

mittee has made a report upon standard track construction laid upon rock ballast and is now studying and working upon the subject of track construction laid in concrete with a view to preparing a report to the association which when adopted will become available to those interested.

"The matter of the construction of tracks in paved streets is obviously one of vital interest to all of us—those who are responsible for the street paving and those who are responsible for the street railway tracks. Since the street railway must furnish its own wearing surface, must supply its own foundation, must also provide a smooth surface for the use of other vehicles, which it does not use, and must maintain this surface, no one will doubt that its engineers are vitally interested, fully as much as any one else, in the permanency of that construction. That the street railways in any great city would fail to look at it from a broad point of view, I should doubt, and I should likewise doubt that engineers, who represent the cities, would entertain any view toward street railways other than those of the greatest fairness and ultimate good to all concerned. What we both seek is cordial co-operation in arriving at the best possible construction for the purpose. It must be obvious to every one that conditions vary and that varying conditions will justify different construction in different locations; that in places of light traffic a needlessly expensive construction would be prohibitory to street railway operation. That condition nobody, I think, would contemplate. In situations of heavier traffic heavier construction is justified, but what is the best construction is what we are all, no doubt, trying to arrive at.

**The Reason for Railroads.**—"To go back into history, I may remind you of what brought the railroad into existence, *viz.*, the lack of a surface suitable for a vehicle to carry sufficient people fast enough. For that reason the pioneers in railroading provided a surface for that purpose, out of which has grown the wonderful network of railroads. Following them, less than thirty years ago, the electric railway came into existence and has also performed its functions, and developed its wonderful system of railways in all centres of population and inter-connecting these centres and ramifying out from these cities through the adjoining country. If you stop to think, you will realize the immense mileage of the street railways, the figures for which I am not prepared to quote, the wonderful development and expansion which they have enabled the cities to enjoy and the tremendous increase in the value of properties and all that they have contributed.

"I have no doubt that you will all give due consideration to the interest of the street railways and will also have in mind that, with the advance in the cost of material, labor and everything else, the street railway is doing what it can to maintain its end and give the best possible service for popular fares.

"I noticed the other day a remark made by an engineer in New York that, if all of the railways in that city were to stop for some reason, the people would not only be unable to go to their work not only on account of the distance and time required, but also because there would not be room on the streets for the people who would want to use them. The essential value of railway transportation must be realized as well as that of vehicular travel.

"In the development of construction we have gone through a great many experimental phases, which we must not forget, and many times we have arrived at what

we thought was perfection. Some years ago we laid a track on a girder or stringer of concrete. That was considered a wonderful development. I don't know whether it is still in use anywhere. It may be, but I know of so many places where it is disintegrated and failed that in the end it proved a great disappointment. Therefore, in arriving at the best and most permanent construction we must be very careful to be sure that we have the right thing before we cause the expenditure of vast sums of money to provide something which has not been established by time.

"I may assure you that the American Street Railway Association will lend its effort, interest and help in arriving at the solution of the problem and will be glad to collaborate with your association for the accomplishment of the desired end."

## REPORT ON PREPARATION OF IRON AND STEEL SURFACES FOR PAINTING.

A COMMITTEE was appointed by the American Society for Testing Materials and the following report was sent in, as taken from advance copy published prior to the annual meeting of that society in June, 1916:—

The preparation of a steel or iron surface for painting should be such as will secure proper adhesion of paint to that surface. It is improbable that paint ever acts chemically on these metals; and the persistence of paint on iron is primarily a matter of adhesion, which may be lessened or destroyed by (1) any unsatisfactory surface, and (2) by the entrance or intrusion of solid or fluid material between the paint film and the metal.

Recently rolled steel or iron is covered with a mill scale of anhydrous oxide, and if painted at once, the paint never touches the metal, but is applied to the mill scale. If this mill scale ever comes off, the paint comes with it, sometimes in scales. If the metal begins to rust by access of air and moisture, the rust penetrates under the mill scale and loosens it. Ordinary rust is hydrated oxide, and stimulates further corrosion, but the anhydrous mill scale does not, and it is objectionable because it may crack off by unequal expansion or from other causes.

In addition to mill scale and rust, other objectionable surface coatings which are frequently encountered are dirt, grease, oil, water and frost.

In considering methods for preparing these surfaces for painting it is well to take account of the methods used to secure the adhesion of substances other than paint to iron or steel. Such cases are, for example, the electro-deposition of copper or other metals; the plating of iron by molten metal; the coating of steel or iron with a vitreous enamel, which is practiced in making enameled vessels for cooking and the like; and the application of varnish enamels, such as are used on bicycles and many other metal surfaces. In all these processes it is essential that the adhesion should be perfect; that is, that the coating should wear off from the outside, not peel off from the metal; and this is what is desired with paint. In all these cases, it is universally believed to be necessary that the coating material should come in actual contact on all parts of the surface with the actual metallic surface of the iron or steel; the latter must be freed from all dirt and grease, and from all scale and rust, before the coating is applied. This is done by (1) cleaning the surface with chemically active liquid, such as sulfuric acid, (2) by the sandblast, and (3) by other mechanical means, such as