When a street upon which tracks are now laid is to be paved in a permanent manner, on concrete or other like foundation, then the purchaser shall remove present tracks & substructures, & replace the same, according to the best modern practice, by improved rails, points & sub-structures of such description as may be determined upon by the city engineer as most suitable for the purpose, & for the comfortable & safe use of the highway by those using vehicles thereon, & all changes in the present rails, tracks & roadbed, construction of new lines or additions to present ones, shall be done under the supervision of the city engineer and to his satisfaction.

"(A). In the event of the purchaser desiring to make any repairs or alterations to the ties, stringers, rails, turnouts, curves, etc., on paved streets, the purchaser shall repave the portion of the roadbed so torn up at his own expense.

"II. When the purchaser desires or is required to change any existing tracks or substructures for the purpose of operating by electric or other motive power, approved by the city engineer & confirmed by the council, the city will lay down a permanent pavement in conjunction therewith upon the track allowance (as herein defined) to be occupied by such new tracks & sub-structures. This shall first apply only to existing main lines & thereafter to branch lines or extensions of main lines & branches, as & when the city engineer may from time to time recommend & the city council may direct & require; but such tracks as are now laid on a permanently formed roadway must, when so required as aforesaid, be changed by the purchaser as hereinbefore provided, without any change of roadbed being made or any expense occasioned to the city thereby."

Under the terms of the agreement the Co. pays the city $1,600 a year per mile of double track, & 8% of the gross receipts. When the receipts exceed $1,000,000, 10% is to be paid. To raise the money for constructing these permanent pavements debentures were issued, payable in 10 years, & the revenue derived from the mileage and percentage of gross receipts is used to pay interest & sinking fund upon these, the total amount of bonds issued being $1,210,776, & the annual payment to provide interest & sinking fund is $149,136. This is at present very nearly the amount received from the Co., but as these pavements between the tracks will last for a much longer period than 10 years, in a few years there should be a considerable revenue derived from this source.

A great diversity of opinion has arisen as as to the meaning of the word "permanent," used in connection with pavements. In 1888 this question was in the High Court of Justice before Judge Rose, in a case brought by the corporation of Toronto against the old Toronto St. Ry. Co., & after a considerable litigation it was finally settled, without, however, the judge giving his opinion as to the meaning of the word "permanent." When the present Co. obtained its franchise, the interpretation of the word was again subjected to a great deal of discussion, & in 1893 the continuation of the work of changing the rails by the Co., & the construction of the pavements were postponed from April until Aug., pending a settlement as to the meaning of this word. The writer has always taken the ground that in this case the word "permanent" refers to pavements with a concrete foundation, & this has since been taken as the meaning of the word as mentioned in these clauses. It is a great pity that this word should be so frequently used in connection with pavements. It would certainly be well in future cases to state explicitly what is a permanent pavement.

In compliance with the provisions contained in the previously mentioned clauses, in the spring of 1892 plans & specifications for paving the track allowance on King, Queen, Yonge & other streets were prepared, & on June 28, 1892, the Co. laid down a temporary track on King St., west of Simcoe St., & the contractor for the pavements commenced work. The work of changing the tracks & constructing permanent pavements on the above streets was carried on continuously until winter set in (with the exception of a week's intermission during the time of the Industrial Exposition). The amount of track taken up & relaid this season was 29.9 miles. The rail adopted by the Co. & approved of by the city was a 6½ in. steel girder rail, weighing 70 pounds to the yard, & having a web three-eighths inch in thickness & a base of 4½ ins. wide. A slight alteration was afterward made in the size of the base, making it 5 ins. instead of 4½. The rail now weighs about 73 lbs. to the yard. From experience since gained a heavier section of rail should have been used. The following are the quantities required to build a mile of single track: 114,714 tons of 73 lbs. rails per mile; 5.85 tons of fish plates, 17 lbs. per pair; 1,800 cedar ties; 1 ton of spikes, ¾ lb. each; 1 ton of bolts & nuts, 1 lb. each.

The work of constructing these pavements & the laying of new rails was carried on continuously until the work was practically completed in 1894, there being only a few extensions constructed since. In constructing these new pavements the Co. took up the old rails, tamped the gravel under the ties, put down new rails & lined & leveled them & the paving contractor did the rest of the work. It may be of some interest to give the amount of work done in each year, the average cost per lineal foot (the width paved being 15 ft. for double track), the average rate of progress per day & the different classes of paving material:

1892—29.9 miles single track cost..$322,555.00
1893 - 26.1 miles single track cost.. 392,030.00
1894— 9.8 miles single track cost.. 116,942.61

Average cost per lineal foot of double track for the different classes of pavement during these years was:

Asphalt	$5 23
Granite	2 43
Brick	4 21
Cedar blocks	3 83

This covers the cost of stone or scoria toothing, but where granite was used the contractor was allowed to relay the blocks that were on the street. Average amount done per day was:

Asphalt—131 lineal feet of double track.
Granite—56 lineal feet of double track.
Brick—73 lineal feet of double track.
Cedar blocks—96 lineal feet of double track.

In 1894, on McCaul St., the method of construction was slightly altered as to the system of laying the granite or scoria toothing. It was found that when the blocks were laid as headers and stretchers that the water lodged next to the block & assisted in destroying the asphalt. To prevent this it was decided to lay scoria blocks, 4 x 5 x 9 ins., parallel to the rail, & then lay the asphalt. The practice had been to lay the first 6 ins. of concrete up to the bottom of the rail, then lay the scoria blocks in mortar, & finally put in the remainder of the concrete. On this street a change was also made in this respect. The whole of the concrete was put in at once & while still wet scoria blocks were pounded into it, & left to consolidate with the concrete before the asphalt was laid down. In any extension constructed since 1895, wooden ties have been dispensed with & steel tie bars, 2 x 3-8 ins., placed 6 ft. apart, are used, the rails being laid on a solid bed of concrete 8 ins. in depth by 20 ins. wide. This method of construction is much superior to the first type adopted, & is largely used in other cities. After an experience of 6 years of the different materials used, it is evident that with the conditions existing in Toronto, asphalt is not a suitable paving material to be used between street railway tracks. After having been down only 4 years, the asphalt commenced to disintegrate. This was at first more noticeable where the asphalt joined the toothing, but it was not long before the rest of the material between the rails commenced to wear into holes. This was due probably to the following causes: The lack of proper foundation under the ties, which was shown by the settlement of the rails in several places, the impossibility of properly tamping the asphalt between the toothing, & the constant watering of the asphalt, rendered necessary by the dust caused by the passage of the cars, & also by climatic conditions. Upon King St., which was the only asphalt pavement laid without toothing, a rut was soon formed, rendering necessary constant repairs. The fact of the lip of the rail not being quite as high as the head, & the gauge of the track being 4 ft. 10⅞ ins. instead of 4 ft. 8½ in., probably had a great deal to do in forming this rut.

As previously mentioned, the first pavements were laid in 1892, & in 1897 it became necessary to commence tearing up the asphalt & replacing it with granite, scoria or brick, depending upon the amount of travel upon the street. By 1900 all the asphalt between the rails will have been replaced by a more permanent material. Up to the present 7½ miles of this work have been done. As these asphalt pavements were guaranteed for 5 years, arrangements were made with the contractors whereby they substituted brick for this asphalt, & were paid $1.50 a square yard, but afterward, when the guarantee expired, the price paid for substituting scoria for asphalt averaged about $2.40 a square yard. This includes taking up the old asphalt & also 4 ins. of concrete. The amount spent up to the present in substituting a more permanent material than asphalt is $137,340.19. In putting in blocks in place of asphalt, the asphalt was first taken off & then the concrete had to be picked out so as to afford room for the blocks, which was bedded on a cushion of sand. Fortunately, on most of the streets the concrete was put in between the rails just to a depth of 4 ins., & it was not a very difficult operation to take this out. Granite is no doubt the most durable material to use between street railway tracks, but owing to the very strong opposition of the cyclists to this material not so much of it was used as the department would have liked, & scoria blocks, imported from England, were used instead. On streets where there was not a great deal of travel Canadian bricks were used. Cement grout was almost entirely used for this work, although some filling was done with paving pitch; but cement was found to be the most satisfactory. Owing, however, to the impossibility of stopping street car traffic while this work was in progress, it was very difficult for the filling to become properly set. On King St., during the past summer, where we were substituting scoria block for the asphalt, a portion of the pavement between the tracks was laid with concrete. It has been down now some two months, but not long enough to know the result.

Maritime Provinces & Newfoundland.

St. John Railway.—The case of Hesse vs. this Co. has recently been before the Supreme Court at Ottawa on the appeal of the plaintiff from an order of the Supreme Court of New Brunswick granting a new trial. The case is of considerable interest, especially on account of the heavy damages awarded at the trial. Jos. Hesse, the plaintiff, on July 17, 1898, with two companions, boarded an open car on King St., St. John. When the car had reached the foot of King St., which is a steep incline, the whole brake gear beneath the car went to pieces. This was known to the con-