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Introductory

IN presenting to the constructional interests the Special Annual Number of the Contract Record and Engineering Review, we do so well knowing that in the searching light of modern criticism it will not be found infallible; that its pages will not be wholly devoid of error—whether of a technical or typographical nature; that indeed, perhaps, it will be remarkable as much for what it does not contain as for what it does.

But infallibility is a virtue to which no human institution can establish a claim; error has been with us since the beginning of all things, and the omissions only leave the more ground upon which we may direct our future effort.

In the preparation of the material presented in this issue we have experienced the most gratifying co-operation from all connected with the various phases of development work, and to these we would offer our sincere thanks. While the part of this journal is an impersonal one, there are times when a personal word is justifiable—when one feels that the thanks that are expressible in the third person are not sufficient return. Success in the journalistic as in every other field depends largely upon co-operation, and in this respect we have met with gratifying encouragement.

With the rapid advances that are being made in the Canadian constructional field we may hope for greater attainment. We are entering upon a new year of work and we shall endeavor therein to make each succeeding number an improvement on its predecessor. It is our ambition to play a really practical part in the advancement of engineering knowledge and in assisting contractors to the readiest and most economical solutions of their problems. We shall aim to make our pages representative only of the most approved construction, and to disseminate timely and accurate information concerning the supply and labor markets in the various cities.

We give this brief outline of our ideas as a guide to those who have been good enough to extend their co-operation to us in the past. To those who find such discourse wearisome we offer our apologies; and to those other friends, once more our thanks.

Trade Conditions and Prospects

FOR a decade or more we have become so accustomed to establishing new records that it is almost a commonplace to predict that 1912 will eclipse the performances of previous years in the Canadian construction field. But after all, this very commonplace is one of the most significant things connected with the development of our country. Year by year we go on attaining greater heights and still reaching out for further eminences. Our opportunities are immeasurable; our confidence in our country is supreme. The only danger lies in the possibility of our becoming inured to normal progress and in failing through the very magnitude of our aspirations.

The records of our principal cities and works departments show that hitherto our general growth has been normal, if vigorous and healthy. As a single instance one may quote the building returns of the city of Toronto which for years have shown a steady increase of about 16 per cent. The leaps and bounds by which certain western cities have progressed is regarded by some as being disproportionate, but little else could be expected of a country that is universally regarded as one of the richest and most opportune in the world.

The opening of the construction season was never attended by more favorable conditions than the present. There has been a general improvement of business, not only in this country, but in the United States, also, and it is reasonable to assume that the building interests of Canada will be greatly benefited thereby. The disturbing elements in the labor world are few, and there is little chance of any upheaval in the prices of the principal building commodities. In spite of the unusually severe weather experienced in the early part of the year, the building returns for thirty-two leading Canadian cities for the first quarter of 1912 show an increase of nearly 12 per cent. over the corresponding period of 1911, which was regarded as a banner building year, particularly in the earlier stages. The quarterly returns to which we have referred are respectively $11,406,015 and $10,208,114. All things considered it is fair to regard the 1912 total as the herald of great prosperity during the active building months. Contracting work promises to be exceptionally active in every branch of construction, and it is impossible to discriminate in favor of any particular department. The various railroads have a programme that will involve the expenditure of nearly $100,000,000; the Dominion and Provincial Governments are undertaking road work that will cost something like $35,000,000; the municipalities, in the case of all the larger cities, are entering upon a season of record magnitude, while the Building Inspectors throughout the country are unanimous on the score of increased business.

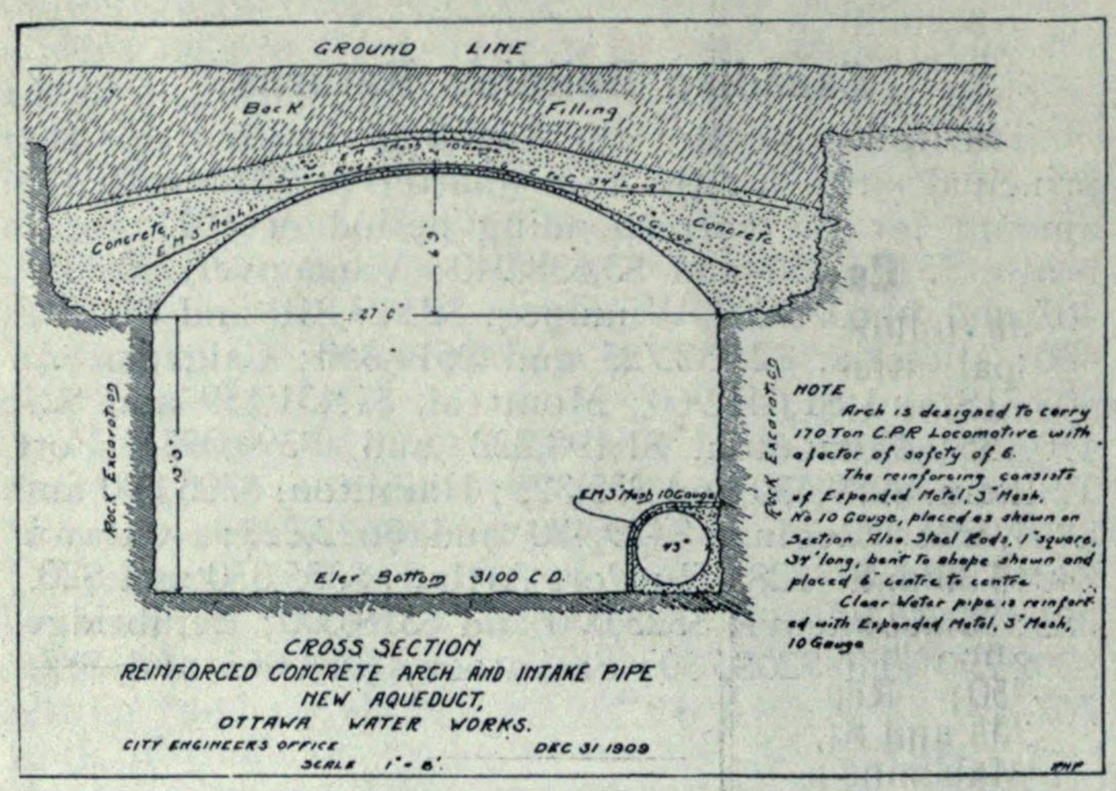
Financial conditions are generally satisfactory.

Municipal Work at the Federal Capital

Reinforced Concrete Bridge to be erected over the Rideau Canal on Bank Street—New Aqueduct and Intake Pipe

Specially Contributed by N. J. Ker, City Engineer of Ottawa, Ont.

AT present, Bank street traffic is carried over the Rideau Canal on a steel swing bridge with a twenty-foot roadway. This is too small to accommodate the traffic and will not permit the Electric Railway to extend its tracks to the rapidly growing part of the city south of the canal. A new bridge was needed, preferably a high level one, that would permit uninterrupted traffic on both the canal and the street. The new bridge has been designed to meet both these requirements, having in the main channel a clearance of twenty-nine feet above water level. The cost of the bridge will



CROSS SECTION
REINFORCED CONCRETE ARCH AND INTAKE PIPE
NEW AQUEDUCT,
OTTAWA WATER WORKS.
CITY ENGINEERS OFFICE DEC 31 1909
SCALE 1"=8'.

be defrayed by both the Dominion Government and the city, the former contributing $80,000 and the latter $50,000.

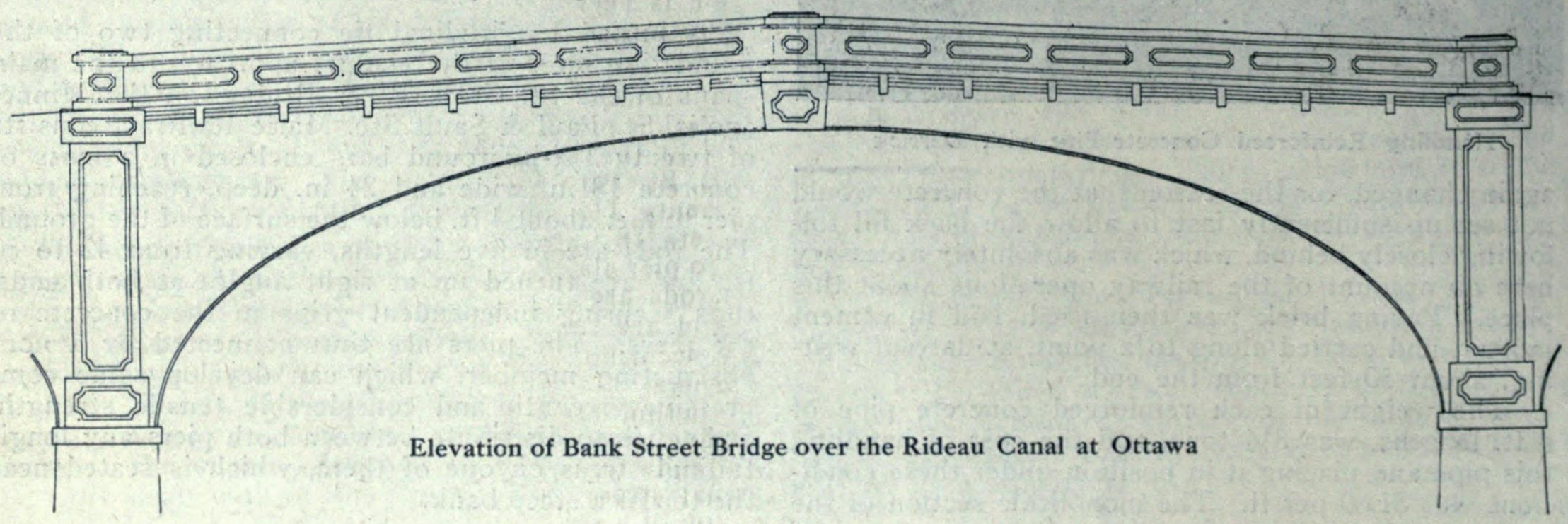
The main channel is spanned by a seventy-six foot arch with a rise of 17.5 feet. The south approach consists of one arch, span 62 ft., rise 14 ft., one arch, span 50 ft., rise 11.15 ft., and about 30 feet of retaining wall which completes the approach to the north side of Echo Drive. The north approach consists of three arches with spans 62 feet, 50 feet and 40 feet, and rises of 14 feet, 11.15 feet and 8.7 feet respectively, and 230 feet of retaining wall.

The Ottawa Improvement Commission Driveway will be carried under the approach arches, through the Exhibition Grounds and along the north bank of the canal as at present. The grade of the roadway on both approaches is five feet per 100. All arches have been designed with elliptical intrados and circular extrados and are proportioned to conform to the specifications of the Department of Railways and Canals. The arch rings are reinforced both top and bottom with steel bars tied together both vertically and horizontally, the percentage of steel at the crown being 72 per cent. The roadway has a clear width of 40 feet and will be paved with creosoted wood blocks. Two eight-foot sidewalks will accommodate the pedestrian traffic, and conduits for the several electrical companies will be provided beneath the walks. The balustrade will be built of reinforced concrete, the posts carrying combination lamp posts and trolley poles. The total length of the structure is 630 ft. The total estimated cost of the bridge, including land damages, is $130,000. The contract for the construction was awarded to Messrs. Jones & Girouard, Ottawa, at $99,500.

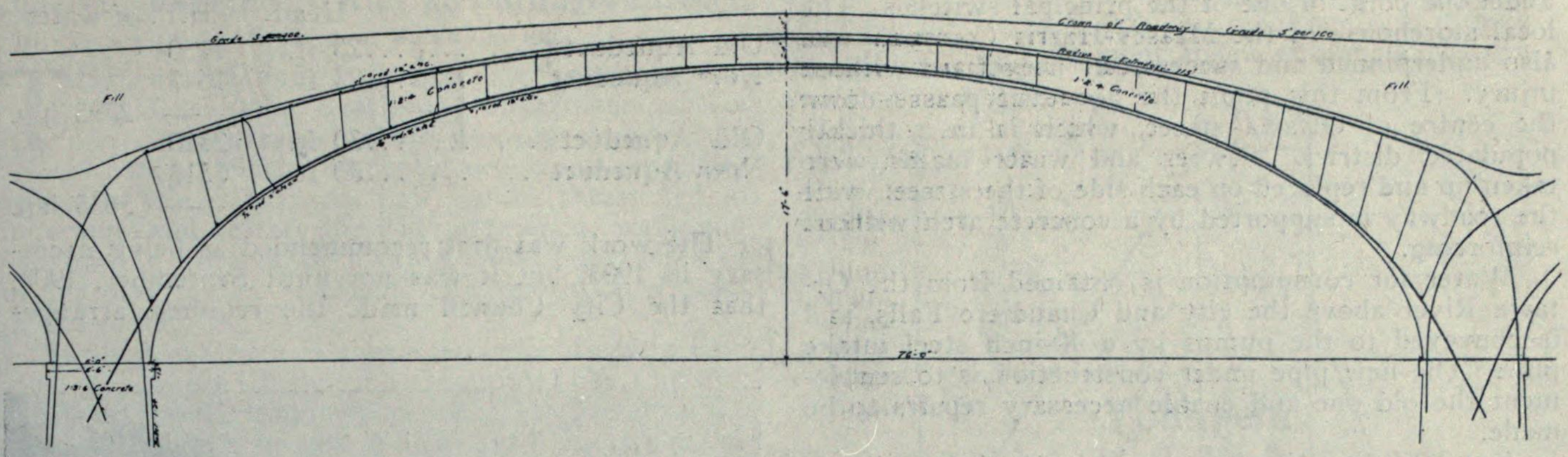
New Aqueduct and Intake Pipe

The waterworks pumping plant at Ottawa is operated by water power. The water is taken from the Ottawa River above the Chaudiere Falls and is conveyed at present by an uncovered aqueduct through a rock cutting. The head varies from 23 feet to 30 feet, depending upon the season of the year, the least head being obtainable in May when the north or flood water backs up in the tail-race below the Falls.

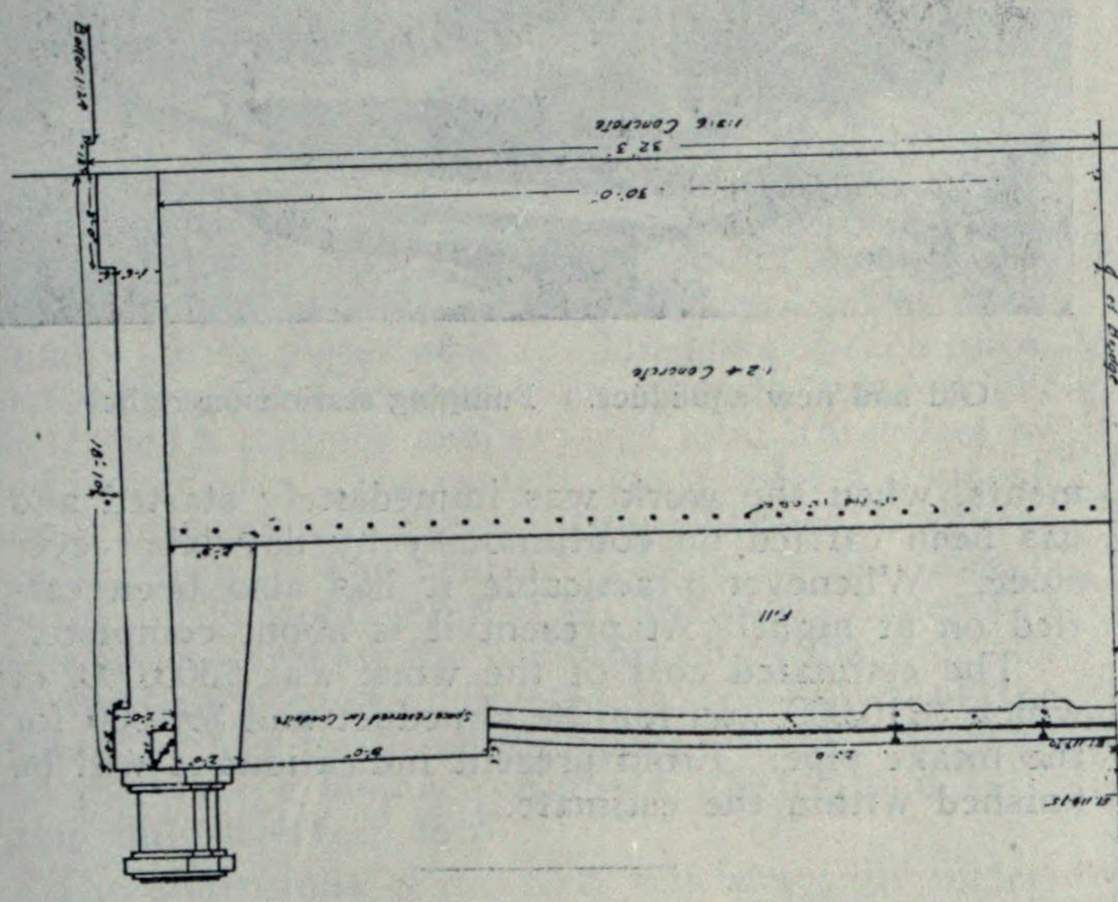
The new aqueduct draws the water from the same point in the river, but for various reasons a different route was followed between the river and the pumping station. It is also through a rock cut, but covered, the cutting being one-half mile in length, 27 feet wide and 22 feet in depth. It passes under the Canadian Pacific Railway freight yard, where the numerous tracks and switches are upheld by a reinforced concrete arch, as shown on the accompanying cross section. Traffic was maintained at all times and no one was injured, although the work passed directly



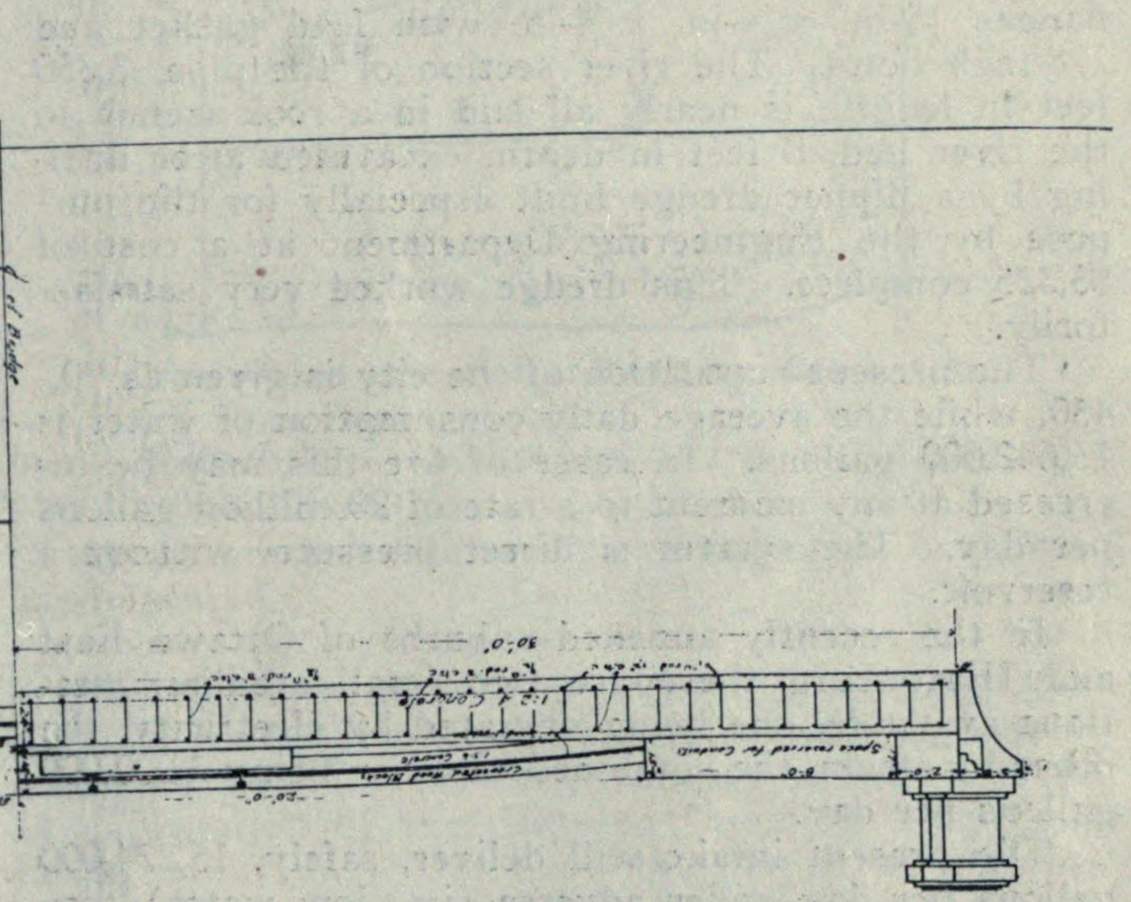
Elevation of Bank Street Bridge over the Rideau Canal at Ottawa



Longitudinal Section, Bank Street Bridge

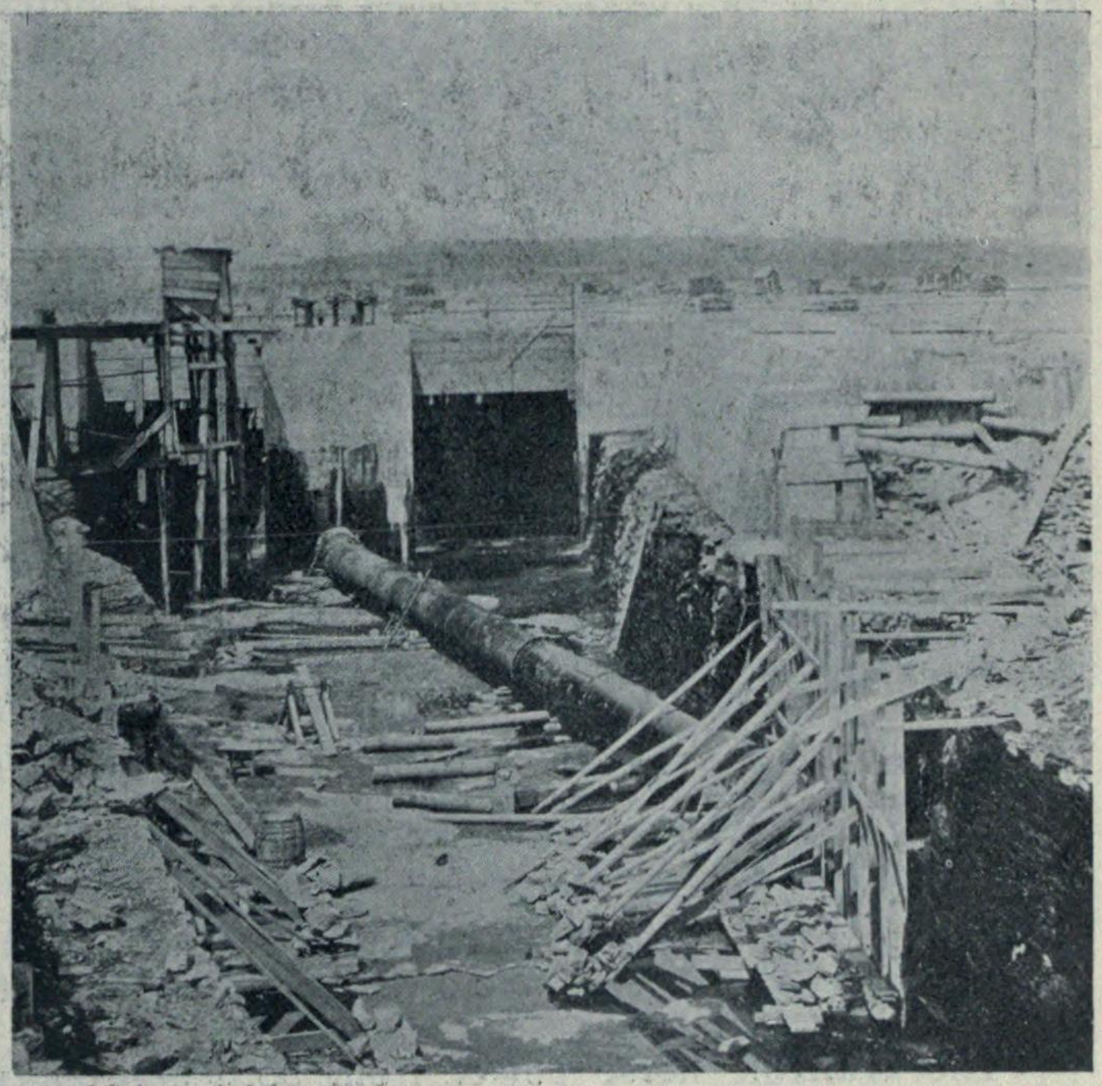


Section at Crown



Section at Pier

New aqueduct passing under C.P.R. tracks



New aqueduct and intake pipe—Ottawa river section

under the point of one of the principal switches. The local storehouse of the Massey-Harris Company was also underpinned and successfully negotiated without injury. From this point the aqueduct passes down the centre of Ottawa street, which is in a thickly populated district. Sewers and water mains were taken up and replaced on each side of the street, while the roadway is supported by a concrete arch without reinforcing.

Water for consumption is obtained from the Ottawa River above the city and Chaudiere Falls, and is conveyed to the pumps by a 40-inch steel intake pipe. The new pipe under construction is to supplement the old one and enable necessary repairs to be made.

For 2,050 lineal feet a new 43-inch reinforced concrete clear water pipe is built in the bottom of the aqueduct as shown. The balance of the pipe is 42-inch steel, 3/8-inch metal, and connected by iron flanges ½-in. x 4-in. x 4-in. with lead gasket and 7/8-inch bolts. The river section of the pipe, 3,350 feet in length, is nearly all laid in a rock trench in the river bed, 8 feet in depth, excavated after drilling by a dipper dredge built especially for the purpose by the Engineering Department at a cost of $3,325 complete. This dredge worked very satisfactorily.

The present population of the city is given as 90,450, while the average daily consumption of water is 15,642,000 gallons. In cases of fire this may be increased at any moment to a rate of 20 million gallons per day. The system is direct pressure without a reservoir.

In the recently annexed suburbs of Ottawa East and Hintonburg there are two small auxiliary stations available, one being operated by electricity, the other by steam, the combined capacity being 3,000,000 gallons per day.

The present intake will deliver, safely, 15,274,000 gallons per day under adverse (i.e., low water) conditions. The new intake pipe will deliver under adverse conditions 18,093,780 gallons per dav, a combined safe capacity of 33,735,780 gallons per day. It

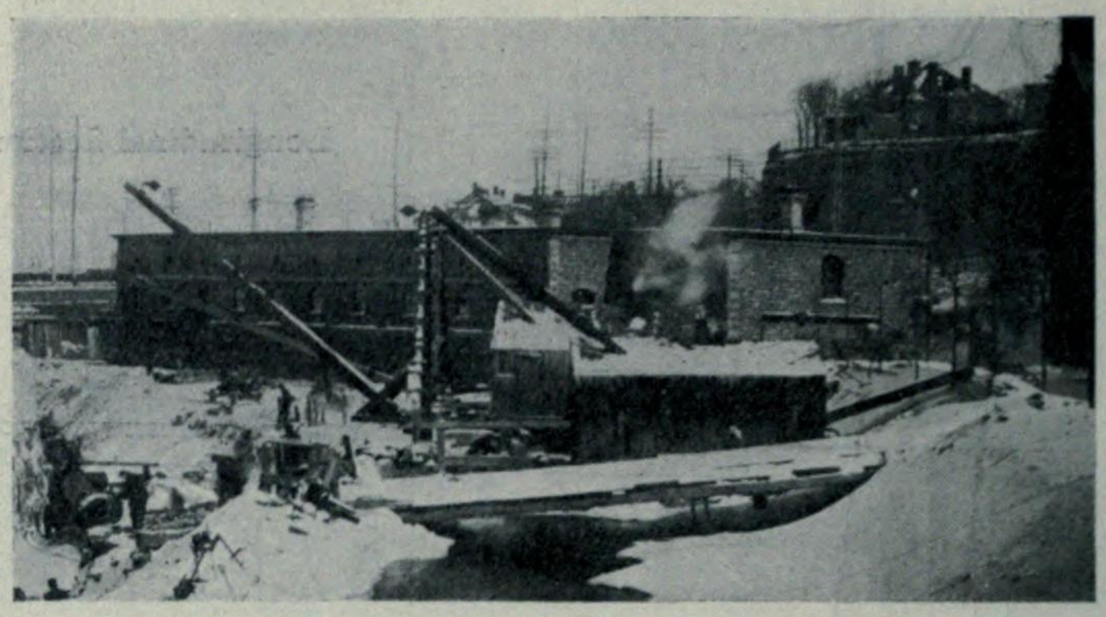
Laying intake pipe. The rock between old and new aqueduct will be removed, forming one large mill pond to overcome anchor ice troubles

is the intention to still further protect the pure water pipe by placing concrete around the joints in the river section.

The available horse power from both aqueducts will be as follows:—

	Head	H.P. of water	
Old Aqueduct.	23 ft.	1150	
New Aqueduct	23 ft.	1645	
		——	2795 h.p.
Old Aqueduct	30 ft.	2320	
New Aqueduct	30 ft.	3315	
		——	5635 h.p.

The work was first recommended as being necessary in 1905, but it was not until September, 1908, that the City Council made the required arrange-



Old and new aqueduct. Pumping station on right

ments, when the work was immediately started and has been carried on continuously by day labor ever since. Whenever practicable it has also been carried on at night. At present it is about complete.

The estimated cost of the work was $300,000, of which $210,000 was for the aqueduct and $90,000 for the intake pipe. From present indications it will be finished within the estimate.

Shoring the 12-storey Wolfe building in New York City presented unusual difficulties, partly due to its small base and to a greater extent because of the inability to shore from the inside of the structure. This was due to machinery occupying most of the basement. The work was accomplished, however, by the use of long inclined frame pushers seated on oak bed-blocks and equipped with shoring screws. The top of each leg of the pusher was fitted into a drop-forged hemispherical cap, which in turn fitted into drop-forged sockets on the under side of structural steel brackets bolted to the building columns. Daily readings with a level were taken on these pushers and necessary adjustments made with the shoring screws.

Reporting on building conditions and trade prospects at Welland, Ont., Mr. D. T. Black, Town Engineer and Building Inspector writes: "The building conditions and general trade prospects show signs of great activity for this year. Last month the council let the contract to pave two miles of the main streets, work to commence on May 1. The street railway company are making preparations to extend their lines on West Main, North Main, East Main, and South Main immediately the weather is suitable. These extensions will exceed four miles of new track. The building contractors expect this to be a record year. New factories and additions to old, new business blocks and a large number of new residences are the projects, in general."