

● Commonwealth of Kentucky ●  
**EDUCATIONAL BULLETIN**

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REGULATIONS GOVERNING  
THE SANITARY AND PROTECTIVE  
CONSTRUCTION OF  
PUBLIC SCHOOL BUILDINGS

*By*

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Director of School Buildings and Grounds



Published by

DEPARTMENT OF EDUCATION

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Superintendent of Public Instruction

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## FOREWORD

The school code passed by the General Assembly at its 1934 session imposed upon the Superintendent of Public Instruction the duty of examining and approving or disapproving plans and specifications of school buildings to be erected by boards of education throughout the Commonwealth. (Section 4384-23.)

Section 4384-24, Kentucky Statutes, provides that the Superintendent of Public Instruction shall prepare or cause to be prepared and approved by the State Board of Education regulations concerning the sanitary and protective construction of public school buildings. Section 4399-48, Kentucky Statutes, requires that contracts for erecting school buildings and additions thereto shall be let to responsible bidders on the basis of competitive bids and in accordance with the plans and specifications prepared under rules and regulations of the State Board of Education.

In compliance with the statutes above mentioned, Mr. John W. Brooker, Director of School Buildings and Grounds, has prepared this number of the Educational Bulletin. This brings together important information which should be observed by all boards of education throughout the Commonwealth in constructing and repairing school buildings in order that the health of the children may be protected and that there shall be secured for them more adequate learning conditions.

JAMES H. RICHMOND,  
*Superintendent of Public Instruction.*

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## BULLETIN ON SCHOOL BUILDINGS AND GROUNDS

### I. Introduction

Public education is a state function, so fixed by the tenth amendment to the Federal Constitution, as one of the unnamed powers reserved by the states. Each state, in turn, places certain responsibilities on the authorities of local units or districts of the state varying in size and population. In Kentucky there are slightly more than three hundred such districts. The duties and responsibilities placed upon the local authorities in these districts are many and varied. Among others there are problems of finance, personnel management and of furnishing proper sites and school buildings. No one of these problems may be singled out as being the most important but each must be considered in the light of the others. The solution of any one of these problems is dependent upon thorough research and investigation, not only in the particular field but also in all related fields.

This bulletin is concerned with but one of the problems set out above, namely, that of providing adequate school grounds and school buildings. It will be the purpose of this bulletin to trace briefly the development of school building architecture in the State of Kentucky and to present a set of standards or minimum requirements in accordance with Section 4384-24 of the Kentucky Statutes, to govern school-house construction in the State of Kentucky. The latter part of the bulletin will be given over to a discussion of the work of the Division of School Buildings and Grounds of the State Department of Education.

### II. The Evolution of School Building Architecture in Kentucky

*Influence of church architecture.* The origin of school building architecture in Kentucky is found in church edifices. This is quite natural since the early schools of the state were often held in the community church. As the community grew and the enrollment of the school increased more attention and thought were given to the planning of the school in order that the physical health of the children might be preserved and, as a result, separate log houses fashioned largely after the church, were built. However there are today a few instances in the state where schools are still being conducted in church buildings. Evidences of the influence of church architecture may also be seen in many of our modern schools. The belfry and the platform in the teachers' end of the classroom, both of which are found in many of our schools, are such.

*Early attempts at state assistance.* A careful study of the annual reports of the State Superintendent of Public Instruction reveals that Superintendent R. T. Dillard, in his report for the year 1845, made first mention of the condition of the school buildings of the state. Superintendent Dillard decried the general type of architecture employed and urged that school children be surrounded with conditions conducive to good health. However, no suggested plans accompanied his report for this year, which reads in part as follows:<sup>1</sup>

“The act of last session, requires me to present ‘a plan of School Houses, and their internal arrangement.’

“From actual observation, there are very few School Houses in the state, fit for purposes of instruction. One general fault prevails in all parts—and that is, they are too small, built without taste, and almost without form, of the most indifferent materials, and very often on the most ineligible sites—very generally on the public roads, where the children are permitted to gaze through the little prison windows, on any one who passes by. Even in wealthy neighborhoods, where the children at home walk on carpets, and sit on ottomans, the School Houses are often miserable shanties, not calculated to inspire one generous thought. Comfort ought to be consulted in the school room, as well as in the family mansion. Hence, the School House should be so constructed as to be warm in winter, and cool in summer. The present plan of School Houses is the very adverse of this—are cold in winter, and hot in summer. School Houses should be built with an eye to health, as well as convenience and comfort.” \* \* \*

The next superintendent to touch on the need for better school buildings in the state was R. Richardson in his report for the year ending December 31, 1859. In his report for that year Superintendent Richardson expresses regret at the lack of detailed information at the State Department of Education concerning the character and condition of the schools of the state. A portion of his report dealing with schoolhouses follows:<sup>2</sup>

“A want of proper returns touching the number and condition of the district school-houses in this state, is one of the greatest defects in the existing system; and, as far as practicable, this department will exert its influence, hereafter, to supply it. Full and complete reports of their various school edifices, classified as to quality and structure, are made annually in several states where the cause of popular education is not more prosperous than in ours. Information on this subject is of obvious necessity and importance. It is, of itself, an index pointing to the degeneracy or prosperity of the whole system.”

*Henderson's manual.* Superintendent H. A. M. Henderson in his annual report dated October 15, 1872, gave the first detailed statement of the condition of the school buildings in the state. In his interesting report for that year Superintendent Henderson denounced

<sup>1</sup> Report of the Superintendent of Public Instruction, 1845, p. 589.

<sup>2</sup> Report of the Superintendent of Public Instruction, 1859, p. 26.



the type of school building and furniture employed in many of the school districts at that time and suggested that a hygienic and comfortable building could be erected at no greater expense. Superintendent Henderson supplemented his report with a discussion of correct models for schoolhouses and offered several floor plans and renderings of the smaller buildings. In 1873 he published a manual of schoolhouse construction which, as far as can be determined, was the first publication of its kind put out by the State Department of Education of Kentucky. Most certainly it constituted a great step forward and served as a wonderful help to local boards of education in the planning of their school buildings.

Excerpts from Superintendent Henderson's report<sup>3</sup> for 1872 follows:

"In my travels through the state the past summer, I have seen many schoolhouses with not a single window glass in them. Those who understand the hygienic value of sun-light, in connection with proper ventilation, will perceive how disastrously the health of the children confined therein is affected. Many of the school-houses that I have seen have no seats, except backless ones, are made of slabs or puncheons, and these so high that the smallest children could not touch the floor with their feet. Think of the cruelty of confining tender urchins upon these hard seats, without pedal or spinal support, for six hours in the day! Nothing but a terror of the ferule or the birch could keep a little child quiet in such a condition; and to suppose that he studies is just as absurd as to postulate that you could mature a perfect school bill while empaled upon the inquisitorial rack. Every one has noticed, who has visited country schools, the many subterfuges resorted to by children to change places, by going to get a drink of water, by asking permission to stand by the fire-place, or to go out. This restlessness is caused by positive pain—all the more severe to children because of the sensitiveness of their bodies.

"Unchinked log houses, in which, upon a cold day, the ink cannot be kept from freezing, are hardly the places to keep a boy's blood warm in his veins. \* \* \*

"Generally the most uncouth place in the neighborhood—some treeless spot which can raise nothing to eat—is selected as the site of the school-house. Who has not seen it on a rocky eminence, or hillock of red clay—without a tree to afford a hospitable shade to house or playground, without a thrifty-looking shrub near by—with its bald, bleak, cold or hot, hard, hateful, repellant look, and felt what cruel mockery he sung, who 'wished he were a boy again?' \* \* \*

"I maintain that a tasteful, healthful, and comfortable school-house can be erected at as little expense as are those ungainly, life-destroying, education-defeating caricatures that so thickly dot and deform the state, and tend to defeat the great cause of Popular Instruction."

Despite Superintendent Henderson's efforts for better school-house planning and construction through the publication and distribution of his manual, he again expressed dissatisfaction with the status of the school buildings of the state in his final report made on June 30, 1879, after eight years of faithful service. He closed this final report with a strong plea for better schoolhouses, stating, "The

<sup>3</sup> Report of Superintendent of Public Instruction, 1872, p. 25.

state *can* compel the building of comfortable schoolhouses, furnished with seats and desks built upon physiological principles.’<sup>4</sup>

Henderson’s Manual of Kentucky School Architecture continued in use as a guide to local boards of education for years after the close of his administration. It would be impossible to begin to estimate the great influence which this manual had on school architecture. As late as 1887 Superintendent Joseph Desha Pickett referred to this manual as follows:<sup>5</sup>

“The law provides that—

‘When a schoolhouse is to be built the Trustees of the district may apply to the Superintendent of Public Instruction for specifications and plans of model school-houses, and the Superintendent may furnish the same, and the school-house may be built upon one or the other of the plans furnished—as nearly as the circumstances of the district will allow.’—Art. VII, sec. 8.

“For this purpose, there are on hand at this office several hundred copies of Henderson’s Manual of Kentucky School Architecture, 136 pages, 8 vo., with numerous plates and plans, and with specifications.’

*Recent publications.* No further mention is made of schoolhouses in the biennial reports of the Superintendents of Public Instruction until that of Superintendent J. G. Crabbe, for the biennium ending June 30, 1909. In his report of that date Superintendent Crabbe lists, among the publications of the Department, a bulletin on school buildings and grounds. His comments upon this bulletin follow:<sup>6</sup>

“There is a great demand among the school officers to furnish plans for school buildings especially for country school houses. With great care I have prepared this bulletin containing modern plans for one-room school house, a two-room house and a four-room building; instructions for heating, ventilating, lighting and equipping school buildings and for improving and beautifying the buildings and grounds; suggestions to teachers and boards of education; and a number of illustrations that will be valuable and helpful. These pages are not fanciful and theoretical, but entirely practical. Next to the Scriptures I want you to read this bulletin constantly. We must have better school houses and we must improve our surroundings. As you read these pages and reflect, will you not begin a local campaign along this line? Do something this year.”

During Superintendent V. O. Gilbert’s administration (1915-19) a bulletin on “School Architecture Kentucky” was prepared by J. Virgil Chapman and Mrs. V. O. Gilbert and published by the Department of Education. This bulletin of 238 pages contains many illustrations and floor plans of school buildings recommended at that time.

After the passage of Section 4388, Kentucky Statutes, Acts of 1924, requiring school boards to submit plans and specifications of buildings to the State Department of Education for approval, this work was usually delegated to the Division of Rural School Supervision. In the biennium ending June 30, 1925, (Superintendent

<sup>4</sup> Report of the Superintendent of Public Instruction, 1879, p. 151.

<sup>5</sup> Report of the Superintendent of Public Instruction, 1887, p. 208.

<sup>6</sup> Report of the Superintendent of Public Instruction, 1919, p. 3.

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McHenry Rhoads) reference is made as follows to the marked improvement in the type of school buildings in Kentucky.<sup>7</sup>

"We are glad to report marked improvement in the type of buildings. An unusually large number of excellent plans of buildings have been approved by this department the past year. The proper construction of school buildings, large and small, is now regarded by authorities as of vital importance. Matters of lighting, heating, seating, ventilation, sanitation and recreation are so closely related to the health and future usefulness of the child as to demand expert advice. The progressive states and cities find that it prevents unnecessary waste in money, material and misdirected effort—not to mention the conservation of eyes, health, happiness, efficiency and human life."

On July 1, 1930, the Division of School Buildings and Grounds of the State Department of Education was created for the purpose of assisting local boards of education with their school building problems. Detailed information concerning the work of this Division is given in the latter part of the bulletin.

### III. Statutes Relating to the Construction of Schoolhouses

Section 4384-23, Kentucky Statutes, reads as follows:

"Approval of School Building Plans.—The Superintendent of Public Instruction shall be furnished a copy of all plans and specifications for new public school buildings contemplated by boards of education and for all additions to or alterations of old buildings. It shall be his duty to examine or cause to be examined all such plans and specifications and to approve or disapprove the same in accordance with the rules and regulations of the State Board of Education. No board of education may award a contract for the erection of a building or contract for an addition to, or alteration of, an old building until the plan for the same has been approved by the Superintendent of Public Instruction."

Section 4384-24, Kentucky Statutes, reads as follows:

"Regulation of Sanitary Conditions.—The Superintendent of Public Instruction shall prepare, or cause to be prepared, and submit for approval and adoption by the State Board of Education regulations for the sanitary and protective construction of public school buildings, toilets, physical equipment of school grounds, school buildings and classrooms, regulations governing medical inspection, physical education, physical recreation, and such other rules and regulations as he may deem necessary or advisable for the protection of the physical welfare and safety of the public school children of the Commonwealth."

Section 4399-48, Kentucky Statutes, reads as follows:

"Contracts for New Buildings: Competitive Bids for Improvements, Repairs, and Supplies and Materials.—The contracts for the erection of school buildings and additions and repairs to buildings shall be made by the board of education after proper letting to the lowest and best responsible bidder complying with the terms of the letting, but the board may reject any or all bids. All necessary specifications and drawings shall be prepared for all such work, and competitive bids therefor shall be solicited by such advertisement as the board may determine; provided that it shall not be necessary to advertise for competitive bids on repairs not exceeding one hundred and fifty dollars (\$150). The board shall advertise in the method set out herein for bids on all

<sup>7</sup> Report of the Superintendent of Public Instruction, 1925, p. 30.

supplies and equipment which it desires to purchase and shall accept the bid of the lowest and best bidder for the supplies and materials, but the board may reject any or all bids; provided that it shall not be necessary for the board to advertise for competitive bids for such supplies and materials when the amount of the purchase does not exceed two hundred and fifty dollars (\$250)."

#### IV. Minimum Requirements for Schoolhouse Construction

*Purpose.* These minimum requirements for schoolhouse construction have been prepared in accordance with Section 4384-24, Kentucky Statutes, in order to furnish school officials, architects, engineers and contractors with such information and directions as will facilitate the preparation and approval of plans and specifications for the construction of school buildings in the State of Kentucky. Careful observance of the standards set up herein will not only eliminate unnecessary delay in the approval of plans but will also insure safer and more serviceable and sanitary school buildings for the children of the Commonwealth.

*The architect.* One of the most important problems to be met by a board of education contemplating a school building program is the selection of an architect. Too often the architect is selected because of local political influence or because of some relationship with the board of education. In many other instances the architect is selected because of a pretty picture of the proposed school building which he has presented or due to the fact that he has underbid his competitors. None of these factors should be considered of prime importance in the selection of an architect by a board of education. Certainly in considering relative merits the question of cut-rate fees should not enter; for example, a difference of a few dollars in fees may represent a difference in ability which will result in many times that amount in waste in the cost of the building, to say nothing of the effect on the quality and design.

The proper way to select an architect is very much the same way in which a lawyer or doctor is chosen, upon the basis of training, reputation and past performance and not upon the basis of competition. Every school building providing facilities for five or more teachers should be designed by a registered architect. Plans and specifications prepared by other than registered architects will not be approved by the Superintendent of Public Instruction, except in special cases.

*Regulations pertaining to the submission of plans for approval.*

1. Before undertaking a school building program the local superintendent or board of education should make a careful survey of the present and future school needs of the district. Upon invitation the State Department of Education will assist in this work in so far as its limited force will permit. The findings of such survey should be used as the basis for the planning of the building program and the following information must be submitted to the Department of Public Instruction before or along with the presentation of the preliminary sketches:



- a) A statement showing the amount of money legally available for use.
- b) A sketch of the school site showing the points of the compass, the size and shape, the location of trees and adjacent buildings, the highway or highways, the slope of the surface and the location of the proposed school in its proper position on the site.
- c) A statement showing the number of elementary school teachers, the number of pupils per elementary school teacher, the number of high school teachers, a schedule of the high school classes with the approximate number of pupils per class, the elementary school enrollment and the high school enrollment ten and five years ago, the possibility of future growth and consolidation and any additional information required by the State Department of Education.

2. Preliminary drawings showing the floor plans and front elevation should be submitted to the Superintendent of Public Instruction for criticism and advice.

3. Complete working plans and specifications must be submitted in duplicate, one set to be checked in accordance with the regulations of the State Board of Education and returned to the board of education, the other set to be filed in the offices of the State Department of Education.

4. No changes, except minor changes not in conflict with these regulations, shall be made in the plans and specifications after approval by the Superintendent of Public Instruction, unless such changes are shown on new drawings and specifications, duly submitted and approved.

5. Upon completion of the building, the board of education shall report to the Superintendent of Public Instruction the following facts: date of actual starting of construction, date of completion of the building, the total cost of the building, the cost per cubic foot and the cost per pupil based on enrollment.

6. In no instance may plans and specifications prepared and approved for a building to be located in one district be used in another district without the permission of the Superintendent of Public Instruction.

*The school site.* The selection and purchase of school sites is another most important problem to be met by boards of education. In the selection of a site for school purposes, due consideration should be given the following factors:

1. The site should be readily accessible from the main highways. The approach roads should be wide and usable throughout the year. They should not be widely traveled or subject to dangerous traffic.

2. The site should be of adequate size and form to provide ample playground facilities. The minimum size of school sites should be as follows:

- a) One-teacher elementary schools where growth is unlikely—1 acre.
- b) One-teacher elementary schools where growth is probable—2 acres.
- c) Elementary schools in rapidly growing communities—3 acres or more.
- d) Twelve-grade schools and high schools—10 acres.

SCHOOL SITES SHOULD BE APPROXIMATELY RECTANGULAR IN FORM

3. In general the long axis of the school building should be run north and south so that the majority of the classrooms may receive east and west light. This fact should be kept in mind when the site is selected.

4. Proper drainage at reasonable cost should be possible. A gentle, even slope away from the building location is preferable. Under no circumstances should a site be used that will receive surface drainage from surrounding areas. The site should be level enough, with reasonable preparation cost, for playgrounds and athletic fields.

5. The site should be free from disturbing noises, distracting influences and hazardous surroundings. A main street or highway with its constant noise and dangerous traffic is not a desirable frontage. Every precaution should be taken in order that the health, morals, safety and comfort of the pupils are not endangered.

6. A safe and sufficient water supply should be provided on the site.

7. Sites should be selected with definite relation to satisfactory disposal of sewage.

8. Whenever possible gas and electric service should be furnished at the site.

9. The site should be reasonably near the center of the sub-district. However, exact centrality may be sacrificed in the interest of any of the above factors.

*Plan in general.* The American Institute of Architects has grouped buildings under five heads as follows:

Type A—A building constructed entirely of fire resistive materials, including its roof, windows, doors, floors and finish.

Type B—A building of fire resistive construction in its walls, floors, stairways and ceilings, but with finish, wood or composition floor surface and wood roof construction over fire resistive ceiling.

Type C—A building with masonry walls, fire resistive corridors and stairways, but with ordinary construction otherwise, i. e., combustible floors, partitions, roof and finish.

Type D—A building with masonry walls but otherwise ordinary or joint construction and wood finish.

Type E—A building of frame construction with wood above foundation with or without slate or other semi-fireproof material on roof.

1. No school building of more than one story in height should be constructed of Type D or E.

2. The department does not assume responsibility for structural design or for the strength of materials proposed to be used. It is recommended, however, that each structural part of the building shall be of sufficient strength to provide for the minimum live load per square foot of floor area, as follows:

Assembly Halls .....	100 lb.
Gymnasiums .....	100 lb.
Classrooms .....	60 lb.



Corridors .....	100 lb.
Stairs .....	100 lb.
Roofs .....	30 lb.

3. The boiler and fuel room shall be of sufficient size to permit of future expansion and so planned to provide proper natural light and ventilation. The floors and walls of such room shall be of incombustible materials and the ceiling, if not of incombustible materials, shall be finished with Portland cement at least three-fourths inch thick applied to metal lath. A convenient means of access from the outside shall be provided and any inside connection with the rest of the building shall be protected by approved fire doors. Ample provision shall be made for the removal of ashes.

4. The use of any room for school purposes, other than for the heating plant and storage with floor level below the finished grade, is discouraged and in no instance shall the floor be more than three feet below the finished grade. In the latter case satisfactory provisions must be made for water-proofing and damp-proofing.

5. The most important part of the school building is that which is used for purposes of instruction, consequently excessive floor space in corridors, lobbies or other divisions of the building should be avoided.

*Administrative offices.* In all school buildings of five teachers in size or larger, provisions should be made for a principal's office. Such office should be ample in size and located adjacent to the main entrance to the building, where it will be readily accessible to the public. In the larger school buildings a public reception room and a secretary's office should be provided. A storeroom, private toilet and lavatory and fireproof vault of standard make should be provided also where finance will permit.

*Elementary schoolrooms.* 1. Classroom.—The elementary classroom unit should, in addition to the classroom, include provision for heating and ventilation, electric wiring, blackboard, a bulletin board, hanging of children's and teacher's clothing, a teacher's locker, a supply cabinet and a bookcase. It may also make provision for radio connection and inter-phone systems, a clock, vacuum outlets and for such other special features as the school organization may require.

2. Size.—No classroom should be planned to accommodate more than forty-five pupils. The width of the classroom may not exceed twice its height. Its length shall be determined by the seating capacity which the classroom is to provide, the nature of the work to be carried on in the room and the type of furniture and equipment to be used. A minimum of fifteen square feet of floor area and 175 cubic feet of air space per pupil is recommended. The ceiling height must be at least eleven feet.

3. Lighting.—All classrooms should provide for the admission of light from the left. Either east or west light is desirable. South light gives excessive sunlight throughout the day which is difficult to control properly. North light does not admit of sunlight for sanitary purposes. It is recommended that the total net glass area be not less than one-sixth the total floor area of the classroom. The win-

dows should be placed as near the ceiling as safety of construction will permit and the window stools should be at least three feet above the floor. In general the windows should be banked on one side of the room beginning near the rear wall of the room and extending to within about four feet of the front of the room. The mullions between the windows should be not over twelve inches wide except in special cases. The double hung type window or an approved modification thereof is recommended.

4. Doors.—Classroom doors shall be at least three feet by six feet, eight inches, made to swing out, placed preferably near the teacher's end of the room.

5. Blackboard.—Each classroom shall be provided with adequate blackboard. The height of the chalk trough above the floor should be approximately, first and second grades, 24 to 26 inches; third and fourth grades, 26 to 28 inches; fifth and sixth grades, 28 to 30 inches; seventh and eighth grades, 30 to 32 inches.

6. Provision for wraps.—All rooms accommodating children of the lower six grades shall be provided with a cloakroom or wardrobe opening directly into the classroom with adequate provisions for ventilating such cloakroom or wardrobe, and with no connection from cloakroom or wardrobe to the corridor.

*High school rooms.* 1. Classrooms.—The same general rules as apply to elementary school rooms shall apply to the high school recitation room. All rooms shall be dimensioned to provide adequate seating capacity for the classes assigned to such rooms.

2. Lockers.—Lockers of sanitary type and properly ventilated are recommended for high school. Wardrobes or cloakrooms will be accepted in lieu of lockers.

3. Science laboratory.—Science laboratories should be designed to meet the requirements of the curriculum. Proper provision must be made for the storage of equipment and apparatus necessary for successful laboratory work.

*Special rooms.* 1. Auditorium-gymnasium.—All schools of eight or more classrooms should be provided with an auditorium and gymnasium. While it is preferable to have separate rooms they may be combined. When an auditorium is provided for in any school it should be located on the first floor, and regardless of size, shall be provided with at least two exits. The aggregate width of such exits shall be not less than twenty-two inches per one hundred persons, counting the full seating capacity of the auditorium and balcony, if any. The floor should be inclined but may be level if the same room is to be used as a gymnasium. An adequate stage at least sixteen feet in depth should be provided, together with dressing rooms segregated for sexes.

Gymnasiums should be placed on the first floor. Local conditions will determine the most advantageous size of the gymnasium, and no school board is required to build a gymnasium of any designated size. The minimum size of the basket-ball court is 35 feet by 60 feet, and the maximum size is 50 feet by 90 feet clear playing



space. A minimum ceiling height of 18 feet is recommended. For best ventilation the two long sides of the gymnasium should be exposed to permit the sweep of air and sunlight across the floor. It is a mistake to design the gymnasium purely as a basket-ball arena. Due consideration should be given to the use of the room for physical training and adequate storage facilities for physical education equipment, as well as an office for the physical education director, should be provided.

Direct entrances to the auditorium and gymnasium should be available so that these rooms may be used for community purposes without disturbing the remainder of the building.

2. Science department.—The size and equipment of an agricultural room should be determined by the requirements of the curriculum. A combination recitation room and laboratory equipped with suitable tables, chairs, shelving and cabinets for the storage of books and illustrative materials for class and laboratory study must be provided as minimum requirements. A teacher's office and storeroom for the storage of apparatus necessary for successful laboratory work is very desirable and should be provided whenever possible.

3. Home economics.—The floor space allotted to home economics should be adequate for the requirements of the curriculum. There should be provided a foods room, a sewing room and a dining room, and where possible it is also desirable to have a separate bedroom, bathroom and kitchen. When the enrollment of the department will not justify such elaborate facilities a combination foods and sewing room may be designed if adequate shelving and cabinets are provided to accommodate the necessary equipment and supplies.

4. Commercial department.—A minimum of two rooms is required for commercial work; one for typewriting, and one for book-keeping and stenography. Where a single teacher is employed for both of these subjects there should be a clear glass partition between these rooms to facilitate supervision. The dimensions of the rooms shall be such as will provide proper space for the necessary equipment.

5. Library.—The library room should be centrally located where it is readily accessible to all the children in the school. A study hall fitted up with tables, chairs and shelving will accommodate high schools with an enrollment of 200 or less; for larger schools a separate library room large enough to accommodate ten per cent of the enrollment, allowing twenty-five square feet per pupil should be provided.

6. Industrial department.—The space allotted for industrial work should depend upon the type and amount of work to be offered. Any special features required by special types of work should be provided when the building is constructed. If power is to be used, the proper connections should be provided. Garage doors opening directly outside should be provided in order that large equipment or pieces of machinery may be brought in. Adequate storage rooms adjoining the main room and accessible from the outside are desirable.

*Corridors, entrances and exits.* 1. Corridors.—The minimum width of the main corridor of any school building containing four classrooms or more, shall be eight feet. The minimum width of secondary corridors shall depend upon the length of such corridors and the number of classroom doors leading to them, but in no case shall such secondary corridors be less than five feet in width. Corridors and passageways shall be well lighted, preferably by outside windows. Artificial illumination to the amount of three foot candles is recommended. Each corridor shall terminate on an egress or stairway.

2. Entrance and exits.—All outside doors and ventilating doors must swing out. They shall be provided with so-called panic hardware of approved and standard construction. Not less than two exits shall be provided for each building of four rooms or more.

*Scuttle.* Every school building should have means of access to the roof from the inside. The opening shall be not less than 20" by 30".

*Stairways.* 1. Every schoolhouse hereafter erected of two stories or more shall be equipped with stairways constructed of fire resistive materials. No such building shall have fewer than two main stairways remote from each other. Two stairways with a common end landing or the same intermediate landing or platform shall be considered as a single stairway.

2. All stairways shall be well lighted, both by natural and by artificial means.

3. Width of main stairways shall be not less than forty-four inches between handrails maintained throughout the entire length of the stairway. All stairs must be provided with a handrail to each side.

4. Each main stairway from story to story shall be in two runs with not more than sixteen risers to the run. The intermediate landing shall be of at least the same width as the stairway.

5. Risers for main stairways shall not exceed seven inches and treads, including nosings, shall not be less than ten and one-half inches in width. Less rise and wider treads are recommended.

6. No door shall open immediately upon a flight of stairs but a landing at least the width of the door shall intervene between the door and the first step. All doors opening upon exit stairs shall be glass sashed and provided with wired or shatter-proofed glass. All doors shall open outward upon stair landing, but in no case shall the effective width of the door be reduced below thirty-six inches.

7. No closet or storage space shall be placed under or over any stairway, except storage or other small rooms may be placed on upper floor over fireproof stairways.

8. Outside steps shall be discouraged or reduced to the absolute minimum. If provided they shall have at least proof protection.



*Sanitary conveniences.* 1. Toilets.—

- a) No building of eight or more rooms shall be constructed without making adequate provisions for a water supply, piped under pressure into the building, also provision must be made for adequate water-closets located in the same building and heated by the central heating plant. Satisfactory arrangements for the safe disposal of sewage must also be made.
- b) Where it is impossible to furnish the smaller buildings of the state with indoor toilets, a sanitary outdoor toilet of a type approved by the State Board of Health must be used.
- c) Boys' and girls' toilets must be segregated.
- d) Only non-porous and non-corrosive fixtures may be used in indoor toilet rooms. All fixtures must combine certainty of operation with durability of material.
- e) Toilet fixtures should be especially designed for the size of the children using them. For the elementary schools it is recommended that the lower height water-closets be used, while the regular height may be used for the high school.
- f) It is recommended that the total number of fixtures in toilet rooms be installed in accordance with the following schedule: in high school (grades 9 to 12) one closet for each forty boys or fraction thereof; one urinal for each twenty-five boys or fraction thereof; one closet for every thirty girls or fraction thereof. In elementary schools (grades 1 to 8) one closet for each thirty boys or fraction thereof; one urinal for each twenty boys or fraction thereof; one closet for each twenty-five girls.
- g) Toilet rooms shall be so located as to receive a maximum of sunshine. The window area outside exposure shall not be less than ten per cent of the floor space.

2. Lavatories.—

- a) Washing facilities shall be located on each floor of school buildings. They shall be located in or immediately adjacent to all toilet rooms, play-rooms, dressing-rooms and gymnasiums.
- b) The recommended number of lavatories for each toilet shall be one lavatory for each three closets.

3. Drinking fountains.—

- a) Drinking fountains must be of the angle stream type, so that water which has touched the lips cannot fall back upon the stream from the nozzle and such that the mouth of the pupil cannot touch the orifice from which the stream is ejected.
- b) Drinking fountains shall be recessed in the corridor walls at conveniently accessible points to all pupils. They should not be placed in the toilets.
- c) Extreme care should be exercised to see that the supply to drinking fountains does not come close to the hot water pipes of steam mains, and is at a safe distance from all sewage disposal lines.

4. Shower and locker rooms.—Ample shower rooms and locker rooms for each sex shall be provided, conveniently located in relation to the gymnasium.

5. Plumbing.—All plumbing shall be done in accordance with the state plumbing code.

*Window shades and interior decoration.* The primary purpose of window shades in so far as the classroom is concerned, is to prevent direct sunlight from falling on the desk tops and at the same

time to permit the maximum amount of light to enter, thus causing a reasonable amount of uniformity of illumination throughout the room. To serve this purpose translucent shades should be used, the color of which should harmonize with the classroom walls. Rooms in which it is desirable to exclude all light may, in addition, be equipped with opaque shades.

All walls should be of a light color, but not white. A light gray, a light buff and a dark cream with a reflection factor of from fifty-two per cent to seventy-eight per cent are recommended colors. In all cases the ceiling shall be ivory white or light cream to facilitate the reflection of light.

*Heating and ventilating.* 1. The heating system shall be of ample capacity and so installed to insure uniform temperature being maintained in all occupied rooms at seventy degrees when the outside temperature is zero. The temperature should be taken at the breathing line or between three and four feet above the floor. All rooms, corridors, stairways and spaces used for school purposes shall be heated.

2. All school buildings of eight teachers in size or larger shall be provided with a central heating plant. Hot air furnaces may be used but should be confined to buildings not requiring long horizontal ducts or multiple fires. It is recommended that the larger buildings be heated by low pressure steam heating apparatus by direct radiation only.

3. The minimum system of ventilation shall be a system in which fresh air is introduced through a raised window over a window deflector and the vitiated air is exhausted through grills in the lower panel of classroom doors thence through the corridor and out through a ventilator head on the roof.

4. Where wardrobes are used, the door to the wardrobes should be hung off the floor sufficiently high to permit vitiated air to pass under and out through a vent duct through the ceiling of the wardrobe thence through the roof.

5. All toilets in school buildings shall be ventilated by means of vent ducts running from ceiling of toilets continuous through roof and vent head above the roof.

6. Toilet stalls should be ten inches from floor so as to allow air to pass under. Doors to stalls in boys' toilets should be omitted. Doors to stalls in girls' toilets should be hung on gravity hinges so that doors remain open except when toilet fixture or commode is in use when door is held closed with bolt.

*Electric installation.* All wires, fittings, materials, installation and construction work used in the electric wiring must be in accordance with the requirements of the Board of Fire Underwriters.

*Fire alarms.* Every school building of two or more rooms shall be provided with gongs or siren horns operated from a central point.

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## V. The Division of School Buildings and Grounds

The Division of School Buildings and Grounds of the State Department of Education was created on July 1, 1930, through the generosity of the General Education Board, for the purpose of rendering assistance to the local boards of education with their school building problems. School boards contemplating school building programs should get in touch with the Department of Education for this service. Briefly stated the functions of the Division of School Buildings and Grounds are as follows:

1. To assist local boards of education in outlining school building problems consistent with their needs and resources.
2. To advise school officials in the selection of school sites and orientation of school buildings.
3. To furnish complete working plans and specifications for school buildings from one to four teachers in size, where the services of a registered architect are not available.
4. To furnish unit layouts of special rooms, such as libraries, study halls, science laboratories and recitation rooms, home economics laboratories, etc.
5. To furnish suggested floor space for larger buildings.
6. To examine and approve or disapprove architect's plans and specifications for school buildings in accordance with Section 4384-23, Kentucky Statutes.
7. To advise with school officials concerning remodeling or adding to existing school buildings.
8. To assist school officials develop plans for such special buildings as farm shops, gymnasiums, home economics cottages, teachers' homes, etc.
9. To furnish information and render assistance in school housekeeping problems.

It will be necessary to continue for some time the practice of building small school buildings accommodating from one to four teachers, in certain sections of Kentucky where the general topography of the land and the condition of the roads prohibit immediate consolidation. Consequently, the selection of school sites and the planning of school buildings for schools of this size remain as a problem to be met by many boards of education in the state.

Because of financial limitations in many counties an architect is not employed to design these smaller schools. In many other instances a competent architect's services are not available because of the location of the building and the size of the fee. Often the building is planned by the superintendent or a board member who has had some experience in building, or even more frequently by a local contractor, or lumber dealer who knows little about the program of the school. As a result the building, although usually imposing, is often illy adapted to the educational program and sadly lacking in provisions for the physical health and comfort of the pupils.

To meet this need for guidance in the planning of smaller schools, the State Department of Education is prepared to loan to local boards of education, free of charge, plans and specifications in sufficient number to distribute to the competing contractors. These plans are

worked out in detail to meet the specific needs of the community where they are to be used, and are not stock plans that are to be used blindly by every county in the state. The same design may be used in more than one district where conditions are essentially the same; however, it is seldom that two districts may be found that agree as to number of pupils, types of educational programs, use the community makes of the school building and in other essential factors.

County boards of education are encouraged to make use of this service. Section 4384-23, of the Kentucky Statutes, requires the submission of plans and specifications for new school buildings to the Superintendent of Public Instruction for examination and approval. Plans furnished by the State Department of Education are worked out according to the standards of the State Board of Education governing arrangement, lighting, heating, ventilation and convenience, and the use of these plans naturally obviate the necessity of submission and approval.

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