

## Relation of the Highway Program to the National Economy

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### The Early Transport

The pattern of our daily range of activities, nation-wide, is largely fashioned by our available transportation. Moreover, this has been true since the earliest colonial days. Our nation is built on transportation. While yet large areas within our present boundaries were claimed by, and rendered homage to, dominant nations of the old world, from the first settlements on our coastal waterways, the pioneers slowly worked their way inland. In the van were the hunters and trappers. Transportation was by boats along the major streams and their tributaries until the possibilities of these waterways were exhausted. Still in pursuit of fur, they struck out overland with packs on their backs, or horses obtained from friendly Indians served to carry the men and their supplies and the pelts taken in their hunting. On the heels of the hunters came the settlers hungry for new lands on which to establish homes. Oxen and horses drew their meager possessions over trails and across the many miles of wholly undeveloped, uncharted, unlimited areas. The discovery of gold in 1849 at Sutter's Saw Mill in California changed the tempo to that of a stampede to the West Coast. Providentially, as it seems now, the placers and mines quickly provided the financial support for the foundations under the permanent structure of our now fabulous western empire. Wealth was found by the few, but the sagas of these early migrations

are for the many the record of hardships, of physical exhaustion, of tragedy. The courage and faith of these pioneers are a rich heritage that we can well remember now.

### The Advancing Stages of Transport

From these early days the unfolding of the nation presents a panorama of transportation in the making. It is not difficult to visualize the step-by-step progress, for in other countries there are counterparts reflecting every stage of transportation development in the United States. The Alaska highway was built through territory where transportation previously was confined to the waterways or to dog sled when the ground was frozen. The pack trails of Central America yet serve major areas. The bull carts of India are the most common forms of transport for local use.

The rapidly growing demands of this vigorous new country for more adequate transport soon outgrew the potentials of the Conestoga wagon and the prairie schooner. It has been consistently true that when the nation's possibilities for growth were not satisfied by the existing types of transportation, a new one has been placed within our reach, so with the development of the steam locomotive it was a logical sequence to embark on an extensive program of railroad building. In 1869 our East Coast was connected to our West Coast by bands of steel. It was this urgently needed physical bond and the rapidly extended railway net that made possible the uniting of many States into a single great nation. For transportation other than local in character we depended upon the railways until the coming of the motor vehicle in 1893. This was followed in 1920 by

the first scheduled airway operations. A new and enlarged waterway traffic has been made possible by extensive river and harbor improvements, and the transportation of gas and oil by pipe line has grown to great volumes.

### Current Competitive Frictions

All this transportation expansion has taken place in a relatively short time, but has consistently paralleled the nation's growing strength. The United States has all of the recognized efficient types of transportation in operation from coast to coast and from Canada to the Gulf--so all-pervading and so efficient there is no other so extensive area in the world that can compete even meagerly with either the quantity or quality of our transport facilities adapted to every need. With the caution that statistical data for major elements are very limited, a tentative estimate indicates above 925 billion ton-miles and more than 1,000 billion passenger miles are now used annually. The claim for a place in the sun by the newer transport types leads to many acute problems that are inherent in vigorous competition. Some of these problems are marginal, that is, the frictions are produced by a relatively small percentage of the sum total of operations that might be handled in more than one way. There are other problems of competition between different types of carriers that are more fundamental. Some of our difficulties--perhaps the major one--in arriving at correct public policies with reference to transportation, are caused by our failure to establish a true standard of value. The divergent qualities of the service characteristic of the different types are not readily comparable, and we have no unit of measurement that gives relative values. For example, the unit of a ton-mile is used generally

to establish not only the magnitude but the relative importance of the various types of transport service, but a fixed quantity of ton-miles may be built up by many tons moved a few miles or a few tons moved many miles. The ton-mile is a measure of work done somewhat similar to the foot-pound, but is not a true measure of value to the public of transport service. Many conditions must be taken into account in determining value of service. There are the long-distance and the local services, the heavy and the light, the slow and the fast, the high-cost and the low-cost commodities, the movement of perishable and of non-perishable foodstuffs; there is the movement of livestock and of processed meats;-- in toto, the movement of persons in their multiple activities, and the movement of goods of the many categories. We cannot hope to cope with the problems of fair competitive transportation until we establish a correct measure of value, or more likely a number of units that, in combination, correctly reflect the value of the different types of transport when used for each of a wide variety of services.

These and many other considerations make the establishment of equitable conditions under which the different types of transport may operate, a highly difficult undertaking. The difficulty should not be permitted to delay the correction of manifest unfairness affecting any type of transport or the equality of opportunity between competitive types. For example, the railroads are now handicapped by a multitude of legislative restrictions and limitations that were imposed by both State and Federal legislation on the theory of regulating monopoly. The lag is serious in the recognition that rail monopoly has ceased to exist in its former significance. There are other legislative controls which impose

upon railroad management operating difficulties which place them at a disadvantage competitively. Currently the Interstate Commerce Committee of the Senate is making a detailed study of transportation of all types with the purpose of formulating corrective legislation. Policies of the Federal Government should be such as to encourage each form of transport to perform the services for which it is economically suited. Each type has an extensive field of service which is not interchangeable with other types without loss in some form.

#### An Increase Not Decrease of Transport Required

Under existing conditions there is one conclusion that may be reached without question. No decision or steps may be taken safely to decrease the available transportation of all types now used in production and commerce; rather, the opposite course must prevail. More transportation, rather than less, must be encouraged. Because of the essential relationship to production, the amount and quick availability of all types of transport are an increasingly important element of national strength. Natural resources, mechanical power, manpower, industrial and agricultural production potentials,--all are impotent without transportation. Decisions as to production quotas are, consciously or unconsciously, made upon the assumption that adequate transportation will be provided.

#### Policies That Should Not Be Repeated

In the field of highways and highway transport, out of our past experience there are two policies characteristic of the war period that would be disastrous if repeated now. The first of these was the inclusion

of highways in the order to cease construction unless certified by control authority. The second was the disregard of State legal load limits, particularly axle weight concentrations for military hauling or claimed military cargoes. Each of these two policies was advanced on the theory of aiding the defense program. The resulting difficulties of highway administration and the unnecessary highway depreciation of the war years need not be reviewed here. It is important that the policies to be adopted now shall be adjusted to existing conditions. Those who carry the heavy responsibility of national policy have repeatedly stated the position that to keep the nation strong, the national production must be increased and the national income must be maintained at high levels. These conditions must continue not for a brief period but for an indefinite time. There is no security in any other course, either for ourselves or for those nations that are dependent upon us for substantial assistance. Readjustments in, and accents upon, different phases of our economy will be needed. Secretary Sawyer of our own Department of Commerce said recently, "Serious shortages, heavy taxes and problems of inflation, will tax our ingenuity and self-control and strength to the utmost, and this will go on for years."

#### Major Changes Affecting Highway Transport

The highway construction and maintenance program bears an essential relationship to a sustained capacity for increasing both production and national income. For confirmation it is only necessary to look at some of the major changes that have taken place in the pattern of our national life since the beginning of World War II in 1941. While many

changes are reflected in the new census, those exerting the most important pressures in the new demands on highway transport are:

First, the decentralization of industry. The expansion of productive capacity has in many cases been moved to new and perhaps distant locations from the parent plants. The integration of the different units requires a largely increased amount of transportation.

Second, the manufacture of parts and materials has been increasingly distributed among many subcontractors operating smaller plants. The initial movement of raw materials and of the finished products for assembly takes more transportation.

Third, there has been a rapid shift of population from the older central city to satellite communities extending into what were only recently farm areas. This year's startling production of around 1,300,000 new nonfarm dwelling units are in large part built in these satellite communities, and each new home unit builds a new increment of demand for transportation. It is this shift in the population pattern that has produced the fantastic volumes of daily ebb and flow of highway traffic between the parent city and the satellite communities.

Fourth, there has been a surprising migration of population to the West Coast--perhaps the most spectacular recent change in our national pattern of population distribution.

Fifth, between 1940 and 1950 our population has grown to 150,697,000,--an increase of 14.5 percent. Our registration of motor vehicles will reach this year above 48,000,000,--an increase of 49.6 percent since 1940.

Our greater dependence upon highway transport inherent in these major changes which have taken place in the ten-year period since 1940 is apparent.

These and other causes have resulted in the pyramiding of highway traffic in a manner that has defied statistical analysis. The projection of the curve of traffic growth by conventional methods has fallen about five years behind the actually experienced traffic volumes for the nation as a whole. For specific highway routes the estimates are more than ten years behind. That is, by the normal methods of forecasting traffic we arrived at traffic volumes for 1960 that are actually reached before the end of the year 1950. The important relationship has been disclosed in the research studies of the Bureau that the upward trend in highway traffic expressed in terms of vehicle-miles closely parallels the upward trend of the national income expressed in terms of a constant dollar. The parallel relationship has been remarkably consistent for the past twenty years, since the nation was well supplied with motor vehicles, save for the war years when controls were applied to motor fuels.

The fundamental principle emerges, that in every dollar of national income there is an increment of transportation. To hold national income at current levels it is necessary to hold transportation at the same levels. To increase national income it will be necessary to increase transportation. This does not mean transportation of one type, but transportation of all types. This statement of course includes both the traffic demands created by the upward trend of national production and the multiplied activities of the defense establishment. There are sufficient



evidences all about us that the whole of transportation as now operated is not adequate to absorb an increasing transportation consumption. The symptoms are recognized but the disease has not been diagnosed. An initial allocation has been made by the National Production Authority of steel for the production of new freight cars at the rate of 10,000 per month. Traffic congestion on our highways and streets with attendant delays in every city, and a shocking upward turn in ~~the number of~~ fatal accidents, reflect with certainty the inadequate capacities of our highways and outmoded design for the traffic volumes. We must make a realistic appraisal of the transportation facilities as they have been affected by the conditions of the critical ten-year period 1940-1950. For the first five years, far from maintaining the level of transportation facilities by required replacements, both roadways and rolling equipment were being depreciated. The recovery in the second five years has not met the increasing demands for transportation by the upward trend of our national income. It must be accepted as an axiom of an expanding economy that there must not only be an adequacy, there must be a margin of transportation available, in excess of net requirements. The reasons for this are: first, it is impossible to realize the theoretical capacities; and second, there can be no precise geographical balance maintained of available facilities.

#### The Nature of Highway Transport in Relation to the National Defense

The military requirement of first significance is the availability of a limited network of highways, interstate in character, adequate for the movement of military personnel, equipment and supplies. The system must include urban arterials and connecting access roads for defense establishments.

Of much greater volume consequence is the use of highways for civilian transportation services directly connected with the military effort and in support of ancillary civilian activities.

In a sustained defense effort the highway system assumes increasing importance reflecting the advancing degree that civilian activity is directed toward one objective. The extent of our dependence upon highway transport now can be best measured by reference to specific uses. Perhaps the most important of these is the food supply services.

#### Fruits and Vegetables

In 1949, forty-eight percent of all fresh fruits and vegetables moved to the markets in 11 large cities by truck, representing 303,166 carloads. This proportion ranged from 26 percent in Chicago to 76 percent in Atlanta and 85 percent in Los Angeles.

In the same year slightly more than the equivalent of 200,000 carloads of fruits and vegetables were unloaded in New York City, of which 35 percent was received by truck. A study of seven selected kinds of commonly used fruits and vegetables received in New York, representing 45 percent of all truck receipts, indicates that 80 percent come from States within 200 miles of New York City and 10 percent from States 500 miles or more distant.

The average receipts by truck at the markets of New York, Boston, Philadelphia and Atlanta, amounted to 36 percent of the total receipts in the five-year period preceding 1941 and 41 percent in 1949.

## Milk

Practically all small cities and towns and many of the largest cities receive all of their fresh milk by truck, and in all the other large cities a large portion of milk shipments is received by truck. Seventy-nine metropolitan areas of 50,000 population and over receive their entire fresh milk supply by truck. This list includes such manufacturing and industrial centers as Buffalo, Detroit, Cleveland, Los Angeles and St. Louis.

In 1949, 95 percent of all milk was shipped to Philadelphia by truck. New York City receives an appreciable quantity by rail, but truck receipts have increased from 37 percent in 1934 to 81 percent in 1949. In the five-year period preceding 1941 an average of 281 million gallons of milk each year were received by truck in New York, Boston and Philadelphia,--56 percent of the total receipts. In 1949 truck shipments had increased to 506 million gallons,--78 percent of the total receipts.

Regardless of ultimate market and method of transportation, initial movement of all foods from the farms is over the highways, and our present collection, processing and delivery methods are geared to the use of motor transport.

## Livestock

Sixty-one million head of livestock were received at 17 large stockyards in 1922, of which seven percent came by truck. In 1940 total receipts were over 52 million head and shipment by truck accounted for 62 percent of all livestock received. The proportion of the total receipts in 1944 was 59 percent, and trucks carried eight million head more than in 1940.

Total receipts at all public stockyards in 1949 were 74 million head of which 50 million or 68 percent were by truck.

The extraordinary increase in the operations of the very numerous meat packing plants which only a few years ago had an extremely limited output, is due in large part to the character of highway transport that saves shrinkage in weight of livestock between the farm and the processor. There is also the factor of an assured regular supply needed for economical operation of the plants.

#### Population Distribution

As population has increased, the proportion residing in metropolitan areas has also increased, until in 1950 it represents 56 percent of the total.

Until 1930 urban population was largely contained within established city limits. Preliminary estimates of 1950 population for 168 metropolitan areas show a 13 percent increase in "central city" population over 1940, but a 35 percent increase for that part of the metropolitan population outside the "central city." More than four-fifths of the national population increase in the period 1940-1950 took place within the metropolitan areas, where population increased from 69 million to almost 84 million. From this population comes most of the manpower employed in industry and manufacturing, which moves to and from work each day and on which the industrial economy depends.

The recent growth of metropolitan areas outside the central cities is a result of the availability of highway transportation. As cities spread, their outlying areas have become more dependent on the private

motor vehicle, the motor bus and truck. Without highway transportation the production in any city would be severely reduced. Our national economy, whether directed toward peace or war, is today so geared to the highway that any severe reduction in highway transport would be crippling.

#### Over-all Use of the Main Rural Roads

The following schedule indicates the growth in the use of our main rural roads, that is, the roads generally under the jurisdiction of the State highway departments in the period 1940-1950. The use of these highways has increased, as measured by vehicle-miles, 60 percent, and as measured by ton-miles of carried loads, by 112.3 percent. It will be noted that the highest percentages of increase in ton-miles carried are in the States which are not well supplied with heavy duty roads.

VEHICLE-MILES AND TON-MILES ON MAIN RURAL ROADS

CENSUS DIVISIONS	VEHICLE MILES <sup>a/</sup>			TON-MILES OF LOAD CARRIED BY TRUCKS AND COMBINATIONS		
	1940 (billions)	b/ 1950 (billions)	Percent Increase	1940 (billions)	b/ 1950 (billions)	Percent Increase
1. NEW ENGLAND	6.3	7.9	25.4	1.7	3.0	76.5
2. MIDDLE ATLANTIC	15.8	23.4	48.1	6.8	12.3	80.9
3. SOUTH ATLANTIC	16.6	25.6	54.2	8.2	14.6	78.0
4. EAST NORTH CENTRAL	21.7	34.2	57.6	9.8	21.0	114.3
5. EAST SOUTH CENTRAL	6.6	12.3	86.4	2.6	7.0	169.2
6. WEST NORTH CENTRAL	13.8	20.0	44.9	5.5	11.4	107.3
7. WEST SOUTH CENTRAL	11.8	21.8	84.7	4.1	11.2	173.2
8. MOUNTAIN	6.2	11.3	82.3	2.4	7.0	191.7
9. PACIFIC	11.0	19.2	74.5	5.2	10.8	107.7
TOTAL	109.8	175.7	60.0	46.3	98.3	112.3

<sup>a/</sup> For all vehicles.

<sup>b/</sup> Estimated.

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| <p>1. NEW ENGLAND<br/>Maine<br/>New Hampshire<br/>Vermont<br/>Massachusetts<br/>Rhode Island<br/>Connecticut</p>   | <p>4. EAST NORTH CENTRAL<br/>Ohio<br/>Indiana<br/>Illinois<br/>Michigan<br/>Wisconsin</p>                                  | <p>7. WEST SOUTH CENTRAL<br/>Arkansas<br/>Louisiana<br/>Oklahoma<br/>Texas</p>                                   |
| <p>2. MIDDLE ATLANTIC<br/>New York<br/>New Jersey<br/>Pennsylvania</p>   | <p>5. EAST SOUTH CENTRAL<br/>Kentucky<br/>Tennessee<br/>Alabama<br/>Mississippi</p>  | <p>8. MOUNTAIN<br/>Montana<br/>Idaho<br/>Wyoming<br/>Colorado<br/>New Mexico<br/>Arizona<br/>Utah<br/>Nevada</p> |
| <p>3. SOUTH ATLANTIC<br/>Delaware<br/>Maryland<br/>District of Columbia<br/>Virginia<br/>West Virginia<br/>North Carolina<br/>South Carolina<br/>Georgia<br/>Florida</p> | <p>6. WEST NORTH CENTRAL<br/>Minnesota<br/>Iowa<br/>Missouri<br/>North Dakota<br/>South Dakota<br/>Nebraska<br/>Kansas</p> | <p>9. PACIFIC<br/>Washington<br/>Oregon<br/>California</p>   |

## The Nature of Our Highway Improvement Program

It is apparent from the foregoing that the highway improvement program must not be confused with an optional public works program. It is true that in the period of large unemployment road building was one of the methods used to provide employment, but we have a wholly different situation now. With employment at the highest peak it has ever reached, the problem now is to keep the highway plant in condition to service employment at present or even increased levels. The post-war Federal-aid highway program, including the completions for the present calendar year, total an estimated 83,700 miles of improved road mileage. In addition, the State or State-supervised improvements built without Federal assistance should reach about 97,000 miles by the end of the year. The total of these two operations standing alone is an impressive figure--an average of just under 36,000 miles of improvements per year for the past five years. These mileages are not "new roads." They are replacements of small fractions of our total highway plant that have depreciated to the extent they are not usable economically by the greatly increased numbers and weights of the traffic. The rehabilitated sections had largely become economic liabilities which could not be maintained in safe condition even at costs leading to bankruptcy of road funds.

Because of limitations of rights-of-way, bad alignment and other handicaps to modern construction standards, some sections are placed on new locations, but these are to serve an existing flow of traffic. The major reason for choosing a new location is the impossibility of caring

adequately for the traffic already existing on the present location. The present job is not one to provide employment or to build "new" roads. It is to keep a vast highway plant in reasonably fair operating condition by replacements of worn-out or obsolete sections.

### The Known Deficiencies of the Interstate System

The report on Highway Needs for the National Defense, dated June 1949, prepared at the direction of Congress and with the cooperation of all State highway departments, revealed the extent of the deficiencies in the National System of Interstate Highways with respect to normal civilian needs as well as requirements of the national defense. On the basis of 1948 prices it was estimated that \$11,266,000,000 would be required to bring the entire 37,800-mile system up to standards desirable for 1948 traffic.

One of the most serious deficiencies both with respect to current civilian loads and possible military requirements is the condition of the bridges. Of the 12,048 bridges carrying the routes of the system, only 1,607 were of the H20-S16 design or rating. While 2,207 other bridges were only slightly deficient, being of H20 design, 8,234 bridges were definitely deficient in carrying capacity. Some of those adequate in structural strength were deficient in vertical or horizontal clearance.

The type and width of surface, gradient, curvature and sight distance, all are important in traffic capacity. In this report of 1949 the average age of all surfaces on rural sections of the system is 12 years, and many of course are much older. The roadways on which they are laid average 17 years in service. Thus the average mile has a surface designed



in 1937 on alignment and gradient last improved in 1932--a most significant fact in view of the growth of traffic since those dates. It is estimated that by 1959, 18,220 miles in service in 1948 will wear out.

In rural areas 9,520 miles of two-lane road existing in 1948 required widening to 24 feet to meet the accepted standard. Another 875 miles of two-lane road need conversion to four lanes, and 1,350 miles then surfaced with three or more lanes undivided, should be rebuilt as divided highways. Similar deficiencies existed in shoulder width, an element most important both in safety and capacity of the highway.

There are other deficiencies including too sharp curvature, excess gradients and particularly inadequate sight distances. The highways which make up the Interstate System carry the heaviest traffic on a nation-wide basis, and are the roads upon which our chief reliance must be placed in any period of emergency. They are in the condition of inadequacy today for two reasons. The rehabilitation program has fallen far below the growth of traffic, and the depreciation has been accelerated by overloading, particularly during the war years. The known deficiencies as detailed here for the Interstate System are typical of conditions on a large part of the remainder of the main rural roads, and the relief of intense traffic congestion in the metropolitan areas by controlled access arterial highways is only in its initial stages although some notable progress has been made.

#### The Problem Now

We know there are two general classes of traffic for which the roads must be maintained continuously in adequate operating condition.

These are the traffic indigenous to the military establishment as such, and the very much greater civilian traffic which stems from the increased defense production, plus the traffic normal to the civilian economy. There are many localities in which the military traffic will be substantial, and we can expect the movement of many convoys. Such traffic is visually military in character, and perhaps the average person thinks of such movements as the sum total of defense traffic. Were this the case the highway problem would be relatively simple. On the contrary, military traffic, as such, is a very small percentage of the traffic set in motion by the defense plus the civilian economy. The highways must carry a tremendous traffic incident to the food supply of the nation, transporting man power, hauling raw materials, and functioning as a part of the production line generally throughout industry. In these services there is no glamour, nothing spectacular, but the nation's production could not function for a single day without them. Neither could other types of transport, for the highways are essentially complementary to them and serve as the sole collection and distribution facilities. The question then becomes--what kind of a program is necessary to keep the highway plant functioning? Since our highways start to depreciate under heavy traffic as soon as they are placed in service, there are only two possibilities of holding them in service. The first is maintenance, and the second is reconstruction to standards adequate for the volumes and weights of the traffic expected. This means a balanced program of these two operations which reasonably should be based on a ten-year period. At the rate of replacements of the obsolete roads under

the control of the State highway departments for the past two or three years as an average, it will require a period of 20 years to rehabilitate these systems. If this 20-year period is added to the average age of the roads today, it must be obvious that maintenance cannot possibly hold these roads in service. For our principal rural roads then, a program of replacement approximating the current rate is the minimum that can possibly keep them in even reasonable operating condition. Added to this is the fact that maintenance costs, particularly in the States of heavy industrial traffic, are ranging upwards to \$5,000 per mile per year for every mile under State control. Again an approximate figure for maintenance cost as an average for the country as a whole is 84 cents per mile per year multiplied by the average daily traffic intensity. These figures are not held to be precise, principally because of the very wide spread between minimum and maximum per-mile maintenance costs. Yet they are indicative that our highways cannot be held in service by maintenance without a substantial annual replacement program for both engineering and financial reasons.

#### The Formulation of a Program

We do not know now what controls may necessarily be imposed. We do know that some materials, particularly steel, will be in short supply. Secretary Sawyer has designated the Bureau of Public Roads as the claimant agency to present to the Department of Commerce the requirements of materials for all highway construction and maintenance, including urban streets constructed with or without Federal aid. We expect to discharge this responsibility with vigor and dispatch. Fortunately, the road

program does not require the more critical materials, and there should be available sufficient steel, since so limited a percentage of our total production is required. The governing rule that as a matter of responsible public service must be applied by every highway official, is to direct the funds, the materials, equipment and contractors' organizations available into the program of construction projects selected on the basis of accurate knowledge of the service they must perform, of their condition, their cost of replacement, and the amounts of critical materials required. There must be a determination of whether each project can be held in service over a period of ten years by maintenance, or whether reconstruction will be required within that period. If reconstruction is required the priorities must be fixed by providing the most important services first. This means an intensive continuing highway planning operation in each State, with the first duty an inventory of condition and traffic service required. This business of keeping our highway plant in operating condition is a great and serious responsibility. The responsibility rests most heavily upon the operating unit in each State--the State highway department. The essential quality of the highway plant in efficient operation carries with it a great opportunity for public service--a public service that will require faith and courage. The performance, no matter how effective, will be largely unsung. Undoubtedly there will be criticism, but there is also the possibility of an inner satisfaction that can come only from the knowledge of a duty well performed.