

CANADIAN CONTRACT RECORD

A WEEKLY JOURNAL

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.

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THE CANADIAN CONTRACT RECORD,

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Notice to Contractors

Combined Traffic and Railway
Bridge for Fraser River, at
New Westminster, British
Columbia, Canada.

SEALED, SEPARATE OR WHOLE TENDERS, properly superscribed, as the case may be, "Tender for Substructure, Fraser River Bridge," "Tender for Superstructure, Fraser River Bridge," "Tender for Fraser River Bridge," will be received by the undersigned up to and including 8th day of January, 1902, for the manufacture, erection and completion of the bridge in accordance with the drawings and specifications to be seen on application at the Lands and Works Department, Victoria, B. C., at the Government Office, New Westminster, B. C., and at the office of Messrs. Waddell and Hedrick, Consulting Engineers, New Nelson Building, Kansas City, Mo., on and after the 5th day of December, 1901.

Intending tenderers upon application at any of the above named offices may obtain, upon payment of ten (\$10) dollars, copies of drawings and specifications for either substructure or superstructure, or twenty (\$20) dollars for both. Each tender must be made out on the form supplied, and must be accompanied by an accepted bank cheque or certificate of deposit on a chartered bank of Canada or National Bank of the United States, made payable to the undersigned, or by gold, in the sum of five (\$5,000) dollars, which will be forfeited if the party tendering decline to enter into contract when called upon to do so.

The cheques or cash deposit, as the case may be, of unsuccessful tenderers will be returned when contract is awarded.

The agreement on the form of tender to furnish a bond for \$50,000, or equivalent satisfactory security, for the due fulfilment of the work, must be signed by the tenderer and his sureties.

The Department is not bound to accept the lowest or any tender.

W. S. GORE,
Deputy Commissioner of Lands and Works,
Lands and Works Department,
Victoria, B. C., 2nd November, 1901

The assets of the plumbing firm of Bates, Robinson & Company, Toronto, have been purchased by C. H. Hunter at 60 cents on the dollar.

CONTRACTS OPEN.

BEDFORD, QUE.—The town council has decided to light the streets by electricity.

EDMONTON, N. W. T. — K. A. McLeod will erect a two storey frame business block.

BARRIE, ONT. — The ratepayers will shortly vote on a by-law to raise \$3,000 for a new fire hall.

BARNET, B. C.—It is said that the Ross-McLaren Co. will put in a shingle plant at their saw mill here.

PARRY SOUND, ONT. — Plans have been completed for alterations to the front of the Beatty estate store.

PERTH, ONT.—On January 6th the ratepayers will vote on a by-law to raise \$15,000 for the construction of sewers.

PETROLIA, ONT.—William Milner, of Windsor, has made a proposition to the council to start a wagon factory here.

BERLIN, ONT.—A by-law to raise \$6,000 for improvements to the sewage farm will be submitted to the ratepayers on January 6th.

NORMAN, ONT.—John Mather, of Ottawa, is understood to have completed arrangements for the erection of a large flour mill at this place.

TEESWATER, ONT. — Tenders close 16th inst. for purchase of \$1,439.63 four per cent. debentures. Address, J. Farquharson, clerk.

THOROLD, ONT.—The ratepayers have sanctioned the granting of a bonus to the Thorold Pulp Co. for the establishment of a paper mill here.

LAMBTON MILLS, ONT.—Surveyors are laying out the proposed extension of the Suburban Electric Railway from this place to Hamilton.

DESERONTO, ONT. — A by-law will likely be submitted to the ratepayers to raise \$10,000 by the issue of debentures for the extension of water mains.

BRANTFORD, ONT.—The Bailey Cutlery Co. have purchased the Winsey mill property here and will install machinery to the value of about \$25,000.

FERNIE, B. C.—Plans have been prepared by the engineering department of the C. P. R. for a new depot to be built here, of Calgary stone, cost \$25,000.

SAULT STE. MARIE, ONT.—It is announced that the chemical works of the Clergue Syndicate, burned recently, will be rebuilt on a much larger scale.—F. H. Clergue has subscribed \$5,000 towards building an addition to the General Hospital.

WINDSOR, ONT.—Architects are invited to submit plans for a new library building to cost \$20,000. Particulars

from Andrew Braid, secretary library board.

LACHINE, QUE.—A proposition has been made to the council that a water service be furnished to St. Laurent by means of an extension of the Lachine aqueduct.

BROCKVILLE, ONT.—It has been decided to submit a by-law to the ratepayers on February 3rd next to raise \$50,000 for improvements to the gas and electric light plants.

DUNDAS, ONT.—Thomas Carpenter, of Hamilton, accompanied by two Boston men, was in this town last week looking for a suitable location for a basket factory.

AMHERST, N.S.—A meeting of ratepayers has been called for December 20th to discuss the question of constructing a sewerage system. A hospital and county jail are also needed.

WESTON, ONT.—The Moffatt Stove Co. are building a two-storey office building and a three-storey warehouse. F. Moffatt is putting in a foundation for a residence.

HAMPTON, N. B.—A public meeting of ratepayers was held on December 2nd, at which it was decided to seek authority to issue \$1,500 of debentures to provide fire apparatus.

SHERBROOKE, QUE.—F. G. Todd, landscape architect, of Montreal, was in this city last week advising the city council as to the location of the new municipal buildings to be erected here.

LEVIS, QUE.—Bids for the construction of a waterworks system in this town will be opened on the 15th inst. It is expected that an arrangement for the construction of a system will be made.

DURHAM, ONT.—It is said that \$300,000 will be spent on the works of the National Cement Co. The buildings are to be of steel, with cement walls. The plant will be operated by electric power.

FREDERICTON, N. B.—The Department of Public Works is asking for tenders up to 16th inst. for rebuilding Hoyt Station bridge in Sunbury county, Didgequash bridge in Charlotte county, and Upsalquitch bridge in Restigouche county.

WOODSTOCK, ONT.—The Woodstock Cereal Co. contemplate completely renovating their building and installing a new flour mill plant.—It is rumored that O. G. Anderson, of the Anderson Furniture Co., is looking for a site for a chair factory.

OWEN SOUND, ONT.—A. J. Spencer, town treasurer, invites bids up to December 16th for the purchase of \$46,216.32 local improvement debentures.—The steamer Athabasca will undergo extensive repairs this winter, including the addition of a new steel deck.

PENETANGUISHENE, ONT.—Henry Gildey intends putting in a steam plant, hand saw, planer and other machinery in his boat building factory.

SOUTHAMPTON, ONT.—The by-law granting the S. M. Knechtel Chair Co. a loan of \$7,500 was carried by a large majority on Monday last.

MARKHAM, ONT.—The Markham Skating Rink Co. are building a rink, 90x180 feet, brick front, concrete foundation, truss roof, cost \$5,000.—W. H. Lount, late of Whitevale, has started a brush back factory here.

NORTH SYDNEY, N.S.—The town council has decided to grant to the Nova Scotia Coal & Steel Company a cash bonus of \$30,000 and the further sum of \$20,000 when the company shall begin to manufacture steel.

COLLINGWOOD, ONT.—It is learned that the capital of the Steel Ship Co. has been increased to \$2,000,000 and that it is the intention to equip large engine and boiler works in connection with the plant.

GRAND FORKS, B. C.—A by-law will shortly be submitted to the ratepayers to grant \$5,500 to the Republic and Grand Forks Railway for the purchase of a depot site. It is also proposed to give a bonus of \$7,500 towards the Vancouver, Victoria and Esquimalt Railway.

NIAGARA FALLS, ONT.—A by-law to raise \$1,600 for the purpose of constructing cement concrete platforms in the market place will be submitted to the electors on January 6th. Plans for the work have been prepared by C. H. Mitchell, C. E. The electric light by-law will be submitted at the same time.

ST. JOHN, N. B.—At the annual meeting of the Board of Trade last week, the necessity of dredging the harbor was referred to.—The proposal to purchase the custom house wharf is under consideration by the council. If purchased it will be necessary to spend about \$45,000 in reconstruction.—No tenders have as yet been taken for heating the immigration building at this place.

SYDNEY, N.S.—A member of the Board of Underwriters has stated that before the insurance companies will incur further risks the city must provide a chemical engine, another fire engine, proper equipment of the fire brigade, and an increased water supply.—Mr. Pistoni has commenced the erection of a brick building on Charlotte street.

LONDON, ONT.—The county council, at a session last week, decided to construct two bridges, one over the Thames river at the Munsey site, and the other on the town line between Dunwich and Aldborough. The cost of the two will be about \$27,000. Plans for the Munsey bridge are to be prepared and tenders called as soon as possible.

VICTORIA, B. C.—It is understood that the following railroads are likely to be built at an early date: The Canadian Northern, from the eastern frontier of British Columbia to the Pacific coast; the Coast & Kootenay line, from Midway, in the Boundary district, to the coast; the Atlin Railway, and the line in Vancouver Island, known as Dunsmuir's Railway.

PORT ARTHUR, ONT.—It is reported that E. S. Jenison has at last completed final arrangements for developing power at this place. The scheme involves the diversion of the water from the Kaministiquia river to a series of reservoirs, affording a fall of 300 feet, from which it is claimed 40,000 horsepower is expected. To carry out the project will cost about \$1,000,000.

PETERBOROUGH, ONT.—The incorporation of the Otonabee Power Co.

has been announced, capital \$200,000. The directors include W. G. Ferguson, Adam Hall, W. T. Hall and G. L. Hay, of this town.—Mr. Moody, representing a Michigan beet sugar company has asked the city and county to grant a bonus of \$50,000 for the establishment of a beet sugar industry here.

ST. MARY'S, ONT.—The by-law to be submitted to the ratepayers on January 6th will provide the sum of \$30,000 for eight miles of permanent roadway and the following improvements: One fifteen ton steam roller, \$3,450; steel superstructure, Park street bridge, \$2,000; arch culvert on Queen street west, \$300; arch culvert on Queen street east, part of Guest's Hill, \$300; arch culvert on Water street at Near & Mathieson's, \$300; arch culvert on James street at Hedley's Hill, \$300.

KINGSTON, ONT.—It is expected that work on the New First Baptist church will be started next spring; estimated cost \$10,000.—The council of Queen's University, at a meeting last week, decided that a new convocation hall was urgently needed. A proposition was received from the students offering to meet the expense, payment to be extended over ten years.—Principal Grant, of Queen's University, has offered a subscription of \$100 towards the erection of a nurses' home at the General Hospital.

VANCOUVER, B. C.—Messrs. Jas. Breen, H. C. Bellenger, and D. S. Fotheringham are said to be the promoters of a large copper smelter about to be built at Osborne Bay, Vancouver Island. The plant will be most modern

and will consist of blast furnaces and a convertible plant which will reduce the copper to matte in the first instance and then into pig copper. The capacity will be 300 tons per day, but the foundations will provide for an enlargement of the plant to 600 tons.—It is announced to be the intention of the Dominion government to build a new assay office in this city within a short time.

HAMILTON, ONT.—The sewers committee will ask the city council to endorse a by-law to provide \$30,000 for sewers, to be submitted to the electors on January 6th.—The county council, in session last week, discussed the question of road improvement. The Ontario government offers \$20,000, on condition that a similar sum is granted by the county.—Thomas J. Russell is about to erect a brick dwelling on Wilson street, at a cost of \$900.—John P. Swinton will erect a brick dwelling on Main street north, between Locke and Margaret streets, to cost \$1,200.—The city engineer has reported that it would cost \$250,000 to install meters in all cases where water is used.

QUEBEC, QUE.—Thomas Meaney, of Toronto, the promoter of the proposed pulp mill at Seven Islands, was here last week and stated that during this winter ties will be taken out for the electric railway to run from the Falls to Seven Islands. Timber will also be taken out for the piers and buildings. Work will likely be commenced early in the spring.—J. Gallagher, waterworks engineer, is calling for tenders up to 19th inst. for the construction of a brick sewer in St. Sauveur.—It has been decided by

NOW READY

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The third edition of the Canadian Contractor's Hand-Book has been published and is now on sale. The book has been revised and enlarged to upwards of two hundred pages, and the title changed to the Canadian Contractor's Hand-Book and Estimator, considerable matter bearing upon the cost of performing various kinds of work having been added.

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the management of the Bank of Montreal to make a complete renovation of their branch in this city.

OTTAWA, ONT.—The French Committee of the Separate School Board have not yet decided upon a site for proposed school for girls to be built in Lower Town. The building will be of brick and will cost about \$10,000.—Rev. Father P. Bertrand, who died last week at Masham bequeathed about \$5,000 for the establishment of a new convent in his parish.—F. Gelinus, Secretary Department of Public Works, invites bids up to 20th inst. for construction of wharf at Caraque, Gloucester county, N.B. Plans at offices of the postmaster at Caraque and at the above Department. This is an important work, each tender to be accompanied by a cheque for \$7,000.

WINNIPEG, MAN.—D. Lennon has sold to English capitalists property on Main street on which it is proposed to build a new block next season for a large retail store.—Tenders are about to be invited for construction of granolithic walk on Pacific avenue and Graham avenue, at an approximate cost of \$7,200.—Tenders are invited up to 12th inst. for construction of sewers, cedar block pavements, and granolithic walks, and for the supply of 4,000 feet of sewer pipe, a quantity of traps, bends, slants and junctions, and a steam derrick of 3 or 5 tons.—A site has not yet been selected for the proposed Greek Catholic church, although the matter is being pushed forward as fast as possible.

MONTREAL, QUE.—Tenders close Tuesday, 17th inst., for supply of timber and planks and stone required by the harbor commissioners during the coming year.—Andrew Carnegie has informed the Mayor that the \$150,000 which he offered towards the creation of a library is solely for the construction of the building.—The Maurane & Gaspé Railway Co. will seek incorporation at the next session of the Provincial Legislature, to construct a railway from St. Octave de Metis to Gaspé Basin.—Senator George A. Drummond has completed arrangements for a fine summer residence to be built at Beaconsfield. It will be two stories and basement, of wood, and will cost about \$60,000.—The city council has given notice of its intention to construct a sewer on Cuvillier street, from Ontario street southward.—The directors of the Montreal Maternity Hospital have decided to buy a lot at the corner of Prince Arthur and St. Urbain streets and to proceed at once with the erection of a new hospital building.—It is probable that a new incinerator may be constructed in the eastern section of the city, at a cost of \$25,000.—Ernest Marceau, superintending engineer of canals, 1709 Notre Dame street, is asking for tenders up to 16th inst. for the annual supply of timber, lumber, cement, cast and wrought iron, hardware, tools, oils, etc., required on the canals during the year 1902.—Building permits have been granted as follows: Jas. Davidson, dining room in rear of building, 292 Stanley st., cost \$1,500 (J. H. Bell, architect, J. H. Maher, contractor); New York Steam Laundry Co., two-storey house, 20-22 Rue DeVienne, cost \$1,600 (S. Frappier, architect); Evans & Sons, Ltd., alterations to warehouse, St. Gabriel st., cost \$1,800 (Ed. & W. L. Maxwell, architects); Canada Cold Storage Co., alterations to cold storage house, William st., cost \$1,600 (Hutchinson & Wood, architects).

TORONTO, ONT.—It is understood that the executors of the Lawlor Estate,

owners of the building at the north-west corner of King and Yonge streets, are considering the question of adding two more stories to the building, for office purposes. Approximate estimates of the cost are believed to be now in the hands of the owners.—The directors of Haverhill Hall, Jarvis street, have purchased a portion of the Rutherford estate, having a frontage of 200 feet on McMillan street, and contemplate building a large addition to the school. The work will not likely be commenced until next spring, although plans are now under consideration.—The council of Wycliffe College have appointed a building committee to take steps towards the immediate construction of a new convocation hall and other needed improvements in lecture room and library accommodation.—W. J. Gage, publisher, has purchased 25 acres of land on Davenport Hill.—It is stated that the total cost of buildings to be erected on Indian road by the York County Loan & Savings Co. will reach \$100,000.—Major Gray, Government engineer for Western Ontario, will recommend the Minister of Public Works to construct three groynes for the protection of the south shore of Toronto Island. The groynes will cost about \$3,000.—It was announced last week by President London that the site of the new medical building for Toronto University had been chosen, and that it would be located immediately to the north-east of the present School of Practical Science. Plans for the building are now under way.—It is rumored that through private enterprise an art museum may be built next year.—A meeting of the directors of the Magnetawan Railway Co. was held in this city last week, at which an agreement was entered into with the Grand Trunk Railway for the construction of the line from Burk's Falls to the head of navigation on the Magnetawan river. Work will be commenced next spring. James Sharpe, of Burk's Falls, is president of the company.—It is probable that the erection of a summer home for poor children on the island will be commenced early in the new year, as the result of a donation of \$20,000 for this purpose.—The Women's Historical Society are considering the question of building permanent headquarters. Some funds are now available for this purpose

—The foundation is being put in for a four-storey building, 30 x 145 feet, to be built near the Union Station for Suckling & Co.—Building permits have been granted as follows: J. G. Ramsey, two storey and an attic brick dwelling, east side Crescent road, near Lampport ave., cost \$8,000; Society of Friends, church on Carlton street, between Yonge and Church, cost \$10,000 (C. F. Wagner, architect); A. Mills, two storey brick dwelling, west side Rusholme Road, cost \$3,200 (Mr. Mallory, architect); William Lawrence, two storey brick dwelling, 1277 Dufferin street, cost \$1,100; Robert Barron, alterations and additions to store, corner Yonge and Car streets, cost \$4,000 (Gowanlock & Baker, architects); Davidge & Lunn, builders; Mrs. Oidfield, two storey summer residence on lake front, near Glandeboye ave., cost \$1,200; Thomas Moore, pair two storey and attic, semi-detached brick dwellings, 493 and 495 Markham street, cost \$5,000; F. Hillock, pair semi-detached brick dwellings, south side Wthrow ave., cost \$3,000; E. Hyland, alterations to house, corner Jarvis and Queen streets, cost \$1,500; H. S. Mara, pair semi-detached dwellings, Gore Vale ave. near Queen street, cost \$3,200; H. E. Sheppard, two pair semi-detached dwellings, corner Bloor and Smith streets, cost \$4,800, also four semi-detached residences, corner Cottingham and Rathnally ave., cost \$3,500, and a detached dwelling north side Bloor street, near Smith street, cost \$1,500; H. S. Mara, pair dwellings, south side Bismark ave., cost \$2,800; Toronto General Trust Corporation, alterations, 198 and 204 Simcoe street, cost \$3,000; F. F. Lugsden, dwelling on Powell ave., near South Drive, cost \$3,000.—The Board of Control are in favor of issuing debentures for \$26,000 to complete the new Bathurst street school.

FIRES.

Foundry at Alton, Ont., owned by Alexander Dick; loss \$8,000, no insurance.—Three storey bunk house at the Silver King Mine, Nelson, B.C.; loss \$15,000.—Summer residence of Major E. L. Bond, Montreal, situated at Phillipsburg, on the shores of Missisquoi Bay.—Establishment of George Roberts, con-

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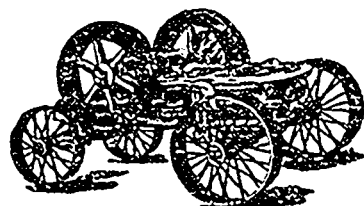
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MUNICIPAL DEBENTURES BOUGHT

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tractor, 597 LaGauchetiere street, Montreal. It was a first class wood-working factory, and the loss is about \$35,000.—Premises of the Duncan Lithographing Co., Hamilton, Ont., damaged on the 4th inst. to extent of \$20,000.—A fire at Leamington, Ont., on the 9th inst., destroyed J. A. Barr's drug store, Miss Conover's millinery store, W. Hepinstall's jewellery store, and A. Campbell's grocery store.

CONTRACTS AWARDED.

SYDNEY, N.S.—D. Matheson has secured the contract for building fire and police station.

TWEED, ONT.—William McGie has been given the contract by the county council for heating the registry office.

ALBERNI, B.C.—The Dominion Government has awarded to T. D. Conway the contract for building 75 miles of telegraph line extending from this place; price, \$6,400.

GALT, ONT.—The following tenders have been accepted for erection of the Burrows carpet building: Stone and brick work, David Smith, Galt, \$3,104; carpenter work, Peter Nichol, Galt, \$1,082; roofing, Brown Bros., Brantford, \$215; plastering, William Morse, Galt, \$60; painting, Jos. E. Munson, \$249.

OTTAWA, ONT.—The contract for new observatory to be erected on the Experimental Farm has been let to Viau & Lachance, of Hull, for a price in the neighborhood of \$75,000. Three other tenders were received. The building is to be of Nepean sandstone, with trimmings of Credit Valley sandstone and foundation of grey limestone.

QUEBEC, QUE—Dussault & Lemieux have secured the contract for construc-

tion of wharf at St. Nicholas, to cost \$15,000. The same firm is erecting five new buildings at Chaudiere Falls for the Canadian Electric Light Company.—George St. Hilaire has secured the contract to complete the interior of the church of St. Georges, Beauce. The contract price is about \$28,000.

ST. JACOBS, ONT.—The following tenders were received by Woolwich township council for purchase of \$8,000 4 per cent. twenty year debentures: W. H. Brouse, Toronto, \$7,860, H. O. Hara & Co., Toronto, \$7,905; George Wegenast, manager of the Mutual Assurance Co. at Waterloo, \$8,010; J. H. Farmer, Elmira, \$8,025; Central Canada Loan and Savings Co., Toronto, \$8,026.50. The tender of J. H. Farmer has been accepted.

TORONTO, ONT.—The Board of Control last week awarded contracts for annual supplies as follows: Lead pipe—Ontario Lead Pipe and Wire Company, \$4.75 per cwt. Iron valve and stopcock

boxes, John Inglis & Son, 90 cents to \$3, according to size. Horse feed—McIntosh & Son, loose hay, \$12 per ton; baled hay, \$11; oats, 46 cents per bushel; rolled oats, \$28 a ton; bran, \$17 a ton; wheat straw, \$5; oat straw, \$9.75; salt, \$1.35 per barrel. Hardwood lumber—Reid & Co., soft elm, \$26 per thousand; rock elm, \$29; white oak, \$39, plank scantling and boards, \$14.75. Gravel—John Mullin, unscreened, delivered west of Simcoe street, 82½ cents per cubic yard, screened, \$1.35 east of and \$1.25 west of Simcoe street; E. Ashton, unscreened gravel, 77½ cents, delivered east of Simcoe street. Sand—Jos. Gaby, 82 1/2 cents delivered west of Simcoe street; E. Ashton, 77 1/2 cents, east of Simcoe street. Cedar posts—Rathbun & Co., 6.45 per cord. Cedar scantlings—Reid & Co., \$14.24 per thousand feet. Wire nails—A. Meredith, \$2.83 per 100 lbs. Special castings—T. Tomlinson & Son, \$1.63 per 100 pounds. Rubber goods—Gutta Percha & Rubber Co. Cast

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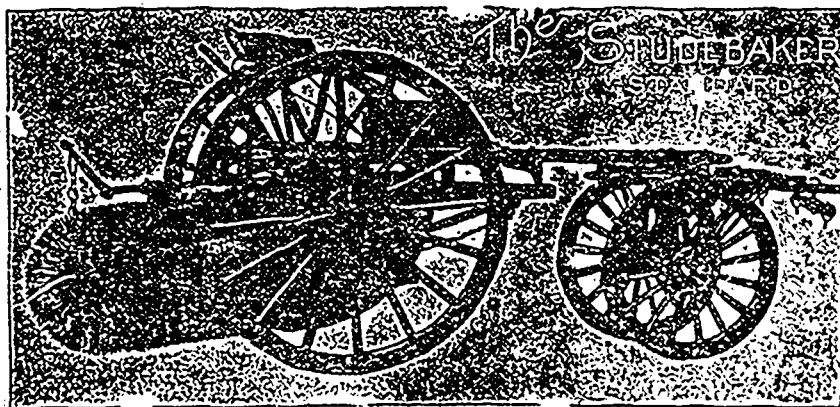
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iron pipe—Canada Foundry Co., 3-in., \$3.52; 4-in., \$4.25; 6-in., \$6.15; 8-in., \$9.20; 10-in., \$11.50; 12-in., \$17.55. Brass and bronze casting—Dean Bros., phosphor bronze, 18 cents per pound; tobin bronze, 8 cents; brass castings, 17 cents; babbit, 12 cents. Lumber for water works—Arthur Bryce, pine lumber, a foot square, 12 and 15 feet lengths, \$16 per thousand; 20 feet lengths, \$17; 24 feet lengths, \$20. Reid & Co., hemlock timbers, 12 and 16 feet lengths, \$1.96; 20 feet lengths, \$15.06; 24 feet lengths, \$17.96. Firemen's caps—J. A. Perry, \$5.75 each. The City Engineer will report on tenders for brass fittings for water works house services, sewer pipes, lubricating oils, and stop valves.—The contract for building a chimney at the western crematory has been awarded to Teagle & Son, at the price of \$1,995.

BUSINESS NOTES.

Braden Bros., plumbers, Victoria, B. C., have sold out to John T. Brdaer.

Andrew Bell, C.E., of Almonte, Ont., has formed a partnership with W. J. Crawford, C.E., who had charge of the Sault Ste. Marie canal when it was being built.

The interest of W. C. Bullock in the National Iron Works, Limited, of Wingham, Ont., is said to have been purchased by local shareholders. John Galt, C.E., will continue with the company, which is being reorganized, to manufacture valves, hydrants, and waterworks supplies generally.

WIRE NAIL PRICES.

A despatch from New York dated Dec. 3rd stated that a further cut in the price of wire nails had been announced. Nails are now selling at the mill at \$2 a keg, which is 15 cents below the price quoted a week ago, and at least 25 cents below the price in October.

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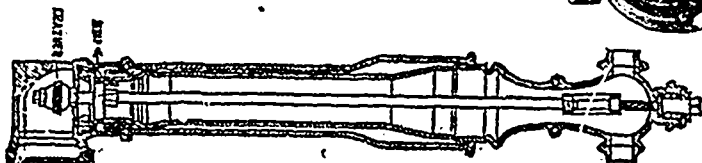
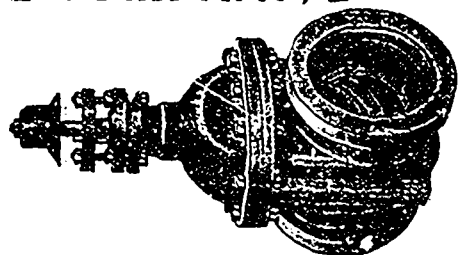
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FOUNDATIONS IN CONCRETE.

In forming the foundations of a building it is important to ascertain the nature of the subsoil and the resistance which it will offer to the pressure to be put upon it. Where the architect has solid rock to build upon it is only necessary to remove the top soil and level or scarp the surface of the rock before he places his walls upon it. But in the large majority of cases the subsoil is of a yielding nature, so that when it is pressed heavily upon it will sink down and be squeezed out laterally. It then becomes necessary to excavate trenches to some depth in order to get lateral resistance from the surrounding earth and to prevent the sinking down of the foundations. This lateral resistance varies greatly with the character of the soil, and also depends upon the depth of the trenches in which the concrete foundation is laid. It is found that when the soil is dry earth its resistance is nearly eight times as great as when the soil is dry fine sand, and that it is four times as much as when the soil is common sand. We must therefore make superficial areas of our foundations inversely proportional to these amounts; thus the area for common sand must be four times as great as for dry fine sand, and eight times as great as for dry earth.

The lateral resistance of the subsoil is also directly proportional to the depth of the trench, the earth at a depth of 10 ft. offering twice the resistance of that at a depth of 5 ft. where the character of the soil is the same throughout. In the case of dry earth, when the trench is 5 ft. deep, the safe load that we can place upon it is three tons per square foot, but where the soil is wet clay the safe load does not exceed 8 cwt. per square foot.

Suppose, for example, that we have a wall 18 in. thick, the height being 40 ft. and the weight 1 cwt. per cubic foot; then the load will be 60 cwt. for each linear foot of walling, and if we add 10 cwt. for the weight of each foot of roofing and 20 cwt. for two floors, we have a total of 90 cwt. pressing upon each foot length of the trench. Dividing this by three tons, or 60 cwt., in the case of dry earth, we find that $1\frac{1}{2}$ ft. is the least area of foundation required for every foot length of walling, so that no footings are actually necessary, and the concrete need not be wider than the thickness of the wall. Where, however, the soil is wet clay, the least area must be eleven square feet for every linear foot of wall, or the footing must extend $4\frac{3}{4}$ ft. on each side of the 18 in. wall.

In the above examples the depth of the trench is supposed to be 5 ft., but if the depth is 10 ft., then half the above area of foundations will suffice; so that in the case of wet clay the footings need not extend more than $2\frac{1}{2}$ ft. on each side of the wall.

The object of using concrete in foundations being to distribute the load uniformly over the whole surface of the trench, it is essential that it should have a sufficient thickness to prevent it from cracking across owing to any unevenness in the soil, or from the soil being harder at some points than at others, since the resistance of this material to transverse stress is not great. No concrete foundation should therefore be less than 12 inches in thickness, and in cases of wet clay or loose

sand it must be much greater, its resistance to transverse stress increasing as the square of the thickness (or depth), a mass of concrete 2 feet thick offering four times the resistance to this sort of stress that a mass 12 inches thick will offer.

Where the soil is loose and yielding and the building to be erected thereon is very heavy, it is sometimes necessary to use piles before laying the concrete foundation, and to drive them down to a firm bottom. Piles, which are long, square baulks of timber shod with iron, are generally driven until the resistance of the earth amounts to 2,000 lb. or 3,000 lb. per square inch of horizontal section. They are driven into the earth by means of a heavy iron ram, which is let fall from a height upon the head of a pile. The resistance in tons can be calculated by dividing the square of the ram's weight by the ram's weight added to that of the pile itself (all in tons), then multiplying by the height in feet through which the ram fell at its last stroke, and dividing by the distance in fractions of a foot through which the pile sank at that stroke. For example, let the weight of ram be one ton, that of the pile three-quarters of a ton, the height which the ram fell 10 feet, and the amount the pile sank 3-roots of a foot. Then calculating by the above rule, we find the resistance of the earth to amount to 190 tons; and if the pile is 12 inches square the resistance will be 3,000 lb. per square inch, and one-fifth of this, or 600 lb., may be taken as the utmost load per square inch that can with safety be placed upon it, provided the pile has reached a firm bottom. If, however, the pile has failed to do so, the safe load will not be more than half the above, or 300 lb. per square inch.

A ram weighing one ton and falling 10 feet produces a pressure equivalent to twenty-five tons on the head of the pile; if it fell 20 feet the pressure on the pile would be thirty-six tons, the pressure being proportional to the square root of the height.—Illustrated Carpenter and Builder

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MAKING CEMENT WALLS BY "POURING" THE MATERIAL.

Some time ago an article appeared in one of the well known periodicals by Thomas A. Edison in which he suggested the building of houses and other structures by "pouring" the material, and in order to demonstrate the practicability of this form of construction John R. Pisel, of Akron, Ohio, has lately built the basement walls of several of his houses by this method. In executing the work Mr. Pisel states that he used planks 16 feet long, 2 inches thick and 12 inches wide, two planks being bolted with three iron bolts, so that the space between the planks was 12 inches, this, of course, giving a 12-inch wall. The planks were laid lengthwise on the ground where the wall was built, and the space was filled in between them with a mixture of 1 part cement and 3 parts coarse sand or pebbles. This mixture was "poured" in slush form and then boulders, or, as they are termed in that locality, "nigger heads," were dropped in. When the space was filled more plank was put on and the lower set removed, this operation being continued until the proper height was reached. Wooden pins were used through the wall at points where it was desired to put in pipes for water, gas or sewer, as after the mixture had set it was almost impossible to penetrate it.

Mr. Pisel states that the running length of the walls was 110 feet, and that the cost of this process was only a little more than half what a brick contractor demanded for building an 8-inch wall.

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MUNICIPAL DEPARTMENT

PUBLIC WORKS IN TORONTO.

The annual report of the city engineer of Toronto, just issued, contains much information of interest to municipal officers and the public generally. The question of pavements is referred to at some length. There were constructed during the year 24.666 miles of new pavements and roadways, and 15.265 miles of concrete and brick sidewalks, divided as follows: 6.348 miles of asphalt pavement; 6.045 miles of brick pavement; 7.842 miles of cedar block pavement; 2.503 miles of macadam roadways; and about two miles of gravel, scoria and stone sett roadways.

Concerning the different classes of pavement the City Engineer says:

The asphalt pavement appears to be the favorite. I think, however, that brick for residential streets will last quite as long and will not cost as much for maintenance as asphalt, but the great objection to this class of pavement is the noise. We have as far as possible taken steps to remedy this, but there is still considerable rumbling and I am afraid it is absolutely impossible to entirely prevent it. The bricks used in the construction of the various pavements have been entirely of Canadian manufacture, and in some instances they have not complied fully with the abrasion test called for in the specifications. These tests were made with the old form of rattler, as adopted by the Brick Manufacturers Association, but I have since ascertained that this has not given satisfactory results and is being gradually discarded, and the Department at present is engaged in making fresh tests with a somewhat different form of machine. We intend during the coming year to have these specifications amended.

In 1895 an experiment was made with different kinds of wood as paving material, on the west approach to the King street subway, the woods used being beech, maple, rock elm, soft elm, hemlock, Norway pine, white pine and cedar. All the blocks were rectangular, 4 in. x 7 in. deep and 8 in. to 12 in. long, with the exception of the cedar, which were the ordinary round blocks. In June of this year these different woods were examined with the following results: Beech, nearly all the blocks were decayed; maple, a few of the blocks were in good condition, but the majority of them had dry-rot; rock elm, most of the blocks were in good condition, with the exception of a few which showed signs of dry rot; soft elm, the blocks were all decaying; hemlock, the majority of the blocks were sound; Norway pine were in fairly good condition, but the traffic had decreased their depth to about a half inch and a few of them showed signs of dry rot; white pine were in as good condition as the Norway pine, a great many of the blocks showing signs of dry-rot. The round cedar blocks were in better condition than any of the other woods.

During the year there were constructed 6,160 lineal feet of sewers, and there are at present 232½ miles of sewers in the city.

SEWAGE DISPOSAL IN TORONTO.

The "Surveyor" of London, England, referring at some length to the report of Mr. C. H. Rust, city engineer, of Toronto, on the subject of sewage disposal, says:

Mr. Rust has submitted four distinct proposals. The first suggests the construction of an intercepting sewer capable of taking the sewage of a population of 500,000, and discharging into Lake Ontario a distance of 3 miles to the east of the eastern limits of the city and about 9 miles from the waterworks intake. Mr. Rust remarks that some objection may be raised to turning crude sewage into a body of water from which the water supply of the city is procured, but he is of opinion that, considering the immense area of the lake and the distance from the sewer outlet to the water supply intake pipe, there will not be the slightest danger for many years to come. The prevailing winds are from a westerly direction, and even with a strong wind blowing from the east it is not considered possible that any pollution can occur. The total first cost of this scheme, including outfall sewer, two intercepting sewers, force mains and pumping stations, is estimated at £350,000, and the annual cost at £3,500. The second proposal suggests the construction of septic tanks and

the purchase of 500 or 600 acres of land to be used as filter beds, the sewage being lifted to that point. The approximate cost of this scheme, which comprises high and low level intercepting sewers, septic tank, forcing main, filter areas and pumping plant, is estimated at £480,000, and the annual cost at £15,000. The third proposal is to the effect that the sewage should be treated by means of septic tanks and bacteria beds; but this proposal does not differ materially from the previous one in regard either to its general features or its cost, with the exception of the annual cost and maintenance, which is put at about half the figure in the previous case. Mr. Rust has also considered the advisability of treating separately the sewage of the western and eastern districts by septic tanks and single bacteria beds. This scheme would comprise separate intercepting sewers, pumping stations, septic tanks and bacteria beds, and the estimated first cost is much the same as in the case of the first proposal, though the annual cost is considerably higher, being estimated at £8,000.

After carefully considering the various schemes he has proposed, Mr. Rust is of opinion that the most satisfactory and economical method of disposing of the sewage of the city would be by the adoption of the first scheme, that is, by discharging the sewage into the lake at a distance of three miles east of the city limits and of nine miles from the waterworks intake.

(To be continued.)

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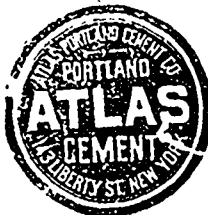
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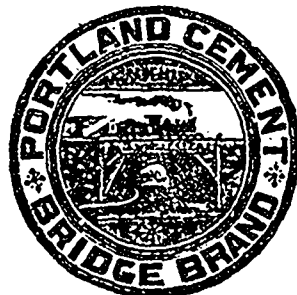
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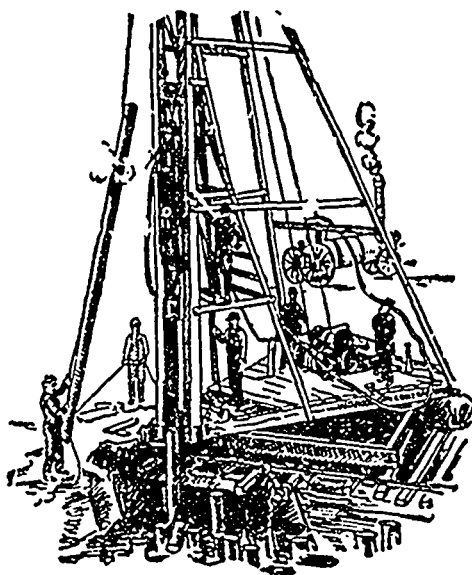
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