

the amount of money saved was about twice the amount expended to make the improvement.

The resurfacing method of improvement not only salvaged and modernized 414 miles of city streets and rural highways, but also permitted approximately \$7,400,000 to be expended for the construction of many miles of low-, intermediate-, and high-type surface and new construction.

I often think of an illustration of two men of moderate means who owned homes adequate for their family needs. These homes had reached the point where some major repairs were needed to put them in good condition. One man made his home satisfactory for his needs by repairing, while the other man tore down his home and built a new one. It is easy to see that the first man was economical, while the second man was extravagant. It was the second man's privilege to be extravagant with his money, although it was unwise; but it is not our privilege, as public officials, to be extravagant with road funds, because they are not our personal property.

The public official should study the economics of each improvement to see if it is possible to salvage any of the original investment. A low-type surface salvaged is a lesser saving, and a high-type surface salvaged is a greater saving; but either will permit the improvement of a greater number of miles—surely service that the public expects: that is, the greatest number of satisfactory improvements possible with the minimum amount of money expended.

## SALVAGING HIGHWAY INVESTMENTS

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Mr. Schafer has covered his subject very thoroughly from a state highway point of view. I have been asked to discuss it as it pertains to county highways. Immediately the money problem appears. The state has limited funds, but ours are more limited. The comparison is somewhat similar to David and Goliath. Under existing conditions we can be interested only in low and intermediate classes of salvage.

In our county, the problem of earth roads is growing rather than decreasing. Subdivisions, outside the corporate limits, are springing up. People are moving to these districts to escape the high tax of a corporate city. These people work in the factories and stores of our cities. They demand high-type roads. The farm-to-market road must be improved because these are the community links between subdivision and city.

To salvage the investments in our present roads, we are using stabilization and surface treatment. We have had very

good success with bituminous material. Other material may work as well. In doing this work we have been forced, because of limited funds, to use all the means at hand. By a joint program with WPA, we were able to reconstruct 23 miles of gravel roads last year. The county furnished equipment and some material; WPA furnished the rest. This road runs east and west across the county, seven miles south of South Bend. It crosses six north and south paved highways. No material was added to the roadbed. WPA built the berms, ditches, and back slope. We built the road surface.

For this work we used three power graders, one multiple-blade maintainer, one 10-ton, smooth-wheeled roller, seven gravel trucks, and a Birch chip spreader. Our power graders are equipped with scarifier and windrow eliminators. The eliminator is quite valuable in laying out the base. This project was completed in less than three months, with an average of a mile every three days.

A road-surface width of 20-feet was used and a depth of base of about 6 inches obtained. The gravel roadbed was scarified and the loosened material turned with the graders to break up the lumps of fines. Then it was spread over the roadbed, and one-half of the tar was applied. This tar and half of the loosened material were bladed back into a windrow. Then the balance of the tar was applied to the rest of the loosened material and windrowed. By repeated turning with the large blades, a peculiar mixing is accomplished. Only the fines are coated. Water must be present. A moisture content of 10 per cent will give a rapid mix, although considerable of this moisture must leave the mix before the laying out of the base. When thoroughly mixed, the base was laid out. Partial compaction was accomplished by the mixing equipment, and more compaction was given by the smooth-wheeled roller.

As soon as the base is rolled, a "tack coat" must be applied. We used .8 gallon of TM-2 in the base and .2 gallon TM-2 for the tack coat. A light spread of pea gravel was placed over this tack coat. Two days later we rolled it again. It was open to traffic at all times. Traffic completes compaction, and the roller smooths the surface. Then a seal of .3 gallon of TH was applied with sufficient cover of pea gravel. The sealed surface was well rolled, this completing the road. In addition to this project, we completed eleven miles of oil mat and sealed four miles of old black-top road surface.

Here I wish to add a good word for WPA. If properly treated, it can be a real asset. Too many counties have taken the attitude of "take all and give nothing." It thrives on co-operative effort, and we profit by it.

#### PLANNING NEEDED

Our salvage problem becomes one of long-time planning. Our people are increasingly demanding better roads. It is

our problem to meet these demands where economically justified. Only by careful, long-term planning, and by using every available dollar can this be done. In my own county such a plan is being developed. Our future work will be so laid out that we believe future administrations will be glad to carry on. This plan will depend heavily upon WPA. The type of work done will be regulated by its costs. We intend to stretch our dollar to its utmost. By planning our budget we can carry part of the salvaging load, but we never will be able to carry all of it.

No attempt has been made to explain procedure. From investigation it is evident that each county has a method it uses. Its equipment is purchased to suit that method. That is not so essential to me as the ultimate end, which is a higher-type road. How we do it in St. Joseph County is not so important as what is accomplished. Therefore, our problem is a planned program employing the use of all federal and state aid available, with careful budgeting of the county dollar. If we do this, our roads will show increasing improvement, and the motoring public will receive the benefit of this effort.

## PRESENT STATUS OF THE HIGHWAY PLANNING SURVEY

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In 1934, Congress passed the Hayden-Cartwright Act, which included feeder roads and grade crossings in federal-aid appropriations. Since that date, the federal government has spent more on secondary roads than on primary roads, including FA, PWA, and WPA. In that act and all succeeding acts carrying appropriations for roads, Congress has set aside 1½ per cent of federal funds for engineering and economic investigations. This made possible the planning surveys being conducted in 46 states, including Indiana.

In 1935, the Indiana General Assembly created a Highway Survey Commission to conduct a survey of the entire highway system of the state. This survey was started in November of that year.

The primary objective of these surveys is to provide the facts needed for an intelligent and economical attack on our ever-increasing road problem. These facts include the mileage of roads and their condition, such as width of surface, width of right-of-way, depth of surface, alignment, and grades; the service they render; the source, destination, and kind of traffic; and the cost of the roads. Studies were made of the