal officer. The finance official in over 80 percent of the cases serves on a long-range planning or kindred committee. It is significant that 70 percent of the finance officers studied are college graduates and that 40 percent of these have completed one or more years of graduate study. Of those who did graduate work, two-thirds completed at least two years.

There are numerous lines of evidence indicating that the corporate finance men's positions in many, perhaps most, of the sizable corporations have been strengthened in recent years. An examination of one group of such personnel shows, for instance, that from 1956 to 1960 the number of corporations assigning finance officers vice presidential rank advanced from 74 to 186 (*2*). Of the 260 corporations Stiller (*6*) studied, 228 had by 1960 chief fiscal people who held positions as corporate officials other than the remaining 32 "controllers." Perhaps the most convincing indication of the altered position of finance management is the recent emphatic tendency toward corporate promotion of finance people to chief executive officer (for example, Browne (*2*) shows that, although

only 75 members of the Controller's Institute had been so promoted ten years ago, 235 held positions as chief executive in 1960) and the frequent board of directors' insistence on personnel experienced in finance as a prerequisite for consideration as such chief executive (*7*).

The widespread formal recognition of finance personnel in corporation practice and especially the recent upsurge in the extent of their acceptance pose important questions. The explanation of the emphasis on the fiscal aspect of administration is apparent in fields like banking and insurance; it is not so apparent in the case of enterprises manufacturing appliances and electronic equipment, in public utilities, and in corporate producers of transportation equipment—all fields in which engineering functions bulk large. One possible explanation lies in the emphasis since the mid-1920's on the management functions of corporate finance personnel (*8-10*) which emerged in the 1950's into the pattern that has been suggested already. This stress on management accompanied corporate executive emphasis on the interpretation of the administrative process as a unified whole, whether directly involving production, marketing, personnel, or finance. The interpretation and its administrative consequences require the distinctly management functions of finance in all aspects of the individual corporation's activity. Cost control is important in Ford Motor Company engineering, production, and marketing; thus, throughout all these and other aspects of the corporate work, financial management skill is essential.

Corporate development of designs for the future following the 1920's meant new stress on long-term planning. There are, in one sense, two facets of the farther look ahead. One involves the economic functions of the corporation. An industrial or marketing enterprise plans its future products and the methods of selling them (*10-12*). Working out such programs requires the participation of finance administration personnel. More particularly, as the cost of each undertaking must be met, execution of the plan requires even stronger accent on fiscal management.

The other form of this long-range planning development expresses itself in the enlarged use of budgeting as a sophisticated vehicle for administration (*13-15*). The essence of budgeting is the forward outlook and the controlled execution. For example, when a corporation considers acquisition of the equipment necessary to turn out a new product, the action inevitably involves not only a view toward the future in terms of the productive processing and the marketing of the product but also a cooperative examination of the possibility and the alternative means of financing. For instance, Miller (*16*) shows that of 127 "well-managed" corporations all but 6 indicate that they use specified formal and established budget tests in planning capital investment. About one-half use two or more such tests. A large minority of the concerns employ highly sophisticated budget techniques.

The typical finance man in current corporate management occupies a position second only to the chief executive. In some cases, the function is of such moment that the latter performs it himself. And the dignity of fiscal administration is decidedly enhanced in recent years. The trend may perhaps be explained by the enlarged place of forward planning and by new emphasis on efficient management as illustrated by cost reduction programing.

Financial Management in Highway Departments

The place of financial administration in state highway departments is roughly parallel to that in private

business except that (a) there are adaptations to their public character, such as the service objective, that in a degree displace the profit-making functions of the business enterprise, (b) the differences among the various highway departments seem to be greater than those among corporations, partly because of the former's political relationships, and (c) there appears to be a greater proportion of highway departments in which management emphasis lags.

There is a corporate and highway department analogy in three ways: (a) long-term departmental programing based on highway needs studies (*17*) is functionally much the same as corporate product and market planning; (b) although construction and current budgetary practices in state highway departments differ procedurally and in some degree functionally from corporate counterparts, the parallel is certainly close (*18, 19*); and (c) generalization about similarities in the use of budgeting in highway and in corporate management is also broadly applicable to accounting, internal auditing, purchasing, property control, and debt management (*20*).

Trends.—Although highway needs studies have been made in the states for many years, they have become the widespread basis for program formulation in the present-day sense only recently. One may perhaps assume that the increasing stress on such a long-term program is related to the growth of planning and of budgeting staffs—or, more broadly, to the currently increased sophistication in highway management. Even now, maximum employment of needs studies for policy definition is apparently a minority practice among the states; *e.g.*, in Tennessee (*21*).

The comprehensive use of modern program budgeting in state highway administration was extremely rare prior to the close of World War II. With growing administration knowhow, signaled by the increasing recognition of fiscal techniques, postwar financial management has matured reasonably up-to-date budgeting apparatus in a number of public works agencies. This maturity appears to be reflected in the trend toward the integration of fiscal management in many state highway departments (*22*). By 1959 at least 21 state departments had an organization that encouraged integrated financial management equivalent to that employed under the typical vice-president finance in the private corporation of the 1960's.

Present Situation.—The policy as to fiscal functions and its actual execution are far more meaningful than the structural arrangements. Conference and correspondence with the top officials of about half the state highway departments indicate that a large proportion regard budget-oriented functions as the most critical financial management tasks of the department. Eighteen of the 21 departments giving categorical information regard such issues as being of first importance. Even though some of these 18 departments clearly do not recognize the full potential of budget management for over-all administration, the extent to which the department heads do envision their opportunity presages future emphasis on modern program budgeting. Even so, other state highway executives seem to assume that the budget task is finished when the year's plan is approved.

As to other fiscal functions, each state seems to distribute emphasis differently. There is heavy stress on accounting, which in some cases is apparently not completely distinguished from budgeting. In rating financial management functions, highway department heads assign an important place to procurement, property control, and related functions. A number of states accord marked emphasis to debt and treas-

ury management even though in many states these functions are administered outside the department of highways. It appears that in most states insurance problems (fidelity, workmen's compensation, fire, and tornado) are regarded as relatively minor or are looked after by some agency outside the highway department.

Certain state highway administrators emphasize the interdependence among fiscal functions and the interrelationships of these with engineering and other operating activities. These complexities suggest to a number of correspondents the wisdom of integrated responsibility under a single subordinate for exercising or supervising financial management. It appears that 16 of the 22 departmental executive correspondents accord general fiscal management, subject to policy direction, to one principal financial official. Some of them include management utilization of planning results for physical-financial construction program planning or execution or both. Fringe subject matter such as public relations and personnel functions are sometimes lodged with finance but more frequently not. One correspondent indicates that fiscal management is subordinate to, rather than coordinate with, engineering management.

Highway executives report surprising satisfaction with diverse financial management structures. The three who would be disposed to make considerable changes, if beginning anew, each independently concurred in desiring a financial management comprehending all fiscal functions and reporting directly to the department head.

There appears to be a considerable area of agreement among officials who express a view to the effect that state highway departments should lodge electronic data processing in the hands of the finance officer. It was reported in 1959 that in most cases computer centers were independent of technical engineering and finance divisions of the departments (*23*). In Kentucky, where such equipment is used mainly for accounting and closely-related purposes, this viewpoint is to be expected. The conclusion is more interesting in Illinois where engineering use of the computer, relatively speaking, bulks larger.

Many progressive state highway departments have assigned major management responsibility to fiscal administration personnel, subject to policy supervision, but the extent of the assignment falls far short of the practice in private corporations. The prevailing policies and trends suggest a far larger place for professional management people in the future highway department—a position not independent of, or superior to, planning or engineering, but closely integrated with and helpful to such functional administration. The widespread state highway department development of program budgeting and the top-level recognition of opportunities for management effectiveness in this direction could greatly accelerate the current trend.

FINANCIAL ADMINISTRATION INTERRELATIONSHIPS

One of the major problems of highway administration is that of producing and maintaining a general awareness throughout the ranks of supervisory personnel of the operating assistance that financial management can provide. (Prerequisite, of course, is the capacity to make such aid available.) Similarly, there is necessity for pervasive understanding that the correctness and serviceability of records depend on accurate and punctual reports from engineering and other operating personnel. This complex of issues is merely a special case of the fundamental truth

that a highway department is a unified operation in which each basis for conclusion typically depends on performance organizationally and geographically separated from the particular action, report, or decision (*18, 24, 25*).

The truism that a state highway department, in order to be effective, must be operated as a unified whole sometimes presents a real departmental problem. So a careful examination of interrelationships within the agency, especially between financial and engineering groups, seems essential to understanding the place of financial management in highway administration. This section will be devoted to such an analysis, using budgeting as a particular case. (Revenue earmarking for highways is assumed in the case analysis. For states whose highway programs are supported by periodic appropriations slight adaptations are essential.) Budget management is chosen as the vehicle for presentation of the basic idea not because it is generally typical but because the interrelationships are easier to see than are those affecting procurement, warehousing, debt administration, property control, etc. Stress on the pervasive interdependence of all fiscal management with other departmental activities, as in the case of budgeting, is appropriate.

For the purpose of steering a straight course, a clear definition of the basic concept of budgeting is important. Informally put, the following statement represents an approximate consensus among finance and other management-oriented students. Highway department budgeting involves the development of a documented work program (including a priority-based list of construction projects), the careful linkage of that program with a formal comprehensive financial plan, and the carrying out of the entire scheme through an administrative arrangement which includes a definite work schedule. Thus, budgeting embodies both maintenance and construction-oriented planning (in the latter case, planning for location, design, right-of-way work, and construction proper) as well as financial planning. It includes plan execution as well as plan formulation (*26*, p. 2). Some highway departments have aspects of budgeting without capitalizing on the entire process. It is usual in such agencies to refer to whatever elements of the budgetary process the department has as its budgeting operation. More precise language would reserve the term "budgeting" for the comprehensive plan, including apparatus for submission, approval, and execution as well as for the preparation of the plan. For many purposes it is important to distinguish the "capital" or "construction" budget from the "current budget." The former characteristically involves advance planning for several years. The latter, which includes the first year of the capital budget as well as the program for all maintenance and other current activities, is equally based on a program conception. For the objectives of the present discussion, "budgeting" obviously refers to both capital and current aspects.

In this section, the comprehensive concept of budgeting or the budgetary process is quite freely assumed even though some elements are missing from most of the state highway departments. (Thus, the interrelationships analyzed in the rest of this paper are only in part those that actually exist in any one state department.) A kindred concept of other fiscal functions is also assumed —oddly enough, with less sweeping departures from existing practice.

Interrelationships in Planning

Planning provides the basic foundation on which budgeting rests even though the budgetary process itself does not include all phases. For ex-

ample, sound management appears to require a long-range definition of objectives such as may well emerge from a comprehensive highway needs study. The focus of such a determination of purposes may include a period of 15 to 30 years (*27*). In keeping with the specific goals set up officially, the budgetary process involves the preparation, submission, approval, and execution of a priority-based program concerned with construction, operation, and maintenance of the highway system. Thus, the budget is a product, as well as a servant, of management activity looking toward implementing the long-term plan.

Highway administration circles understand the planning function sufficiently that one need make only general reference to the necessity that the work can be carried out with active collaboration from all branches of the engineering staff. For instance, economy studies to lay the groundwork for alternative route selection could scarcely be successful without the investigations of real estate costs that the regular right-of-way staff people prepare for the purpose.

Both engineering and planning contributions are essential to the largely general management decisions that the financial administrator reflects in the actual budget. Indeed, program details of performance regarding each engineering function are likely to be directly or through the planning staff the joint product of the financial and the particular engineering management concerned. Thus, finance, planning, and maintenance directors may jointly see to fixing the program—subject, of course, to official general approval. In such a three-way conference, for example, the finance personnel can provide from the record the unit cost data classified by maintenance activity for each class of highway (*28*, pp. 27-29). Planning staff members can supply information regarding physical and traffic interrelationships with other departmental functions. And maintenance people, of course, in view of these kinds of intelligence coupled with information from their own files can make basic maintenance budget estimates. The necessity for collaboration is summarized effectively in Smithies (*19*). The military poses many of the same problems as a highway agency (see Mosher (*29*), especially pp. 57-70).

Although the position of the planning staff is a dominant one in aiding toward decision as to estimates, operating divisions and top management of the highway department depend more heavily on the financial administration for budget-implementation counsel. This whole situation will be clarified later.

As in private business, the effective use of planning results contributes heavily to both construction and maintenance director decisions conforming with departmental policy. To put the point differently: The planning staff and fiscal management provide, in the light of prior cooperation from directors of engineering operations, significant data and analyses necessary for wise budget estimates by those directors and their top supervision. In the use of planning results, as in the development of planning data, the department functions as a single unit. In a large establishment, such unity is feasible only with a planned program uniformly interpreted among persons concerned.

Interrelationships in Budget Administration

One facet of the fiscal management relationship with other branches of the highway department has emerged from the discussion of the employment of the planning results to make budget estimates. As already implied, the formulation of the construction budget is a collaborative process between planning and financial management staffs based largely on decisions

by top management and by the engineering line administrators (*29*). The submission for final approval, whether to the head of the department, the governor, or the legislature, as the law requires in a particular state, may result in program adaptations or alterations which also necessitate similar cooperation. Highway construction budgeting in Great Britain (*30*, pp. 202-205 and Ch. 9) suggests kindred interrelationships.

On the face of the situation, the top departmental officials and the engineering administrators must base certain construction decisions almost exclusively on information and analysis from the financial management (*24, 26*). The whole truth is more complex. For example, the integrity of the data regarding progress on particular projects, whether in administrative, physical, or financial respects, is completely dependent on engineering and other field reports. This fact usually presents little or no difficulty with respect to contract performance; but, in some states, the situation as to force account engineering, right-of-way, and construction activity, and maintenance work is such that the finance administration reports based on project data from the field staff falls short of desirable standards of accuracy. Reports based on field-provided information, whether as to work results or costs, cannot be more precise than the basic data in the reports. This problem has been inadequately reported in the literature; but in practice serious weaknesses have been detected, for example, in the allocation of engineering and right-of-way staff time among projects.

Assuming conditions of good reporting are satisfactorily met, it is important to sketch the position of financial management in the process of construction budget execution. As this function is largely meshed with current program administration, however, the analysis may be deferred momentarily. There is a basic difference in that construction reports must show project financial and action data as well as over-all information similar to that reported for operation and maintenance.

Procedure in different departments in preparing current budget estimates varies widely. Thus, no one assumption as to the formalities can have general validity. For the purpose of showing the position of financial management in the process, however, the following reasonably typical but abbreviated steps in this process in agencies that do program budgeting can be used.

1. The department head and the finance chief confer to assure that the latter adopts a budget-estimates preparation outlook consistent with departmental policy.
2. The finance chief meets with all line administrators who participate in program definition, whether in the engineering staff or not, for the purpose of explaining forms and procedures incident to program summaries and estimating tabulations.
3. The department head, in the light of budget staff work, including revenue estimates, meets with all these administrators and the entire professional budget staff to discuss policy, including any issues of program balance or financial limitations that he finds desirable or necessary. (In strong-governor states this conference is preceded by appropriate discussions with the state's chief executive.)
4. Continually aided individually by budget and planning staffs, the maintenance, right-of-way, design, construction, and other administrators prepare work program summaries and estimates that are final when legally approved.
5. Financial management reviews work program summaries and estimates for consistency with prescribed form and with policy and formulates

the budget document for official approval. (In any instance in which subagency documentation is incorrect or inadequate, the budget staff seeks with the administrator concerned to eliminate the imperfections discovered. When the estimates are ready for approval, they are submitted to the department head with budget staff recommendations based on prior interpretation of policy.)

6. The department head approves or secures the executive or legislative approval established by law as necessary to make the budget official. However, if a department is headed by a commission, rather than an individual executive, the members participate. (Of course, in the event of unresolved disagreements between budget staff and a chief administrator as to the interpretation of policy, it is necessary that financial management report the facts and arrange for conference so that the department head may have full explanation and render a decision to be incorporated in the budget document before it is placed in form for final approval. If the background discussions among the planning staff and all administrators and the earlier steps just specified have been successful, such disagreements should be rare after comprehensive program budgeting has been in use for a while.)

Following budget approval, the procedures again depend on accounting and other formal arrangements. A usual practice is that the budget staff, in keeping with top-level administrative directives, makes allotments (that is, makes appropriated money available in keeping with the accepted work program) on a quarterly basis. It then becomes the responsibility of each operating administrator, aided as desired by the budget staff, to execute the share of the total expenditure plan represented by the program for his branch of the agency.

The budget staff assists the top-level management and the heads of operating units in numerous ways to make each dollar available go as far as possible. One of the most obvious services is monthly analysis of financial reports in the light of program development to show the heads of traffic, maintenance, and other administrative units exactly where their expenditure and work programs stand as compared with the budget estimates. In the case of construction-oriented units, this written and oral analysis extends to individual projects. As for construction budgeting, see Martin (*18*) especially pp. 11-14; for total budgeting generally, see Elkins (*31*), Mosher (*29*), Royal Institute of Public Administration (*30*), and Smithies (*19*); for certain dimensions not fully developed in any of these works, see Martin and Cush (*32,* Ch. 5). In the instance of current activities, policy on this score depends on local procedures. In program budgeting in all cases, the relationship involves budget staff aid to department head, chief engineer, design administrator, or other supervisor in utilization of budget information or other professional findings to achieve the most effective and economical management of his sphere of responsibility. Thus, in program execution, the budget staff is management consultant to line administrators. The necessity for this was recently stated in one context as follows (*33*):

> The engineer's formal preparation for making capital investment decisions consists of a course in engineering economy. . . . As taught to the engineer, engineering economy is usually a one-semester course based on economics, cost accounting, simple mathematics, statistics, interest rate theory and a heavy dose of questionable depreciation theory. This is only a part of the subject matter that the average management student absorbs in four years, yet the engineer is expected to master the field in one semester.

This comment on one phase of management applies to other facets. Incidentally, the management people actually employed in program budget staffs more and more are individuals who after four years of college have had one to four years of graduate study. The mounting level of professional management education is consistent with complexity of demands of state budget administration.

Interrelationships in Other Phases of Financial Management

Carl Fritts (*34*, p. 25) of the Automotive Safety Foundation has pointed out the necessity of balancing departmental emphasis on "business functions" (including budgeting, accounting and auditing, records, purchasing, personnel management, property control, office operation, and in some states planning and aspects of treasury and debt administration) with that on "engineering functions." Some other highway administration specialists would associate with "business functions" the more general administrative management facilities necessary to a well-directed state highway department, including planning, public relations, and miscellaneous service facilities such as multilithing, blue printing, and even map making (if the last is not separately provided by planning) (*35*, pp. 156-157). Numerous other reports and surveys in the past dozen years would seek kindred, but usually less comprehensive, integration of the "general administrative" machinery.

But, whether the "business functions" are or are not organizationally tied in with other general administrative tasks, it is essential to efficiency in highway administration that the structural arrangement imply no separateness in the actual conduct of business. Indeed, a condition of effective over-all operation seems to be a close functional tie between engineering and finance management. The business function personnel may administer property control; if so, the purpose is to contribute to highway maintenance and construction. It may provide for procurement. In some states materials and equipment purchasing, as well as contract procurement, are handled by the highway department; in other states by a general procurement agency—wholly or in part. In the latter instance "provide for procurement" typically means merely see that purchase requisitions are in order, that proper records are made, and that requisitions are promptly forwarded to the state's procurement staff. There is also follow-up activity. If procurement is provided, the equipment and other things purchased are mainly to build or maintain roads and streets. Thus, the "business functions" are separately administered in close cooperation with all the other branches of the department. They are split off in order economically to secure needed business skills and to free highway technicians, especially engineers, of the diversion from their own work.

As in budgeting, but according to techniques characteristic of each function, finance management is successful only as it is integrated with, and helps, technical highway manpower. No highway department exists to keep accounts or to manage debts or to procure commodities or contracts. On the contrary, these activities are carried out in highway administration agencies to facilitate road and street operation, maintenance, and construction. Conditions of departmental success include (a) financial management geared in attitude and performance to the helping function, (b) provision of accurate reports from the operating front that will enable fiscal personnel to function with integrity, and (c) maintenance of an atmosphere of mutual

respect and cooperation between persons performing "business functions" and those carrying on "engineering functions."

CONCLUSIONS

Several conclusions from the analysis seem to be clear:

1. Budgeting, accounting, internal auditing, other records, procurement, property administration, general office operation, and, to the extent the functions are not allocated by law to a different agency, treasury and debt administration are highway department activities that involve financial management skills in varying degrees. Finance administrators also collaborate with outside auditors. Budgeting and some of the other enumerated functions utilize the most general professional management abilities. In addition, personnel, planning, aspects of public relations, and some other functions of the typical state highway departments challenge administrative skills and present fiscal angles.

2. There is a strong tendency—following the even more developed practice of private business—toward integration of all or most of these functions under one individual reporting directly to the department head. This design may or may not include personnel, planning, and kindred tasks, depending on departmental policy as to the orientation of these activities. The indicated trend toward substantial management integration, for the most part, is supported by prescriptive management studies.

3. If any of the functions referred to in Conclusion 1 are administered outside the supervision of the head of the "business functions" generally, they are more and more generally managed by individuals coordinate with the chief fiscal officer and with the chief engineer to the extent that they are not lodged directly in the office of the departmental executive.

4. There is a pronounced movement—again slower than in private business—to recognize the functions enumerated in Conclusion 1 as distinctly management assignments and to man them largely with people professionally trained in that area.

5. The personnel engaged in the performance of "business functions," especially individuals having management responsibility, must recognize their tasks as involving facilitating activity, not as turning out end products. Their assignments are important to the extent that they cooperatively help toward the performance of the "engineering functions."

6. As a corollary of Conclusion 5, one measure of the success of financial management in a particular state highway department is the extent to which the engineering staff capitalizes on consultation with fiscal management personnel in much the same sense that the nontechnical department head makes use of engineering skills.

7. The generalizations in Conclusions 1-6, in the absence of unanticipated developments in administration, are more likely to be fully applicable to the state highway department of the future than to that of today.

ACKNOWLEDGMENTS

The author has profited from a critical reading of this paper in an earlier draft by E. H. Holmes and F. C. Turner, Bureau of Public Roads; Wendell Beals, Utha Conrad, Ken Cook, Betty Rae King, Joe Massie, and Ralph Pickett of the University of Kentucky; W. F. Babcock, North Carolina State Highway Commission; Dwight H. Bray and Leslie Dawson, Kentucky Department of Highways; W. L. Haas, Highway Management Consultant; Eugene C.

Holshouser, University of Georgia; and Charles M. Noble, Consulting Engineer. The author is especially indebted to the highway department executives throughout the country who have written observations on their own fiscal management.

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II. A Modern Look at Financial Administration in State Highway Departments

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• THIS paper attempts to stimulate thinking in the area of financial administration in State highway departments by discussing the interrelationships of that area with over-all State government, the U. S. Bureau of Public Roads, and other aspects of management within a highway department.

Specific examples are cited based on both industrial and State highway department experiences to illustrate and emphasize various points, particularly in areas of the need for another look at the training required of those placed in positions discharging day-to-day heavy management responsibilities. The value to over-all management of coordinated efforts of all aspects of management and the part financial administration might play in the management of a modern

highway department are also illustrated. Reference is made to the approaches in certain specific areas that highway departments' industrial counterparts have effectively used in an effort to stimulate thinking on how accounting systems might be developed to generate reports to assist management at all levels in the discharge of its responsibilities.

As a point of departure and certainly as an oversimplification, sound financial management in any business, including the highway department, depends on three fundamental processes: planning, organizing, and executing. Planning is setting objectives, forecasting future conditions, and determining the future course of action and policies required to attain objectives in the light of forecasts. Organizing is determining and arranging the resources of materials, manpower, and money by function and in relation to the whole to meet the planned objectives. Executing is the carrying out of the approved plan to attain desired objectives. It involves the determination of actual results as compared with predicted performance.

PLANNING

Planning is no different in the highway business than in private business. It involves the establishment of an over-all long-range objective that can logically be translated into a short-range program resulting in a comprehensive plan of operation for the department. It includes, first of all, a determination of the level of automotive transportation service to be provided over a 15- or 20-yr period, with appropriate forecasting of future population and traffic demands to assess probable future maintenance and construction needs. Unless these long-range objectives can be set forth, it is difficult to organize for and logically execute the operation. Too often, the setting of this long-range goal is the basic financial management stumbling block.

Historically, many highway departments have operated merely by making use of the highway funds made available annually or biannually by the State legislature. Too often the amounts of these funds have been based on historical structures of taxation without a realistic appraisal by the highway department or the legislature of the desirable levels of service to be provided or the funds necessary to maintain a reasonably adequate highway system. It might be concluded that this fixed taxation sets a series of goals of achievement for the highway agency. Actually, the reverse takes place in that the goal is merely the expenditure of these funds without a realistic appraisal as to whether the funds being spent are providing too high or too low a level of service consistent with the probable future needs.

The Interstate System, although having passed through several stormy years, represents the opposite approach—that of designating a goal to be achieved and then providing funds to permit its attainment. Admittedly, this great system of highways will solve only a part of the over-all highway problem. If the total highway transportation problem is to be solved, a similar approach is needed within the State highway departments for the primary highways and, of equal importance, the secondary roads and the urban system.

As an illustration of what steps might be taken so that highway departments may achieve this over-all long-range objective, some of the actions taken by the North Carolina State Highway Commission may be of interest. It is important, however, to understand that in North Carolina the highway commission has responsibility for over 70,000 mi of roads, including all of the pri-

mary roads, all of the secondary roads, and all of the major thoroughfares in urban areas. Thus, in this State it may be easier to work towards a long-range goal for all highway systems than in the majority of the States where highway activities are under many separate governmental units.

As a first step, detailed studies were made to determine what might be considered the appropriate levels of service to be provided on all highway systems for the future. This first assumption of future levels of service to be provided sets the long-range objective or goal. With the goal established, the regular population and traffic projections were made for all primary, secondary, and urban thoroughfares. Cooperative thoroughfares were developed in all major urban areas. Relating future traffic projections to the primary, secondary, and urban system as it related to the capacity of the existing systems as defined by the level of service, it was then possible to determine the future needs.

As a result of this study, it was possible to estimate the cost of thousands of improvements and to establish a period when such improvements might be reasonably needed. These needs when related to probable future revenue indicated that a minimum of approximately $500,000,000 in additional funds would be needed over the next 15 years to provide a reasonable level of service.

This report, given rather wide publicity and made available to the Governor and the legislature, indicated that North Carolina was indeed falling behind in coping with its highway transportation problem. Taking cognizance of this fact, the Governor and the members of the last legislature took positive steps to provide more funds for highway operations, which is closing the gap between highway needs and highway revenues.

Admittedly this long-range plan is not unique and many highway departments have been developing such plans. However, it is considered fundamental that any logical fiscal management depends on such a plan in considerable detail as an over-all objective. Without it, legislative bodies have no basis for evaluating highway needs as they relate to over-all governmental needs. Without it there is no equitable basis for determining the appropriate distribution of the total tax dollar.

Without such an objective, highway management tends to be lackadaisical at all levels of State government. As an aside, such a plan brings home forcefully to the people that the highway department is not necessarily "the rich uncle" that many believe it to be.

Finally, without such a plan setting forth objectives to be attained, the problem of organizing to do the job is most difficult and it is virtually impossible to have efficient management within the various organization units. In short, it is management by crisis.

Short-Range Plan

Before manpower, equipment or other organization requirements can be effectively mobilized, long-range goals must be reduced to immediate short-range objectives. In the highway business this is most difficult.

On the one hand, the time required to plan, locate, design, and acquire rights-of-way for construction projects often takes from three to five years. Unless such a complete and detailed 3- to 5-yr program exists, it is virtually impossible to mobilize the manpower in the operating departments to produce a balanced construction program.

On the other hand, budgeting for such specific projects and functional performance within the specific project area must be tied to annual or

biannual legislative budgets. Such overlapping is often confusing to highway commissions, members of the legislature, and the public at large because most agencies of government are spending their allocated funds on an annual basis whereas the highway departments are today working on projects that will go under construction three to five years later based upon anticipated revenues. The 3- to 5-yr short-range plan is, however, absolutely fundamental for any intelligent management of the highway operation.

As a further illustration of the importance of long-range planning, when such a detailed plan exists, it is then possible for the policy-making body of the highway department to set up a 3- to 5-yr work program and make rational decisions as to the amount of total funds that are needed for each given portion of the highway system (primary, secondary, and urban) after first determining what must logically be spent for the maintenance of the existing system. Similarly with such a long-range plan, it is possible for the policy-making body to select construction or improvement projects in a logical manner, based on the relative needs on a statewide basis within any given system.

It is therefore axiomatic that the second step that must be taken in the management process is the development of the short-range plan that will permit the highway administration to make rational determinations of how its manpower and materials should be organized to accomplish the work program.

ORGANIZING

Personnel organization considerations are basic for effective management. Often it is difficult for engineering departments to realize this. However, unless major functional activities are logically grouped and specifically pinpointed to the organization plan and, conversely, the functions of each organizational unit clearly defined so that responsibility and accountability for each major function can be fixed, it is impossible to set up modern accounting systems to generate reports that will reflect the status of a given activity in actual performance as it relates to any planned objectives or course of action. It would logically follow that if the work program is not on schedule, corrective action would be difficult because of the inability of determining exactly what is wrong and who is responsible. Thus, organization considerations are basic and fundamental to the development of accounting systems that will provide highway management with reports vital and essential for efficient operation.

The first step to be taken in bringing the personnel organization into harmony with the short-range plan is a critical examination of the existing functional and departmental structure. In making such a study, it has often been found that departmental functions are not clearly defined, that often there is overlapping responsibility, and that within the total structure itself, there may be an excessive number of departments reporting to a single administrative head. An analysis of one organization chart shows over 30 departments reporting to such an administrative head. In another case, the entire planning function was found to be subordinated and almost lost within the actual engineering operational activities. Therefore, the establishment of the functional activities, definitions of responsibility, and adequate lines of communications with proper levels of intermediate supervision is the first step in organizing for effective financial management.

Once the functional activities have been determined and properly oriented, the second step should be to organize the functional department

itself so that it may carry out its duties and responsibilities most efficiently. Such departmental analysis may show an excessive number of supervisors on the one hand, and on the other, a complete lack of necessary supervision. Overlapping jurisdictions may be found that should be clarified. Improper emphasis in certain sections of the functional department may also be apparent. Such functional departmental analysis as related to the short-range plan often brings to light bottlenecks in the production process because of inadequate staffing, inadequately trained personnel, or a lack of understanding of the objectives to be achieved. As an example, quite often it has been found that roadway design departments have historically grown to cope with secondary and rural primary projects, whereas the short-range program indicates a definite shifting of emphasis to urban expressways.

Those charged with the responsibility for administrative management in the North Carolina Highway Department have found that their most valuable tool in assuring coordinated action and proper orientation to achieve its short-range plan is the development of a specific organizational complement of personnel by specific job function for each department.

It should be mentioned that there was initially somewhat of a resistance to the development of such a detailed departmental organization by many line department heads because it appeared to them to be an excessive control over their activities. It is believed, however, that after such critical analyses were completed and many departments reorganized, each department head now has a better understanding of the relationship of his function to the total operation, that he has a better understanding of the strength and weaknesses of his department, where additional in-service training is to be required and because of this study, the department head has become a more effective manager of his activities. It has often been said that the technically-trained engineer has not had adequate experience to discharge heavy management responsibilities. Such functional and departmental self-analyses provide the department head with a much better understanding of his administrative responsibilities and considerably enhance his effectiveness.

It is possible that the matter of continuing self-analysis of the personnel organizations and complements may be overemphasized as far as some State highway departments are concerned. It is considered, however, to be a most important management consideration in North Carolina with its 70,000-mi highway system to be maintained with an annual payroll exceeding $40,000,000.

Manpower mobilization is only one phase of organizing for the short-range plan. With an equipment rental business in excess of $15,000,000 per year in North Carolina, the same close scrutiny must be given to the development of a table of equipment for each field maintenance and force account construction operation. Without this, it is impossible for the equipment department to determine the amount of equipment that will be necessary, the proper distribution of the equipment, and proper replacement tables and preventive maintenance programs.

In summary, effective financial management at all levels dictates a continuing need for manpower, equipment, and material review as objectives and goals of the short-range plans are changed or modified. Technological advances and improved

techniques similarly demand critical analysis of organizational structure to assure coordinated action towards planned goals at the most efficient cost.

EXECUTING

The execution phase of management can be considered as "controlled performance," "management controls," or "operational control." Execution refers to controls for use by management to assure that objectives and plans are being met in actual performance within the various organizational units. It implies that areas within the operation that must be controlled be identified; that adequate plans and standards are established in each area; that the accounting system provides adequate records of actual performance and results; and that results compared to the plan are reported in such a way that responsibility is identified and exceptions can be made the subject of corrective action.

For many years finance departments were primarily concerned with routine record-keeping, limited to matters pertaining to receipt, deposit, and disbursement of funds. Recent technological advances, the development of accounting machines and high-speed electronic computers, today permit the finance department to play a key role in management control. Status reports may now be regularly produced on any and all matters informing management at all levels of the status of any given activity.

Without attempting to dwell on this point, it is considered of extreme importance, however, that the engineering organization in the highway department understand that all that modern accounting equipment can do is to receive, arrange, and report information in a specified manner. The accuracy of such reports is dependent entirely on the source information received from the various engineering operations. It appears, therefore, that one of the weaknesses in financial management is personnel not understanding the importance of providing accurate information.

Finally, such modern-day reporting systems are of little or no value if corrective action indicated by the report is not taken by the appropriate department head. The controller, making the reports, cannot be expected to take corrective action, which is the responsibility of top-level management and the line department head.

Although the highway business is essentially a production business, the actual control of construction and maintenance activities differs materially in many instances from that of private business, which is essentially a production operation. In most such private businesses information valuable for management control purposes can be reported in percentages of labor and materials consumed in the activity. In the highway business this same approach can be taken in some of the functions. The routine marking and signing of the highways, retreatment and resurfacing maintenance activities, routine unpaved road stabilization, mowing operations, and certain force account construction activities on secondary roads can be analyzed similarly to production in private business.

The matter of controlling the production of a highway construction project from its initial planning stage to the day of contract letting presents, however, a problem unique to this industry. It is difficult, if not impossible, for example, to set forth that the initial planning on a highway project should cost a given number of dollars or take a specific

amount of manpower a given time to complete the job. Similarly, any report reflecting a percentage of total anticipated costs having been expended may be meaningless insofar as percentage of progress is concerned. This is also true in part of field location, of preliminary design, and in right-of-way acquisition. Previous statements should not be interpreted as implying that controls should not be exerted over these activities. Rather, they are made to establish the point that within the creative framework of the highway business for management to determine that it should take, for example, $10,000 to do the preliminary design on a job, would be a completely fallacious approach in that a designer's goal would be to complete his phase of the work within a given framework of money rather than taking the time and effort necessary to develop the most economical and practical design for the stipulated conditions. Quite often this point has been misunderstood and poor highway designs have resulted when a given field party was told to have a specific highway job located in a given number of days.

It follows therefore that certain other devices and techniques should be used to control these activities. Such techniques may in part be susceptible to cost accounting whereas others will not.

As previously explained, the length of time or the cost to carry out any given planning, location, design, or right-of-way acquisition on any given project may be difficult to determine. This is, however, only part of the problem. At any given time in a large highway department there may be several hundred projects in any one of the previously mentioned stages. Therefore, the problem is further compounded by having to keep not just one project on a given schedule but rather the total activities of a vast group of projects in a schedule that permits each department to operate effectively with each activity being coordinated with each other activity to minimize overlapping and lost motion. This problem is then one of "logistics."

This over-all problem can best be handled by a "project control center" that is responsible for scheduling the activities on all highway projects in cooperation with operating personnel; for keeping up-to-date reports on the progress of each activity on each project; and for informing top-level management where projects are getting completely out of a predetermined schedule. As projects become stalled for one reason or another (such as the need for a line revision, difficulties in right-of-way acquisition), then periodically it is necessary to make revisions in the operating schedules of some projects, moving them back in terms of contract letting and at the same time rearranging other projects such that the available manpower can still be used effectively.

The importance of this project control operation is far more significant today than it was two years ago. With the bulk of highway construction projects being Federal-aid projects and with the so-called reimbursement planning, or as it is more commonly known, "contract control," which specifies the amount of Federal funds that may be placed under contract in any one given quarter, the actual planning and design and scheduling of projects must be kept in close harmony with Federal funds available for contract lettings.

In North Carolina, this project control operation has worked very successfully. Proposed construction schedules for each department are

shown on a master board for approximately a five-year period with approximate dates of authorization for preliminary engineering, right-of-way acquisition, and contract letting. These schedules are then tied to the accounting records through control accounts and related to reimbursement planning schedules as anticipated for the next several years. Such a device as this project control operation not only is valuable as a financial control for Federal-aid operations but, of greater importance, it also alerts all operating departments to the schedules of projects that they will be working on for several years. Naturally one of the most important parts of such a project control division is also the balancing of the projects such that excessive workloads for both designers and construction personnel will not take place in any given part of the State for a prolonged period. It might be mentioned also that although there has been a great deal of criticism concerning control, it is actually a good management device and allows an orderly production of work. Finally, in the peculiar operation in North Carolina, the project control operation is a must because of the two thousand or more secondary road projects that may be under design, force account, or contract construction during a given period of time.

Much more could be said about the problems of execution in the highway department. The previous discussion has merely been set forth to illustrate some of the problems.

SUMMARY AND CONCLUSIONS

This paper has dealt with certain problems in planning, organizing, and executing the highway program. The question might be raised as to what all this has to do with financial management. Too often financial management is considered as bookkeeping. It is therefore the thesis of this presentation that financial management encompasses these three processes in their entirety.

The effectiveness with which each department operates, a clear definition of functional responsibility, control of production, the utilization of equipment, personnel, and the efficiency of each of these activities determine the effectiveness of financial management in the highway department.

No mention has been made of budgeting in this discussion of financial management. Such an approach was premeditated. Too often to the engineering employee and in State government, the concept of budgeting is thought of as the amount of funds for routine supplies, travel expense, telephone and telegraph, office equipment, and other incidentals that are insignificant in the total budgeting process. Actually a budget must reflect the considered judgment of top-level management as to its goals and objectives, which is planning. Similarly, the budget must reflect the logical arrangement of manpower, materials, and equipment to achieve its objectives, which is organizing. Similarly, it must guide and assist top-level and lower-echelon management in the daily discharge of its assigned task, which is executing.

It is concluded, therefore, that modern-day financial management in the highway departments can only be effective if this total concept of budgeting is understood as contrasted with the too often accepted concept of budgeting used merely as a control device for routine departmental expenditures. Finally, it is believed that highway departments should give serious consideration to the establishment of a top-level department charged with the responsibility of continuously analyzing and coordinating the planning, organizing, and executing processes.

III. Use of Fiscal Management in the Michigan Highway Department

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• FROM COAST to coast, State highway departments are engaged in a massive roadbuilding program to meet the insatiable demands of a Twentieth Century civilization on wheels. Social and economic patterns are being reshaped, and everywhere the emphasis is on better, more rapid, and safer transportation. So far these ultimate goals are still to be achieved. In many areas, roads are becoming obsolete almost as fast as they are built. Inflation chips away at projected mileage, and additional finances to provide for the necessities and the expanding needs present problems of major proportion. Highway administrators are faced with momentous fiscal decisions. The odds are weighted against them. But they are applying new techniques to their problems.

One solution has emerged that highway administrators can use with surprising results: fiscal management.

How well each administrator uses the resources of men, machines, facilities, materials, and time will determine their progress because all involve money. This imposes the responsibility to plan effectively, budget properly, spend judiciously, and stretch financial resources. This paper discusses how the Michigan Highway Department is approaching the problem.

To provide a basis for advance fiscal planning as well as other department activities, Michigan conducted a highway study projecting needs for the next 20 years. Every mile of State highway, county road, and city and village street was evaluated to determine its ability to carry the traffic load from 1960 to 1980.

The study revealed that traffic volume on highways, roads, and streets will increase 91 percent. Only a tenth of the State's 110,000 mi of roads and streets would be adequate for the anticipated traffic load, and financial needs are at least $11,000,000,000 while estimated income during the same period's only $8,000,000,000.

People and their economic activities generate highway needs, but new highways and money expended in their building can stimulate economic growth, increase productive efficiency, and improve the competitive position of every economic activity in Michigan.

The needs study is to a highway department what the market forecast is to business—a set of studied predictions and indications to be used for an essential element of fiscal management, advanced planning. It involves two principal types of cash projections: future expenditures and future income. Their importance is obvious, but the procedures necessary to secure figures with a relatively high degree of accuracy are not so obvious.

To explain how the highway department establishes funds and how they are disbursed by the finance division, Michigan highway construction is financed through 14 different funds: ten are established in cooperation with other governmental subdivisions (counties and municipal-

ities); three are bond funds supported entirely by the State highway department, and the last, and largest, is the State Trunkline Fund, composed of fuel and weight tax revenues, payments by municipalities and counties, and Federal-aid reimbursements. Expenditures from this fund include payment of all bond interest and retirements, the department's administrative and operating costs (including maintenance of roads and structures), and right-of-way and construction costs not included under the other funds.

It must be remembered that there are various fluctuations, especially seasonal, in total revenues and expenditures. For instance, motor fuel taxes account for approximately two-thirds of the tax revenue of the State Trunkline Fund, and there is no great variation in tax receipts from one month to another. However, motor vehicle weight taxes, which constitute the remaining third, are collected primarily in January, February and March, and result in a peak in cash available in April and May each year. The peak in progress payments occurs during July through October.

To facilitate cash expenditure projections, payment expectancy factor tables based on an analysis of about 1,400 recently completed contracts is computed. Separate factors were determined for each of fourteen different average lengths of contracts and for awards in each of the four quarters of the year. The appropriate factors were applied to the unpaid balance of each contract at each projection date to estimate the balances expected to be paid each month until completion of the contract. The balances were added for each month to determine total cash to be expended on contracts in that month.

This same procedure is applied to future projects yet to be awarded. A similar factor table and procedure was established for right-of-way acquisition projects and expected payments. Expected Federal-aid receipts were also studied and factors established.

It is easily seen that considerable data and extensive computations are required to establish and keep current cash projections. Reports and memoranda from various divisions and sections of the highway department are forwarded currently to the financial planning section where the data is transferred to punched cards. Computations and other operations are made through electronic and mechanical data processing equipment.

Monthly tabulations provide an analysis of payments and a statement of anticipated Federal-aid receipts. Subsequent projections are made showing the balance of funds available. Net cash requirements for each month are ascertained by deducting total projected receipts from the total projected expenditures.

Because certain contracts do not follow a factor table pattern and are usually paid in a lump sum or after road construction is completed, the data for these contracts are not recorded on punch cards. The projections are worked out manually. Included in this category of contracts are those with railroads, municipalities and utilities, steel vendors and contracts dealing with demolition, removal of structures, signs, signals, seeding, sodding, fencing, and guardrails.

Because bond sales must be prepared four months in advance, cash projections have been of great value in determining cash availability for such sales and whether they should be deferred because of unfavorable market conditions.

Projections may indicate sufficient funds to complete a planned project but it must be remembered the fund may be operating at a deficit because payments must be made to contrac-

tors and landowners before Federal aid may be claimed and received. Projections make it possible to arrange temporary advances and loans to a particular fund to carry it through the low period and avoid sale of additional bonds.

When a State is making rapid highway building progress, it is likely to outrun Federal-aid authorizations and allotments. Thus with construction costs and related Federal-aid earnings computed far in advance, which Federal-aid projects must be deferred or delayed can be determined and a prudent selection of individual projects made. It is also easier to determine well in advance when such aid may be claimed, and cash projections are commended as an important fiscal tool of management.

In the Michigan State Highway Department, project programing involves correlation of traffic and condition information pertaining to the entire trunkline system. The programing also involves selection of portions of the system to be improved and determination of the work and cost estimates. The final selection of the program, in turn, determines work schedules for the route location, road and bridge design, and right-of-way divisions.

An invaluable aid in programing has been the establishment of a sufficiency rating system with data compiled annually. The condition of the entire highway system is shown each year, thus providing a basis of comparison from year to year. This is especially helpful to the planning, engineering, design, and maintenance divisions.

A minimum lead time of eighteen months, and preferably two years, is needed to establish a program prior to actual implementation. Costs are estimated by the programing division and a proposed budget is developed for each project, concurrent with establishment of the program. The lead time period is necessary for route location studies, reports, surveys, preliminary plan preparation, and right-of-way acquisition.

When a program has been established, control systems are mandatory to keep within estimated receipts and costs. Additional controls are established for monthly or periodic reviews on each project programed and cost estimates are assembled by the route location, engineering, design, and right-of-way divisions.

Obviously, the volume of program data accumulated requires fast and accurate computations. The entire program is put on tab cards and data processing equipment is used until the program is finalized and projects let. The programed projects are scheduled by quarters for each year, thus allowing every division concerned to re-evaluate the initial schedule in relation to their current operations. How this becomes a fiscal tool is by an evenly divided program considering availability of funds, urgency of particular projects, ability of contractors to accept work, and ability to secure adequate seasonal employees.

The department's first 5-yr program was adopted in 1957. It was based on a sound statistical projection of population trends, vehicle registrations, vehicle miles of travel, adequacy of present facilities, Federal interstate roads, and State trunklines. Fiscal implications involved were the following:

1. The department's ability to finance.

2. The ability to secure adequate and competent personnel, facilities, and equipment within the required limitations to avoid delays.

3. The ability of the road building industry to accept and complete adequately a program of such magnitude within the limitations.

Other considerations included scheduling of construction in respect to the resources available, by fiscal year, for the 5-yr period while retaining sufficient flexibility to compensate for delays in obtaining preliminary plans, specifications, design, right-of-way, etc.

Other prime objectives included the following provisions:

1. Allowing local units of government to start budgeting for their share of the improvement and planning other improvements in conjunction with the building program.
2. Allowing property owners along the proposed routes, as well as business and industry, to plan for the future.
3. Giving the road building industry a guide to the program demands.
4. Giving employees a definite, long-range goal and target dates for various steps that must be taken before a project is completed.

The end product consisted of a 5-yr program costing $1,250,000,000 to construct 900 mi of freeway and modernize more than 3,000 mi of other trunklines.

Nearly four-fifths of the $1,250,000,000 of construction work is either completed or under contract. With few exceptions the established contract award dates have been met on schedule.

The success of this program can be measured in terms of public acceptance and the tribute paid by the voters of Michigan in April 1961 to the man who directed it—Commissioner John C. Mackie.

The development and results of the first 5-yr construction program have been so successful a second 5-yr program has been developed from 1962-1967, calling for an additional 175 mi of freeway, mostly in urban areas, and modernization of 1,400 mi of other trunkline highways at an estimated cost of $750,000,000.

Federal Highway Administrator Rex M. Whitton, in an address at the recent AASHO Convention, urged all States to develop similar 5-yr programs, saying, "It gives the valuable needed time in which to properly locate, design and secure right-of-way for proposed improvements."

There are other advantages to a long term program:

1. Improvements can be arranged in order of need.
2. Goals can be set and the taxpayer shown what his tax dollar is buying.
3. Economies can be effected in capital improvements.
4. Availability of funds can be assured for needed improvements.
5. Too large an accumulation of debt can be prevented.
6. Undue expansion of operating and maintenance costs can be prevented.
7. The effect of fixed charges on the remainder of the operating budget can be determined.
8. Public confidence is inspired in the goals of the administration.
9. The effectiveness of pressure groups is reduced.
10. The economy and the construction industry is stabilized to a great extent.

In July 1961, the Michigan State Highway Department established an "Engineering Development Committee." This committee is to the department what a product development unit is to an industrial corporation. It is the "idea" group, and is composed of individuals qualified in the fields of construction, materials, traffic and traffic devices, methods and equipment, design, objective planning, and finance. The committee's prime objective is to study and develop highways, transportation networks, long-range methods of financing, and future requirements of

the motoring public and motor transportation.

The Michigan State Highway Department utilizes budgets to establish definite goals, outline fiscal policy, promote cooperation between divisions and indicate when changes in established goals are desired. However, budgets have limitations. They are not self-executing, nor do they ever replace the need for sound judgment and good administration. To be fully effective, budgets require constant vigilance and complete departmental cooperation.

To illustrate how the three phases of budgeting—preparation, execution and control—serve as fiscal management tools in the department, the preparation process starts at the office or division level, which allows all levels to evaluate their operations periodically and request changes as desired. Then budget hearings are held between management and each office or division. This permits management periodic evaluation of programs and operations and provides the material necessary for decisions on many fiscal policies. At the same time, the budget process permits exchange of program information from bottom to top and top to bottom.

During the approval phase, the legislature is provided with the proposed budget, which contains information relative to the department's past activities, current operations, and future programs. They evaluate past performance and set the fiscal policy for future operations. The end result is an appropriation bill that is the legal framework for the fiscal operations during the ensuing fiscal period. With this legislative guide line, the highway department develops quarterly allotments of the line item appropriations.

At this point it applies the final phase of budgeting, budget control. (The department "controls" both before and after the expenditure.) Because the operating budget itemizes allotted personnel and equipment, requests for new employees or new equipment are checked against budget authorization. If they were not included, the office or division must propose a substitution for approval by management. This process allows for flexibility of operations while maintaining sound fiscal control.

Post-expenditure controls consist of accurate accounting information, promptly reported. The information compiled as a monthly statement tells how well the department is operating within its allotments and serves to indicate trouble spots before they become acute.

Internal auditing has been defined as the independent activity within an agency to ascertain, for management, whether its policies and procedures are adequate and properly adhered to; to provide management with systematic and objective appraisals of internal controls, operating procedures and practices; and to verify the accuracy and reliability of the financial records and reports. However, in the Michigan State Highway Department, as in all fiscal operations, the actual implementation of internal audit does not conform to any single classic definition of the subject.

The organization and methods impose requirements on the internal audit staff, which are undoubtedly characteristic only of this department. This can best be demonstrated by a review of the contractual relationship with counties and municipalities for the performance of maintenance on trunklines. For this purpose, it has established cost contracts with both counties and municipalities. The basic philosophy of this contract is allowance of charges to the department that represent actual cost as established by post-audit and adjustment of the charges according to this audit at the year's end.

This requires extensive audits and includes the development of a sched-

ule of standard hourly equipment rental rates, by accumulating equipment cost and utilization information from all counties in the State, and conversion of this information to standard hourly rates for use in the subsequent year. Material charges require the cost audit of gravel and other aggregate production operations, and the establishment of unit costs for this material within the agency being audited. This function alone requires a large portion of available audit manhours. However, it has given a further degree of fiscal control over a large part of the operations. Its effectiveness is evidenced by the total savings through adjustment to the contract charges for the past year in the amount of $236,850.

Each transaction in the right-of-way division is audited to insure conformity with Federal requirements, and the department's stated policies. In addition, selected right-of-way transactions are reviewed by identification on maps, verification of the proper accounting of surplus properties, and a review of procedures and systems.

Much work in the construction area is performed under force account conditions and terms. One of the force account activities is the relocation costs of utilities, pipelines, and railroads. Audits of charges for this item have resulted in savings of $46,000 in the past year. Other audit functions performed regularly include:

1. Annual verification of physical inventories and a review of stores and inventory operations.
2. Periodic reconciliations of cash and cash accounts.
3. Periodic review of accounts receivable and the write-off of uncollectable accounts.

Internal audit functions both as a line and staff activity. It represents a necessary and efficient form of fiscal control for management of the many facets of the organization. The theory, principle, and application of fiscal management have been accepted at all levels within the department. This may be attributable to programs, seminars, and management conferences, all designed to effect a better understanding of fiscal management through the mutual exchange of ideas and practical applications. Immeasurable assistance has come from the American Association of State Highway Officials and the National Highway Users Conference through their management seminars.

With the rapid developments in electronics and changing needs and conditions, the ultimate in fiscal management continues to challenge the most able administrator. This challenge can be met by a firm dedication to the principles of fiscal management, the continued application of the varied tools available, and an open-minded approach to new management concepts.

DISCUSSION

GUILFORD P. ST. CLAIR, *Bureau of Public Roads.*—Although varied in approach and each a distinctive contribution to the literature of highway management, the three papers of this symposium convey among other things a common message to the effect that highway engineers had better watch out because the financial and management experts are moving in. No longer can the engineer hope to control the operation of State highway departments without challenge.

Although there is an element of wry humor and perhaps not always friendly rivalry in the contest for highway management control, the struggle is a healthy one and the engineers should accept the challenge

by moving to increase the skill and vision of their planning and the effectiveness of their management. There is a tendency for the engineer, and particularly for the oldtimer at the game, to use the words "bookkeeper" and "clerk" in an effort to disparage the ability of people from the accounting and management fields to handle some of the tasks that highway engineers have handled in the past. This is dangerous. One needs only to have listened to the papers of this session to be assured that the day of the green eye-shade, the alpaca coat, and the high stool is long gone. The administrative personnel of today are very sharp fellows. They are familiar with many other matters besides double-entry bookkeeping; they show an annoying capacity to understand engineering principles as well as engineering processes; and they are often able to challenge the engineer on points of general education. To sell them short is to court disaster.

Having acknowledged the prowess and knightly posture of the challengers, the writer would still like, as an oldtimer, to claim the privilege of recalling some features in highway history of the last 30 years that may reflect some little credit upon the highway engineers of that era. Whether the record is sufficiently good to indicate that the engineer is worthy of remaining in the front rank of highway planning and management, only the event will show. One can only relate past happenings, "All of which I saw and part of which I was," as Aeneas said of some ancient goings-on.

The history of highway engineering up to the early 1930's was primarily that of building roads where they were obviously needed and developing structural techniques in the art of highway building. Gradually the importance of studying and regulating traffic was realized and the problems of highway taxation and finance thrust themselves upon the highway executives. The integrated concept of highway planning was crystallized out of these early efforts by Herbert S. Fairbank of the Bureau of Public Roads, who conceived and set in motion the highway planning survey operation that was initiated in 1935 and rather rapidly adopted, wholly or in part, by all States. The concept of the highway planning survey was that of gathering facts about the highway plant, about the volume and composition of highway traffic, about the life characteristics of highways and highway elements, and about highway taxation and finance; and on the basis of this fact-gathering to project plans for the future development of the highway network.

Concurrently the art of traffic engineering developed rapidly in cities as well as in State highway departments. University instruction and research were enlisted in the attack on these emerging problems of highway planning and management. Thomas H. MacDonald and others foresaw the need for an interregional or interstate system of highways linking the principal centers of population and industry, and planted the seeds that are now coming to fruition.

World War II put a temporary stop order on ordinary highway planning activity and at the same time strained the capacity of the highway plant so that at the war's end there was a backlog of sadly needed highway improvements all over the country. During and shortly after the war the necessities of urban as well as rural highways claimed the attention of highway engineers, and from these efforts sprang the early urban origin-destination studies, chiefly by the home-interview method. Shortly after the war the Automotive Safety Foundation created an engineering staff to aid the States and the Bureau of Public Roads in

attacking the problem of the backlog of highway needs and exploring the means of satisfying these needs on an accelerated basis. This triumvirate developed the original techniques of the highway needs study. The tremendous and unforeseen development in the numbers and travel of motor vehicles made the needs studies doubly urgent and soon proved that the early estimates, thought by many to be extravagant, were only too conservative. This has only sketched the bare outlines of an exciting story. What it is derived to emphasize is that most of this work was the work of engineers, some of whom surely brought to the task a commendable vision and integrity of purpose.

Even during the early planning survey era, it was recognized that other disciplines than that of engineering were needed to solve the increasingly complex problems of highway transportation. Economists were needed to aid in the study of highway finance and related subjects. Psychologists were needed in the field of driver behavior. More recently geographers, social scientists and public health specialists have been called in to counsel and assist in the solution of numerous problems. In the allied fields of planning, programing and budgeting, the skills of accountants, management experts, economists, and political scientists are needed and should be welcomed. This is a big job ahead, and needed in the effort are all the brains, all the skillful hands, and all the strong backs that can be enlisted.

In short, the highway business is a cooperative undertaking in which each can make his best contribution unselfishly and without recrimination. As to the future of the highway engineer, it is not probable that the management group is going to take over and make the engineers into a group of worker bees, expert at their narrow tasks but otherwise witless. For there is another development going on in the engineering colleges. Increasingly science and the humanities are being emphasized at these schools, and training in the routine tasks is being given to the engineering aid or technician. A crop of young engineers is being raised in the Bureau of Public Roads and the State highway departments who can be relied on to give the boys from the administrative field a run for the front-office jobs.