

## PROGRESS IN HIGHWAY PLANNING SURVEYS

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Dr. Robert A. Millikan, recently returned from Europe, has cited the "fool things" that dictators are doing as evidence of the need for wider cultivation of scientific habits of thought.

To the old question - "What is science good for?" - he answers, that every scientific achievement serves further to promote the "general spread of differentiation between what is right and wrong, not in the moral sense, but in the comprehension of that which is incorrect and correct. I am thinking," he says, "of the widespread belief that one opinion is as good as another. It isn't. Any scientific advice that shows how we get real knowledge has an economic value; it makes more people try to regulate their activities on the basis of facts rather than the hunch and guess system."

In editorial comment, the Baltimore Sun says that "Dr. Millikan's faith in the efficacy of scientific thought is understandable. He is not the first to believe that the world might be a better place were there a generally more scrupulous respect for facts, more care and a greater impartiality in the interpretation of them and a closer adherence to them in the formulation of a theory or law or policy

affecting our daily lives. But," says the editor, "the scientific type of mind is, and always has been comparatively rare. And no way has yet been found of training great masses of people to think about problems which closely affect them with objectivity, patience, and precision." Moreover, he says, "The 'facts' of economic and political life do not yield themselves to scientific method as readily as do the facts of the physical world. But above all it is difficult to conceive of the men who seek and hold public office behaving as scientists - confessing ignorance, ruthlessly exposing their own mistakes, eschewing all careless generalizations and substituting analysis for promises."

To say, in the words of Dr. Millikan, that the State-wide highway planning surveys constitute an effort by State and Federal highway officials to "try to regulate their activities on the basis of facts rather than the hunch and guess system" is to describe the character and purposes of the surveys as concisely and pungently as possible. To add that this effort is vigorous almost beyond parallel in the whole experience of public administration in the United States, is simply to state the conclusion to which anyone must be drawn who is familiar with the scope and methods of the surveys.

Having thus admirably begun the consideration of highway problems by scientific methods, whether or not, as public officials, we shall measure up to a somewhat skeptical editor's test of scientific behavior, will depend upon what we now do with the facts we have so abundantly collected, upon how fully and how honestly we

try to apply knowledge gleaned from these facts to the daily highway administrative task, and upon the conviction with which we continue the employment of the scientific methods in which we have become practiced in the course of the surveys.

Already we have met the first test. We have confessed our ignorance - a trifle reluctantly perhaps, but none the less publicly; for the undertaking of the surveys is, in itself, a humble admission of the need of light in the dark places of the highway administrator's factual knowledge.

There will follow inevitably an exposure of mistakes. In most States the inventory has already revealed wide error in the records and beliefs previously held of the extent and condition of the highway system. Unquestionably, there will come to light instances of roads highly improved, which, in view of what is being discovered of their real value and usefulness, will appear as too expensively improved. But the surveys will fail to achieve their highest usefulness unless those responsible for shaping administrative policy shall not only be ready to concede the proved error of past policy and performance, but shall actively seek in the facts that are being gathered the evidence of past error as a guide to more correct action in the future.

Since September 1935, forty-four State highway departments have made the decision to undertake the fundamental fact-finding studies that constitute the highway planning surveys as defined by the Bureau of Public Roads proposals during that period. For every

item of information the Bureau has proposed to obtain in the surveys there has been a foreseen use, and the various items, when placed together are expected to form a broad factual basis upon which a thoroughly rational highway policy can eventually be reared.

It would not be quite honest to assert that every State that has undertaken the studies has shared the Bureau's interest in their every phase. Nor, unfortunately, can it be said that the program of fact finding has been faultlessly carried through in any State. It must be admitted that the methods of study first devised have in some instances proved defective and required revision; and that - generous as the supporting funds have been - even so, to stretch them over the vastness of the fields of knowledge to be explored it has been necessary to thin the fact samples to the limit of safety.

But when these things are said, this thrilling fact remains: That in a score of months there has been amassed such a record of the facts essential for the guidance of highway administration as never before has been brought together for that or any other public business. Highly pertinent and significant, these facts, when properly analyzed, are capable of use in various ways toward improvement of the efficiency and the efficacy of public road building methods and measures. When so used they will lay the basis for the substitution of a more scientific system of highway management for the system of "hunch and guess" which too long has had too great an influence upon administrative decisions.

In the work of the last twenty months a good part of our energies and our interest has been absorbed in the conduct of a great campaign in the field. The quick organization and training of forces; the marshalling of these forces for orderly attack upon a wide front; the devising of strategies for the accomplishment of defined objectives; these have held our interest and have brought forth a most remarkable show of ingenuity, and coordinated effort. It is not a common occurrence for an army of men to be mobilized, trained, and directed simultaneously toward common objectives, by 40 State commands, with so close an approach to absolute concert. It is not an ordinary achievement for a campaign as broad and as varied as that of the planning surveys to be carried to its goal over so wide a territory in so short a time. It is indeed no everyday affair for even 44 sovereign States to yield their potent wills to the monitorship of the Federal Government in any matter, however vital!

That it has been possible for highway engineers of the State and Federal Governments, with so little of fuss and feathers, to launch and carry through so great a project of practical economic and physical research; a project involving such numerous forces, such varied aims, and such novel methods as the highway planning surveys; that, is most convincing testimony of the great worth of twenty years of practice in intergovernmental cooperation under the Federal-Aid Road Act.

That it has been possible in less than two years to approach so closely the hitherto remote goal of a complete and highly detailed map of the transportation facilities and economic plan of the United States - to complete the field observations and make such headway in the drafting of maps as has been made in 40 States; this alone is an accomplishment of such unusual distinction as recently to draw from a hard-bitten newspaper columnist the praise: "A master-planning job, if ever there is one."

We may have looked upon our inventory and its resulting maps as primarily essential for the practical uses of our highway departments. We shall surely find that there are far wider interests in the work we have done that will not permit us to keep the maps to ourselves; interests many and varied and important which we cannot deny, and which we shall certainly want to accommodate as quickly and efficiently and as generously as possible. In this State of Colorado, I am told, the list of requests for planning survey maps already received includes inquiries from twenty-five agencies of the Federal Government, eight departments of the State government, five classes of county agencies, two groups of agencies of city government, and civic and commercial associations and business enterprises by groups to the number of twelve. Already the use of original tracings is causing some to become dogeared; and this is only the beginning of a demand which will rapidly grow, I feel sure, far beyond the modest expectations of a year ago.

In most of the States the first great gathering of facts is now nearly in from the field. The inventory parties have done their job. The scheduled traffic counts are approaching the end of a year's round. The points at which the blanket count has been made begin to form a sufficient pattern on the map. At many well-chosen stations throughout the States vehicles have been weighed; and at suitable places they have been both weighed and measured, and a tremendous body of recorded information has been piled up to show the real character of the carrying vehicles moving over the roads. A considerable section of the road-traveling public has told us where it lives and where and why it is traveling, and how many miles it covers in a year of travel and how much gas it consumes in doing it. Our financial investigators have plumbed more deeply into the taxing measures and the financial transactions of State and local governments than these somewhat murky pools have ever before been sounded. They have traced the interweaving and overlapping financial operations of all agencies that share in the taxpayer's dollar - concerning highway functions in great detail, and concerning other public functions in sufficient itemization; and they have reduced their findings to an order that in uniformity and clarity has not been approached on so large a scale by any previous endeavor. By careful and diligent inquiry of selected citizens, interrogators have laid up a record of the comings and goings of these representative road users, that should tell volumes of the wheres and wherefores of the great summation of individual initiatives that stands for highway transportation in this motor age. And the road life studies in many States

are fast bringing out of long unexamined files a record of the birth and life and death of the generations of roads that thus far have lived on the State highway systems, a record to be continued we hope and when possible reduced to formula, so that highway engineers may be able to gauge the life expectancy of the roads they build at least as accurately as the insurance experts now measure the temporal stay of their human subjects.

Such a gathering of facts - a mass as wide and as deep and as varied as these general descriptions suggest - has now been almost completely accumulated in many States, in these Western States, I am glad to say, more completely than in most. If there is now the question: "What are we going to do with it?"; the answer to that question will be the final test of the ability of highway officials to "behave as scientists," as measured by the accepted standards to which the Sunpaper's editor alludes.

The editor will not be surprised if we fail. His has been an experience that has left him frankly, though rather tolerantly, skeptical of the ability of "those who seek and hold public office" to substitute difficult analysis for easy promises - to shape their acts by studied needs rather than by the political quid pro quo pleasantly anticipated. But, jobholders are not the only subjects of the editor's skepticism; his doubting is of a more catholic order. He holds (it must be confessed upon good evidence) that no way has yet been found to train great masses of people to think about problems which closely affect them with objectivity, and patience,



and precision. And when he writes of the facts of economic and political life, he is so little sure that such facts exist that he encloses the word in quotation marks. But he is sure that if they do exist, they will not yield themselves so easily to the scientific method as have the facts of the physical world.

Upon this last point we may feel certain he errs. If physical facts have been established, and facts economic and political must still be contemplated only in quotations, the distinction is not due, we may believe, to any difference in the susceptibility of the two kinds of facts to the scientific method; but rather to the great difference in the amount of really scientific effort that has been directed toward their discovery.

In the highway planning surveys there has been an expenditure of scientific effort toward the establishment of one group of economic and political facts which, in its intensity, total amount, and definiteness of aim has, I believe, had no previous equal in the whole field of economic research. And if highway officials are capable of "behaving as scientists," we may be sure that there will be great gain in the establishment of economic and political facts pertaining to public highway transportation, which will permit a commensurate abandonment of mumbo-jumbo in the practice of the highway administrator's art.

But these highway planning surveys, as far as they have been carried in the last twenty months, will justify themselves finally, I hope, not so much through the facts they will immediately disclose

and the partial administrative improvements to which they will point, but rather by the example they will set of a way which, as the Baltimore editor rightly says, has not previously been found - a way "to train great masses of people to think about problems which closely affect them with objectivity, patience, and precision."

If it is really to attain to this ambitious goal, the work of these twenty months will be regarded by no one as a task complete, but only, as it really is, a practice toward perfection.

With this more daring end in view, there will be none, I am sure, who will now enter upon the analysis of this first gathering of facts with the limited conception that these facts and this analysis will yield the final answer.

No highway executive who takes this larger view of the purpose and the meaning of the planning survey work will conclude that the time has yet arrived when the practice of these new-tried methods may be put aside; and none, yielding to early discouragement, will abandon hopeful, though imperfect, instruments of investigation until their better has been found.

No high officer of a highway agency, who shares this hope of the greater usefulness of the planning survey effort will be content to let that effort stop with a first perfunctory drawing of conclusions; nor will he sit unmoved with interest while detached subordinates carry on a further study.

No man, in any State, be he highway official, governor, legislator, or common citizen, if he has a real conception of the crying need of highway administration for such guidance as it is

the motive of the planning surveys to give, and if he has the least understanding of the dynamic quality of highway transportation and the problems, economic and political, that continually arise in connection with it; no man of such perception in any State, responding to the Federal government's offer of financial assistance in such studies, will fail to vote a matching support from State revenue to continue them.

Anyone who appreciates the value of this work as a means of popular training in the objective consideration of public questions, will be eager to draw from what has been thus far done such interesting and useful lessons of a general nature as it may be made to yield. And those, thus interested, will properly wish to see the facts discovered and the conclusions they support, given full report in published documents. There will issue from these first studies alone such a volume of factual material, touching upon so many phases of highway interest, that it is doubtful that any single report will hold it. There will probably be subject matter enough for many reports, and it is to be hoped that useful and interesting summaries will be prepared in each State and, as widely as possible, published. But it will be a mistake to look to the publication of reports as the primary end of this effort; and the effort itself would be sheer waste were its only result to be the piling of more government reports at the back of library shelves.

If the work of these recent months and its essential continuance is to yield a maximum of benefit, the facts established, when properly digested, must be permitted to enter directly

into the bloodstream of the highway administrative body, as its life-giving, strength-building nourishment. They must not only be permitted so to enter into vital circulation; but for them there should be a healthy appetite in every member of the administrative body.

It is because they will tend so to introduce some of the facts revealed by the surveys into practical workaday use by the highway departments that I am particularly impressed with the straight-line diagrams, an excellent form of which has been developed by our host department. Of somewhat similar advantage is the form of the grade crossing record; and I hope we may find means of making other results of the surveys as readily usable.

Fortunately the necessity of early selection of the initial group of secondary and feeder roads and the similarly urgent need of a satisfactory rating of railroad grade crossings will force an immediate trial of the usefulness of the facts we have assembled for the rational solution of practical problems. Within a few days the Bureau has outlined a method that may be employed in connection with the secondary road problem, and we expect shortly to offer suggestions for the practical application of the determined grade crossing facts.

As has been our purpose in all previous proposals we offer these further suggestions not as dogma, but as the reasoned result of our best thought for the thoughtful consideration of our State collaborators, and we shall welcome amendments shown by such consideration to be desirable.

In three States the worth of the as yet undigested data of the surveys has received early proof in the aid they have given in resisting unwarranted legal attacks upon the States' powers of taxation and regulation of highway traffic. But, though in these instances the surveys have been helpful in upholding the existing provisions, it is nevertheless true that there is a fallow field for the useful employment of the great mass of vehicular data in the general diversity and irrationality that characterizes the existing State taxing and regulatory provisions affecting all motor vehicles and especially trucks and busses.

Two States have uncovered by means of the financial surveys large unreported and illegal diversions by counties of road user revenue intended for road purposes. It will not be very surprising if similar practices are brought to light in other States.

A less expected service has been rendered in several States, where long-standing uncertainties of political boundaries have been practically settled as incidents of the survey mapmaking.

The analysis of the facts collected in most States is barely begun. Referring to this phase of the survey someone has used the unhappy phrase - "the routine of analysis." It is sincerely to be hoped that this reference does not reflect a general conception of the nature of the task ahead. I can think of no task in which mere routine should form a smaller part. Preparatory to the real analysis there will necessarily be a tabulating of the data in related groups, the better to study and use them. Such tabulations

will also have a desirable use as interesting summations of facts intended for public enlightenment - as statistics, pure and simple. But the real analysis begins when the first mass tabulations are completed; and that analysis, since it should be directed toward the application of our findings to the solution of problems as they exist in each State, must be as varied as the particular conditions of the States.

For some problems the data already in hand will be found ample. For others the process of analysis will certainly reveal gaps in the essential facts, which we must be prepared to fill by further specialized, and perhaps more intensive fact gathering.

One large group of facts - a very important one to future highway planning - that was included in the Bureau's original outline of the essential elements of a complete planning survey, has not yet in most States received attention. I refer to those characteristics of the land that may determine the future trend in location of human settlement and industry. The need of this further knowledge is recognized, not only that we may anticipate the changes in land tenancy that may alter the present pattern of use of the road system, but also that, in the choice of roads to be improved, the highway administration may accelerate the natural movement toward the more productive areas, by withholding or granting improvement in particular areas, and so widening the margin of advantage of the more over the less favorably conditioned.

In these newer lands of the West this is a phase of the planning studies that is peculiarly needed, and I am glad to note and compliment the fine pioneer work that has been done in Montana.

We have postponed the undertaking of this task of land classification, but the Bureau has not forgotten it or lost interest in it. We have felt that it should be done by those especially qualified for it in the agricultural agencies, and we have been working within the Department of Agriculture to obtain such cooperation as might be effective toward the desired end. I am glad to report that the Department as a whole is greatly interested in the matter, and sees the problem as one meriting intensive study; and there is every reason to expect that means will be found shortly to supply the highway departments these additionally needed important facts.

One other general family of facts has not yet received the study its importance warrants. I mean the facts of the relation between the condition of the highways and the safety of travel over them or the occurrence of accidents on them. The traffic facts collected in the planning surveys supply a basis of relative highway utilization in detail that has always been needed for a proper understanding of the meaning of the accident and fatality records, but has never before been available. The reduction of accident records to a vehicle-mileage base which the newly acquired traffic knowledge will permit, will in many ways present these melancholy records in a new light. Many of the States are eager

to undertake studies of this sort and the Bureau is keenly interested; but so much of what has seemed to be ill-prepared effort has been already expended upon the accident problem, that we have not been willing to subscribe to further activity until we had thought through the matter and were reasonably certain of the direction our studies should take. A memorandum of suggestions has now been prepared and is in the hands of each of the State organizations. In it we outline a schedule of study which we believe will produce information of peculiar interest to the highway administrator. We shall be glad now to cooperate in such studies or in any others of similarly definite aim which shall have the appearance of real usefulness.

The work that has already been done in the field has supplied the great mass of data necessary for a correct understanding of the present status. It has not supplied every detail of knowledge that a consideration of what is in hand will show to be needed. Inevitably, the analysis of the broad facts now in our possession will lead on to a desire for a more refined knowledge. And meanwhile, time is changing the picture; and it will be necessary to record the changes by fact-finding methods designed to keep up-to-date the record now compiled. So as we enter upon the first broad analysis, it will be well to make up our minds that there is not the sharp division of phase between analysis and fact gathering that the procedure of the initial surveying would suggest. Henceforth analysis and fact finding and re-analysis and more fact finding must go along together with the purposes of constantly refining, revising, and extending our knowledge of the facts that must condition our rationally determined policies.