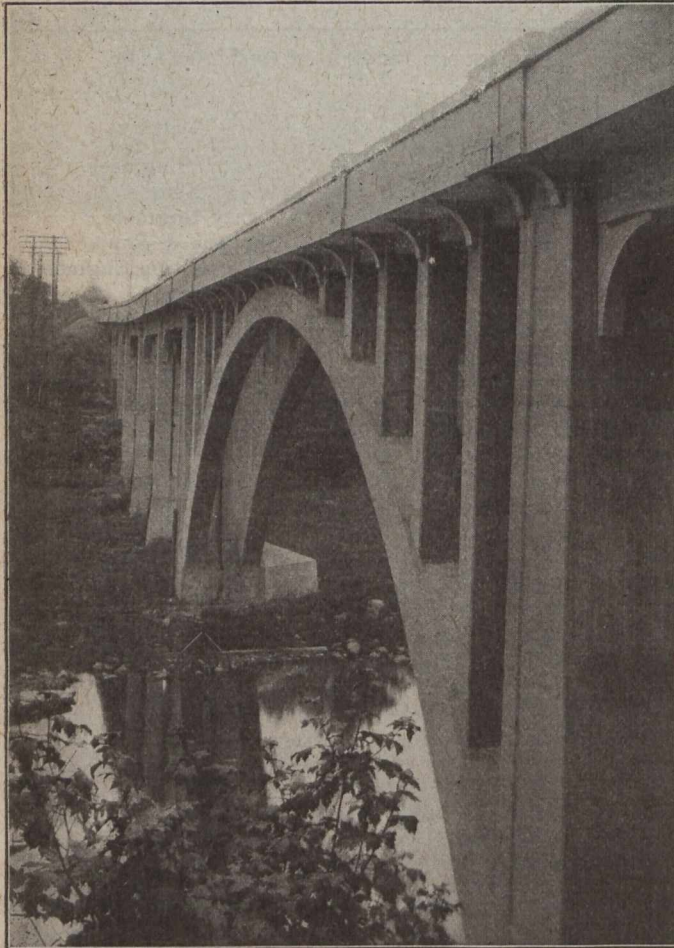


These bridges place Ottawa at the forefront of Canadian cities as to concrete bridges.

Besides the longer arches given in the lists, the information to hand as to earth-filled arch bridges under 200 ft. in length and of spans between 60 and 100 ft., inclusive, is believed to be sufficiently full and accurate to attempt a résumé.

There are nine in Nova Scotia, all in Halifax, seven of spans 60 ft. and two of spans 66 ft., all single spans, all but one having two sidewalks, and with roadways varying from 15 to 33 ft. These are in addition to the two longer bridges, Young Avenue and Tower Road, given in the lists. They were



KING GEORGE BRIDGE, OAKVILLE, ONT.
(Open Spandrel Arch Viaduct)

all built for the Halifax Ocean Terminals Railway by W. A. Duff, assistant chief engineer. They are very handsome bridges. They all have ornamental railings and the exposed surfaces have received tool treatment.

It is believed that New Brunswick has at present no concrete bridges of spans over 60 ft.

In Quebec, besides the Chicoutimi bridge, span 113 ft., the third longest earth-filled arch, and the St. Bazile bridge, by L. A. Vallee, both given in the lists, Magwood & Walker built the Coaticook arch, span 100 ft., in 1910, which for five or six years was the longest concrete span east of Montreal. After these, the longest spans in Quebec province are two bridges by Gauvin & Lassard, each of span 80 ft., one at Notre Dame du Rosaire, 1916, and one at St. Phelamon, 1918, each costing about \$12,000. Next to these two is a bridge on the international boundary over Missisquoi River, of two equal spans of 67 ft., by the Vermont State engineer, and one at Ste. Marie du Monnoir of two equal spans of 60 ft. by F. E. Came.

In Ontario, in addition to the longer bridges given in the lists, there are at least sixteen arches of spans from 60 to 100 ft., inclusive:—

Three by Jas. Bell in Elgin County, Queen's (two spans of 80 ft.), Brewery (two spans of 75 ft.), and Orwell, 75 ft., all built in 1908.

Three by Lucius E. Allen in Hastings County, built in 1913, Bridgewater and Bancroft, each 100 ft., and Spry's, 80 ft.

Three by Bowman & Connor, Eramosa Township, 60 ft., Maryboro Township, 80 ft., and Peel Township, 60 ft.

Three by Frank Barber, Russel, York Township, 60 ft., Newmarket, 60 ft., and Kirkham, Scarborough Township, 70 ft.

One for the Niagara, St. Catharines and Toronto (electric) railway, of main span 80 ft., with five small shore spans, one of the largest when it was built in 1908.

One by C. E. Ure, at Embro, 75 ft.

One by Chas. Talbot, St. John's, Neiddleles Co., 75 ft.

The historic Massey bridge of 92 ft. span was mentioned above. Although of smaller dimensions than those adopted for bridges here recorded, the Guelph Prison bridge by W. A. McLean is worthy of mention on account of its architectural beauty. It has a main span of 50 ft. and two shorter side spans and length of 160 ft.

In Manitoba there is an earth-filled arch of 60 ft. at Arden. Except for a concrete truss of 86½ ft., mentioned later, we have information of no other arches of over 60 ft. in Manitoba. There are sixteen arches over 30 ft., five of them earth-filled, six open spandrel, mentioned above, and five concrete trusses. These are all by the Manitoba Good Roads Board, and have roadways of 18 ft. between curbs. Two of the concrete trusses are especially worth mentioning: The Riverview bridge, span 86½ ft., which is amongst the longest concrete trusses in Canada, and the Rat Creek bridge, No 4, in three spans of 50 ft. and length 124 ft., the only Canadian concrete truss bridge of more than one span. Great care has been taken of the railings, finish and all other details in these Manitoba bridges, and they will compare favorably in appearance with bridges in any part of Canada. The writer is indebted for information as to these bridges to P. Burke Gaffney, bridge engineer to the Board.

Besides the Centre Street and Mission bridges in Calgary and the Saskatoon bridge, we have information of no concrete bridges west of Manitoba of spans greater than 60 ft., and there are said to be none, but information as to British Columbia is meagre.

An historical survey of concrete arches would be quite incomplete without a short review of concrete truss bridges. These are generally arches with the skewbacks tied together by lower chords, and generally with the floor suspended from the arched chords on a level with the lower chords. The first was built by Considère in France in 1904. The first in America was the approach to the Sparkman Street bridge, Nashville, Tenn. The first in Canada and second in America was the Middle Road bridge, between the counties of York and Peel, span 79 ft., designed by Barber & Young and built in 1909 by O. L. Hicks, contractor, one of the pioneers in concrete building in Ontario. In 1911 Prof. C. R. Young left the firm of Barber & Young to become lecturer in structural engineering in the University of Toronto. In that year the writer built two other trusses, Freeman's bridge, York County, span 91 ft., and until 1919 the longest Canadian truss, and Haliburton, span 55 ft., and by 1913 had built nine of this type: Three others in York County,—Highland Creek, Birrels on Yonge Street north of Toronto, and Eckhardt near Unionville; one near Collingwood; and Simpson's and Sproull's in Amaranth Township near Orangeville. Up to this time the concrete truss had not appealed to other engineers, but in 1913, Bowman & Connor built one at Eden Mills, of span 50 ft. In 1914, the writer built eight others mostly in York County and Bowman & Connor built four others in Wellington County. After 1914, concrete trusses became more generally distributed, and at present there are 56 of this type in Canada, 25 of them of 60 ft. span, or over, including four on the Toronto & Hamilton Highway, of spans from 100 to 120 ft., now being completed. These were designed by Mouchel & Partners for H. S. Van Scoyoc, chief engineer of the commission, and Geo. H. Gooderham, chairman of the commission. The five built by the Good Roads Board, Manitoba, have already been mentioned.