Proposed guidelines for Iowa school building construction

William Ray Dabb

Iowa State University

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by

William Ray Dabb

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Graduate Faculty in Partial Fulfillment of
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Dean of Graduate College

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1969
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CHAPTER I. INTRODUCTION

A democracy is dependent for survival upon an educated populace. Therefore, the paramount function and justification for a public school system is to safeguard the nation's future through education. Education, like all other processes of society, constantly changes and such changes ultimately must be reflected in school facilities. Too often, inadequate school buildings and school sites wield a confining influence upon the educational program. Such circumstances frustrate educators in their attempts to develop a program reflecting the needs of the community.

From the inception of the public school system to the present time, building schools has been an arduous task that required persistent efforts on the part of interested educators and lay citizens in order that the future adults be adequately educated. In the words of Silverthorn: (60)

Lay people should be given the opportunity to express their ideas regarding educational programs and school buildings. However, planning educational programs and school buildings is a complex and highly technical professional responsibility of the school administration and personnel, not an extracurricular activity for willing and interested patrons in a community.

Education is often influenced by factors over which its administrators have little control yet development of general guidance principles can strengthen individual weaknesses without demanding conformity.

School districts of the State of Iowa have been constructing about thirty million dollars worth of school plants each year for the last several years. The recognized importance of good school buildings to the educational process, and the volume of construction, would seem to make apparent the need for a guide, or measuring stick, which could be used by local communi-
ties in the evaluation of their present and proposed educational plants.

MacGonnell (40) discusses evaluation as:

The final evaluation of existing school facilities should reveal how adequate the plant is in terms of the phases of the community's approved educational program. The evaluation should also review the condition of the present buildings, picture overcrowding and enumerate the inadequacy of the plant. The evaluation provides a figure, so as to speak, which can be subtracted from the sum representing the ideal school plant.

Once a building has been planned and erected, it can be anticipated that it will house an educational program for fifty years or more, at least this has been the trend in Iowa in the past. Hence, foresight is imperative in developing the educational building plans and in translating them into the finished structure in terms of contemplated trends in student population, educational program, and community services. The National Council on Schoolhouse Construction has summarized planning as:

Planning can be defined as purposeful preparation culminating in decisions which provide a basis for subsequent action. Specific techniques and methods of plant planning vary with both the particular personalities and backgrounds of the school officials and with the nature of the situation involved in each specific planning problem (45).

Although the decision to build new school plants must be made by a board of education, with the assistance of the school superintendent and his co-workers, the process involves a long period of study, research, and planning before reasonably competent decisions can be made. Some of the decisions, too, are a matter of preferences and conditions which must be carefully weighed.

Boles (7), in his book, stated that first it is necessary for the school system to decide upon the nature of the educational program its
community wants. This involves finding out how many children must be housed and taught over a given period of time, where those children live, in what grades they must be placed, how many pupils each school must accommodate, and what the nature of the program of learning activities for each school is. To guide the architect further in his planning, it is necessary to prepare a precise description of the teaching methods that will be used. From these data it is then possible to outline the functional school plant needed and desired by the people of the district.

Secondly, Boles (7) expressed that in order for existing facilities to be inculcated with this plan, they must be incorporated as a matter of dollars-and-cents economy. The existing school plant, therefore, must be carefully appraised to enable as much of it as possible to be utilized in the future program. Some of the existing facilities, while not now in harmony with future requirements, probably can be adapted to meet those needs. Such adaptation, when not too costly, must be made part of the planning.

The Study

This study undertakes the problem of development of school building construction guidelines for the state of Iowa through correlation of varied expert opinions regarding such guidelines into a succinct document suitable for use by the individual school districts of Iowa. This correlation was accomplished through:

1. Interviewing architects, superintendents, state department officials, education consultants and college professors concerning
Planners, the U. S. Office of Education, the National Education Association, and the American Institute of Architects. Architects, superintendents, college professors and education consultants were interviewed concerning school plant planning.

Delimitations

The scope of this investigation was not confined to any one state. The investigation excluded parochial schools and others not listed by the various state departments of education. The selection of the state departments was not limited to those who had prestige in the field of school plant planning. This study does not include junior colleges and area schools.

This study is intended to serve solely as a guide. The report is not a reference in the sense that answers are given to specific questions which might evolve in a school plant construction program. Rather, the writer has intended to raise points which should be considered, and to produce a guide indicating some techniques which could be used in their solution. The individual school district should adapt the use of this guide to the district's unique situation.

This guide is not intended to eliminate the need for consultative planning service, architectural service, legal advice, or other specialized personnel involved in school plant planning and construction. Conversely, the purpose is to bring the services of such personnel to the attention of the school district and to aid the board in coordinating these services.

Suggestions made herein are not to be construed as standards, but
rather as guiding principles or objectives. The development of standards for classrooms, special areas, service systems, safety, or for furniture and equipment is beyond the scope of this study.

Definition of Terms

Inasmuch as certain terms are used extensively throughout this project and are open to a number of interpretations, the following definitions are included:

Addenda refers to written instructions supplied by the architect to prospective construction bidders for the purpose of clarifying, altering, or adding to plans and specifications. Addenda then become a part of the plans and specifications.

Change order refers to the authorization for a contractor to make specific changes in construction plans. The change order form is used ordinarily after the building construction contract has been awarded and must be signed by the architect, the school board, and the contractor.

Educational specifications refers to the educational instructions given by the board of trustees to the architect for a particular building project. These instructions commonly are in the form of space requirements, area relationships, activities to be carried on, and equipment and furniture used.

Master plan refers to the complete, comprehensive, and long-range plan made by a school district to meet anticipated growth of the school system over a period of years.
Maturity schedule refers to the plan for retiring a bond issue. The maturity schedule ordinarily is arranged in tabular form and shows the amount of principal and interest payment due each year for the duration of the bond issue.

Plans and specifications are drawings, sketches, and elevations of the proposed school building including an outline covering type of basic construction; schedule of interior finishes; type of heating plant, lighting, and other service systems to be provided; quality of materials to be used; and quality of workmanship demanded.

Prospectus refers to a financial, economical, and social characterization of the community and school district. The prospectus is prepared in brochure form and is supplied to credit rating agencies and potential school bond buyers.

School bond refers to an instrument issued by a school district in order to borrow money. School bonds are issued under specific conditions of interest and principal payment.

School plant refers to site, buildings, equipment, and all other physical facilities provided for schools and for community services connected with the schools.

Organization of the Study

The material presented in this study has been divided into six chapters. The first chapter includes statement of the problem, purpose of study, sources of data, delimitations, definition of terms, and organization of the study. Chapter II deals with the review of related literature.
Chapter III deals with the methods and procedures used in the study. Chapter IV deals with the findings of the study. Chapter V presents the proposed guideline. In conclusion, Chapter VI deals with the summary, conclusion, and recommendations.
CHAPTER II. REVIEW OF LITERATURE

Introduction

Comprehensive organization from the moment of inception to the ultimate functional use of the school plant is fundamental to effective school building planning. This involves lucid foresight on the part of the board of education, clear delegation of and assumption of responsibility, and a spirit of cooperative teamwork in which the provision of the best possible education for children is unfailingly the prevalent consideration.

Educational Philosophy

The board of education, acting as representatives of the people of the district, must formulate an educational philosophy for the district as a basis for action. This philosophy should discuss the ultimate educational aims in terms of questions and answers applicable on the operational level, and through such discussion serve to point out the need for additional facilities as this need arises (7, p. 4).

Questions regarding the extension of educational opportunities to the adult level are included in the board of education's responsibility, and, when formally adopted, should be well publicized in an effort to call attention to the fact that school buildings and equipment are the property of the entire district and thus available for a wide range of use outside normal school hours (76, p. 5).
Educational Planning

Achievement of an effective educational system may involve attention to the possibility of redistricting. Studies issued by the National Committee on Economic Development (14, p. 6) indicate the necessity for mandatory state action to implement such redistricting, suggesting the possibility of the county as a suitable geographic area for an administrative unit. A minimal inclusion of two thousand students, with advantages accruing up to twenty-five thousand students, is suggested. The large district is able to hire highly qualified administrators and personnel, plan construction and acquire sites at lower costs, and locate schools advantageously (14, p. 61).

Within the district, a unified school system, kindergarten plus grades one through twelve, makes possible a coordinated program, simplifies educational control, fosters use of funds at levels where they are most needed, and avoids duplication in the area of business management (14, p. 60).

Upon attainment of a satisfactory district, comprehensive educational plans suitable to it should be developed. Subplans (45, pp. 2-3) include:

(1) Curriculum, expressing the knowledge, attitudes, and habits of life to be developed through the experiences of children;

(2) Operations, formulating rules for the management of human factors in the school, such as design of teaching and learning activities, principles of mental health, and child development;
(3) Instruction, to be reported by the professional staff, developing means of accomplishment of aims;

(4) Organization, which involves the system adopted to promote instruction, including school organization in regard to grade division, single or team teaching, self-containment or departmentalization, graded or ungraded pupil grouping, delimitations of class size and enrollment, and curricular organization in core or subject matter programs;

(5) Personnel plans;

(6) Evaluation;

(7) In-service education to maintain staff capabilities; and finally,

(8) A support plan depicting resources and services available to support instructional plans.

Prior to any planning of specific new plants, the district should be surveyed to determine present and future educational needs, the adequacy of existing facilities, and to develop a plan of action.

Prediction of student population is of prime importance in this survey. Factors to be considered include birth and mortality rates, promotion policy, area private and parochial schools, district trends affecting population shifts, and the general movement to the suburbs (2, p. 107).

Projection of pupil population can be accomplished through several (7, p. 41) methods:

(1) Forecasting from total population;

(2) Forecasting from past data;
(3) Forecasting by analogy;
(4) Forecasting from multiple factors;
(5) Forecasting by Bell Telephone Co. Index analysis;
(6) Forecasting by the "natural increase" method;
(7) Forecasting by the Pearl-Reed Logistic Curve; and
(8) Forecasting by a combination of the above methods.

The school plant needs survey report attempts to develop long range plans to fit plant development to community and curriculum needs. The study does not extend to detailed recommendations, but exposes needs (7, p. 38).

The report should include (7, p. 54): an introductory passage, including the general background of the community; the district population and growth; present facilities and long-range needs; examination of the district's financial ability to meet plant needs; basic principles; conclusions; and recommendations. Consideration in preparing the report must be given to facilitation of the school program, impartiality, maximum utilization, financial reality, and a form of report easily reviewed. The review will point out the kind of organizational unit to be developed in a particular project in terms of number of pupils per unit, budget, location, and site size necessary.

The curriculum review, covering method of instruction, services to be rendered, activities to be provided, and environment, will indicate the organization within a particular school unit. This is not to be an element of the educational specifications, for it would result in a document so cumbersome as to lose its value to the architect (7, p. 67).
Moving from district wide involvement to the development of plans for specific new construction, consideration should be given to the participants involved, and their areas of responsibility.

The superintendent, as executive officer of the board of education, is often the generating factor in school building planning, first to recognize plant deficiencies and first to initiate planning. His is the responsibility to organize, evaluate, and coordinate all aspects of planning (22, p. 18). The superintendent implements decisions of the board and issues reports, requests, and recommendations to them (45, p. 4). Upon completion of the educational specifications, the superintendent interprets them to the architect to facilitate preliminary building plans. The superintendent, in presenting needs to the board of education (7, p. 7), leads discussion of educational philosophy, ensures closed ranks regarding means of proceeding, verifies participants understanding of semantics, leads in identification of roles, sees to sequential order of proper steps with adequate time allowances, recommends adoption of reports and time schedules, and recommends employment of architects and consultants, often based on prior recommendation of those directly responsible.

Silverthorn (60, p. 13) points out a common misconception regarding the superintendent's role in planning school buildings. Often the system is too large to permit the superintendent to function as an active planner. He must remain aware of the basic facts and developments, but the actual planning in a sizable district should be delegated to some other competent person.
The board of education, as the legislative and policy-making body, exercises control over the superintendent through approval and authorization (44, p. 3), assures compliance with legal requirements, maintains a professional plane of action, informs the community, and secures necessary financing (7, p. 8).

Professional consultants specializing in school planning are available through a variety of sources, such as state education agencies, private agencies, and state universities. Their services (7, p. 8) include: establishment of needs, suggestions regarding assignments of responsibility, sequence and time schedule establishment, and deciding procedures. Experienced specialists can provide invaluable objective assistance in implementing the educational plan in a functional school plant. Stages of consultant service (22, p. 30) begin with evaluation of existing facilities; progress to enrollment prediction, building implications of the educational program, architect selection, site selection, discussion of all stages of building plans; and culminate in community information program services.

The consultant's services must remain within his area of effectiveness, with clear agreement of what is to be expected, and time to do the job should be assured. His direction can lead the administration to dealing effectively with widely varied problems (7, p. 12).

Consultant payment may be per diem, at one to one-and-one-half times his prorated normal salary; a flat fee; or a percentage of the total bond issue or construction cost. Payment should be made by
the board of education from public funds (7, p. 15).

The staff should be aware of needs, help establish the educational philosophy, understand procedures, accept responsibilities, and help develop time schedules (7, p. 8). Staff involvement in planning results in utmost use of the resultant building if the staff involved in planning is subsequently assigned to the new building. Of special consideration in this respect is the principal-elect.

The regular legal counsel of the board can prepare property documents and contracts involving design, construction, and equipment. A bond attorney should be retained to satisfy prospective buyers of bond issue legality, which results in lower interest rates (45, p. 5).

Lay citizens should be kept aware of needs and procedures. Their involvement is primarily through the board of education, though qualified citizens can be involved in an advisory nature, in liaison work, for fact-finding, and in public relations.

City and regional planners can help place schools effectively in the community (22, p. 23).

Educational Specifications

When personnel sources have been determined, committees should be formed to prepare the educational specifications. In the initial stages, strong cooperative effort involving staff and community should be made; as the final stages evolve, the administrator and board of education assume the more positive role. At this point consideration of the architect to be employed is recommended, for his suggestions are helpful in preparing specifications, and he should receive the committee reports
and recommendations as quickly as possible. During this stage the administrator must ensure the availability of sufficient resources for initial planning.

The planning committee should be representative of the community as a whole. Appointment by the board of education implies the assumption that members are aware of community leaders and those organizations suitable to represent the people. Sociological study of the community is desirable, yet often prohibitive in cost. Suggestions from the educational consultant are helpful in determining committee membership (6, p. 12).

Under the direction of a steering committee are several subcommittees in the areas of the community and its service area, the educational program, school enrollment, buildings and sites, and financial resources (6, p. 12).

The final objective of the committees is to produce written recommendations to the board of education expressing the needs and desires of the citizens, and a program for the achievement of same. The reports should be compiled by educators into a succinct presentation of general attitudes, describing to the architect only those facts needed to facilitate design, and known as the educational specifications. Following is a suggested outline of such specifications, as offered in the NCSC Guide (45, p. 15):

A. General Information
   1. Philosophy and objectives of the school
   2. Community characteristics
   3. Pupils to be housed
4. Provisions for community use
5. Site and site development
6. General design of buildings
7. General arrangement of interior spaces
8. Policy concerning multiple use of space
9. Funds available
10. Nature of likely future expansion

B. Complete listing of facilities to be provided

C. Detailed description of each room and space to be provided
   1. General description of space
   2. Activities to be carried on in each space
   3. Location and traffic circulation
   4. Furniture and equipment
   5. Storage
   6. Audio-visual equipment
   7. Utility requirements
   8. Other special requirements

D. Miscellaneous requirements

The written educational specifications should be reviewed, reconciled, and revised before approval. Principles guiding preparation (7, pp. 71-77) include: planning resulting from comprehensive curriculum and plant needs surveys, or starting with the program; consideration of the whole district, welfare of the occupants of the proposed building, educational function, esthetic values, future use, economy, providing only that information essential to aid the architect, communication between involved parties, continuous planning, distinguishing educational from architectural planning, planning to promote instruction, and employment of technically sound procedures.

The Architect

The architect should be chosen as early as possible by the board of education and the administrator, on the basis of a review of professional qualifications and excellence of completed work as they meet
the criteria of the board. The architect must be legally qualified, successful and competent, with the imagination to translate the educational program into functional buildings. His ethical standards must be above reproach. An adequately trained staff, including engineers and specialists, must be available to him. He should be informed concerning state and local building regulations and codes (6, p. 29).

Methods of architect selection include (2, p. 157): a direct selection procedure, selection by comparative methods, and design competition, which is usually prohibitive in terms of time and expense. Semiformal inquiries are made through a letter of invitation, the preliminary questionnaire, and a follow-up questionnaire. The letter of invitation includes general information about the project, and serves to identify interested architects. It puts forth tentative time schedules, an estimation of job size, and describes the selection procedure of the district. Accompanying it is the preliminary questionnaire, which gathers information regarding the architect. The follow-up questionnaire is sent only to those architects selected for personal interviews, and serves to firm up basic information.

The administrator usually does preliminary screening of architects, based on board approved criteria, and reduces the number to be interviewed to three or four, who should be scheduled for at least one hour presentations to the board (7, p. 132).

The board of education, after conducting these interviews, does the ultimate hiring. The contractual agreement should be clear and definite regarding services to be performed and fees to be paid. The standard
contract forms of the American Institute of Architects usually prove satisfactory, forms A-102 and B-102 being those most often used (S, p. 166). Others may wish greater detail, which should be checked by legal counsel.

Common mistakes in dealing with the architect include attempting to bind him too closely to cost and time schedules, confusing architectural duties with those of the contractor, failure to schedule payments, and making excessive demands upon him (2, p. 164).

A statement should be made concerning information to be provided by the owner, the methods and extent of supervision, document ownership, arbitration, procedure in the event of bond proposal rejection, handling of equipment, termination of contract, and provision of "as built" plans for the project (2, p. 168).

Services of the architect have been broken down into basic phases by the Michigan Department of Public Instruction (6, pp. 31-33).

A. Preparation of Preliminary Sketches

(1) Study and discussion of the educational program with the school staff;
(2) Assisting in proposed site study in regard to soil structure, topographical relationship, space, and relation of utilities;
(3) Preparation of preliminary sketches, including floor plan, suggested elevations and sections, location of building on site; drafting brief outline specifications upon which to base cost estimates;
(4) Securing the written approval of the board of the final preliminary sketches;
(5) Securing the written approval of concerned reviewing agencies;
B. Preparation of Working Drawings and Specifications

(1) Preparing complete working drawings and specifications, showing fully the architectural, structural, mechanical, and electrical components of the building in such detail as to enable contractors to estimate costs and build the building as visualized by the architect;
(2) Holding frequent conferences with educational authorities and consultants to discuss planning of choice of materials and anticipated problems in relation to laws, restrictions and ordinances;
(3) Securing the written approval of the board of education of the final working drawings and specifications;
(4) Securing written approval of working drawings and specifications from all agencies having jurisdiction over school building plans.

C. Assistance During Time of Bidding

(1) Furnishing guidance concerning policies to be followed in soliciting bids;
(2) Distributing sufficient number of sets of plans and specifications for purposes of bidding;
(3) Clarifying plans and specifications during the bidding period;
(4) Assisting in opening bids;
(5) Tabulating bids after opening;
(6) Checking performance and financial records of contractors;
(7) Making recommendations to the board regarding contractor's reliability.

D. Assistance in the Preparation of Contract Documents

(1) Documents should be prepared in quadruplicate for the files of the board of education, the architect, the contractor, and the attorney for the school owner. Contract documents should consist of:
   (a) Final working drawings and specifications including all addenda;
   (b) Copy of contract proposal signed by the contractor;
   (c) Contract form properly filled out and signed by the board of education and the contractor;
   (d) Surely bond forms executed by the contractor and the surety company;
   (e) Certificates of required insurance furnished by the contractors.
E. Supervision of Construction

Reach complete agreement regarding the nature and extent of supervision to be furnished by the architect, as distinguished from the continuous supervision obtained by employment of a "clerk-of-the-works". The architect will not guarantee the performance of the construction contractors. The board and the architect should arrange the following work:

(1) Require contractor to make proper project layout;
(2) Require a daily report of persons employed, weather conditions, job conditions, accidents, and other information of importance;
(3) Conduct field tests and inspections;
(4) Approve materials;
(5) Approve sub-contractors;
(6) Record dates of approval and distribution of shop drawings;
(7) Prepare necessary supplemental drawings;
(8) Maintain information regarding all insurance requirements;
(9) Expedite construction when necessary;
(10) Maintain a file throughout life of all construction contracts;
(11) Issue certificates of payment to contractors and keep an owners' account of all expenditures;
(12) Make constant check of project to see that the true intent of plans and specifications is being met;
(13) Make sure owners' file gets all guarantees, roof bonds, copies of required tests, all in proper order and meeting specifications;
(14) Supply school officials with a complete set of "Record Drawings";
(15) Supply school officials with documents regarding operation and maintenance;
(16) Make final inspection and certify approvals for final payment.

The local chapter of the American Institute of Architects will normally provide recommendations regarding fee structure and services to be expected (45, p. 18).

The School Site

Criteria should be developed prior to the discussion of site possibilities. A study committee comprised of a professional consultant,
qualified local citizens, representatives of the school board, the architect, and the landscape architect should investigate community growth trends, the relation of the site to present and projected population, and accessibility (23, p. 6).

Considerations include site size and topography; development potential, with an eye to preservation of natural beauty; natural drainage and vegetation; and soil characteristics, a sandy loam being preferable (82, p. 6).

The park-school site should be considered, for it allows extensive land areas and maximum use of the area outside school hours. The Long Beach program facilitates this plan under a city charter allowing stability and continuity (2, p. 131).

Comparison of sites meeting the criteria may be accomplished by means of a score card, to be completed by several evaluators. Establishment of site value should be made by qualified appraisors, such as realtors or mortgage mean in lending institutions (7, pp. 112-112).

Site acquisition requires knowledge of the rights of all parties regarding transfer of land ownership. The legal structure and responsibility should be clarified, so site acquisition is the joint responsibility of school officials and other community agencies (2, p. 153).

Suggested minimal site sizes per enrollment are (45, p. 27):

(1) Elementary schools: a minimum of ten acres plus one additional acre per each one hundred pupils of projected maximum enrollment;

(2) Junior high schools: a minimum of twenty acres plus one additional acre per each one hundred pupils of the projected maximum enrollment;
(3) Senior high schools: a minimum of thirty acres plus one acre per each one hundred pupils of maximum projected enrollment.

Maximum distances and time for pupil travel are recommended to be (38, p. 28):

1. Walking: Elementary, 3/4 mile; Junior high, 1 1/2 miles; Senior high, 2 miles.
2. Travel on conveyances: Elementary, one-half hour; Secondary, one hour.

Site selection factors enumerated in the Michigan planning bulletin (6, pp. 41-42) include:

(1) Extensiveness of land and building use;
   a. Will use include major playgrounds and community service facilities?
   b. What activities must utilize this site?

(2) Type of school required;
   a. Elementary;
   b. Junior high;
   c. Senior high;
   d. Community college;

(3) Ultimate number of prospective students;

(4) Attendance area to be served;

(5) Population trends;
   a. Placement made with present and future population in mind;
   b. Spacing of buildings based on walking distances to schools;
   c. Trend to small elementary, or K-3 units, in neighborhood service areas;

(6) Availability of adequate sites near center of population;

(7) Feasibility from architectural and engineering standpoint;
   a. Soil conditions;
   b. Topography;

(8) Legal implications in acquiring site;
(9) Cost of site;
   a. Present structures to be moved or razed;
   b. Site improvements;
   c. Utilities;

(10) Relationship to community facilities such as parks, recreation centers, libraries, health centers, streets, and highways;

(11) Hazards and undesirable elements such as railroads, highways, industrial noise and odor, airports, taverns, rivers, swamps, gravel pits, and fire stations;

(12) Relation to public services such as water, gas, electricity, fire protection, transportation, and sewage disposal.

Varied resources are available to aid in the search for and development of a school site. Joining a Soil Conservation District enables the conservation officer to offer technical assistance and to provide a land-use map, a soil map, and air photos (42, p. 1). Developers may reasonably be expected to sell needed school sites to serve housing developments at their purchase price. Civic agencies can provide maps, aerial photos from which topographical maps can be made, records of ownership, and maps of consumer services (7, pp. 120-122). Soil engineers should test subsurface conditions (40, p. 134).

Site development should be considered in the light of service function, physical activities function, and instructional function (6, pp. 46-51). A beautiful environment will be a source of civic pride and an enhancement of the child's attitude toward education. Provision of low maintenance plantings is of value in science instruction, in creation of outdoor "rooms", in control of micro-climate, and aesthetically. Activity areas must be varied and suitable to all ages, with space for those activities requiring close supervision close to a central
control point. Multiple use of the playing fields can be planned. Outdoor labs may include biological gardens, a bog area, an outdoor stage, and outdoor testing areas for science and math. Safety is increased through orientation separating age groups using different equipment. Drives, parking, and bus loading should be patterned to avoid foot traffic. Hard surfacing will be necessary in some areas. Service areas should be accessible, as should parking for teachers, employees, and guests. Pedestrian traffic should be accommodated by a minimum of three 22" lanes, curved for direction changes, and carefully avoiding drives.

The outdoor physical education facilities are discussed in a publication of the State Education Department of New York (78, pp. 2-10). The elementary area should be near the building, with an area of three acres provided for three hundred pupils plus one-half acre for each additional hundred pupils. Turf, apparatus, and shaded areas are necessary. Five thousand square feet are needed for the exclusive use of the kindergarten, with turf, digging, shade, surfaced, and rest areas. Natural features such as trees, roads, and rough terrain, lend themselves well to elementary activities. In the upper levels, one acre will provide thirteen courts (four tennis, four handball, three badminton, two volleyball). High school girls need two acres of level turf; high school boys intramurals can be accommodated on three acres; and four acres are desirable for interschool athletics.
Financing

The limitations on financial planning depend on (7, p. 86) the ability of the district to pay for schools, district willingness, legal restrictions, and the availability of funds from outside the district.

Many jobs must be done, not the least of which is convincing those interested that economic principles related to quality and quantity apply to schools. A review survey involving priorities must be prepared, specifications must be examined for changes and revision of cost estimates, and sources of revenue must be determined. Educational needs must be reconciled with financial resources, making plant needs the basis for a program of income (7, p. 90).

Bonds are the most often used method of financing. They provide large sums of money immediately, with payment extended over the time the building is in use. The administrator (7, p. 98) supervises the bond campaign. He appoints a qualified person to write the financial prospectus, and is responsible for advertisement of the sale of bonds, as well as receiving and analyzing bids. The board should choose a favorable time for marketing the bonds, and invest the resulting funds.

A bond attorney, paid by the board, will carry the bonding procedure through from the "resolution of necessity", to the final sale (7, p. 101). Banks can aid in finding men schooled in bond sales to present facts for the bond sale thoroughly, honestly, and in a manner designed to reduce costs. Securement of a good bond rating (AAA, AA, or A) from either Moody's or Standard and Poor should be accomplished if possible (87, p. 10).
The bond campaign may be organized through an administrative dominated approach, subject to approval or disapproval of the administration and its policies; or the citizen committee approach, focusing voter attention on issues rather than personalities (40, p. 109).

Studies of winning bond issues reported by Crosby (20, pp. 81-82 and 84) reveal an alarming number of failures of school bond issues. More than one-fourth of the school bond proposals in 1967 were defeated. He reports studies discovering:

1. The most favorable voter is young, with a school age child, and is in a skilled occupation or sales work.
2. The least favorable voter is young, childless, with a professional or technical occupation.
3. Bond campaigns should begin at least a year prior to election.
4. The campaign should be pitched to women; 2/3 of wives' attempts to influence husbands are successful.
5. Voters depend on newspapers or personal conversation for guidance.
6. Voter interest is in the school - how it is run and teaching - rather than finances per se. Emphasize benefits, not cost.
7. Avoid technical presentations.
8. Voters want personal contact with school men.
9. Voters reject apologists.
10. Anticipation of and work to eliminate opposition is necessary.
11. Unanimous board endorsement is necessary.
12. Mail campaigns are highly effective in terms of increased positive vote.
In a thesis dealing with bond campaigns, Gott (25, p. 176) describes major reasons for success of bond campaigns, including: need for physical facilities, increased curricular offerings, and staff support. Major contributions to defeat were listed as: additional taxes, poor communication, and apathy.

Attention must be given to the legal debt limits of the district. Emergency measures to increase local revenue may be necessary. Such means include (7, p. 53): encouragement of valuable industry to locate promptly in the district, seeing that real properties are listed on the tax rolls quickly and at a high percentage of "fair value", arranging for federal aid to impacted areas, and requesting the state legislature to allow the district to exceed established debt limits.

The Building

School buildings are becoming simpler, more attractive, and more functional. The architectural character stresses a light, airy environment stimulating learning. Informal, natural use of materials, beautiful structural techniques, and variation of shape and mass, color, and scale are tools used to accommodate children and their needs (6, p. 53).

The one-story plan has found favor in recent years. It enables greater flexibility in relation to plan of building elements, use of light framing material, safety through ease of egress and elimination of stairways, better natural light and ventilation, facility in servicing
shops and kitchens, and ease of moving equipment (6, p. 54).

The kinds of space required in school plants can be divided into three areas (2, pp. 35-36): "home bases" and individual work spaces, which should be more emphasized at the secondary level, while self-containment prevails at the lower elementary level; space for specialized learning, with some areas large enough to accommodate combined meetings of several basic groups; and space for special services, such as instructional materials centers, guidance, health, administration, and staff relaxation.

Physical relationship of areas should isolate noisy activities from study areas. Mutually reinforcing activities should be kept in physical proximity (2, p. 55).

Areas subject to community use should be situated to allow use independent of the remainder of the building, with direct outside egress, and individual heating, lighting, and toilet arrangements (2, p. 55).

Circulation to avoid bottlenecks is necessary, allowing free movement to and from all points in the building. A main corridor should be at least eight and one-half feet wide; a secondary corridor at least seven feet wide, both with recessed equipment (55, p. 77).

Expansibility of the building should be planned through attention to (6, p. 57): heating units designed for maximum expanded areas, provision of access to heat and water lines, electric service and the public address system, corridors extending through to outside walls wherever additions may be desirable, service units designed to accommodate ultimate building capacity, and provision of expansion features.
within the existing structure. This internal readjustment due to change in the educational program is described by Brady (9, p. 42) in an article on the "pseudopodial school", which incorporates reshappable spaces, particularly in the library area, which can expand to absorb standard classroom space to accommodate instructional change.

Elementary school trends toward team teaching, self-containment at the lower elementary level, and the ungraded program all have design implications. Solutions may include cluster arrangements around a central core (59, pp. 88-90), folding partitions, and small conference rooms for individual or small group study (5, p. 63).

The self-contained classroom features space for physical activity, work, a library, arts and crafts, nature and science, music, and storage. The ideal is fewer classrooms of larger size, but this does involve additional equipment expense (5, p. 63). A central instructional materials center can be arranged to serve all levels.

The elementary school will require special services rooms for central office space, consultation, clinic, and service personnel, as well as physical and occupational therapy facilities for the handicapped. The multi-purpose room can accommodate play and physical education, a community center, a lunch program, and auditorium needs. The administrative area should be near the main entrance, easily recognizable, and creating a friendly, informal atmosphere (5, pp. 67-68).

The secondary school involves integration of classes into larger blocks, and individual advancement within a large teaching area that can be subdivided to meet group needs (5, p. 68). High school organization
requires a comprehensive program with specialized equipment in adequate space. An emotional "home base" is necessary, as are physical and intellectual bases (2, p. 51).

The school-within-a-school concept (2, p. 67) accommodates a large enrollment, yet breaks it down into several working components, making team-teaching practicable, and creating the strong sense of personal identification of the smaller school.

Instructional areas in the secondary school provide for, in addition to regular classrooms:

(1) The instructional materials center, including library materials, equipment room, a librarian station, and storage space (6, p. 69);

(2) The art area, with natural light, work centers for various activities, large tack-board and storage areas, and an adjoining supply room (6, p. 70);

(3) Science instruction, with separate laboratories including teaching and experimental areas, as well as essential supply and storage space (6, p. 71);

(4) The acoustically treated music unit, in proximity to the auditorium stage, providing instrumental and choral areas (6, p. 72);

(5) Home economics study, involving extensive multiple use and variety of space and storage (6, p. 73);

(6) Industrial education shops, housed in isolated areas or in separate buildings of industrial-type construction. Safe movement areas around equipment is important here, as is adequate project space (6, p. 77);
(7) An auditorium unit providing space of six to seven square feet per person, a stage of at least 25' depth with a 30' proscenium, and shop-workroom, storage, and dressing facilities (6, p. 80);

(8) A gymnasium unit primarily designed for physical education. Adequate ceiling and floor space for basketball with extended folding bleachers and movement area for spectators should be allowed. A teaching station requires an area of at least 48 X 66'; ceiling height of 22' is recommended. Flooring should be a strip maple. Bilateral lighting is best. Small activity rooms adjacent to the gymnasium increase usability. Dressing, storage, and shower rooms should be directly accessible. Instructor office space may be individual or combined, with some private area provided (7, pp. 7-9).

Among the other necessary areas are lunchrooms (6, p. 83), which may be of the individual, central, satellite, or combined type, and which should be accessible to the service yard.

The administration area (6, p. 85) provides waiting space, private offices, public address facilities, a duplicating area, and general staff space.

Special services include (6, p. 86): a guidance suite apart from the administrative area, with testing and counseling areas; health offices; committee and conference rooms; and teacher work and lounge areas.

Toilet and drinking water accommodations (53, p. 3) should be well ventilated and properly equipped, with a proper ratio of fixtures to pupils.
Physical Environment of the Building

Thermal environment should meet both physiological and psychological objectives (72, p. 7). The atmosphere should be free of objectionable odors, dust, fumes, and gases; fresh air being provided at the rate of ten cubic feet per minute per occupant. Temperatures of from 68-72°F, with a range of not more than four degrees in any portion of the room, should be maintained. Attention to the orientation of the building can aid thermal environment, as can knowledge of prevailing winds during different seasons.

The visual environment demands control of brightness, the brightness of a task equaling or exceeding the brightness of the surrounding area (6, p. 95). Recommended reflective values (69, p. 28) include: floors - 30%; walls - 50-70%; ceiling - 85-95%; and furniture - 25-40%.

Lighting values in classrooms should be approximately 50 foot-candles; in library study areas 70 foot-candles; in auditoriums 30 foot-candles; and in corridors 20 foot-candles (69, p. 28).

The auditory environment should (6, p. 99) prevent sound transmission between areas, and provide auditory comfort within given areas.

Construction

Contracting for construction (7, pp. 157-161) involves location of bidders through advertisement, notification, and, where possible, display by the architect of documents in "plan rooms" such as those maintained by the F. W. Dodge Corporation. Bids must be received, tabulated, and
analyzed. The board then awards contracts to the lowest and best bidders, returns unsuccessful bids, and executes contracts. Most architects require "performance bonds" to guarantee carrying out the terms of the contract. Working documents are then reissued to those contractors who will use them.

Principles to be remembered (7, p. 164) include the architect's professional status and provision of adequate legal counsel. The architect will locate potential bidders and handle phases of construction as outlined earlier. Contractors are responsible for records involving materials and extent of trade work, selection of subcontractors and supplies, provision of bid bonds, and execution of contracts (7, p. 166). Contractors secure and post permits (7, p. 172).

Change orders are issued when construction changes involving cost change occur, and should be regarded as an item to be paid by the board if they involve items that would have been a legitimate cost to the board had they been considered at the time of bid preparation (7, p. 175).

Custom dictates withholding ten percent of what is due on "request for payment" for each contractor to insure completion of detail finish work. Acceptance should not precede completion of all items mentioned by the architects' inspector (7, p. 178).

Resources and documents needed (7, pp. 186-187) include:

(1) Performance bonds (contractors);
(2) Schedule of progress (architect);
(3) Estimates of monies due, submitted monthly by contractors;
(4) Working documents;
(5) Change orders;
(6) Punch lists - items noted by the inspector as needing attention;
(7) Affidavits;
(8) "As built" documents;
(9) Letters of acceptance, sent to all contractors and the architect upon acceptance.

In all matters of construction, meticulous records must be kept, and final acceptance made only upon recommendation of the architect, who will then, with the superintendent, assume responsibility for acquainting prospective users with all facilities (2, p. 181).

Equipping and Furnishing the Building

Equipping and furnishing the building should be on the basis of needs as they pertain to the educational program, tools for environment, teaching, learning, and service. The overall budget should include these items, sometimes devoting as much as twenty per cent of the total capital outlay to them (7, p. 198).

The architect can advise the board regarding items to be attached to the structure. The administrator assumes major responsibility in this area, securing information and seeing that the staff is informed. Consultants' and equipment specialists' suggestions are of value. The bidding, purchase, and installation methods closely parallel those discussed earlier in regard to construction.

Dedication

Prior to taking its place in the educational network, the completed building should be formally dedicated. An administrative assistant should handle public relations, stressing the role played by public
support of the program of study. The principal-elect should design the program, the formal aspects of which should not exceed one hour in length. A carefully devised invitation list is important. Representation in the program of the architect and contractors in presentation of the keys to the principal should be planned. The ministerial association takes part in the invocation and benediction. Tours conducted prior to the ceremony, and a social hour concluding it, complete the program. A final responsibility is prompt issuance of letters of appreciation to dedication participants (87, pp. 26-27).

Related Research

A growing awareness throughout the nation regarding the need for and lack of comprehensive guidelines to aid school plant planning has resulted in several research studies in recent years. The topics of these studies range from development of complete guidelines to role identification of individual participants in the planning process.

McCrary (41) in 1966 dealt with identification of the essential elements of a program of school plant planning, and, on the basis of these identified elements, development of guidelines. On the assumption that a review of pertinent literature coupled with interview with authorities would reveal the considerations necessary to the planning program, he identified characteristic elements and submitted them to a jury of experts for rating. Those elements emerging as essential or highly desirable to a program of school plant planning were: (1) determination of school plant needs; (2) development of standards and educational policy; (3)
selection of an educational consultant; (4) provision of a public relations program; (5) identification of legal problems and services; (6) completion of a school survey; (7) preparation of educational specifications; (8) planning the educational program; (9) site selection and acquisition; (10) architectural services; (11) the financial program; (12) construction services; (13) selecting furniture and equipment, and (14) accepting and occupying the building.

Holstead (27) in a 1966 analysis and evaluation of comprehensive school planning programs in populous school districts in Kansas during the period from 1946-1964, found that two of the five districts reported on had master plans for the guidance of future growth, while the remaining three districts had adopted the "problem-solving" approach. Lack of periodic school plant evaluation and site acquisition for immediate use resulted in sub-standard conditions. His recommendations pointed to the benefits to be accrued through development of written board policy to guide school district improvement.

Roaden (57) completed a study of the essential elements of educational specifications for school plant facilities in 1963. He concluded that educational specifications are vital, and that their use is becoming increasingly widespread. He identified incidental purposes of educational specifications, including stimulation of curriculum improvement, identification of programs desirable in the future, written identification of community values and educational philosophy, and provision of a basic reference to the operations and functions of the resulting educational facilities.
The elements identified as essential to educational specifications included: (1) the problem; (2) statement of educational philosophy and objectives; (3) type of school organization; (4) general enrollment policies; (5) description of those to be served; (6) community uses; (7) general trends; (8) general environment; (9) auxiliary services; (10) general area relationships; (11) desired educational outcomes; (12) discernible trends; (13) activities; (14) specific enrollments; (15) space needs; (16) furniture and equipment; and (17) special requirements.

An investigation of the role played by educational planning in determination of school plant design was completed in 1965 by Hoerner (26). He surveyed public school buildings built in Delaware since 1955 to determine the degree to which educational planning had determined design. He then determined and evaluated the procedures involved in educational planning, analyzed programs where planning was evident, and compared elementary and secondary schools for their degree of involvement in educational planning.

Through questionnaire and interview techniques he found that:

1. Written educational plans were prepared in 44% of the districts studied.

2. The chief school officer was most often assigned responsibility for the educational planning of new school buildings.

3. One half of the districts studied appointed official planning committees.

4. The greatest frequency of educational planning committee size was in the 11-20 member range.
5. One to six months were usually devoted to planning.

6. Eight major elements were included in the written educational policies of the majority of the districts.

7. The rank order of individuals involved in educational planning was chief school officers, architects, teachers, boards of education, principals, lay citizens, and classified personnel.

8. Outside individuals most often involved were the state department of public instruction, the school auxiliary, educational consultants, and civic associations.

9. Problems included identification of future needs, inexperience in planning, legislative inaction and political interference, state regulatory limitations, lack of knowledge of future programs, and lack of time.

Hoerner concluded that systematic written guidelines would aid in the development of educational plans for specific building projects.

Terjeson (67) analyzed school plant planning in a 1963 dissertation. He pointed out the need for public written school board policy to serve as a basis for plant planning programs. His recommendations included long-range planning prior to construction, under the guidance of a member of the school administration designated responsibility for the school plant planning program. Community representation and consideration of community needs were cited as necessary.

Keating (34) reported the effectiveness of procedures used in school building programs in Nebraska. His 1963 dissertation found effective procedures to be: (1) hiring the architect as early as possible; (2) use of printed descriptive brochures to distribute information; (3) use
of outside survey consultants to assist in determination of building needs; (4) utilization of parent-teacher organizations; and (5) a carefully detailed bond campaign plan, with telephone committees, speakers bureau use, and taxi service on election day.

Larson (37) discussed the development of guidelines to determine the role of the high school principal in planning a secondary school building. He pointed to the need for emphasis on proper planning at stages of development, with consideration of aesthetics, economy, and the health, safety, and comfort of the occupants. Early role clarification was stressed, as was the need for direct continuous communication among the participants in vital decision making. Larson suggested the use of a post-construction critique by members of the planning team to facilitate future improvement of the process.

Arthur Larson (38) discusses in his 1966 dissertation the role of the educational consultant in school plant planning in California. His problem dealt with determination of the specific functions performed by consultants, their relationships with other involved personnel, assessment of their influence, and appraisal of their contributions to the planning process.

He identifies three categories of consultants: (1) those affiliated with colleges, universities, or private practices; (2) those affiliated with state departments of education; and (3) those affiliated with architects.

Larson finds that school districts seek consultant assistance because they desire knowledge of current research and trends, and because
their own staffs have insufficient time to keep abreast of developments and to devote to planning projects. He reports that the most frequent consultant function was in school surveys and site selection. Their most frequent assistance was in the area of advising as to procedure and reviewing work produced. The most frequent task performed of fourteen common tasks defined was stimulation of local thought and action. Consultants usually worked within an organizational structure in which their positions were related to the total project by lines of responsibility from the superintendent to the board of education, and by lines of responsibility connecting them with all personnel involved in the same projects. The most frequent effect produced by consultant assistance was obtainment of maximum facilities for money expended.

Consultant skills frequently recognized were their abilities to understand the architectural features of the proposed plant, to communicate with educators, architects, and laymen, and to visualize the proposed school as a total operating unit. Larson found that most districts surveyed desired to involve consultants in subsequent planning projects.

The consensus of most of the research projects reviewed was that the present use of guidelines is not extensive, probably due to their scarcity. The design, construction, and equipping of the school building will enhance the educational program if these steps are taken according to pre-determined educational requirements. Otherwise the plant may become an educational tool which restricts operation of the program due to inadequacy.
CHAPTER III. PROCEDURES USED IN THE STUDY

Introduction

The purpose of this study is the development of a guideline for school construction applicable to the existent situation in Iowa. An in depth review of the school construction procedures currently in practice throughout the nation was conducted, with consideration being given all aspects of construction from inception to the completion and use of new facilities. Through analysis of information accumulated by means of this review, an optimal comprehensive procedural pattern suitable for use by the school districts of Iowa was established.

Methodology

Conduct of the study was divided into four main areas of research:

1. Copies of state school building guides were requested of the state departments of education of the fifty states.

2. A review of all publications thus garnered, in addition to various published literature, was made to determine what other state agencies have done regarding school building planning.

3. A detailed questionnaire was sent to all registered architects in the State, to the State Department of Public Instruction facility planners, and to college professors knowledgeable in the field, to determine their opinions regarding areas suitable for inclusion in the proposed guide.

4. Interviews were conducted with qualified individuals experienced in the various aspects of school building construction.
State departments of education

It was felt that an optimal means of assembling information relevant to the study would be through those publications currently in use as school facility guides in the fifty states. Thus would be brought to light not only established practices, but the stage of development of procedural guides available throughout the nation. A letter was sent to each state department of education requesting copies of their school construction guidance publications.

Review of publications

The published literature pertinent to the study was assembled and reviewed in regard to both national trends and specific state situations, in an effort to determine what has been done in the area of school construction planning, and the extent of realization of the need for provision of procedural guidance by the state to the local school district. It was found that while most states have considered this need, and made available publications concerning various aspects of planning, very few offer a well-organized, comprehensive publication on which a local district can base its individual program of construction.

Questionnaire

Specifically pertinent to the state of Iowa, a questionnaire was sent to fifty qualified architects, to the facility planners in the State Department of Public Instruction, and to college professors concerned with the area of the study. The questionnaire covered the areas of state and local relationships in school plant planning, planning for and of school facilities, conduct of the building program, the school site, the building and its
elements, physical environment of the building, health factors and standards, and safety factors and standards. The resultant information was incorporated into the recommendations for action within the state.

**Interviews**

Again concentrating on recommendations for guidelines suitable to this area, qualified individuals were interviewed to determine opinions based on their experiences in school planning. School superintendents who had conducted building programs in the state were questioned regarding the areas in which they felt a need for definitive guidance. School board members were interviewed. Construction contractors, both general and specialized in the fields of electricity, plumbing and heating, were contacted regarding the areas they felt needed adequate coverage. State regulations were obtained from representatives of the State Department of Public Instruction, the State Fire Marshall and the State Department of Health.

**Validation of the Instrument**

A jury of experts was assembled to review and make recommendations concerning the validity of the instrument. This jury was comprised of a State Department of Public Instruction school building consultant, an Iowa State University extension service school building consultant, and three architects well established in school building construction. The instrument was also subject to the recommendations and evaluations of those superintendents and architects participating in the study.
Summary

Upon compilation of the material assembled through the above outlined research methods, the writer was able to ascertain those points of which the local district undertaking a school building project must be aware. Consensus of informed individuals and agencies was the basis for the recommended procedures established in this guide.
CHAPTER IV. FINDINGS

Introduction

The findings of this study are based on data collected by means of a questionnaire instrument surveying the opinions of Iowa architects and Iowa school superintendents regarding justification of the inclusion of specific items within the proposed school building guidelines.

The findings to be presented are based on 36 questionnaire replies from 40 architects and 36 replies from city school superintendents in 41 districts. This represents 88.8 percent return of the instrument. The return was expedited by an initial and two follow-up letters over a period of three months, the original cover letter being specifically designed to encourage the desired response.

The public high school districts of Iowa were arbitrarily selected by the size enrollment factor. The number of school districts and the number of responses by groups are listed below:

<table>
<thead>
<tr>
<th>Group I 5000 and above</th>
<th>Group II 5000-3000</th>
<th>Group III 3000 and below</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of districts</td>
<td>15</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>Number of replies</td>
<td>12</td>
<td>6</td>
<td>18</td>
</tr>
</tbody>
</table>

In the descriptions to follow, any information concerning school districts by groups will refer to the above classification of Iowa public high school districts. The reference to responses refers to individual school districts which replied to the school building questionnaire used in this investigation.
The information based on architects' opinions obtained in this study was obtained from the 36 completed and returned questionnaires of the 40 questionnaires mailed to architects in the state of Iowa. This represents a 90 percent return of the instrument. This was accomplished by an initial and two follow-up mailings over a period of three months. The original cover letter, designed to elicit a better response, was mailed with the questionnaire. The architects of Iowa were arbitrarily placed into one group. The number of architects and the number of responses are listed below:

<table>
<thead>
<tr>
<th>Number of architects</th>
<th>Number of replies</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>36</td>
</tr>
</tbody>
</table>

This section of the study is a consideration of the items needed for a school building guide for the state of Iowa, as indicated by the opinion of school district superintendents and architects.

**Format of the instrument**

This survey of the opinion of school superintendents and architects in Iowa regarding items to be discussed in the proposed school building guide was conducted by means of a questionnaire dealing with twelve basic areas, each of which was subdivided into pertinent items, with provision for additional notations on the part of the respondent. The following text will discuss these individual areas in terms of the elicited information.
Questionnaire Results

State and local relationships in school plant planning

Question One related to those items to be included in the category of state and local relationships in school plant planning. Table 1A depicts the results of the questionnaires completed by Iowa school superintendents, Table 1B those of the questionnaires completed by Iowa architects in regard to this, the first question.

As shown in Table 1A, Iowa school superintendents indicated a favorable attitude toward inclusion of Item One, Provisions of school building law. Eleven superintendents in Group I, five in Group II, and seventeen in Group III, representing 91.6 percent of the responding superintendents, reacted positively to this item. The response of architects to this item was less favorable, only twenty-six, or 72.2 percent of the thirty-six respondents indicating a need for inclusion of Provisions of school building law, as depicted in Table 1B.

The second item, Employment of registered architects and engineers, was checked by 91.6 percent of the participating school superintendents, twelve in Group I, five in Group II, and sixteen in Group III. The architects, informed of needs in this area, indicated need for inclusion of this item on 86.1 percent of the returned questionnaires.

Item Three dealt with the Meaning of plan approval. Superintendents rated this somewhat lower than did architects, the respective percentages being 58.3 and 66.6. Eight superintendents in Group I, two in Group II, and eleven in Group III checked this item.
Table IA. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to state and local relationships

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
</tr>
<tr>
<td>1. Provisions of school building law</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>2. Employment of registered architects and engineers</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>3. Meaning of plan approval</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>4. Approval by other agencies</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>5. Compliance with local codes and ordinances</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>6. Final plans - approval</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>7. Steps, forms and procedures for planning and construction</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>8. Non-instructional projects</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>9. Others</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 1B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to state and local relationships

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provisions of school building law</td>
<td>26</td>
<td>26</td>
<td>72.2</td>
</tr>
<tr>
<td>2. Employment of registered architects and engineers</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>3. Meaning of plan approval</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>4. Approval by other agencies</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>5. Compliance with local codes and ordinances</td>
<td>28</td>
<td>28</td>
<td>77.7</td>
</tr>
<tr>
<td>6. Final plans - approval</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>7. Steps, forms and procedures for planning and construction</td>
<td>21</td>
<td>21</td>
<td>58.3</td>
</tr>
<tr>
<td>8. Non-instructional projects</td>
<td>11</td>
<td>11</td>
<td>30.5</td>
</tr>
<tr>
<td>9. Others</td>
<td>4</td>
<td>4</td>
<td>11.1</td>
</tr>
</tbody>
</table>
Approval by other agencies, Item Four, was checked by eight respondents in Group I, two in Group II, and ten in Group III, a total of 55.5 percent. Architects considered this more important, 66.6 percent indicating a need for inclusion of this item in the proposed guide. Discrepancy in this area may involve different attitudes regarding the clarification of responsibility between the architect and the school administration with which he works.

Item Five deals with Compliance with local codes and ordinances. School superintendents were overwhelmingly (94.4 percent) in favor of guideline consideration of this item. Twenty-eight, or 77.7 percent of the architects included this item in their response. Again, areas of professional competence may account for difference in attitude.

Mention of Final plans - approval, Item Six in the guideline, was favored by seven superintendents in Group I, three in Group II, and fourteen in Group III, representing 66.6 percent of the total. Architects surveyed were in agreement, the same percentage favoring this item.

Item Seven, Steps, forms, and procedures for planning and construction, was checked by 66.6 percent of the superintendents and 58.3 percent of the architects. Respectively, nine, four, and eleven of Groups I, II, and III responded affirmatively.

Non-instructional projects, Item Eight, was not considered of relative importance by either of the surveyed groups. The superintendents checked it on 27.7 percent of the replies; the architects, on 30.5 percent.

Item Nine, Others, received attention from 13.8 percent of the superintendents and 11.1 percent of the architects. Superintendents in Group I
commented regarding: inclusion of bond issue success, 10 or 15 mill limits, use of state funds, $2\frac{1}{2}$ mill levy, and other legal aspects, including notices, rating services, financial consultants, sale of bonds, and investment of SH funds. A Group II superintendent mentioned the need for educational planning to justify building needs. From Group III came remarks concerning federal rules and regulations where federal funds are involved, and need for differentiation between "low" and "best" bid. One architect's response to this item mentioned opposition to control of school planning by a state department, citing the costly experiences of other states in this area, while remaining amenable to the concept of a suggestive guide. Other architects felt a need for a state building code for all public buildings. Retention of educational consultants, coordination with local and regional planning, and retaining approval at the local level constituted the remaining comments of architects.

Planning for school facilities

The data recorded in this area are presented in Tables 2A and 2B. Table 2A presents data recorded from superintendents' response, Table 2B records that of architects.

Item One, Organizing a planning committee, was favored for inclusion by 88.8 percent of the superintendents, eleven, five, and sixteen, respectively, from Groups I, II, and III. Seventy-five percent of the architects favored this item.

Some elements of a school building survey, Item Two, met equal approval from both architects and superintendents, 80.5 percent.

The third item, Studying the educational program, was highly favored, 94.4 percent of the superintendents and 91.6 percent of the architects checking this item.
Table 2A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to planning for school facilities

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
</tr>
<tr>
<td>1. Organizing a planning committee</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>2. Some elements of a school building survey</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>3. Studying the educational program</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>4. Evaluating existing school plants</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>5. Determining financial resources</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>6. Long range plan</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>7. Preparing educational specifications</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>8. Others</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Evaluating existing school plants was marked for inclusion by 91.6 percent of the superintendents and 88.8 percent of the architects.

Determining financial resources met the approval of 86.1 percent of superintendents and 88.8 percent of the architects.

Item Six, Long range plan, was also favored by both groups, 88.8 percent of the superintendents and 91.6 percent of the architects.

Superintendents reacted positively to inclusion of Preparing educational
Table 2B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to planning for school facilities

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies Total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Organizing a planning committee</td>
<td>27</td>
<td>27</td>
<td>75.0</td>
</tr>
<tr>
<td>2. Some elements of a school building survey</td>
<td>29</td>
<td>29</td>
<td>80.5</td>
</tr>
<tr>
<td>3. Studying the educational program</td>
<td>33</td>
<td>33</td>
<td>91.6</td>
</tr>
<tr>
<td>4. Evaluating existing school plants</td>
<td>32</td>
<td>32</td>
<td>88.8</td>
</tr>
<tr>
<td>5. Determining financial resources</td>
<td>32</td>
<td>32</td>
<td>88.8</td>
</tr>
<tr>
<td>6. The long range plan</td>
<td>33</td>
<td>33</td>
<td>91.6</td>
</tr>
<tr>
<td>7. Preparing educational specifications</td>
<td>26</td>
<td>26</td>
<td>72.2</td>
</tr>
<tr>
<td>8. Others</td>
<td>6</td>
<td>6</td>
<td>16.6</td>
</tr>
</tbody>
</table>
specifications, 88.8 percent marking it, while a somewhat less enthusiastic response came from architects, only 72.2 percent desiring its inclusion in the proposed guidelines.

Other comments in this area were: (Group I) inclusion of special provisions for use of facilities as a neighborhood or community center, enrollment studies, and visitation to other facilities; (Group II) none; and (Group III), provisions for disseminating complete school information to the public, enrollment estimates, and communications media committee inclusion.

Architects' comments included desire for inclusion of: the bond issue (planning through sale), site selection and evaluation, coordination with city and area development planning, organizing a citizens group to publicize the bond issue, and criteria for projecting student enrollment.

Organization of a building program

The third question dealt with those items desired in the area of Organization of a building program. Table 3A sets forth the data recorded from questionnaires submitted to Iowa school superintendents; Table 3B that from architects in Iowa.

The first item, The selection of the architect, met approval for inclusion from 88.8 percent of both the architects and the superintendents.

Inclusion of Item Two, Services of the architect, was almost equally favored; again 88.8 percent of the superintendents responded, as did 86.1 percent of the architects.

Another item dealing with the architect, Contractual relations with the architect, was desired by a large majority, 96.2 percent of the superintendents, while 80.5 percent of the architects checked the item.
Table 3A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to organization of a building program

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
</tr>
<tr>
<td>1. Selection of architect</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>2. Services of architect</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>3. Contractual relations with architect</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>4. Record of proceedings and conferences</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>5. Selection of contractor</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>6. Educational consultant</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>7. Budget preparation</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>8. Financing program</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>9. Others</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>85</td>
<td>39</td>
</tr>
</tbody>
</table>

Architects considered the fourth item, Record of proceedings and conferences, as somewhat more important than did superintendents, 86.1 percent and 80.5 percent respectively checking this item.

The fifth item, Selection of contractor, was not highly favored by either superintendents, 55.5 percent or architects, 44.4 percent.

Educational consultant, Item Six, was marked by 80.5 percent of the superintendents and 72.2 percent of the architects.
Table 3B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to organization of a building program

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Selection of architect</td>
<td>32</td>
<td>32</td>
<td>38.8</td>
</tr>
<tr>
<td>2. Services of the architect</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>3. Contractual relations with the architect</td>
<td>29</td>
<td>29</td>
<td>80.5</td>
</tr>
<tr>
<td>4. Record of proceedings and conferences</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>5. Selection of contractor</td>
<td>16</td>
<td>16</td>
<td>44.4</td>
</tr>
<tr>
<td>6. Educational consultant</td>
<td>26</td>
<td>26</td>
<td>72.2</td>
</tr>
<tr>
<td>7. Budget preparation</td>
<td>29</td>
<td>29</td>
<td>80.5</td>
</tr>
<tr>
<td>8. Financing program</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>9. Others</td>
<td>4</td>
<td>4</td>
<td>11.1</td>
</tr>
</tbody>
</table>
Budget preparation, Item Seven, rated fairly high, 77.7 percent of superintendents and 80.5 percent of architects responding, yet the eighth item, Financing program, received more attention, 94.4 percent of the superintendents and 86.1 percent of the architects favoring it.

The final item in this area, Others, drew comments from 13.8 percent of the superintendents and 11.1 percent of the architects. From Group I came recommendations that the clerk of the works be considered as a site supervisor, and that application of the Program Evaluation and Review Technique (PERT) be included in the guideline. Construction progress conferences involving architect, owner, and contractors were mentioned. Group II and Group III superintendents noted the need for consideration of a bond advisor, while a Group III superintendent felt the need for contractors to be selected by low bid. Architects' response included need for mention of contractor selection by bidding, required hearing, advertising for and receiving of bids, and attention to other consultants, such as experts in audio-visual matters, acoustics, and others.

School site

The fourth area dealt with in the questionnaire was the School site. Data are noted in Tables 4A and 4B.

First, Site selection was presented for consideration. Superintendents felt this item necessary to the guideline, 91.6 percent responding. Architects checked the item on 88.8 percent of their replies.

Site size met similar approval, 94.4 percent of the superintendents and 86.1 percent of the architects responding.
Table 4A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to school site

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Site selection</td>
<td>Group I</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>2. Site size</td>
<td>Group II</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Physical properties</td>
<td>Group III</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>4. Site development</td>
<td></td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>5. Development of ground for educational, recreational and community use</td>
<td></td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>6. Service areas</td>
<td></td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>7. Site acquisition</td>
<td></td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>8. Others</td>
<td></td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

|                  | 77                | 30      | 110     | 217    |

Item Three, Physical properties, received somewhat less response, 77.7 percent of both architects and superintendents marking it.

Site development was considered more important for inclusion by architects than by superintendents, 83.3 percent and 77.7 percent respectively checking it.

Development of ground for educational, recreational, and community uses received more attention, particularly from superintendents, who marked it on 88.8 percent of returned questionnaires, while 83.3 percent of the architects marked it.
Table 4B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to school site

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Site selection</td>
<td>32</td>
<td>32</td>
<td>88.8</td>
</tr>
<tr>
<td>2. Site size</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>3. Physical properties</td>
<td>28</td>
<td>28</td>
<td>77.7</td>
</tr>
<tr>
<td>4. Site development</td>
<td>30</td>
<td>30</td>
<td>83.3</td>
</tr>
<tr>
<td>5. Development of ground for educational, recreational and community use</td>
<td>30</td>
<td>30</td>
<td>83.3</td>
</tr>
<tr>
<td>6. Service areas</td>
<td>28</td>
<td>28</td>
<td>77.7</td>
</tr>
<tr>
<td>7. Site acquisition</td>
<td>27</td>
<td>27</td>
<td>75.0</td>
</tr>
<tr>
<td>8. Others</td>
<td>12</td>
<td>12</td>
<td>33.3</td>
</tr>
</tbody>
</table>
Item Six, Service areas, was among the low items in the area, 72.2 percent of superintendents and 77.7 percent of architects favoring it.

Site acquisition was considered more important by superintendents, 83.3 percent of whom desired its inclusion. Three-fourths of the architects marked this item.

Other comments made by superintendents included: (Group I) arrangement of school locations adjacent to city parks when possible, in cooperation with city officials, and consideration of site accessibility and location. Group II joined in desiring mention of school-park possibilities, while Group III pointed out need for location and cost study.

Architects, in their comments regarding Item Eight, Others, went into technical aspects of site qualifications. Mention was made of the importance of utility and sewer availability and proper depth. Site orientation and environmental aspects, zoning protection, and accessibility were included in one statement. Site adaptability for school building construction, and involvement of the architect in site selection were felt to be necessary points for inclusion. Present zoning and future industrial development are of concern.

The building

Discussion of the building was the point of the fifth area of the questionnaire, portrayed in Tables 5A and 5B.

First, the Educational program was mentioned. Both superintendents and architects attributed importance to this aspect, 94.4 percent and 86.1 percent replying.
Table 5A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to building

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
<td>Group III</td>
</tr>
<tr>
<td>1. Educational program</td>
<td>11</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>2. Architectural character</td>
<td>10</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>3. Plan types</td>
<td>7</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4. Physical relationships</td>
<td>10</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>5. Community use</td>
<td>12</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>6. Orientation</td>
<td>7</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7. Circulation</td>
<td>10</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>8. Flexibility</td>
<td>12</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>9. Expansibility</td>
<td>12</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>10. Finish materials</td>
<td>11</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>11. Others</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Somewhat low in response, Item Two, Architectural character, received the attention of 61.1 percent of both groups.

Again ranking low, Plan types was marked by 55.5 percent of superintendents and 44.4 percent of architects. This low response is in keeping with retaining a guideline, rather than regulatory nature, in the proposed school building guide.
Table 58. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to building

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Educational program</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>2. Architectural character</td>
<td>22</td>
<td>22</td>
<td>61.1</td>
</tr>
<tr>
<td>3. Plan types</td>
<td>16</td>
<td>16</td>
<td>44.4</td>
</tr>
<tr>
<td>4. Physical relationships</td>
<td>26</td>
<td>26</td>
<td>72.2</td>
</tr>
<tr>
<td>5. Community use</td>
<td>30</td>
<td>30</td>
<td>83.3</td>
</tr>
<tr>
<td>6. Orientation</td>
<td>26</td>
<td>26</td>
<td>72.2</td>
</tr>
<tr>
<td>7. Circulation</td>
<td>30</td>
<td>30</td>
<td>83.3</td>
</tr>
<tr>
<td>8. Flexibility</td>
<td>28</td>
<td>28</td>
<td>77.7</td>
</tr>
<tr>
<td>9. Expansibility</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>10. Finish materials</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>11. Others</td>
<td>7</td>
<td>7</td>
<td>19.4</td>
</tr>
</tbody>
</table>
Physical relationships was marked by 66.6 percent of the superintendents and 72.2 percent of the architects.

Community use received more attention, 91.5 percent of the superintendents and 83.3 percent of the architects responding to this item.

Orientation was considered of more importance by architects, 72.2 percent than by superintendents, 47.2 percent.

Flexibility, a key to new educational trends, received relatively great attention in this area, superintendents being almost unanimous in their approval of inclusion, 97.2 percent; architects, 77.7 percent. Professional interests may explain this disparity.

Again high in consideration, Item Nine, Expansibility, received the attention of 94.4 percent of superintendents and 86.1 percent of the architects.

Finish materials were considered of relatively low merit for inclusion in the guideline, 63.8 percent of the superintendents and 66.6 percent of the architects replying. This again reflects interest in general, rather than specific guidelines.

Other comments mentioned maintenance and educational and custodial storage (Group I); carpet pros and cons, and aesthetic considerations (Group II); and cost (Group III).

Architects' response to this item, Others, mentioned construction quality; functional use of specific areas; "systems" type building construction, encompassing durability, maintenance, and fire ratings; and, finally, mechanical, electrical, and plumbing requirements.
Elements of the building

Of major importance to the educators questioned regarding this area were two items, Facilities for instruction and service, 94.4 percent, and Non-instructional areas and equipment, 94.4 percent. Architects marked these areas for inclusion 86.1 percent and 77.7 percent respectively.

The elementary school as an item received the attention of 75.0 percent of the superintendents and 66.6 percent of the architects. The same response was elicited for the item, The secondary school.

Disaster shelters in schools as an item for inclusion was checked by 77.7 percent of the superintendents and 69.4 percent of the architects.

Circulation and service units was responded to more heavily, 83.3 percent of superintendents and architects alike expressing their favor for this item within the guideline.

The only response to Others, the last item, from the superintendents came from Group III, who mentioned the middle school, cost, and special areas.

Architects mentioned the fact that items included in this area will vary according to the program, the need for consideration of the recreational facilities, and attention to be given the aspects of heating and ventilation.

Tables 6A and 6B depict the data collected regarding this area.
Table 6A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to elements of the building

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
<td>Group III</td>
</tr>
<tr>
<td>1. Facilities for instruction and services</td>
<td>12</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>2. The elementary school</td>
<td>10</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>3. The secondary school</td>
<td>10</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>4. Non-instructional areas and equipment</td>
<td>11</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>5. Disaster shelters in schools</td>
<td>8</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>6. Circulation and service units</td>
<td>10</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>7. Others</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total                                      | 61      | 28      | 94       | 183          |     |
Table 6B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to elements of the building

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Facilities for instruction and services</td>
<td>31</td>
<td>31</td>
<td>86.1</td>
</tr>
<tr>
<td>2. The elementary school</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>3. The secondary school</td>
<td>24</td>
<td>24</td>
<td>66.6</td>
</tr>
<tr>
<td>4. Non-instructional areas and equipment</td>
<td>28</td>
<td>28</td>
<td>77.7</td>
</tr>
<tr>
<td>5. Disaster shelters in schools</td>
<td>25</td>
<td>25</td>
<td>69.4</td>
</tr>
<tr>
<td>6. Circulation and service units</td>
<td>30</td>
<td>30</td>
<td>83.3</td>
</tr>
<tr>
<td>7. Others</td>
<td>3</td>
<td>3</td>
<td>8.3</td>
</tr>
</tbody>
</table>
Physical environment of the building

This area, covered in Tables 7A and 7B, was subdivided into the items Visual, Auditory, and Thermal environment, in addition to the area reserved for personal comment, Others. In all three of the former, 97.2 percent of the responding superintendents favored attention in the proposed guideline.

Architects too responded favorably to these items, Visual environment, 91.6 percent; Auditory environment, 91.6 percent; and Thermal environment, 88.8 percent.

Other comments from superintendents all centered on esthetic environment, an area receiving increased attention in modern educational considerations. Nearly 20.0 percent of the responding superintendents noted esthetics, substantiating this trend.

Architects' response noted the psychological effects produced by use of varied colors and materials, safety, health, scale with consideration for the handicapped, and the inclusion of ventilation in the thermal environment area.

Health factors and standards

Question Eight, Health factors and standards, is presented in Tables 8A and 8B.

Item One, Water supply, was checked by 88.8 percent of the participating superintendents and 75.0 percent of the architects.

Item Two, Sewage disposal, was checked by 88.8 percent of the superintendents, 77.7 percent of the architects.

Ventilation, the third item, received heavy responses: superintendents, 97.2 percent; architects, 83.3 percent.
Table 7A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to physical environment of the building

<table>
<thead>
<tr>
<th>Items</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>Total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Visual environment</td>
<td>12</td>
<td>5</td>
<td>18</td>
<td>35</td>
<td>97.2</td>
</tr>
<tr>
<td>2. Auditory environment</td>
<td>12</td>
<td>5</td>
<td>18</td>
<td>35</td>
<td>97.2</td>
</tr>
<tr>
<td>3. Thermal environment</td>
<td>12</td>
<td>5</td>
<td>18</td>
<td>35</td>
<td>97.2</td>
</tr>
<tr>
<td>4. Others</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>19.4</td>
<td></td>
</tr>
</tbody>
</table>

Table 7B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to physical environment of the building

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Visual environment</td>
<td>33</td>
<td>33</td>
<td>91.6</td>
</tr>
<tr>
<td>2. Auditory environment</td>
<td>33</td>
<td>33</td>
<td>91.6</td>
</tr>
<tr>
<td>3. Thermal environment</td>
<td>32</td>
<td>32</td>
<td>88.8</td>
</tr>
<tr>
<td>4. Others</td>
<td>5</td>
<td>5</td>
<td>13.9</td>
</tr>
</tbody>
</table>
Interior fixtures and finishes was checked by 75.0 percent of the superintendents and 63.8 percent of the architects.

The response to the remaining items reflects concern on the part of both architects and superintendents regarding the avoidance of an overly technical guideline.

Equipment specifications, Item Five, was checked by 83.3 percent of the superintendents and only 44.4 percent of the architects.

Sizes of fixtures, Item Six, was favored by 72.2 percent of the superintendents and 52.7 percent of the architects.

Heights of fixtures was checked by 72.2 percent of the superintendents, 58.3 percent of the architects.

Item Eight, Showers, received attention from 80.5 percent of the superintendents, 61.1 percent of the architects.

Floor drains, Item Nine, were included by 75.0 percent of the superintendents and only one-half of the architects.

Plumbing regulations was checked by 72.2 percent of the superintendents, 61.1 percent of the architects.

Swimming pools, the last specified item, was checked by 66.5 percent of the superintendents and 55.5 percent of the architects.

Others, Item Twelve, was well responded to. From Group I come comments regarding a storm sewer plan, number of fixtures, nursing facilities, and the need for a clearing house to evaluate the great variety of new products. A Group II superintendent mentioned consideration of window screens, and from Group III comes mention of lighting and cooling. These comments represent 16.6 percent of the respondents.
Table 8A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to health factors and standards

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
<td>Group III</td>
</tr>
<tr>
<td>1. Water supply</td>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>2. Sewage disposal</td>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>3. Ventilation</td>
<td>12</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>4. Interior fixtures and finishes</td>
<td>11</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>5. Equipment specifications</td>
<td>12</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>6. Sizes of fixtures</td>
<td>10</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>7. Heights of fixtures</td>
<td>9</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>8. Showers</td>
<td>11</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>9. Floor drains</td>
<td>10</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>10. Plumbing regulations</td>
<td>9</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>11. Swimming pools</td>
<td>8</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>12. Others</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>118</td>
<td>49</td>
<td>151</td>
</tr>
</tbody>
</table>

Architects' responses from 22.2 percent of those questioned mentioned application of existing codes rather than the creation of new standards. Light received attention, with mention made of the relationship between light and health. Sources of utility service, hydrants, and food preparation, serving and disposal were mentioned. Finally, the fact that swimming pools are particularly important in relation to the total community was noted.
Table 8B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to health factors and standards

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects Group I</th>
<th>Replies total number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Water supply</td>
<td>27</td>
<td>27</td>
<td>75.0</td>
</tr>
<tr>
<td>2. Sewage disposal</td>
<td>28</td>
<td>28</td>
<td>77.7</td>
</tr>
<tr>
<td>3. Ventilation</td>
<td>30</td>
<td>30</td>
<td>83.3</td>
</tr>
<tr>
<td>4. Interior fixtures and finishes</td>
<td>23</td>
<td>23</td>
<td>63.8</td>
</tr>
<tr>
<td>5. Equipment specifications</td>
<td>16</td>
<td>16</td>
<td>44.4</td>
</tr>
<tr>
<td>6. Sizes of fixtures</td>
<td>19</td>
<td>19</td>
<td>52.7</td>
</tr>
<tr>
<td>7. Heights of fixtures</td>
<td>21</td>
<td>21</td>
<td>58.3</td>
</tr>
<tr>
<td>8. Showers</td>
<td>22</td>
<td>22</td>
<td>61.1</td>
</tr>
<tr>
<td>9. Floor drains</td>
<td>18</td>
<td>18</td>
<td>50.0</td>
</tr>
<tr>
<td>10. Plumbing regulations</td>
<td>22</td>
<td>22</td>
<td>61.1</td>
</tr>
<tr>
<td>11. Swimming pools</td>
<td>20</td>
<td>20</td>
<td>55.5</td>
</tr>
<tr>
<td>12. Others</td>
<td>8</td>
<td>8</td>
<td>22.2</td>
</tr>
</tbody>
</table>
Safety factors and standards

Portrayed in Tables 9A and 9B, Question Nine dealt with those elements of safety to be considered in the proposed guidelines.

The first item was in regard to Application procedures. Slightly more than half, 52.7 percent, of the superintendents favored inclusion of this item. Architects' response exceeded this, amounting to 58.5 percent.

Item Two, Plans and specifications approval, was favored by 63.8 percent of the superintendents; 69.4 percent of the architects checked it.

Item Three, Employment of registered architects and engineers, elicited response from 80.5 percent of the superintendents and 77.7 percent of the architects.

The fourth item, Inspections during construction, was highly approved by superintendents, 86.1 percent favoring it. A lower percentage of architects, 72.2 percent checked this item.

Plans for additions, Item Five, was responded to by 69.4 percent of the superintendents and one half of the architects.

Moving on, the pattern of higher approval from superintendents than architects repeats itself in regard to the somewhat detailed aspects of this question.

Shops and industrial arts, Item Six, were marked by 86.1 percent of the superintendents, compared to 61.1 percent of the architects.

Auditorium stage area protection was responded to by 77.7 percent of the superintendents and 55.5 percent of the architects.

Corridors, Item Eight, received attention from 88.8 percent of the superintendents, as did the following two items, Exits, and Stairways. Respectively, 63.8, 66.6, and 66.6 percent of the architects favored these items.
Table 9A. Recommendations for a State School Building Guide as indicated by Iowa school superintendents; frequency of response to safety factors and standards

<table>
<thead>
<tr>
<th>Items</th>
<th>School districts</th>
<th>Replies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
<td>Group III</td>
</tr>
<tr>
<td>1. Application procedures</td>
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<td>4</td>
<td>7</td>
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<tr>
<td>2. Plans and specifications</td>
<td>7</td>
<td>3</td>
<td>12</td>
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<tr>
<td>approval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Employment of registered architects and engineers</td>
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<td>5</td>
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<tr>
<td>4. Inspections during construction</td>
<td>10</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>5. Plans for additions</td>
<td>8</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>6. Shops and industrial arts</td>
<td>10</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>7. Auditorium stage area</td>
<td>0</td>
<td>5</td>
<td>14</td>
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<tr>
<td>protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Corridors</td>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>9. Exits</td>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>10. Stairways</td>
<td>11</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>11. Interior finish</td>
<td>10</td>
<td>4</td>
<td>8</td>
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<tr>
<td>12. Fire extinguishers</td>
<td>11</td>
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<tr>
<td>13. Storage rooms and work rooms</td>
<td>8</td>
<td>4</td>
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<tr>
<td>14. Storage rooms (gases, flammable liquids and</td>
<td>10</td>
<td>4</td>
<td>13</td>
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<tr>
<td>dangerous chemicals)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15. Fire alarm systems</td>
<td>11</td>
<td>5</td>
<td>16</td>
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<tr>
<td>16. Sprinklers</td>
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<td>17. Heating plant rooms</td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>18. Incinerators</td>
<td>9</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>19. Ventilators</td>
<td>9</td>
<td>5</td>
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<tr>
<td>20. Hot water</td>
<td>9</td>
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<td>12</td>
</tr>
<tr>
<td>21. Gas</td>
<td>9</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>22. Electrical</td>
<td>9</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>23. Change of occupancy</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>24. Others</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

215 103 305 623

Item Eleven, Interior finish, received less attention from superintendents, only 61.1 percent marking it. Architects checked this item on 50.0 percent of the questionnaires completed.

Fire extinguishers, Item Twelve, was highly favored by superintendents,
**Table 9B. Recommendations for a State School Building Guide as indicated by architects of Iowa; frequency of response to safety factors and standards**

<table>
<thead>
<tr>
<th>Items</th>
<th>Architects</th>
<th>Replies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
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<tr>
<td>1. Application procedures</td>
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<td>21</td>
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<tr>
<td>2. Plans and specifications</td>
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<td>25</td>
</tr>
<tr>
<td>approval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Employment of registered architects and engineers</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>4. Inspections during construction</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>5. Plans for additions</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>6. Shops and industrial arts</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>7. Auditorium stage area protection</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>8. Corridors</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>9. Exits</td>
<td>24</td>
<td>24</td>
</tr>
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<td>10. Stairways</td>
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<td>11. Interior finish</td>
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<td>12. Fire extinguishers</td>
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<td>13. Storage rooms and work rooms</td>
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<tr>
<td>14. Storage rooms (gases, flammable liquids and dangerous chemicals)</td>
<td>20</td>
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<tr>
<td>15. Fire alarm systems</td>
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<tr>
<td>16. Sprinklers</td>
<td>18</td>
<td>18</td>
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<td>17. Heating plant rooms</td>
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</tr>
<tr>
<td>18. Incinerators</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>19. Ventilators</td>
<td>22</td>
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<tr>
<td>20. Hot water</td>
<td>19</td>
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<td>23. Change of occupancy</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>24. Others</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
88.8 percent checking it, while only 58.3 percent of the architects did so.

Storage rooms and work rooms received the attention of 63.8 percent of superintendents, 44.4 percent of the architects.

Storage rooms (gases, flammable liquids, and dangerous chemicals) Item Fourteen, was checked by 75.0 percent of the superintendents, 55.5 percent of the architects.

Fire alarm systems received heavy superintendent response, 88.8 percent and 69.4 percent response from architects.

Sprinklers received less attention, 80.5 percent from superintendents, 50.0 percent from architects.

Heating plant rooms, Item Seventeen, was favored by 77.7 percent of the superintendents, and 61.1 percent of the architects.

Incinerators, Item Eighteen, was checked by 77.7 percent of the superintendents, 55.5 percent of the architects.

Item Nineteen, Ventilators, was favored by 69.4 percent of the superintendents, 61.1 percent of the architects.

Hot Water, Item Twenty, received attention from 69.4 percent of the superintendents, 52.7 percent of the architects.

Gas, and Electrical, the following items, were checked by 77.7 percent of the superintendents, and, respectively, 61.1 and 58.3 percent of the architects.

Charge of occupancy was rated low, 27.7 percent of the superintendents and 36.1 percent of the architects responding.

The final item, Others, was commented on by 11.1 percent of superintendents, whose remarks included: Group I, "plan to meet the approval of the state fire marshall", and Group III, "locker rooms and shower rooms", "cafeteria equipment", and "exits". This item, Others, elicited response
from 51.6 percent of the participating architects, most of whom commented on the adequacy of existing codes and the desirability of avoidance of further codes and new standards. Employment of registered architects and engineers was referred to as a means of assuring adequate attention to safety. Finally, maintenance for safety was mentioned.

**Additional statements**

Question Ten on the questionnaire provided for any additional comments which the respondents felt would aid the development of the proposed guidelines.

From Group I superintendents came statements regarding: the necessity for a flexible guideline; the desirability of an architect with his own engineering staff; the need for a modernization guideline for older buildings; landscaping provisions; storm sewer extent; clarification of the term "responsible bidder"; understanding of the specifications on the part of the owner; and, finally, a desire for periodic guidelines compiled from pooled experience, rather than more state regulations.

Group II did not respond, other than a criticism of the questionnaire by one superintendent, who found it ambiguous.

From Group III came a statement regarding format, including the desirability of formulation of a logical step by step procedure, and a remark concerning insurance during construction.

Architects responded heavily to the question, most of their comments centering on the desirability of keeping the guideline on a general, rather than specific, level. The need for nonrestrictive flexibility was paramount. One architect suggested a categorical breakdown of the duties of those involved in the building program. Others stressed the necessity for adequate educational studies prior to building. The need for early employment of the architect, which does not result in increased cost to the client, was mentioned. The overall feeling of the architects centered on the need for flexibility to avoid stereotyped structures.
Additional statements of architects in response to Question 10

1. There should be more complete definition between the duties of school board, superintendent, citizens' advisory committee, architect, etc. May I suggest breaking them down by categories.

2. Guidelines only -- please.

3. Guideline not too restrictive - flexible enough to allow school board and architect design freedom.

4. Complete information on new educational equipment now and in future to be flexible for new equipment.

5. Stress that it does not cost a client any more to hire an architect at the earliest stages of a building program. If we can work with the school administration in the program stage and interpret their needs in the form of schematics, we could then set realistic budgets.

6. Emphasize the importance of educational program prepared by qualified persons with board approval and direction.

7. The key word is "guideline". No two projects are the same. Thus, what is valid for one may be completely unworkable in another situation. Further, physical space requirements are not, necessarily, valid from one project to another.

8. Have always felt that the architects should be selected within the state.

9. A building guide should direct the school administration and board until an architect has been selected. Too technical a guide becomes a code.

10. A complete survey of existing community or district school plants and educational programs with an item by item comparison to probably future enrollment and program goals.

11. Minimum sq. ft. requirements for special areas per student (Bus. Ed., Ind. Art, library, health services, Home Ec., etc.)

12. Don't overlook the value of local committees, architects and contractors for future maintenance problems and projected programs.

13. I believe costs should be kept in mind without impairing aesthetics, structure or size.

14. Guidelines should be as the work describes - a guide - not fixed state regulations.
15. I would contact Dr. Walter "Bud" Hart, education specification consultant at Iowa State University. He has copies of the specifications he developed for Jefferson County Colorado -- excellent.

16. Guidelines should be kept general - it is impossible for a guideline recommendation to fit all conditions or situations. Guidelines should serve more as a checklist to be certain that all important items are studied and considered. They should not serve to limit or discourage imaginative studies or solutions. This leads to a stereotype building.

17. If I understand the questionnaire, some of the information is included in various force codes and miscellaneous planning standards. It would be helpful to include all under one guide. However, continual updating would be required to be of continuing value.

Effectiveness of the school administrator in school planning

Question Eleven, to be answered by the architects only, asked in which areas of school planning they felt the school administration to be least and most effective.

In the area of least effectiveness, response centered on the lack of knowledge of architectural methods and needs, and the lack of ability to evaluate architectural solutions to problems encountered. Administrators were cited as too often being unable to provide detailed response in the area of design solutions. In some cases, inadequate educational specifications were mentioned. Cited was the administrator's desire to plan the building prior to the specs. The complexity of the process from inception through construction is too often not grasped by the administrator.

Response to the areas in which architects found administrators most effective pointed to administrative leadership qualities. The development and articulation of a program to be housed was felt to be a strong point, as was endorsing coordination among the involved groups. Architects found administrators willing to concede the need for expert consultant services.
Their background was found adequate to comprehend ramifications of physical plant development.

Architects' answers to Question 11

In which areas do you feel the school administrator is the least effective and the most effective in school planning?

Least effective:

1. Lack of knowledge of construction procedures and in ability to read blueprints properly.
2. In evaluating architectural solutions.
3. Communication of ideas.
4. Procedures in the selection of an architect.
5. This seems to be a matter of personality rather than position.
7. Preparation of adequate educational specifications.
8. Does not always apply, but should take the initiative in a building program since he is the one most closely related to the school and its problems.
9. Proposing detailed design solutions.
11. In sorting out the "wants" and the "needs" so that facilities can be designed from the outset, within the budget.
12. No two would have the same effectiveness - generally, most administrators do not have the background required to comprehend ramifications.
13. Trying to determine all minute phases of construction.
14. Being able to provide architect with well defined outline of needs (ed. spec.).

15. Technical

16. In giving specific plan for architectural space arrangement.

17. Some administrators who have not gone through a building program tend to underestimate the complexity of the project, and at times become impatient with their architect.

18. (both) If school administrator has time he should be involved with the program and orientation of teaching staff and the program.

19. Esthetics and architectural character and often in plan layout.

20. When he tries to play architect.


22. Construction and design of the school faculty or plant.

23. In planning ahead far enough to allow maximum time for preliminary planning studies and drawing completion. Too often a crash program.


25. In determination of structural system and materials used in construction.

26. Developing the educational program and needs.

27. Physical plant layout.

28. Most want to plan the building first, with little time spent on educational specs. This is like solving the problem without knowing what the problem is.

Most effective:

1. Educational programming.

2. Working with the board of education, planning committees, etc.

3. In determination of requirements, plan layout, circulation, facilities and present-future enrollments as well as budget determination.
4. Coordinating study groups and committees, dispersing and gathering information, administrating the program.

5. In articulating the educational system to be accommodated.

6. Providing the program (and hopefully ed. specs.) and the assistance of the teaching staff.

7. Setting up overall building requirement program and requirements in each individual department.

8. Being a positive, strong leader in directing the board to action.

9. Coordinating teaching aids with faculty and future requirements.

10. His most effective role is in the area of providing the educational program, and deciding whether the architectural program is complementary to it. He is also a great asset in helping the architect present new ideas to his board.

11. In giving general goals of program and specific suggestion of program development.

12. Having a well organized program to be present to the architect, and a member of the school staff to work with architect during project.


14. His ability to see the need for outside help (consultants, architects) to help define needs.

15. Developing a school building survey (or program).

16. Determining teaching methods and application of program and conveying internal organization as it affects structures.

17. All phases of school planning.

18. Background required to comprehend ramification of the physical plant development.

19. He is in a position to correlate the educational program with physical developments in educational facilities.


21. Administration of board policy and decisions. Recommend appropriate changes in educational program and administration. Assist the Board in judging detailed proposals and designs.
22. In programming, acting as coordinator between architect and school board.

23. Arranging for meetings between administrative and teaching staff with architect's staff during concept stage.

24. Develop program or requirements of new building.

25. School requirements and educational requirements.

26. Hires the architect/engineers.

27. In establishing a program.

Effectiveness of the architect in school planning

The final question dealt with in the questionnaire asked of superintendents those areas in which they found the school architect least and most effective.

From Group I, regarding the areas of least effectiveness, the consensus was failure to fully understand and interpret educational function and program.

The superintendents of Group I found architects most effective in the area of structural design and engineering. Mention was made of architectural attention to esthetics and modular design.

Group II reflected agreement with Group I in most cases, but also mentioned the need for more involvement of the architect in the development of educational plans, and the need for more supervision during construction.

Superintendents in Group III joined in the consensus mentioned above. In the area of least effectiveness, the need for consultants to the architect who understood educational needs was mentioned. Understanding of the needs of the modern school curriculum was cited as too often lacking,
particularly in the area of expansibility and flexibility, with interrelation of varied educational objectives.

Again, the most effective area was that of structural detail and design, with knowledge of materials, and compliance with codes and regulations.

Summary

This chapter has presented the response of forty architects and thirty-six city school superintendents, grouped by a size enrollment factor, to a questionnaire dealing with desired coverage in the proposed Iowa school building guide in regard to the following categories:

1. State and local relationships in school plant planning;
2. Planning for school facilities;
3. Organization of a building program;
4. School site;
5. The building;
6. Elements of the building;
7. Physical environment of the building;
8. Health factors and standards;
9. Safety factors and standards;
10. Additional statements;
11. Effectiveness of the school administrator in school planning; and
12. Effectiveness of the architect in school planning.

Response from both groups indicates awareness of need and desire for the guidelines, providing they retain the character of guidelines rather
than that of directives. An inclusive presentation designed to bring awareness of the procedures encountered in a building program from inception to completion to those involved in the building program is indicated as desirable by the majority of both superintendents and architects.

It is felt that the proposed guidelines, if periodically revised to encompass educational developments, will be of particular value to those school districts having relatively little experience with the planning and construction of new structures, and operating under budgets restrictive to the planning process.
CHAPTER V. STATE SCHOOL BUILDING GUIDELINES

Introduction

The following chapter is intended for use by the educators of Iowa as a suggested state guideline for the construction of school facilities. It is to be regarded as a general and adaptable guideline indicating the myriad aspects of the planning process rather than as a specific, concrete document supplanting the need for individual project planning, and as such seeks to promote a cooperative attitude and understanding between the educational and the architectural components of the building program directory body.

Chapter I. State and Community Function in School Plant Planning

While the state serves as a basic supervisory and regulatory agency for education, it is the community, functioning through an elected board of education, which retains responsibility for the planning and construction of the individual school plant. Through the Department of Public Instruction, the state assists local school officials during the planning process, concentrating on the area of advisory services regarding educational program development, survey planning and result interpretation, site rating, schoolhouse function, and recommendations regarding safety, sanitation, and lighting of school buildings. Such services are not intended to supplant those of the architect, who, with his client, assumes responsibility for planning in accordance with local needs, conditions, and educational programs. The primary purpose of the Department of Public Instruction is to facilitate compliance with law in coordination with educational excellence.

During the preliminary stage, the architect will obtain information regarding jurisdiction and secure confirmation of the approval of other concerned agencies and compliance with local codes and ordinances.
Plan approval

Upon satisfaction that the plans and specifications conform to high professional standards, clearly and accurately showing the intent of the architects and engineers, and provision to the board of education of complete, lucid information regarding all phases of construction, final plan approval is in order. Acceptance should always be contingent on satisfaction of these requirements. These plans should be developed to avoid any misinterpretation during the course of bid preparation and construction.

Specific requirements Final plans should meet certain specific requirements, including:

1. Separate drawings showing architectural, structural, and mechanical aspects.
2. Drawings should show complete interior finishes.
3. The specific use of each room should be indicated on floor plans or by a schedule.
4. Plans should include a typical classroom wall section at not less than 3/4" scale, depicting floors, sills, jambs, heads, ceilings, cornices, parapets, and copings, and indicating the true relationship of window heads to ceilings.
5. Stair details should be shown in scale.
6. Detail concerning a school well, if one is to be provided, should include location, depth, construction type, pump capacity, and pressure tank capacity.
7. Sewage disposal systems, if existing or to be provided, should be indicated in detail regarding location, liquid capacity, and design. Soil type, elevation of ground water table, and earth cover at the site of the final disposal unit should be given.
8. Materials and equipment not included in the contract should be specified to allow complete approval.

Addenda involving minor changes in original plans and specifications are subject to the approval of school authorities.

All construction must be under the supervision of qualified architects or engineers.

A review of the planning process

Several considerations must be taken into account in a logical school plant planning program. First, need should be determined and a long-term plan formulated. Next, architect selection and employment is necessary. The school staff should prepare educational specifications. Site selection should be made. At this stage the architect should prepare preliminary plans and outline specifications, which must be approved by the board of education and submitted to the State Fire Marshall. Upon his approval, working drawings and specifications can be prepared, again subject to final approval. Bids must then be advertised for and contracts awarded. Cost data should be recorded, as should change orders during construction. At the appropriate stages of readiness, the building should be inspected by the State Fire Marshall's representative. The steam and boiler installation must be approved by a licensed inspector. Finally, the architect should provide a final completion form. Another aspect to be considered is, of course, the financing program.
Chapter II. Planning for District School Facilities

The process of planning for school facilities involves defining and stating the characteristics desired of the educational program and the long-range plan for housing that program. Because public education is essentially accomplished through community endeavor, educational facilities should reflect the attitudes and aims of the community they serve. The objective considerations of planning for school facilities involve determination of who does the planning, and how they accomplished the provision of a long-range plan involving the entire school district.

The planning committee

Size of committee The planning committee is vital to any proposed school bond issue. Advisory committees vary in size, depending upon the size of the community, the nature of the building program, and the relationship which exists between the board of education, the school staff, and the local community. Too large a group may be unwieldy, but too small a group may not be representagive.

Selection of members The committee should be representative of the community as a whole, and should contain as many community leaders or "opinion formers" as possible. The best way to make sure that these two objectives are accomplished will vary from community to community.

Community assistance in the total planning process will, without a doubt, ensure a program determined by local needs. Widespread community participation results in a populace informed
regarding the purposes and objectives of the school program, enabling citizens to help achieve these aims and purposes. The advantages accrued through community involvement will also promote the success of publicity relating to the bond campaign. Not to be forgotten is the difficulty of true representation of all community interests by the board of education. Use of a planning committee extends the scope of representative function to a level acceptable within large communities.

Membership

Board of education Membership of the planning committee should, of course, include members of the board of education, serving in the capacity of resource people and observers, and acting to define the functions of the board, the superintendent, the educational consultant, the architect and all other concerned specialists.

Superintendent of schools The superintendent of schools, as the executor of board of education policy, should concern himself and his staff to the extent of awareness of the progress made by the advisory committee. Assistance in facilitating their work through provision of materials, meeting places and technical aid is of primary concern to him.

Citizens Because the well planned school is used in some capacity by almost all community members, citizens aid should be enlisted in establishing the outline of the kind of school system desired. Beyond this, the technical help of qualified citizens can be of great value.
Teachers Teachers who are involved in school planning are more able to make effective use of the resultant facilities.

Pupils Not to be overlooked is the effective use of the ideas and service potential of pupils. Their suggestions regarding facilities, and their assistance with publicity and data collection, can enhance the program and provide to them a very real experience in the process of democracy.

Custodians The custodial program for a new structure will function more smoothly if the maintenance staff is consulted during the planning stages. Their primary concern will be with the planning of a specific building rather than with long-term program development.

Educational consultant The employment of a school building consultant prior to the formation of a planning committee may prove invaluable in the organization and formulation of working procedures. The technical aspects of the planning process will require expert consultation to determine what facts are needed, how they may be obtained, and how they should be interpreted. Even in those cases where a school building consultant is not retained, expert help must be obtained as indicated by need. The Department of Public Instruction, state universities and colleges, and private firms can provide expert consultants.

Architect The architect should be selected and involved in the planning process as early as possible, enabling him to become completely familiar with the educational program prior to the development of plans and specifications.
Selection

Selection of the planning committee should take into account feasible group size and representation by community leaders. If the board of education is sufficiently able to identify representative community leaders and openly willing to include those leaders who may not be sympathetic to board ideas, direct appointment of the planning committee by the board is feasible, perhaps under the guidance of a steering committee. Community organization may be asked to select representatives, yet this involves the twofold danger of organization, rather than community representation, and lack of representation of all sections of the community. Sociological study of the community may serve as the ideal basis for selection, yet the expense and time consumption involved may be prohibitive.

Delegation of duties

Upon selection of the advisory committee, it must be organized into working groups under the coordination of a steering committee comprised of the chairmen of the various committees, the officers of the advisory committee, the superintendent of schools, and a representative of the board of education. This steering committee should coordinate subcommittee work, regulate publicity, and formulate, write, and present to the board of education recommendations based on the study group's findings. Those general areas to be covered by small study groups include: the community and its service area, the educational program, enrollment, school buildings and sites, and financial resources.
Function of the selected committee

To achieve its final objective, a written report for submission to the board of education, expressing the community's educational objectives and a means of achieving them, the advisory committee should enlist the professional services of the school staff, the board of education, and educational consultants.

The minimal areas in which study should be made are:

1. **The educational program**: community service, school size, class size, curriculum, methods, special services, non-class activities.

2. **Future enrollments**: district organization, private and parochial schools, grades - year forecast, present and probably future location of children by age groups, future site locations.

3. **Evaluation of existing school plants**: safety, adequacy, accessibility, economy, attractiveness.

4. **Financial resources**: cost of ideal program, cost of immediate program, state equalized valuation, bonded indebtedness, operation and maintenance costs, fixed charges, tax rates, current construction costs.

Group work

To facilitate group functioning, duties, responsibilities, and limitations should be made clear in writing at the time of committee appointment. Committee members should be informed regarding progress. Organizational detail should be handled by some one experienced in group work and a reasonable time schedule set.
Study of the educational program

The educational program to be housed must be thoroughly considered by the planning committee prior to the design of new facilities. This familiarization may entail re-evaluation of the program, with subsequent revision, providing a strong program to be housed in a building planned for many years of effective instruction. The educational program should provide guidelines for: community use of school facilities; site use including educational and constructional areas; school system organization; desirable school and class sizes; curriculum, teaching methods and their implications; and special services provided by the school.

Enrollment Estimation of future enrollments and the location of these pupils are among the most important factors in planning school facilities, since school structures will probably be in use for fifty years or more. Enrollment projections should take into account school district organization, community planning and private and parochial schools.

School system organization A comprehensive secondary program cannot be offered at reasonable cost by small districts. Strong efforts must be made toward consolidation of small districts to allow provision of facilities, equipment, and skilled instructors at the secondary level. The cooperation of community planning boards or commissions should be requested to coordinate the school building program with anticipated community growth patterns.
Enrollment projection  Following determination of the extent of the area involved, and consideration of population forecasts, statistical projections of future school enrollment should be made under the direction of a competent consultant. The technical aspects of this process are such that lay citizens should not attempt it, beyond gathering the basic required data.

Evaluation of existing school plants

Evaluation outline  To determine the adequacy of existing school plants, the advisory committee should undertake an evaluation of the following points regarding these possibly outmoded structures:

I. School plant safety
   A. Have fire safety and emergency egress been provided: Are exits adequate to prevent fire from trapping occupants?
   B. Is the school plant and surrounding area free from traffic hazards and conditions conducive to injury?
   C. Is the school located away from heavily traveled highways and railroads?
   D. Is the playground planned to avoid injury while entering or leaving?
   E. Are health requirements, sanitary conditions and ease of upkeep of these conditions provided?
F. Are light, heat and ventilation adequate? Is suitable plumbing provided?

G. Is the location of toilet and drinking fountain facilities convenient?

H. Does the building meet structural safety standards?

II. Does the school plant implement the desired educational program?
   A. Is classroom size suited to a variety of activities?
   B. Is noise transmission kept to an acceptable minimum?
   C. Does the building plan allow logical change or additions feasible to the architectural style of the building?
   D. Are necessary special rooms provided?
   E. Does the school site accommodate desired activities?

III. Is the school plant accessible?
   A. Does the building location meet board policy regarding accessibility?
   B. Is school bus riding time excessive?

IV. Is the school plant operation economical?
   A. Is the school plant location in proper relation to other schools?
   B. Is each school planned to minimize waste of facilities and space?
   C. Is school plant maintenance ease at an acceptable level?

V. Is the school plant attractive?
   A. Does it provide a comfortable atmosphere conducive to learning?
B. Is the decor attractive?
C. Is the architectural style simple and in keeping with the surrounding area?
D. Is the site landscape attractive and well maintained?

**Determination of financial resources**

Determination of the financial resources potentially available for implementation of the educational program within new structures must be made. Data must be gathered regarding community ability to support public education. The state equalized valuation of the district compared to sale value of property, the present indebtedness and limitations under which a financing program must operate, the availability of outside assistance, and the probable cost of the proposed building program must be known factors. The community's history of effort and support in the past to provide school construction funds should be reviewed in an effort to determine the reasonable limits for an increased tax load. The degree of effective, economical fund expenditure should be studied to determine how wisely the school budget is being administered.

**The long-range program**

Following study by the planning committee of the aforementioned areas, the culmination of their efforts will be reached in development of a long-range program for providing adequate school facilities. This program will describe the present educational program and outline the process by which the desired program may be achieved. It will describe present
facilities as well as a program for proposed structures. Finally, it will propose a program designed to finance new structures.

Chapter III. Planning of Specific School Facilities

The process of planning for school facilities involves defining and stating the characteristics desired of the specific school facilities.

Participants

Having achieved feasible plans for school facilities, the planning of a particular school plant designed to implement the educational program can commence. Participants may well include those who planned for the buildings - the planning committee, board of education members, the superintendent, citizens, teachers, consultants, and the architect. Teacher involvement should increase due to the necessity of close examination of activities to be conducted in the new structures.

Committee organization

Organization of the participants should be similar to that of the committee planning for buildings. Subcommittees will vary according to the type of structure being planned. Elementary school planning may involve subcommittees in the areas of kindergarten, lower elementary classrooms, upper elementary classrooms and special facilities. High school planning becomes more complex, but should be exercised to avoid pitting one department against another in an atmosphere of competition rather than cooperation. The total educational program of the child is at stake,
as are trends in education and the role of secondary education in the society of now and the future. A strong steering committee is of special importance in the resolution of these problems.

The planning committee must maintain an open flow of communication with the community during development of facility plans. Public invitation to open meetings and organization of a subcommittee dealing with information and publicity are recommended.

Objectives of the committee: educational specifications

The purpose of this planning committee is development of a complete set of educational specifications to be presented to the board of education for official adoption, and alternately to the architect for conversion into architectural specifications for a building desirable to the community.

Included within the educational specifications should be:

1. A statement of the school's philosophy and purposes.
2. A statement of the number and ages of children to be accommodated.
3. A statement regarding desirable class sizes for various subjects and areas.
4. A tentative school program.
5. A statement regarding projected enrollment or curriculum changes.
6. A list of rooms and spaces required.
7. A description of activities to be carried out within each room or space.
8. A list of equipment required for each room or space.
9. A description of necessary storage facilities in each room or space.
10. A statement examining desirable space relationships.
11. A statement describing possible community use of rooms and spaces.

Chapter IV. Conduct of the Building Program

Organization

The ultimate success of the building program depends not only on carefully determined educational needs, but on proper conduction of the actual program. Illustrative of recommended organization is the following chart (6, p. 28):

THE COMMUNITY

Local Agencies and ------ The School Board ------ State Authority
Lay Groups

Superintendent of Schools

Architect

Consultants

School Staff

Contractors

School Plant

Legend: ------ lines of responsibility

------ cooperative planning relationships
The architect

Qualifications of the architect Among the initial steps in the school building program is selection by the board of education of a fully competent professional architect. Review of professional qualifications and quality of past services are a most satisfactory basis for selection. In addition to legal qualification for practice in the State of Iowa, the architect should have successful experience, flexible imaginative ability to translate educational objectives into functional buildings, and an innovative nature. His ethical standards and willingness to cooperate with school authorities must be unquestioned. The architect should be abreast of recent developments in his field. He should make economical use of space and material. He should be competent in the field of site planning. He should assure adequate supervision of his projects and compliance with state and municipal building codes. He should maintain sound business practices and record keeping.

Selection procedure The superintendent of schools, as executive agent of the board, should usually secure information relative to architectural firms under consideration, and handle correspondence pertinent to architect selection.

The standard questionnaire developed and adopted by the National Council on Schoolhouse Construction and the American Institute of Architects, entitled "Standard Form of Questionnaire for Selection of Architects for School Building Projects", is recommended, and will serve the dual purposes of (1) a vehicle to be sent to architects in the area to inform them of proposed construction; and (2) serving as an initial screening
screening device to narrow the number of architectural firms under consideration. This standard form may be obtained from the American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C.

Firms highly rated following preliminary inquiries should be thoroughly investigated through visits to recently erected buildings, talking with former clients of the architects, and notation of points of excellence demonstrated in their work.

Final selection of the architect should be made following personal interviews of those included in the narrowed field. Adequate time should be allowed for the architect's presentation, with no more than two scheduled during the course of one evening.

A schedule of recommended charges provided by the Iowa Society of Architects will guide the determination of reasonable fees.

**Services of the architect** Thorough understanding and use of the architect's basic services are necessary, the basic phases of these services being:

I. Preparation of preliminary sketches
   
   A. Study and discussion of the educational program with the school staff.
   
   B. Assistance in site study in regard to soil structure, topography, space, and relation of abilities.
   
   C. Preparation of preliminary sketches, with brief outline specifications upon which tentative cost estimates may be based.
D. Securement of board of education approval of final preliminary sketches.
E. Securement of written approval of concerned reviewing agencies.

II. Preparation of working drawings and specifications
A. Preparation of complete working drawings and specifications, fully showing and describing the architectural, structural, mechanical, and electrical components in such detail as to enable cost estimation and completion of building by the contractors.
B. Holding frequent conferences with educational authorities to discuss plans regarding materials and restrictions imposed by state and local law.
C. Securing written approval of the board of education of the final working drawings and specifications.
D. Securing written approval of working drawings from all agencies having jurisdiction over school building plans.

III. Assistance during building procedures
A. Furnishing policy guidance to the board of education.
B. Distributing a sufficient number of sets of plans and specifications for bidding purposes.
C. Interpreting and clarifying plans during bidding.
D. Assisting in opening bids.
E. Tabulating bids.
F. Checking performance and financial records of contractors.

G. Providing the board of education with recommendations regarding the reliability of contractors.

IV. Assistance in the preparation of contract documents

1. Contracts should be prepared in quadruplicate; the board of education, the architect, the contractor, and the owner to receive copies. Included in these documents are:
   a. Final working drawings including addenda.
   b. Copy of contract proposal signed by the contractor.
   c. Properly completed contract form signed by the board of education and the contractor.
   d. Surety bonds executed by the contractor and the surety company.
   e. Certificates of required insurance provided by the contractor.

V. Supervision of construction

Prior to signing a contract with the architect, it is necessary to reach complete accord regarding the nature and extent of supervision to be provided by him. The architect will not guarantee the performance of construction contracts, and his supervision should be distinguished from the continuous superintendence obtained through employment of a "clerk-of-the-works".
Often, the "clerk-of-the-works" will function under the direction of the architect, though paid by the school board. All parties concerned with the construction of the new building should be informed regarding the authority and responsibility of the "clerk-of-the-works". He should be acceptable to the school board and the architect, who will engage him and include his salary in monthly statements presented by the architect to the owner.

Prior to construction, if federal grants are involved in the process, representatives of the federal agencies should be involved in all procedural understandings, with official signed records of this participation.

Necessary records will be achieved if the board of education and the architect arrange the following work:

A. Require the contractor to make the project layout, locate signs and sheds, obtain permits, provide protective devices, etc.

B. Require daily reports listing number of people employed by trades, job and weather conditions, accidents, visitors, and other pertinent information.

C. Conduct field tests and inspections.

D. Approve materials.

E. Approve sub-contractors.

F. Record dates of approval and distribution of shop drawings.

G. Prepare necessary supplemental drawings.

H. Maintain files concerning status of all insurance records, including those of sub-contractors.
I. Expedite construction if necessary.

J. Maintain a complete file during the duration of all construction contracts, including correspondence, changes in plans and specifications, change orders, and supplementary agreements with approvals.

K. Issue periodic certificates of payment to contractors and maintain an owner's account of all expenditures.

L. Determine that the true content of the plans and specifications is being met through constant checks.

M. Provide for the owner's file all guarantees, roof bonds, and copies of required tests, in proper order and conforming to specifications.

N. Supply complete "Record Drawings" for the permanent school official files.

O. Supply school officials with all documents pertaining to the operation and maintenance of the plant and its equipment.

P. Make final inspections and certify project approval for final payment.

Contractual arrangements

Standard forms have been developed by the American Institute of Architects for the purpose of contractual relations with the architect. These forms, when modified to suit local conditions, often prove most satisfactory. No professional services should be requested prior to reaching definite contractual agreement.

Records

Complete and accurate minutes of all conferences between school officials and the architects serve as protection to both parties, and will serve to prevent both misunderstanding and extra costs.
Selection of the contractor

Following the acceptance and necessary approval of working drawings and specifications, the board of education should turn to the advertisement for bids, under the guidance of the school attorney and the architect. The board of education must accept the lowest competent bid. The board of education should allow time for thorough investigation of contractors under consideration prior to the awarding of contracts. Usually the architect will carry out this investigation and recommend to the board those contractors most suitable.

Educational consultants

While the final determination of educational needs remains a function of the local school district, a variety of consulting services are available to provide experienced assistance in the development of the school plant, and consideration of the employment of their services is warranted. Sources vary from the Department of Public Instruction to universities, colleges, and private firms. Occasionally, the architectural firm will provide this service. The assistance to be sought will vary widely depending on the district size and the experience and staff of the district. Most frequently, assistance is sought to:

1. Determine immediate and long term school plant needs.
2. Determine logical district reorganization.
3. Estimate future enrollments.
4. Select the architect through clarifying efficient means of interviewing, evaluating, and selection.
5. Select sites.
6. Determine the feasibility of modernizing or abandoning existing school plants.

7. Develop educational specifications.

8. Prepare tentative construction budget.

9. Interpret the proposed program to the community.

10. Consult with staff and architect during preparation of preliminary plans.

11. Develop and arrange technical spaces within the proposed structure.

12. Review working plans with suggestions for improvement.

13. Develop efficient methods for selection of furniture and equipment.

14. Develop procedures whereby the staff will be instructed in efficient utilization of the new facilities.

Coordination of the planning process

All aspects of the planning process should be coordinated through the superintendent of schools. He should utilize the available advisory resources while retaining the legal responsibilities of the school board and his own executive function.

The budget

The detailed budget to be prepared prior to presentation of a financial program for school construction should include:

1. Contractual costs - a reliable estimate prepared by the architect.

2. Fees - architectural, engineering, legal, and consultant fees.
3. Contingency fund - an amount to be advised by the architect to cover possible increases in contractual costs.

4. Site development - this is integral to plant planning and can be estimated by the architect.

5. Equipment - that movable equipment not included in basic construction contracts, such as furniture and books. This tabulation is essentially the responsibility of the program developer and should be presented in a set of equipment specifications.

**Financing program**

**Long range planning** Capital outlay budgeting is imperative, due to the long-term continuation of school construction programs. The type of program to be developed will be dependent on such factors as size of the immediate project, the anticipated future program, available financial resources, and local history in respect to financing programs. Competent assistance must be sought to determine the course of action most applicable to local conditions. The district should provide a reasonable balance among cost items and establish priorities when developing the capital outlay budget.

Preliminary expenses will include survey costs, educational and legal fees, preliminary architectural and engineering fees, election and advertising expenses, and bond sale expenses. Site purchase and development costs must be considered. Construction involves architectural, mechanical, and electrical contracts, supervision, risk or construction insurance, contract advertising, and incidental costs. The cost of furnishing the building upon completion, public relations, contingencies,
and incidentals are all essential to the planning of an adequate long-range budget.

**Methods** Bond issuance provides large sums of money immediately to cover necessary construction while extending payment over the useful lifetime of the building. Those people who use the buildings pay their share of construction costs.

Chapter V. The School Site

**Site selection**

Because site selection involves technical problems, the cooperative efforts of the school officials, the architect, the landscape architect, the recreational consultant, and the legal consultant should be enlisted. Consideration must be given to the extensiveness of land and building use, the type of school required, the ultimate number of prospective students, the attendance area to be served, and population trends. The site should be feasible from both architectural and engineering standpoints. Legal implications of site acquisition and cost are to be reviewed. The relationship of the site to community facilities, hazards, and public services must be reasonable.

**Site size**

Modern concepts regarding the use of the school site dictate increased size and utilization, both educational and recreational. Community involvement and adult recreational needs must be considered prior to site determination. Initial acquisition of all land necessary to fulfill ultimate utilization needs is suggested. Economy dictates the pur-
chase of adequate site facilities to handle future demands.

The physical site

The physical properties of the site should be considered, any alteration of natural features taking into account the action of natural forces. A professional landscape architect or site planner can determine the most desirable final conditions to be achieved. This plan should be made in conjunction with building plans. A slightly convex surface, with grounds sloping to the periphery, where drainage is provided, is preferable. Site development must consider recycling of ground water to maintain a proper water table balance; a site elevated above the surrounding water table will permit drainage and installation of an adequate septic tank drain field where necessary.

Soil conditions should be such that good drainage and a suitable base for strong foundations for the building are provided, sandy loam being preferable. Test borings must be made to determine subsoil conditions. Site surface beyond the building, with the exception of surfaced areas, should be covered with grass or low maintenance plantings.

Development of the physical site

Three fundamental principles govern the development of school grounds: service function, physical activities function, and instructional function, each being integral to excellence in planning. A preliminary ground plan depicting in scale the location and orientation of the building, walks, drives, service areas, and recreational and instructional areas should be furnished. This, in turn, is developed into workable construction drawings and micro-climate control plans to be implemented through plantings. Plantings will
also enhance the scale of surrounding areas to the building. They provide screening and integrated instructional and recreational areas. The landscape architect should develop specifications and estimates insuring quality of development by contractors and allowing uniform bids.

**Development of grounds for activities**

School playgrounds planned in cooperation with public agencies will result in utilization of all community facilities in a supplemental recreational program.

Activity areas for a wide range of ages and activities should be planned. The natural landscape of the site may prove invaluable and should not be altered until consideration of its potential is made.

Those activities requiring constant supervision should surround a central control point, while more free activities can be further away. Young children will require a separate shady area with a level open space and some paved area. Spectator sports should be conducted near parking areas. Rest benches will be needed by some children during recess periods.

**Multiple use**

Multiple use of the play areas can be achieved through careful scheduling and seasonal changes. In no case should the inter-scholastic athletic program be allowed to supercede recreation for all in site space utilization.

**The outdoor lab**

Advances in teaching methods have brought about increased recognition of the school site as an outdoor laboratory. Consideration should be given to the development of:

1. A biological garden containing native flowers.
2. A bay area, or pond, for marine life.
3. An outdoor stage for music and drama.

4. An outdoor science and math testing ground.

**Orientation for safety**

The orientation of equipment areas of the site should provide natural separations conducive to safety. Fencing may be necessary to provide maximum safety on playfields. Apparatus must not lie within foot traffic lanes. All motor traffic should avoid foot traffic to the greatest extent possible.

**Play area surfacing**

Hard surfacing of a portion of the school grounds will be necessary in most cases, with proper drainage of these areas for maximum usage. Play apparatus should not be placed on surfaced areas, torpedo sand being preferable under equipment.

**The service area**

Service areas, including walks, drives, and parking space, should be easily accessible from entrance points to the school grounds. Careful consideration will lead to effective and safe traffic regulation. Curves are preferable to angles to accommodate directional changes in sidewalks. Drives should be as direct as feasible to solve the problems of traffic accommodation and accessibility. Service areas of the building should be located near side street entrances to facilitate ease of service without loss of site space.

**The parking area**

Parking space must be provided for three groups. First, teachers, school employees, and students who drive will need a well-drained, shady area, of 10x30 feet per car, with gravel or blacktop surfacing. Next, school visitors such as parents and salesmen should be provided a convenient area marked by signs. Finally, large spectator group parking should be available. This may be in a hard surfaced area.
normally used for play. Adequate lighting provision should be planned for all parking areas.

**Bus loading** A separate bus loading and service drive, located to minimize interference with private car traffic, is desirable.

**Acquiring the site**

Site acquisition may be accomplished by purchase. Avoidance of time-consuming condemnation proceedings caused by price increases in property known to be under consideration for purchase as a school site may be accomplished through setting forth specifications for a school site and asking property owners in a given area to submit offers to sell at stated prices. Land acquisition represents an investment as well as an expense and selection of sites substantially greater than immediately needed is recommended.

**Chapter VI. The School Building**

Recent thought regarding school buildings has resulted in simple, attractive, and functional structures designed to accommodate new methods of teaching and implementing new materials and construction methods. Each new structure must be designed to meet the particular needs of the area it will serve.

**Implementation of educational program**

Fundamental to school building design is the educational program to be housed, for the ideal school building is a usable tool designed to further educational progress. The architect must be provided with well
considered educational specifications, including desires and anticipated problems, if he is to design a building considerate of these implications.

Architectural implications

The architectural character of the modern school is open, informal, and natural. Excellence of structural technique, emphasizing variation of mass, shape, texture, and color has replaced ornate decoration. The lowered initial material cost and maintenance expenses have produced economic benefits.

One-story plan  While plan types are so varied according to individual circumstances that no one plan can be generally recommended, one-story construction does merit attention. It allows the use of:
(1) lighter framing materials; (2) safety with ease of egress; (3) reduced congestion and stairway accidents; (4) stairway construction cost elimination; (5) increased freedom of floor plan arrangements; (6) better natural lighting and ventilation; (7) and more accessible service areas, with ease of moving equipment within the building.

Relationships of areas

Effective functioning of the school program is dependent upon care in placement of various activities. Related activities should be in close physical proximity. Disturbing noises and odors must be kept outside the range of special study areas. Grouping of activities in subject matter areas in close physical proximity permits mutual reinforcement.
Community use

Those areas available for advantageous community use should be planned for functional ease independent of the remainder of the building. Not only large groups, which will commonly make use of the auditorium, gymnasium, cafeteria, library, multi-purpose rooms, and recreational fields, but small adult education groups must be considered. Convenient, direct outside access is important. Heating, telephone, and toilet provisions should be included in the area designed for community use. Convenient, adequate parking facilities, close to the auditorium and gymnasium, should be available. Outside drinking fountains should serve after hours playground use. Those rooms housing popular activities, such as the shop, home economics area, commercial unit, music unit, art unit, and science laboratories, should have convenient access and be grouped to allow ease of supervision. Storage spaces for adult use must be considered.

Circulation facilities

Circulation within a school requires careful design reflecting the nature of the program housed. Self-contained elementary schools have relatively even traffic distribution, while high schools must accommodate a series of peak loads of two-directional traffic. Bottlenecks must be avoided at all costs. Areas involving heavy traffic, such as the auditorium, gymnasium and cafeteria, require at least two non-convergent traffic routes.
Planning for expansion

Many new structures must be designed to allow for future expansion. A detailed long-range plan will be necessary in these cases, with consideration given the following points:

1. Initial heating units must be planned to accommodate future expansion.
2. Access to heating lines, water lines, electric service, clocks and the public address system should be provided.
3. Corridor extension to outside walls where addition is planned is desirable.
4. Placement of essential windows in walls to which units may be added is to be avoided.
5. Administrative and service rooms should be planned to serve the projected maximum capacity of the building.
6. Flexibility within the building is desirable. Plans should allow for library expansion, increased science facilities and other changes. The necessary mechanical facilities for future conversion should be included in the initial plans.

Interior flexibility

Flexibility should extend within the classroom itself. Change in the educational program should be reflected by the possibility of rearrangement of the classroom to enhance each program. Insofar as possible, movable equipment should be selected. Large and small group instruction areas are necessary.
Non-bearing or movable partitions should be incorporated where feasible. Only outside or corridor walls should contain ducts, pipe lines, and conduits. Fenestration design should allow partition relocation. Grouping of inflexible elements, such as toilet rooms and stair wells, will permit maximum uninterrupted room space allocation.

**Interior finishes**

A wide variety of finish materials designed for ease of upkeep is available. Walls should be light and attractive, with non-bridging paint to retain acoustical properties of materials used. Acoustic block and prefinished panels may be considered. Exposed brick is often used in lobbies, shops, and gymnasiums. Hard, smooth, impervious surfaces are necessary in toilet, shower, and locker rooms.

Soft wood paneling, light in color, or decorative fabrics may be considered, provided they conform to fire safety standards.

Regardless of material, ceilings should be flat white. Sound absorption is an important factor, though this may be accomplished by other means.

Floor coverings must be able to take heavy wear. Their surfaces should be smooth and dust-resistant, as well as resilient and quiet. Non-absorptive surfaces are necessary in toilet, shower, and locker rooms.

Due to the necessity of maintaining desirable brightness ratios, no color darker than natural finish maple should be used. Contrasting patterns and bases should not be allowed.

The use of carpeting has become widespread since the development of dirt and wear resistant fabrics.
Construction

The architect will assume responsibility for recommending the type of construction and materials most suitable to the project at hand. He is informed concerning new developments and the suitability of their use in a given situation. Furthermore, he will see that the method and materials used conform to state restrictions and codes.

Chapter VII. Elements of the Building

Basic principles

A well designed school will successfully interpret educational specifications into a design of interrelated areas which function to accomplish the educational requirements of the program. Each component area depends upon the initial program objectives.

Considerations to be included in layout development include:

1. Room grouping based on the activities to be carried on and circulation among rooms.
2. Flexibility and expansibility of individual units and the entire building.
3. Multiple use of space.
4. Individual space unit size, capacity, and layout.

Incorporation of flexibility and expansibility

A modular framework, with non-bearing walls, and the maximum elimination of fixed mechanical and electrical equipment in walls will provide maximum flexibility and expansibility.
Multiple use of units

Because maximum utilization of all building units is desirable in terms of economy of construction, maintenance, and operation, some units may be involved in multiple use. If activities scheduled for a given area are compatible, multiple use may be justified despite the fact that the ideal school would have units designed exclusively for such activity.

Unit planning

Unit size is determined by the educational program and should be such that the unit functions for those purposes for which it was designed, without useless space. The cooperative efforts of the local staff, school authorities, consultants, and architects should result in specific rooms or units designed to accommodate the particular area situation.

The elementary school

The elementary school has increasingly been using team teaching, self-contained lower elementary level classrooms, and the ungraded program, all of which have design implications. Solutions include: the cluster design of classrooms around a central activities core; folding partitions to provide large instructional areas; and small conference rooms for small groups or individual study.

The self-contained room

The self-contained elementary classroom incorporates the essential facilities for the school program of a given group. Activity space, work space, library space, an area for arts and crafts, a nature study area, a music area, and sufficient storage are all
provided within one room. The idea requires fewer classrooms of larger size with great flexibility. Generally, these rooms are square and they may include a pupil toilet, drinking fountain, and work sink. Direct access to a sheltered play area is recommended.

The kindergarten room The kindergarten room employs many of the characteristics of the self-contained classrooms with the additional requirement of an isolated location and a separate play yard.

The central instructional materials area Because the modern elementary school program requires diverse learning materials, a central instructional materials center is necessary. Included in this area are well organized reference and recreational books and other library materials, multi-dimensional models, a community resource file, films, recordings, slides, charts, maps, and programmed teaching machine material.

Provision for the handicapped Consideration should be given to accommodations for the handicapped student. While normal conditions and group interaction should be emphasized whenever possible, certain special facilities will be needed.

Special services Special services require conference office space in each building, as well as central office space. The necessary rooms are:

1. Central office space. The special services personnel should be accommodated in a suite with provision for secretarial service. Private offices are preferable to accommodate interviews. Because this service is for pupils and their families, the suite should be located apart from the administrative offices.
2. Consultation space. All school buildings should include a small conference room, appropriately furnished for the age group served. This room will serve the school psychologist, visiting teachers, the speech teacher, and other itinerate personnel.

3. Clinic room. An area should be provided for the conduction of some health examinations, and for isolation of pupils who become ill during the day. A separate waiting room should be provided. The clinic office should be pleasant in appearance, finished and furnished in easily cleaned material. Furnishings should include a toilet, a foot-operated lavatory, record files, a supply and instrument cabinet, and a cot.

4. Service personnel space. A headquarters in the building will be necessary for visiting teachers, the speech correctionist, the counselors, and others.

Multi-purpose room. The elementary school often makes use of the multi-purpose room for play, physical education, auditorium, lunch room, and meeting room. This room should be a ground floor level and accessible from the main entrance and playground areas, but somewhat isolated from classroom areas. Storage and shelving space should be provided. Good acoustic qualities, sufficient electric outlets and a maximum of wall space should be provided.

Administration. Administrative space needs will vary according to the size and nature of the school and its administrative process. The administrative suite should always be conveniently accessible to the main
entrance and easily recognizable. A friendly, informal atmosphere is desirable.

The secondary school

The recent emergence of significant trends has been felt in building implications at the secondary level. Departmentalization is giving way to the integration of courses and large blocks of related subject areas at the junior high level, and individual pupil advancement is now stressed at the senior high level. A wide variance of instructional group size is evident, with recorded and projected teaching materials in great use. A large teaching area incorporating subdivision possibilities is desired to accommodate these and future changes in program adaptations.

Instructional materials center

The instructional materials center in the secondary school encompasses far more than the traditional library services. Programmed learning materials, transmitting media, recordings, and community resource files have been added to the books, periodicals and charts found in the past. The adequate utilization of this variety of materials demands a suite of suitable rooms including reading rooms, study carrels, offices, a library classroom, listening and preview rooms, and work areas. The extent of this suite is, of course, dependent upon the size of the school. Accommodation of community use will involve attention to access and zoned heating.

The reading room should have adjustable shelving, a lounge area, varied seating arrangements, and a light, quiet atmosphere.

Reference to the American Library Association's Standards for School Library Programs, 1960, will implement an adequate instructional materials
program.

**Art unit** Art studio rooms are desirable in junior and senior high schools. They should be convenient to related areas such as homemaking and industrial arts. Natural, even light, preferably from the north, is desirable. Adaptable facilities are needed to provide a wide range of activities, with provision of an adjacent supply room. Equipment to be considered includes: art tables, work counters and sinks, easels, pottery equipment, tack and peg board areas, and multiple electric outlets. Storage for a wide variety of objects must be accomplished.

**Science unit** The ideal lab is designed to accommodate a single science, yet economy dictates combination in many small schools. Efficient combinations include general science-chemistry and physics-mathematics. The biology enrollment will usually justify a separate laboratory. Physics-chemistry combination is to be avoided due to the chemical action of certain vapors on equipment. A single, all-purpose laboratory should include:

1. A general science laboratory area equipped with a demonstration desk and supply cabinet. Movable student work tables and projection provisions are necessary. A large tackboard display area is required.

2. A physics laboratory with work stations equipped with sinks, gas, and AC-DC current. A demonstration desk and projection materials will be needed.

3. A biology laboratory, to be developed separately, with general
source equipment, growing areas, aquarium, and terrarium.

4. A chemistry laboratory with equipment similar to that provided for physics. Ventilation and fume control are important.

5. A general work and storage room, serving the several sciences.

6. A darkroom, equipped for demonstration purposes.

7. A greenhouse, complementary to the biology and general science unit.

The music suite The music suite should provide separate accommodations for choral and instrumental instruction. Accessibility to the auditorium and sound isolation will be important considerations.

The language unit A language unit, with well designed language laboratory devices such as a teacher's console and sufficient individual listening-recording booths should be available.

Business education The business education area should be designed to provide instruction in secretarial skills, office machine operation and possibly data processing.

Home economics A highly adaptable area is necessary to the learnings provided in the home economics unit. Inclusion of an all purpose area, a teaching center, and a home living center should be planned. Food and nutrition, clothing and textiles, child development, family health, and home furnishing are also areas to be explored. The necessity of adequate storage to accommodate this variety of activities cannot be overemphasized.

Vocational agriculture Vocational agriculture may be part of the curriculum. If so, the unit should be on the ground floor, in proximity to farm classroom and mechanics areas. Large overhead doors must be
provided due to equipment size. Horticulture may be included in this program, which will involve a greenhouse and possibly a land laboratory.

**Industrial education**

The excellence of industrial education facilities is dependent upon the flexibility of space, equipment, and services. The avoidance of future restrictions depends on wise initial planning. Industrial type construction, with a separate building if possible, is preferable. Access to the service drive should be planned. Careful observance of safety regulations must be maintained. A square or rectangular shape is preferred, with space of 45 to 125 square feet per pupil dependent on the extent of machinery provided. Traffic patterns, ventilation, and flooring material suited to the area activity must be well planned. A planning area apart from the shop is recommended.

**The auditorium**

This area should be primarily instructional space, on the ground floor, and accessible from both the outside and the classrooms. The audience space should provide six to seven square feet per person. Seating capacity will be determined by estimated pupil enrollment projections and the extent of community use, but in no case should it be too large for effective use by pupils. The floor should slope gently, with fixed seats. Folding walls can be used to subdivide an appropriately planned auditorium.

The stage should be accessible on both sides from corridors or adjacent rooms. A twenty-five foot depth, and proscenium width of at least 24 feet is desirable. Storage and workroom accommodations should be provided, either in an adjoining room or by extension of a stage wing.
Gymnasium unit  It must be remembered that physical education is the primary purpose of this unit. Recreation and interscholastic activities should not adversely affect this primary function.

The gymnasium should include space for the activity program with additional spectator space. The avoidance of glare is important. Resilient floors which are not slippery, rounded corners, and impervious, non-abrasive walls are needed. Traffic should be planned to avoid crossing the playing area to reach folding bleachers, which should be at least six feet from the court sidelines. Small adjacent rooms for small group instruction are desirable.

Locker and shower space should accommodate an entire class simultaneously. Wire mesh baskets solve the problem of locker space and allow ventilation. Raised lockers allow ease of cleaning, and avoid contact with wet floors. Moisture resistant materials should be employed in construction, as should non-slip floors. Direct outside exhaust vents should be provided, with a filtered, tempered fresh-air supply.

The physical director will require office space adjacent to the gymnasium unit.

Swimming pool If a swimming pool is provided, it should be basically for instruction and community recreation, rather than competition. It should be designed in accord with State Health Department Standards. Location within the gymnasium complex and noise isolation must be considered.

Lunchroom unit A dual purpose can be accomplished here: preparation and serving of food, and instruction. The educators and the food service employees should be asked, early in the program, their opinions concerning the arrangement of the lunchroom unit. The most common unit is the
individual unit in which food is prepared and served for the personnel of one building. A receiving area, storage, a kitchen area, a serving area, and a dining area are the components of this unit. A central unit may be used, in which lunches are prepared for delivery to other buildings. The satellite unit receives food from the central unit, stores it, and serves it. A combination unit combines the work of individual and central units.

Administration
Secondary schools require large offices with waiting space. The general office space should house desks and office equipment for daily activities, while the private administrative offices will be located off this area.

Non-instructional areas and equipment

Special service units:

1. Guidance facilities depend on the extent of services provided. A suite, apart from the administrative suite, should provide a reception room, and small testing and counseling rooms.

2. The health unit should be similar to that of the elementary school, with consideration given the health education program.

3. Committee and conference rooms are necessary and must be convenient to the center of activity of the groups who will utilize them.

4. A teacher work room-lounge, with a restful atmosphere and comfortable furnishings, is essential.
5. Wardrobes or student lockers are necessary. Recessed lockers along corridor walls have been generally used, yet locker alcoves or a central clothes storage area may prove more conducive to noise and congestion reduction. In non-departmentalized elementary schools, storage may be provided in connection with classrooms. In any case, ventilation is imperative.

6. Chalkboards and tack boards must be considered. The tendency is to move away from extensive use of chalkboards, with increased use of tack board. Window walls are not suitable for chalkboard. Tack board should cover all lower wall areas not devoted to other useful equipment, with a minimum of 100 square feet available in each classroom. A light color, complementary to the room decor, is preferable.

Furniture and equipment

The nature of the room will be determined to a large extent by its furnishings. Flexibility is the key to successful planning, and staff involvement in the planning will greatly contribute to its success. Furniture and equipment should be sturdy and safe, of quality materials. It should have a light, non-glossy, easily cleaned finish, it should be movable, it should be designed for the age groups and activities using it, and it should provide variety.

Circulation and service areas

Corridors Corridors providing an evacuation route must comply with safety regulations regarding width, construction, and use. Provision
of natural light in all corridors enhances safety and esthetic values.
Corridor installation should be recessed to avoid obstruction.

Safety dictates separate egress from all occupied areas, yet installation and maintenance costs often require the use of corridor exits. Doors should have bar hardware, located at a height easily operable by the children enrolled in the school, and must open in the direction of egress and be non-lockable from the interior. Consideration of handicapped children demands provision of at least one ramp entrance.

**Stairways**  If stairways are used in a building, they should have direct outside egress rather than convergence into a common vestibule. Ramps, rather than risers, are recommended to accommodate site grade changes.

**Storage**  A centralized storage facility for use by teacher and service personnel must be maintained. Within large administrative units, a "central stores" area for district distribution may be a feasible solution to this problem.

Chapter VIII. Physical Environment of the Building

A physically comfortable environment conducive to the learning process, featuring a balanced relationship among the three principal aspects of this environment, visual, auditory, and thermal, must be achieved in the integral process of school planning.

**Visual environment**

Visual environment must provide for critical seeing or seeing involving focus on a visual task rather than the relaxed vision involved in
large area viewing. Energy is consumed by critical seeing and poor visual conditions will cause undue energy expenditure. Terms relevant to the understanding of visual environment include:

1. The visual task - the object upon which vision is focused at a given time; for example, reading, writing and manipulation of tools or apparatus.

2. Intensity and brightness. Intensity is the amount of light on an object, measured in foot candles. Brightness is the emitted or reflected light from a surface. Control of brightness is the key to good visual environment and measurement-equipment is available.

3. Vision principles. A visual task must have maximum brightness or contrast; use of greater contrast enables reduction of illumination intensity. As brightness differences in the area surrounding the task are reduced, visual comfort and efficiency are increased. Uniform brightness, however, is psychologically intolerable.

4. Brightness principles. Development of principles for providing good visual environment has been made by the National Council on Schoolhouse Construction, The American Institute of Architects, and others. Basically, the lighting system should contribute to an esthetically pleasing environment. Optimal conditions provide brightness equal to or exceeding the entire visual environment, but excessive differences are to be avoided. Best results with a 30 footcandle level of illumination are
achieved if the highest surface brightness in the visual field does not exceed 10 times the task brightness. Immediately adjacent surfaces should have lower brightness levels than surfaces remote to the task. Direct and reflected glares should be minimized, and coordination of daylight with artificial illumination maintained. Brightness control involves increase of low brightness areas and decrease of high brightness areas.

Flat paint of a light color with a minimum of 60% reflection value should be used in classrooms. Desk and equipment finishes should have a 30-40% reflective value, as should floors. Light maple, carpet, or tile in a solid color will prove satisfactory. Warm or cool colors should be used according to the effect desired and the sunlight available.

Fluorescent and incandescent artificial lighting will satisfy the acceptable brightness limitations if properly designed.

**Auditory environment**

Sound control involves prevention of sound transmission between separate building areas and the provision of auditory comfort within a given area.

School location away from noise sources will eliminate much undesirable sound transmission from outside the building. Within the building, use of acoustical construction materials and careful layout of sound producing activities can accomplish the prevention of undesirable sound
transmission. Carpets and sound-absorbent curtains are helpful. A qualified sound engineer can control echo reverberation to meet auditory comfort standards.

**Thermal environment**

Temperature and ventilation control are necessary to the physical and mental comfort of school building occupants. The most common present heating units are of the gas or oil forced hot water or low pressure steam installation types. Unit ventilators passing over heated radiation lines are the most common heat distribution units.

The temperature range within a classroom should not deviate more than four degrees. The temperature should be maintained between 68 and 72°F. Communication corridors need not be heated to this level. High activity areas such as gymnasiums and shops may require temperatures lower than 72°F.

A minimum of two and one-half cubic feet of fresh air per minute per occupant should be maintained. Forced ventilation is preferable to dependence on operable windows.

**Health considerations**

**Regulations** School health factors and standards must, of course, comply with state and local regulations, and approval of this element of building plans must be obtained prior to construction. Such aspects as water supply, food handling, and sanitary facilities are covered in this approval, as are some types of construction such as industrial type shop facilities.
Water supply If possible, the municipal water supply should be used. If not, state regulations must be adhered to.

Sewage disposal Municipal sewer connections should be used for disposal if available. Again, regulations must be followed for any other sewage disposal facilities. Soil tests must be conducted at the proposed sites if disposal systems must be designed. Not all soil has absorption characteristics necessary to handle school sewage systems.

Chapter IX. Fire Safety Regulations for Iowa Schools

This chapter will deal with a summation of the fire safety regulations for schools in the state of Iowa as presented in the official Department of Public Safety publication (30). School districts should refer to the various state and local codes prior to the construction of new school facilities.

General requirements

1. Every structure designed for school occupancy shall be provided with exits permitting prompt escape of occupants in case of fire or other emergency. Secondary safeguards must be provided for safety in case of failure of the primary safeguard due to human or mechanical ineffectiveness.

2. The construction, arrangement, equipment, maintenance, and operation of every building or structure must be such as to avoid undue danger to occupants from fire, smoke, fumes, or the panic accompanying danger for the period of time reasonably necessary for escape of the occupants during emergency situations.
3. The type, number, location, and capacity of exits shall be appropriate to the structure or building, with regard to the character of occupancy, number of occupants, available fire protection, and the height and type of construction of the building or structure, to allow convenient escape facilities for the occupants.

4. Specified fire escapes shall be designed and installed in accordance with Chapter 103, Code of Iowa, and the fire escape regulations presented in the Iowa Departmental Rules.

5. Changes and alterations in school buildings, new or existing, shall conform with the applicable provisions of these regulations.

6. In those school buildings of two or more classrooms without a principal or superintendent on duty, school officials shall appoint a teacher to supervise school fire drills and take charge in event of fire or other emergency.

7. Compliance with these regulations does not eliminate the necessity for other provisions for fire safety of building occupants under normal occupancy conditions, nor do these regulations require or permit potentially hazardous conditions under normal occupancy conditions.

8. Specific requirements of these regulations may be waived by the State Fire Marshall in existing multi-story buildings where substantial compliance with these regulations exist. These
waivers take into consideration the age of regular occupants, the use to which the building is put, the potential hazard of noncompliance, building design and difficulty of fire safety device installation, excessive cost of full compliance, and availability of funds for compliance.
Chapter X. A Summation of Items to Be Considered in a School Construction Program

1. Clarification of state and local relationships:

Prior to planning specific school facilities, applicable state and local codes and ordinances should be reviewed. Personnel involved in the building program should be made aware of areas requiring the approval of various agencies.

2. School facility planning:

An initial step in planning for specific facilities is selection and organization of a planning committee.

3. Consideration of the educational consultant:

It is recommended that the services of an expert educational consultant be engaged during the earliest possible stages of the planning process.

4. The school building survey:

Planning new facilities requires:

A. Development of a comprehensive educational program.
B. Estimation of future enrollments.
C. Evaluation of existing school plants.
D. Determination of the community's financial resources.
E. Development of a long range plan encompassing at least one decade.

5. Preparation of educational specifications:
Educational specification development encompasses the problems of who should participate, organization for planning, and assignment of specific responsibilities. The specifications serve to guide the architect in designing the structure, and should provide to him complete information regarding the different elements of the building, allowing design of a building able to meet all of the needs which will confront it.

6. Selection of the architect:
Development of procedural practices to be followed in architect selection is necessary, as is understanding of the services he may be expected to render. Contractual arrangements providing clear delegation of duties should be made upon selection. Early involvement of the architect is beneficial to the program.

7. School site selection:
Selection procedures should be adopted, and legal steps taken to obtain site purchase funds. Consideration must be made of size, physical properties, development, and use prior to site acquisition.

8. Consideration of the building:
The educational program to be housed, the architectural character to be developed; and the plan type desired must be studied. Elements to be considered include:
A. Expansibility and flexibility;
B. Construction type and finish materials;
C. Elements of the building, instructional and non-instructional;
D. Equipment;
E. Circulation;
F. Service units;
G. Physical environment - visual, thermal, and auditory;
H. Health factors and standards.
I. Safety factors and standards.

9. Retention of legal counsel:
   An attorney should be selected to represent the board of education where necessary; of particular importance is appointment of a bond attorney to handle the legal aspects of the bond election.

10. Preparation of preliminary sketches:
    The architect will preface preliminary sketches following study of the educational program and site appraisal. Upon approval, he will develop from these sketches the working drawings and specifications.

11. Approval of working drawings and specifications:
    Upon board approval, the architect will secure the written approval of agencies having jurisdiction over school building plans.

12. Financing the building program:
    The proposed bond issue should be large enough to cover:
    A. Contractual costs;
    B. Fees;
    C. A contingency fund;
D. Site development; and
E. Equipment.

A long range capital outlay budget, developed with competent advice and counsel, must precede specific bonding arrangements.

13. Contractor selection:

Following acceptance of working drawings and specifications, competitive bids should be advertised for under the guidance of the architect and the board of education attorney. The architect will investigate the contractors submitting bids and make recommendations regarding the awarding of contracts.

14. Recording proceedings and conferences:

Complete and accurate records, serving to protect both school officials and architects, should be maintained to prevent misunderstandings and possible cost increases.

15. Provision of construction supervision:

Understanding should be reached regarding appointment of a "clerk-of-the-works" and his responsibilities in the area of continuous on-the-job supervision.

16. Final inspection and acceptance of the building:

In most cases, the architect will make final inspection and recommend final acceptance by the board of education.

17. Equipping the building:

Equipment, chosen following discussions by the planning committee and educational staff, should be installed insofar as possible prior to building occupancy.
18. Instruction in the use of the building:

Arrangements should be made to acquaint the staff with features of the building and its equipment, their function, and operation.

19. Dedication of the building:

A program should be carried out to formally present the building to the community, and to thank those involved in its development.

Chapter XI. Appendix A: Specifications

Guide to space and area needs:

<table>
<thead>
<tr>
<th>Type of area</th>
<th>Approximate space needs (in square feet)</th>
<th>Description of facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Play lot</td>
<td>10,000 10,000 10,000</td>
<td>Provides such apparatus as a small climbing structure, sandbox, slides, swings, tables, benches, drinking fountain, and open play space.</td>
</tr>
<tr>
<td>Apparatus</td>
<td>10,000 10,000 10,000</td>
<td>For lower elementary use such as slides, swings, jungle gyms, parallel bars, balance beams, etc.</td>
</tr>
<tr>
<td>Paved area</td>
<td>30,000 64,000 64,000</td>
<td>All weather surface for basketball, tennis, skating, dancing, volleyball, badminton, etc.</td>
</tr>
<tr>
<td>Field games</td>
<td>135,000 285,000 350,000</td>
<td>Space for horseshoes, softball, baseball, soccer, archery, football, ice hockey, modified golf, track, straight-a-way.</td>
</tr>
<tr>
<td>Quiet activi-ties</td>
<td>8,000 8,000 8,000</td>
<td>Dramatics, handicraft, music, quiet games, story telling council ring, fireplace, etc.</td>
</tr>
</tbody>
</table>

1 Adapted from "A Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education" by the Athletic Institute.
Approximate space needs (in square feet)

<table>
<thead>
<tr>
<th>Type of area</th>
<th>Approx. Area</th>
<th>Description of facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water play</td>
<td>5,000</td>
<td>Wading pool, spray pool. Add 20,000 for outdoor swimming pool.</td>
</tr>
<tr>
<td>Older adult</td>
<td>4,000</td>
<td>Lounging, general sociability, benches, tables, and shade.</td>
</tr>
<tr>
<td>Garden</td>
<td>4,000</td>
<td>Children's flower and vegetable garden. Also Science connected gardens.</td>
</tr>
<tr>
<td>Interscholastic sports area</td>
<td>522,720</td>
<td>Athletic field, stadium, baseball, football fields, running track, softball diamonds, practice fields, seating for games, parking areas.</td>
</tr>
<tr>
<td>&quot;Park&quot;</td>
<td>87,120</td>
<td>Picnic areas with fireplaces, benches, tables, walks, trails, parking, etc.</td>
</tr>
<tr>
<td>Driver range</td>
<td>175,000</td>
<td>Driver education program</td>
</tr>
<tr>
<td>Plantings and walks</td>
<td>25,000</td>
<td>Boundary and border plantings and walks serving the various sections.</td>
</tr>
<tr>
<td>Total area</td>
<td>10 acres</td>
<td>Remaining part of these totals is taken up with buildings, drives, settings, parking, etc.</td>
</tr>
</tbody>
</table>

Space requirements:

- Baseball - 62,500
- Softball - 25,600
- Football - 57,600 - one or two practice fields necessary
- Track - 43,560 - usually around football field
- Soccer football - 81,000
- Ice hockey - 17,000
- Field hockey - 54,000
- Badminton - 1,456
- Hand tennis - 1,000
- Lawn tennis - 7,200
- Paddle tennis - 1,920
- Table tennis - 325
- Deck tennis - 1,300
- Volleyball - 4,896
- Tetherball - 400
- Handball (1 wall) - 1,944
- Basketball - 6,240
- Lawn bowling - 14,400
- Shuffleboard - 1,008
- Croquet - 1,800
- Horseshoes - 500
- Archery (5 targets) - 22,500
### Equipment - heights by grades

<table>
<thead>
<tr>
<th>Equipment</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>Adult size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kindergarten</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tables</td>
<td>20&quot;</td>
<td>22&quot;</td>
<td>24&quot;</td>
<td>26&quot;</td>
</tr>
<tr>
<td>Chairs</td>
<td>11</td>
<td>13-15</td>
<td>13-15</td>
<td>15</td>
</tr>
<tr>
<td>Sinks and counters (for standing positions)</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Seat benches</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Storage cabinets (same as sinks and counters)</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Paper storage cabinets</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Chalk rails (with eye level at center of 36&quot; panels)</td>
<td>21</td>
<td>24</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>Book trucks (adjust to window stools or radiators)</td>
<td>26-27</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Work benches</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Open storage shelves, toy bins, rug storage</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Clothing cubicles**

- Kindergarten - hat shelf from floor - 2/3 of units at 48"
- 1/3 of units at 44"
- Boot shelf - 10" - 12" from floor
Total air circulation 30 CFM/person:

<table>
<thead>
<tr>
<th>Air space per person in cubic feet</th>
<th>Outdoor air supply per person, CFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>29</td>
</tr>
<tr>
<td>200</td>
<td>21</td>
</tr>
<tr>
<td>300</td>
<td>17</td>
</tr>
<tr>
<td>500</td>
<td>11</td>
</tr>
</tbody>
</table>

(From 1958 guide, ASHRAE)

Given: A classroom 28' x 30' with a ceiling height of 8' housing 25 students plus one teacher.

28' x 30' x 8' = 6720 cu. ft.

6720 cu. ft. ÷ 26 persons = 258 cu. ft. per person

The air space per person range then would be between 200 and 300 cubic feet from the first column of the chart giving an outdoor air space need of 19 CFM per person or a total of 19' x 26' = 494 cu. ft./m of outdoor air for this room.

Minimum toilet fixture requirements for general toilet rooms, drinking fountain requirements:

<table>
<thead>
<tr>
<th>Students served</th>
<th>Water closets</th>
<th>Urinals</th>
<th>Lavatories for boys or girls</th>
<th>Drinking fountains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>girls</td>
<td>Total</td>
<td>girls</td>
<td>boys</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td>50</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>100</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>75</td>
<td>75</td>
<td>150</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>100</td>
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<td>200</td>
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<td>2</td>
</tr>
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<td>175</td>
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<td>350</td>
<td>7</td>
<td>3</td>
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<td>200</td>
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<td>400</td>
<td>8</td>
<td>4</td>
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<td>225</td>
<td>225</td>
<td>450</td>
<td>9</td>
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</tr>
<tr>
<td>250</td>
<td>250</td>
<td>500</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>275</td>
<td>275</td>
<td>550</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>
### Chapter XII. Appendix B: Questionnaire

The following is the standard form of questionnaire for selection of architects for school building projects. (Approved by the National Council on Schoolhouse Construction and The American Institute of Architects and available from AIA, 1735 NY Ave NW, Wash. 6, D.C.).

**A** Information by the school system to the architect:

1. name of school system-----------------------------------------------

2. name of superintendent or other person to whom questionnaire should be returned -----------------------------------------------

3. size of system (pupil enrollment) ---------------------------------

4. general description of proposed projects: ---------------------------

5. approximate timetable for planning and construction period:----------

---

<table>
<thead>
<tr>
<th>Students served</th>
<th>Water closets</th>
<th>Urinals for boys</th>
<th>Lavatories for boys or girls</th>
<th>Drinking fountains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys girls Total</td>
<td>boys girls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>300</td>
<td>600</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>350</td>
<td>350</td>
<td>700</td>
<td>11</td>
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<td>400</td>
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<td>6</td>
</tr>
<tr>
<td>450</td>
<td>450</td>
<td>900</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
<td>1000</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>550</td>
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<td>1100</td>
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<td>600</td>
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<td>1200</td>
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B Architect's questionnaire:

1 name

2 business address

3 telephone number

4 type of organization (check one)  
   - individual
   - partnership
   - corporation

(Test jointly copyrighted by National Council on Schoolhouse Construction and The American Institute of Architects. This form may be duplicated, provided (1) it is reproduced verbatim and (2) advance permission is granted by both copyright holders.)

5 names of principals, professional history, professional affiliation, staff organization: (attach information if you prefer)

6 attach list of completed buildings your firm has designed during recent years. If you have recently established your own practice, indicate prior responsible affiliation with other projects. Underline those which you feel are examples of your work appropriate to our problems and which you would like to have visited.

   include cost of building, type of building, location and dates of construction. (use separate sheet)

7 give names of persons to whom the board of education may write. These persons should have knowledge of your firm and your work:

8 attach any other material which might help the board of education in giving you proper consideration. In questions 7 and 8, the board is interested in finding out about your:
   - integrity
   - thoroughness
   - creativeness
   - adequacy of supervision
   - business procedures and record keeping on the job
   - financial responsibility
if you are called in for an interview, you will be asked to furnish information indicating:

- that your organization is adequate to do the job
- that previous commitments will not prevent expeditious planning of this project
- that you are willing to devote time to carry out cooperative educational planning with designated school staff members or committees
- completeness of contract documents (plans and specifications)

Chapter XIII. Appendix G: School Taxes and Bonds

298.18 Bond tax

(Editors note: For text of other sections of chapter 298, not amended by the 62nd G.A., see pages 154 to 156 of 1966 SCHOOL LAWS.)

298.18 Bond tax. The board of each school corporation shall, when estimating and certifying the amount of money required for general purposes, estimate and certify to the board of supervisors of the proper county for the schoolhouse fund the amount required to pay interest due or that may become due for the year beginning January 1 thereafter, upon lawful bonded indebtedness, and in addition thereto such amount as the board may deem necessary to apply on the principal.

The amount estimated and certified to apply on principal and interest for any one year shall not exceed ten mills on the dollar of the assessed valuation of the taxable property of the school corporation except as hereinafter provided.

298.18, SCHOOL TAXES AND BONDS

Provided that when because of reduced valuation a ten-mill tax is not sufficient to produce the amount required to pay the interest and one-twentieth of the principal of the original issue of bonds legally issued prior to the year 1934, the board may certify such amount and the county auditor shall compute and apply such tax rate for such purposes as may be necessary to raise the amount so certified and the funds so raised shall be used only for the purpose of paying interest and principal on such bonds and shall not be subject to transfer.

Provided further that the tax limitation contained in this section shall not operate to restrict or prevent a school district in the issuance of refunding bonds to pay interest or principal of bonds outstanding on March 31, 1934.

The amount estimated and certified to apply on principal and interest for any one year may exceed ten mills by such number of mills as may be approved by the voters of the school corporation, but not exceeding fifteen mills, on the dollar of the assessed valuation of the
taxable property within any school corporation, provided that the qualified voters of such school corporation have first approved such increased millage at a special election, which may be held at the same time as the regular school election. The proposition submitted to the voters at such special election shall be in substantially the following form:

"Shall the board of directors of the (insert name of school corporation), in the County of , State of Iowa, be authorized to levy annually a tax exceeding ten mills, but not exceeding mills, on the dollar of the assessed valuation of the taxable property within said school corporation to pay the principal of and interest on bonded indebtedness of said school corporation, it being understood that the approval of this proposition shall not limit the source of payment of the bonds and interest but shall only operate to restrict the amount of bonds which may be issued?"

Notice of such election shall be given by publication once each week for four consecutive weeks in a newspaper published in the school corporation, or if there is no newspaper published in the school corporation, in a newspaper published in the county and of general circulation in the school corporation. Such notice shall state the date of the election, the hours of opening and closing of polls and the exact location thereof, and the question to be submitted. The election shall be held on a date not less than five nor more than twenty days after the last publication of the notice. Such notice shall be sufficient and shall be in lieu of any other notice required by any other statute. At such election the ballot used for the submission of said proposition shall be in substantially the form for submitting special questions at general elections. Such proposition shall not be deemed carried or adopted unless the vote in favor of such proposition is equal to at least sixty percent of the total vote cast for and against said proposition at said election. Whenever such a proposition has been approved by the voters of a school corporation as hereinbefore provided, no further approval of the voters of such school corporation shall be required as a result of any subsequent change in the boundaries of such school corporation.
CHAPTER VI. SUMMARY AND RECOMMENDATIONS

The purpose of this chapter is to summarize the major points of the school building guide as well as the major findings of the study in its entirety. A summarization of the procedures used in the study will not be provided, due to its inclusion in prior chapters.

Recommendations for School Building Practices

Due to the complicated nature of school construction, certain integral principles and techniques must be incorporated into the school construction plans of every school district to assure results most beneficial to the district and to the children whose education is dependent upon its policies. The study has revealed increasing concern throughout the nation with the problem of guidance provided by the state to the local school district. This study was designed to bring to light those aspects of the building program which must be considered in every school building program, large or small. On the basis of the findings of this study and the general school building principles suggested in the literature, the following recommendations are made:

1. Administration of the school construction program of the local district should be assigned to the appropriate school official, usually the superintendent or business manager.

2. A school building advisor should be employed to assist in the development of the total school construction program. This consultant should be a person of established capacity and experience in school building construction.
3. An accurate evaluation of school buildings should be ascertained by a reliable educational consultant. To facilitate attainment of accurate appraisals, employment of professional educational consultants is recommended.

4. Involvement of the architect as early as possible in the development of plans for school buildings is recommended. This does not increase the expense of the program, and will lead to the development of a more satisfactory and comprehensive program.

Summary of Results

The major findings of Chapter IV, regarding the opinions of Iowa school superintendents and Iowa architects concerning items for inclusion in the proposed school building guidelines, are summarized as follows:

1. Both Iowa architects and Iowa school superintendents are receptive to the development of a statewide school building guideline.

2. The items to be dealt with in the proposed guideline are favored by both Iowa architects and Iowa school superintendents, providing the characteristics of guidelines are retained and the characteristics of directives are avoided.

3. Non-instructional projects were not considered relevant to the proposed guidelines by either group questioned.

4. No major areas of consideration other than those included in the proposed guidelines were suggested to supplement the guidelines.

5. Nonrestrictive flexibility was considered of major importance in the development of the guidelines by both Iowa superintendents and Iowa
architects.

6. The necessity for periodic review and revision of the guidelines was stressed by both groups questioned.

7. Architects and superintendents questioned felt that one another were competent within their respective fields of interest, but felt the need for improvement of communication with one another, which could be accomplished through standardized statewide guidelines defining the role of each in the development of school building plans.

Recommendations to the State Department of Public Instruction

1. A consultant knowledgeable in the areas of maintenance and operations should be employed by the Iowa State Department of Public Instruction to assist public school districts with their school maintenance programs.

2. The Iowa State Department of Public Instruction should give consideration to the preparation of a school maintenance handbook for distribution to the public school districts of Iowa.

3. The Iowa State Department of Public Instruction should provide for continuous gathering of information regarding school building construction for Iowa public school districts. These data should be made available to all public school districts in the state of Iowa.

4. The Iowa State Department of Public Instruction should cooperate with institutions of higher learning in presenting a workshop for public school administrators regarding recommended school building practices and procedures.
5. The Iowa State Department of Public Instruction should give consideration to the addition of more special consultants for school building construction.

6. The Iowa State Department of Public Instruction should give consideration to a publication dealing with formulation of educational specifications.

7. The Iowa State Department of Public Instruction should encourage the state legislature to pass a law allowing 50% of the voters to approve a school bond issue.

8. The Iowa State Department of Public Instruction should, through legislation, be allowed to approve school building plans prior to construction.

9. The Iowa State Department of Public Instruction should institute a specific procedure for the up-dating of school construction guidelines at five-year intervals.

Recommendations for Further Study

In the judgement of the investigator, the following areas of school building construction merit additional study and research:

1. The feasibility of a state capital outlay building fund for Iowa public school districts merits extensive research.

2. A carefully conducted research study concerning removable walls in Iowa public schools should be made.

3. The cost and feasibility of carpeting in Iowa public schools should be the subject of study.

4. A carefully coordinated study should be made in regard to open space contracts for Iowa public schools.
5. A study should be conducted for the purpose of determining the pros and cons of roof mounted mechanical units for heating and air conditioning.

6. A carefully coordinated research study should be made concerning science equipment for circular school construction.

Conclusion

In conclusion, decided improvement has been made regarding the use of recommended school building procedures and practices by Iowa school officials. However, many areas exist in which room for improvement is apparent. Consideration of school building construction should be cognizant of the complicated and technical nature of this endeavor. School construction requires the education of competent administrators able to devote the necessary time and interest to the school district building program. Since school building construction is undergoing continual change, the program must be subject to frequent revision. Incorporation of new designs in the total school program as they become available will be necessary to provide the best possible education for the students of the Iowa school district.


47. New Mexico Department of Education. New Mexico school building guide. Santa Fe, New Mexico, Author. 1965.


ACKNOWLEDGMENTS

This study has been made possible only with the cooperation of many individuals and organizations, and the officials of the Iowa public high school districts. The researcher wishes to express his sincere appreciation for their assistance.

Special thanks is extended to Paul A. Johnston, Iowa State Superintendent of Public Instruction; and to Gayle Obrecht, Consultant in Plant Facilities for the State of Iowa. The investigator is indebted to Mrs. Edna Henry, Secretary, who assisted with the typing, mailing, and editing of the questionnaire.

Appreciation is extended to my committee, especially to Dr. Richard Manatt, who supervised the researcher and to Dr. Ray Bryan, Chairman, who gave encouragement and guidance throughout my entire graduate program.
Dear Superintendent:

Please find enclosed a questionnaire concerning a guideline for school building construction in the State of Iowa. I am asking school superintendents and architects in the state to respond to certain items concerning what information should be included in a state school building guide. I have the sanction of the State Department of Public Instruction in this study. This questionnaire is very important for my Ph. D. program at Iowa State University. I would certainly appreciate having you complete the items on the questionnaire and return it in the self-addressed envelope.

I wish to thank you for your assistance and cooperation in completing this questionnaire.

Sincerely yours,

W. R. Dabb
Superintendent

WRD ms
Enc.
October 9, 1968

Dear Architect:

Please find enclosed a questionnaire concerning a guideline for school building construction in the State of Iowa. I am asking school superintendents and architects in the state to respond to certain items concerning what information should be included in a state school building guide. I have the sanction of the State Department of Public Instruction in this study. This questionnaire is very important for my Ph.D. program at Iowa State University. I would certainly appreciate having you complete the items on the questionnaire and return it in the self-addressed envelope.

I wish to thank you for your assistance and cooperation in completing this questionnaire.

Sincerely yours,

W. R. Dabb
Superintendent

WRD MS
Enc.
Questionnaire for a State School Building Guide

Name of Architect ________________________________
(or)
Name of School District ____________________________

Completed by ________________________________ Title ________________________________

1. Please circle the items listed below which you feel should be included in the State and Local Relationships in School Plant Planning:

(1) Provisions of School Building Law
(2) Employment of Registered Architects and Engineers
(3) The Meaning of Plan Approval
(4) Approval by Other Agencies
(5) Compliance with Local Codes and Ordinances
(6) Final Plans - Approval
(7) Steps, Forms and Procedures for Planning and Construction
(8) Non-Instructional Projects
(9) Others - (please specify) ________________________________

2. Please circle the items listed below which you feel should be included in Planning for School Facilities:

(1) Organizing a Planning Committee
(2) Some Elements of a School Building Survey
(3) Studying the Educational Program
(4) Evaluating Existing School Plants
(5) Determining Financial Resources
(6) The Long Range Plan
(7) Preparing Educational Specifications
(8) Others - (please specify) ________________________________

3. Please circle the items listed below which you feel should be included in the Organization of a Building Program:

(1) The Selection of the Architect
(2) Services of the Architect
(3) Contractual Relations with the Architect
(4) Record of Proceedings and Conferences
(5) Selection of a Contractor
(6) Educational Consultant
(7) Budget Preparation
(8) Financing Program
(9) Others - (please specify)

4. Please circle the items listed below which you feel should be included in the School Site:

(1) Site Selection
(2) Site Size
(3) Physical Properties
(4) Site Development
(5) Development of Ground for Educational, Recreational and Community Use
(6) Service Areas
(7) Site Acquisition
(8) Others - (please specify)

5. Please circle the items listed below which you feel should be included in the Building:

(1) Educational Program
(2) Architectural Character
(3) Plan Types
(4) Physical Relationships
(5) Community Use
(6) Orientation
(7) Circulation
(8) Flexibility
(9) Expansibility
(10) Finish Materials
(11) Others - (please specify)

6. Please circle the items listed below which you feel should be included in the Elements of the Building:

(1) Facilities for Instruction and Services
(2) The elementary school
The secondary school
Non-Instructional Areas and Equipment
Disaster shelters in schools
Circulation and Service Units
Others - (please specify)

7. Please circle the items listed below which you feel should be included in the Physical Environment of the Building:

Visual Environment
Auditory Environment
Thermal Environment
Others - (please specify)

8. Please circle the items listed below which you feel should be included in Health Factors and Standards:

Water Supply
Sewage Disposal
Ventilation
Interior Fixtures and Finishes
Equipment Specifications
Sizes of Fixtures
Heights of Fixtures
Showers
Floor Drains
Plumbing Regulations
Swimming Pools
Others - (please specify)

9. Please circle the items listed below which you feel should be included in Safety Factors and Standards:

Application procedures
Plans and Specifications Approval
Employment of Registered Architects and Engineers
Inspections During Construction
Plans for Additions
Shops and Industrial Arts
10. Please make any additional statements which you feel might help in writing guidelines for school building construction in the State of Iowa.

(Answered by Architects)

11. In which areas do you feel the school administrator is the least effective and the most effective in school planning?

(least effective)

(most effective)
(Answered by Superintendents)

12. In which areas do you feel the school architect is the least effective and the most effective in school planning?

(least effective) ____________________________________________________________

__________________________________________________________

(most effective) ________________________________________________