# THE BUILDING LAW OF THE CITY OF BOSTON

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BEING ACTS OF 1907, CHAPTER 550, AS AMENDED, ALSO GENERAL AND SPECIAL ACTS RELATING TO BUILDINGS AND THEIR MAINTENANCE, USE AND OCCUPANCY.


CITY OF BOSTON
BUILDING DEPARTMENT
Room 901, City Hall Annex
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Sect. 20, Par. 26.]

weight of the footings themselves and such backfilling and overlying basement floor loads as may come vertically over the projecting spread of the footing.

PAR. 27.— *Foundation Piers and Caissons.*— The foundation of any building or structure may be carried down to ledge or other satisfactory bearing material by isolated piers of approved masonry or by open or pneumatic caissons, so designed that the working stresses in the materials and on the soil do not exceed those established by this act.

[1918, c. 179, sect. 8, Special Act.]

## SECTION 21.

### PILE FOUNDATIONS.

PAR. 1.— *General Requirements.*— The supporting value of piles shall be obtained from embedment in or bearing on material as firm as can practicably be obtained, and the method of driving shall be such as not to impair their strength. The frictional value observed in driving for that part of piles embedded in or passing through such materials as peat, silt, or fill overlying such material, shall not be relied upon for support. No pile or group of piles shall be loaded eccentrically, except in cases where it is impracticable to avoid it. In such cases the unit stress allowable for piles shall not be exceeded. Any type of pile construction not provided for in this section shall meet such requirements as may be prescribed by the commissioner.

PAR. 2.— A detached column or pier footing supported by piling shall rest upon not less than three piles, but column or pier footings supported by proper and permanent masonry or steel construction which provides lateral support in all directions may each rest upon a single pile if the allowable load per pile is not exceeded. Light wall foundations may be supported by a single row of piles: *provided,*

Sect. 21, Par. 2.]

that the length of wall unsupported laterally by proper masonry or steel construction does not exceed ten feet. All other foundation walls requiring piling shall rest upon at least two rows of piles, the rows to be at least two feet on centres for buildings up to thirty feet in height. For buildings exceeding thirty feet in height, if not more than two rows of piles are used, the rows shall be spread not less than three feet on centres.

PAR. 2A.— Piles under masonry buildings shall be capped with concrete or with block granite. If capped with plain concrete the proportion shall be one part Portland cement to not more than seven and one half parts aggregate, and the capping shall be not less than sixteen inches high above the pile heads. All concrete capping shall fill the space between and around them for a depth of six inches and shall extend for not less than six inches beyond the outer edge of the pile cluster. No rubble concrete shall be used for pile capping. If capped with block granite, each block shall have a firm bearing on not less than three piles, shall be not less than twelve inches thick, and shall project sufficiently to cover fully all pile heads.

PAR. 3.— Piles supporting steel or wooden buildings without masonry walls or floors may be capped with timber not less than six inches thick, securely joined together and to the piles.

PAR. 4.— The commissioner shall require additional piles to be driven for all piles which are broken, broomed or injured in any way, and for piles having a lower sustaining power than that required for the work.

PAR. 5.— The sustaining power of piles driven by jetting shall be determined by test loads as directed by the commissioner.

PAR. 6.— *Wooden Piles.*— Wooden piles shall be single sticks except as prescribed elsewhere, cut from sound live trees, shall be close grained and solid, free from defects, such as injurious ring shakes, unsound or loose knots, or

Sect. 21, Par. 6.]

decay, which may materially impair their strength or durability. Piles must be butt-cut above the ground swell and have a uniform taper from butt to tip.

PAR. 7.— *Short Bends not Allowed.*— A line drawn from the centre of the butt to the centre of the tip shall be within the body of the pile.

PAR. 8.— All knots shall be trimmed close to the body of the pile. All piles shall be at least six inches in average diameter at tip under the bark.

PAR. 9.— *Inspection of All Piles.*— The commissioner shall require a competent inspector qualified by experience and training and satisfactory to him, to be on the work at all times while piles are being driven, and the inspector shall keep an accurate record of the length, size of tip and butt of each pile, the weight and fall of the hammer and the penetration of each pile for each of the last three blows.

PAR. 10.— Square timber of approved quality may be used as piling, in which case the average cross section shall be not less than ten inches by ten inches, and the tip not less than six inches by six inches.

PAR. 11.— Pile heads shall be cut to sound wood before capping is placed.

PAR. 12.— *Loads on Wooden Piles.*— Wooden piles driven through fill, silt, peat or other soil incapable of adequately resisting lateral bending, to hardpan or ledge, or deriving their value from embedments of less than one twelfth their length in approved soil, shall be figured as columns, using the table for timber compression members, and using an area equal to the middle cross-section of the pile. All such piles shall be of hard wood such as oak, southern yellow pine or similar woods, if the commissioner shall so decide.

PAR. 13.— The safe load on all other wooden piles driven by drop hammer shall not exceed twelve tons each for

Sect. 21, Par. 13.]

spruce, Norway pine or other soft woods, nor fifteen tons each for southern yellow pine, oak or woods of similar strength, and shall be limited by the following formula:—

$$L = \frac{2\,WH}{P \text{ plus } 1}$$

PAR. 14.— When testing for their value the pile head shall have sound wood and the fall of the hammer shall be ten feet.

PAR. 15.— The safe supporting value of wooden piles when driven by single acting power hammer shall be limited by the following formula:—

$$L = \frac{2\,WH}{P \text{ plus } 0.1}$$

PAR. 16.— In these formulas:—

L is the allowable load in pounds.

W is the weight of the hammer or striking parts in pounds.

H is the fall of the hammer in feet.

P is the average penetration in inches under the last three blows after the pile has been driven to a point where successive blows produce approximately equal or uniformly decreasing penetration.

PAR. 17.— The distance between wooden piles shall be not less than twenty-four inches on centres. The tops of all wooden piles shall be cut at an elevation not higher than grade 5.00, except that the commissioner may in his discretion permit a higher point of cut off, but not exceeding grade 9.00 in localities where the level of the ground water fluctuates with the tidal variations.

PAR. 18.— Wooden piles may be driven to a depth not exceeding ten feet below the ground surface by means of properly designed followers: *provided*, that such followers are constructed of steel or iron, and are equipped with a

Sect. 21, Par. 18.]

suitable cast iron or steel socket which encases the pile head sufficiently to avoid injury to them during the driving process. Before using such a follower the pile head shall be cut or trimmed so as to expose a sound section of timber on which the follower shall rest. If wooden driving blocks are inserted between the follower and pile hammer they shall be not more than twelve inches in height, of hard wood, and shall be replaced as often as their fibers become ruptured. In case followers are used, the sustaining value of the pile as determined by the driving formula shall be reduced twenty-five per cent unless test loads are applied, in which case the commissioner may allow a higher unit loading not exceeding the maximum prescribed by this section.

### CONCRETE PILES.

PAR. 19.— *Pre-cast Concrete Piles.*— Pre-cast concrete piles shall be properly designed and reinforced to permit handling and driving without injury. The amount of longitudinal reinforcing employed shall be not less than two per cent nor more than four per cent, with bands or hoops not less than one fourth of an inch in diameter and spaced not further than ten inches. They shall be thoroughly cured before driving. The diameter or lateral dimension of such a pile shall be not less than eight inches at the point, and shall average not less than eleven inches. The length shall not exceed thirty times the average diameter when the pile is driven through fill, silt, peat or other material having relatively little lateral stiffness, to ledge or hardpan, or when it derives its value from embedment of less than one twelfth its length in approved soil, nor forty times the average diameter in any case.

PAR. 20.— When driven to ledge or hardpan the allowable load on any such pile shall not exceed four hundred pounds per square inch on the concrete at the average cross section,

Sect. 21, Par. 20.]
and six thousand pounds per square inch on the longitudinal reinforcement.

PAR. 21.— All pre-cast concrete piles shall be protected against damage in driving by the use of a suitable cushion cap of approved design, and when driven to ledge shall be provided with a metal shoe having ample bearing surface.

PAR. 22.— *Cast in Place Concrete Piles.*— Concrete piles cast in place shall be so made and placed as to insure the exclusion of any foreign matter, and to secure a perfect full sized shape, and shall be spaced at least three feet, centre to centre, and more if the commissioner so decides. The average diameter of any such pile in place shall be not less than eleven inches, and the diameter of the tip shall be not less than eight inches. The length shall not exceed thirty times the average diameter when the pile is driven through fill, silt, peat or other material having relatively little lateral stiffness, to ledge or hardpan, or when it derives its value from embedment of less than one twelfth its length in approved soil, nor forty times the average diameter in any case. When driven to ledge or hardpan the allowable load on any such pile shall not exceed four hundred pounds per square inch on the concrete at the average section.

PAR. 23.— *General Provisions.*— Metal tubes five sixteenths of an inch thick or less, remaining in the ground, shall not be considered as reinforcement. To be considered as reinforcement, all steel rods shall be embedded in and covered by three inches of concrete.

PAR. 24.— The safe load for all concrete piles not driven to ledge shall be determined by the commissioner, who may, if he deems it necessary, require one or more tests of the same to be made at the expense of the owner of the proposed building or structure, or of the party causing the piles to be driven, but the commissioner shall not allow a greater load than one half of the test load giving three

Sect. 21, Par. 24.]

eighths inch total settlement, such total settlement to remain constant for a period of twenty-four hours, nor shall the prescribed unit stresses be exceeded. Such tests shall be made under the supervision of the commissioner, and the results shall be filed in his office. No concrete pile shall be allowed a greater load than thirty tons in any case.

PAR. 25.— All load tests shall be conducted in accordance with regulations promulgated by the commissioner and to his satisfaction (but in the absence of such regulations all load tests shall be in accordance with regulations formulated by the commissioner, and to his satisfaction),* but in the absence of such regulations, they shall be continued until at least twice the working load allowed has been put upon the pile, and an accurate record shall be kept, to the nearest one sixteenth inch of settlement for and after each increment of load has been added. Increments of load shall not exceed ten thousand pounds each, and at least eight hours shall elapse between the addition of successive increments. Test loads shall be applied at capping grade.

PAR. 26.— All concrete for concrete piles shall be mixed in the proportion of one part Portland cement to not more than six parts of aggregate, and with a sufficient amount of water to produce a plastic or viscous consistency.

PAR. 27.— Concrete piles shall be capped with concrete masonry only.

[1918, c. 179, sect. 9, Special Act.]

## SECTION 22.

### CELLARS — RAT-PROOFING.

PAR. 1.— *Cellars.*— The cellar of every building, where the grade or nature of the ground so

* Words in parenthesis above should be stricken out, being a repetition.