

(10) No column shall have less than sixty-four square inches of effective area or a dimension of less than eight inches.

(11) When longitudinal reinforcing rods in columns have an area in excess of one and one-fourth square inches the ends shall be faced or milled off normal to the longitudinal axis and such rods shall have full and perfect bearings and a tight fitting sleeve or other approved appliance shall be provided at each joint to keep the rods in their proper position.

(11) When longitudinal reinforcing rods in columns have an area of less than one and one-fourth square inches the rods may be lapped and securely wired together, the splice to be of a sufficient length to develop by adhesion the strength of the rod.

(13) All butted joints shall be made at the floor levels or at points where the columns may be considered as fixed, and the centre of lapped joints shall not be more than one foot above floor levels or points at which rigid lateral support is afforded the columns. The ends of all rods at the base of columns shall be made smooth and right angled from the longitudinal axis and such rods shall have a perfect bearing on a steel plate or casting of sufficient size and strength to distribute the load which the column supports to such an extent that the allowable compressive stress per square inch on the material under this plate shall not be exceeded, or in lieu of the plate the stress may be distributed in concrete footings to the required extent by means of dowels of sufficient length and area to sustain the weight by adhesion of the concrete to the steel, without exceeding the specified limit for such in this regulation. The tops of all dowels to extend to the top of the footing and be made perfectly level and smooth to receive the longitudinal reinforcing rods and the joint between the dowels and the rods to be made with a pipe sleeve which is to be grouted into the footing at least six inches and extend six inches above the top of same and the reinforcing rods after being secured in their proper position are to be solidly grouted into the sleeve with liquid Portland cement.

(14) The area required in footings which have to support columns having both spiral hooping and vertical reinforcement shall be obtained in a similar manner to that immediately above specified for columns with vertical reinforcement only. The longitudinal reinforcing bars in all columns shall be straight and sufficient metallic lateral support shall be provided to keep them in their proper place until the concrete in the column has set.

(15) The allowable stress on steel in tension shall be sixteen thousand pounds (16,000) per square inch.

(16) Where it is necessary to introduce steel to resist compression in girders, beams or slabs, the compressive stress per square inch allowed on such steel shall not exceed fifteen times (15) the computed compressive stress in the concrete at the same distance from the neutral axis. All such steel shall be anchored into the mass of concrete in such a way as to prevent any possibility of buckling.

13.—The minimum protection for steel reinforcement which is to be taken, is the distance from the surface of the steel to the nearest concrete surface, shall be:

- (a) For girders and columns, two inches.
- (b) For beams and lintels, one inch and a half.
- (c) For floor and roof slabs, one inch.

Plain and Reinforced Concrete Walls.—14.—(1) Concrete walls without reinforcement, other than those of foundation or basement, shall be constructed with concrete of the same composition and quality in all respects to that hereinbefore specified for reinforced concrete, and shall be the full thickness prescribed in this by-law for brick walls.

(2) Buildings having a complete skeleton construction of steel or of reinforced concrete construction of a combination of both, may have exterior walls of reinforced concrete at least eight inches thick; provided, however, that such walls shall support only their own weight, and that such walls shall have both vertical and horizontal steel reinforcement on both sides, the rods to be placed not more than eighteen inches apart from centres, and be securely wired together at each intersection and rigidly connected with columns and girders. All rods shall be lapped a sufficient length to develop their full stress by the allowable unit stress for adhesion. Additional rods shall be set around openings, the vertical ones to be wired to the nearest horizontal ones, and the horizontal rods at top and bottom of openings wired to the nearest vertical ones. In all cases the percentage of steel reinforcement to be provided shall be sufficient to enable the wall to safely resist a uniformly distributed horizontal pressure by thirty pounds per square foot acting on either side of it, but in no instance shall the percentage of reinforcing metal be less than one-quarter of one per cent. in each direction. The thickness of a reinforced concrete curtain wall shall not be less than one-eighteenth of the unsupported height.

Tile and Reinforced Concrete Joist Construction.—15.—

(1) When tile and reinforced concrete joist construction is used for floors, the tile shall be sound, hard burned, free from shrinkage cracks, or uniform size and corrugated in a horizontal direction upon the sides.

(2) The reinforced concrete joists shall be parallel and in perfect line and of sufficient width to develop the steel, which steel is to be protected from fire with concrete of a similar mixture and thickness to that hereinbefore specified for concrete beams. Should concrete be required on the top of the tile to take compressive stress it must be not less than two inches in thickness and must be poured at the same time at the joists, and be of the same mixture. The tile shall be thoroughly soaked with water before the pouring of the concrete is commenced. In this class of construction the dead and entire live loads will be assumed to be carried by the reinforced concrete joists.

16.—Upon the completion of a reinforced concrete building the architect or engineer who designed the structure shall issue a signed certificate and have the same posted in a conspicuous place on each floor, stating the safe capacity per square foot of floor space, if the entire floor is designed to carry the same load. If, however, the floor is designed to carry different loads, each section must be provided with a certificate stating the capacity of that particular section and describing the limits thereof.

17.—Load tests shall be made by and at the expense of the contractor when required by the inspector of buildings, under his direction and in his presence or in the presence of his representative, on any portion of a reinforced concrete structure within a reasonable time after erection. Such tests shall show that the construction will sustain a load of twice the live load for which it was designed without causing any permanent deformation.

18.—No system of reinforced concrete shall be used which is not capable of design and investigation in accordance with the formula and principles laid down in these regulations.

19.—Section 111 of By-law No. 4861, being "A By-law for regulating the erection and to provide for the safety of buildings," is hereby repealed.

Comments by the Citizens' Committee.—While the proposed by-law for regulating reinforced concrete construction in the city of Toronto is in the main satisfactory to the Citizens' Committee on the revision of the building by-law, there