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PLANNING SCHOOL PLANT CONSTRUCTION

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FOREWORD

A school building is a place where many kinds of activities will take place. It can be a means of teaching children much of beauty, useful arrangement and harmonious living and working together. It may have the opposite effect on the children if the building presents an appearance of drab, ugly, unattractive surroundings.

There is an increasing recognition that the school building should be a place that will help the children to grow up to their best mentally and physically. There seems to be a greater tendency to take care of their seeing, posture, nutrition and bodily processes than to make sure that a place is provided where children can grow up in such surroundings as will guarantee good, clean, healthy, well-balanced, thinking citizens regardless of the childhood environment of their homes.

The problem of providing proper school housing is not simple. Any kind of space in any kind of building in any kind of an environment is not sufficient to satisfy the needs of the children and the desires of their parents. The school building should be constructed to serve not only the learners and staff members who spend many hours there daily, but to serve community groups and adults who may use the building in many ways.

This bulletin has been prepared by Gordie Young, Assistant Superintendent of Public Instruction under whose supervision comes school building construction. It presents in outline form suggested procedures in planning school building facilities. It is recommended as a guide for use of those who are planning school building programs.

Wendell P. Butler
Superintendent of Public Instruction

PLANNING SCHOOL PLANT CONSTRUCTION

I INTRODUCTION

Public schools have been established by the state in order that children may be prepared to meet the responsibility of citizenship. The state has been delegated authority for public education through its Constitution and by legislative enactments. Local boards of education have been given governmental control of school districts which includes school plant management. This procedure is desirable because local communities are vitally interested in the education of their children.

Boards of education and school administrators have been charged with the responsibility of providing educational facilities. These officials of each individual district have been given definite responsibilities in school plant development. Boards of education have been given the right to acquire school property. They have a right of eminent domain. They have authority to erect buildings. They can tax and bond the school district. These rights and privileges have been granted to them in order that they may carry out their responsibilities in providing school facilities in which to train the future citizens.

Since education is a continuous process from birth to death, the school plant should be recognized as a complete educational tool for the whole community. It should be a means to provide educational opportunities, not only for the children, but also for all youth and adults of the community. The school should lead all educational agencies of the community in an organized, cooperative program for more effective education of youth and adults in school and out of school.

Everything which has been learned does not have to be taught. It is necessary to determine what portion of the total educational process and the service connected therewith, will be assumed by a particular school and for what age groups the program and services will be made available.

It is also necessary for each school district to determine the scope of its program, curriculum content, and the basic educational methods. These should be based on sound philosophy and purposes of education. It is recognized that educational aims and purposes are not easy to define because education for an ever-changing society must be dynamic. Yet, it is both an opportunity and an obligation for the local school system to undertake. This task is the first step in a building program.

Any planning must ultimately be focused on a single school building in a specific setting and must rest on a broad base of community analysis. Each individual school center should then be a functional unit, in an integrated whole, which represents a total program for the district.

There are at least two major classes of responsibility of a board of education and the superintendent in setting up an over-all master plan for a building program.

1. To determine the scope and the quality of each community's educational program.

2. To properly locate the school facilities on suitable sites of adequate size.

II LAWS

The following pages contain the school laws that must be complied with by those who are planning school buildings to house educational programs. The laws quoted herein are only those that are concerned with the individuals doing the planning. They are presented as authority on which planners must rely for the procedures which they should follow.

Statutes Relating to the Construction of School Buildings

162.010 Title to School Property. The title to all property owned by a school district is vested in the Commonwealth for the benefit of the district board of education. In the acquisition of land for school purposes whether by purchase, condemnation, or otherwise, the title obtained shall be in fee simple. Any reversionary interest in any land held by boards of education on June 14, 1934, shall not deprive such boards of the ownership of the buildings of other improvements thereon. (1954, c. 20, § 1)

162.030 Condemnation of Property for School Purposes. Each board of education may, when unable to make a contract satisfactory to the board with the owner for the purchase of real estate to be usd for school purposes, initiate condemnation proceedings under any of the methods of condemnation authorized by KRS 416.010 to 416.080; KRS 416.120; and 416.230 to 416.310; and the title to land so obtained shall be vested in fee simple. (1954, c. 20, § 2)

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

162.070 Contracts for Buildings, Improvements and Materials to be Let on Competitive Bidding; When Advertisement Not Required. The contracts for the erection of new school buildings and additions and repairs to old buildings, except repairs not exceeding one hundred fifty dollars, shall be made by the board of education to the

lowest and best responsible bidder complying with the terms of the letting, after such advertisement for competitive bids as the board determines, but the board may reject any or all bids. All necessary specifications and drawings shall be prepared for all such work. The board shall advertise for bids on all supplies and equipment that it desires to purchase, except where the amount of the purchase does not exceed two hundred fifty dollars, and shall accept the bid of the lowest and best bidder, but the board may reject any and all bids. In independent school districts of cities of the first class and in county school districts of counties containing a city of the first class, no advertisement for bids for repairs shall be necessary unless the amount involved exceeds two thousand dollars, and no advertisement for bids for supplies and equipment shall be necessary unless the amount involved exceeds one thousand dollars. (1954, c. 172)

160.476 School Building Fund; Tax for; Other Resources; Investment; Expenditures; Audit. (1) The board of education of any district may, in addition to other taxes requested for school purposes, request the levy of not less than four cents nor more than twenty cents on each one hundred dollars valuation of property subject to local taxation, to provide a special fund for the purchase of sites for school buildings, for the erection and complete equipping of school buildings, and for the major alteration, enlargement and complete equipping of existing buildings, provided, however, that such tax shall come within the maximum school tax levy provided by KRS 160.475. In addition to or in lieu of this special tax, any board of education may pay into this special fund at the close of any fiscal year the proceeds from the sale of land or property no longer needed for school purposes and all or any balances remaining in the general fund over and above the amount necessary for discharging obligations for the fiscal year in full.

(2) The special fund provided for herein shall be kept in a separate account designated as "School Building Fund." The fund shall be kept in the depository selected by the board of education, or invested in bonds of the United States, of this state, or county or municipality in this state, provided however, that such investments shall be approved by the State Board of Education.

(3) All expenditures from such fund shall be made solely for the purposes enumerated herein and shall be made in accordance with the school laws of the state at such times as the board of education determines. The board of education shall cause to be made annually an audit of the building fund by a certified public ac-

countant or by an accountant approved by the State Department of Education. (1946, c. 36, § 1 (3))

160.477 School Building Fund, Voted Tax for; Other Resources of Fund; Expenditures; Audits. (1) (a) Upon request of the board of education of any school district, the tax levying authority of the district shall adopt an ordinance or resolution submitting to the qualified voters of the district, the question as to whether a special school building tax rate of not less than five cents nor more than fifty cents as requested by the board shall be levied on each one hundred dollars of property subject to local taxation. This tax levy shall be in addition to the maximum school tax levy provided by KRS 160.475. The income from the tax shall be used for the purchase or lease of school sites and buildings, for the erection and complete equipping of new school buildings, for the major alteration, enlargement and complete equipping of existing buildings, for the purpose of retiring, directly or through rental payments, school revenue bonds issued for such school building improvements, and for the purpose of financing any program for the acquisition, improvement, or building of schools. The question shall be so framed that the voter may by his vote answer "For" or "Against."

(b) The election shall be held at a time fixed in the ordinance or resolution, not less than fifteen or more than thirty days from the time the request of the board is filed with the tax levying authority, and reasonable notice of the election shall be given. The election shall be conducted and carried out in the school district in all respects as required by the general election laws, and shall be held by the same officers as required by the general election laws. The expense of the election shall be borne by the fiscal court except where the election is held in a district embracing a city of the first five classes, in which case the cost of the election shall be borne by the governing body of the city.

(c) If a majority of those voting on the question favor the special school building tax levy, the tax levying authority shall when the next tax rate for the district is fixed levy the special rate specified by the board of education of the school district for the school building fund in addition to the levy provided by KRS 160.475. (Subsection (1) amended, 1952, c. 77, § 1)

(2) There may be included, in the maximum levy provided for in KRS 160.475, a special levy for building fund purposes as au-

thorized by KRS 160.476, which shall be in addition to the levy authorized by vote as provided in subsection (1) of this section.

(3) In addition to or in lieu of this special tax, any board of education may pay into this special fund at the close of any fiscal year the proceeds from the sale of land or property no longer needed for school purposes and allow any balances remaining in the general fund over and above the amount necessary for discharging obligations for the fiscal year in full.

(4) The special fund provided for in subsection (1) of this section shall be kept in a separate account designated as "Special Voted School Building Fund." The fund shall be kept in the depository selected by the board of education, or invested in bonds of the United States, of this state, or of any county or municipality in this state, provided however, that such investment shall be approved by the State Board of Education.

(5) All expenditures from such fund shall be made solely for the purposes enumerated in this section and shall be made in accordance with the school laws of the state at such times as the board of education determines. The board of education shall cause to be made annually an audit of the building fund by a certified public accountant or by an accountant approved by the State Department of Education. (1950, c. 142)

337.510 Schedule of Prevailing Wages to be Included in Specifications. Before advertising for bids or entering into any contract for construction of public works, every public authority shall ascertain the prevailing rates of wages of laborers, workmen, mechanics, helpers, assistants and apprentices for the class of work called for in the construction of such public works in the locality where the work is to be performed. This schedule of wages shall be attached to and made a part of the specifications for the work and shall be printed on the bidding blanks and made a part of every contract for the construction of public works.

337.520 Determination of Prevailing Wages. The wages paid for a legal day's work to laborers, workmen, mechanics, helpers, assistants and apprentices upon public works shall not be less than the prevailing wages paid in the same trade or occupation in the locality. The public authority shall establish prevailing wages at the same rate that prevails in the locality under collective agreements or understandings between bona fide organizations of labor

and their employers at the date the contract for public works is made if there are such agreements or understandings in the locality applying to a sufficient number of employes to furnish a reasonable basis for considering those rates to be the prevailing rates in the locality. If contracts are not awarded within ninety days from the date of the establishment of the prevailing rate of wages, as provided in KRS 337.510, there shall be a redetermination of the prevailing rate of wages before the contract is awarded and the schedule or scale of prevailing wages shall be incorporated in and made part of each contract.

337.530 Contractor to Pay Prevailing Wages and Post Rates; Payroll Records. (1) Where public authority has established and prescribed a prevailing rate of wages, the contract executed between that public authority and the successful bidder or contractor shall contain a provision requiring the successful bidder and all of his subcontractors to pay the rate of wages so established. The successful bidder or contractor and all subcontractors shall strictly comply with these provisions of the contract.

(2) All contractors and subcontractors required by KRS 337.510 to 337.559 and the contracts with any public authority to pay not less than the prevailing rate of wages, shall pay such wages in legal tender without any deductions. These provisions shall not apply where the employer and employe enter into an agreement in writing at the beginning of or during any term of employment covering deductions for food, sleeping accommodations, or any similar item if this agreement is submitted by the employer to the public authority who fixed the rate of wages and is approved by that authority as fair and reasonable. All contractors and subcontractors affected by the terms of KRS 337.510 to 337.550 shall keep full and accurate payroll records covering all disbursements of wages to their employes to whom they are required to pay not less than the prevailing rate of wages. These payroll records shall not be destroyed or removed from this state for one year following the completion of the improvement in connection with which they are made.

(3) Each contractor and subcontractor subject to the provisions of KRS 337.510 to 337.550 shall post and keep posted in a conspicuous place at the site of the construction work a copy of prevailing rates of wages and working hours as prescribed in the contract with the public authority, showing the rates of wages prescribed and the working hours for each class of laborers, workmen, mechanics,

helpers, assistants and apprentices employed by him in the work of constructing the public works provided for in the contract with the public authority.

337.540 Limitation of Working Hours; Exceptions; Overtime. (1) Every public authority, before advertising for bids, shall include with the schedule of wages a provision that no laborer, workman, mechanic, helper, assistant or apprentice shall be permitted to work more than eight hours in one calendar day, which shall constitute a legal day's work; nor more than forty hours in one week, which shall constitute a legal work week, except in cases of emergency caused by fire, flood or damage to life or property. This limitation of work hours shall be made a part of the specifications for the work and printed on bid blanks where the work is done by contract and shall be incorporated as a part of each contract.

(2) No laborer, workman, mechanic, helper, assistant or apprentice shall be permitted to work more than eight hours in any one calendar day, nor more than forty hours in any one week, except in cases of emergency caused by fire, flood or damage to life or property, on the construction of public works which is being constructed under contract with any public authority.

(3) Any laborer, workman, mechanic, helper, assistant or apprentice worked in excess of eight hours per day or forty hours per week, except in cases of emergency shall be paid not less than one and one-half times the prevailing rate of wages as fixed under this chapter for all overtime worked, and each contract with any public authority for the construction of public works shall so provide.

(4) The determination of exception provided in this section of when an emergency exists shall be made by the public authority letting the contract.

337.550 Department to Aid in Enforcement; Remedies of Laborer. (1) Any laborer or mechanic employed on public works may file a complaint of any violation of any provision of KRS 337.510 to 337.550 with the department. The department shall assist him in the collection of claims of wages due him and shall also assist to the fullest extent in the administration and enforcement of KRS 337.510 to 337.550.

(2) A laborer or worker may by civil action recover any sum due him as the result of the failure of his employer to comply with the terms of KRS 337.510 to 337.550.

337.990 Penalties. (11) Any public authority who willfully fails to comply or to require compliance with KRS 337.510 to 337.550 shall be fined not more than one hundred dollars for each offense.

322.360 Public Work Under Unlicensed Engineer Prohibited. (1) Neither the state nor any of its political subdivisions shall engage in the construction of any public work involving engineering, unless the plans, specifications and estimates have been prepared and the construction executed under the direct supervision of a licensed engineer or a licensed architect.

(2) Subsection (1) of this section shall not apply to any public work in which contemplated expenditure for the completed project does not exceed two thousand dollars or to the maintenance or repair of any existing state or county highway.

156.160 Superintendent to Prepare School Budget and Rules and Regulations Governing Schools, for Adoption by Board. The Superintendent of Public Instruction shall prepare or cause to be prepared and submit for approval and adoption by the State Board of Education:

(5) Regulations for the sanitary and protective construction of public school buildings, toilets, physical equipment of school grounds, school buildings and classrooms;

(6) Regulations governing medical inspection, physical education and recreation, and other rules and regulations deemed necessary or advisable for the protection of the physical welfare and safety of the public school children;

(11) A uniform series of forms and blanks, educational and financial, including forms of contract, for use in the several school districts.

III ROLE OF AGENCIES

A. State Department of Education

The essential function of the State Department of Education in school plant planning is service. Those responsible for providing this service welcome an opportunity to work with local authorities. Because in Kentucky these individuals see all plans for public school construction and have served in consultative relationships in one way or another with superintendents and boards of education in planning hundreds of school building projects, they are in a position to render consultative service which may be of value to local officials in planning any school building program. In general, local officials may expect the following listed services from the officials of the State Department of Education.

1. Advice about the general steps to be taken and the legal requirements to be met in the improvement of the present school buildings and school sites.
2. Suggestions on working with architects and site planners in the designing of school buildings and school sites which will be functionally superior.
3. Help in planning public relations programs including the organization of citizens' planning groups in connection with school buildings and site projects.
4. Consultative service in working with local citizens and school personnel who are conducting their own studies for building and site needs.
5. Surveys for the location of school buildings and sites.
6. Advise on other sources of special help and technical assistance.

The advice and assistance which the State Department of Education can give will be most effective if it is used early in the planning process. The individuals of the department who assist in the planning of school building projects desire to give as much service as possible and to be available whenever they are needed. If this service is to be most effective it is desirable that local officials contact the State Department several days before work is to begin in order that the planning process may get started in the manner which will be most valuable to local officials.

B. Responsibility in Planning

The planning and construction of a school plant in Kentucky is principally the responsibility of the officials of the district in

which it is located. The people of a community are interested in having a plant which will meet their needs for safety, comfort and physical well-being of the pupils and which will be economical in cost of construction. They want plant facilities which will best serve in achieving the educational purposes of the school.

School plant planning involves a large number of decisions. All districts need expert advice in getting a building so designed as to guarantee construction to meet the particular needs and conditions. To secure the best results requires the participation of citizens as well as educational and building specialists. The services of several specialists who are not members of the community will be needed because of their technical abilities.

Principles to be Observed in Discharging Responsibility

In working together in the planning and the designing of a school plant, responsibilities must be fixed and relationships must be determined, understood and accepted. The principles listed below are basic to the responsibilities that should exist in planning and in designing a school plant.

1. The people of a community should participate in determining the program to be housed, and any new plant to be constructed. They need technical advice in their considerations. Conclusions and recommendations should be transmitted to the board of education for appropriate action.
2. While the state is the owner, the local board of education is in control of the school plant. It, therefore, should make the final decision.
3. A local board of education employs specialists including administrators, teachers, custodians, architects, contractors and consultants to carry on its operation, to advise it on technical and professional matters and to perform other assigned tasks.

Participants in Planning

Who should be the participants in planning a school plant? The following is a suggested list of officials, individuals and organizations which have been found to be essential in a school plant planning program.

1. A representative cross section of the people of the community.

2. The school board.
3. The superintendent of schools, who is executive officer of the board.
4. The school staff.
5. Educational consultants.
6. The State Department of Education.
7. Architects and engineers.
8. Technical consultants.
9. Contractors and builders.
10. Local district governing body.

Responsibilities of Each of These Groups

1. **People of the Community.** They should assist, by a committee, in determining the need of the school plant. This should be done through a study of the community growth as well as size and condition of the present plant, educational needs, financial ability and obligations, etc. The records of this group should be passed on to the school board for action.

2. **The School Board.** The board should take action based upon consideration of facts as shown by an authorized study. It should select and appoint architects and consultants to aid in making decisions. It is the legal duty of the board to select and purchase sites after approval by legally authorized agencies. It is also legally required to authorize all contracts and accept the completed building after contracts have been completed. It should act as the legal agent for the district in all phases of planning, designing and constructing plants.

3. **The Superintendent of Schools.** As the executive officer of the board, the superintendent should recommend personnel, procedures, policies and advise the board on all phases of the building program. As the educational leader of the community he should suggest and take the responsibility for studies which should be made showing plant needs. He should direct the collecting and interpreting of data, advise and assist school and community groups in cooperative planning and act as agent of the board in all phases of the program.

4. **The School Staff.** This staff should consist of individuals from a cross section of the services to be offered. It should

assist in planning and carrying out of studies, aid in the interpretation of the findings of these studies and educational specifications and space requirements of the contemplated school plant.

5. **Educational Consultants.** When these are available they should confer with the superintendent of schools, the educational staff and state authorities and advise the school board through the superintendent of schools on functional and educational layouts of floor plans and other phases essential to the school plant program under consideration.

C.

6. **State Department of Education.** Designated representatives of this department should advise local groups on procedures, state regulations and other matters essential to the proper school building program. It should, in so far as it is equipped to do so, provide technical assistance and information. All this should be done on request. In so far as possible it should give supervision and approval of the building construction, which has been erected according to plans and specifications which have been approved as meeting requirements of law and the regulations of the State Board of Education.

7. **Architects and Engineers.** These technicians should advise the board (through the superintendent of schools) on phases of the program for which they have technical training and experience, translate the educational program for which plant facilities are needed into a building design and write specifications for same. They should advise on letting contracts, supervise or direct the supervision and construction and recommend approval and acceptance of the completed building.

8. **Technical Consultants.** These individuals should advise on matters for which they were employed and for which they have preparation and experience. These consultants are usually needed on such matters as landscaping, lighting, heating and ventilating, acoustical planning, legal and financial matters.

9. **Contractors and Builders.** These organizations should construct the plant in accordance with the approved plans and specifications, accept responsibility for expert

craftsmanship and skilled workmanship in executing the drawings and specifications under the supervision of the architect and the owner's designated representatives.

10. **Local District Governing Body.** This body will be the fiscal court, city council or city or county commission. This body will be the owner when revenue bonds are sold to secure funds. While legally it is the owner, it should take required action only after approval of the board of education or its authorized agent.

C. Relationships in Planning

Relationships of the Participating Groups

The board of education is the legal agent for the community and, therefore, should act as the owner of any plant program. The board should review and approve proposals, recommendations and employ all personnel and authorize payment of employees and all work on the recommendation of its executive officer. In doing so it should proceed under the requirements of law and rules and regulations governing its action and make certain that all of these requirements are met.

The superintendent of schools, as the executive officer of the board, is responsible for seeing that the policies and decisions of the board are put into effect. All personnel are responsible to the board for work assigned them through administrative channels as required by law and established by the board.

The school board, in carrying on its school plant program, may appoint a coordinator of the entire enterprise to be responsible to the board and the superintendent for developing proper understanding of jobs to be done, allocation of tasks, coordination of functions and jobs, and effecting orderly procedure leading to the efficient completion of the job at hand. If such a coordinator is employed, he should be the most efficient and responsible person available. When the executive officer of the board—the superintendent of schools—has the preparation, skill and experience, he is ordinarily made the coordinator. Where the superintendent of schools does not have such training and experience or the necessary time from his other duties, he should recommend to the board the appointment on his staff of the most competent person who can be secured to act as coordinator of the project.

When building construction is to be financed by revenue bonds which requires action of the governing body, this body should take action required only after it receives approval for such action by the board of education or its legally authorized agent or representative.

No person, firm or agency which might have a financial interest in the designing and construction of the school building should be legally given the responsibility for conducting a survey to determine the present and future need for building. Any coordinator should be chosen for his unique ability to organize the work of all groups and to obtain the best efforts of all people and the groups working on the program.

Functions of the Participating Groups

1. **The functions of school administrators and educational consultants in school plant planning.** The functions listed under this heading include those to be performed by the administrative and supervisory staff, teachers, lay groups and educational plant consultants employed by the board. Findings and recommendations resulting from these functions will be the instructions to the architect when recommended by the local superintendent and approved by the local board of education. They should proceed as follows:

   a. Conduct Survey. These surveys should include contemplated programs for the school and community services, satisfactory local school district organization and the evaluation of existing school plants. Specialists from the State Department of Education and the architect should advise and assist in inspecting existing buildings for structural adequacy and remodeling possibilities.

   b. Develop and recommend long range master program including the location, type, size and priority in constructional projects.

   c. Determine adequacy of present buildings. See this topic in Principles of Planning.

   d. Submit a detailed statement concerning the financial standing of the district to determine its financial ability to construct the building program, and secure approval of the financial program by the State Department of Edu-

cation in order to determine what may be constructed immediately and what must be left for future construction in order that the remaining planning activities may be determined and governed.

e. Recommend the selection and acquisition of sites. In performance of this function representatives from the State Department of Education and the architect should be consulted.

f. Provide the architect with information necessary to determine property lines, ownership and other information necessary for him to construct topographic maps, make soil tests, percolation tests and locate utility lines and other features necessary to the proper construction of the building project.

g. Determine a schedule of facilities to be included in each project in terms of number, capacity and area of each type of room and other major space. Prepare and recommend to the board of education a set of instructions for the use of the architect. These should include educational specifications and design data as to space and facilities to be incorporated in the tentative sketches.

h. Determine the requirements for shelving, cabinets and closets for the storage of books, supplies, cloaks, etc.

i. Interpret State Board of Education regulations and laws governing the project.

j. Review architect's tentative sketches and suggest changes for efficiency in economy before they are submitted to the State Department of Education for review.

k. Review and approve preliminary drawings and make recommendations to the board concerning any changes that should be made before they are submitted to the State Department of Education for approval.

l. Work closely with the architect, particularly during the period of preparation of preliminary drawings, cost estimates and equipment layouts.

m. Review working drawings and specifications before they are submitted to the State Department of Education for approval.

n. Prepare advertisement bid forms and tabulate bids, recommend contractors and prepare contract documents. (These functions should be performed with the advice and assistance of the architect and legal counsel.)

o. Recommend for approval any necessary change orders recommended by the architect.

p. Inspect and recommend acceptance of the completed job with the architect's advice.

2. **Functions of the Architect in the School Plant Program:**

a. Provide consultative services to educational authorities in preparing educational specifications.

b. Review with the educational staff the educational program as well as the proposed schedule of facilities in preparation for making sketches.

c. Prepare and revise, as instructed, tentative sketches and preliminary drawings.

d. Interpret the application of building codes.

e. Recommend and give advice on structural materials.

f. Provide educational authorities with cost estimates.

g. Prepare final working drawings and specifications.

h. Aid the board of education in preparaing and awarding contracts.

Such service should include:
Providing promotional materials in bond issues such as photographs and drawings which the board of education feels essential for assisting in informing the people.
Assisting in checking and preparing advertisements for bids.
Explaining and clarifying plans and specifications during the bidding period.
Tabulating bids.
Furnishing the board information on performance and financial records of the bidders and the individual to whom contracts are finally awarded.
Assisting the board in securing performance bonds of the individual corporations to which contracts have been awarded.
Where federal grants of money are involved, handling for the board all the necessary negotiations.

i. Direct supervision of the structure. This service should include:

Large scale drawings.
Check shop drawings.

Interpreting drawings and specifications for the contractor.
Making field tests for inspections.
Approving materials of subcontractors.
Making constant check to determine that the true intent of the plans and specifications is being met.
Seeing that the owner gets copies of all guarantees, route bonds, field tests, etc.
Supplying the superintendent, as executive agent of the board, with documentary material regarding the operation of maintenance of the plant and equipment.

j. Check progress of work, issue payment certificates, recommend final acceptance and in general administer the total construction process.

k. Provide educational authorities with a final set of drawings including on the job changes and corrections.

3. **Cooperative Functions.** The following lists the types of "special determinations" which must be arrived at cooperatively between the educational and the architectural specialists.

a. Determine the general type of structure and number of stories of the building.

b. Determine types of sanitary heating and ventilating equipment.

c. Determine types of finish of flooring, interior walls and ceilings.

d. Determine orientation, fenestration pattern, classroom ceiling heights, etc.

e. Determine type and intensity of electric light installation.

IV CHARACTERISTICS OF A GOOD SCHOOL BUILDING

The school building should be constructed to adequately house an educational program suited to the needs of the community. Ample provision should be made for spaces suitable to house the various services to be offered. The building should be so designed as to have an inviting and attractive appearance. It should have architectural excellence without undue decoration.

The site on which a building is to be located should be large enough to furnish adequate space for physical education, recreation and other activities which should be carried on outside the building. The school grounds should provide not only for present needs, but for future development of the school and community needs. Clean buildings and attractive grounds lend much to the wholesome appearance of the total school plant.

Use and Design

The kind of activities that will be carried on in the building has a direct bearing upon its design and construction. During the past several years, increased use has been made of the schol plant as a community center. These activities include not only courses in academic and vocational subjects, but opportunities for recreation including dramatics and athletic activities.

The broadening of the school curriculum to include a wide variety of activities requires a type of building that contains rooms especially planned and equipped for these activities. When a modern twelve-grade educational program is to be housed, the building should contain not only classrooms and spaces for community meetings and athletic activities, but space for art, music, science, shops, vocational studies, home economics, agriculture, social science and, in some communities, trades and industries. Without these facilities in a twelve-grade program it is impossible to effectively house the program that is necessary to meet the requirements of the changing world. The planning of school buildings to carry out the requirements of educational programs becomes a matter of first importance in the successful development of a modern school curriculum. The building may be architecturally attractive and yet not be functionally well-planned. Superintendents who have carried on extensive school building programs realize that if they are to get the full value of every dollar invested in their buildings, it is important that they plan their educational program before building plans are drawn.

This means that the architect should be given specific data on the program to be housed before he begins the drawings for a building that will properly house the educational program to be carried on both inside and outside the building. In general, the following points should be included in the planning:

1. The immediate and ultimate capacity of the building must be anticipated. If it it is to be erected in units, the first unit should be planned with reference to its possible function when the complete building is made available.

2. The policy as to classroom size must be determined. Class size will influence the floor area that is needed. The type of activities that will be carried on in the classroom will affect the amount of floor area that will be needed.

3. The kind of organization that will be housed in the building should be given serious thought. If a school is operating on one type of educational program, a given number of rooms of certain size will be needed, but if a different type of program is to be used, rooms of an entirely different dimension may be needed for the same number of pupils.

4. The methods of teaching to be used and the curricular or the extracurricular activities to be provided may have an important influence on the building planned. Activities will determine the type of built-in and movable equipment to be used. Equipment tends to determine floor space. Fixed equipment is economical of floor space but many times less efficient instructionally. Specialized and movable equipment require more space, but conform more nearly to modern instructional requirements.

5. If a school plant is to be a community center, it will require a definite type of educational planning. In providing adult classes the possibility of avoiding duplication of facilities needed for the children must be given due consideration.

Sites and Design

A site for the school building is as important to the educational program as are classrooms and other instructional spaces. Three trends in the development of school grounds are:

1. More acreage is needed.
2. Greater utilization of the site is being made.
3. School and community use is on the increase.

Architectural Features

The architectural features should be planned in terms of:

1. Maximum educational activities both within the building and on the school plot.
2. The space that will be required for the building, parking area, walks, landscaping, etc.
3. Expansibility sufficient for future needs.
4. Maximum natural ventilation and lighting.
5. Maximum provision for reducing and separation from noisy areas.
6. Without excessive ornamentation.
7. Convenience and safety.
8. The suitability of the soil for educational purposes.
9. The location should fit into the regional highway planning and community street plan.
10. Whether or not the site will be used for community activities.
11. Adapting the building to the site. Economy may be achieved by carefully adapting the building site. Land contour must be known and considered before plans are made for foundations, so that the floor will not be too far above the grade or below grade level. If the contour is such that one level near the building location is somewhat lower, it may be advisable to construct units requiring high ceilings, such as gymnasiums, auditoriums, etc., at this point.

Layout

Much thought should be given to the general layout of the building. The range in this connection is from a multi-storied block type plan of building to a one-floor open type. The trend is toward the one-floor type of building.

In the multi-storied type, economy may be achieved in terms of limiting roof foundation costs and in heating expense. This reduction in cost, however, may be considerably increased by the added expense of strength in foundation, duplicated corridors and necessary stairways.

A few of the advantages of the one story or open type plan are the following:

1. Reduces fire hazards.
2. Better provision may be made for natural light and ventilation.

3. More desirable access to all parts of the building from the outside.

4. Greater flexibility and ease of expansion.

5. Easier to isolate primary area.

These advantages are so outstanding that an effort should be made to keep the number of stories to a minimum.

Basements

It is not recommended that basement areas be provided in school buildings except occasionally for heating plants when the slope of the plot gives advantage. The use of rooms below grade level tends to reduce the natural light and ventilation. This makes the rooms undesirable for instructional or recreational purposes.

Areas Subject to Concentrated Occupation

Those areas, which are mainly auditoriums, gymnasiums and cafeterias, should be located so that they are easily accessible from within the building as well as from the outside of the building. Safety and convenience dictate that these rooms should be located on the ground floor.

Non-usable Spaces

Economy in planning requires that much thought be given to the reduction of such spaces for the use of both man and materials in such a way as to secure the lowest possible construction cost. This should be done without sacrificing quality of construction and with due thought to the grouping of rooms requiring special facilities. Such grouping is important and is recommended in order to increase the flexibility of the building and to reduce the cost of maintenance.

Space Requirements

Economy in planning may be achieved through careful consideration of space requirements. Classroom space should be adequate to meet the needs of the program. The size of the auditorium in relation to enrollment and expected community use must be carefully considered. The amount of spectator space in the gymnasium is always a problem to be considered. The various unit sizes should be planned in relation to each other so that neither is too large nor too small. Wherever possible, units should be used for more than one purpose. Some authorities suggest that the floor area be divided on approximately the following percentages:

1. Instructional spaces—at least 55%
2. Stairs and corridors—not more than 20%
3. Administrative space—not more than 12%
4. Walls and accessories—not more than 13%

Operation and Maintenance:

Economy of operation and maintenance requires that provisions be made for at least the following:

1. Floors and walls should be so constructed as to provide ease in cleaning.
2. Cleaning facilities should include such things as sinks, storage space and electrical outlets.
3. All fixtures and other equipment should be conveniently accessible for inspection, cleaning and repairs.
4. Replaceable materials should be made possible by the use of standard sizes, colors and designs.
5. Sufficient work space should be provided around all machinery and equipment.

Expansibility

During the life of any school plant many changes occur that will affect the number, size and type of classrooms as well as other spaces needed for the school program. Some of these changes may be anticipated by a study of population and enrollment trends. Many others cannot be foreseen. The educational program is constantly changing and facilities constructed today may not be the type that will best meet the needs of the educational program ten years later.

Because of the changes in school programs and the unreliability of enrollment, predictions beyond a reasonable length of time cannot be made. All school plants should, therefore, be planned for ultimate expansion.

The following points should be given consideration in designing school plants to house increased enrollment and changed program needs.

1. The school site should be sufficiently large to provide play areas for increased enrollment. The building should be so placed on the site that additions can be made without encroaching upon these areas.
2. The building should be so located on the site that property lines will not interfere with future expansion and so that permanent walks, driveways, and service drives will not have to be radically changed when additions are made.

3. Septic tanks and drainage fields, when required, should be carefully located to avoid the areas that may be needed for future additions.
4. Corridors should be extended to outside walls where future additions are planned.
5. Stairs should be placed in separate enclosures at right angles to the corridor. Placing them at the end of the corridor often requires that they be removed before an addition can be made to the building.
6. Windows should not be located in walls against which a future addition is likely to be constructed.
7. Boiler rooms should be sufficiently large to allow the installation of a larger or additional boiler that may be tied to the present installation. As a rule, one heating system is more efficient and economical than two small ones working separately.
8. Electric wire sizes and switches should be sufficiently large to take care of a reasonable extention without being overloaded. All entrance switches should allow a few unused circuits for future use.
9. The size of the sewage disposal system should be based on the ultimate expected enrollment.
10. Locate entrances so they will not be eliminated by additions.

Flexibility

There is nearly always a need for alterations and changes in the internal arrangement of the building. The ease with which these changes may be made depends, to a large degree, upon the original design of the building.

Often school rooms must be altered in size in order to adapt them to program changes and to the different activities. Achievements in connection with flexibility cannot be left to chance but must be given positive consideration in the planning process.

In planning for flexibility the following points should be considered.

1. Internal partitions should be non-load-bearing as far as possible.
2. Windows should not be grouped for each room but should be continuous along the entire wall.
3. Conduits, vents, heating and water pipes, etc., should, so far as possible, be located in the corridor and outside walls instead of in partitions between rooms.
4. Rooms should be grouped in series to allow maximum space for alterations. Inflexible installations such as toilet room, stair walls, etc., should be grouped with these requirements in view.

5. Interchangable lockers, shelves, cabinets, etc., might be planned in order that they may be shifted from one room to another as changes demand.

Careful planning in this connection makes it possible to achieve a high degree of flexibility without sacrificing arrangements and provisions that best serve the need of the program.

Circulation

Student traffic usually results in a series of peak loads during the day. This means that the design for student traffic within the school must be carefully planned to meet the needs for these peak periods. There should be no bottlenecks where traffic must go through a narrow passageway from one part of the building to another. It is essential that pupils be able to move freely from one part of the building to another. Corridors should be planned for easy flow. The following points should be considered in planning good circulation in school buildings.

1. Eliminate corridor crossings.
2. Group allied rooms.
3 Allow no fixtures to protrude into the corridor.
4. Provide enough inside stairways.
5. Reduce verticle traffic as much as possible.
6. Have some lobby space for dispersal of incoming crowds.
7. Provide sufficient corridors inside.
8. Do not allow instructional or general service rooms to be used as passageways.
9. Lunch room, auditoriums, cafeterias and general service rooms should be so located that they are accessible from more than one corridor.
10. One toilet for each sex on each floor should be considered a minimum.

Sanitary Conditions

Well arranged sanitary conditions are essential for the health and comfort of the pupils. The following list of principles provide the necessary sanitation in the good school:

1. The water supply should be adequate and safe.
2. Toilet rooms should be sufficient in number and convenient in location to accomodate the enrollment.
3. Plumbing facilities should be such that maximum sanitation may be attained.
4. Toilets for both sexes should be located on all floors.
5. Drinking fountains should be available on each floor and it is recommended that they be recessed for convenience and safety.

6. The sizes and heights of all facilities should be adjusted to the age to be served.
7. Adequate slop sinks and electrical outlets should be provided.
8. All materials should be selected in terms of the ease of cleaning and maintenance, as well as durability.

Heating and Ventilation

The following guiding principles for heating and ventilation should be observed:

1. The temperature of the room should be such as to prevent excessive loss of heat from the human body. This necessitates higher temperature in such areas as dressing rooms, showers, etc.
2. Such atmospheric conditions should be maintained in all usable spaces so as to make safe and comfortable breathing possible at all times.
3. Areas where oders are prevalent and sanitation is paramount such as toilets, cafeterias, etc., should have independent exhaust openings.

Visual Conditions

Eye strain due to glare or dimness, poor eye sight and improper type on the page is a major cause of fatigue where close work is to be done. In recent years a number of careful experiments have revealed that proper lighting will reduce fatigue, will aid in the educational processes, and will help to improve certain eye difficulties.

The quantity of light necessary depends upon the task to be done. The more detailed and precise the tasks, the more light is required. In general, however from 30 to 40 foot-candles are desirable in regular classrooms and at least 50 foot-candles in classrooms where close work is done.

The Illuminating Engineers Society recommends the following intensities in foot-candles:

Classrooms, libraries, shops, and laboratories	30
Sightsaving classes, drafting and sewing rooms	50
Gymnasiums and pools	20
Auditoriums, cafeterias, corridors with lockers, and stairways, etc.	10
Corridors and general store rooms	5

Improvement in lighting, however, does not merely mean more light; there are many factors other than intensity of light which can contribute to producing a well-lighted room. The quality of

light depends upon the source and the intensity of the light, and the general environment, insofar as colors, brightness, and reflection are concerned. When one discusses the quality of light, it brings into consideration brightness-difference. This is defined as a difference in brightness among various reflecting surfaces within the visual field. Only within the visual field of the immediate task does the brightness-difference need to be high. For example, it is easiest to read black type on a white page. Neither very dark nor very bright objects away from the central task are desirable.

The National Council on Schoolhouse Construction proposes the following recommendations on brightness-differences:

1. Within the peripheral field the brightness of a surface should not be more than 50 times or less than 1/5 of the task.
2. Within the surrounding field the brightness should not be more than ten times or less than 1/5 of the task.

In attempting to meet these recommendations it will be found that the reflection factor of surrounding areas control the quality of light. To obtain the above ratios it is necessary to have paint of about the following reflection factors:

1.	Ceiling	80% or more
2.	Sidewalls	50-60%
3.	Wainscot and baseboard	40-50%
4.	Floor	30-40%
5.	Furniture and equipment	30-40%

Some provisions for artificial lighting in the school room is usually necessary because of the uneven distribution of daylight, the size of the room and the use of the buildings in the evening. In choosing the kind of artificial light to be used, the following should be used as guiding principles:

1. Sufficient light for ease of seeing.
2. Absence of glare or bright spots in visual field.
3. Softness of shadows.
4. Attractive installation.
5. Ease of maintenance.

The above conditions may be met by either fluorescent or incandescent lighting. The installation of fluorescent lighting usually costs three or four times as much as incandescent. The school should be lighted adequately with natural light and, therefore, there should be very little use for artificial lighting except on dark days. Where artificial lighting must be constantly used and over a long

period of time, fluorescent light will usually give cheaper service because of lower current consumption. The school is not usually a major user of artificial light. If such is the case, it may be cheaper to install incandescent lighting.

Within recent years attention has been given to methods of securing natural light other than by means of the standard bank of windows. Various plans of bilateral and multi-lateral lighting have been proposed. These methods tend to diffuse the natural light more evenly throughout the room. In most cases such lighting plans can be established easily in the one-story buildings because of the necessity for stepped-up ceilings and skylights. Particular care must be taken that all glass panels and sky-lights be shielded to eliminate glare.

Directional glass blocks have also been introduced for unilateral lighting. The principle involved in the use of glass block is that regardless of the height or direction of sunrays, prisms within the blocks will direct the light upward so that diffusion and reflection from the ceiling may be secured. Regardless of this quality of the block, there appears to be a certain amount of undesirable glare under most conditions. Window shades are therefore necessary to control the light in practically all cases. Shades should be mounted at the mid-point of the windows for separate control of the upper and lower half of the window area. Light-colored translucent material should be used. Venetian blinds, although easily operated, require considerable maintenance and adjustment. Draperies are not considered to be as worthwhile because of their inflexibility.

The skillful use of color will also enhance the quantity and quality of light and will serve to establish the proper brightness-differences. The reflection factors for different colored paints, etc., can only be secured through the correct color selections. For an 80% or more ceiling reflection factor, colors close to white will be necessary. Warmer colors such as cream, canary, peach, coral and certain tints of green and blue will give a 50-60% reflection factor to side walls. On the wainscot, complimentary or contrasting colors to the sidewalls will maintain the 40-50% reflection factor. Floors, in order to meet the 30-40% recommendations, must have finishes of light maple, oak or tile, or light linoleum or plastics. Dark floors and finishes as well as dark brown furniture are not considered to be satisfactory. Any trim should maintain the same reflection factor as the immediately surrounding walls.

Auditory Conditions

In all classrooms and auditoriums the acoustics should be such that the children will be able to hear with ease. At the same time, provisions must be made so that noisy areas such as corridors, gymnasiums and lunchrooms will not disturb the other areas where quiet is necessary.

In order to insure conditions of this sort, acoustical treatment of the building may be necessary or removal of these noisy areas to some territory where they are not close enough to disturb classroom work. Some procedures of obtaining good auditory conditions are listed below.

1. Isolate or insulate noisy areas, walls, ceilings, and floors so that the desirable quiet condition may be attained.
2. Reduce noise through the use of quiet floor materials.
3. Treat all instructional rooms and circulation areas with proper sound absorbent material.
4. Locate the school building itself as far away as possible from congested and noisy areas.

Safety

Safety is a characteristic of the good school plant. One phase of safety has to do with the danger of fire. Fire resistive materials should be used in the construction of the building. Stairway, corridors and means of egress must be laid out with care in terms of fire and panic hazard. A recent comprehensive study of the National Safety Council reveals that a large percent of accidents occur to the pupils in the seventh, eight and ninth grades. Here thirty-five per cent of all accidents occur, and in the upper three grades, twenty-six per cent. This leaves only thirty-nine per cent for the kindergarten and first six grades. This study shows further that over half of the accidents occur in connection with physical education. Of the total accidents inside the school building, thirty-nine per cent occur in the gymnasium. Statistics such as these give a guide in planning the operation of a safe school building.

Community Use

The school building should be erected for community use. Facilities in all schools, whether in large or small communities, should be made available for community use and appreciation.

The planning of buildings for community use will be related to two general areas.

1. Spaces such as those contained in gymnasiums, auditoriums, cafeterias, libraries, recreation areas and grounds which may be

used by groups in connection with civic, social and recreational activities.

2. Other instructional units such as homemaking, science laboratories, shops and certain types of business education which should be used by adults after the normal daytime activities have been concluded.

As these areas are made available to the community and as the people in the community come to realize the school's usefullness and importance in the total ongoing pattern, will the school assume its rightful place in the interest of the community. It will then become a community school whose activities are embraced and endorsed by the residents of the community.

It is usually wise, where only certain parts of the buildings are used by the community for evening classes or meetings, to provide corridor gates to close off the rest of the building. These gates should be located so as not to block off toilet facilities needed in the program for adult education and work. It also may be wise to plan service facilities so that areas subject to extension community use may be used independently of the rest of the building

V DEVELOPING THE BUILDING PROGRAM

Society has a right to expect that its schools will provide educational programs suitable to meet the needs of those who will attend them. Schools, therefore, are expected to give consideration to providing educational facilities for all the children. Our present society will not be satisfied with educational programs which are only academic in scope.

The school of the future will be required to furnish many services which it has not provided in the past. It will be expected to provide programs covering health, physical education, recreation, music, art, hot lunches and opportunity for wider participation in community activities and programs which involve activity as well as abstract thinking. The school of the future will be expected to be much more than a series of rooms with fixed seats. Many special rooms and equipment will be needed as instructional spaces. What once were known as classrooms will become more or less work shops with large spaces, informal equipment and mechanical and electrical facilities for audio-visual aids. Much shelving, cabinet and closet space will be needed for the protection and systematic storage for pictures, films, records and innumerable other gadgets that will become as much of the modern school as the old blue-back speller and slate of the schools of many years ago.

A school conducted in the building of the future will not all be indoors. Large sites will be required for school and community recreation, parking, landscaping, swimming pool and special buildings, such as shops, and recreational area. The school of the future should be the educational and recreational center not only for the children, but for the adults of the territory which it serves. Functional facilities should be the guiding objective in planning the school plant. The trend is toward single story buildings of simple, but dignified, design on large sites and away from noise and confusion.

In order for the school plant to meet requirements for a future expanding educational program, it must provide more land, more floor space, increased number of entrances and exits, natural and artificially controlled lighting, acoustical treatment, built-in features, informal furniture, instructional supplies, books, pictures, more color, tools and gadgets which we cannot now anticipate. The school plant for the future should be functional and built to accomodate groups of children busily engaged in activities which will develop minds, build bodies and form character. The building in a large

measure conditions the educational program which may be operated within the spaces it provides.

An architect should be employed early in the planning program so that he can participate in studying the educational needs and the ways the buildings are to be used.

A. Selection of the Architect

The individual who serves as a school architect should be able to translate the philosophy of the educator and the practices of education into an attractive economical and functional school plant. The school architect must be thoroughly appreciative of the trends and recent developments of education to insure success. He must be able to realize fully the demands and the significance of each school activity. He must possess vision to interpret the aims of the educator and the ability and imagination to coordinate his architectural ability to fulfill the best educational functions. In addition to this, the individual who designs schools must have the other qualifications of any good architect, such as integrity, tact, business ability, artistry and technical knowledge and skill.

The most satisfactory way to select an architect is to consider his professional qualifications and the work which he has done. Some of the questions that should be answered in selecting an architect are:

1. What recent experiences has he had in planning schools?
2. Is he thoroughly familiar with present day educational needs and practices? Is that familiarity shown by the manner in which the schools he has built meet the educational demands imposed upon them?
3. What kind of organization does he maintain?
4. Does he work harmoniously with his educational advisors and contractors? This can be known by consulting some of his former clients.
5. Does he give adequate supervision to his buildings?
6. Does he have set, preconceived ideas which are hard to change or is he willing and eager to adopt designs to meet needs?
7. Is he a man of unquestionable character and professional integrity?
8. Does he show such economy in the use of space and materials as is consistent with educational needs and financial ability?
9. Are his buildings attractive without undue ornamentation?
10. Does he have adequate engineering service available?

After some investigation, any list of architects will probably be narrowed to two or three. These then can be interviewed to allow for a direct sizing up and an interrogation regarding the extent and quality of his recent experience, his methods of operation, fees, etc. The final selection can then be made. This is a procedure that requires some effort on the part of the school officials, but it is much more satisfactory than waiting for an architect to sell himself. The most convincing self-salesman is seldom the best architect.

Beware, too, of the architect who intimates that he can provide more building for less money. The contractor sets the price and erects the building, not the architect. You pay for what you get. Decreased cost can seldom be secured except through less building or reduced quality of construction.

Whereas school design experience is extremely important, other factors being nearly equal, the architect who has designed the most schools may not be the choice. He may have designed only a great many mediocre buildings and may lack the imagination to do more than hark back to obsolete solutions when faced with a new problem. On the other hand, there are undoubtedly architects who, while lacking school experience, nevertheless have a general background plus the vigor, imagination and willingness to work and study new problems to the end that they may produce fresh and superior solutions.

The State Department of Education does not recommend architects for any school program, nor does it provide architectural service. The choice of an architect is the duty of local school authorities. In many cases, the superintendent of schools has so familiarized himself with the work of numerous architects that his advice is valuable in helping the board of education make its final choice.

B. Some Factors to be Considered

1. Who will use the building?
   a. Nursery
   b. Kindergarten
   c. Grades
   d. High school
   e. Adults
   f. Groups by ages
   g. Number of each
2. Location:
   The location of the school is important. This involves some well thought-out relationships and decisions. These de-

cisions involve the relationships of the particular building program to the total building program for the district and the school transportation that will be involved. Decisions should be made involving these relationships before land is purchased for any new building or a decision is made to erect an addition to an existing building. In determining the location of the building such questions as the following must be answered:

a. What shall be the desirable maximum size of the schools in congested areas?
b. What shall be the minimum size of schools in sparsely settled areas?
c. Which of the existing school buildings should be discarded?
d. What amount of space will be needed for each school?
e. What outside activities will be carried on for each school?

3. What activities will be housed?
It should be assumed that the following four groups of activities are to be housed:
a. Acquiring academic subject matter and understanding.
b. Developing skills in applying scientific knowledge.
c. Improving physical strength and well-being.
d. Becoming successful social beings and members of a group.

4. Planning the academic program:
This part of the planning is concerned with the material taught in the classrooms, such as English, mathematics, science, etc. The size and shape of spaces will depend upon the number to be served, the kind of educational program that is to be housed, and the funds available. Natural and artificial lighting must be made to meet minimum health and safety standards. The materials of construction and the equipment are important and will be affected by the funds, location and program.

5. Planning for the development of skills:
Such planning will be concerned with applying skills, science, art, woodshop, mechanical skills and kindred subjects. The major point of educational consideration here is the extent to which the skill-producing activities can be fused together and taught in broadly allotted spaces in contrast to classrooms.

6. Planning for physical development:
One of the most noteworthy expansions in the scope of educational planning is the concern for the health of the entire student body. Both indoor and outdoor space should be provided to the end that each student will be alert and responsive in activities and that each will experience team

effort and individual conflict with at least an occasional victory.

7. Planning for social development:
The auditorium or some such space for occasional meeting of groups, the whole school and the community for plays, orchestra and bands is essential to social development. That such space should be acoustically treated is almost mandatory. It is also important that it have a stage, scenery and ample equipment.

C. Adequacy of the Present Plant

An evaluation should be made of the present school plant in the light of long range planning. This should be done in order to determine ability to house the present school program and to better provide for the comfort, health and safety of those who use the buildings. As a measure of economy, any serviceable facilities should be continued in use even though funds are available for replacing them.

Many buildings that are structurally sound may be educationally obsolete. Such buildings, when they are reasonably well located, may be used in long range school plant planning even though they may have deficiencies, provided these deficiencies can be corrected at a reasonable cost. It is understood that such costs should be in line with the usefullness of the facilities which will result from the remodeling.

Even though a building may be worth remodeling, declining enrollment, shifting population and changes that should be made in the building may make it unwise to consider remodeling or making changes because of an apparent change in the educational program of the community. Two basic questions should be answered before specific improvements are made in modernizing any school building: Is the building structurally and educationally worth remodeling? And, is the building, if remodeled, needed in the housing of the educational program that will be carried on in the community?

In determining the answers to these questions, at least the following points should be considered:

1. **Health and Safety—**
   a. Do the exits from classrooms, assembly rooms and corridors, stairs and drinking fountains give the necessary protection for children and teachers? If not, can this be provided?
   b. Is the building fireproof?
   c. Does the building have proper approaches?

d. Are the stairways, passageways and doors large enough, fireproof and kept open?
e. Is it free from dust, dirt, noise, unpleasant odors and gases?
f. Is the water supply adequate and pure?
g. Are there any other features that would hamper general safety?

2. **Site—**
a. Are the physical features such as to permit improvement?
b. Is it large enough for the program? (Minimum requirements for new sites are five acres for the first one hundred pupils and an acre for each additional hundred for elementary schools. For high schools, ten acres is the minimum for the first one hundred pupils with an acre for each additional hundred.)
c. Can additional desirable land be secured?
d. Can the present lot be improved by landscaping, which includes shrubbery, roads, walks, etc.?

3. **Lighting**—Is the lighting, both natural and artificial, satisfactory? Can it be made to meet minimum standards?

4. **Toilet facilities—**
a. Are the present facilities satisfactory and large enough?
b. Should they be replaced?
c. Are they well located, well lighted and ventilated?

5. **Heating**—Is the heating plant satisfactory or can it be made so?

6. **Remodeling vs. adequacy**—If the buildings are remodeled, will they be comfortable and generally satisfactory for the educational program? In other words, will the community be satisfied to continue the school for the next eight or ten years in this building, and will the cost be reasonable in the light of what the community will have when the job is done? In order to answer these questions standards suitable for pupil and program space requirements should be available for the program which is to be operated. To determine these standards one must have not only a general knowledge of the program to be housed but should consult with the staff of teachers who will use the buildings in order to get first hand information of the needs of the staff.

7. **Possible use of the remodeled building—**
a. Is the population of the community such that it is not likely to decline?
b. Will there be continued use of the building?
c. Is there any possibility that there may be an immediate increase in the population?
d. Can the children living in the territory walk or be transported conveniently to the buildings in other parts of the system?

e. Would it be wise to add a smaller building in a nearby community in order to permit the smaller children to be nearer their homes and thereby increase the size of the school plot rather than make an addition to the present building?

8. **Economical maintenance—**
   a. Does it have space that is being unused that might be put into use?
   b. Does it permit the smooth flow of pupil traffic?
   c. Is the service system free of leaks, stoppages, etc.?
   d. Can the heating cost be reduced?
   e. Does it provide for minimum maintenance cost?
   f. Does it provide or can it be made to provide for maximum natural light?

9. **Other features—**
   a. Is the building readily accessible or can it be made as accessible as desired?
   b. What provision is made or can be made for expansibility and flexibility?
   c. What is the outside appearance, and can it be improved by additions?
   d. Is the location desirable?
   e. What is the condition of downspouts, walls, foundation, and openings and the possibility for improvements?

10. **Temporary buildings as a possibility**—If there is some question about the continued use of the building and there is overcrowding, would it be wise to add one or more portable one-room buildings on the plot as a temporary measure until a definite decision can be made, or to take care of a housing situation where funds are not yet available? In determining such questions, superintendents and boards of education should make themselves familiar with facts concerning standards on maximum space allotment for instruction; administration and auxiliary services; comfortable and sufficient seeing and hearing conditions; and provisions for heating and ventilating. Some plants, because of certain incorrectible defects, should be abandoned on a long range program. A schedule for abandonment should be set up in the light of urgency of need and funds available. In many instances immediate abandonment will not be possible, but in a long range program, it may be wise and necessary.

D The Plant Program

When the school officials of any district have determined that there is a need for the construction of one or more new buildings or additions to two or three buildings, it will usually be wise to make a district-wide study of the school building needs.

District Organization

In order to approach the problem in the most efficient manner, it is necessary to know what area the school or schools will serve in the foreseeable future. Too few children and too small a tax base inevitably results in limited educational programs at high costs. This is especially true at the high school level. It is only reasonable to expect that school districts, when faced with the increased demands for services at increasing costs, will turn to ways of obtaining the needed services. Under such circumstances the planning agency is faced with the problem of whether or not action should be taken to:

1. Form larger administrative units,
2. Plan district wide services for all the schools of the district,
3. Provide for supplementary services through cooperation with neighboring districts.

In order to determine how many children will attend schools in the district in the future, planning agencies should consider the possible changes that may take place in the organization of the district and what effect this change might have on the enrollment in the school or schools.

The Choice of a Method of Study

There are a variety of ways in which a choice of a method of study may be made:

1. The necessary information may be gathered within the community by educational leaders of the community or district,
2. Outside experts may be employed for this service, and
3. Local school officials serving on a committee with community leaders may gather the information necessary and consult with outside authorities.

It is possible that the method used may be determined by availability of local personnel, the amount of research to be done and the money available to pay for outside services.

Other Planning Groups

In considering the school building plan there should be taken into consideration any pertinent information available from:

1. Other planning groups,
2. Other community groups such as private and parochial schools, or
3. Other agencies of the community such as city planning boards and commissions.

Where there are no other planning agencies, the school planning agency should consider such factors as:

1. The possible effect on the schools that the city planning policy may have on industry and resultant population changes,
2. The probable direction of growth in the community,
3. The probable future location of business, manufacturing and residential areas,
4. The American Association of School Administrators in their publication, "American School Buildings," suggests that the following information should be shown on maps:
   a. Number and kind of residential buildings erected over a ten year period,
   b. Zoning provisions where they may affect the school program,
   c. Location of all public parks and play grounds,
   d. Spot maps of the district showing the location of each pupil to be enrolled,
   e. Location and area of school district property, and
   f. The location of each school building and its attendance area.

Future Enrollments

When the district organization has been determined and the effect of any planning groups, on population changes, has been studied, forecasts of enrollment by grades may be predicted with a fair degree of accuracy for the task at hand. It is suggested that all estimated future enrollment figures should be used with caution. Enrollment conditions, wars, legislation, birth rates and other factors are sometimes difficult to estimate. There are listed below a few suggestions based on known births which should be of assistance in predicting future enrollments.

1. Take an accurate pre-school census of all the children in the district, if figures are available, for computing the survival rate of ages from one year to six. If not, a pre-school census of one or two years preceding enrollment will help considerably in determining what the enrollment of the kindergarten or first grade enrollment may be. Include those areas which are served by the district on a tuition basis if there is a considerable number of tuition pupils involved.
2. Determine by estimate or questionnaire the number of children in each age group who attend school.
3. Estimate the percentage of children who can be expected to continue from one grade to the next. Past enrollment should be a help in making this estimate. If tuition pupils are involved in enrollment it will be wise to make some estimate of the number of these who may be enrolled and what grades of the school program they may appear in.

Other Community Data

In addition to these data, maps or a series of annual comparison maps might be prepared to show how the different land areas of the district are being used with respect to business, manufacturing, dwellings, large real estate subdivisions and farming. Such maps will serve as a questionnaire to bring together useful materials that will answer questions on the following points:

1. Where the young married couples are living who will rear the children who will have to be cared for by the school system in the near future.

2. The areas where the number of pupils of the district is declining, is stable or is growing.

3. The location of air ports, manufacturing industries, and any other factors which may either form a nuisance or hazard to existing schools or schools contemplated for future construction.

4. Existing and future traffic arteries which may be formed as a result of growth. Some investigation should be made of the likelihood of new traffic arteries which may be formed by the rerouting of highways.

Forms should be developed and maps prepared for the following information:

1. Pupil trends.
2. School population trends.
3. Business and industrial trends and housing conditions.
4. Existing school facilities and services they render.
5. Educational facilities and opportunities in the community other than public schools.
6. Attendance and census service.
7. Retention in school.
8. Local employment of the graduates; migration of graduates.
9. The social, spiritual, recreational, civic and vocational pattern of the community.
10. All school organizations.
11. Changing emphasis on education—national, state and local.
12. Educational problems confronting the community such as community use of school facilities, education of adults, etc.
13. Financial resources of the community; ability and willingness to pay.

Predicting Population

Predicting the number of pupils who will be in school in a particular district ten years hence is a difficult undertaking, but the responsibility for making such estimates must be assumed by those

charged with the planning of school building programs. Gross errors in predicting enrollments lead to waste or to overcrowded buildings. A careful study should be made of the local situation and of methods of estimating the school population.

Predictions of total population must be based on birth and mortality rates and also on factors which determine the flow of population into and out of the particular school district. The Bell Telephone Company had developed an index-analysis method of prediction which takes account of the major factors in population changes. Indices have been set up to show the normal survivorship from any group of newborn babies at any given age in the future and also to show the probable net migration into or out of each area under consideration. When such information is available for a school district, it should be obtained and studied. It should not be assumed, however, that such calculated estimates possess a greater validity than they really possess. Such a method of prediction may give quite good results in one district and be far from accurate in another. It is necessary for school officials to study the data on which the estimates are based, to insure that the limitations and special problems of the particular district have not been ignored.

When calculated estimates of future population are not available or when such predictions are considered unreliable, local school officials must devise their own procedures for forecasting. Refined statistical techniques are not necessary. It is much more important that accurate data be obtained and used as a basis for prediction. If all of the pertinent facts are known, a common-sense inductive approach will give a reasonably accurate estimate of the total population.

The school census can be forecast on the basis of predictions concerning changes in the total population and in the ratio of number of children to number of adults. Such predictions can be made on the basis of observed trends in the flow of families into and out of the district and in the birth rate. National and state as well as local trends should be noted in regard to birth rates. Analysis should be made of the survivorship of different groups of children, also. That is, the number of children at age six should be checked against the number at age seventeen, eleven years later, for several different groups. Such analyses will reveal a trend in survivorship in the district and will constitute an important factor in estimating the school census ten years hence. Since conditions may have

changed, the estimates must also take into account any factors which may have a bearing on future trends.

In addition to all of the other factors which affect school population trends, another variable must be considered when an attempt is made to forecast school membership. This new factor is the holding power of the school. Whether the school will enroll a larger or smaller percentage of the future population depends upon several factors, some of which are not controlled directly by school officials.

Those responsible for planning the school building program must be as realistic and practical in estimating school enrollment as in predicting total population. Again, past trends provide the best guides in forecasting, but the probable effects of new factors such as enrichment of the program or increased efforts to enforce attendance laws, should also be considered. No method of predicting enrollments can yield good results unless accurate data are obtained and analyzed in the light of local conditions.

Estimating Plant Capacity Needed

On the basis of anticipated population and school membership, the local school officials should arrive at a careful estimate of the number of children for whom the total school plant will be planned. It will be desirable, because of the long life of good school buildings, to be able to predict the needs of the district for thirty or forty years in advance. Since such long-range forecasting is impractical in most districts, and because predictions made for even a few years ahead may prove inaccurate, provision must be made for expansion or contraction of the planned school plant. Buildings should be so planned and should be located on sites in such a way that expansion is readily possible. Financial resources must be conserved to meet unanticipated demands. Even the most carefully prepared estimates of needs may be rendered inaccurate by unpredictable influences. Hence flexibility in planning is a necessity.

E. The Educational Program

Any recommendations for schoolhouse construction should be based upon a complete understanding of the educational program. School life today includes many factors not included in the past. Educational experiences are expanding and changing along with changes in the economic and social order. They vary widely in different communities, and much more than in the past when the traditional "three R's" constituted the principal part of the course of study.

In most cases a school district considering a building program is already operating schools. For that reason an educational program has already been set up and defined. This does not mean that such a district is justified in assuming that the existing program does not need to be reviewed. The planning of buildings or the making of additions to old buildings will offer an excellent opportunity to review and re-evaluate the present program and to do a great deal toward making the necessary improvements.

In view of the fact that it may be wise to re-evaluate the existing educational program and the further fact that the success requires the support and participation of the citizens involved, it is suggested that the board of education should have a committee or advisory council consisting of some faculty and a group of some members of the community to assist in the re-evaluation of any present educational program. This committee or council should assist the board of education in determining:

1. The end products of the school program such as the skills to be developed in the pupils, and the competencies and the attitudes to be attained by the students.
2. The kinds of instructional material which will be needed.
3. The building program that will be needed in terms of the objectives of the educational program.

In applying these terms in the building program, it is necessary to keep in mind the following:

1. The general characteristics the building should have that will be influential in child development.
2. A building planned in such a way that the maintenance and operation may be carried out in an efficient manner.
3. The nature of the activities, both administrative and operational, which will be carried on in the building.
4. The characteristics of the rooms which will be necessary for carrying out the educational purposes of the educational program for the children to be housed.
5. The structural details of the service systems which are desirable for effectiveness in the educational program.

Educational Policies of the Board and Staff

It may be well for the board and the staff to agree upon an educational policy or objective. This objective might be formulated in a written statement. (See Appendix B for such a statement.) The instruction program should be developed in terms of the philosophy of the objective. The school program should be a means of putting into effective operation the ideas expressed in the policy or objective. (See Appendix E for an example of objectives.)

Quantity vs. Quality in Building Construction

It is recognized in many instances that a desirable building program must be cut because of limited funds. It is often necessary to plan building construction where there are insufficient funds to provide the buildings which are essential for the type of program to be housed. In such cases the quantity and quality of the building construction should be given much thought.

Since the quality of the facilities affects the desirable development of the individuals using them, it is always wise to weigh well the desirability of limiting quality in favor of quantity of school building space. If at all possible, it is more important to limit quantity and hold to a minimum quality. The quantity can be achieved over a long period of time, but it is difficult to increase the quality after the first unit of the building has been constructed.

School Organization

As the educational needs are being expressed in terms of the educational program, there should be a clear outline of the objectives of each school. They should answer such questions as:

1. What is the general purpose of the particular school building?
2. What organizational pattern will be used, such as K-8-4 or K-6-3-3?
3. What special services will be provided? For example, what provision, if any, is to be made for teaching handicapped children, for adult education, for evening classes or for health services?
4. What will be the policies concerning walking distances for the various age groups?
5. What will be the policies on transportation time and distances?
6. Will there be reorganization or will there be added facilities provided?
7. To what extent and what use will be made of the school facilities by the community?

Larger Schools

A number of studies have been made during the past twenty years concerning the most effective size of school centers. Each of these state that there is a high relationship between small schools and meager educational opportunities. School leaders generally recognize the difficulty of providing a satisfactory educational program with small enrollments.

1. Some reasons for larger schools:
   a. They require a larger and more permanent type of school building which is more economical to construct and maintain than several small one-and two-teacher schools of the same type of construction and in which an attempt is made to render the same quality of service.
   b. The school buildings and grounds for larger schools are more likely to be classified as outstanding beauty spots in the community.
   c. Better qualified teachers are more likely to be attracted to larger, well-planned and well-equipped schools.
   d. Transportation, if properly carried out, is likely to prove less hazardous than if children are required to walk to schools on the dangerous highways.
   e. A broader educational program may be offered, and, consequently, the children will be given greater educational opportunities.
   f. The holdings of larger schools tend to be greater than those of smaller schools. This should result in a larger percentage of the school children being given the opportunity, as well as the desire, to obtain a more desirable and useful education.
2. Some procedures in increasing the size of the school are:
   a. The only means whereby the rural territory will have an opportunity to provide a school which can be economically operated and at the same time be efficient in providing instructional opportunities for the pupils who are to use it is by combining the smaller units into larger units. The size and organization will depend a great deal on the location, roads and the program to be operated in the district.
   b. There are many instances in the state where the present twelve-grade centers might be combined in such a manner as to make a larger high school center of a more economical and efficient type and leave the grade centers essentially as they are.
   c. There are other types of organizations where it may be wise to leave the lower grades in the present location and combine the upper grades into a larger, more efficient and economical school organization.

Characteristics of an Effective School Center

1. Some Factors which Alter Desirable Situations:

   There is a trend toward reduction of the number of small schools and increasing the size of the school centers. Since this movement has a direct relation to the economy and adequacy of the educational services which may be ren-

dered, any center should have a sufficient number of pupils to justify an adequate instructional program.

Certain physical factors may force modification of a desirable situation. For example, it is generally agreed that the school should be located so as to allow the maximum number of children of an attendance area to walk to school. In many instances, existing facilities are too good to be abandoned, thereby making it necessary to depart from the desirable situation. Geographic factors and highway conditions, together with the location of residence of school age children, are related to factors which often force a departure from the most desirable.

2. Setting the Limits of Attendance Areas:

Guides in setting the limits of attendance areas may include such items as walking distance, time on the school bus, class size and area of school sites. To determine logical attendance areas and the location of school centers to serve them, there must be brought together facts concerning:

a. Location of pupils housed.
b. Direction of residentol development.
c. Location and use of existing school facilities.
d. Location and conditions affecting present and planned transportation routes.
e. Any other factors which may affect the conditions mentioned herein.

Desirable Minimum Enrollment

Whether the school is organized as a twelve-grade center, a high school or an elementary center, the approximate minimum enrollments of a satisfactory center should be considered on the following basis:

1. Elementary—Elementary schools should have a sufficient number of pupils to require a minimum of one teacher for each grade. The total number of pupils per center will be affected by the teacher load or by the number of grades to be located in the center, such as 1-4, 1-6, or 1-8. The distance the pupils live from the center and the transportation facilities will affect the minimum enrollment. There will be instances where an elementary school must be maintained that has smaller than the desirable minimum enrollment. There may be neighborhoods both in the city and rural territory which wish to maintain primary schools, grades 1-2 and 1-4, located near the homes of the children. Where such schools are maintained it is desirable to have a minimum enrollment of 100 pupils with 4 teachers employed.
2. High School—The high school should have at least ten to twelve instructional fields such as agriculture, commerce,

English, health, history, government and citizenship, home economics, languages, mathematics, music and art, physical education, science, shops and manual arts. There should be at least one full-time teacher for each instructional field. A teaching load of 25 pupils would thus require a minimum enrollment of 300 pupils. As the school approaches 25 pupils in the smaller classes, such as certain electives, it may be necessary to have two or three teachers in English, mathematics, history, agriculture and home economics.

It will be seen that if economy of organization is to be maintained, a minimum of about five to six hundred enrollment is desirable.

For these reasons, a minimum, desirable high school of 300 pupils with twelve teachers is recommended. In some districts conditions may be such that a sufficient number of high school students cannot be brought together to justify the twelve teachers. In this case, however, high school service cannot be denied, but a minimum organization should be maintained. A five teacher high school organization with about 100 pupils might be recognized.

F. Educational Specifications

The main function of the educational specifications is to provide a written guide to assist the architect and others interested in planning the building. One of the most difficult considerations in planning the school building program is the translation of the school program into building needs. This means that the plan must determine the right number and size of classrooms, laboratories, shops, health and physical education facilities, study rooms, service rooms, office rooms, general purpose rooms and a multitude of other important items. The better job done in this planning means the better school facilities that will be made available. Lowering costs is not so much in the use of materials as it is in the planning. Occasionally there is a tendency to overload schools with more facilities of a certain type than the program requires. If this is done it produces an unbalanced school building which is more expensive to build and operate than is necessary. This can be avoided by careful preparation of educational specifications which will list the needs for spaces and facilities for each building.

Educational specifications may be prepared in one of several ways. They may range from a simple statement of classrooms needed to complete discussions of the relationship that should exist between the different arrangements of the building and may include a complete description of the activities to be conducted and the spaces

needed. Such specifications may include lists of equipment and supplies. The more complete they are, the more help the architect will have in designing the building to meet the needs.

The greatest share of the responsibility in describing the needed building in terms of organization, personnel, curricular activities and present facilities of the district in terms of functions, activities, programs and equipment is that of the professional school staff. This professional planning, which is subject to the approval of the board of education and acceptance of the people of the district, should involve at least a cross section of the school staff.

These specifications should state preference rather than describe specific materials and dimensions except in rather unusual situations. They should provide answers to such questions as:

1. What groups will be served in this building?
2. How will the groups using the building be organized? (This information should include such factors as class size, home room organization, departmentalization, self-contained classrooms.)
3. What curriculum or program will be housed in specific buildings?
4. What special activities will require especially designed facilities? This information should state if there will be a kindergarten, special education, nursery and the like.
5. What equipment, including built-in equipment, and furniture will be in the proposed new building?
6. What special services will be provided in the building, if any? These should include such things as library, audio-visual aids, music, time clocks, fire alarms, storage space for supplies, storage space for books, extra equipment and furniture.

General Building Requirements

1. Capacity—A statement of the number of pupils the building should house at present with an estimated number to which it would be expanded. For example, 600 pupils with provision for expansion to 750. This housing should include twenty classroom units in addition to study hall and physical education units.

2. Stories—The building shall be one or two stories.

3. Future expansion—The building should be designed to make additions in at least one, two or three ways, as the case may be. Examples are as follows:

a. Regular classrooms are to be placed at some designated spot.

b. Service facilities, such as heating, plumbing and lighting, should be designed so it will be possible to expand them if additions are made to the building in the future.

Spaces Required

1. State the number and give some idea of the area and floor space that is contemplated for all or any group, such as primary, high school and junior high school.

2. Give some idea of what each classroom should have, such as chalkboard, tackboard, sink, if any, hanging space for cloaks, teacher's closets, and give approximate dimensions; built-in shelves, general and pupil supply storage and give a description; materials and finishes of the walls, inside surfaces, provision for natural and electric lighting.

3. As an illustration, the educational specifications for a specific elementary school plant might include the following:

a. Six primary classrooms to accomodate grades 1-3, each to consist of approximately 600-900 square feet of net floor area.
b. Each classroom might have some or all of the following:
   (1) Twenty linear feet of work counter including built-in sink.
   (2) Concealed hanging space for cloaks, teacher's cloak and supply closets. (Give approximate dimensions.)
   (3) Toilet room with water closet and wash basin.
   (4) Built-in book shelving, and general and pupil supply storage. (Give description.)
c. Tack and chalkboard requirements.
d. Materials and finishes of inside surfaces, as well as school plot area.

See Appendix C for details of specifications which have been used.

Master Plan

The educational specifications should indicate in general the ultimate or master plan for the school, with a more detailed description of the facilities to be provided by the immediate project. The development of the educational specifications is a long-range cooperative undertaking by the administrative and teaching personnel as well as interested lay groups.

Although the personnel of the State Department of Education is limited, in so far as it is possible it will provide consultative services to local school officials and committees in the development of educational specifications. It is very essential that this department

have representatives present when educational programs are being planned which require remodeling and making additions to the present school plant facilities. Educational specifications and programs should be reviewed by the Division of Buildings and Grounds before preliminary drawings are made by the architect.

Site

The nature and the scope of the educational program of the school center must be known before a proper site may be selected. The educational program is the standard for determining the requirements, not only to house the program, but for the activities which should be carried on outside the school building. This program will, in a large measure, determine the actual acreage needed. In order to perform this function properly, it is necessary that all factors listed in the educational program be complete and comprehensive. For example, each type of playground activity should be listed as to the area. Service and circulation requirements should be fully determined and, where possible, basic areas outlined.

Site planning is the actual application of the educational program to the particular site. In planning for the site, study should be made as to the most desirable place for the classroom area, the service area, activity and recreational areas, parking and bus areas, quiet zones, entrances and access to major and secondary roads from the standpoint of both vehicular and walking travel, terrain, sewage, water, soil borings, etc. It is necessary that all this information be had before the proper site choice can be made. When these studies have been made, they act as a framework for the plot plan and preliminary drawings to be made by the architect.

Considerations in choosing the site:

1. Its location in relation to the center of the school population.
2. Free from noise of highways, railroads, airports and obnoxious odors.
3. Accessible to roads and utilities.
4. Well drained.
5. The general surroundings should have aesthetic values.
6. Provide major safety for all who use the site.
7. Have a minimum size of 5 acres for small elementary schools, 10 acres for large elementary schools, 10-15 acres for junior high schools and 25-30 acres for senior high schools or twelve-grade schools.

No plot should be purchased until it is known that it meets requirements for the educational program. Every effort will be

made by the State Department of Education to have a representative available to work with local officials, architects, and interested citizens in making proper site selection.

Additions or Remodeling

If the project is an addition to, or the remodeling of an old building, information should be given in the educational specifications showing what changes, if any, will be made in at least the following listed areas.

1. What spaces, if any, will be discarded?
2. What change, if any, in the physical structure of old spaces will be made?
3. What change, if any, will be made in the use of old spaces?
4. What new spaces, if any, will be added and what use will be made of each?
5. What walls, floors, heating, lighting, stairways, doors, corridors, etc., if any, will be changed—How and where?
6. What additions if any, will be made to the site?
7. What change, if any, will be made in the use of the present site?
8. What courses of instruction, if any, will be added or discarded?

G. School Bus Routing

Any change in a building program for rural territory may require changes in school bus routes. In the overall plan the future routing of school buses should be given consideration in determining a long range plan and many times on an immediate plan. Such as the following should be given ample consideration:

1. Conditions of roads and streets with special attention to hazards such as railroad crossings, underpasses, busy highway intersections, several federal and state through highways, blind curves, dangerous hills and nolls, and adequate turning space for buses. Highway officials as well as members of the Highway Patrol should be called in to assist in the safety phases.
2. The location of present and possible future homes and the number of children that will possibly be serviced should be indicated on a spot map.
3. Convenient and safe places for possible school bus stops should be noted in the study. In establishing new attendance centers, the following points should be considered:
   a. The effect it will have on the load carried by buses. Will the mileage be excessive and make it necessary for pupils to leave home at unreasonable hours and remain on the bus too long?

b. Will the services offered at present to a majority of the pupils be impaired or will they be benefited? Will the proposed change fit into the long range plan and will it promote in enrollment one attendance area over another or will there be duplicate service?
c. It is important that all weather roads be made available in school bus transportation.
d. Up-to-date maps should be available and used in studying proposed routes and should be kept in the office of the superintendent and principal. These maps should show the routes, home location of the pupils, bus stops, highway hazards, traffic density and type and conditions of roads.

H. Getting the Proposed Program Underway

1. Board adoptions

A program must be determined for getting the board of education to understand how the proposed building program will affect the improvement of the educational facilities for the people of the district. It is assumed that lay representatives will have had a part in planning the program and the board of education will have had the reaction of the lay members of the committee.

2. Informing the citizens

A plan must be determined for informing the citizens of the community of the proposed building program that will be submitted or has been submitted, as the case might be, to the board of education for adoption. If a bond issue is to be voted to provide funds for the construction of the school building program, it will be necessary to develop a plan of procedure for getting the voters acquainted with the necessity of the bond issue for raising the funds.

3. Other details of the building program
   a. Securing architects
   b. Getting plans prepared and approved by agencies required to approve them
   c. Letting contracts
   d. Selling bonds where it is necessary to issue them
   e. Accepting buildings after they have been constructed.

Suggestions and procedures to be followed in getting this done will be found in other parts of this publication.

VI FINANCING AND CONSTRUCTING THE BUILDING

A. Determining the Financial Ability and Providing Funds

The information needed concerning the money that may be made available for school building purposes may be easily obtained because the essential features which should be followed are contained in the School Law.

The Legal Basis for Securing Funds

A school district may obtain money for school building purposes as follows:

1. Paying all costs from current income.
2. Proceeds from the sale of school district voted bonds.
3. With the proceeds from the sale of bonds by private corporations, usually called holding companies. While this is a legal procedure, it is rarely used. It is not recommended since boards of education can require the governing bodies of city and county districts to issue bonds that are now considered more desirable.
4. By the proceeds of bonds sold by the governing bodies of cities or counties These are known as school revenue bonds.
5. By the levy of a building tax to be accumulated for future building needs by authority of KRS 160.476.
6. By funds accumulated from a tax, authorized by vote of the people. In accordance with provisions of KRS 157.440 or 160.477.
7. For each classroom unit, $400. See KRS 157.390 (4).

Current Income

There are a few districts where it is possible to secure enough funds from current income to provide for building needs. The number of districts that may do this is decreasing. Where such a plan is followed, the districts have so arranged their financial affairs that they may set aside annually an amount sufficient to pay for the construction of some, if not all, of the building needs.

This is a commendable plan where it can be done. It avoids the expense of financing and interest costs. This reduces the obligation for capital outlay.

School District Voted Bonds

The method to be followed in securing funds through this type of financing may be found in detail in Sections 162.080 through 162.100, Kentucky Revised Statutes.

This type of financing has certain limitations. It requires two-thirds of those voting on the question to favor the proposition before it carries. The amount of bonds that may be issued in any district shall not exceed the limit provided in the Constitution, which is two per cent of the assessments next preceding the vote on the bond issue. In most instances the amount of money that may be raised by the two per cent constitutional limit is not sufficient to meet the necessary building requirements.

Private Holding Companies

Many buildings have been constructed under this plan. It is rarely, if ever, used now since the Court of Appeals' decision in the case of Fyfe et al. vs. the Hardin County Board of Education 305 Ky. S. W. 2d, 165. According to this decision the Court said that where a board of education finds it necessary to enlarge school facilities and requests the fiscal court to cooperate with it in the issuance of school revenue bonds, the court acted without authority in refusing to issue the bonds merely because the court disagreed with the board as to the need for new school buildings. This decision was made October 17, 1947.

This plan is not recommended now since the school revenue bonds are more desirable.

School Revenue Bonds

Sections 162.120 through 162.300, Kentucky Revised Statutes, provide that the governing bodies of county or independent districts may issue bonds for the erection of school buildings. The bonds issued are not chargeable to the governing body of the county or city district, but are really obligations of the school district. Actually, the governing body of the district is nothing more than a governmental holding corporation. When a building is erected in the manner provided by these sections, the title is vested in the governing body. This body leases the building to the board of education on an annual rental basis. A contract is entered into between the board of education and the governing body whereby an annual rental is paid which is sufficient to take care of the interest and bond retirement at the end of a definite period of years. When the board of education has paid into the treasury of the governing body sufficient funds to pay all interest charges and costs involved, the title is returned to the board of education by the governing body of the district.

Bonds issued in this type of financing are tax free.

Revenue bonds may be issued by any one of three procedures or some combination of the three:

1. From current income—There are a few districts at this time (1955) which can set aside annually from current income a sufficient amount to retire school revenue bonds of the type indicated above. The number of districts that can follow this procedure is decreasing annually. It is more and more necessary to use either one of the two following procedures to provide the necessary school buildings.
2. School building fund—This building fund may be accumulated over a period of years at not less than four nor more than twenty cents subject to local taxation set aside annually. This may be set aside by authority of Section 160.476, Kentucky Revised Statutes.
3. School building tax—A majority vote of the people of the district may authorize a levy annually for school building purposes.

Other possibilities:

1. Some districts use the funds accumulated under number two and issue bonds from funds accumulated under number three.
2. Cash on hand from the current levy for general school purposes supplemented by funds accumulated by tax authorized under Section 160.477, Kentucky Revised Statutes.
3. By the levy of a maximum tax for a short number of years and using only the cash income for building purposes. This procedure will save the district interest costs as well as any costs necessary to go through the procedure of issuing bonds.

Holding Bond Elections

The preceding paragraphs set out the ways of securing money and the authority for the procedures as outlined. Very careful preparation should be made in holding bond elections. The people must be informed. It is usually a good idea to have a planning committee. This committee will play an important part setting up the procedures to be followed and keeping the public informed. As preparations are made for the election, the functions of the committee may logically extend to include many of the activities necessary to get the voters acquainted with the needed facilities that are to be purchased and with the way of securing the funds.

It may be necessary to have an intensive campaign over a period of weeks. A definite program should be worked out for

getting out the vote. The following activities should form part of the work of the committee:

1. Visit other communities in order to study other building programs.
2. Have a selected group of speakers to inform the members of the community of the needs of the building program.
3. It may be necessary to have a house-to-house canvass in order to determine the number of preschool children who will be entering the schools in future years.
4. Prepare publicity, arrange for car pools to take the voters to the polls and baby sitters where needed.
5. Under the leadership of the superintendent, it could study the educational program of the schools and make recommendations for changes.

Fiscal Agent

There are many times during a school building program when service of a legal advisor is needed. Some of these are when questions of property acquisition arise such as easements, condemnation proceedings, examination of abstracts and deeds; when questions concerning the school law arise; when contracts with architects and contractors are made; when the necessary procedure for bond elections is carried out; and when conflicts arise between the owner and other agencies or persons.

Before bonds can be sold, a legal opinion is required certifying that everything in connection with the issue is in order. Since the attorneys usually employed are not bond specialists nor have had experience in carrying out the details of issuing school bonds, it is suggested that boards of education secure a fiscal agent to prepare all forms in connection with the bond issue and secure an opinion on the bond issue from an authority that is satisfactory to the prospective bond buyers. The fiscal agent should be responsible for preparing all legal forms necessary for carrying out the purposes of the bond issue. These will consist of the notice of election, forms of ballot, bond forms and such abstracts, statute citations and legal opinions as will be necessary to carry out the purposes of the bond issue for the information and protection of the owner and the bond buyer.

Definitions—Capital Outlay, Maintenance and Repair

In dealing with the problems of school construction it is often difficult to determine the difference between capital outlay, maintenance and repair for school plants.

The school law, in Section 160.477, provides that taxes may be voted for financing capital outlay or paying for bonds for capital outlay, equipment and for purchase of school plots. It may be noted that there is nothing in this law authorizing the expenditure of the funds for maintenance and repair of school plants.

The Court of Appeals of Kentucky, in the case of Ewing et al. v. Peak et al., 266 S. W., 2d, 300, said that none of these funds may be spent for maintenance and repair purposes. This means that none of the funds raised by authority of Section 160.477 may be used for repair or maintenance purposes in providing school buildings.

For the purpose of allocating funds secured by authority of Section 160.477, capital outlay, maintenance and repairs should be understood to mean the following:

Capital Outlay—By capital outlay is meant changes in the building structure of such nature as to provide new additions or to replace a building with a new structure. It includes major remodeling jobs such as changes in the style of the structure of the roof or removing partitions in the building to make one room out of two. It is the expenditure of funds for anything which increases the total amount of property controlled by the school board.

New Grounds—This should include payments for all land purchased for school sites, addition to school sites, playgrounds, recreation fields together with all costs of acquiring title to same, condemnation and appraisals, deeds, abstract fees, surveying, and special legal surveys incurred in connection with the purchase of such land. All expenses in connection with improvements of new sites such as filling, grading, seeding lawns, setting out trees and shrubbery, sidewalks, drives, fences, flag poles, and professional landscaping services when made as an original outlay should be classified as an expense in connection with new grounds.

New Buildings—All funds used for erecting the original structure including painting and decorating of the building, interior or exterior, advertising for bids, special bond election and architect's fee paid by the board of education in connection with new buildings should be charged to capital outlay.

Improvements of Grounds and Buildings—There should be charged to this item the expenses of improvements to buildings incurred in removing old buildings, partitions or walls and all

costs for adding new doors, windows, stairways, rooms, etc. The expense incurred in connection with new service systems or improvements of old service systems for an old structure, such as heating and ventilating, fire protection, plumbing and electric service should be classifed as capital outlay.

New Furniture and Equipment—There should be included in the item of capital outlay the cost of new furniture such as tables, chairs, desks, file cabinets and lockers when purchased as original equipment. Include also the cost of instructional apparatus for agriculture, arts, biological, chemical, and commercial apparatus, industrial and physical laboratory equipment as well as the cost for new library equipment. The replacements for these items should not be included in capital outlay.

Any school construction must conform with the laws, rules and regulations of the State Board of Education governing school construction. For more detailed requirements refer to the detailed statement of these regulations. (Department of Education Bulletin, Volume XXI, Number 7, September, 1953.)

Maintenance—Maintenance includes all repairs and replacements and general up-keep of the plant.

Repair—Repair includes replacement of broken pieces and worn parts as well as mending of broken joints and connections.

B. Securing Bids

The School Law in KRS 162.070 requires that boards of education take bids on school building construction. The procedure to be followed should be such as will make well known the fact that the board of education will receive bids for a particular project. This can be done in several ways—by the use of local papers, trade magazines and personal contact of contractors. A competent architect will see that notices are published in trade journals and will send letters to contractors he believes may be interested in bidding on the project. Such advertisement will help to insure that competition will be keen enough to assure letting the contracts under favorable conditions. The architect should also assume the responsibility for seeing that interested bidders are furnished plans for estimating purposes.

Contractor

The contractor, who is a specialist in building construction, agrees to erect the building as specified by the architect on the

basis of competitive bidding. The contract should be awarded on the basis of the amount of the bid and the contractor's reputation and ability. Because there is sometimes confusion as to the relationship that should exist between the school board, the architect, and the contractor, the following three statements are made:

1. The contractor should receive directions only from one of the following: the architect himself, the architect's supervisor, or the clerk-of-the-works.
2. On many occasions the question is asked whether it will be best to have one general contract or three separate contracts, namely, one for masonry work, one for carpentry work, one for heating, plumbing and ventilation, and electrical work. Separate contracts may work with experienced contractors, but the problems of clean-up, responsibilities of coordination and timing always arise. For that reason it is usually not wise to let separate contracts. Generally speaking one general contract rather than several will prove more satisfactory.
   The following, therefore, is the recommended bidding procedure under such a policy:
   (a) A single overall contract bid including all sections,
   (b) Separate bids and awards on the general contract, for masonry work, carpentry work and mechanical work which will include heating, plumbing and electrical.
3. It is recommended that the architect handle all the details of awarding contracts subject, of course, to the approval of the superintendent and board of education.

C. Awarding Contracts

This discussion gives suggested procedures which will assist the owner in awarding contracts for school buildings as authorized by Section 162.070 and Sections 162.120 to 162.300, KRS.

Contract awards should be predicated upon the assumption that proper competition has been invited and that prices quoted are reasonable and fair. Provision should always be made and so stated in securing bids that any and all bids may be rejected.

Tie-bids submitted by two or more prospective contractors may be the result of deliberate price fixing or by accidental coincidence rather than premeditation. Care should be exercised to eliminate, as far as possible, what is sometimes known as complementary bids.

Those who indulge in deliberate price fixing or complementary bidding are, therefore, conspiring to the disadvantage of the board and deserve no consideration in awarding contracts under such

circumstances. Sometimes prospective bidders "sound out" the owner in advance of bidding in order to anticipate what action may be expected in tie or complementary bids. In case of uniform bids where there is evidence of collusion and price fixing and where competition is not available, all bids should be rejected even though proper advertising has been given.

A contract is illegally awarded if discrimination has been exercised against the "lowest responsible bidder" who has complied with the terms of the specifications. The importance of accuracy in handling bids should be kept constantly in mind and the awarding of contracts should be simplified as much as possible. A meeting of minds is essential to the contract.

The Lowest Responsible Bidder

Laws which have been enacted and procedures of boards of education which have been adopted, to govern their action, were devised to protect taxpayers and to secure standards by which awarding of public contracts can be made economically and efficiently with fairness to both bidders and taxpayers.

After bids have been received, opened and tabulated, it becomes the duty of the owner, on the advice of the executive officer and others in authority or who have been employed to advise it, to determine the "lowest responsible bidder." To do this, two things must be determined in order to make a valid award: (1) Determine the responsibility of the bidders and which of the responsible bidders has submitted the lowest bid. (2) Compare the figures contained in the bids. This does not usually involve the exercising of judgement or discretion. Failure to make the award to the 'lowest responsible bidder" may result in an invalid contract which the courts would not sustain.

A determination of the responsibility of the bidder requires the exercising of some judgment and discretion. Honesty and fairness must be based on the facts found after investigating the responsibility of the bidders.

In deciding upon the "lowest responsible bidder," the owner is not required to give bidders a hearing. It is recognized that there are practical difficulties in determining the "lowest and best bidder."

The term "lowest responsible bidder" has been generally interpreted by courts as requiring the successful bidder to possess financial ability to complete the contract, integrity and trust-

worthiness, skill, judgment, ability to perform satisfactory and conscientious work, promptness, experience, necessary facilities and equipment for doing the work efficiently, previous performance of satisfactory work, together with any other essential factor or factors which may be dependent upon type and kind of contract involved. In other words, the lowest bidder is not necessarily the "lowest responsible bidder," and the ability to furnish a bond does not alter the situation. Even though required, financial responsibility in itself is not sufficient to make the lowest bidder the "lowest responsible bidder" within the meaning of that term.

The factors which should be used to determine the responsibility of the lowest and best bidder shall be understood as follows:

1. **Financial Ability**—It is taken for granted that in order to be able to complete or perform any project, financial resources are required by the party undertaking a contract. It should be understood that the nature and type of contract should be taken into consideration in determining financial ability. It may only be necessary to require a performance bond. This is usually considered sufficient evidence that the bidder will carry out the contract. This performance bond should cover at least 100 per cent of the bid price. All policies covering builders' risk should be paid for by the contractor and the building should be his until completed and accepted by the board of education or any agency acting for the board on recommendation of the architect.
2. **Integrity and Trustworthiness**—The contractor most likely to give a full performance is one who has reputation from previous actions, a man who has integrity, honesty and trustworthiness. One may be justified in considering the bidder not responsible if he has previously defrauded in this contract, or if there is bona fide evidence which leads to the belief that the bidder has committed fraud despite the fact that there is no judicial information to that fact. Any previous actions of the bidder in connection with awarding of the contract which is indicative of a want of moral worth appears to be sufficient basis for considering such a bidder of doubtful responsibility.
3. **Skill, Judgment and Experience**—Skill, judgment and experience are three important factors which, by their very nature, are mingled with each other. It is usually considered that skill is acquired by experience. The bid of a contractor should be rejected, if in the judgment of those who are responsible for awarding contracts, the bidder does not possess skill, judgment and the experience necessary to perform satisfactorily the work anticipated.

4. **Promptness**—Bids and contracts invaribly state the time in which the contractor agrees to complete performance of the work. Time of performance is very vital to school boards, particularly in case of large improvements which are financed by bond issues. Delays in the performance of contracts result in the payment of interest charges without the securing of any benefit of the improvements that are being constructed. A low bidder can be rejected even though he is financially responsible, and he has all the work he can presently handle with his equipment and facilities, if those who are responsible for awarding the contract believe that they have evidence that such bidder cannot complete the contract within a stipulated time.

5. **Performance of Previous Satisfactory Work** — Common knowledge, as well as personal experience, shows that businessmen do not continue to maintain business relations with persons or organizations which have previously failed to perform contracts in accordance with their intent and requirements. When the low bidder, though otherwise responsible, has a record of unsatisfactory work the application of the above mentioned principle by officials awarding contracts with such bidders, has generally been upheld by the courts. Definite facts must be available to the board before reaching such a decision.

6. **Necessary Facilities and Equipment**—In almost every contract, except one exclusively for personal services, the contractor must possess the necessary equipment and supplies to perform the contract. Failure to award the contract to a bidder lacking the essential facilities and equipment has been upheld by the courts as a justifiable reason for refusing to grant the contract to the "lowest bidder." It is always necessary to have definite facts of the nature mentioned herein when the owner refuses to award a contract to the "lowest bidder" on this basis.

7. **Special Factors of Responsibility Dependent Upon the Nature of the Contract**—Where the responsibility of bidders is decided by the common, ordinary factors of responsibility above discussed, there are, by the very nature of some contracts, additional elements that must be considered. This can be illustrated by the bidder for the transportation of school children. It is imperative, in awarding this type of contract, that a driver of a school bus be physically fit in all particulars. An award to one whose right leg is missing is not an award to a responsible bidder according to law. It has been judicially expressed that on this kind of a contract a bidder should be tested by "sufficiency of his equipment, his morals, his care and skill as a driver, his satisfactory fulfillment and regularity

in the discharge of his duties, his ability to control a group of children, and his ability to protect them at all times." Specific connection in this case is found in the case of Hutts v. State Board of Education, 165 S. C. 37, 42, 162 S. E. 751, 753, 1932.

The Lowest Dishonest Bidder

The rejection of the lowest bid is proper when the awarding officials believe that beyond a reasonable doubt, the bid of the contractor cannot be completed for the bid price. There are situations where a bidder is low because he feels that he may be in a position to get a contract where he does not intend to comply with the law or plans and specifications or where he believes he is in a position to avoid compliance for lack of enforcement. Under such circumstances this individual should be considered the "lowest dishonest bidder." While he appears to be responsible in every detail, he, in fact, does not expect to carry out the contract as required. Under such circumstances the bid of the honest bidder is invaribly higher because he includes exactly what the dishonest bidder omits. The acceptance of the bid of a dishonest contractor puts an honest contractor at a disadvantage and, if such practices were permitted to prevail, would ultimately force the honest bidder out of business. This type of bidding may come up more often than may be anticipated by officials who are not in the habit of awarding contracts on the basis of the principles herein stated.

If the principles stated herein, as standards for the "lowest responsible bidder" are followed by officials who are responsible for awarding contracts, they will tend to eliminate, from the field of public construction, the bribe giver and the defrauder. It is admitted that this discussion of the "lowest responsible bidder" is more or less legal in nature. For that reason it is usually wise to have good counsel in deciding who is the "lowest responsible bidder" when the amount of the contract and the nature of the bidders will justify expenditures for such counsel. This discussion is presented with hope that it will call attention to the more important phases of awarding contracts as is contemplated by the Statutes and rules and regulations governing the awarding of contracts.

D. Procedures Following Awarding of Contracts

1. Supervision of construction—Since the superintendent and board of education are limited in their knowledge of building construction, it is very important that some arrangements be made for proper supervision during the construction period. The board's

knowledge of the reliability and responsibility of contractors and the advice of the architect should determine what supervision should be given by the school district. The function of the architect in this connection should be thoroughly understood. The architect should supervise and be responsible to the owner for all work provided under contract. He should check all shop drawings and materials used in the work. He should check and approve all payments made to the contractor. It should be definitely understood as to the amount of time which will be spent by the architect, architect's supervisors, or clerk-of-th-works, as the case may be, during this construction period. The supervision and inspection should be sufficient to obtain for the owner full compliance of all parties concerned with the drawings and specifications of the building project.

The suggested form of contract between the architect and the owner can be found in the appendix.

2. Construction started—Before the building construction is begun, the architect will have made certain that all legal requirements have been met, that all contracts have been properly executed, and that the contractor has made the proper layout of the job.

3. Accepting the building—After the construction has been completed, the architect should make final inspection and certify approval of the project for final payment. If it becomes necessary to use any part of the building before construction is completed, before this final inspection and before the building is completed to the satisfaction of the architect, a definite understanding should be had between the owner and the contractor and agreements entered into as to the responsibility of the two parties in case of accident, fire or other catastrophe.

4. Giving instructions for occupying and using the building—The school is a tool to be used by the children and the teacher. Like any other tool, it must be used properly. New floor finishes, new chalkboard surfaces, new wardrobes, new heating systems and new electrical systems and equipment are just a few of the features in school buildings of which teachers, custodians and pupils should be instructed in the manner of proper use. Prior to occupying the building, all those who will use it should be given complete instructions concerning its maintenance and operation. The superintendent, the board and the architect should cooperate in developing a list of the items that are important to be included and the procedure to be followed in giving this information to all those who should have it.

VII APPENDIX

A. Recommended Complete Facilities for Kentucky Schoolhouse Construction

The term "complete facilities" as used herein means for:

A. Elementary Schools
   1. Academic classrooms
   2. Library and workroom
   3. Cafeteria and kitchen
   4. Health clinic
   5. Auditorium-gymnasium and locker rooms
   6. Teachers' lounge
   7. Administrative offices

B. Secondary Schools
   1. Academic classrooms
   2. Library, conference rooms and workroom
   3. Science laboratories
   4. Home economics laboratory
   5. Music and band room
   6. Business education laboratory
   7. Agriculture room and farm shop (rural areas)
   8. General shop
   9. Cafeteria and kitchen
   10. Auditorium
   11. Gymnasium and locker rooms
   12. Health clinic
   13. Teachers' lounge
   14. Administrative offices

SPACE ALLOCATIONS

The space allocations used for determining need in the Kentucky School Facilities Survey are:

1. New School Buildings (for rough estimate)
   a. Elementary—80 sq. ft. per pupil
   b. Secondary—110 sq. ft. per pupil
2. New Sites or Additions to Sites
   a. Elementary—five acres plus one additional acre for each 100 pupils.
   b. Secondary—ten acres plus one additional acre for each 100 pupils.
   c. Combination—ten acres plus one additional acre for each 100 pupils.

When acreage is available at reasonable cost, the above standards should be met. It must be recognized that exceptions will have to be allowed where land is not available adjoining structurally sound and educationally adequate buildings.

3. Instruction Rooms
   a. Elementary — A minimum of 30 sq. ft. per pupil in 30' x 30' classrooms. This space should include cabinets for the storage of materials and equipment, space for care of wraps, handwashing facilities, and drinking fountains.
   b. Secondary
      1. Academic classrooms—A minimum of 25 sq. ft. per pupil in 22' x 30' classrooms. This space should provide for built-in book cases, work space for small groups, and storage space.
      2. Homemaking department—(Twenty-five per cent of the total enrollment should be planned for in this department.)

Department Size	No. of Pupils Daily	Size of Classes	Minimum Space Needs
One teacher	25-100	16-24	1300 sq. ft.
Two teachers	100-200	16-24	1680 sq. ft.
Three teachers	200-300	16-24	2520 sq. ft.

      3. Farm shop—A minimum of 80 sq. ft. per pupil in a maximum class of 20 boys, at least 1600 sq. ft.
      4. Industrial art shops—A minimum of 75 sq. ft. per student in an average size class with a minimum area of 2500 sq. ft. An area of 4000 sq. ft. is recommended.
      5. Science laboratories—A minimum of 35 sq. ft. per student in average size classes, or a minimum of 875 sq. ft.
      6. Music room—A minimum of 16 sq. ft. per pupil for vocal music and 20 sq. ft. per pupil for instrumental music. A minimum of 1000 sq. ft. should be provided in the music suite.
      7. Art—A minimum of 35 sq. ft. per pupil or 875 sq. ft. including storage.

4. Space for General Use Rooms
   a. Libraries
      1. Elementary—Large enough to accommodate the average class group (30) plus 20, allowing 25 sq. ft. per person. In addition, there should be a combination workroom and storage room of approximately 250 sq. ft.

2. Secondary—A reading room large enough to accommodate 15 per cent of the enrollment, allowing 25 sq. ft. per person and a combination workroom and storage room of approximately 250 sq. ft. For high schools with an enrollment above 750 there should be a workroom of at least 150 sq. ft., a conference room of at least 120 sq. ft., an office with a minimum of 120 sq. ft. and a storage room with a minimum of 200 sq. ft. No more than 100 pupils should be accommodated in one reading room.

b. Gymnasium-auditorium—For elementary schools a combination gymnasium-auditorium is recommended. A minimum of 4800 sq. ft. will provide for the playing floor, a stage with dressing rooms, lockers and shower rooms, and storage space.

c. Gymnasium—A gymnasium for secondary schools of at least 8500 sq. ft. should be provided to provide play space, seating space for 500 spectators, offices, apparatus storage room, shower, locker and dressing facilities.

d. Auditorium—An auditorium is recommended for secondary schools. For seating capacities of 300 to 1000, estimate square footage at 10 sq. ft. per person. This will allow for seating space, stage and dressing room requirements.

e. Cafeteria

1. Dining room—A minimum of 12 sq. ft. per person for 50 per cent of the enrollment.

2. Kitchen

Number Served	Space per Person
50 pupils	4 sq. ft. per pupil
100 pupils	3 sq. ft. per pupil
200 pupils	2 sq. ft per pupil
400 pupils and over	1½ sq. ft. per pupil

3. Storage—One-fourth the size of the kitchen space.

f. Clinic—Two square feet per pupil with a minimum of 400 sq. ft.

5. Other facilities—In the construction of new facilities, obtain a total square foot estimate for the number and kind of items listed above and add 25 per cent for administrative offices, teachers' lounge, storage, toilet rooms, corridors, etc.

6. School Bus Garage—Districts which own and operate school busses should provide garages for storage, maintenance, and repair. The shop would require a building 94' x 46' and storage space in addition should be 40' x 12' for each bus to be stored.

7. Central Administration Building—County districts and the larger independent districts should plan administrative offices for the central administrative and supervisory staff, the board of education, and storage of educational, administrative, and other supplies and replacements. This administration building may be on a given school campus but should not be an integral part of another school building. A minimum of 2500 sq. ft. would be needed.

B. PHILOSOPHY OF EDUCATION[1]

Education exists for two major purposes. First, to develop to the fullest extent the potentialities of the individual and second, to protect and promote the welfare of society. These two goals depend upon each other for accomplishment. The individual achieves his fullest self-realization only when serving and being served by the forces of the social interaction. In like manner society is at its best only when it is composed of socialized individuals. It should be the purpose of the school to strive toward these two goals during the time when it has the child in its care. If this is to be done effectively it is essential that the teachers understand and be in sympathy with both the child and society.

Understanding the child implies knowing his potentialities, his needs, his interests, his desires and his fears. It also includes a knowledge of his home, his family, his background and, in short, as many hereditary and environmental factors as possible.

Understanding society means not only that the school should take cognizance of our form of government but of that of other countries. It should help pupils to understand our own culture and the culture of other people as well. It should teach pupils to know intimately the community in which the school is located and to understand the customs, standards, attitudes and aspirations of the local citizenry. Such an understanding will help the school and the community to plan and work together.

If the school is to properly develop the child's potentialities it must take into consideration the nature of his assets. These may be classified as physical, intellectual, emotional, moral and spiritual. Proper development along these lines makes for a well integrated, socialized personality satisfactory to one's own self and to society.

Progress comes through growth and growth requires experience. The child must be given experiences and must think and act upon these if he is to grow intellectually and emotionally toward maturity. Many of these experiences must deal with the concrete and tangible. Many must be firsthand for the child lives largely in the here-and-now. Experiences must be real, varied and significant. They must challenge observation, thinking and evaluation. Indeed the child must help in planning these experiences as well as in their execution for he must become adept at planning if he is to achieve maximum growth.

[1]Adapted from Principal, Dec., 1950

In order to be a good environment for growing children the school should have certain characteristics. It should possess beauty, simplicity and security. Beauty awakens in the child his potentiality for the aesthetic. Simplicity is in accord with his very nature and security gives him a feeling of being wanted. The school, which in a degree is the child's second home, should be a place where the activities of his true home and the activities of the school may be merged so that his parents and his teachers may meet for mutual understanding. The school should be a community center because it is striving to bring the welfare of the individual and that of the community into closer harmony.

C. HIGH SCHOOL EDUCATIONAL PROGRAM AND SPECIFICATIONS FOR HOUSING IT

We believe in good foundation and general education for all students. No all out attempt should be made to train each individual student for a particular occupation. We take as our general objectives the following:

1. Education for citizenship.
2. Education for a career.
3. Education for character.
4. Education for family living.
5. Education for enjoyment.

These objectives should be constantly in the minds of each teacher of each subject and all endeavor should be pointed toward the accomplishment of these objectives in the lives of the students.

General Curriculum

1. English
2. Mathematics
3. Social Studies
4. Science
5. Vocational Agriculture
6. Vocational Home Economics
7. Commerce
8. Music
9. Practical Arts
10. Physical Education
11. Distributive Occupations
12. Guidance

Specific Course of Study

I. English
   1. Literature 2. Reading 3. Speech 4. Writing. Some Latin in this department if demanded. We shouldn't undertake much foreign language.

II. Mathematics
   1. Practical Math. 2. Algebra 3. Geometry (Elective)

III. Social Studies
   1. Civics 2. U. S. History 3. World History 4. Contemporary Problems 5. Geography

IV. Science
   1. General Science 2. Biology 3. Chemistry (Elective) 4. Physics (Elective) 5. Physiology and Health.

V. Vocational Agriculture (Elective)

VI. Vocational Home Economics
   1. Foods, cooking, laundering, clothing, consumer buying, home nursing, child development, home improvement.

VII. Commerce
   1. Typing 2. Shorthand 3. Bookkeeping 4. Business Training 5. Junior Accounting.

VIII. Music
1. Band 2. Orchestra 3. Chorus 4. Music appreciation.

IX. Practical Arts
1. Auto repair 2. Printing 3. Electricity 4. Cabinet making 5. Metal Work 6. Home Mechanics 7. Photography 8. Ceramics.

X. Physical Education
1. Major sports 2. Corrective calisthenics 3. Gym work for both boys and girls.

XI. Distributive occupations. Banking, Retailing, etc.

XII. Guidance—Tests and Counseling.

HOUSING THE PROGRAM

Site—40 acres—including small model farm. One-story building of colonial type red brick with green tile roof. May be partly two storied and flat roof. Construction details to be worked out with architect. (Walls, floors, height of ceiling, etc. Should use as low a ceiling as possible).

SPECIFIC AREAS NEEDED

1. Auditorium—pitched floor—no balcony—stage dressing rooms with toilets—stage storage—movie projection—seat about 1000. Investigate **skewed planning** as it is cheaper, has better acoustics, and better view. Should be very attractive area.
2. Gymnasium—no balcony—portable seating—folding wall in center to allow boys and girls to use gym at same time—use glass boards on the goals—have seats at each end if this holds down size of building—to seat 3000. Emphasize economy, utility, and spaciousness rather than beauty in this area.
3. Cafeteria—Kitchen—Storage—To seat or feed 300. This should be general recreation and social room for community. Tables and chairs should be folding type and storage provided for same.
4. Auditorium lounge with toilets, easily accessible from auditorium, gym and cafeteria. All the above areas should be within a few feet of the main public vestibule. Auditorium and Gym should have two directional approaches.
5. Conference room for students' use.
6. Teachers' lounge.
7. Principal's office with vault.
8. Clerk's office with supply room and general storage.
9. Guidance or counsel room.
10. Clinic for nurse and ailing students.
11. Janitor's room with storage and workshop facilities.
12. Visual Aid Room—Wired table in center—to be used for film storage and previews by teachers. Visual aid materials will be shown in each class room when needed.
13. Music Room—Instrumental and Vocal—Auditorium stage might be used for this by the use of separate heat and folding door.
14. Art Room.
15. Library—for 100 readers.

16. Study Hall—could be adjacent to or a part of library.
17. Agriculture class room and shop with wide doors and cannery, (might go under gym if terrain permits).
18. Home Economics Department—Three teachers—three rooms (a) foods and laundering (b) clothing, consumer buying, home nursing (c) child development and home improvement.
19. Science—22 x 44—locker space—storage—small dark room—general science, biology, chemistry, and physics grouped together.
20. Practical arts shop—32 x 60—Printing, electricity, auto repair, cabinet making, home mechanics, photography, etc. This might be included in the garage structure.
21. Bus Garage—size depends on how many buses the Board decides to house. (Might go under gym if terrain permits.)
22. Long all weather porch for loading buses.
23. Boiler room and fuel storage—might be oil—shouldn't depend on gravity to clear pipes but use pump.
24. English Room—22 x 40—should have stage.
25. Ten (10) to fifteen (15) class rooms—22 x 32—Provision for visual-aid in all areas. Some display cases, tackboards and full-length mirrors at strategic places in the corridor. Proper closets, storage, and lockers in each room.
26. Devote lots of study to accessibility, lobbies, corridors and student traffic, storage, toilets, lockers and locker rooms, playground, athletic fields, parking areas, drives, landscaping, sewage disposal, equipment, and water supply including water fountains.
27. Carefully plan acoustics, lighting, heating, ventilation, floor coverings, fenestration or arrangement of windows.
28. Provide for master program clock.
29. Wherever economy is secured by using the same area for various activities this should be done. The element of cost will dictate procedure.
30. Part of building might be two stories. However by using one story we get better light, better ventilation, greater safety, easier service entrances, segregation of activities, and a more flexible structure in that it is easier to add to it or leave off certain areas.

D. AGREEMENT BETWEEN OWNER AND ARCHITECT

THIS AGREEMENT ENTERED into this the.....day of ....., 19... by and between ..... hereinafter referred to as the Owner and ..... of .....,.. hereinafter referred to as the Architect or engineer.

WHEREAS, the Owner intends to construct a .... at an estimated cost of $....., for the complete construction of said building, including all plumbing, heating, ventilating and electrical design, which estimated cost is used for the purpose of determining the fee or amount of this contract, which fee or amount is as follows:

.....% of $..... AMOUNT $.....

HOWEVER, it is agreed and understood that the basic (or estimated) cost of $..... is used to base the Architect's fee for the purpose of this contract only, and it is further provided that before final payment is made that this basic cost shall be adjusted to the actual amount of the lowest legitimate bid for the work herein above referred to as arrived at by competitive bids and the fee paid to the Architect shall be .....of said legitimate low bid and all payments made prior to said adjustment shall be entered as a credit on this contract in arriving at the balance due the Architect at the time of adjustment, which adjustment shall be made prior to final payment herein provided.

HOWEVER, it is further provided that should the Architect complete the plans provided for in this contract to the satisfaction of the Owner and other agencies required to approve said plans and should the Owner fail within a reasonable length of time not exceeding twelve months from delivery of completed and approved plans and specifications to advertise and receive bids, then, and, in that event, the Owner, on demand of the Architect, shall make final payment for preparing plans and specifications as provided for in this contract and not including the fee for supervision.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained, the parties hereto do hereby covenant and agree as follows:

Section 1. The building or repair work as is hereinbefore set forth and as shall be authorized by the Owner shall not include in the estimated or basic cost set out above any architectural or engineering fees.

Section 2. Architect's Professional Services. The Architect agrees to perform all professional architectural and engineering services as may be required by the Owner for the proper preparation of completed drawings and specifications pertaining to the foresaid construction and which is hereinafter set forth.

1. **Professional Services Defined.** Professional services shall consist of the necessary conferences, the making of necessary investigations, surveys and reports, the preparation of preliminary studies, preliminary working drawings, as are required, large scale and full-sized completed details and drawings, full and completed specifications and the drafting of all forms of proposals and contracts.
2. **Approval by Other Agencies**
The Architect shall submit the necessary drawings and the specifications as soon as same are available to all agencies of the Local, State, or Federal Government which have jurisdiction in any matter over the Project, and shall have the right to require such submission to them for approval. The Architects shall make such changes on the drawings and specifications as may be necessary to obtain the approvel stated above.
3. **Services during Construction**
The Architect shall prepare such drawings as may be needed to supplement the working drawings to permit the proper completion of the Project; check Contractor's shop and detailed drawings; make interpretations of the Contract Documents and approve the materials used in the construction of the Project. The Architect shall attend, or be satisfactorily represented at conferences, with regard to the above items.
4. **Supervision of the Work**
The Architect shall supervise and be responsible to the Owner for the supervision of all work provided for under this Contract. The Architect shall check and approve all shop drawings and materials used in the work. The Architect shall check and approve all payments made to the Contractor or Contractors. It is understood and agreed by the parties hereto that supervision shall not require the continuous services of a resident inspector but shall require sufficient inspection to obtain for the Owner full compli- with the drawings and specifications by the Contractor.
5. **Revisions**
The Architect shall make such changes in, or revision of any of the instruments of work required under Item 2 of Section 2 in order to meet the approval of the Owner or any other agency required to approve the plans.

Section 3. Payment for Professional Services. Payment to the Architect or engineer on account of the fee set forth herein shall be as follows:

1. Payment of 20% of the fee shall be made upon acceptance by the Owner of preliminary drawings and estimated cost for the building or repairs and approval in writing by any other agencies required to approve plans for this construction.

2. Upon approval by the Owner and any other agencies required to make approval of completed plans and specifications of said buildings or repairs payment shall be made of a sum sufficient to increase the payment on the Architect's fee to 60% of the fee provided for by this agreement.
3. The remaining 40% of the fee shall be paid as the work progresses in the same proportion that payment is made to the Contractor.

Section 4. Surveys, Borings and Tests. The Architect shall, so far as the work under this Agreement may require, furnish the following information: A complete and accurate survey of the building sites, giving the grades and lines of streets, roadways, pavements, sewers, water mains, electric services, etc.; percolation test of the soil, and location of adjoining structures. The Owner shall pay for chemical or mechanical or other tests as required and supervised by the Architect.

Section 5. Preliminary Estimates. When requested to do so the Architect shall furnish to the Owner preliminary estimates on the cost of the construction being planned, but the Architects shall not be required to guarantee the accuracy of such estimates; however, the estimates furnished shall be as reasonably accurate as possible.

Section 6. Definition of the Cost of the Work. The cost of the work, as herein referred to, means the cost to the Owner, but such cost shall not include any Architects' or Engineers' fees, cost of furnishing or equipment, except such equipment as may be constructed from drawings and specifications made and furnished by the Architect.

Section 7. Ownership of Documents. The Architect shall furnish to the Owner ..... sets of blueprints and ..... sets of specifications for this project. All drawings and specifications as instruments of service shall be the property of the Owner whether the work for which they are made be executed or not.

Section 8. Successors and Assignments. The Owner and the Architect each bind themselves, their partners, successors, executors, administrators, and assigns, to the other party to this Agreement, and to the partners, successors, executors, administrators and assigns, of such other party in respect of all covenants of this agreement.

Except as above, neither the Owner nor the Architects shall assign, sublet or transfer their interest in this Agreement without the written consent of the other.

Section 9. Arbitration. All questions in dispute under this Agreement shall be submitted to arbitration at the choice of either party.

Section 10. No parts of any liquidated damages that may be collected from the Contractor by the Owner will be payable to the Architects for additional services.

Section 11. The selection of materials and architectural design and type of construction shall be at the Owner's option and direction.

Section 12. This Agreement contemplates the furnishing of complete plans and specifications necessary to the complete general construction of the work and including plumbing, heating, ventilating and electrical design. No additional expense incurred by the Architects in having such plans prepared shall be borne by the Owner. All construction details shall be submitted for and approved by the Owner.

Section 13. Separate Contracts. It may be the desire of the Owner that separate contracts may be let for parts of the construction, such as heating, ventilating, plumbing and electrical.

Section 14. If the Architect shall fail to submit within a reasonable time drawings and other documents, or through any cause shall fail to carry out this contract within a reasonable time, or if the Architect shall violate any of the covenants, agreements or stipulations of this contract, the Owner shall thereupon have the right to terminate this Contract by giving three days' notice to the Architect in writing of the fact and time of such termination. In such event, the Architect shall be entitled to receive just and equitable compensation for services already satisfactorily performed. Nothing set forth in the Contract shall be construed to relieve the Architect of liability for damages sustained by the Owner by virtue of any breach of this Contract by the Architect.

Section 15 It is mutually understood and agreed that in case the preliminary studies or drawings as submitted by the Architect are not satisfactory to the Owner or if for any other reason the Owner does not care to continue the erection of the building, he may abandon either entirely or for any indefinite time the construction of the building or any substantial part thereof, and this Contract may be terminated by the Owner upon written notice to the Architect and upon payment to the Architect by the Owner of the amount due for preliminary plans and the Architect hereby agrees that he shall be entitled only to an equitable compensation for any part of the work satisfactorily performed on said preliminary plans. It is also understood and agreed that the Architect after submitting the preliminary studies and drawings will not do any further work in the performance of this contract unless and until he is notified by the Owner in writing to proceed with the work.

It is further understood and agreed that in case the complete working drawings and specifications as provided for in this con-

tract are not satisfactory to the Owner or for any other reason the Owner desires not to continue the erection of the building, he may abandon either temporarily or for an indefinite time the construction of the building or any substantial part thereof and this Contract may be terminated by the Owner upon written notice to the Architect and upon payment to the Architect for completed plans, if they have been completed to the satisfaction of the Owner. It is further understood that the Architect agrees to accept an equitable compensation for any work satisfactorily performed on the completed plans. After submitting completed plans and working drawings and specifications as required, the Architect agrees that he will not do any further work in the performance of the Contract unless he is notified by the Owner in writing to proceed with the work.

It is also further agreed that if the building provided for in this Contract is erected that additional payments for supervision under the terms of the Contract will be made in accordance with Item 3 of Section 3 of this Contract.

Section 16. Architects shall provide the services of a capable consulting engineer or engineers, well versed in all utilities, such as water supply, sewerage, sewage treatment, electric distribution, heating, ventilation, roads and pavements, to either supervise and develop the plans and specifications for such utilities, or, as an alternative, the Architects may furnish their own engineers for this work and have the plans approved by such consultant or consultants before submission to the Superintendent of Public Instruction. It is agreed that the name of the consulting engineer or engineers selected for this work shall be submitted by the Architects to the Owner for his approval.

Section 17. It is understood by and between the parties hereto that the Architect will observe all laws and all legal rules and regulations of the State Board of Education for making and approving plans and specifications in erecting the school buildings or making of repairs provided for by this contract.

Section 18. It is further understood and agreed that the architect shall prepare sketches, estimates, and such other preliminary information as may be necessary for the promotion of the proposed project with the.....
(Fiscal Court or City Council, etc.)
It is also understood that the construction of this project is dependent upon the approval of the said.....,
(Fiscal Court or City Council, etc.)
since the construction is to be financed by authority of Sections ....., KRS. It is also understood and agreed that in the event the said.....
(Fiscal Court or City Council, etc.)
fails to approve the project, this contract shall be null and void

and the Owner shall have no obligation to the Architect for any services rendered under the terms of this contract.

IN WITNESS WHEREOF the parties hereto have executed this agreement on the date first above written.

.....
FISCAL COURT OR
CITY COUNCIL

.....
JUDGE

.....
CLERK

.....
ARCHITECT

.....
BOARD OF EDUCATION

.....
CHAIRMAN

.....
SECRETARY

E. OBJECTIVES FOR A TWELVE-GRADE PROGRAM

The Purposes of Education in American Democracy,[1] published by the Educational Policies Commission, list four major groups of educational objectives. Perhaps these four groups of objectives are the most representative of the twelve-grade program of education. The four categories are the objectives of Self-Realization, the objectives of Human Relationship, the objectives of Economic Efficiency, and the objectives of Civic Responsibility.

The Objectives of Self-Realization

Education is concerned with the growth and development of the individual

1. who has an inquiring mind;
2. who is skilled in listening and observing;
3. who speaks his mother tongue clearly;
4. who reads his mother tongue efficiently;
5. who writes his mother tongue effectively;
6. who solves his problems of counting and calculating;
7. who understands basic facts of health and disease;
8. who protects his own health and that of his dependents;
9. who wants to improve the health of the community;
10. who participates in sports and pastimes;
11. who has the ability to think rationally; and
12. who appreciates beauty and shows character.

The Objectives of Human Relationship

Education is concerned with the growth and development of the individual

1. who puts human relationships first;
2. who enjoys a rich, sincere, and varied life;
3. who can work and play with others;
4. who observes the amenities of social behavior;
5. who conserves family ideals and skills in homemaking; and
6. who maintains democratic family relationships.

[1]National Education Association and American Association of School Administrators, Educational Policies Commission, **The Purposes of Education** in American Democracy, Washington, D. C.: the Commission, 1938, pp 50, 72, 90, 108

The Objectives of Economic Efficiency

Education is concerned with the growth and development of the individual

1. who knows the satisfaction of good workmanship;
2. who understands the requirements and opportunities for various jobs;
3. who selects his occupation wisely;
4. who succeeds in his chosen vocation;
5. who maintains and improves his efficiency;
6. who appreciates the social value of his work;
7. who plans the economics of his own life;
8. who develops standards for guiding his expenditures;
9. who is an informed and skillful buyer; and
10. who takes appropriate measures to safeguard his interests.

The Objectives of Civic Responsibility

Education is concerned with the growth and development of the individual

1. who is sensitive to the disparities of human circumstances;
2. who acts to correct unsatisfactory conditions;
3. who seeks to understand social structures and social processes;
4. who has defenses against propaganda;
5. who respects honest differences of opinion;
6. who has a regard for the nation's resources;
7. who measures scientific advance by its contribution to the general welfare;
8. who is a cooperating member of the world community;
9. who respects the law;
10. who is economically literate;
11. who accepts his civic duties; and
12. who acts upon unswerving loyalty to democratic ideals.