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CANADIAN CONTRACT RECORD

A WEEKLY JOURNAL OF
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. 9. DECEMBER 7, 1898 No. 45.

THE CANADIAN CONTRACT RECORD,
PUBLISHED EVERY WEDNESDAY

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Complete and only short time in use. Made by McDonald & Co., Limited. Cylinders about 15 inches in diameter and 24 feet long, in sections of 6 ft. long. Can be seen in cellars of Metropolitan Building by applying to Janitor. No reasonable offer refused.

FORSYTH, SUTCLIFFE & CO.,
Wholesale Druggists,
192 and 194 Hollis Street, Halifax, N.S.

P.S.—The room taken by this machinery in cellars is now required, hence the above offer. F. S. & CO.



Notice to Contractors

TENDERS FOR SIDEWALK SHELTERS, QUEEN STREET SUBWAY.

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on

Monday, December 19th, 1898,

for the Supply and Erection of the Corrugated Iron Sidewalk Shelters, under the bridges at the Queen Street Subway.

Contents of envelopes containing tenders must be plainly marked on outside.

Specifications and drawings may be seen, and forms of tender obtained, at the office of the City Engineer, Toronto.

A marked cheque, payable to the order of the City Treasurer, for 5 per cent. of the amount tendered for up to \$1,000, and 2½ per cent. of the amount over that sum, must accompany each and every tender, otherwise it will be ruled out as informal.

The lowest or any tender not necessarily accepted.

JOHN SHAW (Mayor),
Chairman Board of Control.

Toronto, December 3rd, 1898.

Drainage Work

NOTICE TO CONTRACTORS

Sealed Tenders, addressed J. A. Cockburn, Esq., Clerk of Finch Township, Crysler, Ont., and endorsed "Tender for Drainage," will be received until 3 o'clock p.m., DECEMBER 14TH, for the Construction of the Butternut Creek Drain, in the north-east part of Finch Township and the north-west part of Roxborough Township:

Estimated number of cubic yards earth excavation, 21,745—estimated cost, \$3184.36
Two Culverts—estimated cost, 90.00

The work is to be completed on or before the 15th October, 1899.

An accepted check for the sum of \$300.00 must accompany the tender.

Specifications, plans, etc., may be seen at the office of the Engineer, Cornwall, Ont., or at the Clerk's office, Crysler, Ont., after Dec. 5th.

T. H. WIGGINS, J. A. COCKBURN, Clerk.
Engineer. J. R. CRYSLER, Recv.

DATE OF PUBLICATION.

Architects, Engineers, Municipal Authorities and others are reminded that the CONTRACT RECORD is printed every Tuesday afternoon, and that advertisements should reach the office of publication not later than 2 o'clock p.m. on that day to ensure insertion in the issue of the current week. Advertisements are frequently received too late for insertion, to avoid which special attention is directed to this announcement.

CONTRACTS OPEN.

HANOVER, ONT.—A new town hall is required.

KEMPTVILLE, ONT.—The council are taking steps to build a bridge in this village.

PERTH, ONT.—The Lanark county council have decided to build the Waba Brook bridge.

MIDLAND, ONT.—There is an agitation in favor of constructing a system of waterworks.

VANCOUVER, B.C.—The Bertram Company, of Toronto, contemplate establishing a shipyard here.

TORONTO JUNCTION, ONT.—Byron Abbott is forming a joint stock company to erect a skating rink.

BLENHEIM, ONT.—The Blenheim council will receive tenders up to 15th inst. for the extension of a drain.

VALLEYFIELD, QUE.—Surveys are being made for the proposed canal between Valleyfield and Lake Champlain.

DANVILLE, QUE.—The sum of \$5,000 has been subscribed towards the proposed hotel to be built by the Sovereign Hotel Company.

WOODSTOCK, ONT.—The question of municipal ownership of the electric light plant is being discussed by certain councillors.

BEAVERTON, ONT.—The Victoria Telephone Company has decided to extend its line to Pefferlaw, Beaverton and Bolsover.

HULL, QUE.—P. H. Charron has purchased property, corner Lake and Wellington streets, on which to build a furniture store.

CUMBERLAND, ONT.—Capt. Murdoch Beaton, of this place, will build a large skating rink at Buckingham front, on the Ottawa river.

SARNIA, ONT.—Randal Kenny is having plans prepared for a cold storage plant, to be installed in a new building which he will erect.

SMITH'S FALLS, ONT.—The School Board purpose building a new high school, but some difficulty is being met in securing a suitable site.

EDMONTON, N.W.T.—It is probable that the town will undertake the construction of waterworks and sewerage systems in the near future.

CHATHAM, ONT.—The Lake Erie and Detroit River Railway Company is said to have decided to build a swing bridge over the Thames river at this point.

PRESOTT, ONT. Plans for the proposed waterworks and sewerage systems have been submitted to the Provincial Board of Health for approval.

RICHMOND HILL, ONT.—The farmers in this neighborhood are interesting themselves in the establishment of a grain elevator. A committee will report on the available sites.

PORT ARTHUR, ONT.—Surveys are being made for the proposed canal to be built by E. S. Jenison, for the purpose of bringing water from the Kanunistiquia river to this town.

TRURO, N.S.—The directors of the Midland Railway have selected the route from the Shubenacadie river to Truro. Track-laying will be commenced at the Windsor end in April next.

ST VALENTIN, QUE. The parishioners of the parish of St. Valentin de Stottsville have decided to build a church, at a cost of \$20,000. The work is expected to be commenced at an early date.

DAY MILLS, ONT.—Tenders for the erection of a new school house in School Section No. 1, Day, Gladstone and Thessalon, are invited up to December 12th. Address Thomas Grigg, secretary, this place.

BRADFORD, ONT.—At a public meeting held on November 23rd a resolution was almost unanimously carried favoring the installation by the town of an electric light plant. A by-law to provide the necessary funds will be submitted to the ratepayers at the municipal elections in January.

BADDECK, N.S.—It is understood that a company is being formed, in which Prof. Bell, of this place, is interested, to build a new telephone system in the counties of Victoria and Inverness, con-

necting north-east Margaree, Middle River, Big Baddeck, Baddeck, Myanza and Whycocomagh with Orangedale, on the Cape Breton Railway.

CHARLOTTETOWN, P. E. I.—St. Dunstan's College is to be enlarged by the construction of a wing, 80 x 40 feet.

WELLAND, ONT.—Griffiths & Page have decided to proceed at once with the erection of a hockey and skating rink.

OWEN SOUND, ONT.—The council has not yet reached a decision regarding the contract for electric fire alarm system.

DUNTRON, ONT.—The Nottawasaga council has decided to borrow the necessary funds to build a new town hall.

CARLETON PLACE, ONT.—At a recent meeting of the Carleton Place Hockey Club, the question of constructing a large rink, at a cost of \$2,000, was discussed.

WALLACEBURG, ONT.—Work has been commenced on another large warehouse for the Wallaceburg Glass Works.—The council will likely undertake the erection of a fire hall next year.

DIGBY, N. S.—It is understood that the Manhattan Steamship Company have entered into a contract with the town to build a large hotel here, to accommodate 100 guests and to be completed by July 15th next.

WINCHESTER, ONT.—Leslie Suffel has purchased a site upon which he will erect, next spring, a building 24 x 32 feet and two stories high.—It is said that M. F. Beach & Company purpose installing a larger dynamo.

HALIFAX, N. S.—The specifications for the installation of an electric light plant for city lighting will be completed in about two weeks.—The city engineer has submitted a report favorable to the construction of a sewer on Young avenue. The length will be 4,800 feet, and the cost \$25,898.—The repairs to the steamer Turret Chief, now in the dry dock here, will cost \$60,000.

LONDON, ONT.—Knox church congregation has subscribed \$5,600 towards the erection of a new building. The work will not be proceeded with, however, until the full amount (\$15,000) is secured.—The Kirk-Latt Company, of Cleveland, Ohio, have written a second letter to the city council regarding the establishment of a factory here. The company state that they would erect a building 200 x 40 feet and two storeys high.

CAMPBELLTON, N. B.—The Restigouche & Western Railway is subsidized by the Dominion government for 20 miles and by the provincial government for 35 miles, the road being now under construction. It is hoped that at the next sessions subsidies will be granted for the entire road, which will be about 125 miles in length. The survey work will be continued throughout the winter, and completed, if possible, by the spring.

CORNWALL, ONT.—On January 2nd next a vote of the ratepayers will be taken on a by-law to raise \$10,000 for making certain changes in the pump house of the waterworks, and for the purchase of a water wheel, power pump and other necessary appliances.—Subscriptions are being taken for a statue to be erected in memory of the late Dr. Bergin. The treasurer of the committee is Mr. G. C. Smith.

NEW WESTMINSTER, B. C.—The report is revived that the Great Northern Railway will bridge the Fraser river at this place and extend its system to Vancouver.—Mr. Swanson, of the Eickhoff house, will rebuild his hostelry. It will be a three-storey brick building, 33 x 66 feet.—The School Board are considering the question of providing increased accommodation.—The building of a new fire hall, at a cost of \$2,300, is likely to be commenced at an early date.

LETHBRIDGE, N. W. T.—The Alberta Irrigation Company, of which E. C. Galt, of this place, is president, have commenced work on a scheme to reclaim land between Cardston and Lethbridge, in South Alberta. Sixty miles of canals will be built, at a cost of \$500,000. The main canal is to be finished next year and the laterals the following season. George C. Anderson, of Denver, has been engaged as consulting engineer, and for the past four months he has had a large survey party in the field.

VICTORIA, B. C.—E. A. Wilmot, city engineer, has prepared an estimate of the cost of constructing a bridge across James Bay flats, and gives the figures as \$110,000. The question will be considered at the next meeting of the city council.—Thompson & Vincent gave notice recently that they would apply for a provincial charter to build a railway up the west fork of Kettle river. The C. P. R. is now making a survey of a route with the intention, evidently, of building a competitive road.

ST. THOMAS, ONT.—James A. Bell, C.E., has reported to the Elgin County Council that Kains bridge, Port Bruce bridge and the Talbot creek bridge will have to be built next year. He recommends that steel structures be erected. The Elgin County Council has decided to issue \$40,000 of debentures to provide for court house expenditure.—Mr. Percy Donville, of Hamilton, has presented to the city council his report on the cost of a municipal arc and incandescent lighting plant.

BROCKVILLE, ONT.—Some interior fittings will be added to the steamer Brockville next season.—No steps have been taken by the council towards awarding contracts for the proposed improvements to Victoria Hall, but an estimate of the cost is being prepared.—There is an agitation in favor of installing a municipal electric light plant, and it is probable that an expert will be engaged to report as to cost of same.—Thomas Tompkins, contractor, of this city, has made a proposition to the council to build a modern hotel at the corner of Home and King streets. The estimated cost is \$40,000.

QUEBEC, QUE.—An official of the Dominion government has been in the city recently looking into the claims of the Levis land owners in connection with the proposed purchase of property by the government for the enlargement of the Levis station and shunting yards.—The plans for the new building to be built by the Clepham Estate, on the site of the present G. T. R. ticket offices, show a structure 35 x 65 feet, with iron supports and girders. The Grand Trunk Railway Company will occupy the ground floor.—The Quebec Bridge Company has been asked to extend the time for the submission of tenders for the proposed bridge over the St. Lawrence river from Jan 2nd to February 2nd. The matter will be considered at the next meeting of the Board of Directors.

HAMILTON, ONT.—The Lawry Packing Company, in conjunction with New York and Hamilton capitalists, have completed arrangements for starting a stock yard in this city. The Lawry factory will be enlarged at once.—The Eagle Knitting Co. purpose making extensive improvements.—The Cataract Power Company has authorized Thomas C. Hillman, C.E., to survey two direct routes to Guelph and Berlin for an electric railway. The most direct feasible line will be used.—Messrs. Nesbitt, Gauld & Dickson are asking for incorporation for the Hamilton and Caledonia Railway Company, to build an electric railway from Caledonia to Selkirk and other points.—The special committee appointed to consider the establishment of a municipal electric light plant will shortly place before the council the in-

formation gathered. It has been agreed that it would not be advisable to submit a debenture by-law at the coming municipal election, and the Cataract Power Company will be given until February 1st next to quote prices.—W. W. LaChance, architect, is preparing plans for coal elevator and conveyor for Elias Rogers Coal Co., Ltd. Tenders will be called for as soon as drawings are completed.

KAMLOOPS, B. C.—The Thompson Valley Power Company purpose carrying out an extensive irrigation undertaking, the surveys for which have been made by Mr. Pillsworth, C.E. According to the plans of the company, a crib dam 450 feet in length and faced with stone will be built across Jamieson creek. A ditch 16 miles in length will be constructed, and it is probable that a flume one quarter of a mile long will be required. The scheme also includes the construction of an electric tramway to convey the output of the irrigated country, and for this purpose it is proposed to utilize the water power of the Tranquille river by the construction of another dam.

HINTONBURG, ONT.—J. Bullman is building a new brick residence on the Richmond road.—Plans prepared by Mr. T. C. Keefer, C.E., for a waterworks system were submitted to the council at its last meeting. The plans call for 5½ miles of piping, and the total cost of the work is given as follows: Pipe trenching in earth and rock excavation, \$17,000; pipe, pipe laying, special castings, hydrants, valves and valve chambers, \$20,000; elevated tank, \$3,000; pumping station and machinery, and intake pipe, \$7,900; sundry and incidental expenses, \$7,100; total, \$55,000. The plans were adopted by the council, and it is probable that the ratepayers will be asked to vote the necessary funds.

MONTREAL, QUE.—The Methodist General Board of Missions, at a meeting held in Toronto last week, decided to sell the old French Mission church in this city, and rebuild on another site.—At a public meeting held last week, a committee was appointed to wait upon the Road Committee of the City Council to urge the building of a subway or bridge to connect Shearer and Congregation streets.—At the last meeting of the Maisonneuve council, a letter was read from Vineberg & Company stating that they would probably build a large factory, and asking for favorable terms regarding assessment.—The Superintendent of Waterworks has submitted to the Water Committee the required appropriations for the coming year, which include the following: Repairs to distribution pipes, \$31,400; meters, \$5,300; hydrants, \$9,800; aqueduct, \$4,040; pipe track, \$8,000.—C. Drinkwater, secretary of the Atlantic & Northwest Railway Company, will apply to the Dominion parliament for an act extending the time within which the company may complete its road.

WINNIPEG, MAN.—Plans have been prepared for a new Salvation Army barracks, to be built on the site of the present building, and to cost about \$20,000.—The city council has given notice of its intention to construct a sewer on Main street, from Selkirk to Alfred ave.—The council is now considering the advisability of purchasing an asphalt plant for the construction of the asphalt pavement on Portage ave. Tenders for the paving work were received as follows: Kelly Bros., \$52,497.50; Warren-Scharff Co., \$52,806.10. The city engineer estimates the cost of doing the work by day labor at \$43,806.10, and it is thought that the saving thus affected will cover the cost of purchasing an asphalt plant.—It is understood that the Rat Portage Lumber Company, of Rat Portage, Ont., have secured an option on 17 acres of land in the northern part of the city, and will next

year erect a large saw mill there, at a cost of \$150,000.—The by-law to raise \$50,000 for the installation of a municipal electric light plant will be voted on by the rate-payers on February 20th.—The Mayor reports that he has arranged with the Bank of Montreal whereby the city can secure what money is required to proceed with the construction of a waterworks system, should it be decided to await a more favorable time for disposing of the bonds. The tests of the artesian wells sunk in the western limits of the city have proven most satisfactory.—It is understood that the Northern Pacific Railway Company will further extend their system in Manitoba next year.—A committee of the University Senate, appointed to consider the question of erecting a new University building, has recommended that the necessary arrangements be proceeded with at once, and that a building committee be appointed to procure plans and specifications.

OTTAWA, ONT.—James Proctor is building three new houses, corner Lewis and Charles streets.—Speaking of the new central depot, Mr. J. R. Booth states that the plans have been prepared, and that work will be commenced as soon as the government finds accommodation for the militia stores.—Mr. L. Z. Gauthier, architect, of Montreal, has been secured by the University authorities to prepare plans for a new building to be erected on Wilbrod street.—A brick addition will be made to the Canadian Bank of Commerce in this city.—Captain Noonan has made arrangements for the building this winter of a new steamer, 110 feet in length and having 28 foot beam, to be fitted with electric light and 12 x 12 compound engine, and to cost \$20,000.—E. F. Roy, secretary Department of Public Works, desires tenders for Friday, 23rd inst., for the construction of a public building at Liverpool, N. S. Plans at above department and at the office of the Collector of Customs, Liverpool.—Five thousand steel drawers are to be fitted up in the Department of the Interior for the keeping of the records and archives. It is understood that the contract has not yet been awarded.—The preliminary work in connection with the proposed main drainage system is being proceeded with rapidly, and tenders will be invited before many weeks. It is probable that contractors will be asked to submit bulk tenders for whole sections of the work.—The Pacific-Yukon Railway & Navigation Company gives notice of an application for a charter to build a railway from Pyramid Harbor to the Five Finger Rapids.—The Lindsay, Bobcaygeon & Potypool Railway Company is applying for a revival of its charter.—Tenders are asked by the City Clerk, up to 12th inst., for the supply of 2,500 brass or aluminum dog tags.—The Christian Bros. have purchased the La Salle separate school on Sussex street, and as a result the French Committee of the Separate School Board will build a new school, to cost probably \$10,000.—Dr. Chamberlain, of Toronto, Inspector of Prisons and Charitable Institutions, has recommended the erection of a new building in this city as a Home for Friendless Women.—The Canada Atlantic Railway Company are tearing down a number of small buildings in the Elgin street yards, and will erect on the site a large workshop for the building of freight cars. About five hundred cars will be constructed this winter.

TORONTO, ONT.—The government of Japan invite manufacturers of modern building materials and appliances to forward information concerning their goods to "Educational Department of the Imperial Japanese government." This information is desired for use in connection with the erection of an important government building.—Reinhardt & Company, Mark street, have taken tenders on plumbing for new addition.—The steam

launch Wanda, owned by the T. Eaton Company, will be lengthened 15 feet this winter.—The city is asking for tenders up to the 19th inst., for the supply and erection of corrugated iron sidewalk shelter under the bridges at the Queen street subway.—The Confederation Life Association will take tenders immediately on the proposed alterations to the old Mc Willie store in their building, corner of Yonge and Richmond streets. The improvements will be quite extensive, including new iron pillars, the dividing of the store into smaller offices and stores, and the necessary fittings in connection therewith.—The city engineer has reported against the proposal to bridge the Don river at King street with two stone or brick culverts instead of an iron or steel bridge, as the former would involve greater cost.—At a joint meeting of the Board of Control and the council of the Board of Trade, held on Friday last, it was resolved that the diverting of the Don, the deepening of the harbor, and the improvement of the means of access, to meet the demands of the trade that is expected to follow the opening up of the waterways to 14-foot vessels, should be carried out at the earliest possible moment. The city engineer estimates the cost of these works as follows: Diversion of the Don, \$10,000; improvements to eastern entrance, \$250,000; new western entrance, \$403,500.—The city engineer has asked for an appropriation of \$5,000 to construct cribwork in front of the Exhibition grounds.—Building permits have been granted as follows: S. F. McKinnon, five-storey brick warehouse, 90 Wellington street, cost \$12,000; Carling Brewing & Malting Company, two-storey warehouse, east side Simcoe street, cost \$12,000.—G. M. Miller & Co., architects, 51 Victoria Arcade, are taking tenders for seating the new town hall at Orono.—The Mayor has decided to submit only two by-laws to the ratepayers at the municipal elections in January. One of these will be to provide funds for the new bridge over the Don, and the other for the necessary cribbing in connection with the establishment of a new wharf along the water front.—The Metropolitan Railway Company has decided to proceed at once with the erection of a steel bridge over the Grand Trunk Railway tracks at Amora.—It is the intention of St. Mary's Catholic Literary and Athletic Association to build a hall in the near future. Mr. P. J. Lowe is recording secretary.

FIRES.

The fires of the past week included the following: Factory of A. Pion & Company, glove manufacturers, Prince Edward street, Quebec; damage \$20,000, covered by insurance.—G. W. Hyde's slaughter house at Billings Bridge, Ont., loss \$1,000.

CONTRACTS AWARDED.

DAUPHIN, MAN.—The Bank of Ottawa was the successful tenderer for school debentures; price, 98 cents on the dollar.

GOLDEN, B. C.—The Golden Fire Engine Company have ordered a steam fire engine from J. D. Ronald, of Brussels, Ont.

TILBURY, ONT.—Contracts for two iron bridges at Tilbury North have been let to the Stratford Bridge and Iron Company.

OTTAWA, ONT.—The contract for widening the outlet of Lake Manitoba has been let by the Dominion Government to L. Lemoine, of Montreal.

PERTH, ONT.—The tender of Thomas Bradford, of Almonte, has been accepted for building an addition to the public school here; price \$5,050.

MONTREAL, QUE.—The tender of John McDougall, of the Caledonia Iron Works, for repairs to wheel of pumping station, has been accepted, price \$2,850.

FORT AUGUSTUS, P. E. I.—The contract for finishing the interior of the R. C. church has been awarded to McEachren & Steele, of Souris, at a figure about \$4,000.

NEW WESTMINSTER, B. C.—The contract for the new Bank of Montreal building has been let to John Coughlin & Son. The architects are Messrs. Rutenbury & Tiarks.

KINGSTON, ONT.—The Department of Public Works, Ottawa, has awarded contracts as follows in connection with the new drill shed in this city. Carpenter work, M. Sullivan; masonry, W. Langdon.

BARRIE, ONT.—Messrs. G. A. Stimson & Co., the Toronto bond brokers, have just taken delivery of the \$100,000 town of Barrie debentures which they purchased from the town a few days ago. The bonds were issued to take over the waterworks, which had previously been run by a private company. The Barrie council were shrewd enough to get the county of Simcoe to guarantee the bonds, which enabled them to get a handsome premium, although the bonds were issued at 3½ per cent.

TORONTO, ONT.—Mr. Henry Simpson, architect, has accepted the tender of T. Downie for the carpenter work of a laundry building on McCaul street, and that of Smallwood Bros. for the brickwork.—The following contracts were awarded by the Board of Control on Monday last. Sand—Joseph Gaby, 75 cents per yard west of Simcoe street, Ashton & Son, 87 cents per yard east of Simcoe street. Rubber valves, etc.—Gutta Percha & Rubber Manufacturing Co. Cast iron pipe—Rice Lewis & Son, four-inch, \$3 25; six-inch, \$4.80; twelve-inch, \$13.70 per length. Stop valves—Perkins & Co., six-inch, \$13; 12-inch, \$27.95. Lead pipe—James Robertson & Co., \$4.40 per 100 pounds. Lake gravel—Britnell & Co., 95 cents per yard. Unbroken stone—John Maloney, \$9.75, for 40 toise; John Adair, \$9.25, for 20 toise. Daniel Ryan, \$9, for 15 toise. General supplies, Aikenhead & Co. Iron valves and stopcock boxes—St. Lawrence Foundry Co., \$1.80 and \$1.55 for valve boxes, and \$1.22 and 77 cents for double and single stopcock boxes. Hydrants—Four-way, St. Lawrence Foundry, \$59; three and two-way, Somerville & Co., at \$29 and \$27. Special castings—Galloway, Taylor & Son, \$1.50 per 100 pounds. Lumber—Reid & Co., plank, \$11.94; scantling, \$11.94; boards, \$11.64 per M feet. Cedar paving posts—Grant & Co., \$4.47 per cord. Lumber for waterworks—Reid & Co., pine, \$12.74; hemlock, \$9.14 per thousand feet. Sewer pipe—J. H. McKnight, six-inch pipe, 6 9/10 cents per foot; nine-inch, 12½ cents per foot. Wire nails—Aikenhead & Co., \$1.57½ per 100 pounds for five-inch nails. Brass and bronze castings, Dean Bros., bronze and gun metal, 5, 3, 3½ and 3 cents per pound on the several grades; aluminum bronze, 7 cents; phosphor bronze, 17 cents; Tobin bronze, 5 cents; brass castings, 9 cents; rabbit metal, 16 cents.

ARCHES AND BUTTRESSES.

In the construction of these and similar parts of buildings, two desiderata are especially to be kept in view, viz., good bonding with the adjoining parts of the structure, and such a disposition of the joints that each stone will take its fair share of the pressure to be borne, while it receives all possible support both from its own form and from its fair bearing upon the subjacent mass. Common arches are of three forms, viz., semicircular, segmental and elliptical. Besides these there are the Gothic arches, Tudor arches, three-centered arches, and others,

the forms of which belong to architectural art, and the best construction of which can only be determined by practical experience and the knowledge and skill thence required. The radial joints of all arches must be at right angles to the curve of the arch at that point through which the joint passes. The connection of the arch stones or voussours depends mainly on their wedge-like shape, which, so long as the central one, or keystone, keeps its place, prevents any one stone from falling out; but if the joints be not truly directed, so as to lie in the line of thrust toward the centre of the curve, an oblique pressure is caused against the edges of the arch stones, which, in the course of time, causes them to split off. Arches of which the curve is struck from several centers, the curves being tangential at their points of meeting, are always liable to this injury, which is only mitigated when the joints are arranged so as to coincide with the lines which pass through the points of contact of the respective arcs which compose the curve of the arch. Elliptical arches are, for a like reason, more liable to fracture at the joints than circular curved arches. The return joints of the arch stone, under the arch, or in the soffit or intrados, as it is termed, are to be worked and fitted with equal care, so that every stone shall abut closely against the adjoining stones throughout the whole of its bearing surfaces. The arch stones must be alternately of large and small depths, so that a bond may be effected in the direction of the axis of the arch. The upper surface of the arch, or extrados, should not, if the thickness of the arch be small, be throughout parallel with the intrados, if other masonry overlies the work, but the arch stones should be allowed, at intervals, to extend upward, and thus connect with the other work. As the theory of the pressure to which arch stones are subject teaches that this increases toward the lower parts, or haunches, an additional strength is often given to these parts by striking the extrados with a larger radius, thus increasing the height of the arch stones gradually toward the springing points. The impost stones from which the arch at each end springs, being liable

to severe pressure and receiving the entire weight borne by the several stones of the arch, are frequently made of harder stone than the rest of the work. Thus granite is sometimes introduced for these stones, while the rest of the work is executed in sandstone and limestone. All the delicate and architectural details of buildings, as entablatures, friezes, enriched cornices, also parts of ornamental columns, pillars and pilasters, have the joints rubbed carefully after dressing, so as to render them as far as possible invisible when combined in the general design.

CONCRETE AGGREGATES.

The use of concrete for every kind of construction has become so general, writes Warner H. Jenkins, C.E., in Municipal Engineering, that the quality of the materials of which it is made is a matter of great importance. Specifications prepared for this purpose invariably call for broken stone, to the exclusion of other materials. I find that many persons, who have not given the subject proper consideration, contend that the compound is complete whereby stone, regardless of its quality or texture, enters into the mass. I will here state that as much care should be taken in the selection of the aggregates, stone and sand, as in that of cement. The stone should be perfectly clean and free from flour and dust. The fragments should possess angular faces and be graduated as to size. The theory that limestones contribute to the strength of the mortar with which they are mixed, and ultimately produce stronger concretes, is incorrect. The limestone will invariably produce a concrete that can be termed as tough, but never attains extreme hardness, which is essential in all constructive work. I have also found that concretes prepared from limestone aggregates are much more liable to expansion than other stones. The irregular faces and sharp edges of broken stone are not all the advantages in the composition of concrete. It is essential that the aggregates should vary in size, so as to form a wedge with each other, and thereby permit of being properly compacted by ramming. Care should be taken to exclude long, thin fragments, which invariably crush under pressure, or

break in ramming the mass. The best concrete is obtained by using at least two sizes of broken stone, smaller than the largest aggregate. This fact can be readily demonstrated by mixing the stone and placing it in a heap, when the resistance to ramming will be apparent. The use of one size stone is liable to produce arching, even when the presumption is that the concrete has been properly rammed. When preparing concrete I have frequently used screened gravel with equal parts of broken stone. I have found its oval surfaces pack more closely in the interstices of the stone. To sum up the matter, a variety of shapes and sizes in the aggregates are essential for the ultimate strength of concrete.

I would therefore recommend that a percentage of the stone aggregates used in concrete be proportioned into at least two sizes, under the largest aggregate.

Mr. Newton J. Kerr, of the Roadway Department, Toronto, has been appointed assistant engineer to Mr. John Galt, city engineer of Ottawa, Ont., at a salary of \$1,200 per year. Mr. Kerr is thirty-five years of age, and has been connected with the Toronto department for about ten years. He is believed to be one of the most experienced young engineers in Canada, with a good knowledge of drainage work. Before leaving Toronto Mr. Kerr was tendered a complimentary banquet by his associates in the Roadway Department and a number of other friends.

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BUSINESS NOTES.

The assignment is announced of Parker & Company, plumbers, Galt, Ont.

Denman & Bethune have registered partnership in Montreal as plumbers.

Giroux, Charles & Frere, painters, Montreal, have dissolved partnership.

Aime Marsan & Eugene Bouthillier have registered proprietors of the firm of Marsan & Bouthillier, builders, Montreal.

Mantha, Lefebvre & Mantha, manufacturers of doors and windows, Montreal, are reported to have assigned, with liabilities of about \$40,000.

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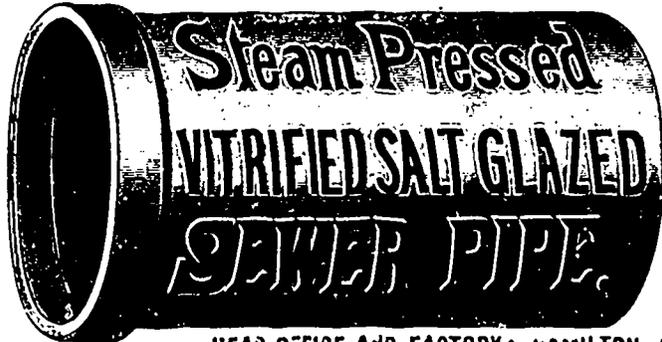
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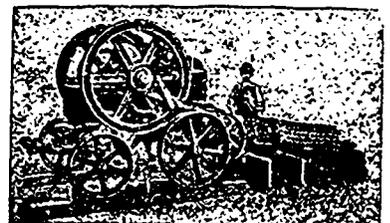
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CEMENT—MACADAM.

An experiment has been made with this new paving in Berlin. The paving is made by first putting down a bed of concrete, on which, when sufficiently hardened, the cement-macadam proper is spread. The latter consists of crushed stone, about the size of a walnut, and Portland cement, with very little sand, four flat shovels for three or four sacks of cement. It is prepared by putting the crushed stone on a platform together with the few shovels of sand. Then the mass is first mixed dry by shoveling, and then wet under the plentiful addition of water. Finally the mixture is thrown upon the concrete and tamped solid. As soon as this is done the surface is rubbed with a board, and the uneven places are filled with the cement mortar. By means of a roller a rifled surface is given to the paving. When finished, the macadam is covered with sand to prevent too rapid drying, and it thus remains from ten to fourteen days.

Although the cement-macadam has been subjected to traffic only three or four days, it has already been badly damaged where heavy freight is passing over it.

Aside from the wretched durability of the paving, it is not suited for the busy streets of Berlin, since it makes necessary a long delay for the purpose of drying the macadam. The short stretch on Invaliden street, a piece about 300 feet long, required about four weeks' time, including the time of hardening. Such a long-continued obstruction of traffic might be tolerated when there is an assurance that the pavement is really durable and where it need not be disturbed for some time. But where gas, water and compressed-air lines, as well as electric cables, require constant repairing, the replacement of the cement macadam would be found inconvenient and expensive, in addition to the poor durability,

A pavement which does not show any of these disadvantages is the brick pavement. Brick made from shale, properly

made, burned and annealed, gives a street pavement which is cheap, durable, needs little repairing, causes comparatively little friction, and is not noisy.—K. Duemmler, in the German Brick and Pottery Gazette.

HOT WATER TEST FOR CEMENT.

Increasing attention has of late been given to the method of testing the soundness of cement by means of the hot water bath, and this system has much to recommend it, especially in cases in which it is important to ascertain speedily the character of any given sample of Portland. The principle which underlies this plan of testing is that moist heat facilitates and accelerates the induration of cement compounds, and, by the employment of boiling water, the setting process is hastened to such an extent that defects, which might take days, or even weeks, under ordinary circumstances to become manifest, are developed in the course of a few hours. Different observers have suggested somewhat varying methods of carrying out this hot water test, which is undoubtedly a powerful agent for the detection of latent imperfections in the composition or quality of cements of the Portland type. Mr. Margetts, who has used this mode of testing, states that no less than ten samples of cements obtained from various sources became more or less disintegrated by the boiling process; some of them being reduced to mud and losing all traces of cohesion. It has been asserted that forty-eight hours in the hot bath are equivalent to immersion for seven days in cold water, that is to say, that a briquette made of neat cement will show a corresponding amount of tensile strength after the above intervals respectively, or that, in the case of tests made with sand, a seven days' hot test is equivalent to a twenty-eight days' cold test; the percentage of difference of the tensile strengths in a good sample of cement being in both instances but trifling. In applying this test to specimens of neat cement, it is usual to make up small circular pats, about 3 inches in diameter, with just enough water to enable them to be smoothed out with the trowel to the thickness of about half an inch in the center, and a quarter of an inch at the edges. As soon as these pats become fairly firm or set, they are placed in water kept at a uniform temperature of about 180° F., or some prefer 212° F. for seven or eight days, after which

period, if the pat still remains firm and unaltered, the cement may be pronounced to be sound and of good quality, and capable of undergoing any of the ordinary engineering tests. If the water in the bath is raised to the boiling point, a much shorter period will suffice. If the tests are made with samples of cement and sand, however, the lower temperature should be employed. If used in conjunction with the ordinary tensile tests, this method should prove of especial importance to the cement manufacturer, who frequently, when making alterations in his material or mixtures, requires to form a speedy conclusion respecting the resultant cement.

Mr. Margetts, in the course of a discussion upon this subject at the Institution of Civil Engineers, in November, 1891, urged the value and importance of this test, and gave the following instance of its application to two cements, nearly identical in their composition, one of which stood the boiling process perfectly, while the second disintegrated after the expiration of three hours in water at 212 F.:

Composition.	No. 1.	No. 2.
Lime	60.67	60.47
Silica	24.86	24.93
Oxide of iron and alumina	12.82	12.42
Magnesia	0.63	0.58
Sulphuric anhydride	0.36	0.30
Carbonic anhydride	0.47	0.52
Alkalies	0.73	0.78
Total	100.00	100.00
Specific gravity	3.11	3.118

Tested with the sieve, No. 2 proved to be somewhat more finely ground than No. 1, and the average tensile strength of No. 1 after seven days (six days' immersion in cold water) was 496 lbs. per sq. inch. The same cement gave, after twenty-four hours in the air and forty-eight hours in the hot water bath, a tensile strength of 418 lbs. per sq. in. No. 2 cement, tested in the ordinary way at 7 days, had a tensile strength of 390 lbs. per sq. inch, but briquettes exposed for twenty-four hours to the air and then immersed in boiling water became disintegrated, as already stated, in three hours.—G. R. Redgrave.

After May next the law of the province of New Brunswick requires that all wagons fitted to haul loads of one ton and over shall have tires not less than four inches wide. A proclamation in the Royal Gazette gives notice to carriage-makers and others concerned to make preparation for the time when the law will come into force.

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miscro is widths.....12 00	13 00		13 00	
Shipping cull boards, stocks	15 00		16 00	
Hemlock scantling and joist				
up to 16 ft.....10 00	12 00		10 00	
Hemlock scantling and joist				
up to 18 ft.....11 00	2 00	12 00	3 00	
Hemlock scantling and joist				
up to 20 ft.....12 00	13 00	13 00	14 00	
Cedar for paving, per cord...	5 00		5 00	
Cedar for kerbing, 4 x 14,				
per M.....14 00	14 00		14 00	
Scantling and joist, up to 16 ft				
" " " 8 ft	14 00		14 00	
" " " 10 ft	15 00		16 00	
" " " 12 ft	16 00		16 00	
Scantling and joist, up to 22 ft				
" " " 24 ft	17 00		17 00	
" " " 26 ft	19 00		19 00	
" " " 28 ft	20 00		21 00	
" " " 30 ft	22 00		23 00	
" " " 32 ft	24 00		25 00	
" " " 34 ft	27 50		27 50	
" " " 36 ft	31 00		31 00	
" " " 38 ft	33 00		33 00	
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1 1/2 " " dressed, F M.	25 00	28 00	27 00	30 00
1 1/2 " " undressed, B M.	18 00	19 00	18 00	19 00
1 " " dressed.....	18 00	20 00	18 00	22 00
1 " " undressed.....	12 00	15 00	12 00	15 00
Beaded sheeting, dressed.....	20 00	35 00	22 00	35 00
Clapboarding, dressed.....	14 00	8 00		12 00
XXX sawn shingles, per M				
16 in.....	2 40	2 35		3 00
XX sawn shingles.....	1 60	1 50		
Sawn lath, No. 1.....	1 75	2 00	2 50	2 60
Cedar.....				2 90
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White.....	37 00	45 00	35 00	55 00
Basswood, No. 1 and 2.....	28 00	30 00	18 00	20 00
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(Continued on Page 8.)

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