

THE KINGSTON AND ST. ANDREW BUILDING ACT

REGULATIONS
(under section 25)THE KINGSTON AND ST. ANDREW BUILDING (TRIBUNAL OF APPEAL)
REGULATIONS, 1932

(Made by the Corporation on the 14th day of March, 1932 and approved by the Governor in Privy Council on the 28th day of June, 1932)

G.N. 489/32
Amd:
L.N. 47/92

1. These Regulations may be cited as the Kingston and St. Andrew Building (Tribunal of Appeal) Regulations, 1932.

2. Every person whose plans or drawings the Building Authority may have refused to approve may appeal to the Tribunal of Appeal against the decision of the Building Authority within fourteen days after the communication to such person of the said decision by leaving with the Building Authority a notice (in triplicate) of his intention to appeal containing the grounds on which he appeals and an address for service and shall at the same time pay to the Building Authority the sum of \$500.00 as a fee on such appeal.

3. The Building Authority shall within two days after the receipt of the notice of appeal and fee forward to the Tribunal of Appeal—

- (i) the notice of intention to erect, re-erect or extend any building and the plans and drawings and any amendments thereof relating to the proposed building which may have been lodged with or supplied to the Building Authority;
- (ii) a statement of the names and addresses of the persons, if any, called and examined as witnesses before the Building Authority;
- (iii) the decision, if any, of the surveyor;
- (iv) the decision of the Building Authority; and
- (v) the notice and grounds of appeal.

The foregoing documents together with any notice and grounds of objection shall be deemed the record on the appeal.

*THE KINGSTON AND ST. ANDREW BUILDING (TRIBUNAL OF
APPEAL) REGULATIONS, 1932*

4. If any person (hereinafter referred to as "the objector") shall have been heard by the Building Authority in opposition to the appellant the Building Authority shall forward a copy of the notice and grounds of appeal to such person and such person may within seven days after the receipt of such notice leave with the Building Authority notice (in triplicate) of his intention to oppose the appeal containing the grounds of opposition and an address for service and pay to the Building Authority the sum of \$100.00 as a fee on lodging such notice.

5. Within two days after the receipt of the notice and fee mentioned in regulation 4 the Building Authority shall forward such notice to the Tribunal of Appeal.

6. The Chief Technical Director may within seven days after the receipt by him of the notice and grounds of appeal by writing under his hand appoint some person to hear and determine the appeal and if any such appointment shall be made the person so appointed shall thereafter be deemed the Tribunal of Appeal.

7. The Tribunal of Appeal shall within fourteen days after the receipt by the Chief Technical Director of the notice and grounds of appeal appoint a time (not being more than fourteen or less than seven days thereafter) and place for the hearing of the appeal and shall give notice in writing to the Building Authority and to the appellant and to the objector (if any) of the time and place so appointed.

8. The Tribunal of Appeal shall at the time and place appointed proceed to hear and determine the appeal with power however to adjourn or postpone the hearing to any other time or place, but no appeal shall be heard unless the notice and grounds of appeal and the fee thereon shall have been lodged and paid within the prescribed time.

9. The appellant shall be entitled to begin and if any fact is in dispute may call and examine witnesses who may be cross-examined by the Building Authority and the objector and re-examined by the appellant; then the objector, if any, shall be entitled to be heard and to call and examine witnesses who shall be liable to be cross-examined by the Building Authority and the appellant and re-examined by the objector and then the Building Authority shall be entitled to be heard provided that no party shall be entitled to call or examine any person as a witness who was not called and examined before the Building Authority.

10. The appellant and objector may appear at the hearing of the appeal in person or by counsel or solicitor and the Building Authority may appear by any member or officer or by counsel or solicitor.

11. Neither the appellant nor the objector may raise or rely upon any ground not contained in the notice lodged by him.

12. Within seven days after the conclusion of the hearing the Tribunal of Appeal shall forward to the Building Authority the record of the appeal and the notes of evidence, if any taken by him and a written statement of his decision and the Building Authority shall forthwith forward to the appellant and the objector (if any) copies of such statement of decision.

13. The decision of the Tribunal of Appeal shall be enforced in the same manner in all respects as a decision of the Building Authority.

THE KINGSTON AND ST. ANDREW BUILDING ACT

REGULATIONS
(under section 25)THE KINGSTON AND ST. ANDREW BUILDING (NOTICES AND OBJECTIONS)
REGULATIONS, 1938

(Made by the Corporation on the 13th day of June, 1938 and approved
by the Governor in Privy Council on the 30th day of August, 1938)
[1st October, 1938.]

G.N. 735/38
Amd:
G.N. 872/46
L.N. 126/57
127/57
46/92

1. These Regulations may be cited as the Kingston and St. Andrew Building (Notices and Objections) Regulations, 1938.

2. In these Regulations unless the context otherwise requires, "proposed site" means the holding or site upon which a person proposes to erect, change the class of or re-erect any building.

NOTICES

3. Where any person—

(a) desires to erect or re-erect—

- (i) a building to be used for the sale of petroleum products or for the purposes of a factory wherever the proposed site may be situated; or
- (ii) a building intended to be used for the purposes of any trade or business or as a church, school or place of assembly on any site not within a "business area" as defined by section 2 of the Act; or

(b) desires to change the class of an existing building,
such person shall not less than three nor more than seven days before giving to the Building Authority the notice prescribed by section 10 of the Act, give notice of his intention to submit plans under that section.

4. The notice of intention to submit plans shall be in the Form No. 1 in the Schedule and shall accurately describe the site on which it is proposed to erect or re-erect or change the class of the building by stating the name of the roadway and the number or name of the site and shall state the class of building to which the notice relates and the name and address of the owner of the proposed site and also the name

Schedule.
Form No. 1.

and address of the builder, if any, whom it is proposed to employ, and a copy of such notice shall be served upon the owner and occupier of every holding adjoining the proposed site and a copy thereof in letters not less than half an inch high shall be posted on some part of the proposed site in such manner as to be distinctly visible from the roadway and the original notice together with proof of the service and posting of the copies thereof shall accompany the notice and plans prescribed by section 10 of the Act:

Provided that in proving service on the occupier or owner of an adjoining holding it shall be sufficient to prove that a copy of the notice was sent by registered post addressed to the last known address of such owner or occupier or in case any adjoining holding is unoccupied and the owner or his address is unknown that such copy was posted on a conspicuous part of such holding.

5. The Building Authority shall not approve of the erection or re-erection of any such building until the expiration of thirty days from the service or posting of the last of such copy notices.

OBJECTIONS

6.—(1) The owner or occupier of an adjoining holding and the owner of any holding within a radius of two hundred yards of a proposed site may object to the approval of any plans submitted in respect of such proposed site by serving (personally or by registered post) upon the owner of the proposed site a notice in writing of such objection and of the grounds thereof and by delivering to the Building Authority a duplicate of such notice together with proof of the service thereof on the owner of the proposed site.

Form No. 2.

(2) Every such notice of objection shall be in the Form No. 2 in the Schedule and shall be served upon the owner of the proposed site and a copy thereof delivered to the Building Authority within thirty days after the day on which the notice of intention to submit plans shall have been posted on the proposed site.

7. The Building Authority shall before coming to a determination on the plans submitted take into consideration all objections which may be made and the grounds thereof and may either grant or refuse approval of the plans submitted or may appoint a time and place to hear the parties and give notice of such appointment to the owner of the proposed site and to every objector and at such hearing the owner of the proposed site and the persons who have objected may

THE KINGSTON AND ST. ANDREW BUILDING ACT

REGULATIONS

*(under Part IV of the First Schedule to the Act)*THE KINGSTON AND ST. ANDREW BUILDING (REINFORCED CONCRETE
CONSTRUCTION) REGULATIONS, 1908*(Approved by the Governor in Privy Council on the 14th day of
October, 1908)*G.N. 517/08
Amd:
G.N. 913/39
L.N. 29/52
30/52

1. These Regulations may be cited as the Kingston and St. Andrew Building (Reinforced Concrete Construction) Regulations, 1908.

PART I

2.—(1) For the purposes of this Part the term “a reinforced concrete structure” shall apply to any part of a building constructed of reinforced concrete, including Bressumers, except any of those parts hereafter mentioned which are specially required or allowed to be of reinforced concrete by the Regulations in the First Schedule to the Act, viz—
walls of a greater thickness than 8½” provided they comply with the requirements of regulations 14, 38 and 41;
lintels of Hearths (regulation 25);
parapets more than 15” and less than 2’ 0” high (regulation 28 (4));
belt courses (regulations 39, 40);
window and door sills and lintels (regulation 42).

(2) A reinforced concrete building is a building in which the walls, floors, floor beams and roofs are constructed of reinforced concrete.

Supervision

3. No person shall erect any reinforced concrete structure or building except under the supervision of a qualified overseer or inspector approved by the Building Authority: but it shall be allowed for any builder or owner to apply to the Building Authority for an inspector to supervise the work, such application to be made at least two days before the work on the building is commenced, and the Building Authority shall appoint such inspector. In no case shall any mixing or depositing of concrete be done except in the presence of such an inspector.

*THE KINGSTON AND ST. ANDREW BUILDING (REINFORCED
CONCRETE CONSTRUCTION) REGULATIONS, 1908*

4. No work on reinforced concrete shall be commenced until the Building Authority has been satisfied that all appliances necessary for carrying out such work have been provided.

Applications to be accompanied by drawings, details, etc.

5. All applications for sanction to erect reinforced concrete buildings or structures shall be accompanied by—

- (a) complete detailed drawings in duplicate, showing the nature, size and disposition of the reinforcing metal, and all other details in regard to the construction required by the Building Authority;
- (b) the calculations, if required by the Building Authority, by which such dimensions were arrived at;
- (c) the origin and nature of the materials to be used: proof may be required by the Building Surveyor of any statement made under this clause;
- (d) the proportions in which the ingredients of the concrete are to be mixed, and the size and nature of the aggregate to be used;
- (e) the use to which all rooms above the ground floor are to be put.

Copy of drawings to be kept on the site

6. A copy of the drawings as approved by the Building Authority is always to be kept on the site, and to be available for the use of the inspector at all times.

Cement

7.—(1) Cement shall be of a slow setting quality to comply with the requirements of the last revise of the British Engineering Standards Committee, or with the specification of the American Society for Testing materials, November 14th, 1904, or otherwise of a brand and description approved by the Building Authority.

(2) Cement is to be delivered in its original packages marked with the maker's name and must be kept in a perfectly dry place. All cement which has been rejected as unsatisfactory is to be removed from the site.

Sand

8. All sand is to be clean and sharp and free from organic or earthy matter and is to be screened through a $\frac{1}{4}$ " sieve if required by the Building Surveyor.

Aggregate

9.—(1) The aggregate may be broken stone or brick, or other hard substance approved by the surveyor, or of gravel which is free from organic or earthy matter.

(2) The aggregate, if required by the surveyor, is to be screened twice, for maximum and minimum size before measuring, and must pass through a sieve of 1" mesh and be retained on a sieve of $\frac{1}{4}$ " mesh. The material which will pass through the $\frac{1}{4}$ " mesh may if clean be used as sand, and measured therewith when gauging, except in the case of broken brick in which case the portion which is less than $\frac{1}{4}$ " must be removed from the site.

(3) In no case is the size of the aggregate to be greater than will easily pass between the reinforcing bars and the boxing or the meshes of the wire cloth or expanded metal, and for columns the maximum size must not be greater than will pass through a sieve of $\frac{3}{4}$ " mesh.

Proportions of mixture of concrete

10. No weaker mixture of concrete shall be used than that specified in the following schedule—

	cement	sand	aggre- gate.
For foundations and walls more than 6" thick	1	3	6
For walls less than 6" thick, floors, beams, roofs and slabs	1	2	4
For columns	1	1½	3

Mixing

11. The ingredients for each batch of concrete are to be measured in gauging boxes of the proper size or in any other way approved by the surveyor.

Metal

12. All reinforcing metal shall be of steel of a medium or high elastic limit and must be of a description especially constructed for reinforced concrete work or otherwise as approved by the surveyor.

Position of reinforcement to be adhered to

13. The exact positions shown in the drawings for the reinforcement shall be strictly adhered to, and no concrete shall be deposited until

*THE KINGSTON AND ST. ANDREW BUILDING (REINFORCED
CONCRETE CONSTRUCTION) REGULATIONS, 1908*

the inspector has satisfied himself that the reinforcement is accurately placed, and securely held in place.

Casing or Boxing

14. All casing or boxing shall be sufficiently supported and braced to the satisfaction of the Surveyor, and no concrete shall be deposited in any casing or boxing not approved by the Surveyor.

Test Load

15. If required by the Building Surveyor, floors shall be tested to a load not exceeding $2\frac{1}{2}$ times the calculated live load for which such floors were designed.

Live load on roofs

16. The live load on flat roofs shall be taken as 50 lbs. per square foot.

Stresses

17. The following shall be the allowable stresses in materials used for reinforced concrete structures—

- (a) Concrete. In tension. Nil.
If made of broken stone or gravel—

Mixture.			In direct com- pression.	For extreme fibre stress.	In.	x	Ms.
Cement, sand, aggregate.					Shear	x	Mc.
1	$1\frac{1}{2}$	3	600	720	60		12
1	2	4	500	600	50		15
1	3	6	375	450	40		20

If made of broken brick the stresses allowed are to be 75 per cent of the above stresses and the fraction Ms/Mc is to be taken at 30 per cent above the figure given in the table.

For hooped columns a direct compression stress of 750 lbs. may be allowed measured on the area contained within the hoops.

For the purposes of this regulation a column may be considered to be a hooped column if the enclosing spirals or hoops are circular in plan, and are spaced not more than 1—7 nor less than 1—10 of the inside diameter of such spirals or hoops apart, and if the material of the spirals is not less than $\frac{1}{4}$ " diameter.

x Ms is the modules of elasticity of the steel to be used.

Mc is the modules of elasticity of the concrete to be used.

(b) Steel in tension 16,000 lbs. per square inch unless specially approved otherwise and in any case not less than 14,000 or more than 18,000 lbs. per square inch nor more than half of the elastic limit.

Bending moments are to be calculated as follows where

L=Length of span in inches;

W=The total distributed load in lbs.

For beams freely supported at both ends WL/8

For beams continuous WL/10

For continuous slabs with tension bars running one way only WL/16

For continuous slabs with tension bars running both ways, according to arrangement of metal and ratio of length to breadth of slab WL/12 to WL/24

For slabs not continuous with tension bars running one way only WL/8

For slabs not continuous with tension bars running both ways according to arrangements of metal and ratio of length to breadth of slab WL/8 to WL/16

Length of columns

18. The maximum ratio of length to diameter or side of column measured on the outside of reinforcing bars shall be 1/15, but in no case shall a column be less than 10" in least diameter measured on the outside of the reinforcing bars.

Weight of concrete

19. For purposes of calculation the weight of concrete may be assumed to be 144 lbs. per cubic foot.

Span of beams or Slabs

20. The length of span of a beam or slab shall be taken as the clear distance between the vertical edges of the supports. No deduction is to be made for angle brackets.

Angle bracing

21. In order as far as possible to guard against the racking strains caused by earthquakes all external columns, buttresses or piers in a "reinforced concrete building" shall be provided with angle brackets or with special reinforcement to columns or beams of a design approved by the surveyor, such design having in contemplation the withstanding of a horizontal pressure equivalent to 50 lbs. per square foot, acting at right angles to and upon the entire surface exposed to it.

Walls, thickness of

22.—(1) No part of any wall shall be of a less thickness than 4" and no part of any external wall shall be of a less thickness than 6", unless the building is a single storey one and the roof of it has a span of 16 feet or less, in which case the thickness shall be such as shall be approved by the Surveyor.

In buildings of more than one storey of which the walls are of reinforced concrete the topmost storey shall have external walls of at least 7" in thickness and each succeeding lower storey shall have external walls at least 3" thicker than the external walls of the storey immediately above it, provided that the height of no storey exceeds 14 feet measured from the top of the floor or joists supporting the floor of such storey to the top of the joists of the floor of the storey next above it, or in the case of the topmost storey to the bottom of the tie beam of the roof trusses or the underside of the roof slab at the line of the wall. If any storey exceeds 14 feet in height the external walls of such storey shall be increased in thickness by at least 3" beyond the thickness above required or any greater amount approved by the Surveyor.

Buttresses for Walls

(2) All walls of a greater length than 15 feet are to be strengthened with piers, buttresses, or cross walls, not more than 15 feet apart, or less if required by the Surveyor, extending from the foundations to the top of the walls and are to be securely anchored to such pier or buttress in a manner approved by the Surveyor.

The projection or accumulated projections of such piers or buttresses shall be in accordance with the following table—

For walls of 7" but less than 10" thick	5"
" " 10" " " 13" "	4"
" " 13" " " 16" "	3"

The width of such piers or buttresses shall in every case be not less than the total thickness of the wall and the projection or accumulated projections of the buttresses or piers.

Steel for Walls

(3) Steel for reinforcement of walls shall be used to at least the extent specified in the following schedule.

For walls of 6" and less than 10" in thickness $\frac{3}{8}$ " square rods placed vertically and horizontally 12" apart alternately near each face of the wall and not less than 1" or more than 2" from either face of the wall.

For walls of 10" and less than 16" in thickness $\frac{1}{2}$ " square rods placed as above.

For walls of 16" and more in thickness $\frac{1}{2}$ " square rods placed as above but 9" apart or as approved by the surveyor. As far as practicable the vertical and horizontal rods shall be continuous throughout the whole length and height of the wall. Where a joint occurs rods are to be overlapped to a distance of 40 times the diameter or size of the rods. The rods are to be bent at the junctions and angles of walls so as to tie the adjacent parts together thoroughly and securely.

Curtain Walls

(4) Walls of a less thickness than 7" shall be considered to be curtain walls.

Curtain walls shall not be considered to bear any part of the super-imposed loads or stresses, such loads or stresses being considered to be carried by the frame work without assistance from the curtain walls.

Curtain walls shall be reinforced in such a manner that they are securely connected to the columns by rods running continuously through the columns or otherwise as approved by the surveyor, and such curtain walls shall be reinforced throughout their length and breadth by $\frac{3}{8}$ " square rods not more than 18" apart vertically and horizontally.

Internal Walls

(5) Internal walls may be reinforced with rods, wire mesh, or in any other way approved by the surveyor.

Roofs

23. Roofs made of reinforced concrete shall be reinforced along the edges resting on the external walls so as thoroughly to tie the roof slabs to such walls, and in this way to assist the beams carrying the roof slabs in making an homogeneous structure.

For this purpose rods 19" apart and $\frac{1}{2}$ " square extending into the roof slab for a distance of two feet, and cranked downwards into the wall (in the centre of such wall) for a distance of 1 foot may be considered as forming secure ties.

PART II

24. Every building and structural part thereof shall be designed in accordance with such detailed methods of design as are set forth herein and are applicable to the said building. In the absence of definite detailed provisions herein for the design of any building or structural part thereof, no method of design shall be employed which will not admit of a rational analysis and which is not in accordance with the established principles of mechanics and of structural design.

25. Every building and all structural parts thereof shall be of sufficient strength to support the estimated or actual imposed loads, including lateral forces, without exceeding the allowable working unit stresses specified herein for the material, materials or permissible combinations thereof, of which the said building or structural parts thereof are constructed; but no building or structural part thereof shall be designed for live loads which are less than those specified herein and which are applicable to the said building by virtue of its type of occupancy.

26. Unless specifically stated otherwise in each instance, all specified allowable working unit stresses given hereinafter for the various materials of construction and permissible combinations thereof are the maximum that shall be employed for the most adverse combination of dead and live loads that are hereinafter specified or, in the absence of definite specifications relative thereto, may in the opinion of the Surveyor be expected to occur.

27.—(1) In resistance to the combination of wind loads and other loads except earthquake, and in resistance to wind load alone, the specified allowable working unit stresses of this regulation for any material of construction, or permissible combination of structural

materials may be increased by an amount not to exceed $33\frac{1}{3}$ per cent; but the effective section and size of any structural member shall not be less than that required to resist the combination of dead and live loads alone, as specified herein, without exceeding the allowable working unit stresses specified for the said combination of dead and live loads alone.

(2) In resistance to the combination of—

(a) forces due to earthquake, as specified herein; and

(b) dead and live loads specified in the regulations,

the specified allowable working unit stresses of the regulations may be increased by an amount as specified under unit working stresses; but the effective section and size of any structural member shall not be less than that required to resist the combination of dead and live loads alone, as specified herein, without exceeding the allowable working unit stresses specified for the said combination of dead and live loads alone.

(3) Where the size and strength of a member designed to resist the combination of dead load, live load, and earthquake forces equals or exceeds that under the combination of dead load, live load, and the wind forces as specified below, then no account need be taken of the effect of wind on that member.

28. Pressures on all vertical surfaces shall be 20 pounds per square foot below a level of 40 ft. above ground, and 25 pounds per square foot above this level, but 40 pounds per square foot is to be taken on sprinkler tanks, sky signs and exposed buildings and their supports.

Cylindrical surfaces are to be proportioned for the same pressure on six-tenths of the projected area.

29. Every structural member subjected to the action of an eccentric load or force shall be designed to provide for any stress due to that eccentricity, whenever the increase in unit stress due solely to the eccentricity exceeds 10 per cent of the unit stress due to concentric axial loads alone.

30. The effect of impact shall be provided for in such manner and in such members as the Surveyor may deem necessary.

31.—(1) The dead load of all buildings constructed of reinforced concrete shall consist of the actual weights of walls, floors, stairs, landings, roof, and all other permanent construction comprised in such building.

*THE KINGSTON AND ST. ANDREW BUILDING (REINFORCED
CONCRETE CONSTRUCTION) REGULATIONS, 1908*

(2) The live or variable loads of such buildings shall consist of all loads other than dead loads.

32. The following unit live loads in pounds per square foot of horizontal projection of floors and/or roofs shall be the minimum live loads which shall be used in the design of buildings—

<u>Class</u>	<u>Description</u>	<u>Unit Live Load (Column A)</u>
(a)	Floors of private houses	50
	Bedrooms on upper floors of hotels	50
	Private bedrooms in hospitals, infirmaries, and other similar buildings	50
	Residential flats	50
(b)	Dormitories in hospitals, infirmaries, and other similar buildings	75
	Art galleries	75
(c)	Assembly rooms or halls	100
	Assembly rooms, lobbies and passages	100
	Class rooms in schools and colleges	100
	Churches or chapels	100
	Theatres, music halls, cinemas, and similar buildings	100
	Restaurants and reception rooms in hotels	100
	Hotels	100
	Offices	100
	Floors for display of light-weight goods	100
	Public auction rooms (not used for storage of goods)	100
	Garages for private cars	100
	Light workshops	100
	Drill-halls, gymnasias, dance halls, and ball-rooms	100
	Spectators' stands	100
	Rooms for storage of goods when the load to be carried will not exceed 100 pounds per square foot	100
	Wholesale stores (light merchandise)	100
	Retail sales-rooms (light merchandise)	100
(d)	Garages for vehicles up to 3 tons gross weight	150
	Medium weight workshops	150
	Rooms for storage of goods when the load to be carried will not exceed 150 pounds per square foot	150
	Theatres' stages	150

Class	Description	Unit Live Load (Column A)
(e)	Book-stores at libraries	200
	Museums for heavy goods	200
	Heavy-weight workshops	200
	Rooms for the storage of goods when the load to be carried will not exceed 200 pounds per square foot	200
	Pavement lights	200
(f)	Actual loads for extra heavy machinery or goods Over	200
(g)	Flat roofs and sloping roofs with an inclination not exceeding 15 degrees to the horizontal, curved and barrel roofs with access thereto	40
	Sloping roofs with inclination exceeding 15 degrees to the horizontal, also curved and barrel roofs without access thereto shall be designed for a live load due to wind pressure of twenty-five pounds per square foot acting at right angles to such roof-slope.	
	Roofs designated as "without access" shall provide only for such access as is necessary for cleaning and repair or fire protection.	
	Roofs designated as with access, shall provide access for such purposes of fire escape or other similar uses.	
(h)	Partitions and other structures superimposed on floors and roofs may be included in the superimposed load provided the weight of the partition or other structures per square foot of base does not exceed the permissible load per square foot of floor or roof area as the case may be. Partitions and other structures of greater weight shall be provided for	Actual Weight.
(i)	To provide for the weight of partitions in cases where their location is not determined on the plans, the beams and floor slabs shall be designed to carry an additional uniform distributed live load per square foot equal to 10 per cent of the actual weight per foot run of such partitions.	

*THE KINGSTON AND ST. ANDREW BUILDING (REINFORCED
CONCRETE CONSTRUCTION) REGULATIONS, 1908*

Class	Description	Unit Live Load (Column A)
(j)	Loads not otherwise specified—Where the superimposed load on any floor, landing, stair or roof exceeds that hereinbefore specified for such floor, landing, stair or roof, such greater load shall be provided for.	
(k)	Angle of dispersion—For calculating the resistance moment the angles of dispersion of a point load through hard filling and concrete shall not be taken at more than 45 degrees from the vertical.	

33. To prevent overloading in all offices, warehouses, factories, workshops and stores, the weight that each floor shall safely sustain upon each square foot thereof or upon each varying part of such floor shall be placed and maintained by the owner of the building on stone, concrete, or metal or other approved tablets in approved conspicuous places in each storey.

The following variations in assumed live load shall be permitted in the designing of columns, pillars, walls, foundations, trusses and girders—

- (i) no reduction of the assumed live load shall be allowed in the design of any slabs, joists or beams;
- (ii) for determining the total live loads carried by columns, the following reductions shall be permitted, the reductions being based on the assumed live loads applied the entire building floor area.

Carrying the roof ...	...	0 per cent
Carrying 1 floor and roof ...	...	0 per cent
Carrying 2 floors and roof ...	...	5 per cent
Carrying 3 floors and roof ...	...	10 per cent
Carrying 4 floors and roof ...	...	15 per cent
Carrying 5 or more floors and roof		20 per cent

34. Floor slabs and beams shall be capable of carrying the following alternative live loads on an otherwise unloaded floor—

CLASS OF FLOOR per square foot

(a)—(f)	SLABS	BEAMS
(a) 50 pounds	NONE	2,240 pounds uniformly distributed.

[The inclusion of this page is authorized by L.N. 4/1976]

CLASS OF FLOOR PER SQUARE FOOT, *contd.*

(a)—(f)	SLABS	BEAMS
(b)	75 pounds	
(c)	100	
(d)	150 pounds, ex- cepting garages	840 pounds per foot width of slab
(e)	200 pounds	4,480 pounds uniformly distributed.
(f)	Over 200 pounds	
(g)	Garages for vehi- cles up to 3 tons dead weight	1.5 times the maximum wheel load, but not less than 1 ton considered distributed over a floor area of 2 ft. 6 in. square.

The reactions arising in the beams for this alternative live loads need not be taken into the pillars.

35. In cases where a rolling load actuated by mechanical power is to be provided for, such rolling load shall be taken as equivalent to a static load of 20 per cent in excess of the actual rolling load or such other allowance as may be specified by the Surveyor to meet special conditions.

36. In case of lifts, elevators, hoists and similar machines, the equivalent static load at the top of the lift-shaft is to be taken as at least 50 per cent in excess of the combined load of the actual pull in the ropes, the weight of overhead machinery sheaves, supports and overhead beams.

37. The actual live loads in buildings of the industrial or commercial type, in so far as such actual live loads may be reasonably estimated, shall be used in the design of such buildings or parts thereof; special provisions shall be made for machine or apparatus loads when such machine or apparatus loads would result in greater stress in the structural member of the floors than would be caused by the loading specified above for such occupancies.

38. Public garages and commercial and industrial buildings on which loaded trucks are to be placed, used or stored, shall have their floor systems designed to support a concentrated rearwheel load of a loaded truck placed in any possible position, or combination of positions. The weight of the concentrated wheel-load to be used in the design shall not be less than 5,750 pounds per wheel.

*THE KINGSTON AND ST. ANDREW BUILDING (REINFORCED
CONCRETE CONSTRUCTION) REGULATIONS, 1908*

39. Each floor and the individual structural members thereof shall be designed for the most severe possible distribution of live loading on the said floor and the said individual structural members thereof.

The web members of trussed structural members of floors and roofs shall be properly proportioned for partial live loading, in any one span of said trussed structural members.

40. In calculating stresses on columns due to lateral forces including earthquake the length of the columns shall be taken as vertical distances from the neutral axis of a beam or girder intersecting the column to the neutral axis of the next beam or girder intersecting the same column.

In calculating the moment of resistance of the column a bending moment not greater than the bending moment at the level of the underside of the beam or bottom of its haunch as defined in these Regulations, or the top of the beam, as the case may be, need be provided for.

41. In calculating stresses in beams due to lateral forces including earthquake, the length of the beams shall be taken as the horizontal distance from the centre of the supporting column to the centre of the next supporting column.

In calculating the moment of resistance of the beam or girders a bending moment not greater than the bending moment at the face of the supporting column need be provided for.

PART III

Pre-stressed Concrete

42. In regulations 43, 44, 45, 46, 47 and 48 "pre-stressed concrete" means high-strength concrete which has been pre-stressed by the use of high grade tensile steel wires strengthened by means of hydraulic jacks either by post-tensioning or pre-tensioning in such manner as to set the stresses in structures which will act contrary to the applied loads and "approved" means approved by the Building Authority or the Building Surveyor.

43. Pre-stressed concrete complying with the provisions of these Regulations may be used in the construction of reinforced concrete buildings either alone or in combination with such other forms of construction as may be approved.

The materials to be used in pre-stressed concrete shall be—

- (a) Concrete consisting of suitably graded aggregate and cement conforming to British Standard Specifications and attaining a minimum compressive stress of 5,000 lb. per square inch at 28 days and shall have a minimum strength of twice the compressive stress which will be applied to it at the time of pre-stressing. After casting the concrete shall be properly protected to prevent rapid evaporation of moisture by being covered in an approved manner at least until stressing takes place and shall be adequately vibrated in an approved manner.
- (b) High tensile steel wire complying with the requirements of British Standard Specifications and in support of which a Certificate has been issued by the manufacturers stating—
 - (i) the ultimate tensile strength of the wire;
 - (ii) 0.1% stress.

44. All pre-stressed concrete structural members shall be designed to carry the loads prescribed under the building regulations in force.

45. The preliminary tension in the steel shall not exceed 65 to 70 per cent of the ultimate stress or 80 to 90 per cent of the proof stress. The final working stress in the steel is to be limited to 60 to 65 per cent of the ultimate stress.

Tensile stress in the concrete shall not exceed 10 per cent of the designed compressive stress.

In pre-tensioned concrete the allowable loss in the steel may be 20 per cent and in post-tensioned concrete 15 per cent.

The load factor of the structure shall not be less than 2.5.

Complete calculations shall be submitted for the approval of the Building Authority along with the plans and application for the approval thereof.

All units manufactured in a factory shall be guaranteed by the manufacturer as complying with the requirements set out above and if so required by the Building Surveyor shall be tested to ascertain compliance with designed loads, and in such case the manufacturer shall provide the necessary testing equipment and labour. No unit which fails to pass the test shall be used for the purpose intended. The Building Authority may however approve of the use of any members under lighter loads than originally designed.

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CONCRETE CONSTRUCTION) REGULATIONS, 1908*

46. All pre-stressed concrete units shall be manufactured under an approved system and shall be guaranteed by the manufacturer to satisfactorily withstand the load for which it is designed.

The manufacturer shall place distinctive marks on each unit indicating the load for which it is designed.

No unit shall be used until the manufacturer's certificate as to the load for which it has been designed has been submitted to the Building Surveyor and approved, and such unit shall only be used to carry the designed load as specified by the manufacturers.

47. When building units are assembled to form a building or any part thereof the work shall be done in such manner that the stresses in the building when fully loaded shall not exceed those provided in the Regulations. Every portion of the building shall be thoroughly secured to adjoining portions so that stresses induced by earthquake and wind pressure as well as dead and live loads shall be properly distributed and taken care of.

48.—(1) In order to facilitate the making of tests of high strength concrete to be used in the manufacture of pre-tensioned concrete units, the manufacturer shall take samples immediately after the concrete has been placed, but if this is not possible, from the concrete as it is being delivered at the point of placing. Each sample shall be of sufficient size to make one test cube, and care shall be taken to ensure that it is representative of the concrete and accurate record shall be kept of the exact spot from which each sample is taken, the temperature and weather conditions at the time of testing, the date and the identification number of the cube.

(2) The mould for test cubes shall be made of steel or cast iron with the inner surfaces parallel to each other and machine-faced. Timber moulds shall not be used. Each mould shall have a metal base-plate with a true surface to support the mould and prevent leakage. The mould and base-plate shall be kept clean and both shall be oiled to prevent the concrete sticking to the sides. No undue strain shall be used when the sides are screwed together. The sample of concrete shall be taken as quickly as possible to the place where the cubes are to be made and there remixed and placed in the mould. Adequate vibration shall be applied to mould while filling. After the moulds are filled, the top surface shall be clearly marked with an identification number and the date.

(3) The test cubes shall be stored for twenty-four hours under damp sacks in a place free from vibration. They shall then be removed from the moulds and stored in water or buried in wet sand until they are sent to the testing laboratory. When being removed from their moulds the cubes shall be carefully handled to ensure that the arrises are not broken. A report to the Building Surveyor shall be made if any test cube is damaged in any way.

Test cubes shall be kept on the site for at least three-quarters of the period before testing, except in the case of tests at ages less than seven days. The storage temperature must not fall below 40°F. and a record shall be kept of the maximum and minimum day and night temperatures at the place of storage during the time the cubes remain on the site.

(4) The cubes shall be sent to a laboratory designated by the Building Surveyor packed in damp sand and carefully crated to avoid damage during transit. Written particulars shall be enclosed in the crate of the identification number of the cubes and the date when the test should be made.