one half the depth of fill; then the value should be taken as equal to the weight of the concrete.

In the practical application of this formula, as with all other formulas, there is abundant opportunity for the exercise of common sense and good judgment. The formula will give pressures somewhat higher than exact values. It shows the effect of continuous and vigorous agitation of the concrete mass only as this is introduced through good judgment in selecting the value for the head of concrete, $H$. For usual conditions $H$ may be taken as not greater than one-half of $R$. For ordinary cement in cold weather, or when continuously and well agitated, $H$ may be three-fourths of $R$ when the filling is continuous beyond one hour. A second pouring on top of concrete that has been in place for 45 mins. or more does not add to the pressures already existing at the bottom of the fill.

The values for $C$ may be taken as the next higher whole number in the per cent. of cement by volume, as the required accuracy does not justify fractional per cents. Values for $S$ may also be taken only as whole numbers, since the slump test is not accurate closer than one inch.

The value of $P$ obtained by the formula is the lateral pressure against the form at the lowest point of the fill. Since the pressures are not uniform from top to bottom, but vary approximately as the ordinates of a parabola, the centre of pressure, or point of resultant pressure, may be taken at 0.6 of the height of fill, $H$, from the top.

The following examples may serve to show the use of the above formula:—

*Example 1.*—For reinforced mass concrete. Mix to be 1:3:5; consistency rather sloppy, or 9-in. slump; the rate of fill, $R$, to be 8 ft. per hour. The total height of concrete filled within one hour, 7 ft. Since this concrete is placed from a chute in a large form, and men are continually walking around in it, the value to be chosen for $H$ is 6, or three-fourths of $R$. Then, substituting in the formula,

$$P = 6^{0.2}8^{0.3} + (0.12 \times 13) - (0.3 \times 9).$$
$$= 1.53 \text{ lbs. per sq. in.}$$

The vertical pressure = 7 lbs. per sq. in.

*Example 2.*—For reinforced concrete column. Mix to 1:2:4; consistency, 8-in. slump; rate of fill to be 24 ft. per hour. Total height of column and final fill, 11 ft., made in one pouring; since this is done in less than 30 mins., the value for $H$ is 11. Substituting in the formula,

$$P = 11^{0.2}24^{0.3} + (0.12 \times 17) - (0.3 \times 8).$$
$$= 3.83 \text{ lbs. per sq in.}$$

Vertical pressure $= P + 0.25H = 6.58$ lbs. per sq. in.

*Example 3.*—For thin curtain walls and reinforced bulkheads. Mortar mix, 1:5; consistency, 8-in. slump; rate of fill, 20 ft. per hour. Total height of fill in one pouring, 14 ft. The value to be selected for $H$ should be 10, since that is the height of fill at 30 mins., when the effect of stiffening and set begins. Substituting, we have

$$P = 10^{0.2}20^{0.3} + (0.12 \times 20) - (0.3 \times 8).$$
$$= 3.89 \text{ lbs. per sq. in.}$$

Vertical pressure $= P + .25H = 6.39$ lbs. per sq. in.

*Example 4.*—For dry mix, mass concrete. Mix to be 1:3:6; consistency, 3-in. slump; rate of fill, 6 ft. per hour; distance between sides of form, 3 ft.; total height of fill within 30 mins., 4 ft. Then

$$P = 4^{0.2}6^{0.3} + (0.12 \times 11) - (0.3 \times 3).$$
$$= 2.68 \text{ lbs. per sq. in.}$$

Vertical pressure = 4 lbs. per sq. in.

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A conference of the road foremen of the county of Elgin, Ont., was held last week in St. Thomas, Ont., under the direction of County Road Superintendent Frank Pineo and County Clerk W. McKay. Eighty foremen and members of the county council were in attendance. The meeting took the form of a round table conference and short addresses by Messrs. Pineo and McKay, and by John McCallum, road superintendent of Lambton County; James A. Bell, county engineer of Elgin; and other officials. Mr. Pineo was so pleased with the success of the conference that he has decided to hold one every spring.

## QUEBEC BRIDGE REPORT

COMPILED under the direction of C. N. Monsarrat, chief engineer of the Government Board of Engineers of the Quebec Bridge, the board's final report is now off press and ready for public distribution. It is published in two volumes, both bound in stiff cloth covers. The page size of each volume is 14¾ by 12 ins. Vol. 1 is profusely illustrated with half-tone reproductions of photographs of the structure during and after erection, and contains the text of the report. Vol. 2 contains the plans of both substructure and superstructure.

Vol. 1 is printed on heavy coated paper, and Vol. 2 on high-grade bond paper. Vol. 1 contains 260 pages, many of them being full page illustrations. Vol. 2 contains 61 plates, many of which are long, folded drawings. Vol. 1 is in 9 chapters, as follows:—

(1) Order-in-council; (2) historical; (3) general narrative; (4) dimensions, weights and general data; (5) substructure; (6) tenders; (7) design; (8) fabrication; (9) erection.

The chapter on "Design" includes: (a) Preliminary considerations; (b) the board's design; (c) the contract design of the St. Lawrence Bridge Co.; (d) the St. Lawrence Bridge Co.'s design as built; (e) calculation of stresses.

The chapter on "Erection" includes: (a) Travellers; (b) loading and handling; (c) approach spans; (d) inside staging; (e) outside staging; (f) main shoes; (g) bottom chords, anchor arm; (h) lower web members, anchor arm; (i) upper web members, anchor arm; (j) main posts; (k) erection of cantilever arms; (l) erection stresses.

The appendix to Vol 1 gives the list of officials, engineering organizations and staffs; calculations of the main piers; main shoes; secondary stresses; temperature stresses; stresses in suspended span arising from unsymmetrical loads on the two tracks; hangers at end of suspended span; expansion joints and traction trusses; lattice bars; tie plates and their rivets; lateral connection plates; tests of nickel steel riveted joints; tests of nickel steel eyebars; column tests, series 1910; tests of carbon steel compression members, series 1912; column tests, series 1913; elongation of eyebars under working loads; tests of eyebars under elongated pin holes; tests of cross-loaded and counterpoised eyebars; tests of hangers for raising the suspended span; friction on pins; tension tests,—plates and built members; specifications of substructure and superstructure.

On account of the large cost of printing this report, the edition has been limited, and a charge of $6 per set of two volumes is being made. Applications for copies of the report should be sent to the Department of Railways and Canals, Ottawa, and should be accompanied by remittance.

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At the annual meeting of the Regina branch of the Association of Building and Construction Industries, R. J. Lecky was elected president for the coming year, and A. E. Long, vice-president.

Geo. C. Anderson, irrigation engineer, California, who was asked by the Alberta government to report upon irrigation in the Lethbridge Northern District, states that 97,531 acres can be irrigated at a cost of about $40 an acre.

Premier Stewart, of Alberta, granted an interview recently to representatives of a number of municipalities in that province, who requested that the provincial government investigate the hydro-electric resources of Alberta. Arthur J. Cantin presented a project for the construction of generating station on the Athabasca, North Saskatchewan, Red Deer, Bow and South Saskatchewan rivers. He claims that 315,000 h.p. could thus be developed as follows: Athabasca, 170,000; North Saskatchewan, 50,000; Red Deer, 7,000; Bow river, 48,000; South Saskatchewan, 40,000. The delegation desired the inauguration of a publicly owned hydro-electric power system. No promise was made by the government, but the premier stated that the matter would receive consideration.