NEW BUILDING BY-LAW FOR TORONTO.

(Continued from last week.)

(7) In all cases where reduction in the bending moment is allowed on account of continuous action, sufficient steel reinforcement must be provided in the top of the slab or beam over the support to meet the requirements of the accepted theory of flexure, and this upper reinforcement shall extend on both sides a sufficient distance beyond the centre of the support to develop adhesion equal to at least the strength of the upper bars on the basis of the allowable unit stresses.

(8) If the girders, beams and slabs are poured in one continuous operation, then the girders or beams may be treated as T-beams with a portion of the slab acting as a flange. In no case shall the overhanging width on each side of the girder or beam exceed four times the thickness of the slab and the total width of the flange shall not exceed five times the width of the girder or beam.

(9) In beam and slab construction an effective metallic bond shall be provided at the junction of the beam and slab and where reinforced concrete girders carry reinforced beams, the portion of the floor slab acting as flange to the girder must be sufficiently reinforced with bars near the top, at right angles to the girder, to enable local loads to be transmitted directly instead of through the beams to the girder, thus avoiding an integration of compressive stresses due to simultaneous action as floor slab and girder flange.

(10) In the design of T-beams acting as continuous beams, due consideration shall be given to the compressive stresses at the support at the bottom of the beam.

(11) When the overall vertical distance of the tension members of a girder or beam is greater than one-sixth of the total depth of the girder or beam, the stresses in members shall be computed in proportion to the distance from the neutral axis.

(12) Shrinkage and thermal stresses must be provided for by the introduction of steel.

Proportion of Concrete and Allowable Stresses on Concrete and Steel.—12.—(1) All concrete for columns, girders, beams, slabs, walls, fireproofing or piles shall be composed of materials meeting the requirements of these regulations, and be mixed as hereinbefore specified, in the proportion of not less than one part of cement to two parts of fine aggregate and four parts of coarse aggregate, or in such other proportions as may be necessary to make the resistance of the mixture to crushing not less than two thousand (2,000) pounds per square inch after hardening for 28 days.

(2) Tests to determine this value must be made at the expense of the contractor when required by the inspector of buildings at a place and by a person satisfactory to him and under the direct supervision of either the said inspector of buildings or a person representing him.

(3) When the proportion of cement is increased and the quality of aggregates hereinbefore called for used, an increase may be made on the allowable working stresses proportional to the increase in compressive strength at 28 days as determined by actual tests, but this increase shall not exceed 25 per cent. On this basis the following maximum stresses for 1:2:4 concrete will be allowed in construction:

(a) Compression in extreme fibre of girders, beams and slabs, 600 pounds per square inch.

(b) Direct compression, 450 pounds per square inch.

(c) Shearing stress, when diagonal tension is not resisted by steel, 40 pounds per square inch.

(d) Shearing stress, when all diagonal tension is resisted by steel, not to exceed 100 pounds per square inch of effective cross section.

Members of web reinforcement shall be designed so as to adequately take up all involved stresses throughout their entire length. They shall not be spaced to exceed three-fourths of the depth of the beam in that portion where the web stresses exceed the allowable shearing value of the concrete.

Web reinforcement, unless rigidly attached, shall be placed at right angles to the axis of the beam and looped around the extreme tension member.

(e) For tee-beams the width of the stem only shall be used in calculating the shear.

(f) Adhesion to plain steel bars, 60 pounds per square inch of surface of bar.

(g) Adhesion to deformed steel bars, up to 100 pounds per square inch of surface of bar may be permitted.

(h) For compression in columns with not less than 1 per cent. and not more than 4 per cent. of longitudinal reinforcement, the safe load shall be computed as follows:

Safe load (in pounds) = 450 (Ac+15 As).

Ac = Net cross sectional effective bearing area of concrete in square inches.

As = Cross sectional area of longitudinal reinforcement in square inches.

(i) For columns reinforced with both longitudinal steel and spirally wound hooping when the volume of hooping is equal to at least one per cent. of the volume of the enclosed concrete and the longitudinal reinforcement is not less than one per cent. and not more than four per cent. of the cross sectional area, the safe load shall be computed as follows:

Safe load (in pounds) = 650 (Ac+15 As).

Ac = Net cross sectional area of concrete enclosed in hooping in square inches.

As = Cross sectional area of longitudinal reinforcement in square inches.

(4) The foregoing allowed stresses shall be used only where the unsupported length of the column is not greater than 15 times the least diameter of effective bearing area. Where the length exceeds this limit, the allowable stress shall be reduced according to approved standard formula.

(5) Bending stresses due to eccentric loads on columns shall be provided for by increasing the section of concrete or steel until the maximum stress on a column will not exceed the allowable working stress.

(6) The least diameter of effective bearing is to be understood to mean the distance from inside to inside of hooping in columns with spiral hooping, and in others from outside to outside of longitudinal reinforcement.

(7) The pitch of spiral reinforcement shall not be greater than one-sixth of the effective diameter of a column, and in no case more than three inches, and adequate means must be provided to hold it in place as as to form a column, the core of which will be straight and well centred.

(8) When columns are reinforced with longitudinal rods only, the reinforcement shall be tied together with bands, having an area of not less than one-sixteenth of a square inch, placed not more than the effective diameter of the column apart or in any case not more than twelve inches. The bands to be jointed in such a manner as to do away with any liability of the reinforcement spreading, and shall be wired to each longitudinal rod.

(9) The percentage of reinforcement in any column, regardless of the load carried by it, is not to be less than one per cent. of the effective cross sectional area. Reinforcement to be in all cases placed at corners of square or rectangular columns, the minimum size of which shall be 9/16 inch round or ½ inch square steel rods.