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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. 10. OCTOBER 11, 1899 No. 37

THE CANADIAN CONTRACT RECORD,
 PUBLISHED EVERY WEDNESDAY

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TENDERS

Tenders will be received up to TUESDAY, OCTOBER 17TH, for the whole of the several Trades required in the erection of a

DETACHED RESIDENCE

on the south side of Maple Avenue, Rosedale. The lowest or any tender not necessarily accepted.
 F. H. HERBERT, Architect,
 9 Toronto Street, Toronto.

TENDERS FOR PUMP

Sealed tenders, addressed to the undersigned, will be received by the Municipal Council of the Town of Orillia, Ontario, until 4 p.m. WEDNESDAY, OCTOBER 25TH, for the Furnishing and Erection of an Electrically Driven WATERWORKS POWER PUMP, in Orillia, of a capacity of 1,250,000 Gallons per day. Plans and specifications may be obtained on application to C. H. Mitchell, Hydraulic Engineer, Niagara Falls, Canada.
 The lowest or any tender not necessarily accepted.

C. E. GRANT,
 Town Clerk.

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.

Notice to Contractors

SMITH'S FALLS, ONT.

SEWERAGE AND WATERWORKS

Sealed tenders will be received by the Town Clerk until 6 p.m. on THURSDAY, OCTOBER 25TH, 1899, for the construction of about 4,000 Lineal Feet of SEWER, in rock trenches, also for laying 3,500 Lineal Feet of WATER MAINS.

Plans and specifications may be seen at the Town Clerk's office, Smith's Falls, or at the office of the Chief Engineer, Toronto, on and after October 15th. No tender necessarily accepted.

B. F. SPARHAM Esq., Town Clerk,
 Smith's Falls, Ont.

WILLIS CHIPMAN, C.E., Chief Engineer,
 103 Bay Street, Toronto, Ont.
 October 11th, 1899.

CONTRACTS OPEN.

STAPLES, ONT.—Mr. Travis has had plans prepared for new building.

PHELPSVILLE, ONT.—Mr. Shaw, of Elmvale, intends establishing a saw mill here.

WIARTON, ONT.—The council has decided to erect a new municipal building.

AVONMORE, ONT.—W. O. Wert and J. D. Hough have purchased building lots.

WHITBY, ONT.—T. Deverell purposes remodelling his stores into a first-class hotel.

FARNHAM, QUE.—Iwin Impey has purchased a lot on which to build a residence.

CARLETON PLACE, ONT.—P. T. Sautler may enlarge his hotel at Lake Park next year.

ANDERDON, ONT.—McNorgan & Young will likely build an elevator at an early date.

BURK'S FALLS, ONT.—F. Downie, of South River, has decided to locate a flour mill at this place.

TORONTO JUNCTION, ONT.—The council has decided to invite tenders for 250 feet of hose.

OTTAWA EAST, ONT.—The Public School Board have decided to erect a new school building.

BEERE PLAIN, QUE.—The Granite Company have decided to build new sheds, 250 x 40 feet.

AVR, ONT.—A company has been formed to build a skating rink, 50 x 160 feet, with circular roof.

MURRAY BAY, QUE.—Next spring it is the intention to enlarge the Church of England chapel here.

WESTON, ONT.—The council will likely award contracts this week for the supply of an electric light plant.

KIOWIN TON LANDING, QUE.—There is some talk of organizing a company here to build a large summer hotel.

NIAGARA FALLS, ONT.—The Finance Committee has been instructed to advertise for bids for \$20,000 of bonds.

PETROLIA, ONT.—Preparations are being made by J. W. Downer for the construction of an implement warehouse.

YARMOUTH, N. S.—The council has decided to adopt steam pumping, at a cost not to exceed \$8,000 for the required plant.

ST. JOHN, N. B.—Debentures to the extent of \$24,000 will be issued for the extension of waterworks and sewerage systems.

SOUTH MAITLAND, ONT.—F. A. McMullen intends next year to raise his saw mill about two feet and make an addition to his dam.

MEAFORD, ONT.—The council will probably build a sewer on Denmark street, and may engage an engineer to superintend the work.

ACTON, ONT.—A movement is on foot to erect a building with accommodation for a gymnasium, skating rink, swimming bath and reading room.

LEAMINGTON, ONT.—Alex. Baird, C. E., will let the work of improving the Hicks drain, in the township of Colchester South, on Saturday, 14th inst.

HINTONBURG, ONT.—The tenders received for construction of intake pipe were considered too high and the corporation will do the work by day labor.

VALLEYFIELD, QUE.—The Montreal Cotton Co. are excavating for a large extension to their electric power house, to be built of stone, with metallic ceiling.

ROSSLAND, B. C.—Mr. Wylie, agent of the Septic Tank Syndicate, will shortly submit to council estimates of the cost of installing septic tank system for this city.

FRANKLIN, QUE.—The Episcopal church congregation have decided to build a new church, 45 x 28 feet, with chancel 12 feet square. Rev. J. I. Strong, rector.

NEWCASTLE, N. B.—The town council has decided to engage the services of an hydraulic and an electrical engineer to prepare plans for the proposed electric light plant.

KAMLOOPS, B. C.—A site has been decided upon for the proposed waterworks power house. The engineer of the proposed system is Mr. Willis Chipman, C. E., of Toronto.

PORT COLBORNE, ONI.—It is understood that a new Sunday School building in connection with St. James church will be built. The interior of the church may also be improved.

SHERBROOKE, QUE.—The Eastern Townships Agricultural Association have appointed a committee to report upon

the proposal to make additions and alterations to the buildings.

FORT WILLIAM, ONT.—The Mattawa Iron Co., in which Messrs. Folger, of Kingston, are said to be interested, have made application for a bonus, with a view to establishing a blast furnace here.

RENFREW, ONT.—The townships of Rolph, Buchanan and Wylie will issue debentures to the amount of \$1,400 for building new school in section No. 3. Particulars from Florence McCarthy, township clerk.

LACHINE, QUE.—Fisk & Co., leather manufacturers, of Montreal, have agreed to build a large factory here in return for a bonus of \$25,000.—Leopold Ledger has been appointed to superintend the construction of the drainage system.

SMITH'S FALLS, ONT.—Work on the proposed waterworks and sewerage systems will be commenced at an early date, under the superintendence of Willis Chipman, C.E., of Toronto. Tenders for construction are now being received.

AMHERSTBURG, ONT.—Tenders for the extension of brick sewer on Simcoe street and for a twelve inch crock sewer on Seymour street will be received by J. H. C. Leggatt, town clerk, up to October 13th. Plans at office of Owen McKay, Windsor.

PORTAGE LA PRAIRIE, MAN.—Adam Brown is negotiating for the purchase of the Bellview Hotel. In the event of a purchase, the building will be remodelled and accommodation increased.—A site is said to have been selected for the proposed bridge across the Assiniboine river.

EGANVILLE, ONT.—Herbert J. Beatty, engineer of township of Admaston, will receive tenders up to Monday, October 30th, for the excavation of an open drain in the township of Admaston, contract to be let in bulk or by the cubic yard, and work to be completed not later than July 1st, 1900.

PERTH, ONT.—It is probable that a new wing will be built to the Separate school next year.—The plans of B. Dillon, architect, of Brockville, have been accepted for new skating rink, and the contract will soon be awarded.—Over thirty offers have been received for sites for the proposed county poor house.

ST. LOUIS, QUE.—The Canadian Pacific Railway Co. purpose building a new freight shed, and asked for exemption from taxation. The council replied that this would be granted provided the company should erect a new depot.—The council has authorized the secretary-treasurer to borrow \$30,000 for public work.

BERLIN, ONT.—The directors of the Orphanage are considering the question of improved heating apparatus for the building.—Lippard & Co., furniture manufacturers, of Waterloo, have agreed to erect a large factory here in return for exemption from taxation and a free building site. The question will be submitted to a vote of the ratepayers.

BRANTFORD, ONT.—The county council passed a by-law last week to raise \$5,000 by the issue of debentures for an addition to the House of Refuge.—The Brantford Co-Operative Pork Packing Co. purpose commencing operations here. They will erect a building to cost about \$16,000, exclusive of plant, for which plans will be prepared by a Toronto architect.

LONDON, ONT.—A. O. Graydon, city engineer, wants tenders by 5 p.m. Thursday next for construction of 8-inch tile sewer on Talbot street.—The city engineer will prepare plans for construction of sewer along Brighton avenue from Elmwood avenue.—Debentures for the sum of \$55,000 for waterworks purposes will shortly be placed on the market.

RAT PORTAGE, ONT.—A report is current that plans are under way for the construction of a railway from Appleton, Wisconsin, into the Rainy River gold districts. The line as proposed involves the development of the water powers of Alberton falls at Koochiching, Minn., and Fort Francis, Ont. The road from the Canadian side to the mines will be about 200 miles long.

HAMILTON, ONT.—Wm. & Walter Stewart, architects, have been instructed to prepare plans for remodelling the old Y. W. C. A. building and for a gymnasium to be built this fall.—The following building permits have been granted: E. B. Patterson, two brick stores, corner Mary and King streets, for the O'Reilly estate, cost \$3,000; Stewart McPhee, alterations to Masonic Hall, cost \$2,500.—Thos. Allen will probably build on his property on Baillie street.

HULL, QUE.—At a council meeting on October 3rd, plans were submitted by Mr. Farley for increasing the water supply by utilizing water power instead of steam. Plans call for an expenditure of \$49,500, including two storey power-house and necessary excavation, \$13,000; wheels, machinery, etc., \$26,500. The proposed site of the power house is the axe factory, power to be obtained by damming Brewery creek.

WOODSTOCK, ONT.—At a meeting of the Board of Health held last week, the question of a wholesale ice house was considered. Dr. Rice suggested that the waste water of the waterworks might be run into a reservoir, from which the ice could be taken, the cost of building same to be about \$4,000.—The Board of Trade have passed a resolution recommending that the council pave Dundas street, from Mill street to Norwich ave., the funds to be raised by debentures.

NEW WESTMINSTER, B.C.—T. Robinson, of the Dominion Fisheries office, has returned from a prospecting trip up the Thompson river, for the purpose of selecting a site for a fish hatchery.—At a congregational meeting of St. Barnabas Episcopal church held a few days ago, it was decided to build a 20-foot addition to the church.—A local company has been organized to manufacture electric light carbons, they having secured water power rights on Stave river.

VICTORIA, B.C.—Mr. Hooper, architect, has invited tenders for new block to be erected at corner Government and Broughton streets for C. A. Vernon.—It is understood that Ald. P. C. MacGregor will commence work early next year on a four-storey building, corner Broad and View streets.—The Royal Artillery have been removed from Halifax to this place, rendering it necessary to erect new buildings at Work Point. These will be commenced immediately.

WINDSOR, ONT.—The Girardot Wine Co., recently organized, will at once commence the erection of extensive wine cellars.—The Board of Water Commissioners is considering the advisability of extending the water mains up Douglass avenue.—It is expected that the question of the extension of the Lake Erie & Detroit River Railway from Ridgetown to St. Thomas will be settled at an early date. If running powers over the Canada Southern are not granted a new line will be constructed.

VANCOUVER, B.C.—W. L. Keene, C. M.C., invites tenders up to November 2nd for repairs to the wharf in the municipality of North Vancouver. Plans at room 42, Inns of Court building, Hamilton street, this city.—The telephone systems of Vancouver, Victoria and New Westminster have been acquired by a syndicate of Eastern capitalists, who, besides improving the service, will establish a long distance system between Victoria and the

mainland. A. C. Flumerfelt represented the purchasers.

WINNIPEG, MAN.—Geo. Browne, architect, has taken tenders on the excavating and foundation walls for science building for the University of Manitoba.—Macadam pavements will be constructed on Graham and Selkirk avenues and Rupert and Thistle streets.—Hon. Mr. Sifton had an interview last week with the Minister of Public Works at Ottawa regarding the proposed improvements to St. Andrew's rapids. He was advised that Mr. St. Laurent, C.E., would prepare plans at once with a view to having the work proceeded with.—Mr. G. Hastings, manager of the Lake of the Woods Milling Co., states in regard to the extension of their business that the directors have not yet decided whether they will enlarge the existing mills or erect entirely new ones. It will perhaps be two months before a decision is reached.

OTTAWA, ONT.—It is expected that Gilmour & Hughson will shortly close the sale of their extensive water power at Ironsides to an American syndicate for pulp manufacturing purposes.—The City Engineer has written the Ottawa Electric Railway Company and the Ottawa and Parry Sound Railway Company asking them what proportion of the cost of the Bank street subway they are willing to bear.—The bonds for the civic officials have not yet come to hand, and it is possible that new tenders may have to be invited.—The question of a municipal electric plant is still engaging the attention of the council.—E. F. E. Roy, Secretary Department of Public Works, desires tenders by 21st inst. for erection of a hospital and two detention buildings at Partridge Island, N. B.—Plans at above department and at office of R. C. John Dunn, architect, St. John, N. B.—Building permits have been granted as follows: Geo. Matthews Co., brick building, corner of Slater and Bank streets, to be used for store purposes, cost \$9,000; Dr. A. Jamieson, brick veneered dwelling, Elgin street, cost \$9,000.

MONTREAL, QUE.—It is expected that work will be commenced immediately on the proposed improvements to Bonaventure station.—Mrs. Reinhardt has purchased property on Mountain street, near Sherbrooke, and is having plans prepared for a modern private residence.—Lord Strathcona has given \$10,000 to assist in the erection and equipment of a new building in connection with the Montreal Maternity hospital. Mrs. W. R. Miller is president of the hospital.—A meeting of representatives of the Canadian Export Furniture Company was held in this city last week. The necessary capital has, it is understood, been secured through R. Wilson Smith, of this city, and the erection of a large factory for the manufacture of furniture for export will be commenced immediately. W. R. Hobbs, of London, is one of the chief movers.—L. O. David, city clerk, has just taken tenders on different works to be performed at the eastern abattoir cattle market, including shed, fence and gates, scale and scale house.—Tenders close at noon to-day (Wednesday) for construction of sewer on Duke street, from William to St. Paul street. The council will also construct a sewer on Joliette street, from St. Charles street to Ontario street, in Hochelaga ward.—The C.P.R. is taking tenders this week on tearing down six vacant houses on St. Martin and Seigneurs streets. Particulars at 1416 Notre Dame street.—The Dufferin Falls Lumber, Pulp & Paper Co. has been incorporated, to manufacture lumber, etc., and develop water powers for the purpose. Among those interested are J. T. Shearer, lumber merchant, this city, and T. E. Fee, lumber merchant, of St. Hyacinthe.—The Grand Trunk Railway Co. have ordered ten monster freight

engines from the Baldwin Locomotive Works, to be operated for handling the freight business via the Atlantic division to Portland. To permit of running these engines large expenditures have been made in replacing light iron bridges with heavy steel structures and in laying heavy rails. It is the intention of the Grand Trunk management to continue these improvements until the entire road between Montreal and Portland is in suitable shape to carry these engines.

TORONTO, ONT.—Ground has just been broken for new residences on the west side of Spadina avenue, near Bloor street.—The Compensating Pipe Organ Co., of Toronto, capital \$200,000, has been granted a charter, and will build a factory in this city.—Tenders for building stairs are wanted at corner King and Spencer avenue.—Tenders are invited by John Holmes, 222 Carlton street, for deepening and concreting cellar at Broadview hotel, corner Adelaide street and Spadina avenue.—Applications for position of chief of the Toronto Fire Department are invited by the Board of Control up to Monday, 23rd inst.—The Separate School Board have been asked to enlarge St. Anne's school on Bolton avenue.—The question of the enlargement of the Isolation hospital was brought up at a recent meeting of the Local Board of Health, but allowed to stand until next year.—Consideration is being given by the municipal authorities to the question of sewage disposal, and it is probable that some definite action will be taken in the near future.—A company has been formed in this city to operate iron mines near Kingston. The dividends to the company are guaranteed by the Trusts and Guarantee Co., of Toronto.—The council has given notice of its intention to construct the following works: Asphalt pavement on Prince Arthur avenue, from St. George street to point near Bedford road, cost \$7,140; asphalt pavement on Church street, Queen to King, cost \$12,100; macadam roadway on River street, Gerrard to Spruce, cost \$1,100; cement concrete sidewalk on Major street, both sides, College to Bloor, cost \$4,700, and on portions of Queen, Richmond, Simcoe, Elm, Prince Arthur, Bedford road and St. George street.—The Board of Works has declined to authorize the laying of a 12-inch tile pipe sewer on Dupont street, from Davenport road to St. George street.—The city engineer has recommended the construction of the following works: Cedar block pavements—Mansfield avenue, Clinton to Bellwoods avenue, cost \$540; Claremont street, Arthur to Mansfield avenue, cost \$1,740; Bellwoods avenue, Queen to Mansfield avenue, cost \$5,440; Niagara street, King to Queen street, cost \$5,690; Manning avenue, Arthur to College, cost \$2,940; Lippincott street, Nassau to College street, cost \$1,440; Claremont street, Robinson to Arthur, cost \$2,500; Berryman street, Davenport road to Hazelton avenue, cost \$1,020; Henderson street, Manning avenue to Clinton street, cost \$460. Brick pavements—Shannon street, Ossington avenue to Dovercourt road, cost \$6,025; Sully street, Arthur to College, cost \$12,610; Shaw street, Arthur to College street, cost \$10,500; Niagara street, Bathurst to King, \$12,740. Asphalt pavements—St. Mary street, from Yonge west, cost \$11,390; Lippincott street, Ulster to Bloor street, cost \$17,370. Concrete sidewalks—North side Simcoe street, Front street to Station street, cost \$443; north side St. Patrick street, Spadina avenue to Denison avenue, cost \$765; north side Gerrard street, Sherbourne to Seaton, cost \$680; north side Wellington place, Spadina avenue to Portland street, cost \$966. Macadam roadway—Strachan avenue, King street to Queen street, cost \$2,590.—It is stated that a company is negotiating with Mr. Robert Fleming, Assessment Commis-

sioner, for the erection of an extensive cotton mill in this city.—Building permits have been granted as below: John Stark & Co., two storey and attic brick residence on Glen road, near Elmvale avenue, cost \$4,500 (Arthur E. Wells, architect); Toronto Railway Co., one storey car shed, wood, covered with corrugated iron, gravel roof, Dundas street, near High Park avenue, cost \$8,000; Geo. Leslie, two storey and attic brick and stone residence, Jamieson avenue, near King street, Parkdale, cost \$5,000 (F. H. Herbert, architect, Dancy Bros., builders); H. G. Norton, Dundas street, alterations to front and new brick addition, corner Dundas and Foxley street, cost \$2,300 (F. H. Herbert, architect, Thompson Bros., builders).—In this issue Mr. F. H. Herbert, architect, invites tenders up to October 17th for the erection of a residence in Rosedale.

FIRES.

Dry goods store of Delarge & Gauvreau on St. John street, Quebec; building damaged to the extent of \$2,000.—Robert Roaflaub's hotel at Sprucedale, Ont., totally destroyed.—Block of six hotels at Cascade City, B.C., reported to have been burned, at a loss of \$25,000.—Interior of High school at Beamsville, Ont.; loss covered by insurance.—A number of buildings at Sussex, N. B., including Queen's hotel, Depot house, the Byrne brick block and residences of Geo. Morton, F. W. Flower and the late Sheriff Frieze; loss \$50,000.—The Hunter block at Warton, Ont., burned on October 4th; loss covered by insurance.—Flour mill at Moulinette, Ont., owned by G. H. Gilbert and leased by McPhee & Meader, totally destroyed; building insured for \$5,000.—All the buildings at Fort Lawrence, N.S., of the Chignecto Ship Railway were destroyed by fire on Monday last. The losers are J. A. McQueen, John A. Roach and C. R. Church.—Store, dwelling, warehouses and barns of Mr. Layton, at St. Charles, Man; loss \$5,000.

CONTRACTS AWARDED.

NORMAN, ONT.—Residence for F. Johnson: Samuel Brown, contractor.
 PETROLIA, ONT.—Granolithic sidewalk: Kelley & Parkinson, successful tenderers.
 GODERICH, ONT.—P. L. Marden & Co., of London, will proceed at once with the laying of granolithic sidewalks here.
 STRATFORD, ONT.—Whyte Company's pork packing factory: Brickwork, E. A. Cawsey; carpenter work, painting and galvanized iron work, Wm. Daly.
 BELLEVILLE, ONT.—Walter Alford, contractor, has secured the contract for

two additional buildings in connection with the rolling mills. One will be 85 x 45 feet and the other 120 x 55 feet, frame, cost \$5,000.

BERLIN, ONT.—For \$18,000 four per cent. debentures tenders were received by the town as follows: G. W. Wood & Son, Toronto, \$18,752 (accepted); B. M. Britton, Kingston, \$18,675; Bank of Hamilton, Hamilton, \$18,635.40; W. H. Brouse, Toronto, \$18,600; G. A. Stinson & Co., Toronto, \$18,573.

OTTAWA, ONT.—Steel rails for extension to waterworks pumphouse. Alex. Fleck, contractor, \$490. Other tenderers: H. McCall, \$195; A. H. Rowley, \$500; Baldwin Iron Works, \$525.—Frank Macdonald, plumber, of this city, has been awarded a contract at Valleyfield by the Canada Atlantic Railway Co.—It is reported that the Department of Public Works has accepted the tender of Thos. Powers, of Levis, Que., for the extension of the Lorne graving dock at that place. The work is expected to cost about \$125,000.

MARKET CONDITIONS.

Some further advances in the prices of builders' supplies have taken place of late. The manufacturers of cut nails on September 30th advanced the base price 25 cents per keg all round. This makes an advance of 45 cents per keg on cut nails since the month of May. It is expected that the Iron Manufacturers' Association will also make an advance in the price of their goods.

Canadian locks, inside door sets, front door sets, and builders' hardware generally have advanced in price, the discount having been reduced to 27½ per cent., as against 33½ per cent. previously. Door knobs show an advance of ten per cent. in certain lines.

If it is thought advisable to paint the pipes in a greenhouse, do not use asphalt and tar paints. They will injure the plants. An application of lampblack, mixed with turpentine and boiled oil, is the best for the purpose.

If permanency of colour is desired, yellow ochre must not be applied to very hot surfaces, such as smoke stacks, steam pipes, &c., because the high degree of heat will drive off its water combination, change the yellow to a dark brown, and eventually throw off the paint.

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 Boilers*

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MUNICIPAL DEPARTMENT

PAVEMENTS IN VANCOUVER, B. C.*

Although only 12 years old, Vancouver has nearly all of its central business streets paved with either bituminous rock or wood blocks, the first of which were laid in 1893. The work under the first contract was a bituminous rock pavement begun in May, 1893, and completed in October of that year, the total length of streets paved being 1.18 miles. All the work in connection with the laying of the double track was done under a separate contract between the contractor and the street railway company, under the direction of the city engineer. The old planking having been removed, the street was first graded to the required contour. All roots, rotten wood, vegetable mold or soft soil was removed and replaced by good dry sand and gravel or broken rock. The surface of the ground having been brought to the proper level, it was well wetted and rolled, and, where directed, well rammed until brought to an even and smooth surface, the contractor being required to take proper care of all gas, water and other pipes, and also all poles.

The concrete or the base was composed of four parts of broken stone, two of clean

* From a paper by Mr. A. K. Stuart, presented to the Canadian Society of Civil Engineers.

gravel and three of clean coarse sand to one of English Portland cement, the quality and brand being approved by the city engineer. From careful experiments this proportion was found to be exceptionally good. The depth of the concrete was 6 inches. All materials were required to be thoroughly dry, and then wetted sufficiently and rammed in place to the proper shape, where it was protected until properly set, and kept clean until the bituminous rock covering was placed on it. In places where it was found necessary or expedient to have the concrete a little deeper than 6 inches, the extra quantity was figured and allowed the contractor. The broken stone used was of such sizes as would pass through a 2 inch ring, and was supplied by the city. The work of grading, concreting and setting the curbstones was kept sufficiently in advance of the covering to allow the concrete to set properly.

The curbing used was of granite, and was 6 inches thick, 20 inches deep, and in lengths not less than 3 feet. The top surface was dressed evenly with a slight round on the outer edge, the joints throughout being kept as square and true as possible so as to make a close fit in order that they might be pointed and made water tight. The curbing at the street intersections was rounded to a 2-foot radius.

The stones for gutters were of granite, 8 inch courses, 8 inches deep and averaging 12 inches in length, the top surface being cut true to a reasonably smooth face, and the sides and ends, so that when laid there were not spaces of more than 1/2 inch between any two courses. The spaces

afterwards were floated with pure cement. It may be stated, however, that these stone gutters were only put in where the fall was slight.

The best quality of bituminous rock covering obtainable from San Luis Obispo, California, was used, containing not less than 15 per cent. of bitumen. This was broken up and then disintegrated by steaming in a tight kettle under a pressure of not less than 60 pounds, and after being taken out of the kettle was dried in a pan heated by steam and placed while hot on the road, then raked to an even surface and rolled with a heavy hot roller until thoroughly compacted. The rolling had to be done to the satisfaction of the city engineer, and, when completed, the surface was required to be smooth and even, and the bituminous rock not less than 2 inches in thickness or weigh less than 20 pounds per square foot. The work was required to be carefully and neatly finished around the gutters, and where not accessible to the roller was rammed with a hot iron. The whole work had to be guaranteed and kept in repair by the contractor for one year, the contractor furnishing a suitable bond to that effect.

The bituminous rock pavement, commenced in 1894 and finished in 1895, was 0.61 mile long, the work being carried out under a new contract, but by the same contractor, the main difference being in connection with the heavy girder rail laid. In this contract the contractor was required to give a two years' guarantee instead of only one, as in the preceding contract.

(Continued on page 6).

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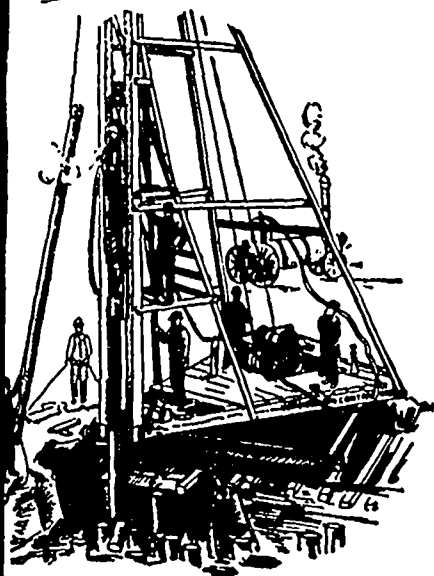
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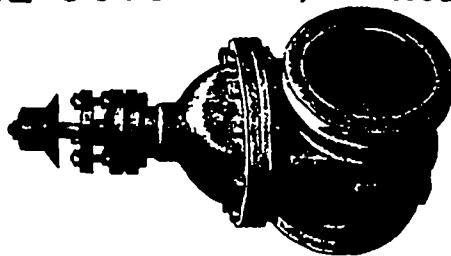
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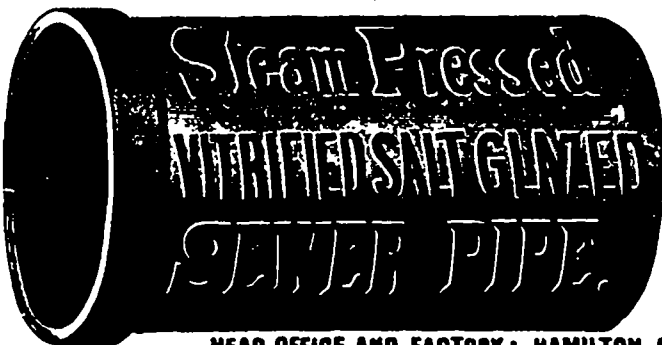
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The wood block paving laid in 1894 was only a short piece, 0.05 mile long, put down as an experiment in order to compare a sample shipment of Australian mahogany, black butt and spotted gum with the local fir and cedar. This was laid in the following order, on a street measuring 57 feet 7 inches between curbs. A strip, 3 feet 7 inches long, of British Columbian cedar not creosoted; a strip 65 feet long, of creosoted British Columbian cedar; a strip, 70 feet long, of creosoted British Columbian Douglas fir; a strip, 43 feet 4 inches long, of Australian spotted gum; a strip 43 feet long, of Australian black butt, and a strip, 38 feet 10 inches long, of Australian mahogany. The conditions as to grading, concreting and granite curb were the same as in the former pavement. Between the concrete and the blocks was a $\frac{1}{2}$ inch cushion of sand. The work was commenced in November, 1894, and finished at the end of December, taking about a month to complete, the work being carried out under trying atmospheric conditions. The contractors were called to furnish good sound fir and cedar free from defects of any kind. The blocks were sawn 9 inches long, 3 inches wide, 5 inches deep, squarely and perfectly uniform in size and surfaced. The fir and cedar were well creosoted under pressure before being laid. The Australian woods were hauled and sawn by the contractor, and all the different kinds of wood were kept separate on the street. The blocks were laid with $\frac{1}{4}$ -inch space between each row, the gradient of the street being over 5 per cent. They were laid in rows running across the street, the contractor doing all the cutting and trimming necessary to break joints. After the blocks had been laid sufficiently ahead, a mixture of coal tar pitch and asphalt were poured into the joints. The joints were then filled with fine gravel well pounded in with a special tool and saturated with the asphalt mixture until filled compactly to the top of the blocks, which then received a coating of liquid asphalt and tar put on hot, the whole being covered with finely broken granite, which was supplied by the city. An expansion joint of well-tempered clay was put in next each curb to allow for the expansion of the blocks. The contractor was required to give a written guarantee for one year, and to make all necessary repairs during that period. As a matter of fact, no repairs to speak of have been necessary, and the city engineer was so pleased with the results achieved from this pavement, especially the local fir and cedar, and more particularly the latter, both creosoted and uncreosoted, that, when the matter came up early in 1898 of the desirability of further extending the system of paved streets, he recommended the use of local cedar blocks as a test on a larger scale.

The chief points of difference between the wood block pavement, commenced in July, 1898, and completed at the close of the year, and the wood pavement of 1894, may be said to be that a good deal of the work entailed the fitting in of the blocks along the heavy 70-pound T rail, and also

that in this contract the specifications required the wood blocks to be laid with close joints instead of the $\frac{1}{4}$ inch space as before, except where the gradient was sufficient to require $\frac{1}{4}$ inch space being left. In this contract the contractors were required to give a two years' guarantee to keep the pavement in proper repair.

In comparing the pavements, the paper states that the repairs to the bituminous rock pavement, especially that of 1893, have been very extensive, more so than anticipated at the time it was put down. The greatest trouble has been along the 40-pound T rail. There can be no question that the humidity of the Vancouver climate, especially at certain seasons of the year, when there is a great deal of moisture and very little sun, is very detrimental to the wearing qualities of the bituminous rock pavement. The bituminous rock close to the light T rail has suffered very much from the vibration of the rail. On one street, however, where a 70 pound girder rail was used and the bituminous rock and concrete built up clean to the rail, no trouble of this kind has been experienced, and neither the pavement nor the portion alongside the girder rail have required any very material repairs. In frosty weather this pavement has proved very slippery for horses, but it has been found that a little sand sprinkled over it has remedied this defect, especially salt water sand, of which any quantity can be obtained here, the salt in the sand appearing almost immediately to thaw out the frost from the surface.

The wood block paving put down at the close of 1894 as an experiment has stood the traffic very well. This piece, however, has not been exposed to the very heavy

traffic, and in frosty weather has proved slippery, but a little sifted sand has been found very effectual in remedying this defect. The local fir and cedar has proved just as satisfactory as the Australian woods so far. It may be remarked, as to all these pavements, that, whenever it has been found necessary at any time to remove the covering for the purposes of repairs, the concrete exposed in each case has been found in a first class condition and to have set exceedingly hard and solid.

As to the form of rail, so far as traffic is concerned, the experience at Vancouver is that a heavy grooved girder rail is the best. So far as the street railway company is concerned, a T rail is best for their purposes. It would appear, in order to make the best and most lasting job, that the rails should be set in concrete with iron cross-ties to hold them in place, avoiding the use of wood altogether. Judging by experience, it would appear that, where a proper rigid track is put down, it is best to lay the bituminous rock or asphalt close up to the rail.

As to the wood block paving, there may be objections to it on sanitary grounds but, owing very largely to the great clamor here for the use of local materials, it was determined early in 1898, when extensions to the paved streets were contemplated, to give it a test on a somewhat considerable scale. The object of dipping the blocks in the mixture of coal tar and asphaltum was not so much with a view to preserving the wood as to prevent absorption and to make the pavement as far as possible impervious to moisture, it not being intended that the surface water should penetrate it. With this end in view, the blocks were laid close where the gradient would admit of it. These pavements were all laid under the direction of Colonel Thomas H. Tracy, city engineer.



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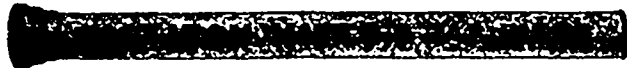
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