rods. This rail has carried the medium traffic imposed upon it, and if a harder steel were used in this section, it would undoubtedly handle all medium traffic. For light traffic, 6-in. 60-lb. or 7-in. 70-lb. may be used in the Lorain tee section, or the 6-in. 74-lb. in the Lorain girder grooved section. Fig. 6 shows three sections of rails in general use, and tables 1, 2 and 3 quote the rail dimensions as given in the Lorain Steel Co.'s. catalogue.

There is no part of the Edmonton street railway system that can be classed as "heavy traffic." The Electric Railway Journal, dealing with "Characteristics of Track Construction in Paved Streets in 36 North American Cities," says that

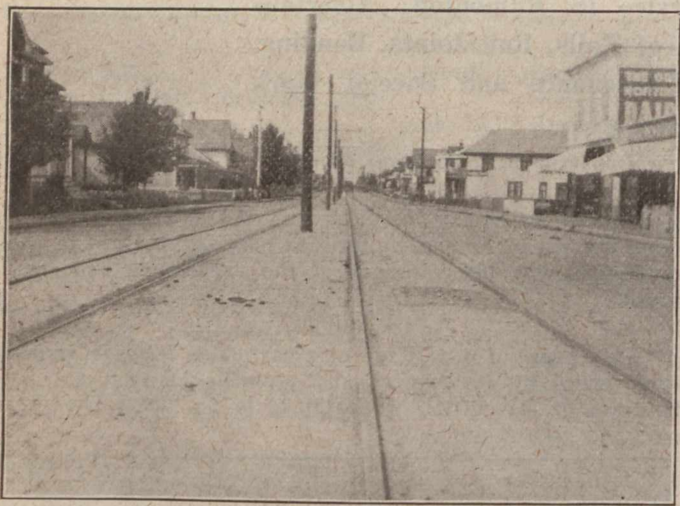

FIG. 3—SYNDICATE AVE., EDMONTON, CONSTRUCTED IN 1912 (SEE FIG. 9)

"where traffic is dense and the weight of the rolling stock increased, the 7-in. 91-lb. or 95-lb. high tee rail has been used in many cases." The weight of the 7-in. girder grooved section generally adopted varies from 100-lbs. to 116 lbs. per yard. A few cities use 9-in. girder grooved rails varying between 125 lbs. and 141 lbs. per yard. For heavy traffic the use of 7-in. 91-lb. to 95-lb. tee sections, or the 100-lb. to 116-lb. girder grooved sections is considered good practice.

The section of a rail for street railway track work is often governed by city ordnance, in order to reduce the great variety of sections which result when the choice is left entirely with the street railway companies. The first four sections in Fig. 6 show types in use on the Edmonton street railway system.

In the earlier days of track construction in paved streets, it was found that vehicular traffic usually preferred to use the railway allowance, because, by placing one wheel along the rail groove, less resistance was offered and vehicles were more easily guided. Not only did this cause considerable inconvenience by delaying car traffic, but it was found that the steel tires of the wagons soon wore the rail. To overcome this difficulty, the groove of the rail was pinched in, so that it was narrower than the narrowest wheel tire, and the top of the groove was brought up level with the pavement. With the advent of the automobile, some cities have found it necessary to regulate traffic, and by-laws have been passed requiring slow traffic to keep to the curb side of the roadway. As most of the fast traffic is rubber-tired, the old trouble from delays and rail wear is fast disappearing.

In adopting a pavement to the tee rail section, on the gauge side of the rail some form of rail block must be used which will allow for flange clearance as well as rail vibration. The rail was made monolithic with the concrete base and pavement in some of the older types of track construction, thus giving a very rigid track, but this type is being replaced by some other method where brick, granite, sandstone or concrete rail blocks are used. The heavy wear from car and vehicular traffic at intersections, however, soon cuts this rail block, giving it a rough appearance, and track maintenance is increased.

The pavement may be laid up to the lip of a girder grooved rail, which takes the wear of the traffic, retains its appearance and protects the adjoining pavement. From the pavement standpoint, there is little doubt but that the grooved section is much to be preferred.

Rail Joints

It has been said that an ideal joint should have the same strength, stiffness and elasticity as the rail which it joins. That is true of all joints used on rails laid in a pavement, and as far as strength is concerned, equally true in open track work, but in this case, expansion and contraction of the rails have to be considered. In open track work the duty of the joint is a peculiar one. It must have the supporting and stiffening power of the adjoining rail in order that the wave motion of the rail may be continued, and yet possess the capacity to move under contraction and expension. Provision is usually made for this movement by giving an elliptical shape to the bolt holes in the joint, making the long diameter ¼ in. greater than the diameter of the bolt. It is not necessary to consider the joint as a relief for stresses induced by temperature in rails laid in a pavement where they are protected from extreme changes of temperature.

Joints may be classified as mechanical or welded joints. The mechanical joint is made by bolting some form of plate on each side of the rail; welded joints are made by joining the ends of the two rails in a butt-joint.

Fig. 5 shows a number of common types of mechanical joints which are in use to-day. The fishplate is used in open track work, and with small rails such as are used in industrial railways or the light temporary tracks used by contractors.

The angle splice bar is being used in large quantities for both steam and electric railways. It is made in a great variety of sizes, varying from the 16⅛-in. 4-hole bar weighing 3.97 lbs. per ft., up to the 34-in. 6-hole bar, weighing 18.12 lbs. per ft. As a general rule, this bar is used on open track work, but the writer believes that a 34-in. 6-hole angle

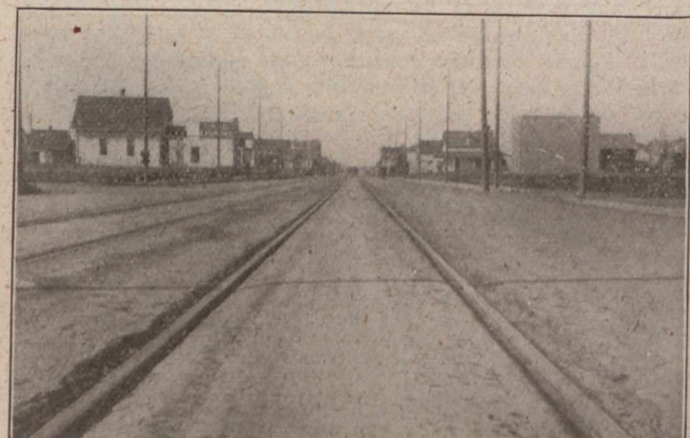

FIG. 4—KUBNESS ST., EDMONTON, CONSTRUCTED IN 1913 (SEE FIG. 10)

splice bar, supported by a centre tie and two end ties, will make a good joint in a paved street.

Fig. 5 also gives a section through the continuous joint, which is very popular with track engineers where a mechanical joint is to be used in a paved street. The flange of the rail fits so tightly into the base of the joint that it is usually necessary to drive the joint to place with a sledge.

The Nichols composite joint is made by riveting two loosely fitting plates to the rail and filling the open spaces with molten zinc, which enters into and fills out all irregularities of the rolled surfaces, thus giving a continuous bear-