

Review of the Postwar Highway Program

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We have a highway plant to keep in operation. This is a fact, not a theory. The 24-hour, every-day services produced by the improved highway and the motor vehicle, inseparable as a working team, are universal in extent and essential to our national functioning. A high official of one of our leading railroad systems stated recently that if highway transport were to cease suddenly the whole system would be jammed within one week beyond effective operation. Surely there is no need to inventory from A to Z the inescapable evidence of the extensive degree to which the pattern of our economy is influenced by, and dependent upon, highway transport. It does seem necessary patiently to reiterate the inherent distinction between public services that cannot, and public works that can, be made subject to discretionary timing. Public services must be kept in continuous operation. For highways, only two methods are possible: the first of these, strictly limited as to the length of time it will prove even reasonably effective, is intensive maintenance; the second is replacement and improvement by construction. This is probably equally true of any industrial or agricultural plant.

Just what is meant by the highway plant? In terms of total mileage, the highways and streets of the nation are adequate. There are sparsely populated areas, submarginal for agricultural purposes,

in which the mileage legally rated as public highways should be reduced. Some additional highway mileage will be required, but this is so small it can be absorbed in the overall figures, and will be largely due to the relocation of important highways and the opening of arterial streets or expressways in urban areas. The mileage of new roads is inconsequential. All of the highway construction work is being done on roads that are now in service, reported as about 800,000 miles of surfaced roads under jurisdiction of the State highway departments and the local authorities, county and urban. This total is less than one-third of the overall mileage rated as public roads. It does carry the major traffic of the nation. The following is quoted from a discussion before the American Association of State Highway Officials in September last. "As the Federal aid primary and Federal aid secondary systems expand from the 590,000 miles now included in these two systems to reach perhaps in a period of ten years as much as 750,000 miles, they will embrace one-quarter of the total rural road mileage, but that one-quarter will provide almost 90 percent of the entire service."

For the sake of this discussion, then, suppose we say that the highway plant that must be kept in operation daily is substantially 800,000 miles. We do not have complete information as to the rate at which this whole mileage deteriorates beyond a reasonable condition for use, but we do have a close approximation of the life expectancy of the roads included in the primary Federal-aid system, amounting to 232,000 miles. Based on the experience records of 35 States, a large mileage of these highways annually are in need of replacement if they are to be kept in public service. This principle has been well expressed by the Economic Report of the President of January, 1948.

Somewhat elaborating the details of that statement, maintenance and traffic records indicate that within the eleven-year period from January 1, 1947, to January 1, 1958, the following percentages of existing road surfaces on the primary Federal-aid highway system in rural areas will have to be repaired, rebuilt or improved:

	Existing	Improvement required	
	Jan. 1, 1947	by January 1, 1958	
	Miles	Miles	Percent
High-type surfaces	107,000	49,200	46
Intermediate-type surfaces	79,000	56,900	72
Low-type surfaces	23,000	23,000	100
Graded and drained and unimproved	<u>8,000</u>	<u>8,000</u>	100
Total	217,000	137,100	

The total indicated surfacing need on the primary Federal-aid system in rural areas only is 137,100 miles or about 12,450 miles per year. A similar estimate for the 14,000 miles of the primary Federal-aid system in urban areas shows an annual resurfacing requirement of 650 miles, making a total for the primary system of 13,100 miles annually. On the basis of the best data available it is estimated that the annual resurfacing need on the Federal-aid secondary system will approximate 27,000 miles. Combining this figure with the 13,100 miles replacement on the primary system, the total for all Federal-aid highways is approximately 40,000 miles annually.

On the basis of the principle that continuous highway service is non-deferrable, and that we can keep highways in operation only by two methods, maintenance or replacement, it must be apparent that under existing conditions, such a large construction program is extremely impracticable and the only possibility of highway service on a continuing basis is a wise combination of intensive maintenance and a conservative construction program.

As the most important guide to the framing of the 1948 highway program, with a knowledge of the level of replacement that ought to be reached to keep the highway plant in operating condition, a critical examination of the accomplishments of the 1947 highway construction program is the best guide to the production we can expect during the current year, and indicates the major degree to which it will be necessary to rely upon maintenance. Maintenance itself, however, it will be shown, is no better and no more economical an answer than

replacement by construction to the extent that actually matured construction is possible. To serve traffic adequately then we must concentrate on the two major operations of maintenance and construction to replace worn-out sections of highway or to raise obsolete sections to adequate standards.

There is an interrelationship between the expenditures in each of these two major divisions; that is, a construction program which replaces a large mileage of worn-out surfaces expensive to maintain, will reduce both overall and average maintenance costs. Contrary-wise, the theory has been advanced from time to time that with the provision of adequate highways, maintenance alone would be sufficient. The very illuminating facts as to maintenance costs for the nation indicate that the reduction over a considerable period of a construction program below desirable limits does not in the long run save dollars.

During the war it was necessary to postpone a large volume of highway construction because of the prior demands of the war production program. The construction program dropped from something more than \$1 billion per year before the war to an average of less than \$600 million per year for the war years, a reduction of more than \$400 million. Maintenance expenditures, on the other hand, increased from \$735 million in 1940 to an estimated \$1,140 million in 1947, an increase of \$405 million, or 55 percent. This illustrates the fact that reduced construction merely changes the form of performing essential highway operations. The highway plant is in existence but the motor vehicle in increasing numbers is constantly using and deteriorating it. Every section of the system must be replaced in a businesslike management

policy by reconstruction when "its day is done" or we must continue to patch and nurse along worn-out sections which do not serve adequately. There are those who advocate that our postwar highway program be very much curtailed or even postponed indefinitely because of high prices and as an inflation block. Our studies indicate that a maintenance dollar will buy no more than a construction dollar since the unit costs of maintenance work have increased at a comparable rate with increases in unit costs for construction. Reductions in the construction program simply result in the increased use of highway revenue on the maintenance side of the ledger where the dollar has a similar decreased purchasing power, and where deterioration and obsolescence cannot be adequately corrected.

This is not to say that maintenance operations have been inadequate or inefficient. On the contrary the maintenance forces of the nation performed an outstanding job in keeping our highway plant in operation during the war, and nothing but commendation is due the 327,000 men employed by State, county and municipal highway departments who are responsible for the streets and highways which serve 37,000,000 motor vehicles. On the average, each of these men is responsible for keeping 1100 motor vehicles moving - a thought which should, but probably will not, give pause to those who continually criticize the number of employees required by government.

As a theory we stand to gain little, if any, by too severely curtailing our postwar construction and reconstruction program, or by postponing essential projects indefinitely in hope of more favorable prices. If we are ever to erase our backlog of deferred construction, and correct the deficiencies which are everywhere so glaringly evident,

we must advance the postwar highway program as rapidly as the construction industry can actually produce. There has been criticism, or at least disappointment, expressed at the rate at which the postwar highway program has been advancing. It is true that funds have not been expended at the rate they have been made available, but nevertheless a very substantial program is under way. There is considerable evidence that work has been offered somewhat in excess of the rate at which the construction industry can absorb new projects.

Let us examine briefly the Federal-aid segment of the entire post-war highway program. It is now slightly more than two years since the funds authorized by the Federal-aid Highway Act of 1944 became available for expenditure. The entire \$1,500,000,000 is now available. By the end of 1947, projects involving \$557 million of Federal funds had been let to contract, \$449 million were programmed or otherwise obligated, and \$444 million remained unprogrammed. (\$50 million administrative funds and unapportioned balance.)

The programming of funds, or letting projects to contract, is not the full measure of accomplishment. In the Federal-aid program, we entered the calendar year 1946 with a carry-over of work under way but uncompleted of \$138,274,000 in terms of the total cost of Federal-aid projects, including both Federal and State matching funds, and project allowances over and above the contract price to cover preliminary engineering, right-of-way costs and contingencies. During 1946, the total cost of Federal-aid projects let to contract was \$580,125,000, and the value of work done was \$344,321,000; so we entered 1947 with a carry-over of work under way but uncompleted of \$374,078,000. During 1947, we placed under contract a total of \$644,348,000 of Federal-aid projects, and accomplished \$590,506,000. The carry-over of uncompleted work from 1947 to 1948 was \$427,920,000.

The dollar value of work placed under contract, therefore, was 11 percent greater in 1947 than in 1946; the dollar value of work done in 1947 was 72 percent greater than in 1946. The dollar value of un-completed carry-over increased by 14 percent from the beginning of 1947 to the beginning of 1948.

These indices show that, for the country as a whole, work is being offered to the construction industry at a rate somewhat exceeding that which the industry can absorb. When the record is examined by States or groups of States, it is evident that in some areas work is being placed under contract with too little regard to construction capacity, and in other areas there is too great hesitancy and little work is being offered.

The highway administrator has two direct methods of assessing the situation currently and project by project - the first is the number of bids received as projects are offered to contract; the second is the rate of progress on work under construction.

During the past year it has happened frequently that either no bids at all were received for an advertised project or else so few bids that there was little or no competition. During the third quarter of 1947 the number of bids received averaged 3.6 for each Federal-aid project advertised. For one-fifth of the projects advertised, an average of only two bids were received for each project, and for one project in seven, only one bid was received. For five percent of the projects advertised, no bids at all were received. In other words,

for two-fifths of the projects advertised, two bids or less were received per project.

Of the total of Federal-aid projects completed in the last two years, 40 per cent ran over the contract time. Unsatisfactory progress was reported for 27 per cent, or nearly a third, of the Federal-aid projects active in the last quarter of 1947. The reasons given for unsatisfactory progress on these projects were:

1. Shortage of materials - 18%
2. Shortage of labor or labor problems - 15%
3. Shortage of equipment - 18%
4. Poor management - 31%
5. Weather and miscellaneous causes - 18%

Steel has been the most difficult material to obtain; deliveries have been slow and uncertain, and these uncertainties add considerably to our costs. Despite the solemn assurances of the steel industry to the public that increases in base steel prices have been restricted to the essential minimum, the cost of finished steel in place in highway structure and pavements has advanced more than any other road material. Since 1940, unit prices for structural steel and for reinforcing steel have doubled while listed base prices advanced only about one-third. It is interesting to note that although on a dollar basis steel represents 15 per cent of the materials used in highway construction, and approximately 4 per cent of the total highway construction cost, it represents only 0.6 per cent of the total steel produced. Steel for highway use is a negligible part of this total, but "try to get it!"

Lumber has been scarce but the situation is improving. During the first nine months of 1947, production increased 8 per cent over the same period in 1946, while gross stocks gained about one billion board feet.

Some delays due to slow delivery of Portland cement have been reported, but seem to be largely caused by a lack of railroad cars. Similarly, while the supply of bituminous products and mineral aggregates has been adequate at the sources, slow delivery has delayed construction.

The transportation situation will no doubt improve after the heavy coal-consuming months are over, but slow delivery of materials requiring gondola and tank cars may be expected until the supply of these cars is greatly increased.

Poor management - failure to start the work on time, and failure to push the work - is reported as the direct cause or contributing cause for unsatisfactory progress on 31 per cent of the projects which are behind schedule. It is probable that in some cases what appears to be to the inspecting engineer poor management may not be in fact poor management from the contractor's point of view. Other conditions are probably the actual cause of such delays and in the contractor's opinion it may actually be good management to defer operations on one project while his limited forces and equipment are completing other projects which he has under contract. A check of unsatisfactory progress on projects reported for September 30, 1947 in five widely separated States shows that 53 contractors had 129 contracts under way, of which 87, or 67 per cent, were behind schedule. More than half of these contractors had 2 contracts or more. One contractor had a total of

14 under way with 10 of them behind schedule. Four contractors holding two or more contracts each were behind schedule on all of them. In cases of this kind, therefore, the real reason for unsatisfactory progress is that the individual contractor has been awarded more work than his organization can handle simultaneously. It is reasonable to expect a contractor to endeavor to obtain additional contracts before completing those already in progress, but the practice should not be permitted to extend to the point where the contractor has more work than he can properly equip, finance and manage.

The large number of offerings for which there was very little or no competition, and the unsatisfactory progress on so many projects, strongly suggest that we are at the optimum rate of offerings in relation to construction capacity. To exceed this optimum rate will not result in the completion of work at a faster rate, but simply in lack of competition, unsatisfactory progress and unnecessarily high prices. The rate of placing work under contract should be governed by the rate of production of finished work. Powered equipment and the rate at which its use is expanded on highway work has become the most important factor in production. How important equipment is now in highway construction is amply demonstrated by a recent study of the equipment used in the construction of a large sample of Federal-aid projects. These projects totalled \$20 million in contract value. The total investment for the inventory reported, based on 1946 purchase prices for new machines, was \$18 million or 90 percent of the total contract value of the work. The major equipment

on the Federal-aid projects in this study consisted of:

- 850 trucks
- 365 tractor-scraper-dozer units
- 116 shovel-draglines
- 70 tractor-wagon units
- 25 crushing and screening plants
- 40 pavers and auxiliary paving equipment
- 120 motor graders, and
- 73 flat rollers.

These figures give some idea of how extensively highway construction is mechanized, and of how important a factor is the contractor's capital investment in equipment. They also indicate that we cannot increase the rate of highway construction very much faster than the equipment industry increases the rate at which it supplies its highway-contractor customers with replacements and repair parts.

These figures also emphasize another very important consideration with respect to the highway program as a whole, and that is the folly of assuming that the highway construction program can be turned on or off at will like a spigot. No contractor can afford this enormous capital investment in equipment unless he is assured of a going market for highway work. New contractors will not be attracted to this field unless there is reasonable assurance of a steadily continuing program. Specialized highway equipment is only useful and usable in a few major areas of construction and of these, highway replacement must be accorded a high perhaps the highest, priority. The investment in contractors' highway equipment must be regarded as a capital accumulation which must be kept

working if the public interest is to be served.

In summary, then, as in the beginning, we have a highway plant to keep in operation. The keeping of the plant in operating condition should be rated as a public service and not as an element of public works subject to uncertain policies or casual timing. It is a 24-hour, 7-day week, 52 week-year operation that goes on repetitively year by year. To maintain the plant in operation we have two methods. They are not optional methods, since it is demonstrated that the production of new construction is limited neither by administration nor by financial insufficiencies, but by the physical conditions which enter into production. The proper administrative policy indicated then becomes a matter of determining, State by State, the potential production, as nearly as can be estimated, strictly limiting this amount to the dimensions of a true competitive market. The validity of the market will be demonstrated by the number of bids and the approximation of the low bids to a carefully and conservatively estimated cost. The situation is so spotty that no generalizations can be made with any reliability for the overall program, since the State increments must be made up by consideration of the conditions within each State. The interest of the contractors and of equipment manufacturers and suppliers in such a program is doubtless self-apparent. But there is another important element in which the highway administrators and officials are chiefly concerned and for which they are altogether responsible. Under present conditions there must be at all levels of public management - Federal, State and local - a reconsideration

and a readjustment of the regulations, specifications and design of work. Projects should be divided into contracts requiring single rather than multiple types of operations.

Perhaps the best approach would be a joint conference in each State of contractors and other suppliers and the State and Federal highway departments, to arrive at a conservative conclusion as to the production that can be actually brought into service during the coming year without a material increase in the price index. After all, the objective of the highway program is to replace the elements in our road plant that are inadequate and obsolete. There is no point in awarding contracts that are not carried to completion. This is no time for other than a conservative attitude toward the highway construction program based on the production that can be achieved at current prices.

Let us not follow the delusion that there are any easier conditions for the production of new construction just around the corner. So long as private capital investment holds at anywhere near the current rate there will be the same critical shortages for which we should not compete with public funds. While the public actually has a capital accumulation of tremendous importance in the contractor's organization and his equipment, which must be kept intact and operating, we should not attempt to expand the highway program at current prices, and we must therefore place our greater reliance for the immediate future upon intensive maintenance to keep our highway plant in operation.