

We know that the people of the state want a better and more extensive road system for pleasure riding. Will these people, who already spend not less than three hundred millions of dollars for such travel be willing to spend in taxes as much as one-tenth of this amount for the further improvement of our state schools and our state parks?

These are some of the serious questions which those whose duty it is to think for the future as well as live for the present, are asking. Unless this great modern public undertaking of road construction shall produce something more than those profits that make for material prosperity; unless these roads furnish something for our people besides the means of speed and pleasure; unless they become a new agency by which men come to know and to understand one another better; unless they become the threads by which we are bound more securely to our common heritage of duties and responsibilities, then I say to you that we shall have spent our substance in vain, and that the roads we build today are leading to the land of nowhere, instead of the land of our dreams and our hopes.

Will hard roads make for a soft civilization is a fair and open public question.

### **ADDRESS OF TOASTMASTER AT ANNUAL ROAD SCHOOL BANQUET**

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By Prof. W. K. Hatt, Head,  
School of Civil Engineering, Purdue University.

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On behalf of Purdue University and the School of Civil Engineering I desire to welcome to this banquet the members of the organizations constituting the Twelfth Annual Road School, namely: The Indiana State Highway Commission, the Indiana County Highway Superintendents' Association, the Indiana County Surveyors' and County Engineers' Association, and the City Street Commissioners' Association of the State of Indiana, including County Commissioners, City Engineers and Contractors. The members of these associations are public officials of this state and in like manner to the Purdue Faculty are dedicated to the service of the state.

For the first time this year, through the co-operation of the School of Electrical Engineering, these public officials assembled in this meeting are part of a much larger invisible audience reached through the radio broadcast.

The purpose of this Road School, conducted by the School of Civil Engineering as a part of the Engineering Extension of the Engineering Schools, is to discuss the serious problems of highway transportation in this state—it is to mobilize the growing fund of information obtained by individuals who have solved successfully their local problems. A program has been arranged by Professor Petty in co-operation with the committees of the associated organizations in which the more important topics are presented by leaders throughout the state, and discussed by the assembly. In this way abilities of the many members of the Road School move upward with the rising level of knowledge and technical accomplishments of their fellows, and they return home and transmit new principles and new methods to their assistants and to their constituencies. With stiffer determination to fight for what they know to be right against all unformed criticism, or that arising from the interests of individuals.

The sessions have a serious purpose, and one has only to look into the faces of the 400 delegates assembled at the sessions to realize the close attention given to the discussions and the vital interest of these delegates in their duties. The usual fringe activities of conventions are absent, namely: elaborate exhibits of producing organizations and the entertainment functions which are likely to divert the attention of the delegates from the sessions of the school. In other words, this Road School is at one in the methods and purposes of instruction at Purdue University.

It is not to be thought that the Road School started full grown at the beginning. It is now a going concern, but the present successful organization was only reached after a process of trial and error beginning in 1913 with a rather ambitious program of two weeks instruction for all the public officials who have to do with public works in the state. The growing seriousness and complexity of road problems naturally led to the special attention given to these matters in a Road School in 1915. At this time the position of county highway superintendents was not firmly fixed. There was a period when many bills were introduced in the legislature to abolish this office. We are glad to recognize the fact that the increasing efficiency and the success with which these county highway superintendents have accomplished their tasks has firmly entrenched this office in the minds of the public. Such complaints as may have occurred have come from the individual lack of success of a single county highway superintendent rather than the action of the body as a whole. Purdue University ventures the hope that the quality and action of the Road School has served to advance the work of the county

highway superintendents and through them to bring about a more intelligent and economical maintenance of our county road systems. There are 92 of these superintendents, with about 1,656 assistants and over 3,000 temporary employees.

It must be remembered that while the acute problems of transportation occur on the heavily traveled state road system, comprising approximately 4,000 miles of highway, yet these county road superintendents have to do with approximately 35,000 miles of our roads. It would surprise many of our citizens to know that individual county highway superintendents spend over \$100,000 a year in taking care of road surfaces. Expenditures by counties vary from \$10,000 to \$300,000 per year, totaling about \$7,000,000. Therefore the county highway superintendent is an important public official, and should receive the co-operation and intelligent assistance of business men and others interested in our roads. Those of us who have been in contact with the Road School since 1915 believe we have observed a growing sense of importance of his job on the part of the highway superintendent and a devotion to his task which leads him to come back to this Road School and find out the best there is to know, in order that he may apply it to his local circumstances.

Indeed the growth of ability with the increasing seriousness of road problems is not confined to the county highway superintendents. The State Highway Commission was at first built on unsettled foundations. It has grown in outlook and character of organization as our road situation developed. It is only necessary to refer to the increasing load on the road until now some twenty millions of motor vehicles in the U. S. are breaking down and wearing out those road surfaces which were designed for a much lighter service. Indiana is the link that connects major lines of transport east and west, north and south. Mr. Sheets, Head of Department of Highways of the State of Illinois told us in meeting the other day that in spite of the years of study and hundreds of thousands of dollars spent in scientific investigations in Illinois to determine the design of road slabs they were still seeking answers to many of their problems.

Since this meeting is one of public officials of the State of Indiana charged with public duties and representing a wide constituency, and not, as so many of these conferences a grouping of private citizens, it follows therefore, that the School of Civil Engineering of Purdue University, which has been, and still is, a training school for state officials having to do with public works, is, in this Road School merely carrying out on a different level the process applied to the students registered

in the school curriculum. Some 300 of the alumni of the School of Civil Engineering and many others who have had instruction in the School of Civil Engineering are employed now in directing or building roads, bridges, and other structures of this state. They will be found on the staff of the State Highway Commission, the Department of Conservation, the State Tax Board, and they fill positions of county engineer, county surveyor, county road superintendent and city engineer.

### County Surveyors

Our friends, the county engineers and county surveyors who were with us in 1913 and have been attending the Road School individually since that time have now joined the Road School officially. A law was passed at the last legislature similar to the law provided for the county highway superintendents directing these county engineers and county surveyors to attend this school at Purdue University and providing for the expenses per diem and subsistence.

The office of the surveyor is a most important one, as the county surveyor is responsible for surveys, plans and specifications for all county and township roads, plans and specifications for bridges, surveys and plans for drainage systems and many other duties of equal importance. A technically trained engineer can save the taxpayers of a county considerable sums of money during his term of office due to the greater efficiency and ability in this line of work.

Eighteen Purdue men are now county surveyors over Indiana, and are among those attending the Purdue Road School. All of these activities of the Road School are finally expressed in the receipt by the taxpayers of a dollar's worth of construction and maintenance for a dollar's worth of road taxes.

It is the engineer who stands for the public in matters of plans, materials and construction. He must fight for what he believes to be right in his informed opinion. He may be defeated by higher officials whose business it is to express the final opinion, but up to that time he should carry with him the determination of his convictions.

At the present time the engineer needs special study and access to sources of reliable information to enable him to decide between the conflicting testimony of representatives of producing interests who present only a partial view of a problem. I refer to the growing practice of industry in establishing technical staffs that are a part of the overhead organization for the promotion of the use of various products employed in engineering constructions. These staffs are not composed of

the ordinary type of sales engineer, but are technically trained men coming up through research and study. They have been students of general problems. For instance, the lumber interests, the burned clay interests, the Portland Cement interests, the brick interests, the sand and gravel interests, the crushed stone interests and a number of others have been able to attract to their organizations men who have been associated with research and intensive study of difficult problems of technology. Their researches in the field, their duties, are of a highly involved nature. The validity of their conclusions is only to be determined by analysis of underlying conditions of the experiments that but few are able to make. I say the engineer of the present day is in a difficult position trying to reconcile conflicting evidence or to satisfy himself of the conditions under which experiments or tests have been made, and which are referred to his judgment. This is all the more reason, therefore, why he should devote himself to study and come in communication with his fellow craftsman and engineer in associations of this kind where there may be a free exchange of information and judgment.

Indeed controversies between rival producing interests may become so acute as to delay needed improvements.

I welcome the free expression in open meetings of these controversies. Differences of opinion and controversies become more acute when talked of under cover—a matter of innuendo, of backstairs gossip. If men attempt to settle their differences of opinion in open meeting, they will find that many disputes are entirely unnecessary, misconceptions are removed, and that a common ground of action will be found. A most advantageous application of any one material or machine will then be determined and unnecessary friction, which engenders heat and is expensive, will be eliminated from the wheels of industry. Industry itself will be on a firmer basis.

So much, therefore, for the setting of this Road School. The whole picture is one of reduction of cost of transportation. These transportation costs amount to one-third of the general cost of production in industry.

These men assembled here at the Road School are the busy bees whose toil creates the honey which our motorists enjoy on good roads, making their life sweeter, easier and more enjoyable by eliminating tire changes and reducing garage bills. It is a long way from the beginnings of road construction in 1816 when a man named Macadam changed the whole theory of construction of roads with his idea that a stone going into a road surface should pass through a 2½ inch ring.

But tonight we are assembled not for detailed instruction, but to enjoy a rest from schooling.

“The wisest men that e’er you ken  
have never deemed it treason  
To rest a bit, to jest a bit,  
And balance up their reason,  
To laugh a bit, and chaff a bit  
And joke a bit in season.”

## PATCHING AND RESURFACING CITY PAVEMENTS

By D. B. Davis,  
City Engineer, Richmond, Indiana.

City pavements are structures which are subjected to very great abuse. Consequently they must receive considerable attention and repairs to keep them in a serviceable condition. The causes which contribute most largely to their deterioration can be defined as those due to foundation defects, surface defects, presence of street car tracks therein and utility cuts.

The cuts in pavements made by utility companies cause greater distress and inconvenience to the official and the traveling public than any other. Although efforts are made to get a sufficient number of service pipes laid prior to laying of the pavement, the growth of cities and business constantly necessitates the laying of additional mains and service connections. This is a temporary inconvenience and should not be discouraged, but rather it should be so regulated that repairs can be made quickly and efficiently.

For the city to properly maintain its pavements, it is necessary that it have complete control over all excavations and replacements. If complete responsibility is centered on the city authorities, they may then receive the censure for negligence or likewise may receive the credit for strict attention.

In Richmond, Indiana, such responsibility is placed upon the city by ordinance, the city refilling all trenches and replacing the surface with its own forces.

In this connection, it is essential to good business that costs be kept of all repair work. This may be done effectively by means of the usual work-order system. In this way relative