

the working of the mixture. On reaching the street, it shall at once be dumped on a spot outside of the space on which it is to be spread. It shall then be deposited roughly in place by means of hot shovels, after which it shall be uniformly spread by means of hot iron rakes in such a manner that, after having received its final compression by rolling, the finished pavement shall conform to the established grade and have a thickness of not less than 1.5 inches. Before the surface mixture is placed, all contact surfaces of curbs, manholes, etc., must be well painted with hot asphalt cement. After raking, the surface mixture shall at once be compressed by rolling or tamping, after which a small amount of cement shall be swept over it, and it shall then be thoroughly compressed by a steam roller, weighing not less than 200 pounds to the inch width of tread, the rolling being continued until a compression is obtained which is satisfactory to the engineer. Such portions of the completed pavement as are defective in finish, compression or composition, or that do not comply in all respects with the requirements of these specifications, shall be taken up, removed and replaced with suitable material, properly laid, in accordance with these specifications, at the expense of the contractor. Whenever so ordered by the engineer, a space of 12 inches next the curb shall be coated with hot asphalt cement, which shall be ironed into the pavement with hot smoothing irons.

No wearing surface shall be laid, when, in the opinion of the engineer, the weather conditions are unsuitable, or unless the binder on which it is to be placed is dry. The finished pavement must be well protected from all traffic by suitable barricades until it is in proper condition for use.

Requirements.—The finished pavement shall contain between 9.5 per cent. and 12.5 per cent. of bitumen soluble in cold carbon disulphide, depending upon its mesh composition and the character of the sand used and the traffic to which it is to be subjected, but in all cases sufficient asphalt cement must be used to properly coat all the particles of the mineral aggregate. It must also contain not less than 1 per cent. of mineral matter passing a 200 mesh sieve and not less than a combined total of 25 per cent. passing the 200, 100 and 80 mesh sieves. On streets of light traffic, when the engineer has approved the use of a coarser sand than that specified for general use, the surface mixture must contain not less than 6 per cent. of mineral matter passing a 200 mesh sieve, and not less than a combined total of 18 per cent. passing the 200, 100 and 80 mesh sieves. The maximum amount of 200, 100 and 80 mesh material in the pavement will be regulated according to the kind of sand and asphalt used, and the traffic upon the street on which the pavement is to be laid, subject to the maximum requirements elsewhere herein specified under sand and filler.

The above limits as to mesh composition and per cent. of bitumen are intended to provide for such permissible variations as may be rendered necessary by the raw materials used and the character of the work to be done. The composition of the wearing surface may be varied within the limits above specified, at the discretion of the engineer, depending upon the kind of sand, filler and asphalt used and the traffic conditions upon the street or streets to be paved.

Condition at Expiration of Guarantee.

In addition to the proper maintenance of the pavement as provided for elsewhere herein, the contractor shall, at his own expense, just before the expiration of the guarantee period, make such repairs as may be ordered by the engineer and as may be necessary to produce a pavement which shall:

a. Conform substantially in grade to the pavement as first laid.

- b. Be free from cracks more than 3 feet in length.
- c. Contain no disintegrated surface mixture.
- d. Not have been reduced in thickness more than $\frac{1}{4}$ inch in any part.
- e. Have a foundation free from cracks or defects.
- f. Be in substantial accord with the specifications under which the pavement was laid, except as otherwise provided for in this section.

Repairing.

Whenever the repairs made at any one time shall amount to more than 50 per cent. of the surface of any one block, the entire pavement on that block shall be taken up and re-laid. These repairs, except as provided for below, shall in all cases be made by cutting out the defective binder and wearing surface down to the concrete and replacing them by new and freshly repaired binder and wearing surface made and laid in strict accordance with these specifications.

Whenever any defects are caused by the failure of the foundation, the pavement, including such foundation, shall be taken up and relaid with freshly prepared material, made and laid in strict accordance with these specifications.

The surface heater method of repairing may be used only in those cases where the repairs are not rendered necessary by:

- a. Failure of the concrete.
- b. Failure of the binder.
- c. Failure caused by the disintegration of the lower portion of the wearing surface.

Whenever the surface heater method is employed, all defective surface shall be removed before replacing it with new material. In all cases the old surface shall be removed to a depth of not less than $\frac{1}{4}$ -inch and the new surface must, when compressed, be not less than $\frac{1}{2}$ -inch in thickness. The heat shall be applied in such a manner as not to injure the remaining pavement. All burned and loose material shall at once be completely removed and, while the remaining portion of the old pavement is still warm, shall be replaced by new and freshly prepared wearing surface made and laid in strict accordance with these specifications.

FOREST FIRES AND RAILWAYS.

By R. H. Campbell, Dominion Superintendent of Forestry.

The vicinity to a forest of a railway either in construction or operation makes the danger of fires more intense. This is partly due to causes connected with the railway itself, and partly due to the crowds of land-seekers, prospectors, freighters, tramps and other people equipped more or less generally with a fine bump of irresponsibility who accompany or follow it. The record of each year's conflagrations shows the railways well up in the list of the causes of forest fires. If they do not lead they always follow close in the black array. It is of interest, then, to consider the relation of the railways to forest fires. In doing so the subject will be confined to the fires which are due directly to the railways.

Railway Construction.

In the construction of the railway it is necessary that the right-of-way should be thoroughly cleared. If dead tops, limbs and stumps are left scattered over the right-of-way or piled just outside of it, as has usually been done, they become a veritable fire-trap, and the destruction of the surrounding forest is an inevitable consequence sooner or later. The regulations for clearing the right-of-way adopted by