	Ultimate compressive strength in pounds per square inch				
Proportion of ingredients (cement, sand, crushed stone or gravel).....	1:1:2	1:1½:3	1:2:4	1:2½:5	1:3:6
Kind of crushed stone or gravel.....					
Granite, trap rock.....	3300	2800	2200	1800	1400
Gravel, hard limestone or hard sandstone.....	3000	2500	2000	1600	1300
Soft limestone or soft sandstone.....	2200	1800	1500	1200	1000

24. Compressive Stress in Piers and Abutments.

The compressive stress in concrete piers and abutments shall not exceed 22.5% of the ultimate compressive strength of the concrete.

25. Bearing Stress on Piers and Abutments.

The bearing stress on piers and abutments shall not exceed one-third of the ultimate compressive strength of the concrete, if the compression be applied to a surface of concrete less than one-half the surface of the pier or abutment, otherwise the bearing stress shall not exceed 22.5% of the ultimate compressive strength of the concrete.

26. Compressive Stress in Columns.

The safe axial load on columns shall be determined by the following formulae,—

(1) Columns with longitudinal reinforcing only,

$$P = Af_c\,[1+(n-1)p]$$

(2) Hooped columns,

$$P = Af_c\,[1+(n-1)\,(2.4\,h+p)]$$

in which P = safe axial load, in pounds.

A = effective area of column, in square inches.

A_s = sectional area of longitudinal steel embedded in the concrete, in square inches.

$p = \frac{A_s}{A}$

f_c = 22.5% of the ultimate compressive strength of the concrete, in pounds per square inch.

n = modular ratio of steel to concrete = 15.

$h = \frac{\text{volume of circumferential reinforcing}}{\text{volume of column enclosed}}$

$\frac{P}{A}$ shall not exceed 45% of the ultimate compressive strength of the concrete.

For columns with longitudinal reinforcing only, p shall not be less than 0.01 nor more than 0.04.

Columns shall be deemed hooped columns when h is not less than 0.0075 nor more than 0.015, and when p is not less than 0.01. The value of (h+p) for hooped columns shall not exceed 0.05, and h shall not exceed p.

The length of a hooped column shall not exceed ten times its diameter as defined in Section 22.

27. Compressive Stress in Beams.

The compressive stress at the extreme layer of beams shall not exceed 30.0% of the ultimate compression strength of the concrete. The estimated compressive stress due to the end moment on a continuous beam may be allowed to exceed this value by 15%.

28. Shearing Stress in Beams.

The shearing stress, v, in the concrete of beams shall be computed by the following formula,—

$$v = \frac{V}{bjd}$$

in which V = total shear at any section, in pounds.

b = breadth of a rectangular beam, or of stem of tee-beam, in inches.

d = depth of beam, in inches.

jd = distance from tensile reinforcing to centre of compression, in inches.

For beams having tension reinforcing only, v shall not exceed 2% of the ultimate compressive strength of the concrete.

For beams in which part of the tension reinforcing is bent, as opportunity offers, so as to provide inclined shear reinforcing, the value of v shall not exceed 3% of the ultimate compressive strength of the concrete.

For beams in which v exceeds 3% of the ultimate compressive strength of the concrete additional shear reinforcing shall be provided in the form of stirrups inclined or normal to the tension reinforcing and looped around or connected to it. Using the above notation and letting s = spacing of stirrups, in inches, each stirrup shall be designed to withstand a pull of $\frac{2}{3}\,\frac{V_s}{jd}$ if set normally to the tension reinforcement, and a pull of seven-tenths of this amount if inclined at 45° to the tension reinforcing. The spacing of the stirrups shall not exceed the depth of the beam. Stirrups shall be of such a length that they approach within two inches of opposite faces of the beam, and they shall be so anchored or bonded that they can develop the pull for which they are designed. The value of v for beams so reinforced shall not exceed 6% of the ultimate compressive strength of the concrete.

29. Bond Stress.

The bond stress between concrete and steel shall not exceed 4% of the ultimate compressive strength of the concrete for plain or deformed bars, nor 2% of the ultimate compressive strength of the concrete for drawn wire.

30. Modular Ratio.

The ratio of the modulus of elasticity of steel to that of concrete shall be taken as 15.

31. Steel.

Steel for reinforcing shall have the following physical properties,—

	Medium Steel Bars		High Carbon Steel Bars		Cold-Twisted Bars from Medium Steel as specified
	Plain	Deformed	Plain	Deformed	
Ultimate Tensile Strength, in pounds per sq. inch = T.....	55,000 to 70,000	55,000 to 70,000	Minimum of 80,000	Minimum of 80,000	
Elastic Limit, Minimum, in pounds per sq. inch.....	33,000	33,000	50,000	50,000	55,000
Elongation, Minimum, per cent. in 8 ins....	1,400,000 / T	1,250,000 / T	1,200,000 / T	1,000,000 / T	5%
Cold Bend Without Fracture (d = diameter, t = thickness).....					
For bars where d or t is less than ¾".....	180° d=t	180° d=t	180° d=3t	180° d=4t	180° d=2t
For bars where d or t equals or is greater than ¾"	180° d=t	180° d=2t	90° d=3t	90° d=4t	180° d=3t

For each 1-8" increase in diameter or thickness above ¾" nominal diameter or thickness, and for each 1-16" decrease in diameter or thickness for bars below 7-16" nominal diameter or thickness a deduction of 1% shall be made from the above specified percentage of elongation; but these modifications for elongation shall not apply to cold twisted bars.

Material shall be free from injurious seams, flaws or cracks, and shall have a workmanlike finish.