

municipality has been awarded to Morrow Bros., of Okanagan Mission. The price is 16 cents per yard, or about \$5,200 for the contract.

**BARRIE, ONT.**—Smith & Bird, architects, have awarded the following contracts: Office buildings for the Stewart Estate, Goderich, to Buchanan & Rhymes; alterations and additions to the Standard Bank, Bradford, to cost \$1,000, to W. Lawrence of Bradford.

**HINTONBURG, ONT.**—Contracts for the new wing to be built to the public school have been let as follows: Brick and stone work, Mr. H. Ross, Hintonburg; carpenter work, Messrs. Gilchrist & Buchanan, Ottawa; painting, Mr. W. Bones, Hintonburg; plumbing, McKinley & Northwood, Ottawa; boiler, W. J. Campbell & Son, Ottawa.

**LONDON, ONT.**—Tenders have been accepted as follows for a two-room addition to Lorne avenue school: carpentering, Davidson & Hessel, \$1,050; brickwork, Everett & Sing, \$1,490; painting and glazing, A. H. Cook, \$93; plastering, A. Dowel, \$159; slating, J. Whittaker, \$140; metallic ceiling and galvanizing, \$132; heating, McLaren & Parkinson, \$173. The latter firm will also supply the heating apparatus for St. George's school at \$347.

**ST. JOHN, N. B.**—The school trustees opened tenders on Friday last for erecting the new High School building. The following were received: Mason work—George McArthur, \$14,600; John Flood, \$15,300; Charles F. Tilley, \$17,413; B. Mooney & Sons, \$14,578; carpenter work—J. Drury & Sons, \$18,000; John Duffy, \$15,660; Andrew Miles, \$17,788. Whole building—W. L. Prince, \$33,183; R. C. Donald, \$34,475. The tenders of Messrs. B. Mooney & Sons and John Duffy were accepted. The total cost of the building will be \$30,238.

**PETROLEA, ONT.**—The following is a statement of bids received for the construction of a system of waterworks for this town: William Garson & Co., St. Catharines, \$131,945, (accepted); J. H. Armstrong & Co., Toronto, \$133,727; Harding & Leathorn, London, \$138,264; Robert Grant, Toronto, \$138,297; Secretan & O'Boyle, Ottawa, \$141,548; McQuillan & Co., Toronto, \$139,549; Clark & Connolly, Toronto, \$142,000; A. W. Godson, Toronto, \$144,799; M. M. McCarthy, Sherbrooke, Que., \$145,300; Lyons & Wagner, Windsor, \$146,000; George A. Dana, Brockville, \$151,847; Burns & McCormack, Toronto, \$152,917.

**MONTREAL, QUE.**—The contract for the erection of a new school at St. Lambert has been awarded to George Beatty and work will be commenced immediately. The architect is Mr. Findlay.—The roofing and galvanized iron work for the Grand hotel, St. Hyacinthe, has been awarded to J. H. Moni, and the heating, lighting and plumbing to A. Blondin & Co.—A. C. Hutchison, architect, has awarded contracts as follows for one house on Peel street, two and a half stories, for W. Denoon: Masonry, J. B. St. Louis; carpenter and joiner's work, A. Laurence; roofing, not let; plumbing and heating, A. MacKay & Co.; brick, A. Beland; plastering, W. J. Cook; painting and glazing, F. Lefebvre & Co.—J. B. Resther & Son have awarded contracts as follows for one house on Mount Royal street for Rev'd Father of St. Sacrement: Masonry, Martineau & Prenoveau; carpenter and joiner's work, Desire Houle; roofing, plumbing and heating, Bluin, Desforges & Latourelle; brick, Mr. Bourgeois; plastering, G. Leveille; painting and glazing not let.

The Erie Ironworks Co., St. Thomas, Ont., have found it necessary to wind up their business.

## FOUNDATIONS PRACTICALLY CONSIDERED.

### DOVETAILING CONCRETE MASSES.

The foundations of the piers of the Tower Bridge having consisted of separate masses of concrete, of which the lower portions of the caissons formed the encasing shells, it was necessary to form a bonding connection between them. The permanent encasing caissons were wholly embedded in the London clay of the river bottom to a depth of over 20 ft., and the bonding of the central and surrounding concrete masses was affected throughout this depth by means of a succession of sections of large dovetailing masses of concrete in two vertical tiers in each caisson. There were three tiers of small dovetails between the adjacent square caissons and four between the triangular caissons within the height of the top metal plate of the permanent caisson, which was removed afterwards, as noted further on. The caisson concrete masses were dovetailed to the central concrete in vertical sections corresponding to the undersides of the horizontal timber frames successively until the top of the rolled vertical joists was reached. The boxes forming the small dovetails were removed before the concrete was allowed to fill them, when the adjoining mass of concrete was formed. A further bond was affected from the level of the top of the rolled joists where the horizontal joint of the upper skin plate of the permanent caisson occurred, this plate having been removed by means of the provision previously made. The concrete mass extended continuously over the caissons, forming a uniting cap, which constituted an effectual bond between the four adjoining concrete masses.

### THE MASONRY.

The level of the concrete foundation being 2 ft. below the top of the permanent caissons, brickwork of this thickness was laid all over the concrete. On this bed of brickwork the granite facing was laid within the temporary caissons. The courses were between 2 ft. and 2½ ft. high, and were laid with a header or thorough bonding stone at every second stretcher. The masonry was commenced in the four square caissons on each side of the piers. The Cornish granite facing was backed up with wire-cut gault bricks laid in Portland cement mortar one part

to 2½ parts of sand. Staffordshire brindle bricks were laid in the inside face-work of the pier chambers for machinery, etc., and also in the part of the pier supporting the bascule lifting spans of the bridge. The mortar for the Staffordshire bricks and the granite facing was one part of Portland cement to 1½ parts sand. The brickwork was laid in English bond of alternate header and stretcher courses, and along the ends of the square caissons, which butted against each other, the alternate stretcher courses were made to tightly butt against the caisson iron plates, the intermediate (heading) courses being set back to form a *toothing bond* of a quarter brick with the brickwork, which was to be afterwards built in the triangular caissons and in the centre rectangle of the pier. The large dovetails formed in the caisson concrete masses was continued up in the brickwork, and formed an additional bond between the brickwork masses. At the ends of the rows of square caissons adjoining the triangular caissons and between the latter, the brickwork was racked back until the masonry had been brought to the level in the latter and all was bonded together.

### A CONTRAST OF BONDS.

A difference may here be observed between the engineering mason's brickwork bonds and those of the architectural mason or bricklayer. The latter would have inevitably used tarred and sanded hoop-iron bond, which it is believed was first brought into use by Brunel (Sir Marc Isambart) in the construction of the circular land shafts of the Thames Tunnel. The architectural bricklayer, perhaps, would have endeavored to obviate, running the hoop iron continuously through the whole length of the temporary caisson of solid brickwork, by fastening the hoop iron to iron anchors embedded in the brickwork a few feet from the ends, or turned up the ends of the hoop iron and built them in the solid brickwork a few courses high. Again, in America, block bonding of separate walls or buildings of brickwork is used more than tooth bonding. The block bonding is usually in four or more courses in height, projecting a quarter brick length beyond similar intermediate spaces. The block bonding possesses more transverse strength, but less longitudinal tenacity, than the toothing bond. The dovetail bond will possess

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