Electrolytic troubles and damage to the piping system and cables result from these two conditions and is spread out over the whole of the centre of the city, although it has appeared only, so far, in certain districts.

Recommendations.

The cure for the electrolytic trouble should come from the Electric Railway Company as the city cannot do anything to protect its piping system from stray currents.

Remedial means are mainly those which I have already stated in my preliminary report dated April 1, 1909, and addressed to your secretary, namely:

1. Installation of substations at different points of the system-this with a view of diminishing the amount of current to be returned through the rails in the centre of the city.

2. Proper rebonding of all tracks that show defect.

3. Special bonding and cross bonding work at intersections.



4. A system of inspection of track returns by the railway company.

A substation system of power distribution will do away with the electrolytic trouble. At present the whole current for the railway service being fed from one station, gives rise to a concentration of current in the tracks situated in the heart of the city. The current density in the rail returns must be kept low. The soil in this city shows a very low resistance and only very small difference of potential in rail returns can be allowed. This must be assisted by a rebonding of the tracks which show defects, that is, which indicates excessive drop. All bonds showing a reading of more than 4.5, that is, whose resistance is greater than 4.5 feet of rail should receive attention and be made good. Track intersections should also receive careful attention, ground plates at sides of bridges to carry return currents from one side of river bank to the other must be done away with and insulated feeders placed instead. white bot watthe

Action By Company.

I am pleased to state that the Winnipeg Electric Railway Company is carrying its work along these lines. Following recommendations made by William B. Boyd, chief engineer, Toronto Railway Company and Toronto Power

Company, Toronto, and approved by the writer, the Winnipeg Railway Company have placed orders for electrical machinery, which will be installed in three new substations located as follows: One substation near the car barns at Fort Rouge, another on the line running to the Country Club, approximately 17,000 feet from the Mill Street substation, and the third in the north end of the city near the car barns. This will reduce very largely the amount of current returning through the rails on Main Street. These rails are now very much overloaded with current.

In connection with the rebonding of the tracks, the railway company have now in the city, and in operation, a bonding car for electrically brazing copper bonds on the rail joints. This type of bond, carefully installed, will secure an effective system of rail return. It can be easily applied on old work with very little disturbance of pavements. Tests made on Logan Avenue, where this type of bond is in place, show very low readings of voltage drop. The work being carried out now by the railway company on Dufferin Avenue shows construction work of a very substantial nature and plans for special work at intersections submitted by the railway company to your city electrician and approved by the writer will give intersections with very small drop of potential.

Besides the above, the railway company have advised me through Mr. Boyd, that it is the intention of the company to carry out the following work of reconstruction of their tracks:

1. New rails on Broadway from Main Street to Osborne Street.

2. New rails on River Avenue from Main Street to Osborne Street.

3. New rails on Osborne from Assiniboine River to Spadina Avenue.

4. New rails on Academy Road from Wellington Crescent to Stafford Street.

5. New rails on Notre Dame Avenue from Nena to Arlington Avenue.

The Winnipeg Railway Company must be instructed to proceed with this rebonding work and with the installation of the substations without delay. The rebonding of the tracks must proceed at maximum speed, night and day, until the whole system is in proper condition. After this is done, all bonding of the rails to the telephone cables and pipes should be removed, as well as the ground plates at bridges. The amount of copper in the feeder returns from Main Street, corner of Portage Avenue, to the substation, must be increased to at least 10,000,000 c.m. and the railway company should be instructed to place these wires in the ground in approved conduit.

The writer also desires to recommend that following the termination of the work above outlined, that is, sometime in the fall, a survey be made to see results accomplished.

The third recommendation made, namely, that the railway company should maintain its plant in a high state of efficiency through a rigid inspection of the track returns, is of the greatest importance to the city and should be enforced. The track returns should be under test at all times, in order to remedy at once any faulty bonds as they appear.

Accurate records of the drop of potential at different points of the railway system should be kept by the railway company and be open to inspection of the city electrician.

If the above recommendations are carried out with a desire to obtain best results, troubles due to electrolysis will be practically eliminated. In conclusion, the writer desires to acknowledge his indebtedness to Mr. Boyd for his assistance in this investigation.

The electrolysis tests were carried out by Mr. Beaubien, electrical engineer, Montreal, assisted by Mr. McGinnis, of the Winnipeg electrical department. Respectfully submitted.

