# Highways During and After the War

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In 1934 - a little more than a year after Hitler's rise to power - it was my privilege to inspect in Germany the first section of the projected system of national motor highways, then nearing completion. With other delegates to the Seventh International Road Congress I listened to an exposition by Dr. Fritz Todt of the purposes of the Third Reich in undertaking the construction of the Autobahn system.

To many of Dr. Todt's guests on that occasion, the omission of purely military objectives from his enumeration of the purposes of the new road program was a matter of skeptical remark. He dwelt upon the employment-producing opportunities of the program and the great merit of the construction from that point of view to a Germany that then had plumbed a greater depth of economic depression than any other nation, including our own. He spoke of the value of the popular pride that would be aroused in the accomplishment of the lavishly planned system, as a means of restoring the gravely damaged morale of the German people. He did not specifically cite the usefulness of the undertaking as part of a carefully planned build-up of German confidence in the foresighted wisdom of the then still somewhat shaky new regime and its oddly mustached Fuehrer

(the July purge was then only two months past); but doubtless that also was prominent among the actual purposes.

Dr. Todt was then recognized as an able highway administrator. He since has given evidence of extraordinary capacity as the builder of the Siegfried Line and generalissimo of the entire war production industry of the Reich, and I surmise that he was more frank than many of his Road Congress auditors thought, when he attached greatest importance to the service that would be rendered by the new motor road system in two ways.

He pointed out first that the projected roads were so laid out as to join the various important manufacturing centers and producing areas of the German State, and emphasized their expected usefulness in knitting with threads of vastly improved transportation the many productive industries of the country into a great, closely coordinated unit.

He next underscored the stimulation that provision of the ultra-modern highways would give to a new German automotive industry. He spoke of this new industry in terms of its production of a popular-priced "people's car", and told how the new industry would be subsidized by a scheme of installment payments in advance of production by the expectant possessors of cars yet to be manufactured. He doubtless considered it unnecessary to explain that the prepaid installments on pleasure cars would help to tool an industry that would be vitally necessary to produce the automotive equipment of war. Nor, certainly, did he forecast that few indeed of the pleasure

cars for which prepayment was to be made would ever be delivered; but probably even he - Dr. Todt, high-ranking Nazi that he was and is - did not at that time see clearly to that eventuality.

The point of these prefatory remarks is this: That, whereas most of the foreign, road-minded visitors to Germany, in that early fall of 1934, were thinking (as nearly all the world has since thought) of the German Autobahnen, as arteries for the rapid movement of combat forces in war, the German war planners - though certainly not unconscious of that utility of their new road system - were giving greater thought to its broader strategic significance as a means of creating the very means of those rapid movements. And far beyond that, they were aiming to provide the transport facilities essential to a broadly conceived industrial fundament for a type of warfare that was to be dependent, as no previous warfare had been, upon a closely integrated, exactly time-tabled industrial production.

With typically clear-headed foresight and thoroughness, the Germans worked toward these main objectives in the building of their new roads; and for them, time was decidedly of the essence.

They were making a late start; and with due respect for the modernity of their designs, their program was not extraordinarily large. They projected a network of autobahnen of only about 4,500 miles, which would have meant only about a mile for each 40 square miles of their territory before annexation of Austria; and at the beginning of the war they had completed about 2,000 miles.

Nevertheless, such was the grandiose character of their planning, and such the effect of their admirably efficient performance, that - in the idiom of their western neighbors - they gave the rest of the world furiously to think; to think of the advisability of an emulation in identical kind of their planning and their performance. So that here in the United States - a country as differently circumstanced as it would be possible to imagine, and one in which a lately improved trunk highway system was already serving with relative adequacy the daily movements of 30,000,000 motor vehicles - here, even in the United States, there was the urge to build a system of continent-traversing, super-autobahnen exactly according to the Nazi model, as a military necessity.

Now, it so happened that the United States government had not been completely blind to the strategic importance of highways. Since 1922 it had had a definite conception of a country-wide system of main highways that would be necessary to serve the principal strategic needs. It had a map of those highways about which very little was said, but the roads shown on that map had been carefully included in the Federal-aid highway system; and the Federal-aid system had been progressively improved by joint Federal and State effort for nearly two decades. Moreover, the American conception of strategy in relation to highway development - allowing for differences in the time factor - was probably not greatly different from the Nazi conception. It had been summed up in a designation

of routes of principal strategic importance that were almost invariably identical with the roads of greatest significance for the service of the country's peace-time industry and for the promotion of an increasing use of the motor vehicle in peaceful pursuits. It had been further expressed in the advice of the War Department that the standards of improvement that would satisfactorily meet the traffic demands of peace would also generally serve the requirements of war.

These concepts of the highway needs of war strategy had been constantly, if quietly, influential in determining the place and character of the development of the Federal-aid highway system practically from the date of its original designation. And time had been granted us for a progressive development, the general adequacy of which is fully attested by the facts of its daily service to a volume and facility of highway travel without parallel in the world.

But despite the general adequacy of our highway system - for war and peace alike - it has been recognized for some time that in many details of its development it remains inadequate. The inadequacy exists in varying degrees, and similar inadequacies must always be expected to exist in whatever highway system we may at any time possess. They are inherent in the only process by which a highway system can be created. A process that requires a span of twenty years for its unfolding, can not avoid the existence at any moment of parts of the total product that are more or less obsolescent.

It was with the purpose of measuring the place and degree of such obsolescence of the highway system at the end of our first twenty-year cycle of road improvement, and the further purpose to plan a systematic course of renewal for the second twenty years, with all that such planning would imply of financial, and traffic regulatory provisions, as well as the engineering design of the renewed facilities, that the highway planning surveys were instituted in 1935.

The foreknowledge the surveys had amassed of the conditions and use of the entire rural highway system of the country, supplemented by a quick review of purely military necessities by the Public Roads Administration, in cooperation with the War and Navy Departments, and the State highway departments, enabled the Federal Works Administrator a year ago to reply in specific terms to the President's request for recommendations concerning the highway improvements required for service of the nation's defense needs.

The report emphasized the superior urgency of improvements required upon roads affording local access to military and naval establishments and industrial plants engaged in the manufacture of war materials. It recommended as of secondary necessity the elimination of definite deficiencies of the 78,000-mile strategic highway network. For both of these major objectives the Administrator's report recommended Federal appropriations of definite amount, and an appropriate manner of expenditure.

It is not necessary here to recite the various delays that ensued after the filing of those recommendations before appropriations of the kind recommended were finally made in somewhat different amounts, and for slightly modified mode of expenditure.

Hard upon the heels of the appropriations came the disaster of Pearl Harbor. That world-shaking event has altered many plans. It, and its consequences, will profoundly affect the plans and business of highway engineers and road builders, and all those who supply the materials and equipment of road building.

The occurrence of actual war increases the urgency and relative importance of so-called access road improvements. It does not materially alter the lesser need for correction of deficiencies of the strategic network. But upon both of these activities - now happily set in motion - and upon all other work of highway and street improvement, the consequences of Pearl Harbor impose sharp restrictions - unavoidable restrictions that are the result of the stark necessities of our nation in a moment of peril more threatening than any in our past history.

The control that it has been necessary to place upon Federal highway funds will confine to strictly war-needed improvements, not only the special funds appropriated for that purpose, but also the unexpended balances of earlier regular funds for Federal-aid highways, secondary or farm-to-market roads, and the elimination of hazards at railroad grade crossings. Beyond the expenditures for urgently needed access road improvements, the only projects that will be

approved for accomplishment with presently available funds will be those that can clearly be shown as necessary to correct serious deficiencies of the strategic network or other highways serving important flows of war traffic. In recognition of the greater Federal responsibility for such improvements, the recent legislation authorizes payment of 75 percent of the cost of construction and right of way for strategic network projects, and up to 100 percent of the costs of access roads.

For the duration of the war there is no probability that any Federal highway appropriations will be made that will not be subject to these or closely similar restrictions; and the total of Federal expenditures is likely to drop below the normal level of recent years in consequence of the effort to retrench wherever possible, to offset the tremendous, but imperative rise in war expenditures.

In State highway revenues also we must expect a sharp decline, since these revenues - collected almost in their entirety through gasoline taxes and motor vehicle license fees - will be immediately and increasingly affected by the virtual suspension of motor vehicle production and the imposition of tire rationing. And finally, expenditures for the streets and highways of cities and counties will be sharply curtailed, first by withdrawal of the WPA assistance that has contributed so largely to recent improvements of these categories, and probably also by the reduction of city and county property tax rates; for it seems clear that these levies must be reduced if taxpayers are to be able to meet the drastically higher Federal war taxes.

It is abundantly clear, therefore, that for the duration of the war there will be much less money to spend for road and street improvements than we have become accustomed to expect. And, perhaps, it is well that this is so; because even were the money available, other restrictions imposed by the war necessity would prevent its expenditure.

The word "priorities" is not, I am sure, wholly unfamiliar to this audience. At any rate, it or its equivalent in restrictive effect - the word "allocations" - is certain to retain its potency for a long time to come. And there is going to be no way around either of them. The country is short, perilously short, of certain strategically important materials. It must make the limited supply go as far as possible, and as fully as possible to those uses most directly contributing to the winning of the war.

Highway construction employs directly, mainly three of these critical materials - steel, zinc and copper. But supplies of non-critical materials employed are affected by shortages restricting the availability of production equipment. This, I presume, is the situation in which the sand and gravel industry finds itself.

Now, there are few, if any, people who can speak with confidence on the subject of priorities, and certainly the present speaker is not one of them. It will be possible, however, to tell you something of what the Public Roads Administration has attempted to do to assure the availability of a supply of critical materials and essential equipment at least sufficient for the more vital highway improvements and for maintenance.

Throughout the many changes that have marked the taking of control over critical materials, we have maintained a close touch with executives of the Office of Production Management, and it can fairly be said that we have been able to convey to them a knowledge of the essential needs of highway construction, and to inspire in them some confidence in the desire of the highway industries to help toward a reasonable solution of their difficult problems.

Working with the Priorities Division, we had succeeded, a few days before the recent creation of the War Production Board, in establishing a procedure for the rating of all proposed street and highway projects according to their essentiality for the purposes of war and protection of the health and safety of the civilian population. How, if at all, this procedure may now be altered by the new organization that is being set up under Mr. Donald Nelson, I can not say. I can only tell you that it is now in effect; and this is how it is intended to work.

All applications for preference ratings for street and highway work of all sorts are to be forwarded to the War Production Board through the Public Roads Administration. The State highway departments will initiate these applications for the Federal defense projects to be built under their supervision and also for other Federal-aid and State projects which they deem to be of sufficient importance to merit approval.

Cities and counties and other local governments will be required to submit their applications first to the respective State highway departments; and all applications submitted will be forwarded by the State agencies to the Public Roads Administration with or without a recommendation for approval. The Public Roads Administration will review all applications submitted to it, for both State and local projects, and will recommend for favorable action by the War Production Board all those that appear to warrant such action. The tests in all cases will be, first, the essentiality of the project and, second, whether or not the proposed design involves a minimum use of critical materials.

Final decision and the issuance or withholding of preference ratings in each case will rest with the Division of Priorities or its equivalent in the new organization. In view of the magnitude of the war necessities it must be realized that preference will be accorded only to the most meritorious road projects and then only for the irreducible minimum of critical materials.

One of the more difficult problems of the Office of Production Management from the beginning has been that of ascertaining the probable gross demand of all essential industries for each of the critical materials. In the absence of a reasonably exact determination of these quantities its issuance of preference ratings on an individual project basis has been a process surrounded with doubt as to its immediate necessity and ultimate consequences.

In the hope of removing some of these doubts, officials of the Office of Production Management recently requested the American Association of State Highway Officials to assemble from State highway departments and all other street and highway administrative agencies estimates of the total dimensions of a desirable road and street program for the year 1942, with particular reference to the quantities of critical materials, certain other important materials, and labor and equipment involved. The Association was asked first to obtain estimates of the quantities involved in such a program carried out under normal specifications and designs; then to propose feasible changes in specifications and designs with the view of reducing the quantities of critical materials; and finally to obtain revised estimates of the quantities required for an identical program planned in accordance with the proposed alterations of design and specification.

At the request of the President of the Association, the Public Roads Administration has directed the assembly of the desired information and has received to date estimates covering the proposed programs of 38 States on the basis of normal designs. These estimates refer to State work only and do not as yet include the programs of the counties and cities.

On the basis of the 38 reports received, we have estimated probable totals for all States; and the total cost thus estimated for all construction and maintenance by the States is nearly one-and-a-quarter billion dollars. This covers all State projects anticipated and all kinds of Federal and Federal-aid projects,

except those of the WPA, but including the special defense projects on access roads and the strategic network. It does not include construction and maintenance to be carried out by the counties, cities and other political subdivisions.

You will be especially interested in the estimates of quantities of commercial gravel, crushed stone and sand, that are among the figures supplied. These figures cover only the quantities of aggregates required that must be shipped by rail or water. The total for construction and maintenance of structures amounts to approximately 4 million cubic yards, and for surfacing, about 26 million cubic yards, or a grand total of 30 million. If the proposed program were actually to be carried out, the estimated amounts of these materials would probably be substantially increased; because, under pressure to eliminate critical materials, concrete would be substituted for steel wherever possible in structures, and thicker plain concrete pavements would be substituted for those that have been planned with reinforcement. Both of these changes, of course, necessitate a greater use of gravel or stone and sand.

The estimates thus far received indicate that a normally planned Federal and State highway program for 1942, of the dimensions deemed desirable by the State highway departments, would involve over a million tons of steel and iron for structures and pavements, about 56,000 tons of galvanized sheets and pipes, nearly 1,300 tons of bronze, brass, and copper, plus lighting fixtures and wire estimated to cost more than $1,600,000.

There is presently no assurance that a program of such dimensions can be carried out. The probability is that reduced revenues, insufficiency of labor supply, a lack of adequately equipped contractors, and possibly transportation delays and difficulties would force a reduction in the estimated program even if materials were available in the full amounts indicated.

Certainly it will be necessary to reduce the amounts of critical materials involved, and this is the purpose of design and specification changes recently recommended by the Committee on Standards of the American Association of State Highway Officials. Some of these proposals call for the use of reinforced concrete in place of steel wherever possible in bridges, diminished use of steel grid bridge floors, discontinuance of the use of aluminum paint and practically all galvanizing, substitution of small concrete box culverts or concrete or clay pipe for corrugated-iron pipes, repair of existing structures wherever possible rather than their replacement with new structures, and reduction or elimination of steel from concrete pavements. Steel reinforcement, it is suggested, can be omitted in concrete pavements by substitution of non-reinforced slabs of uniform thickness. To conserve copper, it is proposed that lighting projects be entirely eliminated.

The effect of these proposals will be determined by the revised estimates that are to be made, and both the original and revised estimates will be placed before the War Production Board, for its information as to the approximate total magnitude of the job of

highway construction and maintenance and the possibilities of eliminating critical materials normally employed.

There is little probability that a construction program of the size the States have estimated upon can be carried out. To the extent that reconstruction must be deferred, maintenance of the existing facilities will call for an increasing part of the total expenditure. The necessary maintenance operations must be adequately supported with money and material if a reasonable efficiency of highway transportation is to be continued.

That serviceable highways are a vital war necessity is the plain implication of the reports we are receiving with reference to the use of highways by war industries and their workers. These reports make it clear that many of those industries are as dependent as a modern army on motor vehicles.

For example, the Glenn L. Martin airplane plant near Baltimore employs about 30,000 people. All use highway transportation going to and from work. About 350 ride in busses; the remaining thousands are transported in more than 10,000 private automobiles. None of the employees rides the railroad that passes the plant gates; and railroad company officials state that it would be impossible to provide the 100 coaches, 10 locomotives and 30 train crews that would be required for the sixty 10-car train movements a day needed to take over the transport duty now being provided by the private passenger cars.

The Ford bomber plant at Ypsilanti, Michigan, probably will employ more than 50,000 people this year, and it is expected they will travel to work in 22,000 private cars. Plant officials expect to get 25 percent of their necessary raw materials by motor truck, 75 percent by rail. Outgoing, the product of the plant will probably move 60 percent by truck, 40 percent by air.

Ninety-five percent of the 7,000 employees of the Hudson Navy Arsenal in Detroit are brought to their work by highway transportation. The Arsenal gets 75 percent of its raw materials by truck, 25 percent by rail, and the finished product is transported by the two means in about the same proportions. The Chrysler tank plant in Detroit brings in 50 percent of its raw materials by truck; and similar examples of the dependence of war industry on adequate highway service and the motor vehicle could be almost endlessly multiplied.

Clearly, then, the highways have a vital role to play in the war effort. Clearly the task of fitting them for their role and maintaining them in serviceable condition will be beset by numerous hampering restrictions. Maintenance must not be neglected. New construction can be undertaken only where need is greatest. The task of the road builder, and those who work with him, is to do much with little, and somehow to "keep 'em rolling." The results, we may confidently expect, will not be too bad.

And, finally, we shall emerge victorious from this war. What then will be the highway picture?

There will have been a hiatus in what should have been a continuous process of normal structural renewal. Maintenance, we hope, will not have been too badly neglected; but there will be much to do to catch up with just the ordinary construction foregone during the war interval. Beyond that there will remain the biggest task—a task which, but for the war emergency, we should have already begun—the task of converting a large part of our main highway system from a condition merely tolerable in the present to a state wholly adequate to meet the demands of the next twenty-year future. Bulking large in this biggest task will be the huge job of creating the new, congestion-free urban and suburban arteries and terminal facilities, for want of which our metropolitan and city areas now exist in a state of partial economic strangulation.

After the war, the conditions which now restrict the road program will no longer exist. The reverse of the present circumstances will be the rule. Where now there is shortage of building materials and equipment, there then will be a surplus. Where now all work must beg for labor, there then will be once more the need to provide useful occupation for workers otherwise idle. A national economy lifted far beyond normal to accomplish the destruction of our enemies will have to be eased back to a new plateau, lower than the war time peaks, but still well above the past level. The time will be propitious for the doing of things that in our depressed past we have not dared to undertake; and among these things, if we are ready, there can be a long start toward realization of the highways of the future.

To be ready then, we must get ready now; and we are beginning to get ready; but there is much to be done, and strong inertias to overcome.

The President has clearly seen these necessities, and he has appointed a National Interregional Highway Committee to draw the general outlines of a future program of highway modernization.

The Committee has viewed its task broadly, and it will shortly submit a report which, it is to be hoped, may serve as a sound basis for a coordinated planning effort by the Federal government and every State and the numerous cities, metropolitan areas, and counties that must participate in shaping and providing the new facilities.

Without anticipating the committee's report in detail, it may be expected that it will lay especial emphasis upon the necessity of relieving traffic congestion and supplying terminal and off-street parking facilities in the cities and metropolitan areas that are home to nearly half of the nation's population and commerce and industry. In each of these cities it will propose the planning of new express arteries radiating from downtown terminals, and such system of inner and outer distribution arteries as may be needed to provide adequately for the transfer of traffic from one radial route to another, both within and around the city. Extension of the radial arteries from each major city to its nearest similar neighbor will form a backbone system of primary rural highways of interregional importance, improvement of which to the requisite high standards the committee will propose as essential, subordinate only to creation of the needed metropolitan facilities.

Actually, the undertaking is more complicated than this statement suggests. Advance legislative provision is necessary for the creation of limited-access arteries, both urban and rural. Archaic State laws that now thwart all effort toward the acquirement of satisfactory and sufficient rights-of-way must be set aside for more liberal ordinances. In rural areas the planning of the highways must be accompanied by zoning provisions that will prevent the growth of string-towns, and encourage the development of efficient, and socially desirable land uses.

In the cities, planning of the new arteries must proceed hand in hand with the over-all replanning and rehabilitation of the cities themselves. There is danger in the arbitrary laying out of express highway and terminal facilities. Unwisely located, these improvements may improperly warp the city's development for years to come. The lay-out of street, terminal, and parking facilities should harmonize with solutions of such other pressing problems of the cities as the overcrowding of population, housing, recreation space, slums, and blighted areas, both residential and commercial. These problems cannot properly be solved singly. Nor will a uniform general plan for all cities necessarily be acceptable. Each city will present its own problems, which should be solved in a manner consistent with its particular circumstances.

The devising of measures for the financing of such improvements will not be easy, but it is a job that must soon be undertaken. The situation of the cities is especially difficult. Though their

need of the new highway facilities and other associated measures of rehabilitation is urgent in the extreme, their financial resources are at present wholly inadequate. Long carrying all their tax eggs in one real-property basket, their revenue has been gathered with increasing difficulty as the blight that now must be halted has spread to greater and greater areas within their taxing reach. There seems to be no alternative to Federal help, which probably may be most usefully extended at the initial stage of land acquisition, on terms that will permit repayment over a long period without interest, somewhat as suggested by the Public Roads Administration in its report "Toll Roads and Free Roads" in 1939.

Needless to say, such a program of post-war highway improvement is not the task of a year or two. To carry it out will keep us busy for many years to come. But, if developed now in some detail, it will be possible to accomplish it in part at a more rapid rate in the immediate jobs for much of the labor released by the shutdown of war industries.

A beginning of the planning is made possible by the authorization of an appropriation of $10,000,000 carried in the Defense Highway Act of 1941. This authorization has since been apportioned, according to the provisions of the Federal Highway Act, among all States, and the funds apportioned are now expendable in each State, when matched on the basic 50-50 plan with State money. The provision is not large but it is sufficient for a start, and it will not be made larger unless there is evidence of a desire and ability to use this first grant wisely and well. In the planning of highway programs as in all other undertakings, the way to begin is to begin, and the means to begin our post-war highway planning are now in hand. Let's use them.