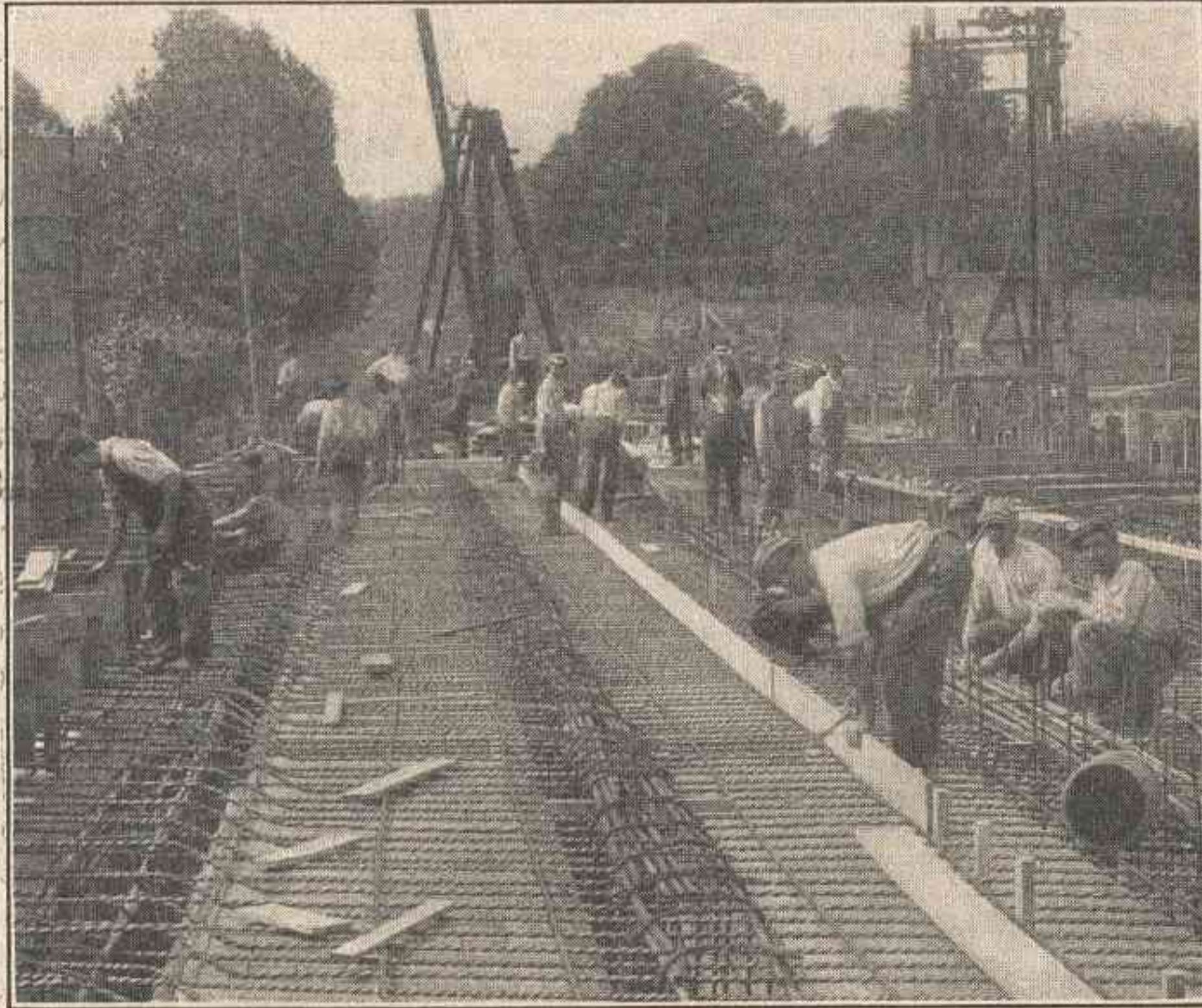


# An Attractive Reinforced Concrete Highway Viaduct

Lackawanna Bridge at Clark's Summit Involves a Number of Interesting Features of Design and Construction

THE Delaware, Lackawanna & Western recently completed a reinforced concrete bridge over its tracks at Clark's Summit, Pa., which has a total length of 390 ft. and a width over all of 31 ft. 9 in. It consists of six 50-ft. and two 45-ft. concrete deck girder spans. Space is provided for a clear roadway of 24 ft., a 5-ft. sidewalk on the west



Placing the Reinforcement in the T-Beams and Floor Slab

side and the concrete railings. The bridge spans the three main tracks of the new line recently completed by the Lackawanna as well as the westbound slow freight track and one track of the old line which was left in place as an entrance track to the Clark's Summit freight house.

The bridge floor, which is the T-beam type was designed

crete columns which in turn rest on concrete pedestals. The T-beams are stiffened over the bents and at the center of the spans, by transverse struts cast monolithic with them. At every third span a double column bent was used to provide for contraction and expansion of the floor, depending upon the flexibility of the columns to take up the movement. This is a feature of the design and is more satisfactory in long spans than sliding joints, while it eliminates the necessity for transverse beams connecting the columns. Between these expansion joints the girders are continuous over the supports and are designed as continuous beams.

In the T-beam floor, each beam is supported directly on a column so proportioned as to be just within the limits of the ratio of slenderness requiring the diameter of the columns to equal  $1/15$  of their height. The beams have a curved soffit, giving a pleasing architectural effect and counteracting the sagging at the center appearance common in beams of long spans when built level or on a straight line. The increased depth of the beams at the columns provides for the diagonal tension and the negative moment at the support where the T-beam effect is lost.

## CONSTRUCTION

By referring to the photograph showing the completed bridge it can be seen that the tracks were placed in a cut at this location. In preparing the site for the structure, the knoll between the main line tracks and the westbound slow track was taken out by a steam shovel. The two bents on the left or north are founded on rock that was found close to the surface and the others rest on an earth foundation. In the latter case, the footings were designed for three tons per square foot.

The footings were not placed at the same level and in order to make the column lengths the same for the 50-ft. spans, thus permitting the reusing of forms, pedestals which carry the columns were built up to the proper height. The pedestals on each side of the main track, which act as a



The Completed Viaduct

for a live load of 100 lb. per sq. ft. or a 10-ton roller plus 25 per cent impact for both. The girders are 1 ft. 6 in. wide, spaced 4 ft. 6 in. face to face with variable depths and are covered by a floor slab 8 in. thick spanning transversely.

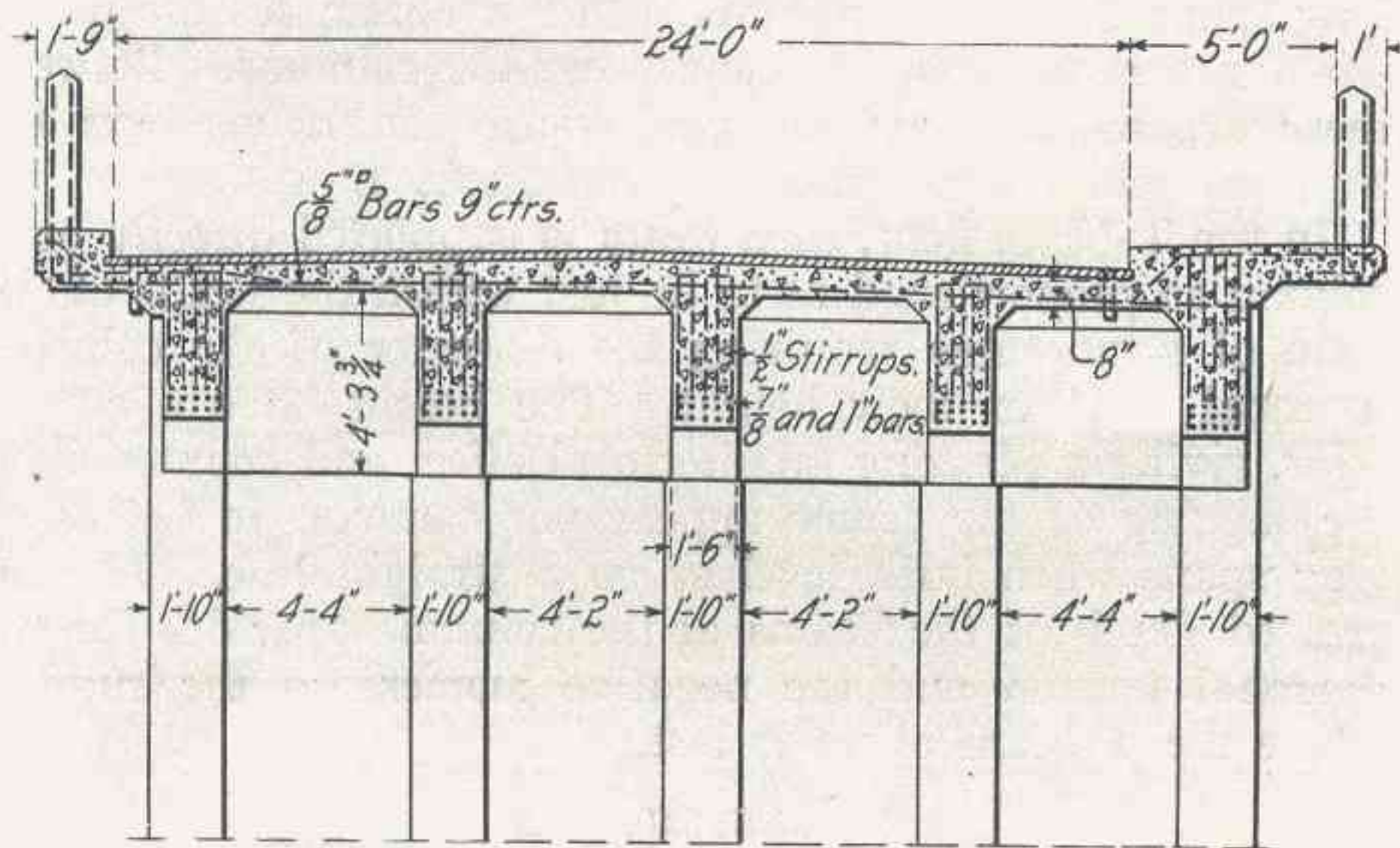
The substructure consists of bents built of reinforced con-

protection in the case of derailment, were placed about  $6\frac{1}{2}$  ft. above the top of the rail and control the height of the others.

In placing the falsework during the construction it was essential to span the main tracks without placing a support between tracks. For this reason old steel trusses were

brought in and used to support the centering. The forms for the columns were braced to the bents which carried the trusses. In the double column bents the space between columns is only  $1\frac{3}{8}$  in. The columns were poured simultaneously and the form between the two consisted of two beveled boards which were wedged in place. To facilitate the removal of the forms the wedge was started just after the completion of the pouring. With the wedge started no difficulty was encountered in removing the forms.

In placing the concrete floor, the run was continued without interruption for three spans or between expansion joints for one-half the width of the bridge. The bridge is on a 3 per cent grade and the floor is drained through  $2\frac{1}{2}$ -in.



Cross Section of the Floor

wrought iron pipes spaced 10 ft. apart. The floor is paved with 3 in. of asphalt which provides the necessary waterproofing.

The concrete plant was located at the track level and a tower was provided for elevating the concrete to the forms. The 45-ft. spans were built first and after their completion were utilized as a site for precasting the concrete fence panels. The concrete railing was erected by placing the panels and pouring the posts in place around the panels which project 3 in. into the posts. The bridge was built by the company's forces under the direction of G. J. Ray, chief engineer of the Lackawanna, and L. L. Tallyn, division engineer. A. B. Cohen was in charge of the design.

## THE TRAIN DESPATCHER'S PART IN THE WAR

By C. J. McDonald\*

By the organization of the Special Committee on National Defense of the American Railway Association (its "War Board") we have in reality a continental railway system. One railroad, under one management, one set of tracks, one lot of power and equipment, and greater than all, just one purpose. . . . The Commission on Car Service, acting under the War Board, is in continuous session at the Washington headquarters. It is directing the movement of equipment; regulating embargoes and release of cars, and at all times is keeping in close touch with the whole situation, changing as it does from day to day. . . . The Government will not, like that of England or Germany, have a separate branch of its organization conduct the system of transportation, but rather the United States Government has, ready for use, a system of railroads that has become so proficient that it is furnishing the highest class of freight and passenger service in the world.

Will our great American Continental Railroad uphold the honor of the greatest railroad system in the world? It

\* From an address delivered before the Train Dispatchers' Association, at Fresno, Cal., June 20. Mr. McDonald is assistant superintendent of transportation of the Southern Pacific, Pacific System, and also assistant to the chairman of the Western Department of the Railroads' War Board.

must and it will. The railroads are keenly appreciative of the opportunity to demonstrate to the country at large the value in time of war of railroads with elastic management. The railroads of this country are on trial. It is up to you, and it is up to me, and it is up to every single individual employee to see that this continental system does not fail. It can not fail; the very life of our nation depends upon the success of the government. The time-worn phrase "An army travels on its stomach" has been brought up-to-date by General Joffre's remark, "An army can progress only as its railroad facilities permit."

What can the train despatcher do? You can do a great deal. Your part in the war is right on your job of handling trains. The train despatcher is the superintendent's lieutenant. You will by far serve your country better and more effectively on your job than you would by actual physical fighting in the trenches. You are going to handle the greatest volume of tonnage in history; every car is going to be of the highest importance. There is only one thing to do, gentlemen; we must change our standards, change the breadth and width of a day's work for a freight car. Instead of handling only 16 tons, one car must carry twice the volume. You must speed up that car so that it will move faster. It moves fast enough when it is moving, but you must cut out lost motion. . . . Get trains moving out of the terminal right on the call, keep them going; figure your meets just a little closer; see that passing tracks and sidings are kept clear, and don't let your trains get caught outside of terminal by the legal limits. Do your part, and do it just a little better than you have ever done it before.

The keynote of success is train loading. You have done well in train loading, very well, but with the future in prospect, you are going to have to materially increase that train load; it simply must be done. None of us have locomotives to spare and there is just one thing to do—increase the day's work for the power we have. I have asked you to see that every engine on your division makes more than 75 miles a day. The nearer you come to actually doubling that daily mileage the better, but your efforts are not going to be very successful unless you accumulate that mileage with tonnage. Increase the train load just as much as it can be done.

Your roundhouses and your shops are going to become more efficient; they are going to give you engines that are steaming better, engines that are not leaking, engines that can do a full day's work any time they show up for call. The shop forces are just as anxious to contribute their efforts as you are. But the work that an engine does is entirely up to you, Mr. Despatcher. You are the one who can handle company material on trains that could not otherwise handle full tonnage; you are the one who will handle the company coal or company oil so as to fill up storage points at odd times without interference with regular traffic.

The War Board may even ask for a number of your engines to be turned over to another railroad. Some of these orders you may not understand, but if you will comply fully and promptly with all of them, you may rest assured that you are helping the whole situation. Suppose you get an order to deliver ten engines to your neighbor, or fifty coaches, or something like that. You know that he already has more equipment than you have; but the thing you don't know is that he may have a great military movement. . . .

. . . You know that our newspapers are not printing troop movements, and realizing the crafty enemy with which we have to deal, you also know how necessary it is to surround troop movements with secrecy. The despatcher must, of course, know all about such movements; the curious public is going to try to find out from you the details. Keep this in mind. Protect the troop movements the way our government wants them protected, by not letting information that may have harmful effects get out. Tell this to your train crews, too; they realize the harm that may come from information on troops getting out and they are glad to help.