

tional bridge being three-quarters on that side. "If this scheme goes through," he said, "it simply means starving the Canadian industries and navigation interests."

**Ottawa, Ont.**—The annual report of the surveyor-general for the last fiscal year shows that 4,550 miles were surveyed by day labor and 12,483 by contract, a total of 17,033 miles. The average cost per mile under the former system was \$83.72 and under the latter \$26.78. The cost aggregated \$615,247. One hundred and sixty-six whole townships and eight fractional townships were completely subdivided while a partial subdivision was made of three hundred and thirty others, and a resurvey either partial or complete was made of two hundred and twenty-five others. The surveys were carried on exclusively in the western provinces. The report discusses a proposal for reciprocity among surveyors and tells of a conference on the subject. It says in part, by way of approval of the scheme: "Even if a part only of the examinations for qualifying as surveyors should be accepted throughout the empire, so that a candidate who had passed that part of the examination in any portion of the empire would be excused having to undergo it again, in order to qualify as a surveyor in another portion of the empire, a step forward would be made."

**Ottawa, Ont.**—The Department of Public Works has decided to leave the work of surveying Esquimalt harbor, with a view to the location of the new \$3,000,000 drydock, which it is proposed to establish there, to District Engineer McLachlin, who is located at Victoria. The order and instructions, it is understood, will be forwarded to him shortly, so that there will be no delay in pushing forward the work. The engineering staff of the Public Works Department is working at the present time on the plans for the piers and harbor work at Victoria. The department is overloaded with similar work, and the preparation of the plans has been somewhat delayed. Chief Engineer Lafleur states, however, that the plans will be ready within the next month, when tenders will be called for at once.

**Toronto, Ont.**—The repair and renewal of small bridges and culverts during the timber or plank period of construction, has, in purely agricultural districts, been a serious drain on municipal resources, states W. A. McLean, in his annual report on highway improvements in Ontario, but the policy now being adopted of replacing these with concrete or other permanent material is one which, in the near future, promises to relieve taxpayers of this annual expenditure, and permit the outlay to be directed to more necessary road building. Some municipalities, with commendable desire to avoid public debt, are burdening themselves, and delaying progress, in order that all bridges and culverts may be built by annual levy. Where permanent material is used, construction carried on under proper supervision, and repairs provided for, there is every justification for borrowing money to build bridges of steel or concrete, extending payment over a term of twenty or thirty years. In this way those who benefit hereafter will contribute to the cost, and those who use them to-day are not unduly burdened. This does not apply (it must be emphasized) to flimsy steel trusses, weak concrete structures, wooden floors and substructures of steel legs, steel tubes and wooden backing; but only to those in which the greatest degree of permanence and strength is provided with a view to future traffic demands. The future users should not be burdened with charges for which they derive no service. Road building has, in the past, suffered much by this annual demand for culverts and bridges. A decayed bridge, or broken culvert, must of necessity be replaced or repaired, while the road, if at all safe or passable for a part of the year, can wait. It should not be

forgotten that, while bridges are necessary, they are only a short part of the highway; are only built because of the highway, and are an unfortunate necessity. Users of the road may pass over a bridge or culvert in ten seconds, while it may take ten minutes longer to drive over a mile of road. The writer has found many localities in which excellent bridges are being built, but in which the roads proper are in a neglected state. Good bridges should be accompanied by good roads, and every councillor may feel assured that the community which will sanction expenditure for permanent bridges, will with equal good will sanction the cost of good roads when shown a model of what well-directed expenditure will do in that regard.

**St. Catharines, Ont.**—Chief Engineer Weller, of the Welland Ship Canal, work on the lower section of which will begin in August, announces that the present old canal will be closed between Allanburg and Marlatt's Bridge, near Thorold, for building a new weir at the head of Lock No. 25 of the present canal, to supply the above-mentioned water. A dam will then be thrown across the old canal at Allanburg, and the old bed of the canal between the dam and Marlatt's Bridge will be utilized as a dumping ground in which to place the material removed from above water in widening the deep cut. The total length of the canal from lake to lake is 25 miles, and the difference in level between the two lakes 325½ feet, is to be overcome by seven liftlocks, each having a life of 46½ feet. The dimensions of the locks are to be 800 feet in length by 80 feet in width in the clear, and with 30 feet of water over the miter sills at extreme low stages in the lakes. The width of the canal at the bottom will be 200 feet, and for the present the canal reaches will be excavated to a depth of 25 feet only, but all stretches will be sunk to the 30-foot depth, so that the canal can be deepened at any future date by the simple process of dredging out the reaches.

**Fort William, Ont.**—The Dominion Government, realizing the importance of the harbors at the head of Canadian lake navigation, is doing all that can possibly be done to meet the demands of the marine trade, which during the past ten years has increased in volume over 100 per cent. Fifteen million dollars have been spent during the last ten years in harbor improvements at this city and Port Arthur. This year alone an appropriation of two million dollars has been set aside by the Dominion Government for work in the harbor, and the contemplated improvements yet to be made will cover a period of at least five years more and will cost between fifteen and twenty million dollars. When the contemplated improvements to the harbor have been completed there will have been spent an amount approaching fifty million dollars.

**Niagara Falls, Ont.**—This city may soon be the scene of an engineering feat that, when completed, will go down in history as one of the greatest engineering triumphs of the times. The engineers of the Ontario Power Company are considering the construction of a tunnel under the bed of the Niagara River just above the Horseshoe Falls, the object being to provide a new water course for their powerful turbines. At the present time, the turbines are fed from two tunnels, each about eighteen feet in diameter, but the ever-increasing demand for power has taxed these channels to the utmost. These two pipes are located just under the ground surface, alongside of the street car tracks that go up to Chippewa, and experience has shown that it is not wise to duplicate this construction for future use. One is made of steel overlaid with concrete, and the other is of reinforced concrete. These are subject to atmospheric changes, and it is on this account that the peculiar location of the new tunnel has been chosen. The under waters of the Niagara River never freeze, and it has been noticed that