has been tried out for several years. The plan, when finally adopted by the plan commissioners, should be the result not only of their own careful thought and deliberations but also of that of all county officers and community-minded citizens. Citizen co-operation is definitely essential to sound planning. The plan should be so flexible that social or economic changes which may occur in the future will not seriously handicap its attainment. Certification may tend toward fossilization.

After the master plan has been adopted, the discharge of other duties assigned to the commission by the planning act is not so difficult. With the plan as a guide, a long-term improvement program attended by a plan for financing the improvements can be worked out and amended from time to time. Thus, public services such as highway construction and maintenance, development of recreational areas, construction of drainage and flood prevention works, etc., will be performed at the right time, in the right place, and at a reasonable cost.

Those who oppose the theory that planning is a proper function of government maintain that dictatorial power is necessary for planning achievement. I cannot agree to that. I may be wrong; but I am firmly convinced that thinking citizens are planning-minded. They recognize the need for safeguarding the future of our communities, economically, socially, and physically, by planning for that future now.

AIMS AND ACTIVITIES OF THE JOINT HIGHWAY RESEARCH PROJECT

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For the benefit of those not closely associated with the Research Project, it seems in order to raise certain questions concerning the wisdom of the S.H.C.I. in establishing it. First, is the amount too large? Second, should the Project have been located at Purdue? Third, what benefits are expected from the Project and who are the chief beneficiaries?

The amount authorized for the Joint Highway Research Project by statute is a maximum of $50,000 per year. The annual report of the State Highway Commission of Indiana for the fiscal year ending June 30, 1939, shows a total expenditure from its beginning in 1919 of $324,548,839.32. If 1% of this had been spent for research, it would have amounted to $3,245,488. Even 0.1% would have amounted to $325,000 approximately. The actual expenditure for the Joint Highway Research Project has, in fact, been less than 0.05% of the total disbursements of the S.H.C.I. to July 1, 1939.

Now let us compare this with research in private industry. In this connection, I have recently been much interested in
reading a history of the Standard Oil Company of Indiana, entitled *The First Fifty*. The growth of this company is traced from its establishment in 1889 with a capitalization of $500,000 to 1939 when its assets are estimated at $665,000,000. Its first endeavors were directed toward making a satisfactory kerosene from a sour, high-sulphur-content Lima crude oil. These efforts were under the direction of Dr. Burton, who, at first, was the entire research staff, and whose laboratory was a two-room wooden building. From this beginning, Drs. Burton and Humphreys evolved their cracking process, which resulted in increasing the yield of gasoline from crude oil from 10 or 12% up to 52%. Within recent times, the development of the cracking process has led to a method of condensing the gases by alkylation and polymerization to a liquid gasoline of over 100 octane (and possibly 125 octane) rating.

But the purpose of these remarks is not to emphasize the growth of the Standard Oil Co. of Indiana. After all, there are many larger corporations in the U. S. and several larger among the oil companies. Standard of Indiana sells less than 20% of the total in its territory and has very lusty competition from the Shell group, Texaco, Sinclair, and many others. The significant thing about its history is that research has been the key and central theme of its development and growth. There are now about 150 full-time research employees, specialists in chemistry, physics, engineering, etc. This staff must involve an annual expense of $400,000 to $500,000 for salaries alone.

Another comparison might be drawn with the General Electric Co. According to *Fortune*, this company now has assets of $375,000,000 and does from 20 to 25% of the total electrical business of the U. S. General Electric has large, well-equipped research facilities employing, among others, many E.E. graduates of Purdue. Sealed-beam headlamps for automobiles are a widely-known recent accomplishment.

According to *Time*, General Motors last week completed the manufacture of its 25,000,000th car, while Henry Ford was reaching his 28,000,000th, and Chrysler had turned out about 7,500,000. Over 60,000,000 cars have been produced by these three U. S. manufacturers, not to mention Nash, Studebaker, Hudson, Packard, Willys, and others. The rest of the world has not yet manufactured 19,000,000. Ford has a large research staff developing body enamels from soybean oil, making moulded compositions of soybean meal, etc. He also has cold and hot rooms, wind tunnels, noise-proof rooms, and proving grounds for all types of automotive engineering research.

To the list of large, successful corporations which owe their existence and growth to technological research might be added DuPont, Dow, Eastman Kodak, and many more.
These business units feel that it is necessary to spend from 1% to 4% of their total disbursements for research in order to keep up with the times and with competition. Relatively, our public unit, the State Highway Commission of Indiana, is spending less than 0.25% on the Joint Highway Research Project. The expenditure and size of the permanent staff seem quite small compared to those in private enterprise.

Now let us consider the second question, should the Joint Highway Research Project be located at Purdue? It might be urged that the Bureau of Materials and Tests at Indianapolis has a large, well-equipped laboratory available for such research. However, Purdue University makes no charge for laboratory facilities furnished to the project. Also available, without cost to the project, are the consulting services of Dean Potter, Professor Wiley, and other members of the various engineering faculties. It is believed that a more detached viewpoint can be maintained at Purdue. The Research Project is under less direct sales pressure from material and equipment representatives at Lafayette than if it were at Indianapolis. It is a great convenience for those of us at Indianapolis to be able to refer propositions of possible merit to a research laboratory at some distance for more leisurely consideration and study. The prestige of Purdue University is behind the findings of the project by reason of its location on the campus.

The third question, as to who gets the major benefits from the project, is of direct interest to this Road School audience. It is chiefly of benefit to county highway engineers and those of the State Highway Commission who are responsible for the moderate-cost types of construction and maintenance. Of the 23 separate research undertakings, only 2 or 3 are directly concerned with high-type construction. All others pertain to the use of low-cost materials—even to methods of utilizing local soils in such a way as to get the greatest structural strength possible from them.

In closing, it is desirable to point out that the results of the Joint Highway Research Project will be made available to all of you in the form of bulletins of the Engineering Experiment Station of Purdue University.

THE HIGHWAY COMMISSION GOES TO TOWN

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In January, 1938, the highway commission “moved into town.” This was in compliance with an act of the 1937 Legislature charging the commission with maintenance, construction, and traffic control of its marked routes through all cities