Editorial Comment

Highway Crossing Protection With Federal Funds

THE INSTALLATION of protective devices at highway-railroad grade crossings affords an economical means of minimizing the hazard to highway users, and at the same time offers an opportunity for the employment of many men now supported by public relief funds. These facts were recognized in the Emergency Relief Appropriation Act of 1935, which specifically mentions among authorized activities "the elimination of hazards to life at railroad crossings, including the separation or protection of grade crossings." Of the $800,000,000 appropriated for highway and allied work, $200,000,000 has been allotted specifically for the elimination of existing hazards at railway-highway grade crossings, which designation has been interpreted definitely by the U. S. Bureau of Public Roads to include the installation of protective devices at grade crossings, as well as the outright elimination of grade crossings through grade separation and the relocation of highways.

In addition to the above fund an additional $200,000,000 has been allotted specifically for highway construction, and while this second sum will be used, undoubtedly, largely for strictly highway work, the Bureau of Public Roads has made it clear that there are no legal restrictions whatever to employing money from this fund for grade crossing protection work, or any other form of work designed to minimize or to eliminate existing hazards at railway-highway grade crossings.

The proportion of the $800,000,000 which will be spent for grade crossing protection depends on several important factors. Estimating the average cost of a grade crossing protection installation at $3,000, approximately 20,000 such projects could be installed for $60,000,000 or only one-fifth of the $300,000,000, set aside for the three major items. The entire highway program is under the direction of Thos. H. MacDonald, Chief of the Bureau of Public Roads, whose 12 district engineers co-operate with the officers of the various states in planning and executing the program. The state highway executives and railroad representatives are largely responsible for the investigation and selection of the projects to be considered and, therefore, exert a strong influence in the allotment of funds for the installation of protective devices at crossings which are not to be separated. These proposals are being prepared in co-operation with the district engineers who in turn present them to Mr. MacDonald for final approval.

Stipulations Can Be Met

The most difficult phase of the situation, which applies equally to all classes of projects authorized under the Act, is to meet the stipulations as to labor. The primary purpose of the Act is, of course, to provide work for men now unemployed and on public relief. For this reason the regulations require that 90 per cent of the persons employed on any project shall be obtained from relief rolls, and stipulate that all projects will be measured for approval on the basis of a total expenditure of $1,400 for labor, materials and incidentals per man per year, or on the basis that 40 per cent of the total expenditure is to go for labor employed directly on the project.

The stipulation that 90 per cent of the persons shall be taken from relief rolls can be met on crossing protection projects. For example, on one large signaling project now under way, 135 of the 167 railroad signalmen employed were taken from relief rolls. So many signalmen have been out of work for years that in the majority of states enough trained signalmen can be drawn from relief rolls to do the strictly signal work and, if necessary to comply with the regulations, much of the work on the highway proper, such as digging and the mixing of concrete can be done by common labor from relief rolls.

Likewise, it is possible to meet the requirement that 40 per cent of the total expenditure shall go to labor employed on the project. Ordinarily from 30 to 35 per cent of the cost of a crossing signal installation goes for labor when performed by highly organized and efficient railroad organizations. Therefore, with a force built up of men, assembled hurriedly from various sources, and unfamiliar with the standards or methods of construction employed on the particular road, the percentage that must go for labor may easily exceed 40 per cent.

The Need for Protection

The complete separation of grades between highways and railroads is, of course, the ultimate in safety. However, with more than 235,000 grade crossings in the United States, it is evident that it is impracticable to eliminate any considerable proportion of the total. Furthermore, local conditions, such as adjacent buildings, intersecting streets, etc., make it impracticable to separate grades at some points. Likewise, at many crossings, the density or nature of the traffic on the highway or the railway, or both, reduces the possible hazard to such an extent that the expense for separation is not warranted. On the other hand, the cost of providing crossing-signal protection varies from $2,000 for a single-track project in non-automatic block territory to $4,000 or more for a multiple-track project in automatic block signal territory. Using an average figure of $3,000, at least 25 crossings can be protected for one grade separation.

According to the latest information available, only about 30,400 of the 235,000 crossings in the United States are protected by other than fixed signs. Of these, about 4,700 are protected by gates (of which 2,800 are in part-time operation), 1,200 by watchmen full time and 5,000 by watchmen part time, 16,700 are protected by automatically-controlled visible signals and 3,600 by audible signals.

In many states, the highway authorities have co-operated with the railroad representatives in selecting the crossings which should be equipped with protection. A rough estimate indicates some 20,000 of the 194,600 crossings not now protected by other than fixed signs, handle traffic warranting automatically-controlled protection. Assuming an average figure of 1,000 man-hours of labor for each of the 20,000 needed projects for grade crossing protection, as mentioned previously, the installation of these signals would require 20,000,000 man-hours of labor, which, at 40 hours per man each week, would take 20,000 men off the relief rolls for 25 weeks. Furthermore, 3,600 crossings are now equipped

with audible signals only (bells), and in many of these instances, greater benefit would be secured by adding visible signals at these crossings than would be accomplished by making complete new signal installations at other crossings. In recognition of this fact, the state of Pennsylvania has recently inaugurated a program of modernization of the protection at several hundred crossings, at public expense.

A Letter to the Editor

Comments on Multiple-Aspects

Philadelphia, Pa.

To the Editor:

Your editorial on "Multiple-Aspect Signaling" in the June issue has interested me considerably, taking me back to the period when signaling was going through the throes of standardization.

It might be interesting to your readers if you would print Exhibits 102 on page 325 and 104 on page 326 from the Proceedings of the Railway Signal Association of 1908 with possibly excerpts from the report showing what the Committee had in mind in regard to "Multiple-Aspect Signaling" 27 years ago.

This report was discussed for several years and in 1912 a minority report was made, which is particularly apropos and which might be used as an argument against some of your suggestions. The minority members recommended as "Fundamental" a one-arm three-position upper-quadrant signal indicating Stop, Proceed-with-Caution, and Proceed, and as "Supplemental" a two-arm signal, top arm horizontal and bottom arm 45 deg., Proceed at low speed; top arm horizontal and bottom arm vertical, Proceed at medium speed; with stop signals operated under automatic block system rules designated by a number plate. Some of the objections to the majority report were as follows:

"2. It is unnecessary, and, in fact, dangerous, to tell the engineman by fixed signal how he shall control his train at some point in advance.

3. Advance information so given is misleading and unreliable, as it is subject to change without notice, and therefore the engineman cannot safely use it. If he does so use it, it is done at the expense of safety.

4. The conditions of modern railway operation do not require trains to be run at full speed past caution signals, and any time gained by this practice is at the expense of safety.

5. Each signal should indicate Stop or Caution or Proceed, and have no relation to signals in advance or in the rear.

6. Each signal should be observed in turn as the train comes to it, and not at some point in advance at the option of the engineman.

8. No Proceed or Caution indication should imply or assure clear track to a point in advance. * * * *

9. The giving of information by signal indications about conditions in advance, whether it be regarding the next signal or the next station, or any other object or condition, is wrong practice, productive of laxity and a fruitful source of danger and accident."

How times have changed and signals with them!

I note on page 318 you state: "The importance of providing multiple-aspects to facilitate trains, as explained, may seem far-fetched to many, especially on account of the expenditure required for additional apparatus. However, the results obtained on such roads as the Boston & Maine, the Erie, the New York Central and the Lackawanna warrant this measure." It may interest your readers to know that three-block indication signals were first installed on the Pennsylvania Railroad 35 years ago this month between Altoona and Cresson; each signal consisted of a square-end red semaphore arm and two fish-tail green arms with lights of the same color, two-position lower-quadrant electro-pneumatic: All arms horizontal, red light above two greens, Stop and Proceed; top arm lowered, white light, One block clear; top arm and middle arm clear, two white lights over a green, Two blocks clear; and all three arms clear with three white lights, at least three blocks clear. The same signal was used approaching some of the interlockings at other points on the railroad in automatic signal territory: Top arm clear and middle arm clear was for the main track, an indication similar to the home and distant signal still used in some parts of the country; top arm clear, second arm horizontal and bottom arm clear meant that train was to cross over and proceed with traffic, so that there is nothing very new about the suggestion.

As you state, the purple light is short range and undesirable for that reason. Lunar white may have been improved, but, when we investigated it years ago, it was not distinctive when used with yellow. It is valuable when used in color-position signals. You state that it has been used "extensively for position-light signals as well as for certan aspects in color-position-light signals"—it is not used on the Pennsylvania, which has the largest installation of position-light signals in the country, and I have not noticed it on other roads. Perhaps you have confused it with the light yellow used with our position-light signals.

The report of Committee I, finally adopted, was a compromise and really endorsed two systems; in one of these the signal indicated what might be expected at the next signal, but it never went so far as to indicate how the train should be controlled at the second signal in advance, except in some cases where a distant signal governed the approach to two home signals, and when it indicated "Caution" the engineman must be prepared to stop at one or both of them, which meant he must approach the first one prepared to stop.

The matter of additional aspects has been very thoroughly discussed in some quarters and some of us at least believe that, with propr spacing, the present Code provides everything that is needed for straightaway running by using the aspects in Rules 281, 282, 285 and 291 or 292 to give sufficient advance information for the fastest train. If it is decided in some cases that four-block indication is necessary, the system recently adopted for suburban lines in Australia might be given serious consideration, where a restricting signal, Rule 290, is placed midway between the approach signal, Rule 285, and the stop signal, Rule 292, so that a train receives first an approach-medium, Rule 282, then an approach, Rule 285, then a restricting signal, Rule 290, and finally a stop signal, Rule 291 or 292.

With few exceptions, modern signaling in automatic territory is so arranged that, as far as information given the engineman is concerned, the stop signal is of practically no value except as a marker showing the location where the stop is to be made and for this purpose it ought to be distinctly visible *under all conditions of weather;* the means for making this visible should be permanent and as, in the system described, each signal may at some time display "Stop" or "Stop and Proceed," they should all be given the greatest visibility possible.

Yours very truly,

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Philadelphia, Pa.