

may be some bituminous macadam laid also. The estimate for sidewalk work is \$25,000.

Welland, Ont.—Last year 6,150 sq. yds. of vitrified brick were laid by contract at a cost of \$2.55. Another contract was for 6,280 sq. yds. of wood block, the blocks being 3 inches, with a 20-pound treatment and laid on a 5-inch concrete base. The track allowance portion cost \$4.15 and the sides \$3 per sq. yd. The total amount spent on new pavements last year was \$41,866.33. An additional \$500 was spent on macadam road repairs, executed by day labor. The expenditure on sidewalks was \$7,972.50. The total mileage of pavements laid to date is 2.45 and of sidewalks, 27.2. For 1915 no estimates for pavements have been decided upon. About \$1,500 worth of sidewalk work will be done. Mr. D. T. Black is the city engineer.

Westmount, Que.—According to Mr. P. E. Jarman, city engineer, 1.37 miles of pavements were added in 1914, bringing the total up to 23.22 miles, last year's expenditure on new work being \$40,077.30, and on pavement repairs \$35,617.41. The new pavements included 5,235 sq. yds. of concrete; 2,316 sq. yds. of tar macadam; 3,700 sq. yds. of Rocmac; 5,168 sq. yds. of stone block, and 13,488 sq. yds. of sheet asphalt. The asphalt was laid by contract, while all other pavements, with the exception of a little stone block, was laid by day labor. Expenditure on sidewalks amounted to \$16,676.39, and on curbs and gutters \$1,196.70. The sidewalk mileage at present stands at 47.584. The 1915 work has not been decided upon.

Windsor, Ont.—This city spent \$18,358.66 on sidewalks in 1914, bringing the total mileage up to approximately 100. There are 35 miles of pavements, 7.8 miles of which were added last year. This included 28,955 sq. yds. of asphalt block at \$1.35 f.o.b. factory and 72,577 sq. yds. of concrete at \$1.30, exclusive of grading and foundation. Some 11,900 sq. yds. of Dolorway were laid at a cost of 28c. for surfacing. All this work was done under contract. Pavement repairs amounted to \$920.70 for labor and \$800 for material. No figures are yet to hand respecting 1915 work. It is premised, however, that little work will be done. Mr. M. E. Bryan is the city engineer.

Winnipeg, Man.—The following table gives in detail the mileage of pavements and sidewalks constructed in 1914, and also the total mileages constructed in previous years:—

Type.	Constructed to Dec.	Constructed during	Total.
	31, 1913.	1914.	
Asphalt plant No. 1 ..	84.747	8.09	92.837
Asphalt plant No. 2 ..	13.484	5.89	19.374
Concrete	1.756	4.26	6.016
Macadam	33.138	0.046	33.184
Granolithic walks	118.659	9.94	128.599
Plank walks	372.139	19.91	392.049

Work during 1915 will include the expenditure of \$336,000 on asphalt pavements; \$60,000 on granolithic sidewalks; \$50,000 on plank sidewalks; \$500,000 on street and lane openings; \$56,741 on Main St. bridge superstructure, and about \$250,000 on Salter St. subway, including approaches. The city engineer is Mr. W. P. Brereton.

Yorkton, Sask.—The town has done no street paving as yet; the sub-soil is of sand and gravel and the streets are kept in good condition by frequent use of the log drag. There are 17½ miles of sidewalks and this construction was so well advanced in 1913 that it was not added to last year, and none is likely to be added this year. Mr. H. Talbot Crosbie is town engineer.

THE CONSTRUCTION OF ROADS IN CITIES.

By Archibald Currie, C.E.,

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IN deciding on the various classes of roadways proposed to be constructed, very careful consideration has to be given to the amount and nature of the traffic on any particular road, with a certain assumption of what it might be in the future. The following descriptions of each type of roadway will be of some interest:—

(1) **Asphalt.**—It is proposed to construct asphalt pavements with concrete base on streets with very heavy traffic, such as will be found near railway freight yards and on streets where street cars are running, except in the track allowance and 18 inches on either side, which should be paved with stone blocks or setts. It has to be understood that asphalt pavement should not be used on grades steeper than 5 per cent. The advantages of this pavement are:—

- (a) Ease of traction.
- (b) Comparative noiselessness under traffic.
- (c) Impervious to water.
- (d) Easily cleaned.
- (e) Pleasing to the eye.
- (f) Suitable to all classes of traffic.
- (g) No vibration or concussion in travelling over it.

The defects are:—

- (a) Slippery under certain conditions of the atmosphere.
- (b) Disintegrates if excessively sprinkled or otherwise subjected to constant moisture, although asphaltum is impervious in either fresh or salt water.
- (c) Becomes soft under traffic in extreme heat and presents a wavy surface, and under extreme cold may crack and become friable.
- (d) Not adapted to steep grades.

(2) **Asphalt Macadam.**—It is proposed to use this form of construction on streets where the traffic is not quite so heavy as it would be on asphalt pavement, and with the same foundation course, *viz.*, concrete. It may take the place of sheet asphalt on grades steeper than 5 per cent.

The most common type of asphalt macadam roadway is laid on what is known as a Telford base, this base being stones about 8 inches thick laid on edge. The course on top of the concrete or Telford base, whichever is decided upon, is composed of stone from 1¼ to ¾ in. mixed with bitumen in its melted condition. From 17 to 20 gallons of bitumen will be used to each cubic yard of stone, thus covering completely each particle.

The mixture is then laid on the concrete to a depth, after rolling, of not less than 3 in. Before rolling, a grit course of clean stone screenings is spread over the surface in such quantity as will cover and fill the voids in the surface. The excess of this grit course is then removed and the road swept clean, and over the surface a squeegee coat of bitumen is applied, using about a half gallon per square yard. Over this again is spread the excess of screenings which was previously removed to correct the stickiness of the bitumen. The road is then well rolled until the screenings are bonded with the bitumen of the squeegee coat.

(3) **Asphalt and Stone Blocks.**—This refers to work on streets where street cars are running. Asphalt has