in diameter in a thin plate, and be free from sulphides, ashes, coal, coke or any material combustible at a temperature below 1,500° Fahrenheit.

6. Water.

"Water" shall be fresh water and be free from oil, acid, alkalies or organic matter.

7. Steel.

"Steel" shall have the properties set forth in Section 30, and be free from loose mill scale, excessive rust, oil or other foreign matter.

8. Mortar.

"Mortar" shall be composed of cement, sand and water.

9. Concrete.

"Concrete" shall be composed of mortar and crushed stone or gravel, or of mortar and crushed stone and gravel.

10. Cinder Concrete.

"Cinder Concrete" shall be composed of mortar and cinders.

11. Reinforced Concrete.

"Reinforced Concrete" shall be composed of concrete in which steel of small sectional area is systematically embedded at the time of depositing the concrete for the purpose of forming a composite structure in which the component parts act in unison in resisting applied forces.

12. Reinforced Cinder Concrete.

"Reinforced Cinder Concrete" shall be composed of cinder concrete in which steel of small sectional area is systematically embedded at the time of depositing the cinder concrete for the purpose of forming a composite structure in which the component parts act in unison in resisting applied forces.

13. Rubble Concrete.

"Rubble Concrete" shall be the mass obtained by embedding boulders, fragments of rock, or both, in concrete while being deposited in place.

METHODS OF CALCULATION

14. Proportioning of Parts.

Every structure of concrete or of reinforced concrete shall be so designed that any possible combination of loading thereon will not produce stresses of greater intensity than the unit stresses given in this specification.

15. Loading Generally.

The loads to be resisted shall be considered to consist of the dead load and the live load.

The dead load shall be the weight of the structure itself and any other fixed loads.

The live load shall be all loads other than dead loads.

The loads shall be reduced to their static equivalents by a recognized method of design. All dynamic, vibratory and impact effects shall be considered and provided for.

16. Loads on Building Columns.

In the case of columns in buildings which support three or more floors, reduction of live load may be made in accordance with this section, except in the case of buildings such as warehouses in which the floors are liable to be fully loaded simultaneously. For the columns supporting the roof and top floor the full live load shall be taken. For the succeeding columns taken in order, the full live load on such columns may be reduced successively by 5% until a reduction of 50% is reached. For all lower columns the live load shall be taken as at least 50% of that used in calculating the floors.

17. Span of Beams and Slabs.

The span of beams or slabs shall be the clear span plus the depth of beam or slab, but need not exceed the distance from centre to centre of supports. Brackets shall not be considered as affecting the clear span in this connection.

18. Bending Moments of Beams and Slabs.

Taking "w" to represent the equivalent static load per unit length of span of beam or slab, and "l" to represent the span length, the following bending moments shall be used,—

(1) For beams or slabs supported at both ends without constraint, $+\frac{wl^2}{8}$

(2) For beams or slabs continuous over three or more equal spans, $+\frac{wl^2}{12}$ at centres of interior spans and $-\frac{wl^2}{12}$ over their intermediate supports; and $+\frac{wl^2}{10}$ at the section of maximum bending moment in end spans and $-\frac{wl^2}{10}$ over their inner supports.

(3) For beams or slabs continuous over two equal spans only, $-\frac{wl^2}{8}$ over the centre support, and $+\frac{wl^2}{10}$ at the section of maximum bending moment in the spans.

When the spans are of unequal lengths, or when special cases of loading arise, the bending moments shall be computed on statical principles, and due regard shall be paid to the influence of constraint at the supports in determining the maximum bending moments in the spans.

19. Assumptions for Stresses in Beams and Slabs.

The stresses in beams and slabs due to the bending moment shall be determined from the principles of the bending of homogeneous beams, using the following assumptions,—

(a) that the modulus of elasticity of concrete in compression is constant,

(b) that the tensile resistance of concrete is negligible, and the steel reinforcement carries all the tension,

(c) that plane transverse sections of a beam before bending remain plane after bending,

(d) that the steel and concrete are properly bonded together, and that in beams reinforced on the compression side the two materials are stressed in compression in the ratio of their moduli of elasticity,

(e) that initial stress in the beam due to shrinkage of the concrete is negligible,

(f) that the depth of a beam is measured from the extreme compression layer to the centre line of the tension reinforcement.

20. Proportioning of Tee-Beams.

In beam and slab construction the design shall provide efficient bond between the slab and beam. The slab shall be regarded as forming part of the compression area of the beam. The effective width of slab so acting shall not exceed one-fourth of the span of the beam, and the overhang on either side of the stem of the beam shall not exceed four times the slab thickness, nor twice the width of stem of the beam.

Where a tee-beam is continuous, as at a column, and the bending moment undergoes reversal the stresses due to the end moment shall be computed as for a rectangular beam reinforced on both tension and compression sides. The compressive stress in the concrete may be 15% greater than the maximum specified in Section 27.

21. Proportioning of Slabs.

When the reinforcement of the slab runs in one direction only computations shall be made by the formulae for simple beams.

When employing slab systems where the reinforcement runs in two or more directions the designer shall use his judgment in the interpretation of theories regarding stresses therein, and of experimental results obtained from slabs so reinforced.

22. Proportioning of Piers and Columns.

When the unsupported length of a compression member subjected to axial load does not exceed six times the least dimension of its effective area, it shall be deemed a pier, and if its unsupported length exceed the above limit it shall be deemed a column. All columns shall be reinforced.

The effective area of a column shall be the area included within the line circumscribing and touching the outermost reinforcing.

The diameter of a column shall be the least dimension of its effective area.

The length of a column shall be measured between its lateral supports, neglecting bracketing, and shall not exceed fifteen times its diameter.

UNIT STRESSES

23. Ultimate Compressive Strength of Concrete.

In the absence of tests on concrete made from the materials to be used, the following values shall be taken as the ultimate compressive strength of concrete, twenty-eight days after mixing, having the proportions of ingredients as set forth.

[Note.—Reports to the annual meeting of other standing committees of the Canadian Society of Civil Engineers will be published in an early issue of *The Canadian Engineer*.—Editor.]