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INTERREGIONAL HIGHWAYS INDICATED BY STATE-WIDE HIGHWAY PLANNING SURVEYS

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In its report on "TOLL ROADS AND FREE ROADS," which President Roosevelt sent to Congress with an approving message last spring, the Public Roads Administration advanced a number of recommendations describing the broad outlines of a master plan for free highway development in the United States. As one of the important elements of the plan, but not by any means the whole plan or even its most essential part, the Administration proposed the designation and construction of an interregional highway system to interlace the various sections of the country with a network of direct routes, of an aggregate length not exceeding one percent of the Nation's total road mileage, which would be about 30,000 miles.

In the same document the Administration reported adversely upon the feasibility of financing a designated 14,000-mile system of transcontinental highways with direct tolls, estimating that the tolls collectible would recover less than half the cost of such a system as a whole in the period prior to 1960, beyond which no estimate was attempted.

Some readers of the report have been troubled by a seeming inconsistency of the toll road finding with the recommended construction of a Nation-wide interregional system more than twice as large, as a free facility. "If," they say, "the tolls collectible from the maximum traffic that can be expected on the 14,000-mile system fall so far short of paying the cost of that system, how can the

expenditure of tax revenue be justified for a so-called free system more than twice as large? The money to build the system will have to be raised somehow. If the road users won't pay it, who will?"

Actually, there is no inconsistency between the toll road finding and the interregional road recommendation. The deficiency of traffic for self-liquidation on the toll system would be due mainly to the inability of that system to attract usage against the competition of reasonably satisfactory "free" highways and to the impracticability of its use by a large fraction of normal highway traffic, the trip lengths of which are shorter than the essential distance between entrances to the toll roads. The construction cost of the interregional system, on the other hand, can be kept within the limits of road-user tax revenues generated by traffic on the system. Of this fact there is assurance in the information amassed by highway planning surveys in 46 States; but the clarification of superficial doubts is not assisted by such discussions as those which have recently appeared on the editorial pages of the magazine "RAILWAY AGE" and their stereotype reproductions in a section of the daily press.

In these discussions the Administration's reasonable proposal is made to appear in fantastic guise by a ten-time magnification of the probable cost. The misinformed editors assume the 20-year cost of a 28,000-mile interregional system to be between 35 and 40 billion dollars. By adding just a few more billions their upper figure could properly be assumed as the probable cost of the Nation's entire street and highway system during the 20-year period. As an estimate of the

cost of the proposed interregional system only the estimate needs to be scaled to about one-tenth of the stated amount.

The Administration's estimates of the traffic that would use the 14,000-mile toll road system placed the probable vehicle-mileage at approximately 1.2 percent of the total usage of all rural roads. For an interregional "free" system less than twice as large its estimate of probable traffic was more than ten times as great. In this difference between the estimates of prospective traffic for the two systems lies a good part of the explanation of the difference between them from the standpoint of financial feasibility. Partly also the explanation is found in the higher per-mile costs of both construction and operation for the toll road system.

As previously stated, the interregional system alone is not regarded as a sufficient answer to the present needs of highway transportation. Its construction would be only one part of a program of systematic highway modernization, the urgent need of which is shown by the highway planning surveys. On the existing Federal-aid and State highways there is much to be done in the easing of sharp curvature; the reduction of steep gradients; the lengthening of short sight-distances; the widening of pavements, surfaces, and shoulders; the elimination of railroad grade crossings; and the construction of stronger and more durable bridges with ampler horizontal and vertical clearances. In and near cities and towns there are needed arterial streets, bypasses and belt lines that are not included in the rather restricted interregional system that has been proposed. Then, too, there is still an

important job to be done to effect a really systematic improvement of secondary and feeder roads, properly integrated with the primary system, and extended to the economically feasible limit, in order to bring the benefits of improved road service as closely as possible to the homes of the rural population.

In the great mass of factual data which the planning surveys have collected there is evidence of the need of all these classes of improvement, and there is also information necessary for their adequate planning in detail. The place and kind of each needed improvement can be determined. The traffic that will benefit by each can be estimated. The probable costs of each can be computed within reasonably approximate limits, and there can thus be integrated for each city, each county, each State and for the country as a whole, a schedule of the additional street and highway improvements needed to correct, in the next 20 years, the obvious deficiencies and inconsistencies of pioneer improvements effected in the last 20 years.

If in the next score of years we are actually to produce a highway system improved in its various parts in essential balance with the respective traffic needs; if we are to do so efficiently, and without danger of excessive and insupportable total and continuing cost, then it is high time that we set about such a scheduling of the improving operations. We can hold these operations in total within any desirable limits of cost. The total revenues to be taken from the pocketbooks of taxpayers can be kept within any agreed maximum limits. The tax collection can be continued at the present rates, if that is desired,

and a correction of the presently inconsistent improvement of the highway system can in time be effected. But such a result cannot be attained unless the available revenues, whatever they may be, are allotted to the various parts of the whole street and highway system in strict proportion to the determined improvement needs of the several parts; and this, therefore, should be a first objective of future highway planning.

What this means is that we have passed the time when the planning of improvements of the primary rural highways could reasonably be considered apart from the improvement of the feeder roads of the rural system, and both of these without regard to the needs and plans for city streets. We have passed the time when each year's construction program on streets or highways could reasonably be prepared without conscious relation to the ultimate objectives of a general long-time plan. For the development of each section of the whole street and highway system there should be a definite provision of the condition to be achieved within a period of 10 or 20 years; and over these several partial plans, to maintain a consistent and reasonable relation between them there is need of a master plan. It is such a master plan that is suggested in broadest outline in the report of the Public Roads Administration on TOLL ROADS AND FREE ROADS, and it is as a part of such a master plan that the proposed construction of interregional highways should be considered.

In its report to Congress the Administration presented a map of a 26,700-mile system, which it had tentatively designated after

consultation with the War Department and all State highway departments. That system, after further study, has been slightly revised and extended to form the system indicated in Figure 1, which includes approximately 29,315 miles.

The need for the designation of this system or some reasonable modification of it is the present need for adequate arterial highways directly connecting the principal cities of the country. The existing main highways, in most instances do not provide such connections. Resulting from the joining of improvements extended outward from adjacent towns, their course between the larger cities is often quite circuitous; and, superimposed upon such major deviations, their alignment suffers from the complacency with which local indirection was accepted in the earlier pioneer period of road improvement, in order to avoid the costs and delays of acquiring the new rights-of-way, and overcoming the physical obstacles necessary for the projection of straighter courses.

It is not the transcontinental traffic that demands the provision of such a system. If there is one fact that the planning surveys have demonstrated more clearly than another it is the fact that traffic of transcontinental range is now, and always will be a very small part of the total of all traffic on any highway. The traffic which the proposed system is designed to serve is that important traffic that now is moving daily from one large city to another, and from one general region of the country to another. Generally the trip lengths of this traffic are measured in the

hundreds rather than in the thousands of miles; but it is nevertheless a traffic that is quite distinct in its characteristics and demands from the local traffic that forms the bulk of the total on most of the existing primary highways. It is a traffic that moves by day-long stages, and pressing each day toward an evening objective it moves at a rate that is invariably well above the speed of the local traffic with which it is intermixed on the existing roads. It is a traffic that is impatient of the delays imposed by the necessity of frequent passage through small towns on the present highways, and reluctantly reduces its open road speed to the lower limits which considerations of safety suggest as essential for the town streets. It is a traffic that in very large proportion has its origins or destinations, either ultimately or temporarily in the principal cities; and it demands, therefore, satisfactory facilities for entrance into and exit from such cities without annoying delays by traffic congestion.

Needed for the service of an important peace time traffic already developed, such an interregional system would also constitute the major arteries of the group of roads that would bear the brunt of the augmented industrial traffic and military movements in the event of a war in the national defense. Moreover, such military necessity is likely in the future to appear less as a remote contingency and more as an ever present and important basis of highway design, simply because our increasingly mechanized army will inevitably appear more frequently on the highways in its practice maneuvers. An important

demonstration of what may be expected will be afforded by the large-scale maneuvers that are scheduled to be conducted this winter in the Southern States.

The first characteristic of the interregional system, desirable alike from military, economic, social, and recreational points of view, is that it shall connect by courses as direct as practicable the country's principal centers of population and industry. In addition it is desirable that the routes of the system shall penetrate centrally into every significant region of the United States and provide in each such region convenient points of departure at which it may discharge and take on the burden of long-range traffic which it will accommodate from region to region. That the tentatively designated system meets these requirements with some success is shown by the intimacy of its association in location with the greatest concentrations of population in the map reproduced as Figure 2.

It is not proposed that such an interregional system be newly constructed throughout, separate from existing routes in all its sections. On the contrary, the system as ultimately developed should include to the greatest practicable degree existing roads on their substantially unchanged locations, and should incorporate to the fullest extent the improvements that have previously been made on such roads. The degree to which it will be practicable to utilize existing road sections, however, will vary considerably in different parts of the country.

In the populous east and west coast regions, and in the northeastern section of the country, a number of factors conduce to a probable necessity for the construction of many sections of the system on new location. Among such factors are the close proximity of small towns that should be bypassed, and the excessive curvature of the existing routes, many of which were durably constructed in their present locations before the speed of motor vehicles had been so increased as to make them the loci of hazards they have since become. Other conditions similarly conducive to the choice of new locations in these more populous sections are the fact that rights-of-way of the existing primary routes are there predominantly the narrowest possible, and the further fact that accretions of road-bordering property improvements render excessively expensive and destructive acquisition of the wider and straighter land strips now required.

In other sections of the country these conditions, common in the more populous regions, are not present to anything like the same degree. Existing highway locations in these other sections conform much more closely to the requirements of modern vehicle speeds, and existing 2-lane surfaces are still adequate for the developed traffic and will long continue so. Indirection in these sections of the country is found mainly where what should be straight diagonal routes now follow stairstepwise the existing roads located on the borders of rectangular land sections.

With the close and helpful cooperation of all State highway departments, the Public Roads Administration has gathered the various

facts which indicate the general conditions prevailing at present on the existing roads which approximate the various sections of the tentatively proposed interregional system. Route by route, the information compiled gives the width of right-of-way and surfaced width of the existing roads at all points, the physical character of the surface, the present existence of excessive curvature and gradient and significantly short sight distance, and the annual rate of fatal accident occurrence per hundred million vehicle-miles of traffic. For each section the present average daily volume of traffic has been compiled in total and as subdivided into passenger vehicles and trucks and local and "foreign" traffic in each State. This information already compiled as to the roads and road surfaces, is now being supplemented by information in similar detail with respect to the existing bridges, which will include the design rating of each bridge, its safe load limitation in its present state, its vertical and horizontal clearances, and magnitude and frequency of the critical gross loads and axle loads to which it is currently subjected.

Figure 3 shows the manner in which the data regarding roads and road surfaces are recorded on condensed straight-line diagrams for each section of the studied routes; and Figure 4 gives a graphical summary of the conditions found to exist at present on the existing roads approximating the location of the proposed interregional system. A brief study of this latter graph will show how erroneous would be the conception of such a system as a network of uniformly designed

thoroughfares. Even in this group of important highways, composed generally of roads which are among the most heavily traveled of their respective regions, it will be seen that a large percentage of the mileage serves a present traffic averaging less than 500 vehicles per 24-hour day; and a relatively small percentage carries more than 10,000 vehicles per day. But it is clear that the wide range of traffic volume calls for a variation in the design of road facilities of somewhat similar scope.

The greatest disparity between present physical capacity and traffic requirement is shown to exist in the analysis of the right-of-way situation. The greater right-of-way width now available where traffic is lightest, as shown in one part of the graph, reflects the relative narrowness of the old eastern rights-of-way on heavily traveled roads and the ampler widths of the acquired land strips in other sections where traffic is lighter. Existing surfaces of 2-lane width, shown to exist uniformly where average traffic is less than 3,000 vehicles per day, are reasonably consistent with traffic requirements, but the average width of pavements serving traffic of greater volume does not increase as largely as it should with increase in the traffic volume.

The general classification of surface types as between the two general classes represented confirms the average wisdom of type selection employed in the construction of the existing roads. But the conditions of curvature and sight distance again show the greater need of modernization that exists on the more heavily traveled sections of the system.

The traffic volumes used as the base of the graphical summary presented in Figure 4 are those observed at present on the existing roads approximating the location of the proposed routes. The designation of these roads as links in an interregional system and the improvement of the system consistent with the purposes of its designation would draw to these roads an access of traffic over their present usage; and where the new routes are constructed on new locations the increase that would result from this cause would offset the loss of local traffic. The volumes of traffic now using existing roads approximating the location of various parts of the system is shown in Figure 5 by the width of the darker traffic bands representing the system, against a background of the lighter bands representing the traffic use of other existing primary highways of the United States.

The facts here briefly presented indicate that the proposed system, intelligently improved, would not conform to the somewhat popular picture of a transcontinental boulevard network of uniform and highly expensive construction. But this does not mean that the standard of design should not be consistently high in all elements having a bearing on the safe and convenient service of traffic moving at the high speeds that may be expected to prevail on such a system. The Public Roads Administration has suggested that curvature be limited to 3 degrees and gradients to 3 percent wherever possible. Twelve-foot surface lanes, sight distances extended to the greatest extent consistent with reasonable economy, and liberal criteria for the widening of surfaces from 2 to 4 and more lanes are also among

the standards by which the relative adequacy of the existing roads approximating the system is now being tested.

The results of such tests, as previously suggested, show that the greater needs of modernization and also of improved directness of connection exist in those parts of the system that are at present the more heavily traveled, and greatest need of improvement is found to exist in the most important metropolitan areas. It is in these areas, accordingly, that the first improvements should logically be undertaken; and in them, as a matter of fact, they are already being planned and carried out by local and State initiative, as instanced by the Merritt Parkway in Connecticut, the Worcester Turnpike in Massachusetts, the Henry Hudson Parkway in New York City, the Pulaski Skyway in New Jersey, the improvement of U S route 40 in Delaware and Maryland, the Chicago-Milwaukee highway and other recently constructed facilities in other parts of the country. A number of such road sections would be incorporated in the proposed interregional system without substantial change of their present location. But even some of these roads would require further improvement by the widening of pavements, the separation of grades at highway and railway intersections, and by the easing of curves and grades and the lengthening of sight distances.

Most needed and certainly most expensive of the improvements required are those that should be effected as promptly as possible in sections of the interregional system immediately approaching and extending through the largest cities of the country. On such sections the improvements in many cases should provide for limitation of access

to the express roadways with lateral service roads; and the frequency of crossing of other highways will necessitate the construction of the interregional route as either a depressed or elevated artery. Such construction, necessarily expensive, is yet viewed as of greater urgency than the simpler required improvements of the system, and it was this view that prompted the Public Roads Administration to suggest the provision of means by which the Federal Government could lend prompt and large financial aid to the States and cities, especially for the obtainment of the expensive rights-of-way required. The same purpose is the objective of identical bills introduced at the last session of Congress by Senator Hayden of Arizona and Representative Cartwright of Oklahoma, which would authorize the Reconstruction Finance Corporation to the money necessary both for land acquisition and construction either directly or through the agency of the Commissioner of Public Roads. These bills are certain to be the subject of discussion and debate in this year's Congressional session; and one way or another the outcome of the consideration they will receive is likely to be a first step toward the improvement of such a system of interregional routes as has been generally described in this article.