

easterly; south side of Queen street from Spadina ave. to Esther st.; north side of Queen st. from Esther to Denison ave.; south side of Queen street from Esther to Bathurst street; Excelsior pavement on the north side of College street from Spadina to Robert street, and the widening of the block pavement on the north side of College street, from Spadina to Robert; granolithic sidewalk on Spadina ave. from Nassau st. to Clyde st., and the widening of the pavement between those points; scoria and cedar block pavement and stone and wooden sidewalks in the King street subway. Sewers on Muir street, between first lane west of Dufferin street to line between lots 29 and 30; Steiner street, Matilda street to Don river; Garnett avenue, Christie street to western terminus; Lappin avenue, Dufferin st. to Northern division of G. T. R. tracks, Herrick st., Borden st. to Lippincott street; Elm street, Elizabeth st. to Chesnut st.; Lisgar st., Queen st. to Blair st., Blair street, Lisgar st. to Armour st.; Armour street, Blair st. (storm overflow from Queen st.) to King st.; Severn street, Severn's brewery to Rosedale drive; North drive, Rosedale road to Yonge street; Bellevue square, present terminus to a point 50 feet west; a lane between St. Patrick and D'Arcy streets; Sherbourne street, between South drive and Rachael street; a line of mill for renting purposes on the city's property at the Don, at an estimated cost of \$20,000.—New water mains are recommended by the Local Board of Health on sanitary grounds, as follows: Huron street extension to Dupont street, May avenue extension, Brunswick ave. to Wells street, Pears street, 4th main, Millstone lane extension, Sully crescent to Sully street.—The Water Works Committee will recommend that instead of accepting the tender for the new 10,000,000 gallon engine now in, that a by-law be submitted to the people asking for \$200,000 for waterworks purposes. This sum, if voted, is to be applied in the building of a new pumping house west of the present station, the purchase of two 10,000,000 gallon engines and the making of connections. The Industrial School Association has decided to postpone for the present the purchase of a site for the proposed Industrial school for girls.—It is reported that the preliminary plans have been prepared for a mammoth hotel on King st. The names of Geo. A. Cox, S. H. Janes and Robt. Jaffray are mentioned in connection with the project. The location which is said to have been selected would seem to discredit the rumour.—It is said to be the intention of the Dominion Transport Co. to erect a large stable and waggon sheds on Wellington place.—The following building permits have been granted. Trustees Church of the Redeemer, school house and rectory, n. e. corner Bloor street and Avenue road, cost \$16,000; The Commercial Travellers Association, alterations 51 Yonge street, cost \$7,000; Brown Bros., additional fourth storey to store, cost \$7,000; Wm. McBean, three 3-storey bk. stores, east side Spadina ave., cost \$12,000; John Sim, 2 storey brick addition, west side Dalhousie street, cost \$300; John Thompson, pair 2-storey and attic bk. fronted dwellings, east side Berkeley street, cost \$2,500.—The Government has granted the urgent request of the city to provide better protection for the Island, and instructions have been given for the erection of two groynes.—Tenders will be received by J. A. Fowler, 13 Victoria Street, up to Sept. 5, for the erection of three brick houses on Victor ave.—At the meeting of the sub-committee of the Markets and License Committee called to consider plans for the better heating of the gaol, Governor Green submitted a set of plans which were approved of and it was decided that they be sent on to the general committee with the recommendation that tenders be invited for the work.

CONTRACTS AWARDED.

FOREST, ONT.—The contract for the erection of the new Presbyterian church has been given to Isaac Mercier for \$7,600.

THILSONBURG, ONT.—The contract to supply the cut stone trimmings for the new Methodist parsonage has been given to Mr. J. T. Heard, of London.

WATERLOO, ONT.—The contract for building the new hotel on the site of the present Bowman House, has been awarded to Mr. John Letter. The contract price is \$6,298.

KINGSTON, ONT.—The tenders for the erection of Dr. Clement's houses were awarded as follows: Masonry, G. Newlands; carpentering, A. Williamson; painting, Mr. Savage.

SARNIA, ONT.—Mr. J. C. McKenzie, of this place, has been given the contract for the erection of a new bridge over the Sydenham river at Aberfeldy, his tender being \$1,887.

BRANTFORD, ONT.—Messrs. Mihan, Elliot & Phin of this city, have been awarded the contract for excavating the approaches to the St. Clair tunnel at Sarnia and Port Huron. The contract amounts to about \$200,000.

TORONTO, ONT.—The city has awarded the following contracts: Cedar block pavements—Howland avenue, Burns & McCormack, \$4,670; Lowther avenue, A. W. Godson, \$3,670; Dovercourt road, D. L. Van Vlack, \$16,450; Crocker avenue, A. J. Brown, \$950; Dupont street, A. J. Brown, \$2,500; Dufferin street, D. L. Van Vlack, \$16,855; Palmerston avenue, W. H. Cathro, \$13,838; Sydenham lane, W. H. Cathro, \$769; and Brunswick, place, Burns & McCormack, \$1,482. Granolithic sidewalk—Spadina avenue, 20 feet wide, R. Forsyth, \$7.95 per lineal foot. Eureka sidewalk—Yonge street, east side, Gardiner & Co., \$4 per lineal foot. Excelsior sidewalk—College street, 16 feet wide, Excelsior Pavement Company, \$7 per lineal foot. Stone kerbing—King street subway, Owen Sound Stone Quarrying and Construction Company, 67½ cents per lineal foot for 6 inches straight and 90 cents for circular.

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Information from any part of the Dominion regarding contracts open to tender will be gratefully received.

ADVERTISING RATES ON APPLICATION.

At its Convention held in Toronto, Nov. 20 and 21, 1889, the Ontario Association of Architects signified its approval of the CANADIAN CONTRACT RECORD, and pledged its members to use this journal as their medium of communication with contractors with respect to advertisements for Tenders.

The publisher of the "Canadian Contract Record" desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both old and new address.

ADHESIVE STRENGTH OF SULPHUR, LEAD AND PORTLAND CEMENT FOR ANCHORING BOLTS.

During a recent experience of the writer in constructing foundations for an elevated railway, solid rock was encountered so near the surface as to necessitate anchoring the foundation bolts in it. Some more durable and economic means of accomplishing this than by the use of sulphur or lead was desired, and Portland cement was suggested as being suitable.

A careful investigation failed to find any record showing the adhesive strength of cement in pounds per square inch, when used this way, hence it was decided to make such experimental tests as would give reasonably positive information on this point. For this purpose 14 holes were drilled in a ledge of solid limestone, 7 of them being 1½ inches in diameter and 7 of them 1½ inches in diameter, all being 3½ feet deep. Seven ¾-inch and seven 1-inch bolts were prepared, with thread and nut on one end and plain at the other end, but ragged for a length of 3½ feet from the blank end.

Four were anchored with sulphur, 4 with lead and 6 with cement mixed neat. Half of each were ¾-inch and half 1-inch bolts, and all of them were allowed to stand till the cement was two weeks old. At the expiration of this time a lever of sufficient power was rigged and all the bolts were pulled with the following results:

Sulphur: 3 bolts out of 4 developed their full strength, 16,000 and 31,000 pounds. One 1-inch bolt failed by drawing out under 12,000 pounds.

Lead: 3 bolts out of 4 developed their full strength, as above; one 1-inch bolt pulled out under 13,000 pounds.

Cement: 5 of the bolts out of 6 broke without pulling out; one 1-inch bolt began to yield in the cement at 26,000 pounds, but sustained the yield a few seconds before it broke.

Whilst this experiment demonstrated the superiority of cement both as to strength and ease of application, yet it did not give the strength per square inch of area. To determine this, 4 specimens of limestone were prepared, each 10 inches wide, 18 inches long and 12 inches thick, 2 of them having 1½-inch holes, and 2 of them 2¼-inch holes drilled in them. Into the small holes 1-inch bolts were cemented, one of them being perfectly plain round iron, and the other having a thread cut on the portion which was imbedded in the cement. Into the 2¼-inch holes were cemented 2-inch bolts similarly treated, and the 4