THE HIGHWAY IMPROVEMENT PROGRAM IN RELATION TO THE CONVENTIONAL PUBLIC WORKS CONCEPT

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Traditionally, the popular concept of public works embraces highway improvements. This, in itself, might result in no adverse consequences were it followed by a breakdown of all public works into the deferrable and the non-deferrable groups, predicated upon the degree of essentiality of the service which each one provides or the purpose which each one serves. There has been, as yet, no accepted distinction. It is common to include all works directed and paid for by government in a single category, subject to the same policies.

The Elements that Control Construction

In a period covering little more than a decade, the nation has lived through two experiences reflecting the extremes in public works undertakings. The first of these was the result of the desperate efforts to supply employment during the depression years. Public works of many types were undertaken on a maximum scale virtually unlimited by the finances required. The second period was coincident with the war years when public works were severely limited to those serving the war effort. These two extremes in our recent national experience had this in common. The realized end product was determined by the human and material resources that could be, and were made available. These resources reduce principally to the elements of labor, management, equipment and materials.

Now we are in a third period, as yet more limited in time, but the postwar months have evidenced control of production by the same influences of available resources. While we worry about costs and the finances to meet them, it is evident that basically our ability to carry on a highway program rests on other factors. Since we started the postwar program, the criterion of contract awards has been the price index, but this is only a composite reflection of the meager availability of resources relative to the overall demands. While the contributing causes may be different, the current status of the program follows rather closely the pattern set in the months immediately following World War I. The Federal-aid projects put under way since the bars were taken down approximate 40 percent of our estimate of the program that would have matured with the funds available under normal postwar conditions. As it is, the progress compares favorably with the level reached in other fields. The evidence indicates that any further extension would not have been justified, since 28 percent of the projects are lagging due to deficiencies in one or more of the necessary elements. In general, additional awards would only have increased this percentage of lag.

With the close of the war, housing was rightfully accorded priority, and the highway officials have been faced with no criticism resulting from interference with the housing program. On the contrary, much assistance has been rendered this program by the extension of access roads to facilitate the production of building material, such as lumber. An even more important aspect of the interrelationship of housing and highways will be suggested later.

The Responsibility of Highway Officials

We are, as yet, a long way from being out of the woods, and in the many years of cooperative effort between the State highway departments and Public Roads there has never been a time when mutual helpfulness and tolerance were needed as they are now. This responsibility extends beyond the highway officials to include the major elements of highway users and industries which are the chief beneficiaries of a sound program of highway improvement. As public officials responsible for highway administration, it is our duty to inform the public at large, and more particularly the legislative branches of the State and Federal governments, of the problems currently confronting the integrity of our highway plant. Fortunately, to serve this purpose we have the factual data from the highway planning surveys. This attitude of responsibility to the public is a characteristic inherent in qualified public officials under any circumstances, but under the stress of present uncertainties it becomes an essential.

The executive departments of the States and of the Nation are facing difficult policy determinations. This is true also of State Legislatures. The Congress has adopted a reorganization plan that places highway work under the jurisdiction of a Public Works Committee which will, in the future, consider and determine the policies for all works supported by Federal funds. We can have full faith in the decisions that will be reached, whether these are executive or legislative determinations, if we, first, agree among ourselves upon a sound program and, second, marshal the convincing

and accurate factual data upon which our recommendations rest.

The Fallacy in the Theoretical Concept of Highway Improvements as Public Works

There is no purpose here to draw comparisons or to argue the relative importance of the various types of public works. This analysis concerns itself solely with highways and is designed to prove why the traditional concept of highway improvements as public works that may be undertaken or may be deferred is fallacious in the extreme. Government has undertaken to supply certain services which cannot be provided as private undertakings with private capital. All such efforts in the past have ended in failure or, at best, inadequate services. Among such government supplied services are sewerage, water, roads and streets, public schools and police and fire protection. These are all an inseparable part of our individual and community lives. They are to a large extent interdependent or complementary. They require certain continuing works of construction and maintenance that cannot be turned off or turned on to accord with some theoretical concept of using such works to fill the gaps if private employment lags. There can be, of course, a reasonable degree of acceleration or deceleration, but a going program must be maintained. The theoretical concept of such works as intermittent activities presupposes quite falsely that all private works and all private employment transcend in importance the health, the protection, the daily pattern of life of every community, large and small. He who realistically thinks through the daily, even the hourly, dependence of every individual and of every community upon all these services, will reject any such conclusion. The utter dependence

upon the roads and streets in the routine of our daily life has been doubly fixed by the advent of the motor vehicle, both passenger and goods carriers. Thus, highway improvements cannot be evaluated as public works. Their services must be measured in terms of saving lives, of preserving property values, of maintaining essential services, and of sustaining major industries. The too prevalent economic concept of holding back highway improvements to bolster employment, if or when unemployment appears, is a completely fallacious theory. It disregards the essential principle that the highway plant, like all physical properties, is constantly deteriorating. This fictitious concept, which has too long been unchallenged, fits well the definition of economic theory that draws "a mathematical precise line from an unwarranted assumption to a foregone conclusion." The only sound approach is to accept the principle that to avoid irreplaceable losses the highway plant must be continuously renewed and replaced.

The Highway Plant is Essential to our National Social and Economic Life

Adjusted to current values, our highway plant reasonably represents a $30 billion asset. There are (1945) 1,430,000 miles of surfaced rural highways and 220,000 miles of surfaced urban streets. This mileage provides a virtually continuous network for the movement of traffic, but it is composed of many thousand individual segments from less than one to more than thirty years in age. Basically, our problem is to keep this vast physical structure operating efficiently. It cannot be done without a large scale annual program of replacements and modernization, in addition to routine maintenance. Most fortunately, it is not necessary to beg the question. Down-to-earth research has

been a handmaiden to the highway administrator from the early inception of modern highway development. We now do not need to depend on broad generalization. The facts are available.

Service to the General Public

Just what do our highways mean today? First, consider their relation to the public in general. Total highway use skyrocketed from an estimated 55 billion vehicle miles in 1921 to 333 billion in 1941. This later figure represents a travel for each person of our total population of around 2,400 miles annually. What possible use of the highways and streets could add to this amazing total when considered in terms of this comprehensible figure of the average person's travel? To understand this, it is necessary to review what has happened to the pattern of daily life and the reorganization of our internal economy in every quarter of the United States.

Service to the Rural Areas

Total traffic is about evenly divided between urban and rural areas. Consider the rural areas first. No attempt is made to recite the whole story. The examples given are only indicative of the magnitude and range of the services the highways must perform for agriculture. There are approximately six million farms producing foods and materials for processing into clothing, building materials, and other products of commerce. In 1945, the production of 28 important farm items aggregated more than 177 million tons, a 37 percent increase over the average for 1936-1940. For the current year,

the record is expected to go higher.

Service to Agriculture

The first movement to market of substantially every ton of agricultural production is over the highways. Important percentages of these food products continue direct to the market and to the individual consumers. For example, 62 percent of the butter for the Chicago market is received over the highways; so is 85 percent of the fresh fruits and vegetables for the City of Los Angeles, and 96 percent of the live poultry for San Francisco. In 1944, when meat was so vitally necessary, more than 52 million head of livestock, which was 59 percent of the total receipts, came by the highways to 17 of our larger stockyards.

One needs to experience the scant supply and inferior grade of milk in other countries to appreciate what a luxury our dairy farms supply in copious quantity and at relatively low prices for us. In England, at present, or in India continuously, milk of good quality is simply not available for general use. How often do we pause to consider how many of the essential foods are made possible only through highway transport? When we have eggs for breakfast here in Los Angeles, as road builders we can claim a reasonable share of credit for their availability since 93 percent of the supply comes over the roads.

Rural education has rapidly embraced the school bus without much fanfare and without much recognition that it is the magic wand that has transformed the one-room district school to the graded

consolidated school, which also frequently serves as the community center. When such a predominantly agricultural State as Iowa has a motor vehicle for each 3.5 persons, this figure of 2,400 miles of road travel per year per person begins to appear reasonable.

Service to Urban Areas

But this is only the first half of the story. Until about 1917, the typical urban area was compact. There was only a moderate finger development into the surrounding areas along the extension of city streetcar lines. An example of what has happened since the general urban use of the motor vehicle is more concretely expressed by the example of the District of Columbia, which has a land area of 61.4 square miles. In 1915, there were only 8,000 motor vehicles; busses had not come into use, and 65 miles of streetcar track served the residents. A few lines of street railway extended through the District into adjacent Maryland. There were about 350,000 people, and excluding the 15-square-mile compact area, 50 percent of the remaining, that is, 23.2 square miles, was within one-quarter mile of the streetcar lines. Only 8.4 square miles of the area within this distance had been developed and that rather sparsely. Of the 23.2 square miles of more than one-quarter mile from streetcars, 2.8 square miles had been developed.

In 1940, with a population of 663,091, practically the entire useable area has been developed with no appreciable increase in streetcar mileage. There has been a large extension of public service by bus lines. The suburban area of Washington is considered about 130 square miles, of which about 31 square miles are in Alexandria and Arlington County, Virginia. In 1915, there were 43 square miles

within one-quarter mile of suburban streetcar lines, of which about 7.5 square miles were within one-quarter mile of these lines in Alexandria and Arlington. Some three-quarters of this latter area was developed to some extent, and about two square miles in the Virginia portion of the metropolitan area.

Since 1915, the streetcars have entirely disappeared from Arlington and Alexandria. The area between the radial routes first built up along the car lines now is largely developed into residential areas served entirely by motor vehicle transportation. At present, there remains only about five square miles undeveloped, some of which is in rough topography along the banks of the Potomac River. Thus, motor-vehicle transportation has increased the developed suburban area of Washington in Virginia from 9.5 square miles in 1915 to approximately 22 square miles at the present time. This development has been the result of filling in between the radial routes without an appreciable extension of the developed area until very recently.

This is typical of what has been going on in all metropolitan areas. The population of the central cities of 140 metropolitan areas increased by only two and a half million in the decade from 1930 to 1940, while in the same period the urbanized area outside the central cities gained almost three million. As a percentage, the suburban areas gained at a rate approximately three times as fast as the central area. But in many cities, there was an actual decrease of the population. The central city area of Boston lost 10,000 people, and the suburbs gained 53,000. Cleveland decreased 22,000 in the city

proper, and increased 42,000 in its outlying areas. While the population of the city of Detroit was increased 55,000, the metropolitan district increased 136,000.

Some have attributed this changing pattern of our cities to the motor vehicle. This is not true. The motor vehicle made it possible for the people to escape from decadent areas at the hearts of cities, but they did not create the conditions which forced the people to abandon these areas. The motor vehicle offered escape from intolerable conditions which had developed. This abandonment of the central city has created serious problems, of which more will be said later. The very existence of these problems, however, indicates the degree to which urban life has become dependent upon the motor vehicle, which means necessarily the maintenance of the highway plant.

The Dependence of Major Industries upon the Highway Plant

These are some of the facts of highway utilization. Just what do they mean to the industries dependent not only upon the maintenance of the existing mileage of all-weather roads and streets but upon its extension? Facing the future, there is one precept upon which there is general agreement. It is repeated over and over by high authority, not only in our own country but in other nations of the world. The one formula urged to defeat economic catastrophe is full production. In the United States, the highway plant is the principal support of a number of our major industries directly, and of a very considerable number more indirectly. Of these, the petroleum, automotive, and rubber industries are examples. Full production in these industries means nothing and cannot be sustained unless there is an equal consuming market.

We are proud of these great industrial empires. Yet, they could not exist without the highway plant. Conversely, neither would we have brought into service the extensive mileage of highways without the pressures created by the public demand to use the products of these same industries. So the two are mutually dependent and common problems need to be considered in this spirit.

The dependence of the petroleum industry upon the maintenance and constant expansion of the highway plant to furnish the major market for its products is dramatically shown by the growth in consumption of gasoline from 3.9 billion gallons in 1921 to more than six times as much, estimated at 24 billion gallons in 1941. This astonishing record of expansion of the market of motor fuels runs parallel and, in fact, outpaces the mileage of roads capable of carrying the ever-increasing numbers of cars that the public was eager to use as rapidly as even reasonably suitable facilities upon which to operate them were provided.

The total mileage of all-weather rural roads increased from 387,000 miles in 1921 to 1,385,000 in 1941. The mileage of high-type surfaces increased from 36,000 to 194,000 in the same period. The consumption of motor fuel increased six times, while the all-weather surfaces were increased between three and four times. This is explained by the increase in the use of the individual motor vehicle from about 4,500 miles per year in 1921 to over 9,000 in 1941. That the use of each motor vehicle was doubled reflects primarily the

growth of improved highways and streets that imposed less and less restriction on the freedom of movement of the individual owner.

Gasoline taxes, Federal and State, have increased steadily since the original Oregon law of 1918. A searching examination of the relation between the rate of taxes imposed and the individual State consumption of gas does not disclose the faintest evidence of restriction of the market from this cause. On the contrary, since the income from these taxes has been so large a factor in extending the mileage of improved roads, the conclusion is inescapable that the constantly growing market for motor fuel is a direct result of these taxes.

One of the most remarkable facts reflecting the importance of highway transport and its capacity to sustain the gasoline market is that the growth of the overall consumption continued through the depression, with the exception of two years, although the sales of new motor vehicles decreased to about 30 percent of the peak year, 1929, of 5,358,420 units. The motor industry at present does not have to worry about markets for its output. As a long-term matter, however, there are two areas which offer the best chance for increased sales, but the potentials of both of these for increase in car ownership are dependent upon the extension of road improvements. Unincorporated areas, as of 1940, supported only 168 cars per 1,000 population. At the other extreme, cities in the 500,000 and over class had only 183 cars per 1,000 population. For the same year, the average for all areas of the United States was 208 motor vehicles per 1,000 population. In California, there is the startling ownership of 355

vehicles per 1,000 population.

Assurance of the constantly increasing market for the output of the rubber industry is inherent in the constant upward trend in the mileage each vehicle is operated annually. In addition, one of the very important outlets is the growth in the requirements for heavy-duty tires in mammoth sizes, which have become standard in roadbuilding equipment. The fact may be noted that the efficiency of roadbuilding equipment, and even the type of design, have been controlled in a major way by the ability of the rubber industry to produce tires of the capacity and durability which make possible the larger units.

There can be no serious question as to the degree of dependence of the petroleum, the automotive, and the rubber industry for their major markets directly upon the maintenance and extension of the highway plant. Many other industries are directly or indirectly supported by this same plant. If there is any legitimate criticism of the State and Federal taxes upon the products of these major highway industries, it must rest upon the diversion, the dissipation, or the failure to collect equitably these taxes and to use the proceeds for highway improvement purposes.

In 1946, the total of all State and Federal imposts upon the road user amounted to no more than three-quarters of one cent per mile of travel. If the cost of car ownership and operation is no higher than four cents per mile, a figure far too low for a fair average, the highway cost would be only 18.75 percent of the operation cost. This

is less than the differential between operating cars over worn and rough roadways, as compared with the cost of operation over smooth roadways.

Present Trends in Highway Traffic

October of this year produced the highest volume of traffic for that month ever recorded for the United States as a whole. In the 11 Western States, the total traffic was more than 31 percent above the October 1941 counts, and on the main roads in California the increase was 45 percent over the 1941 volume, which was the previous highest October record. As compared with 1945 volumes, traffic in the Western States is up 23 percent; in the central regions, 25 percent; in the Eastern States, 26 percent, and on California main roads, 30 percent. Traffic in seven representative cities in October of this year showed volumes well in excess of the 1945 volume varying from an increase of 15 percent in Washington, D. C., to 34 percent in Santa Fe, New Mexico. This acceleration of highway use induces much foreboding on the part of the highway official confronted as he is with current limitations upon replacements and maintenance of the highway plant.

Highway Expenditures

Contrary to the tremendous increase in highway usage, highway expenditures have been declining for a considerable period. Even if we include WPA expenditures at their estimated production value, the total amounts for construction, maintenance, and administration of highways

are as follows:

For the 4-year period,	1923-1926	$5.9 billion
	1927-1930	8.0 "
	1931-1934	6.6 "
	1935-1938	7.5 "
	1939-1942	7.4 "

During the war years, this last figure fell off sharply. It may come as a surprise that the period from 1927 to 1930, with an annual average of $2 billion for all highway and street purposes, was the peak period of highway development. A constantly declining expenditure since has resulted in the accumulation of a backlog of several billion dollars in deferred construction expenditures, needed to replace the obsolescent condition of our main State highways, to provide facilities for relief of traffic and parking congestion in cities, and to make needed improvements on our principal secondary roads. Unless a given segment of road is resurfaced or reconstructed at the time when, by reason of obsolescence or structural deterioration it needs replacement, not only does it become an obstacle and a hazard to traffic, but it also becomes a financial liability in that maintenance costs become excessive and the cost of reconstruction, when the work is finally done, is likely to be unduly high because of loss of salvage value. Thus the very existence of the continually depreciating highway plant imposes on highway administrators and engineers the necessity to plan for a continuous, rather than a sporadic, program of construction and maintenance.

A pattern that is sure to be followed in many States has been set by the California highway study by a committee appointed by the California Legislature, Senator Randolph Collier, Chairman, which, after months of

thorough, detailed studies and State-wide hearings, is reporting a comprehensive plan for the redevelopment of an adequate highway plant for the State. There are a number of outstanding features of this committee which are worthy of emulation. It is a Legislative committee that will bring before the California Legislature the findings of representative members of its own membership. It has approached the problem of California highways from the standpoint of a State-wide integrated network serving every section, and it predicates its findings upon a long-range program. So important is this problem to the economy of the State, that Governor Warren has called a special session of the Legislature to consider the report of this committee. Highway officials throughout the Nation are looking forward with hope that this far-reaching report will receive favorable action by the law-makers of the State.

The Program for the Immediate Future

The highway construction program must continue at as high a level as is consistent with the availability of the component resources. It is certain that most of the required elements are as yet in scarce supply. The line will still have to be held on the basis of prices, which quite accurately reflect the ability of the contracting industry to deliver the finished product. It is apparent that high prices as such will not complete work. It is our responsibility to keep contract prices on a basis fairly comparable with costs. One of the elements that is seriously lacking in many States is sufficient competent engineers for the highway departments' own organizations. This is a serious drag on production, and the

situation will not be remedied until there is a decided upgrading in salaries. There are certain phases of the current situation that should be given special attention. Housing can be greatly aided by proper planning of highways, particularly in urban areas. It is probable that much emphasis will be placed upon large projects of the multiple-unit type because of the high cost of single dwellings. Such projects may be undertaken as part of the redevelopment of slum areas and the recapture of property values in decadent areas. Seven such projects are now under design or under construction in the City of New York. One of these, Stuyvesant Town, financed by the Metropolitan Life Insurance Company, is to have 8,773 apartments. Although the project is located within walking distance of centers of employment, thus reducing transportation requirements, a provision for motor vehicle transport is an essential part of the plan. One corner of the area fronts on an existing expressway, which is to be extended. Garage space for 2,400 cars is to be provided and off-street surface parking is to be available for 300 cars. Frontage roads encircling the development at the edges of the area are to be widened. This would have been impracticable because of cost were it not undertaken as a part of the overall plan. The interior streets will be closed.

Here in Los Angeles, is an excellent example of the problem of the metropolitan areas. The City has an actual corporate area of 452 square miles, but the urban area spreads over 600 square miles.

Within this area, there are 1-1/2 million people and 30 cities of 5,000 or more population. This situation is on an exaggerated scale perhaps, but it is more or less characteristic of the situation confronting all metropolitan areas.

Parking congestion on the streets and lack of off-street parking are gradually throttling the business district and the loss of property values can only be checked by major redevelopment of these necessary traffic facilities. It is hopeless to attack this problem of city traffic congestion by palliative measures, such as street widening. One well-designed, 4-lane expressway will accommodate the same number of vehicles at nearly twice the average speed as will five 40-foot ordinary streets on which parking is prohibited and under favorable conditions of traffic control for the intersecting streets. Under unfavorable conditions, it will require eight typical city streets 54 feet wide on which parking is permitted to serve the volume of traffic that may be handled more efficiently on one 4-lane expressway. The limited-access highway is the only possible means of coping with urban congestion, so far as moving traffic is concerned. Parking facilities must be made an integral part of the overall plan. This city problem in the States where it exists is so serious as to demand the full cooperation of State, urban, and Federal highway officials.

The serious lag in replacement of Federal-aid highways is indicated by the latest inspections. These show that of 187,557 miles, 27,218 miles or 14.5 percent, are in a condition requiring reconstruction.

This mileage has deteriorated with age and traffic, or the design is obsolete, resulting in unsafe highways. If this ratio holds on other highways maintained by State highway departments, of the 547,285 miles there would be 65,000 miles in need of reconstruction. How serious is this situation is indicated by the growth of maintenance costs to approximately $750 million this year. This illustrates very well the fact that if replacement is neglected, maintenance costs increase and we substitute the less efficient maintenance dollar for the construction dollar.

On the showing that the desirable safe capacity of a 2-lane road is 3,000 vehicles per day, on an annual average, there are in the neighborhood now of 14,000 miles which need to be stepped up to the 4-lane design, and these inadequate highways are on the main-traveled routes of the States.

Highway Safety

All of our efforts must be aimed at greater highway and street safety. Since the President's Highway Safety Conference in May, the downward trend of accidents has been most encouraging. The three committees contemplated by the program adopted by the conference have been formed or are in process of formation. The response of the Governors of the States and the highway departments has been splendid. These State safety conferences are the most effective organization of public and official support we have yet had and center the movement where it can be most effective. The conference committees and the State meetings have received encouragement and

material assistance from the Automotive Safety Foundation and other organizations dedicated to the cause of greater traffic safety. Motor vehicle administrators, the State highway police, and the highway departments are in their associations, and as individuals, devoting increasing efforts and are cooperating fully to advance the safety cause.

World Interest in Highways

This is an appropriate time for a word of appreciation to the highway officials of the States who have devoted time and attention to the engineers and officials who have visited this country to advance their knowledge of highway construction. During the past months, more than 32 countries have been represented by more than 150 representatives. There has just been formed a World Health Conference to cooperate with the United Nations. Dr. Thomas Parran, Surgeon General of the Public Health Service, who served as President of the conference, said in his address: "The fundamental freedoms can be realized only when the people are healthy and well nourished. Hunger and malnutrition stunt the bodies and warp the minds of a large number of the world's population. To attain freedom from want of food is another goal which we may hope to reach by pooling our nutritional knowledge with the food and agricultural efforts of the United Nations."

The experiences stemming from the construction of the Inter-American Highway in Central America are convincing that food is the

key to ability of the individual to produce and the major element in a better standard of living. This conclusion is confirmed by observations in many other parts of the world, but along with this is the equally ruling principle that transportation in the end determines whether people are or can be properly fed. Today, the ability of the United States to feed her own people abundantly and to share great quantities of food with other Nations is as much the result of a great transportation plant as it is of the production of the foods themselves. This transportation plant must be carefully and constantly improved. Every element, railways, airways, waterways, as well as highways, must be kept in efficient operation and economic health. We will get the best and most economical service if there is full cooperation between the different forms of transport. It might be desirable to broaden the contacts of this association with the railroads, now confined to the gradecrossing improvement program, to include other matters of mutual interest. England has just introduced a measure designed to nationalize all forms of transportation. Serious questions immediately arise. We will certainly be wise if we leave transportation as it is in this country and perfect the services through cooperation. On the world front, the highway officials, the technical staffs, the highway industries can be certain that the methods and processes they are developing and providing are to be a major contribution to the rebuilding of the shattered social and economic world structure.