although it also was laid on the natural soil and the drainage provided was field tile placed only about 10 inches below the surface. This road went through the first winter with only about eight cracks in a length of 2¼ miles. The second winter, however, largely on account of defects in the drainage, developed a much larger number of cracks, although the road is still in a satisfactory condition.

In the late summer of 1912 a portion of the King Edward highway, passing through the village of Napierville, Que., was laid of concrete, being more or less an experiment by the Department of Roads of the province. The grading was carefully done by day labor by the Department of Roads and was thoroughly rolled. The concrete work was carefully done by a conscientious contractor with many years' experience in concrete work. This road has passed through four winters. Four cracks have developed. They have been filled once each season and the road is as good as when built, although it gets all the through traffic from Montreal to New York State, as well as the local traffic of the village.

Other instances could be given of longitudinal cracks developing, but enough has been said to show that in some cases the trouble has been caused by settlement of the sub-grade near the edges of the concrete, due to improper preparation of the sub-grade. Sometimes boggy spots beneath the concrete have not been properly drained; the system of drainage provided has not permanently kept the sub-grade dry. In practically every case mentioned there is sufficient evidence to show that lack of proper care rather than climatic conditions has led to cracks. Reinforcing has had a beneficial result in some cases at least, by adding sufficient tensile strength to avoid the formation of cracks.

Canadian weather does not prevent the building of successful concrete roads, but it does serve to emphasize the advisability of thorough drainage, the careful carrying out of proven methods of construction and the absolute necessity for a maintenance system that takes care of defects when they appear.

A great irrigation system in India was opened officially in December. It comprises three separate but connected canals—the Upper Jhelum, the Upper Chenab and the Lower Bari Doab. These aggregate 322 miles in length, with about 22,645 miles of auxiliary channels and laterals. They provide for the irrigation of about 2,200,000 acres of arid land in the Punjab province, in the northern portion of the country. As described in a paper presented before the Institution of Civil Engineers by Sir John Benton, the eastern portion of the Punjab had a tract of 1,500,000 acres of arid but good land which could not be irrigated from any water supply near at hand, owing to previous utilization and reservation of such supply. On the western side of the province the Jhelum River provided a large and unused amount of water. To deliver it to the arid lands necessitated extensive and difficult works, with the crossing of two large rivers and numerous mountain streams and torrents. Bridges are spaced at average intervals of 1.6, 1.5 and 3.4 miles for the three canals respectively. The regulating works, etc., are largely of brick. Chambers in the floors provide settling basins for the silt and so reduce erosion of the masonry floor. Inspectors' houses are placed at intervals of about 10 miles. There is a complete telegraph system. Flour mills have been located at some of the falls on the canals. The project has been carried out by the provincial government of the Punjab at a cost of about $35,000,000.

COAST TO COAST

Calgary, Alta.—The new concrete pier under the Ogden bridge has been completed.

Toronto, Ont.—The new main sewer on Dundas Street, between Humberside Avenue and Runnymede Road, has been completed.

Brantford, Ont.—Freight services on the Lake Erie & Northern Railway between Brantford and Galt was opened on March 1st, giving Brantford connection with the main line of the C.P.R. at Galt.

Spirit River, Alta.—The Gurney Scale Company, of Hamilton, Ont., recently shipped a 6-ton dump scale to this place. This will be the furthest north in Canada that a dump scale has ever been operated.

Victoria, B.C.—The E. & N. Railway Company has been given until April 10th to sign the agreement respecting the proposed Johnson Street bridge, otherwise no further negotiations will be carried on with it.

Vancouver, B.C.—An arrangement has been made for the Dominion Government to pay the province more than the latter's $300,000 for the Kitsilano Reserve and to hand it over to the harbor board to develop as an industrial centre.

Sarnia, Ont.—At a meeting held to discuss whether it would be advisable to use 25-cycle power from the Hydro or maintain the present 60-cycle plant, it was shown by the Hydro engineer that the former was much cheaper for power purposes.

Ottawa, Ont.—A deputation from the Trent Valley was given encouragement in its application for hydro power for eastern Ontario. The obstacle at present lies in disputed jurisdiction of the provincial and federal governments over water powers.

Ottawa, Ont.—It was announced during the budget debate that a new process for refining nickel had been discovered in Canada by which 100 lbs. of matte could be converted into 50 lbs. of metal in 48 hours. The process will be applicable to low-grade as well as high-grade ores.

Victoria, B.C.—The contract for the Canadian Northern Pacific Railway Company's bridge over the upper arm of the harbor has been let and plans are under way for the permanent bascule span which will provide for a clear opening of 70 ft. for purposes of navigation.

Toronto, Ont.—The Ontario Legislature will approve the plans of the engineers of the Hydro-Electric Power Commission of Ontario for a large power development in the Niagara Peninsula. It is said the immediate development will be 100,000 h.p., and there are visions of an ultimate capacity of 900,000 h.p.

Vancouver, B.C.—It is expected that arrangements will be completed shortly whereby the Canadian Northern Railway will purchase right-of-way along the Fraser River, which will enable it to link up its main line with steel already laid on Lulu Island, extending to the proposed permanent ferry terminus at Woodward's Landing.

Moose Jaw, Sask.—The Canadian Pacific Railway has installed a pumping unit at the high-pressure reservoir. This, in conjunction with the advent of milder weather, has relieved the water situation considerably. More water each day is being secured from Caron, and if the warm weather continues the flow will soon commence to approach normal.