through the horizontal angles at the tops of the diaphragms, which are so located in the troughs that the bolts will be about 4 in.—a convenient working distance—inside the guard rail. The horizontal legs of the angles at the tops are turned toward the ends of the ties to make the bolts accessible after the ties are put in place. The tie bolt diaphragms are omitted in the troughs adjacent to the floor beams, as they would interfere with the driving of the field rivets at the ends of these troughs.

The troughs (half-section, B-B), are carried by longitudinal girders which are parallel to the trusses, and placed at a sufficient distance from the lower chord to permit ready inspection of the chord and girder. The longitudinal girders are carried by the floor beams (half-section A-A), which are designed to receive the entire panel load and transmit it to the truss.

The troughs are designed to carry a concentration of 60,000 lb. on each track, each concentration distributed over two ties. This gives a load of 30,000 lb. on each of the two ties carried by the trough, or 60,000 lb. carried by the trough. The floor beam is designed to carry the load from the intermediate troughs, concentrated at the bearings of the longitudinal girders, 2 ft. 1 in. from the centre lines of the trusses; and, in addition, to carry its part of the load on the ties in the adjacent troughs.

The heavy load carried by the floor beam, together with its greater length, requires in this member a section considerably heavier than that of the troughs. The depth back to back of angles is made the same in the floor beam and troughs, but the addition of flange material required to give the necessary section modulus in the floor beam, makes the extreme depth of this member somewhat greater than that of the trough sections. This extreme depth of floor beam determines the depth of floor for this type of bridge. By flattening the rivets under the rail and allowing a clearance of 1 in. from the base of rail to the tops of the flattened rivet heads, a satisfactory section is worked out with a depth of floor of 1 ft. 11 in.

It will be noticed that the material in the floor beam and trough sections is not disposed symmetrically with reference to a horizontal line at the middle of the section. In order to obtain the most effective distribution of material, the neutral axis is maintained at the middle of the section. The metal is increased on the tension or lower side to make up for the reduction of section by rivet holes, no allowance for reduction of section by rivet holes being necessary on the compression or upper side of the section.

The depth of the longitudinal girders is made considerably greater than economic considerations require for the section. This is done to obtain a good detail at the end bearing and at the connection to the floor beam.

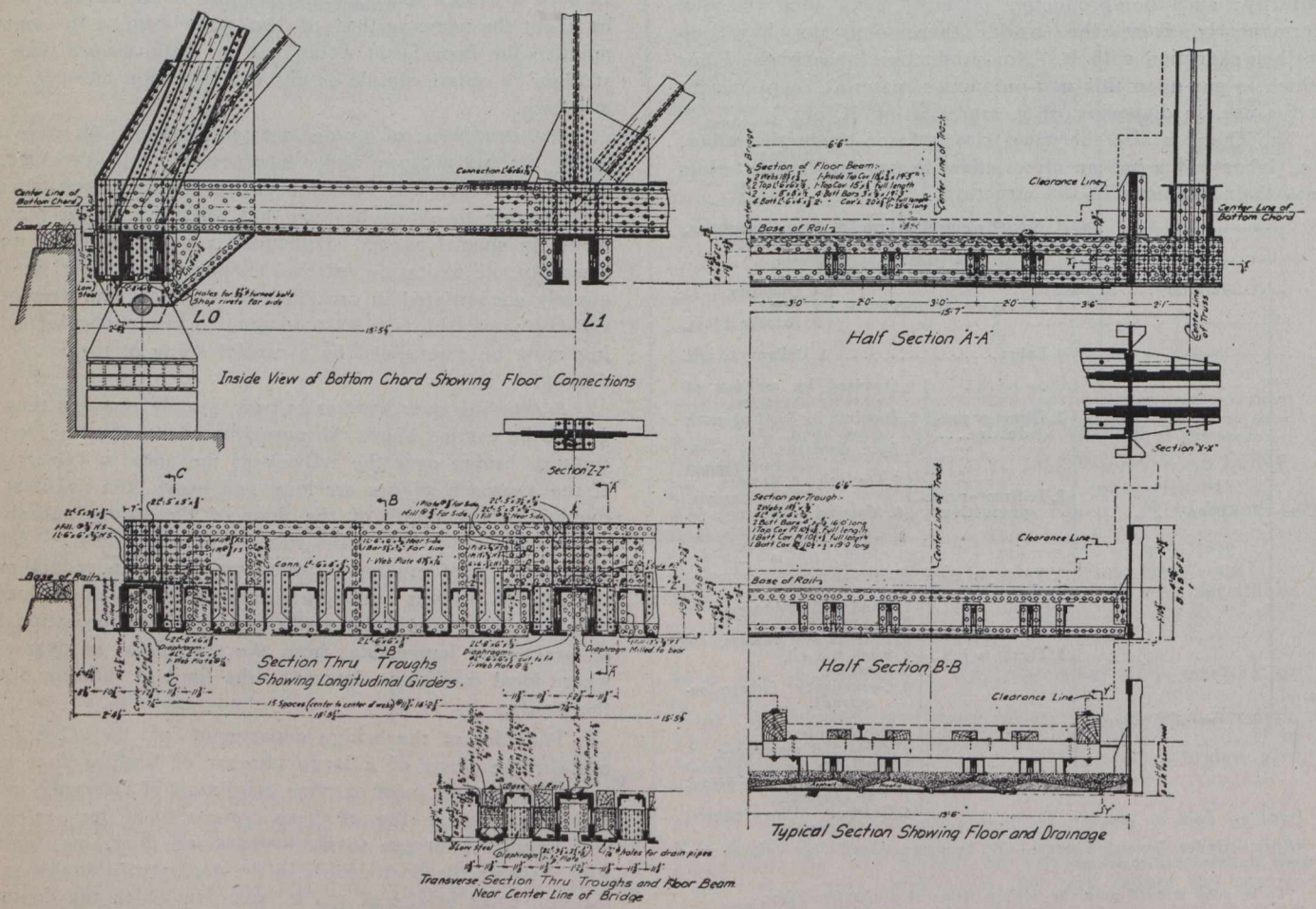

Fig. 1.—General Details of Shallow Trough Bridge Floor.

The top flange of this girder is unsymmetrical, being composed of a plate and an angle, the angle placed with its face against the web, the horizontal leg projecting over the top of the web and outward from the track. This detail of the top flange is to gain an additional horizontal clearance, as at this point the structure approaches nearer to the clearance diagram than at any other place except at the end post, where the edge of the cover plate is coincident with the extreme vertical line of the clearance diagram. An advantage in erection is also obtained by this detail of top flange section, as it permits setting the trough sections in place on the bottom flanges of the girders, with only a very slight displacement of the girders from their permanent position.