HIGHWAYS AND THE NATIONAL DEFENSE

by Thos. H. MacDonald, Commissioner of Public Roads,
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Every crisis in our national life presents the opportunity for intelligent readjustment of our public policies, and compels from all citizens, worthy of the name, a wholly voluntary rededication of their first loyalty to the best interests of our country. In this twenty-sixth annual meeting of the American Association of State Highway Officials we focus our deliberations upon the broad fields of highway development and highway utilization, but with a new emphasis over previous years. At no previous conference in the long life of this Association, or during the more than a quarter century of State-Federal cooperation in road building, has the relationship of highways to the national defense become such a vivid reality. While there is considerable substance to support the conclusion that the entrance into, and the scale of participation in a national highway program on the part of the Federal Government, were in a large measure products of the first world war, there was then no very clearly defined conception of the defense functioning of highways, and certainly in a relative sense, no important development of a motorized transport or a mechanized army. During these many years the national defense argument has been liberally and loosely used in support of Federal road building appropriations with a complete lack of precise analysis of the potentials of defense utility. So now grave necessity presses for the reaching of national understandings, in particular among the highway officials,

and in general on the part of the public, upon this subject of defense highways. In a large measure it is a pioneer undertaking for which there are literally no precedents. This sweeping assertion does not overlook or underrate the significance of the German autobahnen. Neither is there any lack of a real appreciation of the true value of the actual accomplishment up to the present time, or of the original conception of the proposed system as a whole. The conception, it should be noted, of a national system of integrated highways for Germany, antedated by many years the Hitler regime.

In 1926 I was given the opportunity to go over in considerable detail the planning work then in progress in Germany, which envisioned not only an extensive system of national highways, but also revamped and enlarged networks of railway and waterway transport facilities. It did remain for the Nazi party in 1932, as one of the major undertakings of the new government, to motivate the construction of the highway system on an extensive scale and to continue at an accelerated rate until 1939. In that seven-year period the best information we have been able to secure indicates a completed mileage of about 2,000 miles now in service, and a considerable mileage in some stage of construction.

In 1936, and again in 1938, I motored over the completed work, usually in company with the German engineers in charge. Some sections under construction I inspected from the air, and some sections I rode over many times. I admired the bold, advanced engineering design, and was much impressed by the administrative and technical ability of the

organization, from Dr. Todt, the Inspector General, through his whole staff of principal assistants. The engineering technique and construction details, however, did not disclose any new engineering developments in a major sense. I was much more interested in the planning of the system as a whole, and in the underlying philosophy which guided the concept. As an over-all comment, none of the road designs departed from examples of modern divided roadways already existent in the United States. In certain construction methods there was departure from our practice, due largely to our extensive use of rubber-tired equipment and gas power rather than their use of industrial railways and steam power. Also, they were making extensive use of designs and methods, especially for bridges and viaducts, which utilized a very large amount of hand labor. These differences were readily understandable, and apparently fitted into their scheme for attacking widespread unemployment, which I accept as one of the major reasons behind the whole undertaking. This is contrary to the easy and somewhat uninformed statements so commonly expressed, that the German autobahnen were conceived and carried into execution wholly as a military policy. With this viewpoint I do not agree, and we miss the highly valuable guide to our own sound thinking in the formulation of future policies of road development, if we accept such a superficial conclusion. Here is an extract from my 1938 notes:

"One of the most important changes I note in the location and design policies and technique in the two-year interval since my last visit, is the introduction of more spectacular architectural and landscape features. While the landscape motive was early introduced,

the practice was of the more restrained and conventional types in smaller scale developments. The newer policies very noticeably are to plan locations near the industrial areas, and to screen by woodlands and topography the evidence of these great and now very busy cities and towns. The characteristic sight that marks industrial works, extensive and small, are the usually rather distant smokestacks against the skyline.

"Then in the country the roads are carried to high grounds to give sweeping views about the whole horizon of lovely nearby and distant fields, forests, villages of purely agricultural character, and streams. This policy necessitates high, long viaducts even for the crossing of rather small stream valleys. No attempt is made to hold the roads at any such elevation across the valleys of the major rivers. For the viaducts some very large scale stone arch and stone veneered construction has been developed. These are quite inadequately shown in the various pictures, since the scale of the most important structures is so large that adequate pictures are difficult. But there can be no question that the Germans are setting the highest mark in bold conception of their highway planning and design with very large scale freedom from precedent."

These comments were written while traveling over the completed work and inspecting many of the more spectacular bridges and viaducts and amazing road locations then in process of construction in Bavaria. They are quoted here in support of the assertion that the autobahnen, as their development progressed, were certainly not reflecting the character of purely military roads. It escapes probability that anyone

would so design a military highway that when built it becomes the most conspicuous large-scale object in the whole of the surrounding landscape. In addition to the spectacular characteristics which became increasingly apparent as the building progressed, particularly in southern Germany, there is another most important fact - that the sequence of the building program did not first complete long stretches of road in the strategically important areas. On the contrary, short stretches were undertaken at many different points, apparently where unemployment was highest. Even the idea to utilize road building to provide work for the unemployed antedated the Hitler regime.

Thus it is apparent that the original planning of a network of great highways to serve the German nation was a product of the pre-Nazi period when the motive was more dominantly civil use. It should be promptly added, however, that the influence of the General Staff is apparent in the general layout of the network, most notably in the route which follows the Rhine. Here the location is east of the river, running through rather adverse topography and relatively thin population areas, which takes the service of the new route away from the population centers west of the river but moves it farther from the border with its then threat of interference.

As a whole, therefore, it may be very definitely stated that the German autobahnen were planned to serve the civil needs with only occasional major departures from the conception where it appears certain the General Staff exerted a ruling influence. As a result, competent military authorities have concluded that were the original contemplated

network completed, (approximately less than one-half the first projected mileage is now in service) Germany would have highways of military value for defense against any conceivable combination of enemies. Of this I am not so sure, but it is certain that for offense purposes some of the completed routes have been of military value beyond price. Before, however, arriving precipitately at the conclusion that what Germany has actually accomplished in the development of these special motor roads, sets the perfect example for this nation to follow now, consider the absurdity of comparing the German situation of the moment with that of the United States.

With important construction stopped less than midway of completion of the first planned network of approximately 4,200 miles, the Germans do not have a national system of autobahnen for either military or civil highway transport. They do have certain highly adequate completed routes. With the drastic rationing of gasoline, the previously existing but relatively meager civil traffic has very largely disappeared. With the German nation engaged in a desperate offensive whose operations are largely outside the country itself, how can any rational evaluation of the autobahnen as defense utilities be formed? Finally, pre-war Germany is relatively so small it could be superimposed ten times or more upon the great expanse of the United States with ample margin. Most decidedly what has been done in Germany does not provide the pattern for us.

In Washington, the carefully considered opinion of those who are planning the ancillary defense programs outside the more purely military and naval activities, emphasizes the sustained sequence of

policies of production and of transportation that will cumulatively and rapidly build the nation to a state of internationally recognized preparedness. Such a program is not born of a parentage of hysteria and self serving. It is a determined and honest approach to national security through the acceptance of national responsibility - not alone by the Federal Government, but also by free individuals who may yet voluntarily unite through agreement upon sound policies. Had we been faced with the formulation of a highway program for national defense only two or three years ago, the necessary basic information was then seriously lacking. Now the way is clear. The State-wide planning surveys form a secure foundation for sound policies and provide the detailed information for effective and immediate action.

The happiest personal reaction which I obtain from this great national undertaking in which all of the States are participating with the Public Roads Administration, is found in the attitude I meet among the officials of the highway departments of professional sureness and confidence in their knowledge of the highway needs of their States, and the relative priorities of these needs. Thus, in the only way possible, the ideals of impartial and efficient service to the public have been lifted out of reach of selfish motives of both individuals and groups to a degree never before attained. The highway departments have now the facts, first to guide decisions, and second to support their decisions successfully before the all-important court of public opinion.

Cooperative traffic studies started in 1922, and these have been in progress in one or more States continuously for eighteen years.

All this time the technique of obtaining and the interpretation of the multiform data have been maturing from amateur into professional standards. There are now thoroughly sound engineering and economic principles of highway planning developed, which confound the quack doctors of highway policies. In the special field of the national defense, the first recommendations from the War Department as to needed highway routes came in 1922 with the production of the so-called Pershing map. During the intervening years continuous liaison has been maintained, and in 1938, in response to the joint request of this Association and the Secretary of Agriculture, the Secretary of War appointed a permanent committee under the chairmanship of Brigadier General Geo. V. Strong, to cooperate continuously upon all matters affecting the planning and development of highways important to the national defense. This committee, under the interested and competent leadership of General Strong, has restudied the previous recommendations, and after revisions and expansion has approved a basic network of strategic routes. Lt. Col. Paul E. Tombaugh, who represented General Strong before this Association last year, has continued to act as liaison officer and has in addition been most helpful in providing important information and arranging for contacts with officers in charge of other important activities affecting the design and location of defense highways. For roads serving military posts and reservations the Quartermaster Corps is in charge, and is extending complete cooperation, as is the Bureau of Yards and Docks of the Navy for similar roads for naval reservations.

Through all these activities, both the civil and the military highway uses and highway needs have been analyzed and reduced to

definitely planned conceptions. For the first time engineering and economic studies and conclusions have outstripped the financing of the job to be done. Yet this work of engineering ahead of the need is only well begun, and from now on the policy will be pushed vigorously. The expenditures made now for engineering will provide the greatest returns in certainty and economy of final costs of the long, necessary programs of highway improvement ahead.

It is now certain there are important changes facing us in the use of our highways. The degree of change will depend in tempo upon the developments of the wars in other countries of the world. But we can be sure of these new characteristics as a part of the daily life on our highways - troops on the march, transport trucks, motorized ordnance, increased local movements of automobiles and trucks around production plants, the highway traffic incident to training camps, and a step-up of miscellaneous highway traffic.

Since the defense policies now contemplate activities that will effect permanent changes in the traffic uses of the highways, it is important that provision be made to assimilate these changes, or more correctly, additions, with the least impact and inconvenience to the established and normal routine possible. This can only be accomplished by careful planning based upon actual purposes of utilization. Highways are not built for motor vehicles as such. Neither are motor vehicles built for highways. Both have been produced and are used for the purpose of performing a wide variety of services, regardless of all of the theories to the contrary which are turned loose for propaganda purposes.

On the concept only of the extent and character of the services required from motor transport does highway planning become precise in the desirable and authentic sense. From the defense angle the following classification is based upon the required service.

(1) Strategic network - rural - including interregional routes.
(2) Strategic network - urban - including extensions of the interregional system into and through metropolitan areas.
(3) Access roads - urban and rural.
    a. Army camps - mobilization points
    b. Navy
    c. Rail terminals
    d. Airports
    e. Industrial production areas
(4) Defense reservation roads
(5) Tactical roads

The strategic network - rural - as now approved, totals approximately 75,000 miles of the major roads of the nation, and includes the projected interregional system of approximately 30,000 miles selected on the basis of major traffic flow lines as reported in "Toll Roads and Free Roads." The proper conception of this network is not that of the exact roads as outlined, but rather of routes which will very likely consist ultimately of several roughly parallel roads, depending upon the particular section of the country in which they are located and the possible service requirements.

The strategic network - urban - consists of the extensions and important connections between extensions into and through the metropolitan areas of the strategic major routes of the nation. Here again the accent should be placed on routes rather than on single lines of highways. The mileage of this class is not now definite as a total, although for a number of the most important metropolitan districts a close approximation of the most necessary arteries is available. The total mileage will not be large, but the cost will be high.

Access roads consist of feeder roads and streets providing connections from the strategic network and other main roads to military and naval posts and reservations and air bases. Those serving industrial areas and plants and those serving civil airports, railroad terminals and depots.

There are approximately 2,000 miles, as of the present date, of roads serving military and naval reservations but outside of these reservations. All roads in this category are of immediate importance, with first priority attached to those serving the training camps which will be first occupied.

Reservation roads are those within military and naval reservations, of which at the present date there are approximately 1,300 miles. These also come in the category of immediate necessities.

Tactical roads are those within areas which will be used for large-scale training maneuvers.

The structural requirements to meet minimum military needs correspond closely to those which have been accepted as the minimum to meet civil highway transport needs. The H-15 specification loadings which have been standard over a long period for rural highway bridges are adequate to carry all military loadings which are proposed up to the present time. The 9,000-pound wheel loading for road surfaces provided the traffic is carried on pneumatic tires is in line with the capacity of standard highway pavements. As a result of the observations upon military training maneuvers which have taken place in recent months, the most apparent general lack in existing rural highways is the too

narrow shoulder widths. Some idea of the necessary program ahead is indicated by the fact that out of some 16,000 rural bridges upon the strategic network, there are approximately 1,800 designed for capacities less than H-15 specifications.

There is a large mileage of road surfaces to be strengthened. The present estimates include about 14,000 miles which may be increased materially when the effect of repeated applications of loadings approaching the maximum for which they are designed is considered.

It is not important to attempt a recital in detail now of the program of highway building and betterment that will be necessary to meet even the minimum requirements of civil and defense use. The President has requested Mr. Carmody, Administrator of the Federal Works Agency, to prepare a report upon the adequacy of our highways for the national defense in collaboration with the War Department, the Navy Department and the Advisory Commission. The members of this Association are cooperating in assembling the necessary data, and the report should be ready for submission in about thirty days. However, much progress is already being made due to the willingness of the State highway departments to proceed with surveys, plans and cost estimates for important access roads. Additional requests are going out to the departments which we hope will meet the same generous response. There are three agencies of the Federal Government which have the power to designate defense highways, - the Secretary of War, the Secretary of the Navy and the Advisory Commission. After conferences with the Post Commander or official in charge, the District Engineer of the Public Roads Administration submits a report as to the access roads needed for each

reservation, post or industrial plant, and recommendations as to priorities of improvement. This report goes to the proper defense agency through the Administrator for action. After formal designation by one of the agencies, the request for engineering then goes to the highway department of the State in which the defense project is located. Under the new highway legislation authority is granted to use Federal-aid funds apportioned to the States for engineering work required, including construction engineering if the State is unable for any cause to carry the costs.

If we may assume the willingness of the highway departments to make a quick job of the preliminary engineering work, the next step will be that of financing each project and then to award contracts.

Essentially the same procedure will be followed for roads of the strategic network - rural - but probably the Federal-aid funds will not be approved for project engineering. The accent will be on under-capacity bridges first, then the elimination of bottlenecks, the widening of shoulders, and the rebuilding of weak surfaces to adequate paved roadways.

It will be noted that a very large part of the work indicated under these categories is on roads required for civil use. While their improvement with the regular road funds would perhaps distort to some extent the normal program, the need justifies. For both classes, arrangements have been made with the Work Projects Administration to give preference to road projects that are included in the approved program.

Fortunately, the Commissioner for Transportation on the Advisory Commission, Mr. Ralph Budd, not only has a lifetime of experience in transportation problems of all classes, but his background is engineering, with his early associations and early ideals influenced by great engineers whose achievements are high in engineering tradition. We can count on Mr. Budd's support of a carefully prepared program following sound engineering concepts.

Administrator Carmody has authorized me to appoint the members of the Highway Transport Committee of this Association to serve in an advisory and liaison capacity in the formulation of policies affecting the defense highway program. This is indicative of the approach to all of the administrative and engineering problems on the part of the Public Roads Administration, and a pledge of the effort to continue to carry into effect the policies of reaching agreements with the States that will not jeopardize but rather will forward the present congenial and effective relationships. A meeting of this committee will be called for the very near future, probably in Washington, and a method will be found to secure the effective cooperation of the highway industry in all its phases by working through the American Road Builders Association and other organizations.

There is one category of highways which it will be noted has not been provided for in this discussion, and which in my judgment embodies the greatest problem now confronting the highway officials if we are to have really efficient highway transport. This is the problem of the strategic network - urban, - that is, the extension of free-flowing highways through the metropolitan areas. It is in

these areas that we may expect a rapid increase in local traffic which must be carried now upon highways already overloaded. Undoubtedly the State highway departments will be requested to make recommendations for the coordination and development of the important routes in these areas.

This final statement of policy is held to the last to accent its importance. The road building organization of the State highway departments must be used to carry on the active engineering and supervision of whatever program of defense highway improvements is undertaken. It will be the policy of the Public Roads Administration to hold steadfastly to the same type of cooperative relationships that have proven effective in the past, and that must be relied upon now. The greatest service that the State highway departments can render at the present time is to enter wholeheartedly into the common cause - that of national preparedness. From my contacts with the organizations and the individuals composing them over a long period I have full faith that their response will be prompt and generous and in the spirit of national unity.