LET'S KEEP WHAT WE HAVE UNTIL WE GET MORE TO KEEP

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We must keep the traffic rolling—that is fundamental and essential in this war effort. We can't build new roads to replace those that are wearing out; so we must concentrate on maintenance. The maintenance of roads and bridges requires money, men, material, and machines. The first problem of the maintenance engineer is to solve the critical shortages of all these items. It is my intent in this paper to point out some of the difficulties which we maintenance engineers may expect to encounter this year and to discuss with you ways of overcoming these obstacles.

Finance

First, let's give attention to the financial problem. This should be the easiest of solution. I know, of course, the lifeblood of the highway departments, state and local, is derived in a large part from motor-vehicle licenses and motor-vehicle fuel taxes. I know also that truck and automobile registrations will undoubtedly drop in 1943, and that less gasoline will be used on the highways this year than formerly. To offset this, however, we will do practically no construction work; so the funds which we are able to collect can be used largely for maintenance. If funds thus available are insufficient, we still have the credit of the state or county to fall back on. Funds can be made available by the proper action of our governing bodies. It may not be easy to get additional money needed for maintenance, but it certainly should be less difficult than getting copper, for example, out of the WPB.

Man Power

Let's look next at the manpower problem. The shortage of suitable labor has already handicapped highway maintenance, but I am optimistic about this—in fact, I am optimistic about the whole matter of highway maintenance in wartime. We have been losing men primarily in three ways—first, to the draft; second, to war industries; and third, to the construction of war plants. Men 38 and over are no longer being drafted. I believe you will find that at least a majority of highway workers are over 38; so they, at least, won't *have* to go to war. Also married men with dependent children are not yet generally being drafted. This war draft situation is not as bad now as we anticipated six months ago that it would be.

The loss of men to war industries, particularly near industrial centers, is severe and we see no immediate relief. These industries pay more than state and counties can afford to pay, and working conditions seem to be generally satisfactory. About the only incentive for an employee to stay on maintenance work when he has been offered a job in industry is his loyalty to the organization and the probability of more permanent employment. These, after all, are important factors; they should be emphasized. We know a lot of our men have passed up better paying jobs and have elected to stay with us because we took care of them during the last depression and they don't want to be left without a job when this war is ended.

The loss of men to the construction of war plants, we believe, has passed the peak and is now less serious than it was a year ago. Many ordnance plants, air fields, and supply depots have been finished and comparatively few projects are being started. Men on these jobs will gradually drift back to highway work; in fact, some have already come back and asked for their old jobs. Our policy with reference to men leaving for defense jobs has been to give them a leave of absence but no guarantee that they would be reemployed when they return. If, however, they are reemployed, they lose no sick leave or vacation rights previously earned. Some of the first to leave for defense jobs were men that we didn't particularly care for. For one reason or another we had been unwilling or unable to disassociate ourselves from them. Naturally, when such men come back, we simply don't have any work for them.

We have relieved the labor situation in our state to some extent by increasing the number of hours per week for the hourly employees. We have no legal restriction such as time and a half or double time with reference to this matter. Within the last year we first changed from a 40-hour week to a 44-hour week and then to a 48-hour week. This means that each man has had a 20% increase in his weekly pay check, and it means that we presumably have been able to accomplish 20% more work with each man. In addition to this increase in hours we have increased the hourly rate of our maintenance employees approximately 10%. This, of course, does not in any way compete with war industry, but the men have appreciated the favor and it will more than take care of their Victory Tax.

So, all in all, the manpower problem is a real one and we feel it will get worse before it gets better. Nevertheless, we are sure our chief difficulty during the war period is going to be the scarcity of maintenance materials and equipment.

Maintenance Classifications

Before attacking this material and machine problem let's take a look at the general maintenance situation. All mainte-

nance work may be classified under three general heads: (1) Work immediately necessary to keep traffic moving. (2) Work necessary for the preservation of our highways including bridges. (3) Work which is performed primarily as an aesthetic matter. During the war period we should use maintenance money available for doing Class 1 maintenance first. When this has been completed, if any money is available, Class 2 maintenance should be undertaken. Class 3 maintenance should be out for the duration.

In attempting to classify maintenance operations in one of the above three classes, we find that many maintenance functions lie partly in one class and partly in another. This requires special consideration when we are trying to ascertain whether such items should be included in our wartime maintenance program or dropped for the duration.

Suppose we jot down a few Class 1 items—repair of holes in pavements or other type roads, repair of ruts along pavements, replacement or repair of damaged bridges or culverts, preservation of drainage lines, snow removal, and treatment of ice. These jobs require materials and the use of equipment. About the only critical material, however, ordinarily used in these operations is steel. Redesign of these repair jobs can readily eliminate steel, except possibly in the case of bridge failures. A bridge failure, if it requires much steel, will be a construction job and is beyond the scope of this paper.

Bituminous materials are essential in maintenance work. Road oils are not available, but we can still get cutback asphalts and tars. It is true that these materials are being rationed by certificate issued through the Public Roads Administration; but we didn't suffer last year, and the situation with reference to 1943 looks fairly good. We recently had approval on 1,700,000 gallons of MC asphalt for patching the Iowa primary bituminous roads in 1943. So far we have had little difficulty in securing our needs of cement, sand, crushed stone, and gravel.

Considering Class 2 maintenance, which includes bridge painting, resurfacing of bituminous roads and untreated gravel or stone roads, we find that much of this type of work can be deferred temporarily. The ultimate cost may, and probably will, be greater than if the work was done at this time; but we are not now so much interested in the economics of the problem as we are in the availability of materials and equipment. Take bridge painting for example—in normal times as soon as rust spots appear on a steel bridge we clean it up and repaint it. In these distressing times, why can't we clean and spot coat the rusty places and defer the general painting until after the war? We know this won't leave a nice looking job, but maybe the public will think we have camouflaged the structure.

By patching bituminous or gravel or stone roads instead of completely resurfacing them, we can save a lot of material. The resurfacing work will have to be done some time, but traffic can be kept moving by a systematic patching program, and we believe that general resurfacing should so far as possible be deferred.

It is not easy to find many maintenance items wholly in Class 3. Weed cutting, tree trimming, guard-rail painting, and sign painting are in this zone. Weed cutting might at first be thought to be entirely in this class; however, weeds cause snow drifts which may block the traffic, so some consideration must be given even to weed cutting. This type of work can be greatly reduced but not entirely eliminated. Road signs can be more or less neglected during war times, but they must be kept in such condition that traffic at 35 miles an hour can travel in safety.

There is another difficulty in connection with maintenance work which involves all three items of men, material, and equipment. That is the difficulty of securing satisfactory bids on maintenance jobs. During the latter part of 1942 contractors were so loaded up with defense jobs, or were so frightened about the rubber situation, that it was practically impossible to get reasonable bids on maintenance projects even though plenty of money was available for paying for the work. The indications at this time are that this situation will be easier in 1943 than it was late in 1942. Many contractors have completed their defense jobs, and other contractors with large fleets of trucks have secured their certificates of necessity and are in a position to handle road jobs.

Equipment

The equipment problem is the maintenance problem most difficult of solution at this time. Any state or county which does not have the necessary equipment on hand to perform its work is going to have plenty of difficulty in purchasing new equipment. As a matter of fact, we feel that all states and counties should make an honest effort to get along with the equipment which they now have, even though extensive overhauls and repairs are necessary. Except for cutting edges, the repair part situation has not been too bad in our state. True, we have had many exasperating delays; but in the long run we have been able to get the repair parts to keep our equipment going. We have, however, been unable to get enough cutting edges of high-carbon steel to take care of our needs for snow plows and various types of graders. In order to relieve this shortage somewhat we have adopted a practice of welding worn blades. Grader cutting edges are usually supplied in 6″ widths. Only about 3 inches of the blade extends below the moldboard. Formerly it was the universal

custom to wear the blade down to the moldboard and then throw the rest away. This meant about 50% waste, which under present conditions is almost criminal. We have worked out with the state National Youth Administration a plan of welding old blades so that no steel is wasted. Some time ago the Nebraska Department of Roads and Irrigation designed a clever system of clamps to hold the sections of blade in place while the welding is being done. We borrowed this system. The NYA does the welding free in order to furnish work for boys who are learning the welding trade. We furnish the old blades and the welding rods. The process is rather simple.

For example, we take two old 8′ cutting edges—usually worn more at one end than at the other. They will probably be 3″ wide at one end and 4″ at the other. The old blades are first cleaned, and then are placed together with the 3″ end of one blade matched with the 4″ end of the second. They are lapped not less than ½″ and held in place with three clamps. The first weld is made in the middle of the blade. The blade is then turned over and two welds, one on each side of the first, are made on the other side. All individual welds are 3″ wide, and a 3″ open space is left between welds. Next the blade is again turned and two more welds are made. This process is repeated until the welds reach the ends of the blade.

When the welds have cooled, the blade is taken out of the clamps and covered with a mixture of oil and gasoline, which is ignited. Very little straightening is necessary. The welded blade is then put on the moldboard, and when the lower section has worn off, the part remaining on the moldboard is made the cutting edge on a new weld. In putting a welded blade on the moldboard, we always fasten it so that the actual cutting edge is ahead of the part fastened to the moldboard.

During this emergency we should be more careful than usual in the inspection of our equipment. Minor defects should be noted before serious breakage occurs. The O.D.T. has set up a comprehensive system of tire checking. We should make similar checks on all of our maintenance equipment. The War Production Board will save great quantities of critical materials if the states do not purchase new equipment; however, if states and counties do not purchase new equipment, then the War Production Board must make repair parts and shop supplies available. We believe this will be done under the new Controlled Materials Plan, which we understand will be in full operation by about July 1.

In conclusion, in this whole matter of wartime maintenance let's be careful not to overemphasize the importance of our own little job, and let's not cry before we are hurt. It is our democratic right to criticise everything that is being done by those in responsible charge of our war effort, particularly if we are pinched a little. On the other hand, we should continually keep in mind that other agencies may need the same

critical materials that we need and may need them a lot more. Also, let's make the best of the various questionnaires and reports that are demanded of us. It will do no good to get all "het up". In most cases if you go quietly to the federal official in charge of the annoying agency in your state or county, you will find him human and willing to try to work out your problem with you; at least that has been our experience in Iowa. It is my firm belief that those in charge of our war effort realize the need of an adequate highway transportation system, and in the long run I do not believe they will allow conditions to get so bad that traffic will be seriously hampered. If we will not undertake any jobs except those which are necessary for the successful prosecution of the war, including the accommodation of essential civilian traffic, and if we will not ask for any materials and equipment not needed for those particular projects, then I am sure our needs will be taken care of somehow.

RELATIONSHIP OF POLITICAL SUBDIVISIONS TO THE WAR PRODUCTION BOARD IN HIGHWAY IMPROVEMENT

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This subject, in its broadest sense as affecting our industry, encompasses a plan for securing critical materials in the construction and maintenance of highways, streets, park boulevards, bridges, overhead and underpass structures, and all other drainage structures. The need for some feasible and workable machinery was, of course, brought about by our war efforts. I should like for us to approach this problem in a sane and workmanlike manner.

A supercritical attitude will neither clarify nor solve our problem. We are responsible to the public for solving transportation problems, and it is our duty to make even the worst regulations and the poorest directives work in the best possible manner. A poor regulation can be made to function by our full co-operation and efficient execution. Ignorance breeds suspicion, and we cannot permit ourselves to enjoy (and I use the term "enjoy" advisedly) this state of mind and yet accomplish anything worthwhile for those whom we serve if we wish to do the proper kind of a job. Thus it behooves us to put more intensive effort into our job than ever before.

The fundamental purpose of a "controlled materials plan" is to assure a balance between supply and demand and that such materials will be available to the consumer in the quantity and at the time they are needed.