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# CANADIAN CONTRACT RECORD

A WEEKLY JOURNAL OF CONTRACTS AND TENDERS

PUBLIC • WORKS • TENDERS •  
ADVANCE • INFORMATION •  
AND • MUNICIPAL • PROGRESS

EVERY WEDNESDAY

This paper reaches every week the Town and City Clerks, Town and City Engineers, County Clerks and County Engineers Purchasers of Municipal Debentures and leading Contractors in all lines throughout Canada.

VOL. 10.

JANUARY 3, 1900

No. 49.

## THE CANADIAN CONTRACT RECORD, PUBLISHED EVERY WEDNESDAY

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## TENDERS FOR BRIDGE

Sealed tenders, addressed to George Stewart, Esq., County Clerk, Peterborough, will be received up to TUESDAY, JANUARY 23RD, 1900, at four o'clock p.m., for

### Floating Bridge and Approaches

over Chemung Lake. Bulk and separate tenders received.

Plans, etc., may be seen at the office of J. E. Belber, Esq., County Engineer, Peterborough. An accepted cheque for five per cent. must accompany each tender. The lowest or any tender not necessarily accepted.

(Sgd.) E. HAWTHORNE,  
Warden.

## TENDERS

Will be received by the undersigned, on behalf of the County of Huron, at the Wingham Post-Office, until 4 o'clock p.m. on SATURDAY, THE 20TH DAY OF JANUARY NEXT, 1900, for the erection of a

### Steel Bridge

on the boundary line between the Townships of Morris and East Wawanosh, about one-half mile south of Wingham, to be of one span of 100 feet clear between the abutments, roadway 16 feet wide clear between trusses, trusses to have seven panels each, and 18 feet high from pin to pin.

Joists, 3 x 12 inches, placed at two feet centres, to be of rock elm. Floor planks to be 3 inches thick and from 6 to 10 inches wide, securely spiked to all joists (to be of rock elm or tamarac). Wheel guard, 6 x 6 inches, of pine or cedar. Railing to be 4 feet high, of 3 tiers of 1 1/2-inch gas pipe.

The bridge will be supported on concrete abutments, about 22 feet from bed of stream to floor. Bridge finished on or before the 15th of August next. A good race to erect a bridge.

The lowest or any tender not necessarily accepted.

JOHN ANSLEY,  
County Commissioner.

Wingham, Dec. 25th, 1899.

## WANTED

Wanted, a Civil Engineer to take charge of the Department of Works of the Municipal Corporation of the City of St. Catharines.

Persons applying for the position will please state expected salary, and give testimonial as to character and ability.

J. ROLLISON,  
City Clerk.

City Clerk's Office, St. Catharines, 20th Dec., 1899.



## WELLAND CANAL NOTICE TO CONTRACTORS

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Improvements at Port Colborne," will be received at this office until 1 o'clock on FRI DAY, THE 20TH DAY OF JANUARY, 1900, for the works of improvement at the upper entrance to the Welland Canal.

Plans and specifications of the works can be seen on and after the 26th day of December, 1899, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the Superintendent Engineer's office at St. Catharines. Printed forms of tender can also be obtained at the places mentioned. In the case of firms there must be attached to the tender the actual signatures of the full name, the nature of the occupation and residence of each member of same, and, further, an accepted bank cheque for the sum of \$10,000 must accompany the tender. The accepted bank cheque must be endorsed over to the Minister of Railways and Canals, and will be forfeited if the party tendering declines entering into contract for the work at the rates and on the terms stated in the offer submitted.

The accepted bank cheque thus sent in will be returned to the respective parties whose tenders are not accepted.

The Department does not bind itself to accept the lowest or any tender.

Contractors are specially notified that the conditions requiring the works to be wholly completed by the 15th day of June, 1902, will be rigidly enforced and all penalties for delay enacted.

By order,  
L. K. JONES,  
Secretary Dept. Railways and Canals.

Department of Railways and Canals,  
Ottawa, December 21, 1899

## BUSINESS NOTES.

John Lidstone, carpenter and joiner, Montreal, is dead.

Egles & Linington, painters, Toronto, have dissolved partnership.

A. R. Smith, painter, Ottawa, is reported to have assigned to W. A. Cole.

The assets of Napoleon Vezina, plumber, Quebec, will be sold on the 4th inst.

The Shallow Lake Portland Cement Co., Limited, Owen Sound, Ont., has been granted a provincial charter.

Henry M. Clark, contractor, Fredon-ton, N. B., is said to be offering to compromise with his creditors. The liabilities are estimated at \$4,000.

## CONTRACTS OPEN.

ORILLIA, ONT.—A new steamer will be built here this winter.

SMITH'S FALLS, ONT.—Additional school accommodation is required.

MEAFORD, ONT.—A by-law has been passed in council to raise \$56,000 by debentures.

KINCARDINE, ONT.—The ratepayers have sanctioned a bonus to establish a pork-packing factory.

PEMBROKE, ONT.—On Monday last the ratepayers approved of the purchase of the electric light plant.

NEW GLASGOW, N.S.—The New Glasgow Milling Co. talk of erecting flour mills at Halifax and St. John.

PARIS, ONT.—The by-law to raise \$30,000 for the erection of a central school was voted down on Monday last.

RAMSAY, ONT.—The Ramsay township council have passed a by-law to raise \$11,500 by debentures to pay off indebtedness.

KEMPTVILLE, ONT.—The by-law to provide \$2,500 for the construction of a bridge was carried by an almost unanimous vote.

TIVERTON, ONT.—The plans for the Presbyterian church to be erected here are on view at J. McKellar's grocery store.

CLAYTON, ONT.—Plans for a new Anglican church to be built at this place have been completed by J. H. Watts, architect, of Ottawa.

GRAND FORKS, B. C.—Mr. Newland, architect, has completed plans for proposed hospital at this place, and work will shortly be commenced.

MIDLAND, ONT.—The ratepayers voted on Monday last on a by-law to raise \$5,000 for addition to west ward school; result not learned.

PHOENIX, B. C.—The Phoenix Water-works Co. will build a tank in the spring with a capacity of 100,000 gallons. The main streets will also be piped.

UDNEY, ONT.—Thos. Martin will receive tenders up to January 20th for erection of church at this place. Plans at residence of Rev. J. A. Connell, Atherley.

UFFINGTON, ONT.—John Crozier invites bids up to February 1st for repairing school house at this place, or for building a new one, either stone, brick or frame.

GREENWOOD, B. C.—Madden & Dallas, of the Pacific Hotel, have leased the Windsor premises adjoining and purpose erecting a new building on the property.

COOKSHIRE, QUE.—The town has granted a bonus of \$15,000 to the Canada Food Supply Co. It is expected that building operations will be commenced immediately.

AMHERSTBURG, ONT.—The Canadian Southern Bridge Co. has made application to parliament to build a railway bridge

across the Detroit river from Amherstburg to Gorse Island.

**ST. JOHN, N.B.**—It is understood that several thousand dollars will be spent on the building now occupied by the Daily Telegraph.

**VERNON, B.C.**—The by-law to raise \$7,000 required for the completion of the waterworks system received the approval of the ratepayers last week.

**LINDSAY, ONT.**—The town has granted a bonus of \$25,000, Veulam township \$14,000, and Bethany township a small sum towards the Lindsay, Bobcaygeon & Pontypool Railway.

**WOODSTOCK, ONT.**—The ratepayers voted in favor of the purchase of the electric light plant—Dr J J Brown has purchased a lot on Riddell street and purposes building a fine residence.

**CHARLOTTETOWN, P.E.I.**—The tenders for construction of 12 miles of the proposed southern railway have been sent to Moncton, and from there may be forwarded to the authorities at Ottawa.

**NELSON, B.C.**—The C.P.R. have completed plans for the new depot and other improvements to be carried out at this place.—Plans have been completed for the enlargement of the Waverley Hotel.

**KINGSTON, ONT.**—It is the intention of the city council to issue debentures for the sums of \$25,400 for consolidation of of the city debt, and \$3,500 for the extension and improvement of the waterworks.

**ROSSLAND, B.C.**—Plans for new freight terminals for the C.P.R. have been completed. The freight shed will be 180 x 32 feet. On the south side of the freight yard there will be erected several warehouses.

**BRIDGEBURG, ONT.**—The question of the construction of a waterworks system is still under consideration. Some of the ratepayers contend that the work cannot be carried out for \$26,000, the estimate made by Mr. Gross.

**REGINA, N.W.T.**—J. T. Dennis, Deputy Commissioner of Provincial Public Works, will receive tenders up to January 15th for construction of a sub-structure for a bridge to be erected over the bow river, near Cochrane. Plans at the office of the Irrigation Surveys office, post office building, Calgary.

**YARMOUTH, N.S.**—James Rozee, jr., and Wm. Churchill purpose building a brick block on the site of their burned structure.—On January 15th a public meeting of ratepayers will be held to consider the borrowing of \$13,000 for the purpose of enlarging the pumping station and installing steam engines, pumps and other necessary machinery for pumping purposes.

**NIAGARA FALLS, ONT.**—The Canadian Power Co. has changed its name to the Dominion Power Co. This company has a franchise from the Dominion government to take water for power purposes from Chippewa creek. It is stated that General Fields, of Buffalo, represents capital that has become interested in the project, and that work may be commenced in the near future.

**OTTAWA, ONT.**—The Collegiate Institute Board, at last meeting, decided to take steps in the direction of an addition to the present building. The matter will again be taken up at the January meeting.—W. H. McLaughlin is building a brick veneered house on Florence street, to cost \$1,000.—The authorities of the Gatineau Valley Railway have decided to complete the extension of their line from Graceland to Blue Sea Lake early next summer.

**ST. CATHARINES, ONT.**—The Niagara Central Railway Co. have been granted permission to use the streets to extend their electric road through to Beamsville.—J. S. Gamble, solicitor, has made appli-

cation to parliament for the incorporation of the Niagara and South-Western Railway Co., with power to construct an electric railway from Niagara-on-the-Lake through St. Catharines and Smithville to Hagersville, with branches to Dunnville, Cayuga and Queenston.

**WINNIPEG, MAN.**—The C.P.R. have applied for authority to construct several lines in Manitoba, including the extension of the West Selkirk branch to Little Saskatchewan river.—The Immigration Department have received from Ottawa plans of the proposed immigration hospital to be built in this city. The building will be two storeys, 70 x 35 feet, cost \$7,000, and will be equipped with a sterilizing plant costing \$2,000.—It is said that tenders will be called for in a few days by the Dominion government for improvements to St. Andrews rapids.

**VICTORIA, B.C.**—The Rhode property, corner Cormorant and Store street, and the adjoining brick block, have been purchased by John Hepburn. A brick block will be built on the property.—John Hepburn has purchased the American hotel property on Yates street and will erect on the site a three-storey stone front building.—Besides plans under way for new buildings, F. M. Rattenbury, architect, has under construction the following buildings: New Westminster, three buildings, cost \$40,000; Vancouver, cold storage for P. Burns, \$20,000; block of stores, \$15,000; Calgary, stone residence for P. Burns, \$25,000; Calgary, office block, \$8,000; Nelson, bank building, \$35,000; Nelson, cold storage, \$15,000; Rossland, bank building, \$50,000; projected hotel, \$75,000; Greenwood, hotel, \$15,000; Deerpark, residence, \$10,000; Victoria, alterations to court house, \$25,000; Victoria, residence for E. V. Bodwell, \$5,000.

**MONTREAL, QUE.**—The application of the Demarara Electric Co. for a franchise for an electric railway and lighting plant in Georgetown, Demarara, has been granted by the council of that city. The capital stock of the company is \$850,000, and among the directors are Senator Drummond, Sir Wm. Van Horne and W. B. Chapman, of this city.—It is understood that the Department of Public Works at Ottawa have completed the plans for the proposed improvements at the east end of the harbor, and that they will be forwarded to the Harbor Board in a few days.—An order-in-council has been issued, and is published in the Canada Gazette, approving of the agreement between the Montreal Harbor Commissioners and the Connors Syndicate for the construction of elevators and other harbor improvements.

**HAMILTON, ONT.**—It is said that the Hoepfner Refining Co. have decided to enlarge their plant here to four times the size at first contemplated. The plant as it now stands consists of a main building 236 x 55 feet and three smaller buildings.—Gibson & Osborne have applied for incorporation of the Nickel Copper Co. of Ontario, with a capital of \$1,000,000. Among the incorporators are A. T. Wood, M.P., J. H. Tilden and Geo. E. Tuckett, of this city, and J. A. Kammerer, of Toronto.—R. Buscombe has been granted a building permit for 12 two-storey brick dwellings, corner Locke and King streets, cost \$13,500.—Mayor Teetzel is advocating the purchase of additional property adjoining the hospital, for the purposes of projected additions to that institution.—The ratepayers on Monday last approved of the expenditure of \$150,000 for road improvements.

**VANCOUVER, B.C.**—It is said that the British Columbia Electric Railway Co. intend erecting a large hotel on Hastings street, to cost \$100,000.—S. Sherdahl, of the Rose Hill nurseries, has decided to erect a two-storey brick and stone building, 66 x 132 feet, corner Abbott and

Water streets, from plans prepared by E. Guenther, architect.—The School Board has requested that the council provide several new school buildings, including one at Fairview and one between Fairview and Mount Pleasant.—The British Columbia Electric Railway Co. will shortly extend its tracks on Robson and other streets, in connection with which considerable paving will be done.—Application will be made to parliament to incorporate a company to construct a railway from Kitimat Arm, in this province, via Copper and Skeena rivers to Pine river pass, in the district of Cariboo.

**TORONTO, ONT.**—The Metallic Roofing Co. have purchased property adjoining their factory on King street west, with the intention of building a large addition.—Dr. A. E. Sheppard, of Chicago, was in the city last week in connection with the establishment of a sanatorium as a branch of St. Luke's Society, of Chicago. If a suitable property can not be secured, a new building will be erected.—The city engineer has been advised that the plans for straightening the Don river have been sent to Ottawa.—It is understood that Ryrie Bros., jewellers, who recently leased the premises at 122 Yonge street, intend making considerable alterations, including a handsome front, the one recently put in being intended as temporary.—Building permits have been granted as follows: Copp, Clark & Co., warehouse on Front street west, near Bay, cost \$20,000; Wm. Booth, pair semi-detached two-storey and attic brick dwellings, south side Chicora avenue, near Avenue road, cost \$4,000.—Tenders are invited up to Friday, 5th inst., for additions and alterations to St. Patrick's church in this city. Plans at office of A. W. Holmes, architect, 170 Spadina avenue.—The Compensating Pipe Organ Company are about to commence operations in this city. They have secured temporary premises at corner of Tecumseh and Niagara streets, but intend erecting a factory on King street west, opposite the Metallic Roofing Co.'s works.—The Artificial Lumber Co., of New York, purpose establishing a branch in Canada, and are looking for a site where a large supply of straw and good shipping facilities are available.

#### FIRES.

Catholic church at Campbellford, Ont., loss \$6,000, insurance \$3,000.—Schooley & Co.'s general store at Holland, Man.; loss \$4,000.—Rectory at Rothsay, N.B., occupied by Rev. A. W. Daniel. The building was owned by the New Brunswick Real Estate & Loan Co.

#### CONTRACTS AWARDED.

**CHEMAINUS, B.C.**—Walter Ford has secured contract for hospital building.

**AMHERSTBURG, ONT.**—The contract of rebuilding the St. Imperial has been let to Wm. Lane, of Windsor.

**GALT, ONT.**—\$7,411.05 local improvements debentures have been sold to the Gore Mutual Insurance Co. for \$7,930.56.

**NELSON, B.C.**—The contract for engines for new tug boat to be built here by the C.P.R. has been awarded to the Polson Iron Works Co., Toronto.

**HULL, QUE.**—Joseph Bourque, of this city, has secured contracts for erecting House of Studies adjoining St. Jean Baptiste church in Ottawa for the Dominican Fathers.

**BRANTFORD, ONT.**—The tender of the Watrous Engine Works Co., of Brantford, has been accepted by the council for a pumping engine; price, \$29,957. There were six tenderers.

**QUEBEC, QUE.**—The Great Northern Railway Company have awarded a contract to Chapman & Co., of Buffalo, to

erect an elevator at this place, to cost about \$250,000. Work will be commenced immediately.

**TORONTO, ONT.**—The Board of Control have accepted tenders as follows for asphalt pavements: Bernard ave., Bedford to St. George, \$4,487, and Brunswick ave., Ulster to Sussex, \$9,200, Construction & Paving Co.; Palmerston avenue, Arthur to College, \$11,045, Warren-Scharf Company.

**KINGSTON, ONT.**—Following are the successful tenderers for alterations and additions to residence for A. B. Cunningham: Carpenter work, Samuel Hyland; hot water heating, plumbing and gas-fitting and tinsmithing, J. Jamieson; painting and glazing, T. Milo; masonry, bricklaying, plastering, etc., N. Langdon and R. Hamilton. H. P. Smith, architect.

### MARKET CONDITIONS.

A very light movement of builders' supplies is reported, and with scarcely an exception prices remain unchanged. Owing to the increased cost of raw materials, it is understood that the plumbers of Toronto will, at an early meeting, consider the question of advancing prices on plumbing work. It is felt that they have not increased their prices in proportion to the advanced cost of material. Pig iron has so far advanced that buyers hesitate to place further orders. No. 1 Hamilton is quoted at \$25 per ton at the furnace, and No. 1 Southern at \$24 per ton in bond, Toronto.

### BEST PAINT FOR GALVANIZED IRON.

By JOSEPH GRIGGS.

The painting of galvanized iron so that the coating will adhere firmly and neither crack nor peel, is a problem that many of the craft have tried to solve in the past without success. In our daily travels through the streets of large cities, if we keep our eyes open, we can see coats of paint, plain and sanded, hanging down in large shreds from galvanized iron bay window sheetings, cornices, awnings, etc., leaving the metal exposed, and this peeling will take place in anywhere from two months to one year's time after painting. To prevent such a result, we must of necessity first look to the causes which bring it about. In the first place, galvanized iron is prepared by first pickling black iron in a solution of sulphuric acid and water, so as to remove mill scales, rust and grease in order to make the subsequent galvanic bath take the proper hold. This bath, which consists of melted zinc and tin, produces a coating on the iron which is of very much the same nature as sheet zinc, and every painter of experience knows that ordinary oil paint will not adhere to metallic zinc. Next it will be observed that the handling of the metal in course of erection is liable to make its surface greasy, and it is but natural that unless grease and dust, etc., be removed preparatory to first coating, the paint cannot adhere to the metal. A wash with strong soda water, or soft water to which some ammonia has been added, and subsequent rinsing with clear water, will remove the grease. A still better wash is dilute muretic acid, which will, on drying, produce a grayish film,

that should be rinsed with clear water and the surface allowed to dry before beginning to prime.

As to the paint for first coating galvanized iron, beware of white lead, because it remains soft and eventually peels, of zinc white, which will crack and flake, of any of the light carbon paints, which require much oil to spread, because these will wrinkle and later on part. The cheap, ordinary mineral paints will not serve the purpose either, because these are most liable to peeling. Red lead, as a base for an all-oil paint, has given best service, but it, too, has given away at times, and the cause of the trouble appears to be that in an all-oil paint the oil is attacked by the metallic zinc. The writer has found, after many trials, that a paint made from a heavy pigment, that requires a small percentage of thinner for spreading, will serve the purpose of first coating galvanized iron best of all. Thus, a mixture of equal parts by measure (not weight) of dry red lead and first-class mineral brown, ground together dry and then mixed by hand with equal parts of pure raw linseed oil and pure spirits of turpentine, without the use of any japan or liquid dryer, has given the most durable and effective results. Over this priming any good oil paint may be applied and permanent adhesion may be looked for.

The reason for employing dry red lead is to let the paint oxidize on the surface, rather than to have it saponify the oil in the pot, as there is ample proof that such paint is most liable to peel, it having lost its cementing qualities. Let it be noted, however, that this semi-flat, yet fairly elastic paint, is to be used for first coat only and not as a finish. It is intended to isolate the oil paint from the metallic surface to prevent the latter from acting on the oil. And under no consideration should boiled oil be used in mixing this first coat for galvanized iron. If a good grade of mineral brown cannot be had, a fine, chemically pure oxide of iron, such as Indian red, may be used in its place and serve the purpose even better. And no more of the paint should be made at any time than can be used the same day.

A meeting of the creditors of Labelle & Deschamps, plumbers, Montreal, will be held on January 10th.

### BORING HOLES IN BRICKS.

Holes may be very quickly drilled in brick or stone walls by making the cutting end of the drill in the form of a cross with four cutting edges, says an exchange. The drill is held in one hand and rotated while being struck with a hammer. When the holes are required to be deep, a projection may be made on the outer end by which it can be knocked out of the hole quickly. The cutting end should be larger than the shank, so as to allow the clearance, and the shank should be sufficiently long to allow a hammer to be used for knocking it out of a deep hole. An old twist-bit also makes a good boring tool for the purpose required, also a piece of steel tube such as bicycles are made with, will, if jagged at the end, answer very well. These tools are only suitable where the bricks are very soft.

### REMOVING GREASE SPOTS FROM STONE.

"T. C." writes from Norwalk, Conn.: "Please tell me how to remove grease from stone slabs in a passage."

ANSWER.—Pour strong soda dissolved in water, while boiling hot, on the spot or spots, mix some fuller's earth in boiling water to a thin paste, put a coat of this over the spots and let it remain over night. If this has not taken all of the grease out, repeat the operation. Sometimes, when the grease has not penetrated deeply, it may be removed by rubbing the spot with a hard stone and sand, using very hot water and soap and soda.

### ATTACHING A BLOCK AND FALL TO A SMOKESTACK.

The following is given as a method of attaching a block and fall to the top of a smokestack 57 feet high that has no ladder attached to it: An iron smokestack of the above height is generally of a fair diameter, and has knees or brackets riveted on inside on which to get to the top. A man climbs up on these and takes with him a rope, one end of which he throws to the ground, and then pulls up hooks, block and fall. If the stack is not provided with brackets in the manner described, it will be necessary to have extension ladders or scaffold.

The Morgan Lumber Co., Limited, Toronto, has obtained a charter.

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**THE OLDEST BRICK IN EXISTENCE.**

At one of the recent meetings of the Academy des Inscriptions et Belles-Lettres, in Paris, the keeper of the Louvre, Mr. Henzey, showed a brick which is undoubtedly the oldest in existence, dating, it is estimated, from the fortieth century B.C. The brick in question was discovered by the French savant and antiquarian, de Sarzee, during recent excavations at Tello, the ancient Sipulo in Chaldea.

The brick was somewhat curved, and had been baked, but was of such crude form that it evidently had neither been put in a press nor moulded. The mark of the maker was simply the imprint of the thumb. It was clearly made very soon after the discovery of the art of brickmaking, which art, as is universally admitted, marks the dawn of civilization.

Other bricks of a much more recent date were shown. Some of them bore the mark of the coat of arms of Sipulo, an eagle with the head of a lion. Others again were inscribed with the name of the reigning monarch.—Exchange.

**OIL CEMENT OF THE ANCIENTS.**

Samples of cement used in antique water conduits about Ephesus and Smyrna were recently subjected to chemical analysis, and the results have proved interesting from the archaeological as well as the engineering point of view. While the different samples were from the water-works that dated from several centuries before Christ to 300 years after, yet it was found that the general composition of all was quite similar. The chief constituent was carbonate of lime, but mixed with it was from two to eight per cent. of organic material. This was ascertained to consist of a mixture of fatty acids, and it is believed that the cement was the oil cement which Pliny and Vitruvius mention in their works. Experiments were made with a cement consisting of burned lime and olive or linseed oil, but it was not found to be permanent. On the other hand a mixture of two-thirds air-slaked lime and one third olive oil hardened readily and possessed great endurance, leading to the belief that this was the composition of the ancient cements which were analyzed.

For graining, glazing and staining purposes sienna should have clearness, depth of tone, richness, brilliancy and transparency, and the same qualities for coloring purposes, except that transparency is not all essential.

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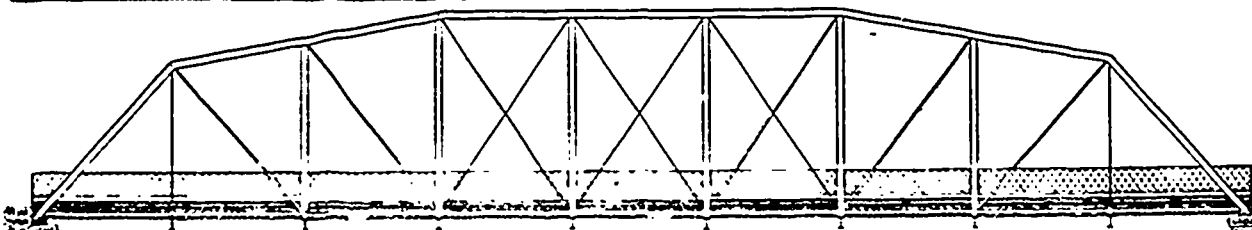
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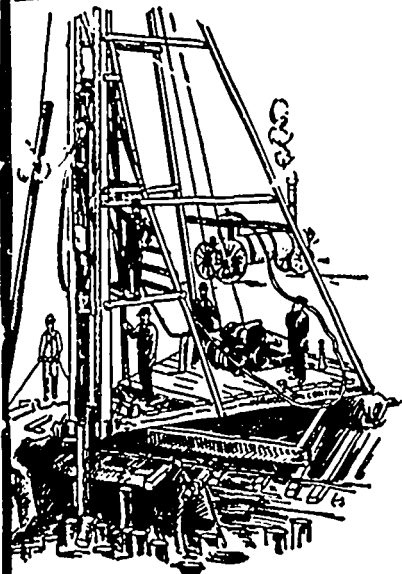
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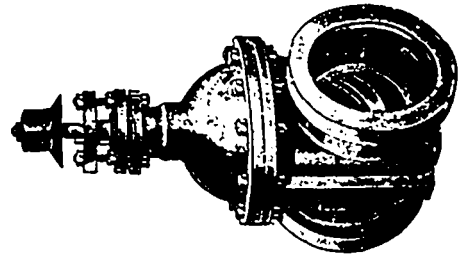


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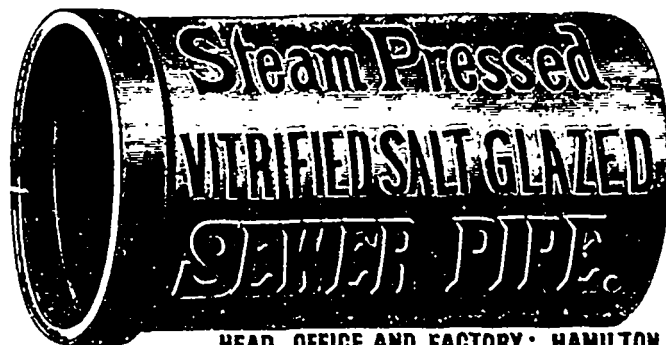
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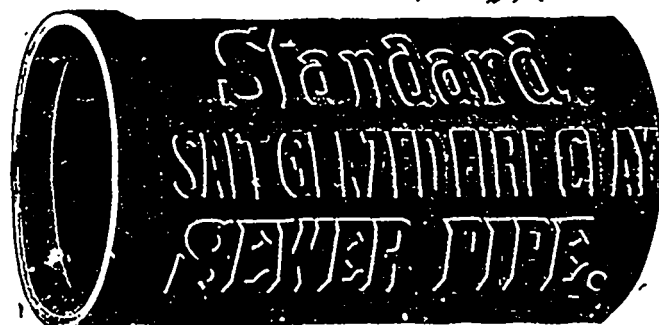


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# MUNICIPAL DEPARTMENT

## THE MAIN DRAINAGE OF OTTAWA.

The question of extending the drainage system of Ottawa, Canada, has been under discussion for several years owing to the extension of the city limits and the rapid growth in population from 32,857 in 1885 to 57,000 in 1899. In December, 1893, Mr. E. H. Keating, M. Am. Soc. C.E., then city engineer of Toronto, reported on a system of trunk sewers for the undrained portion of the city; in August, 1896, Messrs. C. H. Keefer and R. Adams Davy, of Ottawa, reported on a system; and in May, 1897, Mr. Rudolph Hering, M. Am. Soc. C.E., reported as to the best method of draining the city. All of these reports were submitted to the ratepayers and voted down for various reasons, principally as being too expensive. Finally, in June, 1898, a plan prepared by Mr. Robert Surtees, city engineer of Ottawa, and approved by Mr. Keating, with the exception of a few minor details, was passed by the ratepayers, the estimated cost being \$425,000. In the meantime, Mr. Surtees resigned, Mr. John Galt was appointed city engineer and Mr. Newton J. Ker was appointed assistant city engineer in charge of the main drainage system.

The system, says the Engineering Record, consists of two large intercepting sewers, one draining the eastern and central portion of the city and the other draining the western portion. They carry both storm water and domestic sewage and were designed for a rainfall of  $1\frac{1}{2}$  inches per hour. The sewer draining the eastern and central portions of the city consists of three sections. Section 1 includes a double steel pipe outfall, 4,400 feet of brick sewer 7 feet in diameter and a double steel pipe crossing under the Rideau river; section 2 consists of 7,731 feet of brick sewer 6 feet in diameter; and section 3 includes 1,827 feet of 6-foot, 6,016 feet of 5-foot, 2,980 feet of 4-foot circular brick sewer and 1,332 feet of 2 x 3-foot egg-shaped sewer. Section 4 includes 6,400 feet of 5-foot and 1,640 feet of 4-foot brick circular sewer draining the western section of the city and discharging into the Ottawa river at a separate outfall.

The outfall on the first section, which is not yet built, will discharge into the center of the channel of the Ottawa river, where there is a depth of 40 feet and a current of one mile per hour. It will consist of a double line of steel pipes, each 5 feet in diameter, laid side by side to line and grade. One of the difficulties encountered was how to support these pipes, as there is about 20 feet of sawdust overlying sand at this point, the sand lying on rock. The river has a variation of 19 feet between high and low water, and on account of the Rideau falls

and the Chaudiere falls being less than a mile up the river from the outlet, large masses of ice pile up and float low in the water and drag along the bottom. Consequently the pipes must be well supported and protected. To accomplish this it is proposed to lay them on piles in a trench excavated in the sawdust. The pipes are to be made in lengths of 30 feet, of  $\frac{3}{8}$ -inch mild steel plate, all seams, both circular and horizontal, being securely rivetted and thoroughly caulked in a manner similar to good steam boiler work. Flange joints are to be used between the sections, the flanges being  $4 \times 4 \times \frac{3}{4}$  inches in size, rivetted to the pipes with  $\frac{3}{4}$  inch rivets. Each face flange will have 18 bolt holes to suit  $\frac{3}{4}$ -inch bolts and oblong in shape, being  $\frac{3}{4}$  inch longer than wide. All pipes are required to be perfectly water tight when completed, without using any packing or plugging. After the flanges are fastened in place the pipes are to be coated both inside and out with graphite.

To support the outlet and keep it in place, bearing and stay piles will be used, not less than 20 feet in length, nor the former less than 10 inches in diameter at the small end. The bents of these piles are to be driven alternately, one of each to each length of pipe. The bearing piles will be 10 feet from the outer end of each

length of pipe and the distance across the trench between the centers of the piles will be 9 feet. They will be capped with  $10 \times 12$  inch timbers 12 feet long, on which the pipes will rest. The two bents of bearing piles at the outer end of the outfall will be driven to the rock foundation. The stay piles will be driven by the sides of the pipes as they are laid, to insure their remaining in the proper position, and will be placed 5 feet from the inner end of each section. They will be spaced 11 feet 6 inches center to center across the trench and cut off at an elevation of 12 inches above the top of the pipes. The trench will be excavated for a depth of about 2 feet below the bottom of the pipes except beneath the joints, where it will be 3 feet deep, so that a diver may get beneath the same in order to insert and tighten up the bolts. After inspection, the trench under and around the pipes will be refilled in layers of 12 inches, tightly rammed, and carried up to the original level.

Between the brick sewer and the steel pipe outfall is a connecting chamber about  $10 \times 12$  feet in size, built of brick except the bottom, which is of scoria blocks laid on a concrete foundation. The brick sewer enters this chamber at a height of about 9 feet above the bottom. One of the outfall pipes leaves the chamber at the level of the bottom and is 6 feet in diameter, decreasing to 5 feet at a point 10 feet outside the chamber. The other pipe leaves the chamber at a height of 11 feet above the bottom, dropping to the level of the first pipe at a point 20 feet away.

(To be Continued.)



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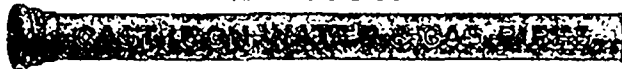
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