

in design at a smaller cost than any other form of bridge for these spans. Changes of temperature cause the decking of such bridges to rise and fall considerably at the centre of the span, and allowance for this will, of course, have to be made by the employment of a special form of joint to prevent racking of the pipes. In order to prevent the freezing of the water in the pipes where they would be exposed to the air, there is the alternative of insulating them with a sufficient thickness of material and of carrying them within a light timber structure or shed, special provision being made to warm the air inside the shed in winter. The latter alternative permits of a lighter and cheaper bridge for the long spans, and the estimate is based on this assumption. Where the pipes cross the two narrow channels the box girder form of bridge would be suitable, the pipes being laid in the interior of the box girder, the bridges being designed so as to interfere as little as possible with the existing surface of the ground and of sufficient strength to carry four 51-inch diameter pipes, which would give a maximum discharge at the rate of 93,000,000 gallons per diem without material loss of head between the service reservoir and the city.

The following estimate is based upon the proposals mentioned in the report:—

Head Works.

Dam at outlet of Mitchell's Lake to raise water surface to 570 feet	\$ 130,180
Clearing and burning area to be submerged..	128,000
Tunnel between Pemichangaw and Long Lake, including shafts, etc.—3,000 lin. ft.	119,630
Outlet works at Long Lake—straining tower, etc.	43,660
Smaller works about lakes, including subsidiary dams at depressions in height of land, temporary works at Pemichangaw, dowering and clearing Long Lake, etc..	72,000

Aqueduct to Service Reservoir.

54-in. steel main, 7-16-in. thick, between outlet tower and service reservoir—235,000 lin. ft.	4,314,080
Bridge on Gatineau River	30,000
Various smaller stream crossings and culverts	110,000

Service Reservoir.

Dams	212,150
Clearing and stripping site	21,460
Inlet and outlet works	26,600

Aqueduct Service Reservoir to City.

51-in. steel main, 7-16-in. thick between service reservoir and city—two lines of pipe, each 32,000 lin. ft.	1,101,120
Various smaller stream crossings, culverts, etc.	20,000
Bridge across the Ottawa River	180,000

Total for works	\$6,508,880
Add 10 p.c. for engineering and contingencies	976,320
	<u>\$7,485,200</u>
Land, lakes, compensation, etc.	500,000

Total

If the scheme is proceeded with immediately, the system may be in use in 1917.

The City Council will have the proposal under consideration at its meeting to-morrow (October 17th, 1913).

OVER FIFTEEN HUNDRED AT ROAD CONGRESS.

OVER fifteen hundred delegates attended the American Road Congress held at Detroit the first week of this month. About sixty Canadians attended the meetings, including A. W. Campbell, Deputy Minister of Railways and Canals; Honorable Dr. Reaume, Minister of Public Works of Ontario; Honorable J. E. Carron, Minister of Agriculture and Roads of Quebec Province; the members of the Ontario Highway Commission; the city engineers and some of the assistant city engineers of London, Hamilton, Toronto, Ottawa, Oshawa, Port Arthur, Orillia, St. Catharines, Windsor and Walkerville; M. D. Hallman, County Roads Superintendent, Berlin; E. A. James, engineer of the York County Highway Commission, Toronto; C. H. Keefer, C.E., Ottawa; A. T. Laing, Department of Highway Engineering, University of Toronto; A. J. MacPherson, Chairman of the Provincial Highway Commission, Regina; W. G. MacKendrick, of the Warren Bituminous Paving Co., Toronto; Controller J. W. Nelson, Ottawa; the Mayors of Port Arthur and Hamilton; Victor Pigeon, Chairman of the Road Commission of Longueuil, Que.; J. O. Sharkey, President of the Central Steel and Wire Co., Toronto; B. E. Smith, of the Barrett Manufacturing Co., Toronto; Gordon Smith, of the Barber Asphalt Paving Co., Toronto; F. M. Williamson, Engineer of Dominion Parks, Ottawa; D. P. Wagner, secretary of the Ontario Highway Commission, etc.

The attendance was better than at the Second American Road Congress, which was held in 1912 at Atlantic City, and far better than the First American Road Congress, held in 1911 at Richmond, Va. The exhibits occupied twice as much floor space as they did at Atlantic City, and were most interesting and instructive.

The asphalt interests were represented by the exhibits of the Barber Asphalt Paving Co., A. B. Chamberlain, Standard Oil Co., The Texas Co., U.S. Asphalt Refining Co., and the Warner-Quinlan Co.

The brick interests were represented by the National Paving Brick Manufacturers' Association and its constituent companies.

A number of cement companies exhibited, including the Canada Cement Co., which was the only Canadian firm having a booth, with the exception of *The Canadian Engineer*.

Several firms exhibited expansion joints or reinforcements for concrete pavements, including the American Steel and Wire Co., R. D. Baker & Co., Thomas Steel Reinforcement Co., and the Trussed Concrete Steel Co. A felt expansion joint filler was exhibited by Philip Carey Co.

Among the companies exhibiting other types of pavements or paving materials were the Asphalt Block Pavement Co., Barrett Manufacturing Co., Rudolf S. Blome Co., Dolarway Paving Co., Jennison-Wright Co. (wood block), Robeson Process Co. (Glutrin), and Warren Brothers Co.

Rock crushers, graders, rollers and other road machinery were shown by the Acme Road Machinery Co., J. D. Adams & Co., American Road Machinery Co., Austin Western Co., Climax Road Machine Co., Galion Iron Works Co., Good Roads Machinery Co., Charles Hvass & Co., Port Huron Engine and Thresher Co., Rumely Products Co., Wheeling Mold and Foundry Co., etc.