

SCHOOLHOUSE PLANNING  
AND CONSTRUCTION  
A GUIDE



STATE BOARD OF EDUCATION

NEW JERSEY

1958



STATE OF NEW JERSEY  
DEPARTMENT OF EDUCATION

175 West State Street  
Trenton 8, New Jersey

SCHOOLHOUSE PLANNING  
AND  
CONSTRUCTION

A GUIDE

Comprising  
Suggestions, Recommendations, and Mandatory  
Requirements Relating to the Construction  
of Public School Buildings in  
the State of New Jersey

Revision  
as Adopted by the  
State Board of Education  
Trenton, New Jersey

December 3, 1958

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## FOREWORD

In no other era have the school districts of New Jersey been faced with the necessity of building so many new schools. Few districts have been exempt from the necessity as the great "tidal wave of students," so accurately predicted and foreseen, has sought seats in our classrooms wherein they might partake of the educational opportunities which the citizens of our State have guaranteed to all of our children.

In March, 1952, the State Board of Education adopted the forerunner of this publication, which was entitled Guide for Schoolhouse Planning and Construction. It was an excellent guide, prepared by an earnest and talented committee of educators, architects, and school board members. The controlling concern of that committee, as it is with the present committee, was to find ways to reduce the cost of school construction without impairing the educational opportunities offered to pupils, and to bring building requirements and recommendations in line with modern thinking and with the newer constructional materials. But four years have passed--a long time in this fast moving world and new materials, better construction techniques, and more clearly discerned educational trends have come into being. Even the best guide, if it is not periodically reviewed and revised, can slow the pace of progress like a dragging anchor. Therefore, this revised edition of the Guide was authorized.

In New Jersey's decentralized system of schools, in which great power and authority are granted to the individual districts in the management of their schools, the State serves its function by establishing the minimum standards below which no district may go. Districts must consider such standards as minimum in nature. The sight-lifting suggestions and recommendations con-

tained herein are, in our opinion, of greater importance and significance to a board of education sincerely striving to improve educational conditions than are the mandatory minimum requirements.

Today's school buildings should be built to house, and make effective, the educational program which a community desires and needs. Since no two communities are alike in their characteristics and needs, it follows that the same building plan can never be equally effective in serving the children of different communities.

It should be pointed out that each local Board of Education will eventually determine most of the features of a new schoolhouse. Consultation with the administration and staff concerning the nature of the educational program to be housed should be considered so advisable as almost to be mandatory. It is equally as important to use foresight and wisdom in the selection of a site, especially in respect to size. And of paramount importance is the selection of an architect who can give wise guidance to the Board of education as it makes decisions about the building problems which arise. Too much care cannot be given to the selective process by which an architect is chosen.

On behalf of the State Board of Education, which has adopted this present instrument and have made its requirements operative immediately, I wish to thank the current committee which, under the leadership of Howard D. Morrison, produced this revised edition. Through many arduous conferences and meetings, with selfless sacrifice of time and energy, they have brought to fruition a document which will do much to create a better environment for learning for the students of tomorrow. The names of the committee members appear on the next page. We deem it fitting, however, to repeat the names of the members of the

1952 committee, for it was upon the foundation of their work that the current committee built.

Frederick M. Raubinger

Commissioner of Education

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Chairman - Howard D. Morrison,\* Superintendent of Schools, Hamilton Township

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\* Participated in the 1958 revision of the Guide.

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## How to Read This Guide

This Schoolhouse Planning and Construction, A Guide is designed to serve a three-fold purpose.

Prepared especially for architects, school board members, and educators, it is framed especially to present a convenient outline of the mandatory provisions of the school building code. These provisions, wherever they appear, are printed in gothic type.

Its second purpose is to point out, to prospective builders of school plants, certain constructional features which, although not required by the school building code, are considered to be highly desirable and are strongly recommended. Such recommendations, to distinguish them from the mandatory provisions, always appear in regular body type.

The Guide contains a third type of material, which is designed to introduce, explain, interpret, or enlarge upon mandatory and recommended provisions, or to present a point of view that will form a basis for discussion and a guide for contemplated action. This material also is printed in regular body type.

As was stated in the Foreword, any Guide to be constantly effective must be reviewed periodically. Typically only minor changes or revisions affecting only a part of the Guide become advisable at any one time. The policy has been adopted of publishing this Guide in a loose-leaf form, so as to permit changes to be made in single pages rather than to force the publication of a new Guide every time a minor change is authorized. In the future, as changes occur, each person on the regular mailing list of the Bureau of School Building Services will receive new pages for insertion in place of those whose provisions have been superseded. In this manner your copy of the Guide can be kept up-to-date at all

times.

In order that the lives, health, sight, and comfort of pupils may be properly protected, all schoolhouses hereafter constructed shall comply with the Gothic type regulations which follow, including the entire sections entitled A-Policies and Services, B-Approval and Filing of Plans and Contracts, and C-Application and Conditions for Approval of Plans and Specifications.

## Planning a Successful School Building Program

The successful carrying out of a school building program depends upon an orderly procedure designed to make certain that no important phase is neglected. The following steps are offered as a guide and all concerned are urged to follow the same.

1. The educational program is developed to meet the needs of the children of the community. Assistance is provided through conferences with consultants from the Department of Education in the fields of elementary and secondary education.
2. The kind and extent of school plant facilities needed is carefully determined.
3. If an extension of credit is necessary, a date for a hearing is arranged for with the Bureau of Business Services and enough time is allowed to permit the submission of schematic plans for review and advice by the Bureau of School Building Services at least ten days before the hearing.
4. All necessary documents and data are prepared by local district officials in accordance with instructions from the Bureau of Business Services and presented at the hearing on the extension of credit.
5. If the results of the hearing are favorable, the architect prepares preliminary plans which are submitted to the Bureau of School Building Services for review.
6. If the preliminary plans represent a satisfactory solution to the building problem, tentative approval and authorization to proceed with the preparation of final plans is issued to the architect in writing.
7. The architect submits for review two copies each of the final plans, specifications and applications for approval.
8. If the final plans and specifications are found to comply with the rules and regulations as set forth in the Guide for Schoolhouse Planning and Construction, the architects, the superintendent, the board of education and the county superintendent are advised that approval of the same has been recommended to the State Board of Education.
9. Advertising for bids may proceed as soon as word is received that approval of the plans and specifications has been recommended.
10. Formal approval of the final plans and specifications is made by the State Board of Education at its regular monthly meeting and official notice of such approval is sent to the board of education, the architect and the county superintendent.
11. Attention is called to 18:11-8 of the Statutes which provides that bids may not be accepted or contracts awarded until after the plans and specifications and

all addenda thereto have been approved by the State Board of Education.

12. Copies of the signed contracts are forwarded to the Bureau of School Building Services for review and filing within ten days after signing.

13. a. The architect shall submit two copies of all bulletins\* and addenda to the Bureau of School Building Services simultaneously with their issuance to contractors or other parties concerned. No contracts may be awarded until the amended plans and specifications are approved.

b. The architect shall submit two copies of all change orders to the Bureau of School Building Services for approval prior to making such changes.

14. Upon approval of change orders by the State Board of Education, a copy of the change order, marked "Approved", will be sent to the board of education for its information and files. The architect is notified of the approval by letter.

15. The architect shall advise the Bureau at least ten days before a closing in or plastering that the building is ready for preliminary inspection.\*\*

16. If the inspection reveals that plans and specifications have been complied with, the architect will be notified in writing to proceed with construction.

17. When in the opinion of the architect the building is completed, he shall notify the Bureau accordingly and final inspection will be made.

18. If the inspection indicates that the work has been completed in accordance with the plans and specifications, notice to that effect will be issued to the board of education, the architect and the county superintendent.

19. The board of education accepts the building upon certification by the architect that the project has been completed in accordance with the plans and specifications.

20. The superintendent of schools, his staff, the board of education and the architect orient custodians, maintenance staff and educational staff in the operation of equipment, housekeeping, maintenance and use of the building in order to utilize the building as effectively as possible and to assure its proper care and maintenance.

\* Bulletins are defined as explanatory material only.

\*\* The intent of this regulation is to permit an inspection before duct work and primary heating, plumbing or electrical lines are covered up.

## The Modernization of Existing Schools

Almost as urgent as the construction of new school buildings in New Jersey is the renovation, rehabilitation, and modernization of some of our existing school plants. Alterations in present facilities are least effective when haphazardly made; they are most effective when they are part of a carefully planned program of improvement.

Many school buildings of necessity have been continued in use, even after they have approached obsolescence. Because boards of education have desired not to spend too much money on such old buildings, repairs and maintenance costs have been pared to the minimum. In many instances safety conditions have grown increasingly worse, often aggravated by the non-fireproof interior construction of the buildings.

In such buildings it is not uncommon to find ancient toilet installations located in the basement; heating plants operating ineffectively on borrowed time; improper and inadequate lighting reduced to its lowest possible factor by dingy walls, somber ceilings, and dark woodwork; classroom facilities insufficient to meet pupil and teacher needs in today's educational program; and unimproved school sites deficient in provisions for proper outdoor activities. The health, safety, and comfort of pupils housed in such buildings merit the sincere attention of boards of education.

In many older buildings, programs involving major improvements can be undertaken, and will prove both advantageous and economical. Even a minor improvement program, possible in any building, will produce astounding benefits to pupils, teachers, and community. Interiors can be painted to develop the maximum reflection values of walls and ceilings. Artificial lighting can be

improved, by increasing the number of fixtures and raising the wattage. A lighter, brighter learning environment is easily obtained even in the oldest buildings, and will pay dividends in the protection of children's vision.

It is neither necessary nor advisable for boards of education to postpone improvement programs until their resources permit them to embark upon the construction of new buildings. A planned survey of existing conditions will realistically approach the problem of providing better opportunities for those pupils whose education is at present sorely handicapped by obsolete facilities. The rejuvenation of existing school plans is often the first step that should be taken to protect the safety, sight, health, and comfort of pupils.

## Building Schools to Fit Programs

A school building is erected to house an educational program, and therefore, should be planned from the inside out. The school plant should ideally be considered an instrument of great value in furthering, facilitating, and making effective the type of educational program desired by the community.

The first task facing a school system considering new school construction is, therefore, to decide what grades, classes, and courses should be taught, what the curriculum content should be, and what basic educational methods should be encouraged. Underlying such decisions, of course, will be the philosophy of education, especially in respect to aims and purposes, accepted as desirable by the community.

To be able to plan intelligently a school building today, the persons responsible for planning should be at least cognizant of such points of view as the following, which have received wide-spread acceptance:

1. The schoolhouse is a place for many kinds of learning. No longer is the mastery of the three R's the only objective sought. Every member of a school staff is expected to help guide pupils toward the attainment of a wide variety of objectives, each of which has a part in the development of a wholesome, effective, and well-rounded personality.
2. The schoolhouse itself can help teach children an appreciation of beauty, the orderly usefulness of space, the profitable interrelationships of parts, and the spirit of harmonious living.
3. A school building should be a place that will help children grow to their best, physically as well as mentally. Their sight, posture, nutrition, and every bodily process should be helped toward the ideal by the conditions of life at

school.

4. School buildings should serve not only pupils and teachers, but also the community which provides the school.
5. Classes should not average more than twenty-five pupils, if the community hopes to provide an educational program fitted to the individual needs of children and to achieve a wide horizon of objectives. Children differ greatly in abilities, attitudes, needs, and other characteristics, and teachers cannot adapt instruction to all the children unless class size is limited.
6. Classrooms and all instructional areas should be designed and equipped to provide the conditions under which children learn best. It is now known that children do not learn best when they sit, silent and unmoving, at a desk, with a book before them. They learn best when they work in a classroom designed as a laboratory for purposeful group planning, group activities, individual study and research, class discussion and evaluation. The new classrooms, therefore, are provided with maps, globes, radio, record player, library corner, bookcases, encyclopedias, work bench, art easels, running water, storage for supplies, and movable desks and tables. Such learning laboratories, although housing fewer pupils, require larger floor areas than the learning program of former eras.
7. Larger buildings, serving larger areas, together with a realization of the need for nutrition education, have made advisable the inclusion of kitchens and lunchrooms in both elementary and high schools.
8. A modern program of education has come to need gymnasiums in high schools, together with related facilities such as dressing rooms, lockers, and showers. They are also considered essential in all except the very small elementary

schools.

9. The music program in good schools, once limited to classroom choral work, now emphasizes bands, orchestras, a variety of choral groups, and individual instrumental work.
10. Play areas, for elementary and high schools, are increasing in size, thus forcing school boards to search for larger acreages for school sites. Such play areas are often adapted to community and adult use in evenings, on Saturdays, and in vacation periods.
11. Schools are, more and more, being made to house an educational program. There is a present trend toward one-story buildings. Basements have almost entirely been eliminated in new buildings except for heating plant and storage space.
12. Teachers and custodial employees should be brought early and continuously into the planning of the building, and should be encouraged to present suggestions for consideration. There is a trend, now, for pupils and citizens to participate also.
13. Every new building should possess possibilities for expansion.

In the planning of buildings, trends in educational organization, programs of instruction, and teaching methods are very worthy of serious consideration, since a school plant is built to serve not only the needs of today, but the needs of the future.

A well-planned school building will reflect thoughtful consideration of the:

1. Orientation of classrooms to obtain the best and most easily controlled daylight.

2. Various sizes and shapes of rooms, to fit the types of instruction and activity carried on in those rooms.
3. Reduction of traffic on stairs and in corridors, for pupils and materials.
4. Provisions for orderly pupil traffic flow with a minimum of congestion.
5. Relationship of classroom and service facilities, to make coordination more effective and to minimize student traffic.
6. Attempt to keep as much as possible of the school site area available for playground and outdoor educational purposes.
7. Shielding of such work areas as the library and classrooms from noise-producing activities carried on in rooms for choruses, band and orchestra, gymnasium, shop, and playground.
8. Protection of class, study, and assembly groups from the disturbing odors of laboratories and kitchens.
9. Construction materials used, the financial ability of the district, the community being served, the safety of the pupils, maintenance costs, and beauty.
10. Location of entrances easily available to persons who walk, come by bus, or come by automobile.
11. Pupil safety in approaching and leaving the building.
12. Health, safety, comfort, and efficiency factors, applicable to both pupil population and employed personnel.
13. Provisions for parking facilities, for pupils, teachers, visitors, and community.
14. Flexibility of the building, to permit reorganization of space to fit changing concepts of education and changing needs of the pupil population.
15. Possibilities of community use of the school facilities.

State Board Rules  
Governing Schoolhouse Construction  
Pursuant to R. S. 18:2-4

The following regulations adopted by the State Board of Education in order that the lives, health, sight, and comfort of pupils may be properly protected shall apply to the erection, construction, reconstruction, and alteration of any public school building or addition thereto.

Policy, Services, and Procedure  
Relating to Plan Preparation, Filing and Approval

A. Policies and Services

1. The object of the Guide for Schoolhouse Planning and Construction is to further the interests of the public schools of New Jersey by making the school buildings of the State healthful and safe, while at the same time preventing extravagance or wastefulness in their construction. The State Board of Education cordially invites suggestions from local boards, architects, and other citizens, in improving the provisions of the Guide.
2. The approval of the plans and specifications is limited to the various matters mentioned as prescribed in the specific requirements of the Guide and does not contemplate the endorsement of any particular kind of materials, apparatus, mechanical equipment, or any special devices which may be mentioned in the specifications or shown on the plans.
3. No responsibility is assumed by the State Board of Education for the structural features of the building, the efficiency of the mechanical equipment, the grade of materials, or the quality of fixtures which are to be installed.
4. The principal function of the State Department of Education is that of service rather than regulation. The State Department of Education welcomes the opportunity to give all possible assistance to those asking advice about the erection of new school buildings or the remodelling of existing schools, or in school planning as the demands upon its staff permit.
5. The regulations and requirements contained herein shall apply to every new public school building within the State and to all modifications to any existing

school building involving additions, alterations, or reconstruction. Alterations to existing buildings shall comply with the Guide as far as practicable.

6. The definitions of new buildings and existing buildings shall be understood to be as follows:
  - a. New buildings shall mean and include any building or unit of a building in which the entire work is new, or an entirely new addition connected to an existing building or any existing structure proposed to be remodelled or enlarged by building into it fifty per cent or more of new work based on the square foot area.
  - b. Existing building shall mean and include all buildings erected, remodelled, or enlarged, prior to publication of the Guide, or to buildings remodelled or enlarged after publication of the Guide, provided that less than fifty per cent of the floor area of the remodelled or enlarged building is new work.
  - c. Any changes to existing construction, necessitated by any remodelling or repairs, shall conform to the requirements as set forth. When existing schoolhouses are enlarged, these provisions shall apply only to the added portion or portions. It is recommended, however, that the old portions of such buildings shall be made to conform to the provisions of the Guide as far as practicable.

#### **B. Approval and Filing of Plans and Contracts**

1. No contract for the erection of any public school building or any part thereof shall be made until and after plans and specifications therefor have been submitted to and approved by the State Board of Education. A copy of the plans and specifications as approved shall be filed forthwith with the State Board of Education. (18:11-8)
2. No change in the plans or specifications shall be legal unless the same have

been submitted to and approved by the State Board. A copy of all changes as approved shall be filed forthwith with the said Board. (18:11-8)

3. A copy of the contracts for the erection of the whole or any part of the school building and for the furnishing thereof shall be filed with the State Board of Education within ten days after the same have been signed. (18:11-9)

NOTE: They may be filed by the architect, board's attorney or the secretary of the board of education.

4. No board of education of any school district nor any board of education of a county vocational school shall be required to secure the approval of its plans and specifications for the erection or alteration of any school building or vocational school building or any part thereof by the municipality therein, nor shall any board of education or any board of education of a county vocational school or any contractor doing work in connection with school buildings or county vocational school buildings be required to secure a building permit from the municipality. (Revised Statutes 18:11-11, as amended P. L. 1948, c. 56 p. 144)

5. In the preparation of plans and specifications for the erection, construction, alteration, or repair of a public school building, when the entire cost of the work will exceed one thousand dollars in amount, the architect, engineer or other person preparing such plans and specifications, shall prepare separate plans and specifications for the plumbing and gas fitting, and all work kindred thereto, and of the steam and hot water heating and ventilation apparatus, steam power plant and all work kindred thereto, and electrical work, structural steel and ornamental iron work. (18:11-7)

6. In the erection, construction, alteration, or repair of a public school

building, when the entire cost of the work will exceed two thousand dollars in amount, the Board of Education shall, in the manner provided by law, advertise for and receive separate bids for the plumbing and gas fitting and all work kindred thereto, the steam and hot water heating and ventilating apparatus, steam power plant and all work kindred thereto, and electrical work structural steel and ornamental iron work. The Board shall award contracts for such work to the lowest responsible bidder for each of such branches respectively. (18:11-10)

7. No contract for the building of a new schoolhouse or for the enlargement of an existing schoolhouse shall be entered into without first advertising for proposals therefor. No contract for repairing of an existing schoolhouse at a cost of more than two thousand dollars shall be entered into without first advertising for proposals therefor. The advertisements required by this section shall be made under such regulations as the board may prescribe. (18:6-25 as amended P. L. 1957, c. 174) No Board of Education shall advertise for bids until the Director of School Building Services informs the same that he is recommending approval of plans and specifications to the State Board of Education.

8. No bid for building or repairing schoolhouses or for supplies shall be accepted which does not conform to the specifications furnished therefor, and all contracts shall be awarded to the lowest responsible bidder. (18:6-26)

#### C. Application and Conditions for Approval of Plans and Specifications

1. All plans and specifications for school building work of any nature must be prepared by an architect registered to practice in this State or by a consulting mechanical or structural engineer registered to practice in this State and within the limits covered by such registration. All plans and specifications must bear the seal of the architect and/or the consulting mechanical or

structural engineer. The name of the consulting mechanical and/or structural engineer shall be placed on the plans, if and when such engineer is used.

2. Duplicate copies of all plans and specifications embracing each and every contract shall be submitted, together with duplicate copies of an application for approval.
3. All applications for approval shall be directed to the Secretary of the State Board of Education and made upon the blank form prepared and supplied by him. These forms are furnished upon request of the architect, and it is requested that they be used instead of duplicate copies made by the architect. The application must be signed by the architect, or by the consulting mechanical or structural engineer in the case of specific planning being undertaken in these areas exclusive of other areas, and the president of the board of education. Applications signed by others will not be accepted.

All information requested on the application for approval must be given and all queries fully answered.

4. Approval by the State Board of Education is valid only for the specific project indicated on the application. Every building project requires separate submission and approval of its plans and specifications. Any changes or revisions to the plans and specifications as approved must be submitted for approval in the same manner as the original submission, as such changes or revisions invalidate the original approval.
5. Approval of plans and specifications shall be held as in effect for a period of one year only after the date of such approval. After this period a renewal of the approval must be secured for the work not under contract.
6. It shall be incumbent on the architect, or on the consulting mechanical or structural engineer for specific areas, to give written notice to the Director

of School Building Services at least ten days before plastering is started or any work is closed in so that an inspection can be scheduled of all work in place and written approval given before proceeding with plastering. Strict attention to this requirement will enable the Department to schedule inspections and expedite approval. Unless specifically advised by letter otherwise, plastering work may not proceed without approval.

It is also required that the architect, or the consulting mechanical or structural engineer, advise on the completion of all contracts so that a final inspection may be made.

#### D. Preliminary Plans

The policy of the State Department of Education is not to accept any preliminary plans for tentative approval unless and until the architect submitting the plans has been regularly retained as the architect for the project.

Educational needs should determine the plan and design of the school; therefore, before preliminary plans are developed for the project the educational program and accommodations required should be definitely determined by the school board and its staff. The architect can be very helpful to the board and its staff at this stage. However, the architect should not be expected to plan the educational program as well as the building and facilities to carry on the program.

Boards of education will find that the services of a well qualified consultant in school plant planning often will help them to plan buildings which are better adapted to the educational needs of the community. Frequently such consultants are able to indicate more economical ways by which needs may be met. Many times errors, which would have resulted in a less satisfactory building

or in increased costs, are thus avoided.

The experience of the State Department of Education indicates that the period of preliminary planning offers fruitful opportunities for its cooperation with architects and boards in the evolution and development of building plans. It is the period in planning when the architect studies and endeavors to solve all the major problems that confront him in determining the overall scheme and layout of planned spaces and use, to best meet the needs and functions of the desired educational program. Since final plans are basically a development of the preliminary plans, complete and comprehensive studies are practically essential at this state of plan-development.

In order to minimize the amount of revision in the final plans or working drawings, it is required that preliminary plans shall be submitted to and tentatively approved by the State Department of Education before the final plans are started. This permits the Department to review them in the light of requirements and to offer such constructive comments or advice that may be deemed advisable. Preliminary plans submitted for review and tentative approval shall include the following:

1. A plot plan of the school property, drawn to scale, giving overall dimensions, the points of the compass, general topographical conditions, the location of existing structures and their relation to the proposed building, the relation of the school to highways and streets, and such physical features that present any deterrents in maintaining adequate protection of the safety, health, sight, or comfort of the pupils. The plot plan may be drawn to any scale, so long as it indicates with clarity the required features.
2. Floor plans shall be drawn not less than 1/16" to the foot, giving overall dimensions; the location, size, and intended use of all areas of the plans; the

tentative layout of equipment features of special rooms including built-in equipment; future additions; and a statement giving general method of heating and ventilating; and a description of the proposed method of lighting all instructional areas. If the proposed building is to have several identical rooms, one such room shall be shown in complete detail as being typical of such identical rooms.

3. There shall be a drawing, using the same scale, of elevations and sections to indicate the finished floor and ceiling levels and their relations to the finished outside grade; together with the steps or other features related to the exit facilities.
4. In the case of the addition to any existing building it is required that a floor plan be submitted showing existing sanitary facilities and exits and any proposed changes therein.
5. There shall be submitted with, or as a part of the preliminary plans, a statement showing:
  - a. The grade levels of pupils to be housed in the building.
  - b. The planned pupil capacity of the building.
6. Three important practices, followed undeviatingly by the State Department of Education, should be noted by those submitting preliminary plans:
  - a. Any preliminary plans not in conformity with the above requirements will be returned, without review.
  - b. Preliminary plans submitted prior to those submitted as the architect's solution of the planning to meet the educational program, or "schematic" plans to indicate general schemes under consideration, will be reviewed when the Department's advice on specific or unusual cases is desired.

c. Prints, preferably black and white to identify preliminary plans from final plans in blueprint form, are required in submitting preliminary plans for review and tentative approval. These should be mailed to the Director of School Building Services, State Department of Education, Trenton 25, New Jersey.

#### E. Final Plans and Specifications

Final plans and specifications submitted for review and approval by the State Board of Education shall meet the following requirements and shall conform with the best professional practices. They shall show clearly, accurately, and completely information on all phases of the work to be undertaken.

1. Plans and specifications shall be submitted in duplicate, together with an application for approval properly filled out and signed as required.
2. When the plans and specifications have been reviewed and approval has been granted by the State Board of Education, formal notice will be sent the architect and the Board of Education advising of the approval.
3. One set of the plans and specifications will be retained by the State Department of Education, and the duplicate set, stamped with the State Board of Education's seal of approval, including the official notice of approval signed by the President and Secretary of the State Board, will be forwarded to the secretary of the local board of education. A copy of the official notice of approval signed by the Secretary of the State Board will be forwarded to the architect and the County Superintendent of Schools.
4. Plans and specifications submitted for approval shall not be eligible for review and recommendation for approval until all the requirements of procedure have been complied with.

5. The following specific items are suggestive of the information required in plans and specifications submitted for approval. They are not intended to enumerate all the items that should be covered but rather to establish uniformity in presenting data for review.
  - a. All specifications should be indexed for quick identification of individual items. It is recommended that the five sections of the specifications be in different colors for the same reason.
  - b. Specifications preferably should be of letter-size, bound at the left-hand side with covers the same size as the inside specifications, to facilitate filing and use.
  - c. The hardware schedule shall be included with the specifications. Plans and/or specifications shall clearly indicate the location of anti-panic hardware and door closers.
  - d. Wherever possible, drawings should not exceed 36" x 48".
  - e. Architectural, structural, and other kinds of mechanical work should be shown on separate drawings. They should be combined only when clarity and completeness are not impaired.
  - f. A key plot plan should be given on one of the drawings to indicate the location of the school building with relation to the school property and to existing structures when additions are made, and the established orientation of the building to points of the compass.
  - g. A better practice than that of submitting a key plot plan is to include with the final plans one sheet showing all of the items referred to under the preliminary plot plan, fully developed and including the contours and the finished grades at the building and the elevation of the first-floor level. Included should be such items as the location of walls, drives, parking

areas, play and organized activity areas, kindergarten play yards, and adjoining streets and sidewalks. The boundaries, the size and shape of the entire school property, the location of existing sewage disposal system, and walls are other possible items for inclusion.

- h. All drawings of any nature shall be fully dimensioned to give over-all and individual unit dimensions, both horizontal and vertical, for all portions of the building, and should include the thickness of all walls, floors and foundations, together with the present and finished grades at building.
- i. General drawings shall be on not less than 1/8" scale with plans for each floor and roof, elevations sufficient to indicate all exteriors of the building and materials, sections sufficient to show clearly all and any special conditions. Stairs, classrooms and corridors, furred ceilings, equipment and fixtures, floor construction, levels and thickness; wall construction; and typical windows, should be shown.

Consideration will be given to any exceptions an architect may find necessary in the scale and layout of his plans due to the unusual size of the program, provided however, that the clarity and completeness of information will not be impaired.

- j. Typical details should be given at larger scale where necessary for clarity, providing complete information on wall sections, floors, and windows, with complete details for each type of window and with data on the glass area, including the vertical distances of the sill and the vision strip, if any, the top of the window glass above the floor, and the distance below ceiling. Stair details should show the construction and materials, riser heights and tread widths, the over-all dimensions of the

stair runs, both vertical and horizontal, and the landing levels. Details of chalkboard and tackboard trim, standing trim, etc., should be pictured. Built-in equipment, wardrobes, and all special features requiring details for proper development should be clearly portrayed.

- k. Plumbing, heating, ventilating, electrical and structural plans shall be scaled to conform with the general drawings. All mechanical and structural plans and details should be developed with the same clarity and completeness that are required for the general plans. The method of ventilating clothing storage areas shall be clearly indicated by plan and section.
- l. There should be shown on the drawings the interior finish, including the floor, base, wainscot, wall, ceiling and trim. A complete door and window schedule should be given. The materials used in all walls, partitions, etc., should be indicated by means of a symbol key. A standard symbol key should also be used in describing electrical work. The use intended for each room or space should be written on the floor plans and not by numerical cross reference.

#### F. Regulations Pertaining to the Use of Former Private Residences as Home Economics Buildings

When any school district establishes a homemaking course approved by the State Department of Education for which the use of facilities in a building originally planned for a private residence is especially adapted the board of education may operate the course in such building, owned or rented by the board; provided that the Director of School Building Services of the State Department of Education or his representative shall have examined and approved the

property as being free from fire hazard or other objectionable features which might endanger the health and safety of the pupils enrolled in the course. Such a building may not be used by the board or school for the conducting of any other type of school work. The board of education shall adopt regulations for safety of buildings used for instruction in homemaking, which regulations shall be approved by the State Department of Education.

## I. Selecting an Adequate Site

In the selection of a site for a school plant it is recommended that consideration be given to the following factors: size, topography, accessibility, environment, safety, health of pupils, nearness to public utilities and services, the orientation of the projected building on the site and the over-all master plan for schools in the community.

Before any action is taken to purchase sites intended for future schools or school expansion, it is strongly urged that the consultative services of the Bureau of School Building Services in the State Department of Education be utilized. Approval by the Bureau consultants will do much to create favorable reactions among voters when balloting is required. The advisory service is designed to help boards of education to avoid later embarrassment, for the purchase of land, when the site or size is unsatisfactory, frequently obligates boards to undesirable courses of action in the future.

### A. Size of Site

The desirable size of a school site should be determined by the nature, scope, and the envisioned future of the contemplated educational program. It is believed that every elementary school should be built on a site containing at least 5 acres, plus one acre for every hundred pupils enrolled. For secondary schools and vocational schools a minimum of 20 acres is recommended, plus one acre for every hundred pupils enrolled.

Larger school sites have become necessary for a variety of reasons. On-the-site parking for students, faculty, and the public have made increased demands on school space. Growing communities, which have not

been able to make provision for adequate parks and recreational areas for the public, have found it both desirable and economical to combine public recreational and school recreational areas. Sometimes schools and communities jointly plan school and community libraries, health clinics, and adult education facilities, to get maximum use of a site. The growing popularity of one-story schools and campus-type construction, in place of multi-storied structures, makes its demand upon space, as does also the pressing realization that future additions to the building will probably be necessary in the not-far-distant future. It is true, too, that some schools like to have adequate space for school gardens and an agriculture demonstration area, and rate highly their educational values.

Almost all suburban communities are burgeoning in population. Their possible destinies, in point of future population, are only vaguely felt and very dimly perceived. A small restricted school site, a few years hence, is likely to prove a ponderous obstacle to adjustment to new conditions, and may prove to be one of the most compelling factors in the creation of a "blighted" district. A large school site has always the opposite effect.

Even for small schools a large site is essential. Actually, for many activities such as baseball, tennis, track, soccer, and football, the same space needs are felt by both large and small schools.

#### B. Topography of Site

Fine grounds embellish and provide an appropriate setting for a fine school building. A natural elevation with satisfactory approaches for avoiding long or difficult climbs makes a desirable setting. The site should be free from drainage from contiguous territory and should permit proper

drainage throughout at a reasonable cost. Rapid drainage and quick drying should characterize the parts of the plot which are expected to serve as recreational and play areas. A clay subsoil is not considered to be so satisfactory as sandy loam fertile enough to produce good lawns and vigorous landscaping.

Topography is of necessity related to size of site. If, because of topography, portions of a site are unusable for certain necessary purposes, the total amount of land needed for a school must be reconsidered in individual cases.

#### C. Accessibility of Site

Schools should usually be located near the center of the present and the probable future school population which is to be served. Yet there are exceptions to this rule-of-thumb. Like the large super-markets, schools are finding that a large fine site, perhaps removed from the center of population, is preferable to a small restricted site more centrally located. In other words, the amount of good space available is frequently a more compelling cause for site selection than is central location.

Where transportation is involved, the maximum travel time for elementary pupils should rarely exceed thirty minutes and for secondary pupils one hour. Special paths for bicyclists should be planned, with covered racks for the vehicles.

#### D. Environment of Site

Most school grounds are planned to contain lawns, foundation plants to "tie" the buildings to the ground, hardy shrubs placed at the angles and curves of drives and walks, tall trees to frame the building, and trees

planted in groves for shade. Among the common classes of plants used are shade trees, smaller ornamental trees, coniferous evergreens, broad-leafed evergreen shrubs, deciduous flowering shrubs, vines, and ground covers. Whatever is planted should be grouped with respect to height, color, and cultivation requirements.

Because attractive physical surroundings have an especially strong influence on youth, the environment of a school site is a very important factor. The activities conducted within a school call for quiet surroundings, clean fresh air, abundant sunshine, and freedom from disturbing noises and the turmoil of crowded neighborhoods. Isolation from undesirable commercial enterprises should be sought. If possible, close proximity to sanitariums and hospitals should be avoided. Resourceful treatment of landscaping can usually minimize the disfiguring effects of such essential but unsightly facilities as parking areas, service drives, and refuse-disposal units.

If community recreational use is planned, consideration should be given to setting aside a special area for picnic tables and fireplaces.

#### E. Safety Conditions of Site

A major objective in selecting a site is to provide conditions conducive to the safety of children. The location of the building on the site should permit children to pass through a safety zone before being confronted by traffic dangers. If at all possible, children should not be forced, by the location of the school, to cross railroads, automobile speedways, or heavy traffic lines. The site should be free from fire, water, or land hazards. Automobile roads within the site should be constructed to accommodate one-way traffic only, with proper signs indicating clearly their directional use. Where buses are

used for transportation, careful consideration should be given to the loading and unloading facilities, to achieve the maximum of safety for the children. Parking space should be provided properly related to school use. If possible, a separate parking space for school visitors, located near the main entrance, should be provided. Dividends will accrue when parking facilities used for evening functions are amply lighted.

It is frequently advisable, also, especially in elementary schools, to provide special playground areas for children in the lower grades.

#### F. Health of Pupils

Since the building in its environment is expected to be a healthful place for human beings to live, work, and mature, there should be present no factor that will interfere with the natural lighting of the rooms, nor should the site suffer from odors, dust, or polluted air blown from industrial centers, streets, or unfinished playgrounds.

#### G. Accessibility to Public Utilities and Services

Economy, as well as convenience and efficiency, would dictate that inexpensive access to gas, water, sewer, electric, and telephone service be considered in acquiring a site. Since it is recommended that all public utility services be placed underground, it can readily be seen that extensive pipe-laying and wiring, connected with distant points, would involve large financial expenditures. When site facilities are planned, consideration should be given to outdoor drinking fountains, hose connections near the various courts and playing fields, and lights for courts, playground areas, driveways and parking plots.

## H. Orientation of the Building

It is advisable to locate the building on the site in such a way as to permit the maximum use of the light area and to allow for possible future additions. For unilateral lighting it is more important to orient the building to provide the best seeing conditions in the classroom than to locate it with regard to the axis of roads, streets, or other physical features. East and west exposures for the majority of the rooms are generally considered most satisfactory. Because the best orientation is that which avoids morning or late afternoon sun at right angles to the classroom, it is desirable that the building be built to face slightly south of east and north of west.

Although schools have a reasonable set-back from the street line, for both safety and attractiveness, the utility of the site should not be sacrificed just for beauty. Schools with long beautiful approaches, set in the center of their site, usually constrict the amount of space that should be used for essential physical education and recreational purposes.

## II. Space Requirements Within Schools

### A. Classrooms and Other Instructional Areas

1. EVERY INSTRUCTIONAL AREA SHALL BE PLANNED IN CONSIDERATION OF THE NUMBER OF PUPILS TO BE HOUSED, THE PROGRAM OF INSTRUCTION TO BE FOLLOWED, AND THE EDUCATIONAL PURPOSES OF THE ROOM.

2. It is recommended that standard classroom areas be planned in accordance with the following table:

| <u>Grade or Subject</u>                   | <u>Standard Classroom Areas</u>                     |  |  |
|---|---|--|--|
|   | <u>Minimum</u>                                      | <u>Better</u>  | <u>Desirable</u>   |
|   | Provides space for only limited educational program | Provides space for more, but not all that is needed for a good educational program | Space is adequate for an enriched program that is stimulating to pupils and teachers |
| Kindergarten                              | 700 sq. ft.   | 800-900 sq. ft.  | 1,000 sq. ft. or more  |
| First Grade through Third                 | 650 sq. ft.   | 800 sq. ft.  | 950 sq. ft. or more  |
| Fourth Grade through Eighth               | 600 sq. ft.   | 750 sq. ft.  | 900 sq. ft. or more  |
| Academic Rooms Grades Nine through Twelve | 600 sq. ft.   | 700 sq. ft.  | 800 sq. ft. or more  |

3. Space requirements for other instructional areas are indicated in the special New Jersey Department of Education bulletins, which are a part of this Guide.

4. It is recommended that a few of the classrooms in high schools be made smaller than other rooms to accommodate the smaller classes that typically take certain subjects and to provide space for small-group instruction of other types.

5. The club and extra-curricular programs of schools may require certain specialized areas, such as a darkroom for photography and an inside greenhouse for the garden club.

#### B. Rooms Below Grade

1. WHEN A SCHOOL BUILDING HAS A BASEMENT THE CEILING OF WHICH AVERAGES 7' 6" OR MORE ABOVE THE FINISHED GRADE LINE, SUCH BASEMENT SHALL BE CONSIDERED A STORY IN DETERMINING THE NUMBER OF STORIES IN THE BUILDING.
2. FOR ANY ROOM USED FOR INSTRUCTIONAL PURPOSES IN NEW BUILDINGS, THE EXTERIOR GRADE AT THE WINDOWS AND FOR 2' 0" BEYOND THE WINDOWS SHALL BE NOT MORE THAN 2' 0" ABOVE THE FINISHED FLOOR.
3. IN NO CASE SHALL AN AUDITORIUM, ASSEMBLY ROOM, GYMNASIUM OR CAFETERIA BE SO SITUATED THAT AN OCCUPANT OF ITS MAIN FLOOR, USING MAIN EXITS, MUST DESCEND OR ASCEND MORE THAN 8' 0" TO REACH THE OUTSIDE GRADE.
4. NO WALL OR AREAWAY SHALL INTERFERE WITH THE FENESTRATION OF ANY INSTRUCTIONAL ROOM.

#### C. Ceiling Heights

1. THE AVERAGE CEILING HEIGHT OF A CLASSROOM OR OTHER INSTRUCTIONAL AREA SHALL NOT BE LESS THAN 9' 6". NO PART OF THE CEILING CONSTRUCTION AT ANY POINT SHALL BE LESS THAN 8' 6" HIGH.
2. THE CEILING HEIGHT IN A SHOP, LIBRARY, OR MUSIC ROOM SHALL BE PROPORTIONATE TO THE SIZE OF THE ROOM AND APPROPRIATE TO ITS USE, BUT SHALL NOT BE LESS THAN THAT INDICATED IN THE PRECEDING RULE.
3. THE CEILING HEIGHT FOR CORRIDORS SHALL BE NOT LESS THAN 7' 6".

#### D. Corridor

1. INTERIOR CORRIDORS SHALL BE PROVIDED IN ALL SCHOOL BUILDINGS MORE THAN ONE STORY HIGH.
2. PRIMARY CORRIDORS IN ELEMENTARY SCHOOLS (GRADES KINDERGARTEN THROUGH EIGHT) SHALL BE NOT LESS THAN 7' 0" IN WIDTH, EXCEPT AS HEREINAFTER PROVIDED.

3. PRIMARY CORRIDORS IN SECONDARY SCHOOLS (GRADES SEVEN THROUGH TWELVE, OR ANY COMBINATION THEREOF) SHALL BE NOT LESS THAN 7' 6" IN WIDTH, EXCEPT AS HEREINAFTER PROVIDED.
4. PRIMARY CORRIDORS MAY BE REDUCED ONE FOOT IN WIDTH, FROM THE ABOVE REQUIREMENTS, WHEN EACH INSTRUCTIONAL ROOM HAS A DIRECT EXTERIOR EXIT, AND
  - A. THE CORRIDOR DOOR IS RECESSED SO AS NOT TO PROJECT MORE THAN 6" BEYOND THE CORRIDOR WALL, OR
  - B. THE CORRIDOR DOOR SWINGS TO A 180-DEGREE ANGLE AGAINST THE CORRIDOR SIDE OF THE WALL, OR
  - C. THE CORRIDOR DOOR SWINGS INTO THE ROOM.
5. ALL CORRIDORS SHALL BE INCREASED ONE FOOT IN WIDTH WHERE THERE ARE LOCKERS OR OTHER PROVISIONS FOR STORAGE OF PUPIL CLOTHING OR BOOKS ON ONE SIDE OF THE CORRIDOR, AND SHALL BE INCREASED A MINIMUM OF 2' 6" IN WIDTH WHERE THERE ARE LOCKERS OR OTHER PROVISIONS FOR STORAGE OF PUPIL CLOTHING OR BOOKS ON BOTH SIDES OF THE CORRIDOR. CORRIDOR WIDTH IS DEFINED AS THE DISTANCE BETWEEN THE FACES OF THE WALLS AND/OR LOCKERS.
6. SECONDARY CORRIDORS MAY BE REDUCED 1' 6" BELOW THE WIDTH REQUIRED FOR PRIMARY CORRIDORS. SECONDARY CORRIDORS ARE DEFINED AS BRANCH CORRIDORS INTERSECTING WITH A PRIMARY CORRIDOR AND SERVING NOT MORE THAN THREE INSTRUCTIONAL ROOMS, WITH THE LOCATION AND PLAN ARRANGEMENT OF THE SECONDARY CORRIDOR BEING SUCH AS TO PRECLUDE THE POSSIBILITY OF ADDITIONAL ROOMS BEING ADDED IN THE FUTURE, WITH A CONSEQUENT INCREASE OF TRAFFIC LOAD.
7. PASSAGES OTHER THAN CORRIDORS SHALL NEVER BE LESS THAN 4' 0" IN WIDTH.
8. THERE SHALL BE NO STRUCTURAL PROJECTIONS EXTENDING MORE THAN 8", WITH A WIDTH OF 1' 6", INTO THE PRESCRIBED MINIMUM WIDTH OF CORRIDORS. ACCUMULATIVE STRUCTURAL ENCROACHMENTS WHICH REDUCE A MINIMUM CORRIDOR WIDTH BY MORE THAN 8" SHALL NOT BE PERMITTED.
9. DRINKING FOUNTAINS SHALL NOT PROJECT INTO CORRIDORS MORE THAN 9".

10. RADIATORS, FIRE EXTINGUISHERS, AND OTHER RECESSED EQUIPMENT SHALL NOT PROJECT MORE THAN 6" BEYOND THE FACE OF THE CORRIDOR WALLS.
11. EACH CORRIDOR ON THE FIRST FLOOR SHALL TERMINATE WITH A DIRECT EXIT TO THE EXTERIOR OF THE BUILDING.
12. THE MINIMUM CEILING HEIGHT OF CORRIDORS SHALL BE 7' 6".
13. Corridors, while serving primarily as sheltered passageways between the several parts of a building, may be modified to adapt them to such added uses as lounges, social rooms, and specialized activity areas.

#### E. Exits

1. A UNIT OF EXIT DOOR WIDTH SHALL BE 22" CLEAR, EXCEPT THAT A 42-INCH OPENING MAY BE CONSIDERED AS TWO UNITS.
2. THE MINIMUM NUMBER OF EXIT DOOR WIDTHS FROM THE FIRST OR ENTRANCE STORY SHALL BE:
  - A. ONE UNIT OF EXIT WIDTH FOR EVERY THREE INSTRUCTIONAL ROOMS ON THE FIRST OR ENTRANCE STORY, PLUS
  - B. ONE UNIT FOR EACH REQUIRED UNIT OF STAIRWAY WIDTH FROM UPPER FLOORS, PLUS
  - C. ONE UNIT OF EXIT WIDTH FOR EACH REQUIRED UNIT OF STAIRWAY WIDTH FROM THE ROOMS BELOW GRADE.
  - D. ONE UNIT OF EXIT WIDTH FOR EACH 100 PERSONS BASED ON 7.5 SQUARE FEET OF FLOOR AREA FOR AUDITORIUMS, 9 SQUARE FEET FOR GYMNASIUMS IF THEY ARE USED FOR ASSEMBLY OR AUDITORIUM PURPOSES (OTHER THAN REQUIRED BY E BELOW), AND 10 SQUARE FEET FOR CAFETERIAS.
  - E. ONE UNIT OF EXIT WIDTH FOR EACH 300 SQUARE FEET OF FLOOR AREA OF THE AUDITORIUM OR GYMNASIUM IN FRAME BUILDINGS.
3. ALL EXTERIOR EXIT DOORS SHALL BE NOT LESS THAN 2' 6" IN WIDTH.
4. INSTRUCTIONAL ROOMS HAVING DIRECT ENTRANCE TO AN ASSEMBLY ROOM, STAGE, GYM-

NASIUM, CAFETERIA, ALL-PURPOSE ROOM, OR A ROOM OF SIMILAR FUNCTION, SHALL BE PROVIDED WITH EXTERIOR EXIT DOORS.

5. AT LEAST ONE STAIRWAY OR EXIT SHALL BE WITHIN 120 FEET, AS MEASURED ALONG THE LINE OF TRAVEL, OF EACH DOOR OF ALL ROOMS USED BY PUPILS.
6. AN "EXIT WAY" IS DEFINED TO MEAN A DOORWAY OR DOORWAYS, INTERIOR OR EXTERIOR, PROVIDING SAFE ACCESS TO CORRIDORS AND TO EXTERIOR OPEN SPACE WITH SAFE ACCESS TO THE STREET.
  - A. EVERY ROOM, GALLERY, BALCONY, OR OTHER SPACE HAVING A CAPACITY OF 100 OR MORE PERSONS SHALL HAVE AT LEAST TWO EXIT WAYS.
  - B. EVERY ROOM, GALLERY, BALCONY, OR OTHER SPACE HAVING A CAPACITY IN EXCESS OF 600 PERSONS SHALL HAVE AT LEAST THREE EXIT WAYS.
  - C. WHERE THE CAPACITY OF SUCH SPACE IS MORE THAN 1000 PERSONS, THERE SHALL BE NOT LESS THAN FOUR EXIT WAYS.
  - D. EXIT WAYS SHALL BE APPROPRIATELY LOCATED IN EVERY ROOM, GALLERY, BALCONY, OR OTHER SPACE HAVING A CAPACITY OF MORE THAN 200 PERSONS.
  - E. CAPACITIES SHALL BE BASED ON 7.5 SQUARE FEET GROSS PER PERSON FOR AUDITORIUMS, 9 SQUARE FEET FOR GYMNASIUMS, AND ALL-PURPOSE ROOMS, AND 10 SQUARE FEET FOR CAFETERIAS; BUT THE NUMBER OF EXITS SHALL NOT BE LESS THAN REQUIRED UNDER SECTIONS E. 2. D. AND E. ABOVE.
7. REQUIRED EXIT WAYS MAY USE COMMUNICATING CORRIDORS LEADING TO EXTERIOR EXITS; BUT, EMERGING FROM ANY ONE PLACE OF ASSEMBLY, THEY MAY NOT USE A COMMON STAIRWAY.
8. THERE SHALL BE AT LEAST TWO EXIT WAYS FROM ALL HEATER ROOMS; ONE MUST LEAD TO THE EXTERIOR OF THE BUILDING. ON HEATER ROOMS, WHERE THE FLOOR AREA IS 100 SQUARE FEET OR LESS, THERE NEED ONLY BE A DOOR TO THE EXTERIOR.

## F. Doors

1. ALL PUPIL EXIT DOORS FROM THE BUILDING INCLUDING EXTERIOR EXIT DOORS FROM AUDITORIUMS, GYMNASIUMS, ALL-PURPOSE ROOMS, AND CAFETERIAS, SHALL BE PROVIDED WITH BAR-TYPE ANTI-PANIC HARDWARE, EXCEPT THAT DOORS FROM THE HEATER ROOM, LOCKER ROOMS, SHOP AND OTHER SPECIAL INSTRUCTIONAL AREAS MAY BE OF THE KNOB-OPERATED TYPE ALWAYS PERMITTING EGRESS. CLASSROOMS AND KINDERGARTEN ROOMS MAY HAVE KNOB-OPERATED HARDWARE ON EXTERIOR DOORS. TWO OR MORE CLASSROOMS USING A COMMON EXTERIOR EXIT SHALL HAVE ANTI-PANIC HARDWARE ON THE EXTERIOR DOOR.
2. NO DOOR OPENING FROM AN INSTRUCTIONAL ROOM INTO THE CORRIDOR SHALL BE LESS THAN 30 INCHES WIDE, AND ALL SUCH DOORS SHALL SWING OUT INTO THE CORRIDOR UNLESS OTHERWISE PERMITTED. NO DOOR SHALL BE SO LOCATED AS TO OFFER ANY OBSTRUCTION TO, OR TO BLOCK, THE MAXIMUM FREE OPENING OF DOORS FROM ROOMS, STAIRWAYS, OR EXITS. DOORS MAY SWING INTO AN INSTRUCTIONAL ROOM PROVIDING THE ROOM HAS AN EXTERIOR EXIT.
3. LOCKS ON ALL DOORS OF INSTRUCTION ROOMS AND ALL ASSEMBLY AREAS SHALL BE OPERATIVE FROM THE INSIDE AT ALL TIMES.
4. ALL EXTERIOR DOORS, THE INTERIOR DOORS TO MAIN PUPIL TOILET ROOMS, DOORS BETWEEN THE CORRIDOR AND THE HEATING ROOM, SMOKE SCREEN DOORS, AND ALL FIRE DOORS SHALL HAVE CLOSERS OR OTHER APPROVED SELF-CLOSING TYPE OF OPERATION. INDIVIDUAL CLASSROOM EXIT DOORS ARE EXCEPTED FROM THIS REQUIREMENT.
5. DOORS TO SMOKE SCREENS SHALL BE SOLID-CORE VENEERED, KALAMEIN, OR HOLLOW METAL, 1-3/4" THICK. SUCH DOORS SHALL CONTAIN GLASS PANELS OF CLEAR WIRE PLATE GLASS.
6. EXTERIOR ENTRANCE AND EXIT DOORS SHALL CONTAIN PANELS OF CLEAR GLASS, EXCEPT EMERGENCY DOORS FROM ASSEMBLY AREAS. THE GLASS PANEL ABOVE THE LOCK RAIL SHALL BE NOT LESS THAN 3/16" THICK. ANY GLASS AREA BELOW THE LOCK RAIL OR DIRECTLY BEHIND ANTI-PANIC BOLTS SHALL BE CLEAR WIRE PLATE GLASS OR TEMPERED GLASS.

7. ALL PUPIL EXIT DOORS SHALL SWING OUTWARD.
8. HEATER ROOMS SHALL BE SHUT OFF FROM THE INTERIOR OF A BUILDING BY A CLASS "B" FIRE DOOR EQUIPPED WITH SELF-CLOSING HARDWARE.
9. DOORS TO THE STAGE, FAN ROOM, HEAD OF BASEMENT STAIRS, AND DOORS OF PERMANENT STAIRS TO ATTIC AND ROOF SPACES SHALL BE KALAMEIN OR HOLLOW METAL, OR CLASS "B" WOOD DOORS.

#### G. Stairways

1. A UNIT OF STAIRWAY WIDTH SHALL BE 22", EXCEPT THAT 42" MAY BE CONSIDERED AS TWO UNITS, THE SAME AS FOR EXIT UNIT WIDTH. ALL WIDTHS SHALL BE TAKEN CLEAR, NOT INCLUDING HANDRAILS AND NEWELS. NO EXIT STAIRWAY SHALL BE LESS THAN 42" WIDE BETWEEN HANDRAILS.
2. AT LEAST ONE STAIRWAY OR EXIT SHALL BE WITHIN 120 FEET, AS MEASURED ALONG THE LINE OF TRAVEL, FROM THE EXIT DOOR FROM ANY INSTRUCTION ROOM.
3. EVERY BUILDING OF TWO OR MORE STORIES NOT EXCEEDING 12 CLASSROOMS ABOVE THE FIRST FLOOR SHALL HAVE NOT LESS THAN TWO STAIRWAYS REMOTE FROM EACH OTHER. FOR EACH ADDITIONAL SIX CLASSROOMS, OR FRACTION THEREOF, ABOVE THE FIRST FLOOR, ONE ADDITIONAL STAIRWAY SHALL BE PROVIDED.
4. STAIRWAYS SHALL BE SO LOCATED WITH RESPECT TO CORRIDORS, PASSAGES, AND ROOMS THAT NO CORRIDOR SHALL EXTEND BEYOND THE STAIRS A GREATER DISTANCE THAN THE WIDTH OF THE CORRIDOR.
5. ONE UNIT OF STAIRWAY WIDTH SHALL BE REQUIRED FOR EVERY THREE CLASSROOMS OR INSTRUCTIONAL ROOMS, OR FRACTION THEREOF, ABOVE THE FIRST FLOOR.
6. NO STAIR RUN SHALL EXCEED 15 RISERS IN HEIGHT.
7. RISERS IN STAIRWAYS SHALL NOT EXCEED SEVEN INCHES IN HEIGHT.
8. TREADS SHALL BE NOT LESS THAN 11 INCHES, INCLUDING NOSING WHICH SHALL NOT EXCEED A ONE-INCH PROJECTION.
9. TREADS SHALL HAVE A NON-SLIP SURFACE. TREADS AT THE TOP, BOTTOM AND INTERMEDIATE LANDINGS SHALL BE FLUSH WITH THE ADJACENT SURFACES, AND THE TOP TREAD ON EACH RUN SHALL HAVE A NON-SLIP SURFACE EXTENDING NOT LESS THAN 12"

FROM THE RISER.

10. LANDINGS SHALL MAINTAIN A WIDTH AND DEPTH NOT LESS THAN THE STAIRS THEY SERVE.
11. WINDERS SHALL NOT BE PERMITTED ON EXIT STAIRS.
12. THE DISTANCE FROM THE FIRST RISER TO THE SMOKE-SCREEN DOOR SHALL BE EQUAL TO NOT LESS THAN TWICE THE WIDTH OF THE SMOKE-SCREEN DOOR.
13. HANDRAILS SHALL BE PROVIDED UPON BOTH SIDES OF THE STAIRS. INSIDE HANDRAILS SHALL BE CONTINUOUS FROM THE TOP OF THE STAIRS TO THE BOTTOM. BALUSTRADES AT SIDES OF STAIRS SHALL BE NOT LESS THAN FOUR FEET HIGH.
14. WHEN THE WIDTH OF A FLIGHT OF STAIRS EXCEEDS 84", AN INTERMEDIATE HANDRAIL, CONTINUOUS BETWEEN LANDINGS AND SECURELY SUPPORTED, WITH NO PROJECTION, SHALL BE PROVIDED.
15. ALL STAIRWAYS SHALL BE BUILT OF INCOMBUSTIBLE MATERIALS, EXCEPT FOR THE SMOKE-SCREEN PARTITIONS IN TWO-STORY NON-FIREPROOF BUILDINGS. ALL GLAZING IN STAIR HALLS OR TOWERS SHALL BE OF WIRE GLASS EXCEPT EXTERIOR WINDOWS. SUCH WINDOWS SHALL BE PROTECTED BY RAILINGS OR OTHER DEVICES FOR THE SAFETY OF CHILDREN, WHERE SILL HEIGHTS ARE LESS THAN 48" ABOVE THE FLOOR LEVEL OF THE LANDING.
16. ALL STAIRWAYS SHALL BE ENCLOSED WITH SMOKE-SCREEN DOORS AND PARTITIONS.
17. THERE SHALL BE NO STORAGE SPACES OR CLOSETS UNDER OR OVER STAIRS, AND NO DOORS OR PASSAGES SHALL OPEN FROM INTERMEDIATE STAIR LANDINGS.
18. EXIT STAIRWAYS SHALL BE LIGHTED BY NATURAL LIGHT.
19. OPEN STAIR WELLS SHALL NOT BE PERMITTED.
20. ALL EXIT STAIRWAYS SHALL HAVE DIRECT ACCESS TO AN EXTERIOR EXIT DOOR.

#### H. Ramps

1. NO RAMP FOR PUPIL USE SHALL EXCEED A ONE-FOOT RISE FOR EACH TEN FEET OF RUN.
2. RAMP FLOORS SHALL HAVE A NON-SLIP FINISH.

#### I. Interior Courts

1. THE HORIZONTAL DISTANCE FROM ANY SCHOOL ROOM WINDOW TO ANY LIGHT OBSTRUCTION

OF AN INTERIOR COURT WALL, TOP OF CORNICE, OR PARAPET OPPOSITE THE WINDOW SHALL BE TWICE THE HEIGHT FROM THE WINDOW SILL TO THE TOP OF THE OBSTRUCTION, BUT IN NO CASE SHALL BE LESS THAN 30 FEET.

2. INTERIOR CLOSED COURTS SHALL HAVE EXIT FACILITIES OPERABLE FROM THE COURT AT ALL TIMES.
3. INTERIOR CLOSED COURTS SHALL NOT BE USED IN BUILDINGS OF FRAME CONSTRUCTION.

## NOTES

## Sight-Lifting Suggestions for Better Space Utilization in School Buildings

### Recommendations:

1. As far as possible, internal partitions should be non-bearing, to permit maximum flexibility.
2. For reasons of both safety and educational usefulness, school plants should be designed with the smallest practicable number of stories.
3. Acoustical treatment is recommended for corridor, classroom, and cafeteria ceilings. Resilient floor coverings contribute to the reduction of noise.
4. An outside entrance from the playground to at least one toilet room for each sex should be provided.
5. All locks installed in school buildings should be master-keyed according to a carefully planned pattern.
6. If school-community use of facilities--such as libraries, health clinics, and adult education classes--is envisioned, definite provisions for such use should be made in the planning stages.
7. Metal corridor gates, recessed in the wall when not needed, are helpful in separating the areas frequently used by the community from the rest of the school plant. Such gates should be so located as to provide sufficient exits to meet requirements for the maximum occupancy of the enclosed area.
8. When areas are used by both school and community groups, consideration should be given to separate storage spaces for materials and equipment.
9. If the gymnasium is to be used frequently by community groups, additional

- lockers for gym clothing are desirable.
10. Auditorium, lunchrooms, and gymnasiums or playrooms are coming to be regarded as essential to a good elementary school program.
  11. Elementary classrooms find desirable such planned space units as library corners, art centers, project centers, science corners, and music centers, each equipped with appropriate furniture.
  12. A recessed rod equipped with sliding hooks for hanging maps and other similar instructional materials can be profitably installed above all chalkboards and tackboards.
  13. Built in equipment can care for storage of materials and projects, bookshelves, work counters, filing cabinets, teacher's lockers, sinks, cleaning cabinet, and student wardrobes. The need for built-in equipment in high school classrooms is often as great as in elementary classrooms.
  14. Each classroom should be equipped for the use of visual and auditory aids, with electrical connections, speaker cables, projection screens, and darkening provisions.
  15. Special rooms, because of the many students using them, typically need unusual provisions for storage and display.
  16. Lockers for high school pupils' wraps, books, and other personal belongings should not be located in classrooms. Corridor lockers for upper elementary classrooms will permit more flexibility and better utilization of the space in the classroom as well as leaving one more wall free for display or other use.
  17. For lockers, separate master-keyed combination locks are usually preferred to built-in locks opened by key or combination.

18. A recessed area for a piano is desirable in a gymnasium.
19. A combination science room, arranged and equipped for a wide variety of activities, is usually preferred to the separate classroom and laboratory. Equipment needs must be carefully studied and made a part of the planning process because of the necessity for properly locating utility connections and drainage lines.
20. If the school centers many of its business activities in the commercial department--school bank, ticket sales, school store, etc.--it is often advisable to provide windows accessible from the corridor.
21. Exploratory arts and crafts shops, usually housed in large rooms, often have a central area for group planning, with unit areas around the walls for such specialized crafts as leather work, block printing, simple sheet metal work, wood carving, pottery making, bookbinding, showcard writing, simple mechanical drawing, woodworking, weaving, basket making, photography, regular and silk-screen printing, and home mechanics.
22. Individual practice rooms, small in size, should be a part of the music unit. Provisions also should be made for storing instruments, sheet music, and uniforms. Each room should be acoustically treated, and thermostatically controlled, because of the effect of temperature variations on instruments.
23. A home economics unit should contain an area adequate for instructional and laboratorial work in foods and nutrition, clothing and textiles, child care and development, family economics, family relations, housing, home furnishings and equipment. A combination living-dining room unit is desirable. A service entrance for supply deliveries is helpful. Unit kitchens should be as homelike as possible. One unit kitchen should be provided

for each four pupils. A fireplace adds to the attractiveness of the living-dining room unit. A special bulletin outlining in detail the desirable features of a good home economics unit is available from the Department of Education.

24. In the field of industrial arts, the trend is toward general shops rather than specialized shops. In vocational shops, of course, specialized training is essential.
25. A well-planned office unit will provide space for the reception of visitors, the work of secretaries and student-assistants, private offices for the administrators, fireproof and safe storage of money and records, storage of office supplies, toilet facilities, the use of duplicating and other office machines, and conference rooms.
26. A public-address system, used as a teaching device, often requires careful planning in respect to its location.
27. For auditoriums with fixed seats, used only for assembly purposes, a sloping floor is desirable.
28. A ticket booth is desirable outside the auditorium, as are also toilet rooms for the use of patrons. Often general pupil toilet rooms can be so located as to conveniently serve auditorium needs, thus effecting a considerable saving in construction cost.
29. A stage depth of not less than 25 feet is desirable, and ample off-stage space, not including dressing rooms and other auxiliary rooms, should always be provided. Both sides of the stage should be accessible.
30. Stage curtains and draperies should be flameproof.
31. A well-planned library often contains a reading room, a workroom, one or

more group conference rooms, a room for storing and using audio-visual equipment and material, and the librarian's office. In the reading room a browsing area equipped with informal homelike furniture is desirable.

32. A teachers' combination workroom and conference room is often provided as a part of the administrative office suite. In this room are usually located a conference table, desks for individual study, library chairs, a professional library of books and magazines, a bulletin board, a typewriter, and a duplicating machine.
33. Rest rooms, equipped with comfortable chairs and toilet facilities, should be provided for teachers.
34. To handle the problem of storage, schools need a supply room, a book-room, a room for uniforms and athletic equipment, a stage scenery room, a costume room, and a repair room for furniture and other equipment.
35. Program clocks, in each classroom and instructional area, can be equipped with single and two-tone chimes of pleasing quality.
36. Radio-sound systems can be designed to provide broadcast listening, in-school program origination, recording and playbacks for all classrooms, and local amplification of special events in the gymnasium, auditorium, and other activity areas.
37. Microphone outlets should be provided in the gymnasium, auditorium, lunchroom, the bus-loading platform, athletic field, and playground.
38. For radio receiving sets, a central antenna and ground system, into which individual radio sets in the classrooms can be plugged, is a desirable construction feature.
39. For many schools, television antennae should be built into the building at

the time of construction.

40. Colored chalkboards, because of their higher reflection factors, are replacing blackboards in most schools.
41. Classroom furniture should be of the movable type, and should be in natural or blond finishes.
42. In gymnasiums provision should be made for a regulation basketball court, with a ceiling height of 20 to 22 feet.
43. For a large school, separate gymnasiums for boys and girls are desirable. Some large gymnasiums are often divided by a motor-driven partition, with the whole space available for interscholastic games.
44. Folding bleachers in gymnasiums provide the maximum seating capacity for a given space, and take up little room when not in use. Overhanging balconies are never recommended.
45. An acoustically treated dining room for teachers, separated from the rest of the lunchroom, will provide the teachers with a brief oasis of quietude.
46. The recommended height for chalkboards, from floor to chalk rail, is 26" for kindergarten, 28" for grades 1-3, 30" for grades 4-6, 32" to 34" for grades 7-9, and 34" to 38" for grades 10-12.
47. Tackboards should be of a height appropriate to the ages of the children being served. They may extend, in some instances, from the baseboard to the top of the reach of the pupils.
48. For the floors of instructional rooms, linoleum, asphalt tile, rubber tile, vinyl tile, or hardwood are recommended; for corridor floors terrazzo, linoleum, vinyl tile, and asphalt tile are suggested; wood floors are recommended for woodworking shops and similar areas; toilet room floors should be of ceramic tile.

### III. Lighting in School Buildings

#### Enlightenment and Lighting

Schools are established by society to provide enlightenment for its young citizens. All parts of the school and all phases of construction are consciously planned to achieve an integrated learning environment that is wholesome, healthful, and efficient. Of all of the elements that make for good classroom learning, lighting is one of the most important.

To obtain good lighting in a classroom is not so simple a task as it may appear at first to be. A casual observer may step into a classroom and quickly judge that the lighting installations seem to be producing adequate illumination. Accurate judgments can be made, however, only after one submits himself to prolonged experience within the classroom situation. While lighting, as a field of study, cannot yet be considered to be an exact science, a great deal of careful research over more than a score of years has been conducted by such organizations as the A.I.A., A.M.A., I.E.S., A.I.E.E., N.C.S.C., and Public Health Association. Out of these researches has come unanimity of agreement on the basic principles underlying the discussion and recommendations presented in this Supplement to Schoolhouse Planning and Construction - A Guide, which was published by the State Board of Education of New Jersey in 1956.

#### Basic Principles of Good Lighting

1. There must be adequate light for the tasks required of pupils. There are many different kinds of learning spaces within a school, each of which is designed for a specific type of learning activity. The quantity of light deemed desirable for activities pursued in a gymnasium or auditorium may be far

different from the lighting needs of a classroom, with its emphasis on reading and writing, and of a drafting or sewing room, where demands for fine discrimination are great. Sometimes the kind of pupils to be housed in a learning space makes advisable an abnormal quantity of light, as would be true for a classroom for partially-seeing pupils and for those using lip-reading techniques. In respect to quantity of light, New Jersey has accepted as its requirements for the lighting of various school classrooms and areas the standards established by the Illuminating Engineering Society and American Institute of Architects in 1948, as contained in Table I.

Table I  
Required Installed Lighting Levels in Schools

| <u>Locations</u>   | <u>Minimum<br/>Foot-Candles</u> |
|--|---------------------------------|
| Classrooms - on desks  | 30                              |
| Study halls, lecture rooms, art rooms, offices, libraries, shops, and laboratories                             | 30                              |
| Classrooms for partially-seeing pupils and those requiring lip-reading -- on desks                             | 50                              |
| Drafting, typing, and sewing rooms   | 50                              |
| Reception rooms, gymnasiums, and swimming pools  | 20                              |
| Auditoriums (not used for study), cafeterias, locker rooms, washrooms, corridors containing lockers, stairways | 10                              |
| Open corridors and store rooms   | 5                               |

2. The light in all parts of the room must be balanced to obtain high-quality seeing conditions. Installations can provide a satisfactory quantity of light in a room, and yet result in extremely poor seeing conditions. Quality lighting is a matter of balance of brightness areas in a room. Great variations

in brightness areas in a room cause eye fatigue in pupils.

The pupil in a classroom must adjust to three areas of brightness: a. the brightness of the task itself (e.g., the page in a book), b. the brightness of the immediate surroundings of the task (e.g., the desk top), and c. the brightness of the entire peripheral field of vision (everything the eye sees in the field of view, upward, downward, and on both sides). The eye can adjust readily to changes in the quantity of light, but it cannot adjust to excessive differences which exist simultaneously in various parts of the visual field. Excessive brightness differences in a classroom are the real causes of glare and eye fatigue.

To illustrate the "balanced brightness" factors in quality lighting, let us examine the interreflectance formula for optimum seeing conditions propounded by Professor Perry Moon of Massachusetts Institute of Technology. His formula can be summed up in a simple 3:1 ratio rule. This rule, using the task as its central focus, means that the brightest surface in the room should be no brighter than three times that of the task, and that the darkest surface in the room should be no less than one-third the task brightness. When these ratios are met, says Professor Moon, glare, shadows, and other troublesome factors are automatically removed, and ideal psychological and visual conditions result.

Let us assume, for illustration purposes, 50 foot-candles at desk level. A white paper (the task) on a desk probably has a reflectance factor of 80%. Thus the task brightness is 40 foot-lamberts. Under the 3:1 ratio rule, the darkest surfaces in the room (such as the floor) should have a brightness of at least 14 foot-lamberts (R. F. 35 plus) and the brightest surface (usually

the lighting fixture) should have a surface brightness of not more than 120 foot-lamberts. The 1:3 ratio is probably attainable only through the use of a luminous ceiling, with lights installed above the translucent ceiling material.

The minimum standards of brightness ratios suggested by "American Standard Practices for School Lighting", published by the Illuminating Engineering Society and American Institute of Architects, are, when compared with those of Professor Moon, very generous. They are shown in Table II.

Table II

Required Brightness Ratios

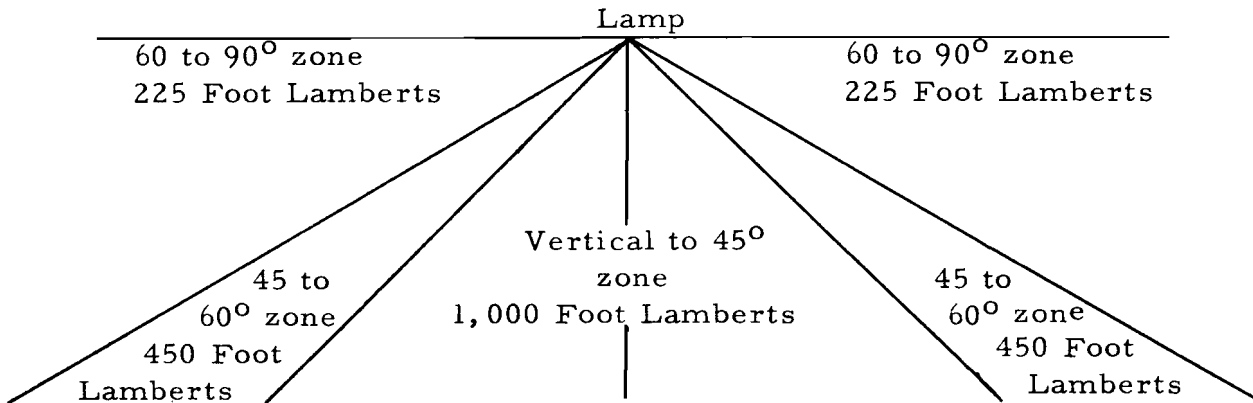
| <u>Surroundings</u>  | <u>Ratio</u> |
|--|--------------|
| Between the seeing task and the immediate surroundings (desk top) with the task being the brighter surface | 1 to 1/3     |
| Between the task and the more remote darker surfaces in the surroundings (such as the floor)               | 1 to 1/10    |
| Between the task and the more remote brighter surfaces in the surroundings (such as the ceiling)           | 1 to 10      |
| Between luminaires or windows and surfaces adjacent to them in the visual field                            | 20 to 1      |

In a small office or cubicle, with the light source directly overhead, the worker, unless he intentionally does so, never has the source of light within his field of vision. For him the surface brightness of the fixture is not an important factor. But for the pupil in a classroom, where his field of vision is normally about 170°, the surface brightness of lighting fixtures is a significant factor. The next table sets forth the maximum foot-lambert surface brightnesses of luminaires permitted by "American Standard Practice for School Lighting."

Table III

Maximum Recommended Luminaire Brightness in Foot-Lamberts

| <u>Zone</u>                   | <u>Maximum Brightness Limits</u> |
|-------------------------------|----------------------------------|
| Vertical to 45° (See diagram) | 1,000 Foot Lamberts              |
| 45° to 60°                    | 450 Foot Lamberts                |
| 60° to Horizontal or 90°      | 225 Foot Lamberts                |



3. Reflection Values in the pupils' environment can be controlled.

Reflected glare in classrooms often is caused by such shiny and glossy surfaces as are found in varnished furniture, glass doors or cabinets, and glass-covered pictures. Lighting fixtures themselves sometimes are so located or are of such type as to constitute a source of direct glare. The problem is minimized when brightness differences or ratios are kept within such limits as are suggested in Table II, and maximum luminaire brightness shown in Table III are not exceeded.

The reflecting characteristics of room surfaces and furniture have much to do with the brightness pattern in a schoolroom. Some of the light falling upon a surface or object is absorbed; the rest is reflected. The amount reflected, in terms of a percent, is called the reflection factor or reflectance. The lighter the color, the higher is its reflection factor. The amount of light

in certain areas of a room can often be doubled merely by repainting or by changing the color. Simply by covering chalkboards with light-colored shades or tackboards, when they are not in use, will increase appreciably the light levels on the desks near the boards. Eye hygiene calls for high reflection from all surfaces above eye level, so that the light striking such surfaces may be reflected downward upon the work or task. Surfaces below eye level should reflect slightly less light.

Colored chalkboards, because of their higher reflection values, are replacing blackboards in many schools. Classroom furniture, because of reflection factors, is increasingly constructed with natural or blonde non-glossy finishes. Variations in the color scheme from room to room, and within rooms, are desirable; in general, warm colors should be used for northern and eastern exposures, and cool colors for southern and western exposures.

Table IV summarizes the desirable reflectances of various room surfaces.

Table IV

Desirable Reflectances of Room Surfaces

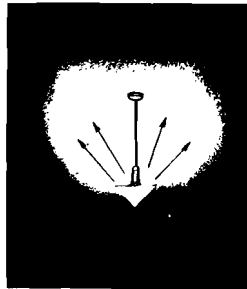
| <u>Surface</u>                 | <u>Reflection Factor</u> |
|--------------------------------|--------------------------|
| A - - Ceilings, white          | 85 - 80%                 |
| B - - Walls                    | 60 - 50%                 |
| C - - Furniture, light-colored | 50 - 30%                 |
| D - - Floors, light-colored    | 30 - 15%                 |

4. For the achievement of good lighting conditions within a classroom, the selection of luminaires is extremely important. There are many types of lighting installations on the market, made by many companies. In general, however, those suitable for classrooms fall within these categories:

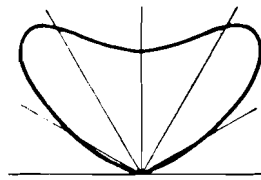
## Type A

### The Indirect Lighting Fixture

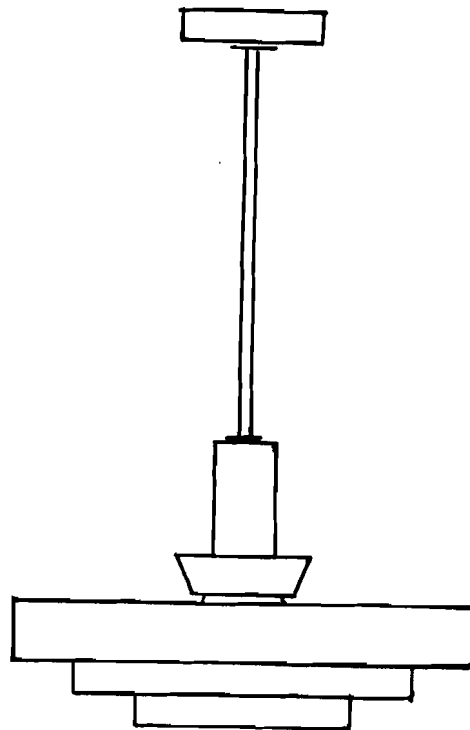
In this system the fixture is so designed as to direct its total output of light to the ceiling. The ceiling must be finished so as to have a high reflectance factor and be maintained properly if a satisfactory result is to be obtained. Usually this employs an incandescent lamp and may be either the inside frosted or silver bowl type. Best results are obtained with a ceiling height of 10 to 12 feet and with the fixture suspended at from 30 to 36 inches from the ceiling.



**INDIRECT**



*Indirect lighting — 90% or more of light directed to ceiling.*

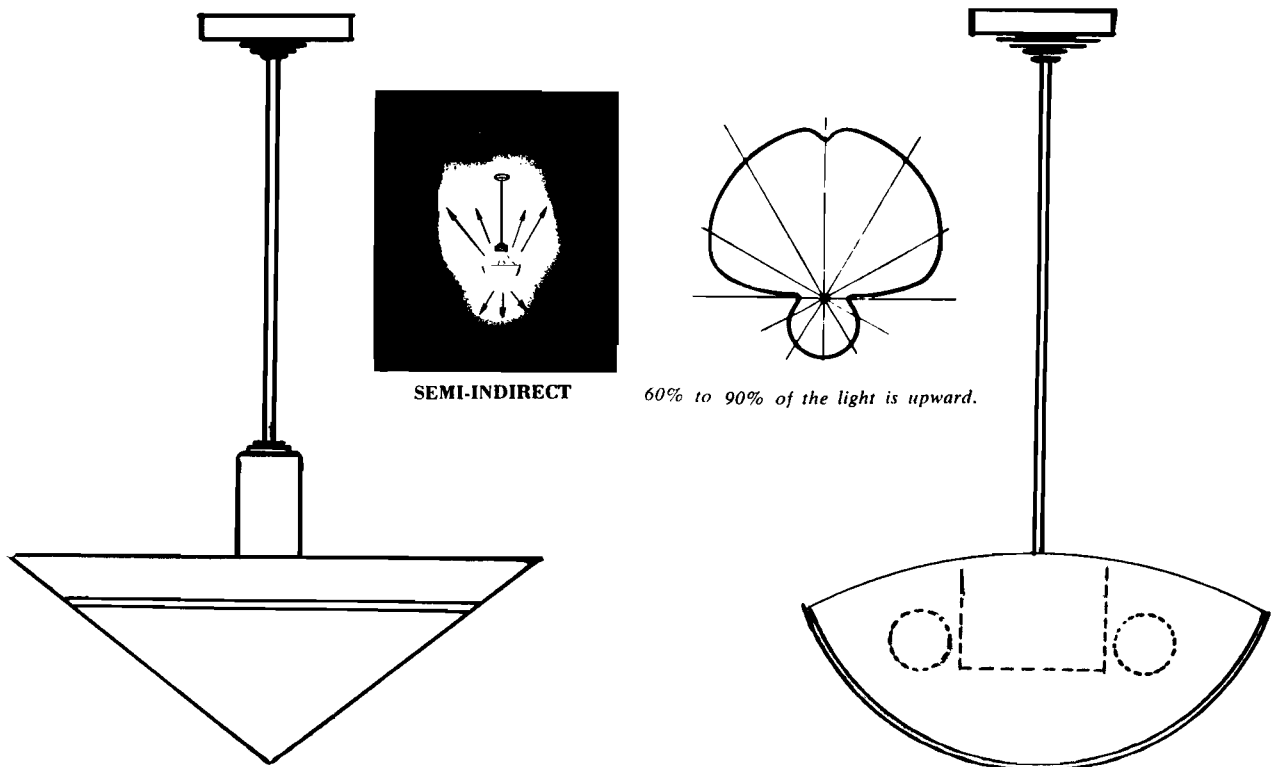


**SILVERED-BOWL LAMP  
IN OPEN-BOTTOM  
LUMINAIRE**

## Type B

### The Semi-Indirect Lighting Fixture

This system differs from Type "A" in that the reflector or diffuser is of a light transmitting material permitting about 10 percent of the light to be directed through the reflector to the floor and the balance being directed toward the ceiling. Here again the ceiling must have a high reflectance and be properly maintained in order to assure satisfactory results. The same ceiling and suspension heights apply as described for Type "A". The fixture may be either incandescent or fluorescent. Light of a high quality is obtained and the ratio of fixture brightness to ceiling brightness is usually very satisfactory. The trend toward lowered classroom ceilings is making the use of this fixture impractical.

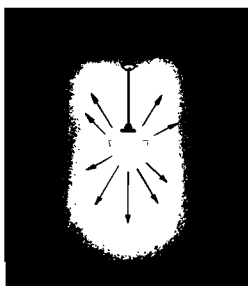


## Type C

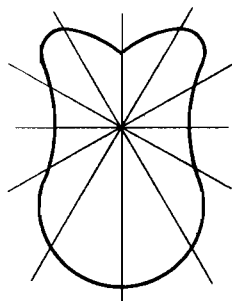
### The Direct-Indirect Lighting Fixture

In this type of fixture, approximately one-half of the light is directed toward the ceiling and the rest toward the floor. The indirect or upward component in lighting the ceiling relieves the brightness contrast between the ceiling and the fixture. This upward component also is the principal factor in reducing or eliminating undesirable shadows within the room. The direct or downward component is responsible for most of the light that reaches the working level or desk top. It is important that the fluorescent tubes used in these fixtures be shielded with louvers of such design as to cut off a direct view of the tubes at an angle of less than 45 degrees with the horizontal both lengthwise and crosswise. Some glare may result from a reflection of the tubes on glossy surfaces or surfaces with a high reflectance factor directly under the fixture.

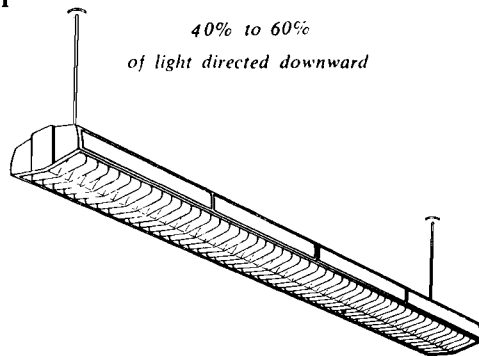
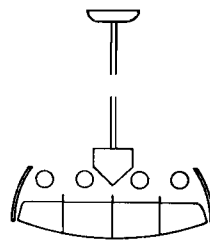
This type of fixture is the most efficient of the shielded luminaires and is the most widely used.



**DIRECT-INDIRECT**



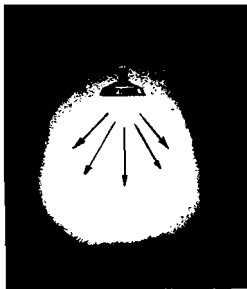
*40% to 60%  
of light directed downward*



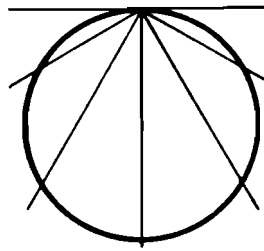
Type D

Direct Luminaires

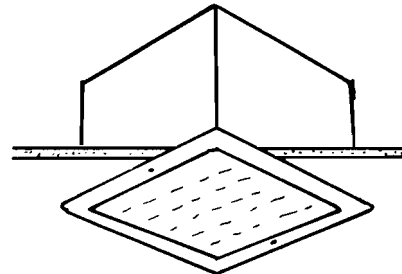
This is descriptive of any unshielded lamp whether incandescent or fluorescent, with or without reflectors. Also included in this category are fixtures equipped with lenses or large glass or plastic enclosures, such as globes, which serve to diffuse the light. In terms of the amount of light energy which reaches the task, direct luminaires are the most efficient. Since the surface brightness of the lamp or fixture in practically all types of direct luminaires exceeds the standards indicated in Table III, they do not meet the requirements for Lighting Level One or Lighting Level Two described on pages 12, 13, and 14. However, luminaires with a surface brightness not in excess of 1,150 foot lamberts will be approved as meeting the requirements of Lighting Level Three.



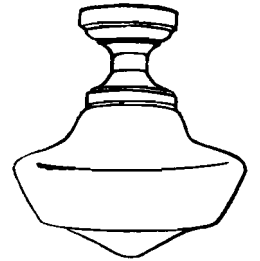
DIRECT



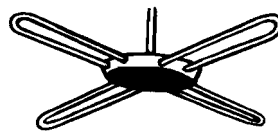
90% to 100% of the light is downward in direct lighting.



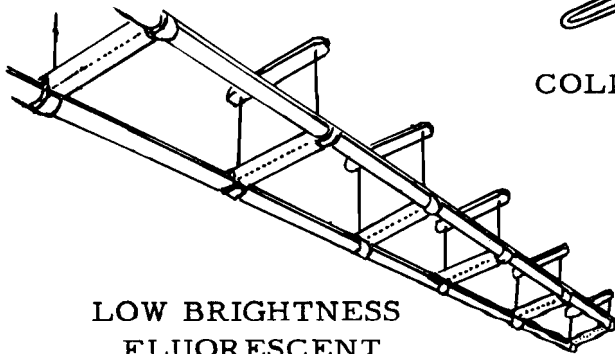
INCANDESCENT



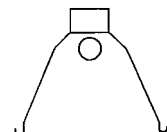
INCANDESCENT



COLD CATHODE



LOW BRIGHTNESS  
FLUORESCENT



TROFFER  
FLUORESCENT

To be of good quality, light must be distributed throughout the classroom from all overhead directions. To avoid shadows on the working surface, right-handed children when writing should receive more light from over the left shoulder than from over the right. The reverse is true for left-handed pupils. If light is evenly distributed and diffused in all parts of a schoolroom, however, there will be no shadows and the brightness intensity will be the same in all directions.

Classrooms with ceilings as low as 9'6" present problems in achieving satisfactory artificial lighting. To avoid a high ratio of brightness between the light fixtures and the ceiling and to achieve well-diffused light, it is necessary a. to select fixtures which direct approximately half of their light upward, and b. to suspend such fixtures far enough below the ceiling as to enable the total ceiling to be illuminated as evenly as possible. The following distances between the top of the fixture and the ceiling for different ceiling heights are recommended.

Table V

| <u>Ceiling Height Above Floor</u> | <u>Fixture Mounting Height:<br/>Distance From Top of<br/>Fixture to Ceiling</u> |
|-----------------------------------|---|
| 9'6"                              | 15"   |
| 10'0"                             | 18"   |
| 10'6" and up                      | 24"   |

Lighting Requirements for New Jersey Public Schools

The purpose of this lighting brochure is two-fold. It is designed as an educational instrument, to help boards of education and school administrators to understand the many-faceted factors involved in good school lighting. It is

also designed to show, as explicitly as possible, what is required in new public schools by Schoolhouse Planning and Construction: A Guide. The requirements that are given below supersede and replace those which are contained in the 1956 edition of Schoolhouse Planning and Construction: A Guide.

The light intensities designated for rooms used for instructional purposes may be obtained through the use of daylight or a combination of daylight and artificial light in rooms used exclusively for instructional purposes during daylight hours. Rooms used for instructional purposes at night must have artificial illumination adequate to meet such intensity requirements.

The requirements listed below recognize that, although all school districts desire to provide optimum seeing conditions for the pupils in their schools, their financial ability to provide such conditions varies. In some instances, however, it must be admitted that differences between poor lighting and good lighting in schools are more a matter of knowledge than of cost.

Schoolhouse Planning and Construction: A Guide permits three levels of lighting:

Quality Level One - School lighting conditions as nearly ideal as possible.

Quality Level Two - School lighting conditions below the ideal, but better than the minimum requirements.

Quality Level Three - Lighting conditions which assure only the bare minimums in quality of lighting.

#### Quality Lighting Level One Guide Requirements

This level of lighting comfort and efficiency approaches the ideal, attainable through skillful attention to details and at a cost consonant with the lighting results.

### Artificial Lighting-

1. Sufficient luminaires shall be provided and so located as to maintain easily the minimum foot candles of light for each area indicated in Table I.
2. Lighting fixtures shall be so selected and the total seeing environment in the classroom so organized as to narrow appreciably the generous brightness ratios indicated in Table II and to approach the 1:3 ratio rule discussed in Basic Principle 2.

### Daylighting-

1. Daylight shall be controlled so as to provide a seeing environment in classrooms approaching as nearly as practicable the 1:3 brightness ratio rule discussed in Basic Principle 2 either as the sole source of illumination or in combination with artificial light sources.

### Quality Lighting Level Two Guide Requirements

This level of lighting quantity and quality provides high-type visual comfort and efficiency, at reasonable cost.

### Artificial Lighting-

1. Sufficient luminaires shall be provided to obtain the minimum foot candles in each location as suggested in Table I. The table is interpreted to mean that the light intensities indicated are to be maintained during the hours when the school building is used for instructional purposes.
2. Luminaires shall have a brightness not in excess of 450 foot-lamberts when viewed from an angle less than 45 degrees with the horizontal axis of the fixture.

3. To achieve a brightness ratio of less than 20 to 1, fixtures must be of the indirect, semi-direct, or direct-indirect types (see Types A, B, C), suspended sufficiently far below the ceiling to illuminate the ceiling as uniformly as possible (see Table V).
4. All of the brightness ratios and required reflectances, as presented in Tables II and IV, are equaled or bettered.

#### Daylighting-

1. Daylight shall be controlled so as to provide a seeing environment in classrooms consistent with the brightness ratios indicated in Table II either as the sole source of illumination or in combination with artificial light sources.

#### Quality Lighting Level Three Guide Requirements

This, the lowest level of school lighting approvable for new school construction under the Guide, permits much greater ratios of brightness within the pupils' visual field than are contained within the two higher levels of school lighting.

#### Artificial Lighting-

1. Luminaires with a surface brightness of not more than 1,150 foot lamberts will be permitted. Fixtures with a surface brightness in excess of 450 foot lamberts in the 45° - 90° zone shall be suspended at a height not less than 9'0" above the floor.
2. Sufficient luminaires shall be provided to yield an installed minimum of 30 foot-candles of light on desks at any location within the room under varying weather conditions and during the hours when the room is to be used for instructional purposes.

3. All lighting standards in Tables I, II, and IV apply, except for the last item in Table II. This level of lighting does not require the limit of the 20 to 1 brightness ratio between luminaires and surfaces adjacent to them in the visual field.

#### Daylighting -

1. Daylight shall be controlled so as to provide a seeing environment in classrooms approaching the brightness ratios in Table II as a goal either as the sole source of illumination or in combination with artificial light sources, except that as noted above, the artificial light source need not meet the limit of a 20 to 1 brightness ratio between the luminaire and adjacent surfaces.

#### Special Lighting Requirements

In shops and gymnasiums direct luminaires of the reflector or troffer type shall be permitted. Such fixtures shall be mounted at a minimum distance of nine feet from the floor to the lower part of the fixture. Reflectors or troffers shall be deep enough to cut off a direct view of the lamp at an angle above 45 degrees (when troffers are viewed from the side).

#### General Daylighting Requirements

1. The net glass area in all instructional rooms, except gymnasiums, shall be not less than 15 percent of the floor area.
2. Glassblock, tinted glass, or rigid plastic-and-fiber glass may be used in lieu of clear glass, provided that:
  - a. The area of such materials when used shall be 25 percent greater than the area of clear glass required.
  - b. The glassblock, when used, shall be of the directional type.

- c. The light transmission factor of such material shall not be less than 60 percent, unless compensated for by a proportionate increase in the window area.
  - d. The lowest point of glass block or other non-transparent medium including its supporting frame shall be not less than 5'6" above the floor.
  - e. There shall be a vision strip of transparent glass, either clear or tinted, extending the full length of the window section with a minimum vertical width of 24 inches in all classrooms except shops, band rooms and choral rooms.
  - f. At least one-half of the area of the vision strip shall consist of operable sash to permit extra ventilation when required.
  - g. Any medium used in lieu of glass shall meet the National Board of Fire Underwriters requirements for fire resistance.
3. Main window sills shall be not more than 36 inches above the floor in all instructional rooms, except shops, gymnasiums, and other special areas.
  4. In determining the glass area required when horizontal overhead daylighting is provided, such overhead horizontal daylighting shall be computed as equivalent to two times the area of clear vertical glass.
  5. Natural light shall be provided in all pupil toilet rooms, except individual toilet rooms, and the glass area shall be not less than 10 per cent of the floor area.
  6. Natural light shall be provided in all stair halls.

## General School Lighting Requirements for All Levels

The following regulations apply to all new school buildings:

1. Switches for classroom lights shall be so wired as to permit the flexibility needed for varying light requirements in the room.
2. Corridor and stair hall lights shall be controlled by three-way switches located at convenient control points.
3. Exit lights shall be provided over exits from corridors, rooms of assembly, gymnasiums, and cafeterias.

For other electrical requirements, see Schoolhouse Planning and Construction: A Guide.

### LIGHTING MAINTENANCE

Continued satisfactory lighting results are dependent upon good maintenance. This includes the care and upkeep of fixtures, keeping ceilings, walls, floors, and furniture clean and painted as frequently as necessary, and the cleaning, repair, and replacement of shades or other types of daylight control. The following recommendations are made to those responsible for school lighting in the interest of making certain that children in classrooms are getting the quantity and quality of light necessary for a good seeing situation:

1. Wash glass or plastic diffusers or reflectors at least once each year; oftener where dust conditions are more severe than normal.\*
2. Wash louvers or fluorescent fixtures and rings on indirect concentric ring fixtures once each year.\*
3. Wipe dust off tubes and lamps at least once each year; oftener where dust conditions are more severe than normal.

\* Detergents are available, which if used for rinsing plastic or metal parts will reduce the tendency to attract dust.

4. Replace fluorescent and cold cathode tubes when they begin to appear dark. Do not wait until they begin to flicker as in the case of fluorescent tubes or cease to give a satisfactory amount of light as is the case with cold cathode tubes after several years use.
5. Wash windows three times each year. This applies also to glassblock and other tinted or non-transparent window medium.
6. If window shades are washable, have them laundered every two or three years as conditions require. Window shades of cotton duck which may be easily slipped from the rollers for laundering are recommended.
7. Wash venetian blinds at least once each year and remove dust periodically during the year as needed. \*
8. In large buildings using fluorescent tube fixtures, it is often found practicable that a regular tube replacement schedule be worked out which is consistent with the normal number of hours of tube life. Under such a system all tubes will be replaced at one time eliminating the trouble and expense of getting ladders and replacing each tube as it burns out. This system also assures having all fixtures operating at or near their maximum output. It also avoids the necessity of having a large stock of tubes on hand at all times.
9. The life of tubes, starters, ballasts or incandescent lamps depends upon having electric current of the proper voltage and which does not fluctuate. If trouble is experienced in this respect, notify the light company and have a check made on the voltage of the current in your

\*Detergents are available, which if used for rinsing plastic or metal parts will reduce the tendency to attract dust.

lighting circuits. The light company will be glad to make the necessary corrections.

10. Do not operate fluorescent fixtures without proper shielding. A bare fluorescent tube has a brightness approximately four times as great as is regarded as satisfactory for classroom purposes.
11. Do not replace silverbowl lamps with clear or inside frosted lamps. The brightness of inside frosted or clear lamps is such as to cause glare which may be harmful to the eyes of both children and teachers.

## IV. Ventilation of School Buildings

### A. Mechanical Air Supply

1. ALL SCHOOL BUILDINGS SHALL BE PROVIDED WITH A MECHANICAL SYSTEM OF SUPPLY VENTILATION SO THAT, DURING THE PERIOD OF OCCUPANCY, EACH CLASSROOM AND OTHER INSTRUCTIONAL AREAS SHALL OBTAIN TEMPERED OUTDOOR AIR IN QUANTITIES OF NOT LESS THAN TEN CUBIC FEET OF STANDARD AIR PER MINUTE PER PUPIL.
2. MECHANICAL VENTILATION SHALL BE PROVIDED AT THE RATE OF TWO AIR CHANGES PER HOUR FOR GYMNASIUMS, ALL-PURPOSE ROOMS, AND COMBINED GYMNASIUM-AUDITORIUMS, AND AT THE RATE OF FOUR CHANGES PER HOUR FOR AUDITORIUMS.
3. MECHANICAL VENTILATION SHALL BE PROVIDED IN STUDENT CAFETERIAS ON THE BASIS OF NOT LESS THAN FOUR AIR CHANGES PER HOUR; FOR CAFETERIA KITCHENS ON THE BASIS OF NOT LESS THAN TWELVE AIR CHANGES PER HOUR; AND FOR LOCKER ROOMS, SHOWER ROOMS, TOILET ROOMS, AND JANITORS' SERVICE ROOMS ON THE BASIS OF NOT LESS THAN SIX CHANGES PER HOUR.
4. A MECHANICAL AIR SUPPLY AND EXHAUST SYSTEM SHALL BE PROVIDED FOR ALL SWIMMING POOLS, WITH NOT LESS THAN SIX AIR CHANGES PER HOUR.
5. RE-CIRCULATION OF AIR IS PERMITTED, PROVIDED THAT THE MINIMUM QUANTITY OF OUTDOOR AIR, AS PREVIOUSLY MENTIONED, IS FURNISHED FOR THE DIFFERENT LOCATIONS.

### B. Air Exhaust

1. ALL CLASSROOMS AND OTHER INSTRUCTIONAL AREAS SHALL BE PROVIDED WITH GRAVITY OR MECHANICAL EXHAUST VENTILATION. SUCH VENTILATION MAY BE THROUGH WARDROBES, LOCKERS, OR INDIVIDUAL ROOM VENTS, BUT IN NO CASE SHALL THE EXHAUST VENTILATION FROM A CHEMISTRY, COOKING, OR OTHER ROOM WITH ODORS BE DIRECT TO THE CORRIDOR.
2. VENTILATING FLUES OR DUCTS LEADING FROM TOILET ROOMS SHALL NOT CONNECT WITH THOSE LEADING TO OR FROM ANY OTHER AREAS, EXCEPT THE JANITOR'S SERVICE ROOMS.

3. MECHANICAL EXHAUST VENTILATION SHALL BE PROVIDED IN ALL SHOPS OR LABORATORIES IN WHICH DUST, GASES, FUMES, OR ODORS MIGHT BE PRODUCED IN SUFFICIENT QUANTITY AS TO BE DEEMED TO BE PREJUDICIAL TO THE HEALTH AND WELL BEING OF OCCUPANTS.
4. AUXILIARY EXHAUST VENTILATION SHALL BE INSTALLED IN GYMNASIUMS, ALL-PURPOSE ROOMS, COMBINED GYMNASIUM-AUDITORIUMS, AND AUDITORIUMS SUFFICIENT TO PROVIDE A MINIMUM OF EIGHT AIR CHANGES PER HOUR IN WARM WEATHER.
5. INDIVIDUAL TOILET ROOMS WITHOUT WINDOW VENTILATION SHALL BE PROVIDED WITH AN EXHAUST SYSTEM FURNISHING NOT LESS THAN SIX AIR CHANGES PER HOUR.
6. A BUILT-IN MECHANICAL EXHAUST SYSTEM SHALL BE PROVIDED FOR EACH INTERNAL COMBUSTION ENGINE AND HEAT TREATING FURNACE.

#### NOTES

## V. Heating of School Buildings

### A. Weather Zones

1. THE HEATING PLANT SHALL BE CAPABLE OF HEATING ALL PARTS OF THE BUILDING TO A UNIFORM TEMPERATURE OF 70 DEGREES F. IN ZERO WEATHER IN THE NORTH ZONE OF NEW JERSEY AND IN PLUS 10 DEGREES F. IN THE SOUTH ZONE OF NEW JERSEY. THE 40TH PARALLEL SHALL BE THE LINE OF DEMARCATION BETWEEN THE NORTH AND THE SOUTH TEMPERATURE ZONES.

### B. Temperature Control

1. THERE SHALL BE PROVIDED AN AUTOMATIC CONTROL SYSTEM TO ASSURE A RELATIVELY UNIFORM TEMPERATURE IN ALL AREAS OCCUPIED OR USED BY PUPILS.
2. Recommendation: For temperature control purposes it is permitted to establish zones within the building. In such instances, instead of a thermostatic control in each classroom, a control is placed in each zone, and the zone might be all of the classrooms on one side of the building, or all of the rooms on one side of a wing of the building.
3. Certain parts of school buildings, such as the auditorium, the gymnasium, and the offices, should be so zoned as to permit them to be heated as separate units, for they will often be used when the rest of the building is idle.

### C. Air Intake

1. HEATER ROOMS SHALL BE PROVIDED WITH AN OUTSIDE AIR INTAKE FOR THE PROPER COMBUSTION OF FUEL. THE FREE AREA OF THE INTAKE SHALL BE NOT LESS THAN 75 PERCENT OF THE SMOKESTACK AREA.

### D. Safety Devices

1. ALL COAL, LIQUID OR GAS FIRED BOILERS, AND VESSELS OR FURNACES USED FOR HEATING OR FOR DOMESTIC HOT WATER SHALL BE PROVIDED WITH ALL PRESCRIBED

SAFETY DEVICES RECOMMENDED BY THE LATEST PUBLISHED RULES OF THE NATIONAL BOARD OF FIRE UNDERWRITERS. THESE SHALL INCLUDE SOLENOID VAPOR VALVES ON ALL GAS PILOT LINES.

2. WHERE BOTTLED GAS IS USED FOR ANY PURPOSES, THE LOCATION OF CONTAINERS SHALL BE IN ACCORDANCE WITH THE LATEST PUBLISHED STANDARDS OF THE NATIONAL BOARD OF FIRE UNDERWRITERS FOR THE STORAGE AND HANDLING OF LIQUEFIED PETROLEUM GAS AS RECOMMENDED BY THE NATIONAL FIRE PROTECTIVE ASSOCIATION.
3. AN EMERGENCY CUT-OFF SWITCH FOR OIL BURNERS SHALL BE PROVIDED AND SHALL BE CONVENIENTLY LOCATED.

#### NOTES

## VI. Sanitation in School Buildings

### A. Plumbing Codes and Regulations

1. ALL PLUMBING INSTALLATION SHALL CONFORM TO THE STANDARDS OF THE LATEST PUBLISHED PLUMBING CODE OF NEW JERSEY (PART E OF THE STANDARD BUILDING CODE OF NEW JERSEY) AND SUBSEQUENT AMENDMENTS THERETO, EXCEPT WHEREIN THE SAME IS IN CONFLICT WITH EXISTING REGULATIONS OF THE STATE BOARD OF EDUCATION.
2. WHERE CONNECTION TO AN APPROVED SEWER CANNOT BE EFFECTED, PLANS AND SPECIFICATIONS FOR SEPTIC TANKS, DRAINAGE FIELDS AND SEWAGE TREATMENT PLANTS SHALL BE IN ACCORDANCE WITH THE LATEST PUBLISHED RULES AND REGULATIONS OF AND APPROVED BY THE NEW JERSEY STATE DEPARTMENT OF HEALTH.
3. WHERE AN APPROVED PUBLIC WATER SUPPLY IS NOT AVAILABLE, PROVISIONS FOR DRINKING WATER SHALL BE MADE IN ACCORDANCE WITH THE LATEST PUBLISHED RULES AND REGULATIONS AS PRESCRIBED BY THE NEW JERSEY DEPARTMENT OF HEALTH AND OTHER AUTHORITIES HAVING JURISDICTION.

### B. Toilet Facilities

1. THE FOLLOWING RATIO OF SANITARY FIXTURES SHALL BE CONSIDERED MINIMUM REQUIREMENTS IN SCHOOL BUILDINGS. WHERE SCHOOL BUILDINGS HAVE SELF-CONTAINED CLASSROOMS WITH TOILET AND LAVATORY FACILITIES, THE PUPILS IN THESE ROOMS SHALL NOT BE COUNTED IN COMPUTING THE NUMBER OF FIXTURES TO BE INSTALLED IN GENERAL TOILET ROOMS.

#### A. WATER CLOSETS

|                                     |                  |
|-------------------------------------|------------------|
| GIRLS - GRADES ONE THROUGH EIGHT    | ONE TO 30 PUPILS |
| BOYS - GRADES ONE THROUGH EIGHT     | ONE TO 60 PUPILS |
| GIRLS - GRADES SEVEN THROUGH TWELVE | ONE TO 45 PUPILS |
| BOYS - GRADES SEVEN THROUGH TWELVE  | ONE TO 90 PUPILS |

#### B. URINALS

|                                    |                  |
|------------------------------------|------------------|
| BOYS - GRADES ONE THROUGH EIGHT    | ONE TO 30 PUPILS |
| BOYS - GRADES SEVEN THROUGH TWELVE | ONE TO 45 PUPILS |

C. LAVATORIES

BOYS AND GIRLS - ALL GRADES

ONE TO 50 PUPILS

2. NO GENERAL TOILET ROOM SHALL CONTAIN LESS THAN TWO OF EACH OF THE RESPECTIVE FIXTURES REQUIRED.
3. KINDERGARTEN ROOMS SHALL BE EQUIPPED WITH SEPARATE WATER CLOSET AND LAVATORY FACILITIES.
4. WHEN FLUSHOMETER VALVES ARE USED, THEY SHALL BE PROVIDED WITH APPROVED VACUUM BREAKERS.
5. NATURAL LIGHT SHALL BE PROVIDED IN ALL PUPIL TOILET ROOMS, EXCEPT INDIVIDUAL TOILET ROOMS, AND THE GLASS AREA SHALL BE NOT LESS THAN 10 PER CENT OF THE FLOOR AREA.
6. ENTRANCES TO TOILET ROOMS SHALL BE PROVIDED WITH SCREENS TO PREVENT VISIBILITY FROM THE CORRIDOR.
7. ALL PUPIL TOILET AND SHOWER ROOM FLOORS SHALL BE CERAMIC TILE OR OTHER SIMILAR IMPERVIOUS SURFACE.
8. WATER CLOSETS SHALL BE SEPARATED BY INDIVIDUAL STALLS OF SMOOTH NON-POROUS MATERIALS TO PERMIT EFFICIENT CLEANING. "SEPARATED" DOES NOT MEAN EXTENSION TO FLOOR LEVEL OR PROVISION OF STALL DOORS.
9. NO TOILET ROOMS FOR PUPILS, EXCEPT AUXILIARY TOILETS, SHALL BE PLACED IN BUILDING BASEMENTS.
10. IN MULTI-STORY BUILDINGS THERE SHALL BE BOYS' AND GIRLS' TOILET ROOMS ON EACH FLOOR USED BY PUPILS.
11. THE TEMPERATURE OF DOMESTIC HOT WATER SHALL BE THERMOSTATICALLY CONTROLLED.
12. Individual classroom toilets are not recommended for pupils above the third grade.

C. Drinking Fountains

1. THE NUMBER OF DRINKING FOUNTAINS TO BE INSTALLED IN A SCHOOL BUILDING SHALL BE IN ACCORDANCE WITH THE FOLLOWING RATIOS:

A. ELEMENTARY SCHOOLS

ONE DRINKING FOUNTAIN FOR EACH 50 PUPILS UP TO 250 PUPILS  
ONE DRINKING FOUNTAIN FOR EACH 75 PUPILS UP TO 550 PUPILS  
ONE DRINKING FOUNTAIN FOR EACH 100 PUPILS OR FRACTION THEREOF  
BEYOND 550 PUPILS.

B. HIGH SCHOOLS

ONE DRINKING FOUNTAIN FOR EACH 75 STUDENTS UP TO 300 STUDENTS  
ONE DRINKING FOUNTAIN FOR EACH 125 STUDENTS UP TO 550 STUDENTS  
ONE DRINKING FOUNTAIN FOR EACH 200 STUDENTS OR FRACTION THEREOF  
BEYOND 550 STUDENTS.

C. WHEN DRINKING FOUNTAINS ARE INSTALLED IN INSTRUCTIONAL ROOMS, THE  
PUPIL CAPACITY OF THESE ROOMS SHALL NOT BE USED IN COMPUTING THE  
TOTAL BUILDING CAPACITY TO DETERMINE THE NUMBER OF DRINKING FOUNTAINS  
REQUIRED ELSEWHERE.

2. AT LEAST TWO DRINKING FOUNTAINS SHALL BE PROVIDED IN EVERY SCHOOL BUILDING.
3. THERE SHALL BE NOT LESS THAN ONE DRINKING FOUNTAIN ON EACH FLOOR OF MULTI-STORY BUILDINGS.
4. DRINKING FOUNTAINS SHALL BE OF THE ANGLE-STREAM TYPE.
5. DRINKING FOUNTAINS SHALL BE PROVIDED IN KINDERGARTEN ROOMS.
6. DRINKING FOUNTAINS SHALL NOT BE INSTALLED IN TOILET ROOMS.
7. ANGLE-STREAM FOUNTAINS MAY BE ATTACHED TO SINKS OR LAVATORIES IN INSTRUCTIONAL ROOMS.

## Sight-Lifting for Sanitation in School Buildings

1. A shelf 10" wide and from 4' to 6' in length makes a very convenient installation in all main toilet rooms in junior and senior high schools to provide a place for books and other possessions while students are using the facilities.
2. Individual toilet rooms are recommended for all classrooms serving grades one through three.
3. Gang showers are recommended for boys. There is a trend toward gang showers for girls, with several individual showers and adjoining dressing cubicles. Each community should decide the type of showers to provide for girls in terms of local custom and desires.
4. Provision for liquid or bar soap should be made in the shower room.
5. A towel room should be considered, where each pupil may obtain a clean towel for every gymnasium period. Some schools have found a small laundry economical over a long-term period.
6. A health unit should include a waiting area, an examination room, and separate rest rooms for boys and girls, each equipped with one or more cots, with lavatory and toilet facilities conveniently accessible.
7. All windows in the lunchroom, kitchen, and related areas should be screened.
8. A dressing room with lockers, lavatory, and showers should be provided for lunchroom workers, near, but not opening directly into the kitchen.
9. A drinking fountain is a desirable feature in every elementary classroom and may be attached to the lavatory.
10. A swimming pool is a very valuable adjunct to a modern health and physical education program.

11. For gymnasium locker rooms, the best recommendation is for a small locker for every pupil who uses the gymnasium, for the storage of his gym clothes, and for enough larger lockers to contain the street clothes of the pupils who use the gymnasium at any one time.
12. Consideration should be given to the growing use of schools by pupils who are physically handicapped by orthopedic defects, cardiac disorders, and other physical disabilities. The presence of an entrance which permits easy access to the building from the ground level or the availability of an elevator in a multi-story building may often be the controlling condition which permits such pupils to continue attending school.
13. Advisable heights for toilet seats for kindergarten children are 10" (baby size); for grades one through six, 13" (junior size); and for grades seven through twelve and adults, 15" (standard size).
14. Where economy is essential, consideration may be given to:
  - a. The elimination of separate shut-off valves on the cold and hot water lines to separate wash bowls, and the adoption of one cold water and one hot water shut-off valve for the entire group of wash bowls in each toilet room.
  - b. The installation of one long wash trough with an equivalent number of faucets and one trap, instead of several wash bowls with separate traps.
  - c. The installation of one wall-hung trough-type urinal with only one flush valve and one trap, instead of separate urinals. Urinals of china and porcelain seem to be most serviceable.

## VII. Building Safety

### A. Fire Safety

1. FRAME CONSTRUCTION. THIS IS DEFINED BY SUBSECTION "A-1" OF SECTION 18:6-66 AND SUBSECTION "A-1" OF SECTION 18:7-91 OF THE REVISED STATUTES OF NEW JERSEY AS FOLLOWS: THIS IS A BUILDING OR STRUCTURE OF WHICH THE EXTERIOR WALLS, OR A PORTION THEREOF ARE CONSTRUCTED OF WOOD, OR A BUILDING SHEATHED WITH BOARDS AND PARTIALLY OR ENTIRELY COVERED WITH FOUR INCHES OR LESS OF MASONRY OR WITH METAL SHEETS.

A. AS HEREINAFTER AMPLIFIED, FRAME CONSTRUCTION MAY BE USED FOR ONE-STORY SCHOOL BUILDINGS, WITHOUT BASEMENT OR ROOM BELOW GRADE, PROVIDED THAT EACH CLASSROOM SHALL HAVE AN OUTSIDE EXIT AND THAT NO OTHER FRAME STRUCTURE SHALL BE LOCATED CLOSER THAN 100 FEET TO ANY PART OF SUCH FRAME SCHOOL BUILDING. SPACE NECESSARY FOR THE HEATING PLANT MAY BE LOCATED IN A ROOM BELOW GRADE IF SUCH ROOM MEETS REQUIREMENTS FOR NON-FIRE PROOF CONSTRUCTION. (SEE SECTION 2-A BELOW.) NO ROOM SHALL CONTAIN MORE THAN 2,500 SQUARE FEET.

2. NON-FIREPROOF CONSTRUCTION. THIS IS DEFINED BY SUBSECTION "A-2" OF SECTION 18:6-66 AND SUBSECTION "A-2" SECTION 18:7-91 OF THE REVISED STATUTES OF NEW JERSEY AS FOLLOWS: THIS IS A BUILDING OR STRUCTURE THE OUTER WALLS OF WHICH ARE CONSTRUCTED IN ACCORD WITH THE SPECIFICATIONS CONTAINED IN PARAGRAPH "A-3" OF THIS SECTION FOR A FIREPROOF BUILDING, BUT WHICH FAIL TO CONFORM WITH ANY OF THE OTHER SPECIFICATIONS FOR A FIREPROOF BUILDING, AS DEFINED IN SAID PARAGRAPH "A-3".

A. NON-FIREPROOF CONSTRUCTION, AS THUS DEFINED AND AS HEREINAFTER AMPLIFIED, MAY BE USED FOR ALL ONE-STORY AND TWO-STORY SCHOOL BUILDINGS, PROVIDED THAT STAIR HALLS, HEATER ROOMS, AND COAL VAULTS ARE OF FIRE-PROOF CONSTRUCTION WITH A ONE-HOUR RATING FOR FLOORS, WALLS, AND CEILINGS. CORRIDOR WALLS, FLOORS, AND CEILINGS, SHALL BE CONSTRUCTED OF INCOMBUSTIBLE MATERIALS. ALL GLASS PANELS IN CORRIDORS SHALL BE OF

WIRE GLASS, EXCEPT IN DISPLAY CASES WHICH ARE COMPLETELY ENCLOSED BY NON-COMBUSTIBLE CONSTRUCTION.

3. FIREPROOF CONSTRUCTION. THIS IS DEFINED BY SUBSECTION "A-3" SECTION 18:6-66 AND SUBSECTION "A-3" SECTION 18:7-91 OF THE REVISED STATUTES OF NEW JERSEY AS FOLLOWS: THIS IS A BUILDING THE WALLS OF WHICH ARE CONSTRUCTED OF BRICK, STONE, IRON, OR HARD INCOMBUSTIBLE MATERIALS, AND IN WHICH THERE ARE NO WOOD BEAMS OR LINTELS, AND IN WHICH THE FLOOR, STAIR HALLS, AND PUBLIC HALLS ARE BUILT ENTIRELY OF BRICK, STONE, IRON, OR OTHER HARD INCOMBUSTIBLE MATERIALS, AND IN WHICH NO WOODWORK OR OTHER INFLAMMABLE MATERIAL IS USED IN ANY OF THE PARTITIONS, FLOORING, OR CEILINGS; BUT THIS DEFINITION SHALL INCLUDE A BUILDING IN WHICH THERE IS USED ELSEWHERE THAN IN THE STAIR HALLS AND ENTRANCE HALLS WOODEN HANDRAILS AND TREADS IF MADE OF HARD WOOD NOT LESS THAN TWO INCHES THICK, OR HAVING WOODEN DOORS OR WINDOW SASH, OR WOODEN JAMBS, FRAMES, CASING, OR TRIM IN OTHER THAN STAIR OR ENTRANCE HALLS, OR NON-FIREPROOF RAFTERS.

- A. FIREPROOF CONSTRUCTION, AS HEREINAFTER AMPLIFIED, MAY BE USED FOR ALL SCHOOL BUILDINGS AND SHALL BE USED FOR ALL THOSE WHICH ARE THREE-STORIES AND OVER IN HEIGHT. FLOORS, WALLS AND CEILINGS IN CORRIDORS, STAIR HALLS AND HEATER ROOMS SHALL HAVE A ONE-HOUR RATING. ROOFS, EXCEPT OVER STAGES EQUIPPED TO FLY SCENERY AND BOILER ROOMS, MAY BE OF NON-FIREPROOF CONSTRUCTION.

4. ALL AUDITORIUMS WITH PERMANENT STAGES EQUIPPED TO FLY SCENERY SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL BUILDING CODE, LATEST PUBLISHED EDITION.
5. FUEL OIL OR GAS BURNER INSTALLATIONS, INCLUDING FUEL STORAGE AND FUEL SUPPLY LINES SHALL COMPLY WITH THE LATEST PUBLISHED STANDARDS ESTABLISHED BY THE NATIONAL BOARD OF FIRE UNDERWRITERS.

6. FIRE ESCAPES. (WHERE THEY ARE FOUND NECESSARY)

- A. FIRE ESCAPES SHALL BE CONSTRUCTED OF IRON STRINGS, TREADS AND PLATFORMS, WITH A RISE OF NOT MORE THAN SEVEN INCHES IN HEIGHT AND

- TREADS NOT LESS THAN  $10\frac{1}{2}$ " IN WIDTH, PROJECTING NOT MORE THAN 1" OVER TREAD BELOW. TREADS AND PLATFORMS MUST HAVE GRATINGS OF THE RETICULATED TYPE WITH INTERSTICES NOT EXCEEDING FIVE-EIGHTS INCH.
- B. THE TOP PLATFORM SHALL BE NOT MORE THAN FIVE INCHES BELOW THE ADJOINING FLOOR. ENTRANCE TO THE PLATFORM SHALL BE BY MEANS OF A DOOR, EXTENDING TO THE FLOOR LEVEL. PLATFORMS SHALL NOT BE LESS THAN THE WIDTH OF THE MASONRY OPENING OF THE DOORS WHICH THEY SERVE.
  - C. THE STAIRS SHALL BE NOT LESS THAN 3'2" WIDE BETWEEN HANDRAILS, SUPPORTED BY VERTICAL STEEL MEMBERS OR CONCRETE FILLED CIRCULAR COLUMNS. STAIRS SHALL EXTEND UNINTERRUPTED TO THE GROUND LEVEL.
  - D. LONG FLIGHTS OF STAIRS SHALL BE BROKEN WITH INTERMEDIATE LANDINGS NOT LESS THAN 3'6" WIDE, WITH EACH RUN AT 90 OR 180 DEGREES TO THE NEXT HIGHER OR LOWER RUN.
  - E. THE OUTSIDE STRINGS SHALL BE PROTECTED BY A HEAVY GALVINIZED WIRE MESH SCREEN OR OTHER APPROVED PROTECTIVE RAILINGS NOT LESS THAN FIVE FEET HIGH.
  - F. WINDOWS OR DOORS LOCATED BENEATH OR WITHIN 10'0" OF FIRE ESCAPES SHALL BE GLAZED WITH WIRE GLASS.
  - G. HANDRAILS SHALL BE PROVIDED FOR EACH SIDE OF THE STAIRS.
  - H. GATES SHALL NOT BE PERMITTED AT THE FOOT OF ANY FIRE ESCAPES.
  - I. SPIRAL SLIDE OR TUBULAR FIRE ESCAPES. SLIDE TYPE FIRE ESCAPES SHALL HEREAFTER INSTALLED TO PROVIDE ADDITIONAL MEANS OF EGRESS FROM HERETOFORE ERECTED BUILDINGS SHALL BE OF APPROVED TYPE AND CONFORM TO THE FOLLOWING:
    - (1) THEY SHALL NOT BE USED TO PROVIDE MEANS OF EGRESS FROM BUILDINGS EXCEEDING 40'0" OR 3 STORIES IN HEIGHT. THE PITCH AND DESIGN SHALL BE SUCH THAT A PERSON USING THE CHUTE WILL BE DISCHARGED WITHOUT INJURY. DOORS AT THE ENTRANCE TO THE CHUTE SHALL HAVE APPROVED PANIC BAR RELEASES AND SHALL SWING WITH

THE EXIT TRAVEL AND BE SO INSTALLED THAT THEY WILL NOT OBSTRUCT THE USE OF THE CHUTE. IF DOORS ARE INSTALLED AT THE LOWER END OF THE CHUTE, THEY SHALL BE EQUIPPED WITH A RELEASING DEVICE ON THE INSIDE SUCH AS A KICK PLATE.

(2) ALL SHEET METAL USED FOR THE CHUTE SHALL BE NON-CORROSIVE, SHALL NOT BE PAINTED ON THE INSIDE AND SHALL BE MAINTAINED SO AS TO BE FREE FROM RUST. ANY PART OF THE CHUTE WITH WHICH THE USER MAY COME IN CONTACT SHALL BE FREE FROM CRACKS, CREVICES, OR ANY PROJECTION OR ROUGHNESS WHICH MAY CAUSE INJURY OR REDUCE THE EFFECTIVENESS OF THE CHUTE.

(3) ALL CHUTES SHALL BE OF SUFFICIENT SIZE AND AMPLE STRENGTH AND BE SUPPORTED IN A SUBSTANTIAL MANNER.

7. FIRE ALARMS. A FIRE ALARM SYSTEM SHALL BE PROVIDED IN ALL SCHOOL BUILDINGS. THE TYPE OF ALARM SHALL BE APPROPRIATE TO THE SIZE OF THE BUILDING.

8. FIRE EXTINGUISHERS.

- A. PROVIDE PROPER TYPE AND ADEQUATE NUMBER OF FIRE EXTINGUISHERS BEARING THE LABEL OF THE FIRE UNDERWRITERS LABORATORY OF  $2\frac{1}{2}$  GALLON OR 15 POUND SIZE ACCORDING TO TYPE. LOCATION OF ALL FIRE EXTINGUISHERS SHALL BE INDICATED ON THE PLANS.
- B. EXTINGUISHERS SHALL BE SO DISTRIBUTED THAT ONE  $2\frac{1}{2}$  GALLON WATER TYPE EXTINGUISHER OR EQUIVALENT WILL BE NOT MORE THAN 100' 0" TRAVEL DISTANCE FROM ANY POINT, AND SO THAT THERE WILL BE NOT LESS THAN ONE FOR EACH 5000 SQUARE FEET OF FLOOR AREA OR FRACTION THEREOF. IN TRADE SCHOOLS AND SHOPS THE TRAVEL DISTANCE SHALL NOT EXCEED 50' 0" AND THE NUMBER BE NOT LESS THAN ONE FOR EVERY 2500 SQUARE FEET OF FLOOR AREA.
- C. FOR LOCATIONS WHERE FIRES MAY OCCUR IN FLAMMABLE LIQUIDS OR GREASES OR IN ELECTRICAL EQUIPMENT, EXTINGUISHERS OF THE VAPORIZING LIQUID (CARBON TETRACHLORIDE OR CHLOROBROME - METHANE BASE) CARBON DIOXIDE OR DRY CHEMICAL TYPE SHALL BE PROVIDED IN ADDITION TO THOSE REQUIRED IN 8. B. ABOVE.

9. ALL EXHAUST DUCTS SHALL BE CONSTRUCTED OF NON-COMBUSTIBLE MATERIAL.
10. EXHAUST DUCTS SHALL NOT EMPTY INTO THE ATTIC SPACE, BUT SHALL BE DIRECT CONNECTED TO THE EXTERIOR WITH NON-COMBUSTIBLE MATERIALS.
11. NO EXHAUST SHALL EMPTY INTO STAIRHALLS.

## B. Structural Safety

1. THE FOLLOWING STRUCTURAL DESIGN STANDARDS IN THEIR MOST RECENTLY PUBLISHED OR AMENDED FORM SHALL BE A PART OF THE NEW JERSEY SCHOOL BUILDING CODE.
  - A. "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE," (ACI 318-47). APPROVED AS AMERICAN STANDARD BY THE AMERICAN STANDARDS ASSOCIATION.
  - B. "SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS." AMERICAN INSTITUTE OF STEEL CONSTRUCTION.
  - C. "AMERICAN STANDARD BUILDING CODE REQUIREMENTS FOR MASONRY." ISSUED MARCH 15, 1944 BY THE AMERICAN STANDARDS ASSOCIATION AS AMERICAN STANDARD A41.1-1944.
  - D. "NATIONAL DESIGN SPECIFICATION FOR STRESS-GRADE LUMBER AND ITS FASTENINGS." RECOMMENDED BY THE NATIONAL LUMBER MANUFACTURERS ASSOCIATION, WASHINGTON, D. C.
2. SCHOOL BUILDINGS AND THEIR ACCOMPANYING STRUCTURES SHALL BE DESIGNED FOR ALL CONDITIONS OF LOADING, AS SPECIFIED IN THE AMERICAN STANDARD BUILDINGS REQUIREMENTS A58.1-1945, "MINIMUM DESIGN LOADS IN BUILDINGS AND OTHER STRUCTURES," APPROVED JUNE 19, 1945 BY THE AMERICAN STANDARDS ASSOCIATION, AND SPONSORED BY THE NATIONAL BUREAU OF STANDARDS, EXCEPT AS HERINAFTER SPECIFICALLY MODIFIED OR AS MODIFIED BY FUTURE REVISIONS.
3. THE LIVE LOADS ASSUMED FOR PURPOSES OF DESIGN SHALL BE THE GREATEST LOADS THAT PROBABLY WILL BE PRODUCED BY THE INTENDED OCCUPANCIES OR USES. THE ASSUMED LIVE LOADS, CONSIDERED AS UNIFORMLY DISTRIBUTED, SHALL BE NOT LESS THAN THE VALUES GIVEN IN THE FOLLOWING TABLE:

OCCUPANCY OR USE

LIVE LOAD  
LBS. PER SQ. FT.

|  |     |
|--|-----|
| AUDITORIUMS AND ASSEMBLY HALLS WITH                |     |
| FIXED SEATS ON SLOPING OR STEPPED FLOOR            | 60  |
| MOVABLE OR FIXED SEATS ON LEVEL FLOOR              | 100 |
| STAGE FLOOR  | 100 |
| BALCONIES  |     |
| FIXED SEATS  | 60  |
| MOVABLE SEATS                                      | 100 |
| CLASSROOMS   | 50  |
| LIBRARIES, LARGER THAN NORMAL CLASSROOM (WEIGHT OF |     |
| BOOK STACKS SHALL BE COMPUTED AT NOT LESS THAN     |     |
| 20 LBS. PER CUBIC FOOT.                            | 80  |
| LABORATORIES, LARGER THAN NORMAL CLASSROOM         | 60  |
| STAIRS, LANDINGS AND FIRE ESCAPES                  | 100 |
| SHOPS  |     |
| FOR LIGHT OPERATIONS                               | 125 |
| FOR AGRICULTURE, MACHINERY, AUTOMOBILE REPAIR,     | 150 |
| STORE ROOMS  | 100 |
| TOILET ROOMS                                       | 60  |
| CORRIDORS  | 100 |
| CAFETERIAS   | 100 |
| KITCHENS   | 100 |
| FAN ROOMS  | 150 |
| FLOOR OVER BOILER ROOM                             | 80  |
| GYMNASIUMS   | 100 |
| GRANDSTANDS, BLEACHERS, ETC.                       | 100 |

4. IN OPEN-TYPE GRANDSTANDS AND BLEACHERS EACH FOOTWAY AND SEAT SHALL BE DESIGNED FOR A LIVE LOAD OF NOT LESS THAN 120 LBS. PER LINEAR FOOT.

5. ALL GRANDSTANDS, BLEACHERS, ETC., SHALL BE DESIGNED FOR HORIZONTAL FORCES RESULTING FROM OCCUPANCY, APPLIED AT THE LEVEL OF EACH SEAT. IN THE DIRECTION LENGTHWISE OF THE SEATS, THE FORCE SHALL BE 24 LBS. PER LINEAR FOOT OF EACH SEAT. IN THE DIRECTION CROSSWISE OF THE SEATS, THE FORCE SHALL BE 10 LBS. PER LINEAR FOOT OF EACH SEAT.
6. GRANDSTANDS, BLEACHERS, ETC., SHALL BE DESIGNED FOR A WIND OF 20 LBS. OF VERTICAL PROJECTION ACTING IN ANY DIRECTION, IN ADDITION TO OCCUPANCY LOADS.
7. THERE SHALL NOT BE PLACED, OR CAUSED OR PERMITTED TO BE PLACED, ON ANY FLOOR OR ROOF OF A BUILDING OR OTHER STRUCTURE A LOAD GREATER THAN THAT FOR WHICH SUCH FLOOR OR ROOF IS DESIGNED.
8. ROOFS SHALL BE DESIGNED FOR A UNIFORMLY DISTRIBUTED LOAD, (INCLUDING SNOW LOADS) ON THE HORIZONTAL PROJECTION AS DESCRIBED IN THE FOLLOWING SCHEDULE OF LOADS. THE LOAD SHALL BE IN ADDITION TO THE DEAD LOAD AND WIND LOAD.

UNIFORM LOAD OVER HORIZONTAL PROJECTION  
LBS. PER SQUARE FOOT

ROOF SLOPE

|               |    |
|---------------|----|
| LESS THAN 20° | 30 |
| 20° OR MORE   | 20 |

9. ROOFS TO BE USED FOR PROMENADES SHALL BE DESIGNED FOR MINIMUM LOAD OF 60 POUNDS PER SQUARE FOOT IN ADDITION TO THE DEAD LOADS. ROOFS TO BE USED FOR OTHER SPECIAL PURPOSES SHALL BE DESIGNED FOR APPROPRIATE LOADS.
10. EARTHQUAKE LOADS SHALL NOT BE REQUIRED BY THIS GUIDE.

### C. Equipment Safety

1. IN INDUSTRIAL ARTS AND VOCATIONAL SHOPS, EVERY PORTABLE AND STATIONARY ELECTRICALLY OPERATED DEVICE OR MOTOR, GRINDER, GLUE POT, AND PORTABLE HAND AND STAND LAMP SHALL HAVE ITS FRAMEWORK EFFECTIVELY GROUNDED AND ALL PORTABLE ELECTRICAL TOOLS AND MACHINERY SHALL BE EQUIPPED WITH

ELECTRICAL PLUGS AND RECEPTACLES TO GROUND THE ELECTRICAL CONNECTIONS IN CONFORMITY WITH THE REGULATIONS OF THE NEW JERSEY DEPARTMENT OF LABOR. AT LEAST TWO EMERGENCY CUT-OUT SWITCHES SHALL BE PROVIDED, ONE AT OR NEAR EACH END OF THE SHOP. EACH INDIVIDUAL PIECE OF MOTORIZED ELECTRICAL EQUIPMENT, EXCEPT PORTABLE HAND TOOLS, SHALL BE CONTROLLED BY A MAGNETIC TYPE SWITCH OR OTHER SIMILAR ARRANGEMENT WHEREBY EACH PIECE OF EQUIPMENT MUST BE MANUALLY REACTIVATED AFTER CURRENT INTERRUPTION.

2. THE PROTECTION FROM MACHINERY IN INDUSTRIAL SHOPS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE VOCATIONAL DIVISION OF THE NEW JERSEY STATE DEPARTMENT OF EDUCATION.
3. AN EMERGENCY CUT-OFF SWITCH FOR OIL BURNERS SHALL BE PROVIDED AND CONVENIENTLY LOCATED.
4. ALL GAS HEATERS SHALL BE VENTED TO THE EXTERIOR OF THE BUILDING.
5. ASSEMBLY ROOMS AND AUDITORIUMS SHALL BE PROVIDED WITH A CONVENIENCE OUTLET AT THE PROBABLE LOCATION OF A PORTABLE PROJECTOR. A BUILT-IN SPEAKER CABLE SHALL BE RUN FROM THAT LOCATION TO A STAGE OUTLET.
6. WINDOW GUARDS, WHEN USED, SHALL BE OF OPEN-WIRE MESH ARRANGED SO THAT THEY MAY BE OPENED FROM THE INSIDE.

## NOTES

## VIII. Miscellaneous

### A. Lockers and Wardrobes

1. PROVISION SHALL BE MADE FOR THE STORAGE OF PUPILS' CLOTHING. WHERE THE CLOTHING OF PUPILS IS TO BE STORED IN CLOSED WARDROBES, PROVISION SHALL BE MADE FOR THE POSITIVE VENTILATION OF SUCH SPACE.
2. CORRIDOR LOCKERS SHALL BE RECESSED AND VENTILATED. (SEE SECTION IV, B1)

### B. Floors

1. CONCRETE FLOORS WITHOUT FLOOR COVERING SHALL NOT BE PERMITTED IN INSTRUCTIONAL AREAS, EXCEPT IN SHOPS.
2. WOOD FLOORS SHALL NOT BE PERMITTED IN CORRIDORS, EXCEPT IN ONE-STORY BUILDINGS OF FRAME CONSTRUCTION.

### C. Custodian's Service Areas

1. CUSTODIAN'S SERVICE ROOMS WITH SINKS AND ADEQUATE STORAGE SPACE SHALL BE PROVIDED, WITH A MINIMUM OF ONE SUCH FACILITY FOR EACH STORY, LOCATED TO PROVIDE THE GREATEST ACCESSIBILITY TO THE AREAS SERVED. (FOR VENTILATION, SEE SECTION IV A-3.)

### D. Duplex Outlets

1. CLASSROOMS SHALL BE PROVIDED WITH AT LEAST TWO DUPLEX OUTLETS.

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