

# University of the State of New York Bulletin

Entered as second-class matter August 2, 1913, at the Post Office at Albany, N. Y., under the act of August 24, 1912. Acceptance for mailing at special rate of postage provided for in section 1103, act of October 3, 1917, authorized July 19, 1918

Published Fortnightly

No. 837

ALBANY, N. Y.

October 1, 1925

## SCHOOL BUILDINGS AND GROUNDS

### LAWS, RULES, AND INFORMATION RELATING TO SCHOOL BUILDING CONSTRUCTION

#### School Building Pamphlet 1

ALBANY  
THE UNIVERSITY OF THE STATE OF NEW YORK PRESS  
1926

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Entered as second-class matter August 7, 1913, at the Post Office at Albany, N. Y., under the act of August 24, 1912. Acceptance for mailing at special rate of postage provided for in section 1103, act of October 3, 1917, authorized July 19, 1918.

Published Fortnightly

No. 837

ALBANY, N. Y.

October 1, 1925

LAWS, RULES, AND INFORMATION RELATING TO  
SCHOOL BUILDING CONSTRUCTION

Purpose of Pamphlet

This pamphlet is issued for the information of architects, boards of education and trustees of common school districts. It contains such portions of the Education Law as relate to school building construction, rules adopted by the Board of Regents, and information and directions to facilitate the preparation and approval of plans and specifications for the construction of school buildings. Much unnecessary trouble and delay in the examination and approval of plans and specifications could be avoided if the requirements for school building construction were better understood and observed. In the following pages, briefly stated, will be found legal requirements and points to be given special attention in the preparation of plans and specifications.

I

STATUTE RELATING TO SCHOOL BUILDING  
CONSTRUCTION

Article 16 of the Education Law reads as follows:

Section 450 No schoolhouse shall be built on town line. No schoolhouse shall be built so as to stand on the division line of any two towns.

§ 451 Plans and specifications of school buildings must be approved by Commissioner of Education. 1 No schoolhouse shall hereafter be erected, repaired, enlarged or remodeled in a city of the third class or in a school district, at an expense which shall exceed five hundred dollars, until the plans and specifications thereof shall have been submitted to the Commissioner of Education and his approval indorsed thereon. Such plans and specifications shall show in detail the ventilation, heating and lighting of such buildings.

2 The Commissioner of Education shall not approve the plans for the erection of any school building or addition thereto or remodeling thereof unless the same shall provide

a At least fifteen square feet of floor space and two hundred cubic feet of air space for each pupil to be accommodated in each study or recitation room therein.

b For assuring at least thirty cubic feet of pure air every minute per pupil, and

c The facilities for exhausting the foul or vitiated air therein shall be positive and independent of atmospheric changes.

3 No tax voted by a district meeting or other competent authority in any such city or school district, exceeding the sum of five hundred dollars, shall be levied by the trustees until the Commissioner of Education shall certify that the plans and specifications for the same comply with the provisions of this section.

§ 452 Halls, doors, stairways, staircases etc. 1 All schoolhouses for which plans and detailed statements shall be filed and approved, as required by the preceding section, shall have all halls, doors, stairways, seats, passageways and aisles and all lighting and heating appliances and apparatus arranged to facilitate egress and afford adequate protection in cases of fire or accident.

2 All exit doors shall open outwardly, and shall, if double doors be used, be fastened with movable bolts operated simultaneously by one handle from the inner face of the door.

3 No staircase shall be constructed with winder steps in lieu of a platform but shall be constructed with straight runs, changes in direction being made by platforms. No door shall open immediately upon a flight of stairs, but a landing at least the width of the door shall be provided between such stairs and such doorway.

§ 453 Fire escapes. 1 All school buildings in the State, except in the city of New York, that come within either of the following classifications shall be equipped with exterior fire escapes as herein provided:

- (a) All school buildings that are more than three stories in height;
- (b) All school buildings that are three stories in height and not of fire-proof construction, at least up to the third floor, or that have not sufficient and satisfactory stairways located, planned and constructed in accordance with the rules and regulations established by the Regents of The University of the State of New York;
- (c) All school buildings that are two stories in height and not of fire-proof construction, when found by the Commissioner of Educa-

tion to present a fire hazard requiring the erection of fire escapes for the protection of the pupils.

Fire escapes shall be constructed of approved fire-proof material, in accordance with the best modern engineering practice as to stability and durability. Landings and treads shall be designed with sufficient openings to permit the passage of snow and facilitate cleaning. All roof eaves, gutters, ledges, or other projections above such fire escapes upon which snow or ice may accumulate shall be so guarded as to prevent water from falling upon the stairs or landings. Entrances to all fire escapes shall be through doors of at least six feet in height and at floor level. All doors to fire escapes shall be fitted with fixtures so that they are never locked to the occupants of the rooms but are always locked to those outside. All landing stairways must be inclosed on exposed sides and sections with wire mesh and approved gange. No schoolhouse upon which fire escapes are required as herein provided shall be erected, repaired, or remodeled hereafter until plans and specifications shall be submitted to the Commissioner of Education and his approval indorsed thereon. Such plans shall show in detail drawings the degree of inclination from horizontal, height of risers, width of tread, width of flight between hand rails, the capacity of landing and all other construction details.

2 It shall be the duty of the trustee or board of education having charge of said school buildings to cause such stairways to be constructed and maintained, and the reasonable and proper cost thereof shall in each case be a legal charge upon the district or city, and shall be raised by tax, as other moneys are raised for school purposes. [Section 453 amended by L. 1923, ch. 402, in effect May 21, 1923.]

## II

### RULES ON BUILDING CONSTRUCTION ADOPTED BY THE BOARD OF REGENTS

In accordance with the authority conferred by article 3, section 46 of the Education Law, the Board of Regents has adopted the following rules:

§ 680 Submission of plans and specifications. Plans and specifications for the erection, repair, enlargement or remodeling of a schoolhouse, required to be submitted to the Commissioner of Education for his approval as provided in section 451 of the Education Law, shall be submitted in duplicate; one set shall be placed on file in the Education Department and the other returned to the trustee

or board of education submitting such plans and specifications, with the approval of the Commissioner of Education indorsed thereon. Alterations or addenda to plans and specifications so approved by the Commissioner of Education shall also be submitted to the Commissioner of Education in like manner and be approved by him before they become effective.

§ 681 Procedure on submission of plans and specifications. Plans and specifications for schoolhouses submitted as required by law shall be referred to the School Buildings and Grounds Division. It shall be the duty of such Division to advise with school officers and architects as to the sufficiency of such plans and specifications and the compliance with the provisions of law and the rules of the Regents as to the erection, repair, enlargement and remodeling of school buildings. Such Division shall carefully examine the proposed plans and specifications and if it be determined that they do not comply with the requirements of law or the rules of the Regents, the trustee or board of education of the district or city submitting such plans shall be notified in writing, which notice shall contain a statement specifying in what respect the proposed plans and specifications do not conform with the law and rules. The Director of the School Buildings and Grounds Division shall cause a copy of such notice and statement to be filed in the office of the Commissioner of Education. If the trustee or board of education of the district or city submitting such plans is aggrieved at the action of the School Buildings and Grounds Division in disapproving such plans and specifications, such trustee or board of education may present a complaint in writing to the Commissioner of Education. On the presentation of such complaint the Commissioner of Education shall review the action of the School Buildings and Grounds Division and direct as to the action which shall be taken as to such plans and specifications.

§ 682 Recommendations as to school buildings. The Commissioner of Education shall cause to be prepared instructions and recommendations for the use and guidance of trustees and boards of education and of architects in the preparation of plans and specifications for the erection, repair, enlargement and remodeling of school buildings. Before such recommendations or instructions are printed and distributed they shall be submitted to the Board of Regents for its consideration. If approved by the Board, they shall become effective and shall be published and distributed as a bulletin of the Education Department.

§ 683 Requirements as to construction. In addition to the requirements prescribed by sections 451, 452 and 453 of the Educa-

tion Law, plans and specifications for the erection, repair, enlargement or remodeling of school buildings shall meet the following requirements:

1 The products or commodities required to be used by such plans and specifications shall not be limited to those manufactured by any specified manufacturer. In naming the standard the specifications must be so worded as to permit the use of the products or commodities of any manufacturer which are deemed of "equal standard" in the common acceptance of the term.

2 The heating and ventilating specifications shall contain a guarantee of performance with the following minimum standards: a temperature of 70 degrees Fahrenheit in zero weather; 30 cubic feet of fresh air per minute per pupil (statutory requirement); and 35 per cent humidity.

3 Special conditions which are prescribed respectively for a central fan system and for a unit system of heating and ventilation shall be clearly shown and definitely covered in the plans and specifications.

4 Toilet ventilation must be separate and distinct from the ventilation for study, class, recitation and work rooms.

5 One-room school buildings may be heated and ventilated by an approved room heater. In buildings of a larger size a cellar, basement or separate building or room must be provided for the furnace or boiler.

6 The points of compass shall be clearly and accurately shown upon the plans. Provision shall be made for the lighting of classrooms and study rooms from one side only, that is from the left of the pupil. The window area must be equal to at least one-fifth of the floor area. Windows shall be grouped as closely together as possible, and where practicable not over 6 inches apart, and shall extend as near as may be to the ceiling. No windows shall be placed within 6 feet of the front of the room unless it be shown to be essential. All rooms used as class or study rooms for pupils shall be so oriented that they will be thoroughly flushed out with sunlight during some portion of the day.

7 All plumbing must conform to commonly accepted standards for public work. The main toilets shall be located in rooms above the ground level, and if possible should be on each floor of the building. There must be at least one unit for twenty-five pupils. Adequate provision must be made for ventilation of toilets. Plans will not be approved unless provision is made for adequate sanitary toilet facilities. Where plans for sewage disposal systems are submitted,

copies thereof must be submitted at the same time to the State Engineer for his acceptance.

8 Fireproof material shall be used when necessary to avoid fire hazard, so far as conditions will permit. All heater and fuel rooms must be protected by fire walls and specially constructed ceilings. Heater, fuel and store rooms shall not be permitted under stairways. Buildings with two or more stories shall have more than one exit from each floor above the first, so placed and constructed that one may be used if the other is shut off by smoke or fire.

9 The plans and specifications for a new school building shall be accompanied with a map and description of the site upon which the building is to be erected, which shall indicate the location and distance of surrounding buildings. The Commissioner shall withhold his approval of all plans for new buildings if it be determined upon investigation that the site is unsanitary, insufficiently or improperly drained, not of sufficient size to provide for required outdoor activities of the pupils of the school, or is so situated as to surrounding buildings that there will be an unreasonable obstruction of light and air.

10 In plans and specification for a new school building, provision must be made for one or more library rooms if a librarian is to be employed.

11 Provision shall be made in plans and specifications for new school buildings so that all the pupils in the school may be accommodated in a general assembly room. Provision shall also be made in such buildings for facilities sufficient for carrying out the provisions of the physical training law and the rules and regulations of the Board of Regents pursuant thereto.

12 Plans and specifications must show and properly describe suitable facilities for drinking purposes.

13 In classrooms and study rooms the aisles must run the long way of the room. The entrance door to a classroom shall, if possible, be located in the end near the teacher's desk.

### III

#### INFORMATION AND DIRECTIONS TO FACILITATE PREPARATION AND APPROVAL OF PLANS

##### Sites for New Buildings

In the selection of sites, in addition to meeting the requirements prescribed by the Board of Regents of the University, due attention

should be given to accessibility, geographic centrality, centrality of school population, population trends and freedom from objectionable surroundings.

##### Plans and Specifications

Plans and specifications for new buildings and alterations or additions costing more than \$500 must be submitted<sup>1</sup> in complete form in duplicate for approval by the Commissioner of Education.

Alterations or addenda to plans and specifications so approved by the Commissioner of Education shall also be submitted in like manner and be approved by him before they become effective.

Drawings must be on paper not more than 36 inches wide, and one copy of the specifications must be in black and white. When submitted these are to be accompanied by an application form properly filled out. (Application blanks will be furnished upon request.) The Department welcomes school officials and architects who are desirous of a conference to talk over requirements relating to school building planning, or to present preliminary sketches for criticism and advice. It is found that the submission of preliminary sketch plans often provides a means for criticism which saves valuable time in the approval of the completed plans and specifications.

A map and description of the site and surroundings and a block plan of the building at correct scale and correctly located are required.

The points of the compass must be clearly and accurately shown either on the floor plans or on the block plan or on both. This is one of the first points to be considered in the examination of plans.

It is required that plans and specifications for heating and ventilating, plumbing work and electric lighting shall be submitted with those for general construction.

##### Sewage Disposal System

Plans and specifications for sewage disposal systems must be submitted to the State Engineer for acceptance prior to the approval of the building plans. The approval by the Commissioner of Education of plans and specifications for a school building shall not be construed as an approval of any sewage disposal system.

##### Classrooms

A width of 22 feet between walls will provide space for five rows of single desks and six aisles. Classrooms should be rectangular in plan, with the windows at the left of the pupils, the walls at the

<sup>1</sup> Plans and specifications should be addressed to the Director of the School Buildings and Grounds Division, State Department of Education, Albany, N. Y.

right and front reserved for blackboards. The following dimensions are recommended:

For 40 pupils, 22 feet by 30 feet by 12 feet

For 35 pupils, 22 feet by 27 feet by 12 feet

For 30 pupils, 22 feet by 24½ feet by 12 feet

For rural schools it is sometimes advantageous to provide rooms of less width and height. The following dimensions are recommended for such cases:

For 32 pupils, 19 feet by 30 feet by 11 feet, 4 inches

For 28 pupils, 19 feet by 27 feet by 11 feet, 4 inches

The statute requires for classrooms and study halls a minimum of 15 square feet of floor space and 200 cubic feet of air space for each pupil.

#### Windows

Classrooms, study halls and recitation rooms shall be lighted from one side, the left of the pupils when seated. The window glass area for such rooms must equal one-fifth of the floor area. The distance from the forward corner of the room to the jamb of the first window shall be 6 feet where possible, in no case less than 4 feet. The top glass line of windows shall be located at a height above the floor equal to, or exceeding, one-half the width of the room.

Windows shall be grouped together as closely as possible, and where practicable shall be separated by mullions not more than 8 inches in width, except where structural support is needed, when mullions of 12 inches or piers 12 or 16 inches wide will be allowed. A broad pier located between windows in classrooms or study halls must be avoided.

#### Orientation

It is important to give much attention to the orientation of the building so that classrooms and study halls, and as far as possible, recitation rooms will be lighted from the east or west. North light is not approved for these rooms; and south light should be avoided if possible. Rooms for administration, assembly or other special purpose rooms can well be located to utilize north and south light. Rooms for classes in drawing should preferably have north light.

#### Doors and Exits

Halls, doors, stairways, seats, passageways and aisles, and all lighting and heating appliances and apparatus shall be arranged to facilitate egress and to afford adequate protection in case of fire and accident.

Classroom doors should be located if possible at the end of the room near the teacher's desk and should swing into the room. It is recommended that the upper panels of these doors be glazed with either clear or obscure glass.

All exit doors, auditorium, assembly hall and gymnasium doors shall swing outward. Panic bolts must be used on all double doors. Assembly rooms and gymnasiums shall have one or more emergency exits opening directly out of the building. Where playrooms, shops or other rooms used by pupils are located in a basement, there shall be one or more exits from the basement, easy of access and independent of stairway exits.

#### Corridors

The width of corridors should be from 8 feet to 10 feet, according to conditions, and should not have projecting features, such as drinking fountains (they can be partially recessed into the wall), radiators or deep pilasters.

They should be abundantly lighted by large windows at the corridor ends. Partition sash in the classroom partitions for the purpose of lighting the corridors are not approved. The ends of corridors terminating at the outside walls of the building should not be used for rooms unless the separating partition is of glass which will admit ample light to the corridor. Partitions when used to separate corridors and stairs should be glazed with wire glass. Lockers if located in corridors should be built into the wall in such a manner that their fronts shall be flush with the face of the wall, and that there shall be a solid base below lockers not less than 4 inches in height.

#### Stairs

Buildings with two or more stories shall have more than one stairway exit from each floor above the first, so placed and constructed that one may be used if the other is shut off by smoke or fire. They should be so located that there may be direct exit from the building at the ground floor level. In the basement the stair halls should be inclosed with fireproof partitions and doors.

Staircases shall be constructed with straight runs, changes in direction being made by platforms. No arrangement of stair treads known as winders will be approved. All stairways used by pupils shall have handrails on both sides.

The height of risers of exterior steps (except fire escapes) and interior stairs shall be 6 inches for elementary schools and 6½ inches for high schools. Treads in either case shall be not less than 11 inches from face to face of risers.

The width of a door must intervene between any doorway and the first step of a stairway.

The width of stairs should be not less than 44 inches and it is not advisable that the width be greater than 60 inches between rails. Stairways of larger proportions having greater width should have a center handrail in addition to those on each side.

There should be as few as possible entrance steps exposed to the weather. In cases in which the height from ground to main floor makes necessary a number of risers it is recommended that the greater number be located within the building.

#### Physical Training and Assembly Room

In complying with the rules of the Board of Regents, suitable provision must be made for physical training and general assembly. The assembly room should have sufficient seating capacity to accommodate the entire school. The provisions for physical training may take the form of a cleared space on the level floor of the assembly room or a special room for this purpose.

In a combination assembly room and gymnasium, provision should be made for the handling and storage of the assembly chairs, preferably on trucks which can be stored under the stage or in store-rooms at one side.

In larger high schools it will generally be found advantageous to provide separate gymnasiums and auditoriums. A combination auditorium and gymnasium with single movable partition between is not favored and under conditions usually presented can not be recommended for approval.

#### Library

When a school librarian is employed (required in high schools having an enrolment of 50 pupils or more) there shall be provided one or more library rooms. If for a school library they should be located in communication with or in close proximity to the study hall. If designed as a public library the rooms should be near one of the principal entrances. Shelving and book space should be provided to meet the estimated needs of the school.

#### Cupboards and Bookcases

Each classroom should be provided with suitable cupboard or closet for supplies and property; and when a school is without a library room, each classroom should have one bookcase, containing approximately 16 running feet of book shelves, with dust-tight back and glass doors.

#### Lockers and Wardrobes

Provision should be made in high schools for individual lockers located in well-lighted and well-ventilated spaces. Where the physical training, gymnasium and athletic work require, there should be also provided for each sex a suitable number of gymnasium lockers, conveniently located and connected with the shower rooms.

Elementary classrooms should have wardrobe rooms or built-in wardrobes connected with each room with ample space to provide accommodations for the maximum room capacity. These should be ventilated and equipped with coat hooks, hat and book shelf, and suitable means to care for umbrellas. Wardrobes should be located at the rear of the classroom where possible.

#### Laboratory Service

The equipment for laboratories, home economics and manual training work is generally furnished under contracts other than the general construction. It is important, however, that the architect provide for the special electric wiring, water, gas and sink waste pipes which will be required and have them installed to such local points as will permit connections to be made easily.

#### Toilets

The main toilets must be in rooms above the ground level and, if possible, on each floor. There shall be at least one toilet for each 25 pupils (one closet and one urinal for each 40 boys), one lavatory for each 50 pupils. Toilet rooms for pupils must be outside rooms, well-lighted and well-ventilated and shall be so planned that there will be an anteroom between the toilet fixtures and the corridor. If necessary the lavatories may be located in this anteroom.

Where water is available from mains or can be had from wells by the installation of an automatic pump and pressure tank, the flushing type of toilets must be installed.

Plumbing must conform to the commonly accepted standards for public works, and local ordinances, if any, shall be observed.

For small rural schools and temporary buildings the chemical system or L. R. S. system of toilets will be approved when properly installed. These systems should include one tank of the required capacity for each toilet room, one or more closets with substantial hinged and well-finished hardwood seats and covers, galvanized or enameled sheet metal ventilating pipes from each closet to an approved type of sheet metal roof ventilator, a leaching cesspool or a subsoil drainage system for the disposal of the contents of the tanks.

and the necessary vitrified tile drains between tanks and disposal unit. Where required, the tanks shall be equipped with a durable and efficient agitator operative from the toilet room and, if not self draining, an emptying or blow off valve easily accessible. Cesspools and subsoil drains should be located 25 feet or more from the building, should be in loose (preferably sandy or gravelly) soil, and should not be near a well or other source of water supply.

#### Drinking Fountains

Where running water is available, there should be provided on each floor one or more approved type of sanitary drinking fountains. When located in corridors in positions tending to impede exit, they should be recessed into the walls.

#### Blackboards

Natural black slate having a clear surface with what is known as hand-shaved, or rubbed, velvety smooth finish is the most satisfactory and permanent material for blackboards. Each classroom and recitation room should have blackboards on the walls in front of and on the right of the pupils, aggregating approximately 40 running feet for a 40-pupil room, and in proportion for smaller rooms. Blackboards should be provided for study halls, laboratories and other special rooms as may be required by the character of the work conducted in these rooms.

Slate blackboards are produced and carried in stock in width of three feet, four inches; three feet, six inches; and four feet. The width of three feet six inches is recommended for general use. The proper height from the floor to the chalk trough is:

Kindergarten .....	24 inches
First, second, third grades.....	24 to 26 inches
Fourth, fifth, sixth grades.....	28 to 30 inches
Seventh, eighth grades.....	36 inches
High schools.....	36 inches

The height of blackboards should be determined before contractor's work becomes advanced so that alterations, with the resultant added cost, may be avoided.

Cork boards when desired should be located in a 4-foot section of the blackboard frame near the room entrance.

#### Picture Molding

Picture molding should be erected in each classroom, study hall, corridor and administrative room, located at a height varying from 24 inches to 18 inches below the ceiling.

#### Miscellaneous

Steel or other sheet metal (except for repair work), or matched and beaded wood should not be used for a finishing material on walls and ceilings of school rooms. Wood not exceeding 4 feet in height above the floor is on occasion suitable for wainscoting.

Deep exposed or cased girders in classrooms are not approved.

Walls and ceilings of rooms should be finished with hard, durable wall plaster, troweled smooth. Metal lath is recommended in all places where lathing is required for the application of plaster. It is especially necessary on ceilings to guarantee permanency of the plaster work, and it should be used over all sheet metal warm air flues in partitions.

Heater and fuel rooms must be inclosed with fire walls, and the ceilings, if not of fireproof material, shall be finished with portland cement plaster three-quarters of an inch thick or more, applied to wire or sheet metal lath. Doorways from heater and fuel rooms must be closed with metal clad or other form of fireproof door and frame.

Boiler rooms should be of sufficient size to permit of future expansion, and also to provide light and space for comfortable attendance of the plant. Ample space should be provided for the removal of ashes.

No store room, heater room or fuel room is permissible under stairways or in any locality where such a room would create a fire hazard.

Fireproof material shall be used when necessary to avoid fire hazard, so far as conditions will permit.

All heat and ventilating flues must be so planned that they will not project into classrooms. They must be constructed of sheet metal or fireproof partition material finished smooth on the inside. When of metal they shall be concealed in the partition work of finished parts of the building. Poor air flues or registers must not discharge into a nonfireproof attic space. They shall be continued in metal to the roof ventilator or discharge into a fireproof air chamber in the roof space.



On account of the risk, storage should not be provided in the building for large quantities of bituminous coal. Fires are frequently traceable to spontaneous combustion of soft coal.

Products must not be limited to the output of one manufacturer. When a standard is named, the specifications must be so worded as to permit the use of the products of any manufacturer which are deemed of equal standard in the common acceptance of the term.

Due attention should be given to the relative floor space devoted to instruction, circulation, administration and structural features to the end that the maximum percentage of space may be devoted to instruction.

Drawings and specifications should show and state clearly all essentials necessary to complete the building in order to avoid misunderstandings which often result in compromise or extra costs. A good quality of craftsmanship and material should be insisted upon in order to insure the maximum permanency of building construction.

Steel sash when used must have jamb and mullion members of a form which will permit of the proper attachment of window shade fittings and provide for at least 1 inch side lap of the shade cloth outside the glass line. Pivots or hinged casements of all types of sash shall open in such a manner as not to interfere with the operation of window shades.

In this climate water is one of the destroying elements (particularly when combined with freezing); and it is recommended that specification requirements for roofing and exterior wall construction receive particular attention, and that subsoil be drained at exterior walls when the need is apparent.

The contract made by a school board with an architect for construction work should be in writing and should be safeguarded with the following provisions:

It should be agreed that any modifications or redrafting of plans when necessary to bring the contract price within the appropriation will be made without additional charge to the district.

No payment should be due the architect until he furnishes approved plans of a building that can be constructed within the appropriation.

#### Fire Escapes

In compliance with the Education Law relating to the erection of fire escapes, the following items should be observed:

They must be constructed entirely of wrought iron or soft or medium steel in accordance with the best engineering practice as to stability and durability.

No bar material less than one-fourth of an inch thick shall be used in construction of any fire escape.

Balconies, landings and stairs shall be designed and constructed to carry a load of 100 pounds a square foot with a factor of safety of 4.

Handrails should be of 1½-inch standard pipe and shall be placed on both sides of all flights. They shall be set not more than 2 feet vertically above the nose of treads. If the width of the stairway is more than 5 feet, center handrails must be used. Handrails must be turned into walls at ends.

Platforms and stairs shall consist of flat bars either on edge or on the flat. Bars on edge shall not be less than 1½-inch by ¾-inch and placed not greater than 1¼-inch on centers. Bars on the flat shall be 1½-inch by ¾-inch and placed not greater than 1¼-inch on centers.

For elementary and intermediate schools no step shall have a rise of more than 6¾ inches or a tread less than 8 inches; for junior and senior schools the rise shall not be more than 7½ inches and the tread shall not be less than 9 inches.

Floor platforms shall be at least 30 inches in width and placed below the floor level at least 3 inches and not greater than 6 inches. Platforms in the course of the run of stairs shall be 4 feet in the direction of travel if possible. All platforms must have an unobstructed width equal to the width of the stairs.

No single flight shall consist of more than sixteen risers without a landing nor shall there be less than three steps to the flight.

Platforms and landings shall be designed of capacity required to receive traffic from the several levels at which they are placed.

All windows opening within vertical lines 5 feet outside of the extreme line of stairs or landings shall be glazed with wire glass. Glass in doors opening onto fire escapes below the first landing must also be so glazed.

All landings and stairways must be either inclosed by wire mesh after the Boston School House Commission type or with wire mesh extending not less than 5 feet vertically above landing and front edge of risers, or less than 3 feet, 10 inches on a line perpendicular to the angle of string from the upper angle of steps. Wire shall not be less than 10 standard gauge with 2-inch diamond mesh, or less than 12 standard gauge with 1½-inch diamond mesh, supported by and securely fastened to framework of rolled shapes designed to resist any possible outward pressure.

Doors shall not be less than 2 feet, 6 inches in width and 6 feet in height and must open outward. If the opening is 5 feet or more in width double doors with panic bolt must be used.

Brackets for a 30-inch platform when placed not more than 4 feet apart shall be made of not less than 1-inch square bars or 2-inch x 2-inch x 3/4-inch angle iron. Each bracket shall be fastened at the top to the wall by a through bolt (at least 1-inch in diameter), nut and washer (at least 4 inches square). The slope of the lower bracket bar shall be not less than thirty degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

Full detailed drawings and specifications of fire escapes, together with floor plans of buildings upon which they are required, must be submitted in duplicate as a condition precedent to their consideration for approval.

It shall be the duty of boards of education to have fire escapes painted as often as may be necessary to prevent corrosion, at least once in from 3 to 5 years.

#### Strength of Materials

The Department does not assume responsibility for structural design or for the strength of materials proposed to be used. Local building ordinances and codes must be observed when in effect.

In the absence of local building regulations it is recommended that the floor and roof construction be designed to safely sustain live loads as provided for in the building regulations of any one of the cities of New York, Rochester or Buffalo given below.

#### Live loads in pounds per square foot

	NEW YORK	ROCHESTER	BUFFALO
Assembly halls .....	100	100	{ fixed seats 80 movable seats 100
Gymnasiums .....	100	.....	100
Corridors .....	100	75	80
Stairs .....	100	100	100
Class and study rooms { fixed seats .....	75	70	50
{ movable seats .....	75	70	80
Other floors .....	75	70	.....
Roofs .....	40	40	30

<sup>a</sup>The city of Rochester requires for boiler room roofs 150 pounds, coal room roofs 300 pounds, and fan room roofs 60 pounds per square foot; and in addition, provision to carry concentrations of piping.

#### Classification of Buildings as to Fire Hazard

*Class A* Buildings constructed entirely of fireproof materials with the exception of windows, doors, standing trim and finish flooring of classrooms for which wood may be used. Stairs and floor surfacing in rooms other than above to be of fireproof material.

*Class B* Buildings having exterior and interior walls, stairways and the entire first floor construction of fireproof material; but with wood floor and partition construction elsewhere, wood roof construction, and wood for windows, doors, standing trim and finish floors.

*Class C* Buildings having exterior masonry walls throughout and interior masonry walls in basement, and fireproof construction around fuel and heater rooms, but otherwise of wood construction with fire stops in all partitions.

*Class D* Buildings having masonry basement and foundation walls but otherwise of frame construction with firestops in stud walls and partitions, and the heater and fuel rooms inclosed with fire-resisting materials.

(A plus, A minus, B plus, B minus may be used to denote further discrimination in classification.)

#### Heating and Ventilation

Heating and ventilating systems must be so designed and installed that when properly adjusted and operated they will meet the following requirements; and the specification must contain a performance guaranty clause specifically setting forth these minimum standards: Heat all rooms to a temperature of 70 degrees Fahrenheit in zero (10 degrees below in northern counties) weather; furnish 30 cubic feet of pure air per minute per pupil to all classrooms, recitation rooms, and study halls; and maintain in these rooms a relative humidity of 35 per cent.

Toilet rooms shall be thoroughly ventilated by means of a motor driven exhaust fan or by connection, through ventilating flues, to an approved and efficient type of roof ventilator. Toilet ventilation (and hood vents from laboratories) must be separate from the classroom system. Where indirect heating systems are used, the capacity of the foul air flue from toilets must exceed that of the warm air supply.

It is recommended that the ventilation of assembly halls be equal to four or more complete changes of air an hour.

Special conditions prescribed respectively for central fan, unit ventilator, gravity and other indirect systems of heat and ventilation must be clearly shown and definitely covered in all plans and specifications.

Forced ventilation systems must be so designed as not to produce draughtiness in the rooms, and the tempering stacks for heating the air supply must be sufficient to raise the temperature of the air, in zero weather, above the required room temperature.

In a combined direct and indirect steam system in which either central fans or unit ventilators are used, known as a "split system," recirculating devices are not necessary or favored. There should be means provided to close the cold air openings at night and at other times when the building is unoccupied.

**Central fan systems.** In addition to general requirements elsewhere stated, heating and ventilating systems with central fan are expected to meet the following conditions:

Fresh air tempered to meet requirements must be admitted through ducts in interior or protected walls with grill openings at least 7 feet above the floor.

The fan must be of sufficient capacity to furnish the required amount of air while running at a moderate speed. It must be free from objectionable noise, and the fan housing should be connected to the main duct by means of an air-tight canvas connection or its equivalent.

**Unit systems.** Unit systems are expected to meet the following conditions:

The unit must be contained in a strong, rigid metal case, which if exposed to view shall be neatly finished. The radiator must be of a kind and weight of material to insure durability and an adequate amount of radiating surface to provide the required quantity of fresh air at a minimum temperature of 80 degrees when the outside temperature is zero.

Air circulation must be maintained by a motor driven fan free from disturbing noise when in operation, and the outlet must be so constructed that the air velocity can be readily measured by anemometer. The velocity of air should not exceed 125 feet a minute for each foot of distance from outlet of ventilator to the ceiling.

Speed regulators are not recommended. Every fan should be regulated from a rheostat on the switchboard; and, when adjusted to meet requirements, should be locked and not changed again without official permission.

A mixing damper either automatically or manually operated must be provided. Recirculating devices are not favored.

In new buildings the units should be installed either in a recess in the wall of the room or below the window sill.

Every type must be officially approved before being specified. An installation made otherwise is subject to removal at the manufacturer's expense if upon official test it fails to meet the prescribed requirements.

**Warm air heaters.** Warm air systems, either gravity or fan types, are expected to meet the following conditions:

These systems, being entirely indirect, must deliver the required amount of pure air (from outside the building) and heat it as required to maintain the room temperatures. Each flue to classrooms, study halls and assembly rooms shall be equipped with a mixing damper or device, operative from the room, by which cold air can be admitted with the heated air to regulate the room temperature without reducing the volume.

The cold air supply should if possible be taken through openings 6 feet or more above the ground. The connecting chambers and ducts between this opening and the heater casings should be either sheet metal or masonry.

Dampers or doors should be provided whereby the outside cold air opening may be closed and the air recirculated at night and at other times when the building is unoccupied.

Warm air shall be conducted from heater to rooms through sheet metal or masonry flues which shall have volume and regulating dampers to adjust the flow of air. Metal ducts inclosed in frame construction shall be covered with at least two thicknesses of asbestos paper as a safeguard against fire from overheating. It is also recommended that the exposed metal warm air ducts be covered in like manner to prevent loss of heat and to save fuel.

The furnaces or generators shall be inclosed in masonry or an insulated casing of sheet metal. They shall have ample grate and radiating surface to heat the building without forcing, an extra deep ash pit, and shall be equipped with a humidifier that should be automatically supplied with water.

The requirements for size of fan and the location of flues and registers are the same as for central fan systems. A base register or floor register located in hall or corridor will be permitted as a foot-warmer.

**Room heaters.** In rural school buildings having one classroom, an approved ventilating room heater is recommended. It should be so located that it will not interfere with the proper supervision or use of the room; and shall be complete including chimney connections, fresh air intake, water pan for humidifying the air, and floor plate. The foul air is to be removed from the room by means of a flue built in the chimney or a metal flue extending from floor to

a sheet metal roof ventilator. These heaters must be guaranteed by the manufacturers to heat the classroom to a temperature of 70 degrees in zero weather, furnish 30 cubic feet of pure air per minute per pupil, and maintain a relative humidity of 35 per cent.

Room heaters can not be approved for new buildings having more than one classroom.

The use of common stoves, and warm air heaters of the type known as "pipeless furnaces" is not approved.

**Control and conditioning appliances.** The installation of any practicable, serviceable and reliable apparatus for the automatic control of temperatures, or equipment for filtering or washing the air is optional with the school authorities and will be approved by the Department.

Any conditioning apparatus the purpose of which is to treat the air removed from the school rooms and return it to the rooms, can not be considered by the Department as meeting the requirements of the Education Law relating to ventilation.

**Electrical installations.** All electrical wiring, apparatus or appliances for furnishing light, heat or power shall be in accordance with the current issue of the National Electrical Code.

Wherever electric current is available provision should be made for artificial lighting from this source.

Classrooms, recitation rooms, study halls and other rooms in which class work is conducted should be provided with overhead lighting of ample and uniform intensity of illumination at work places, and so distributed and shaded as to avoid harmful glare. Fixtures must be of such a pattern that the lamp is completely inclosed by a translucent shade. Bare lamp filaments produce harmful glare and for this reason should be covered.

Auditoriums, assembly halls and lecture rooms should be equipped with one or more electric wall or base outlets for stereopticons or motion picture projectors. When stereopticon equipment is to be used in classrooms a base outlet should be provided at the rear of the room.

In halls, stairways, passages to exits, etc., adequate intensity of light is necessary for safety. The use of special exit lights, on separate circuits, is recommended for marking all exits from assembly halls and gymnasiums having a seating capacity of 100 or more.

Switching and controlling apparatus should be installed at points of entrance to buildings, also in classrooms, hallways and wherever required in other parts of the building.

### Special Appliances

The installation of program, time clock and telephone systems is optional with the local boards of education. For large schools a program clock system and electric fire alarm system are recommended.

In order that the provisions of article 28 of the Education Law relating to fire drills may be properly complied with, it is required that in schools having 100 or more pupils there shall be installed a reliable alarm system or device which can be heard in all parts of the building.

Vacuum cleaning equipment is desirable but its installation is optional.

### Interior Decorations

The proportion of light reflected by walls and ceilings of various colors has an important bearing on both natural and artificial lighting. The reflecting factor of medium and dark greens and grays is below 50 per cent, while that of lighter colors varies from 65 to 75 per cent. It is recommended, therefore, in the painting of the walls and ceilings of classrooms, study halls and corridors that cream, light buff, light tan or similar colors be selected; and that the ceilings be of a light shade of the color used on the wall (white tinted with the side wall color would give good results).

Water paints should not be used. They spot easily and are quickly soiled. To avoid glare an oil paint that will dry with a dull flat or semifat finish is desirable. Such paints, ready mixed, may be readily obtained.

### Window Shades

Although direct sunlight is desirable in interiors from a hygienic standpoint, it is often necessary to diffuse it by means of window shades. Shades should perform several functions such as the diffusion of direct sunlight, the control of illumination to secure reasonable uniformity and the elimination of glare from bright areas out of doors or on blackboards.

To meet these requirements shades should be of a translucent, strong shade material preferably of a cream, ecru or light tan color, mounted on (a) two rollers at the center of the window, one of which may be pulled up by a cord running over a grip type pulley and the other pulled down; (b) a single roller with patent movable or adjustable fixtures.

A shade material containing a dense paintlike filler which renders it more or less opaque should not be used.

In rooms in which a stereopticon will be used or class work will be conducted requiring the darkening of the room, the windows should be equipped with an additional set of dark opaque shades hung on rollers at the top of the window and having a side and bottom lap of 2 inches if possible.

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