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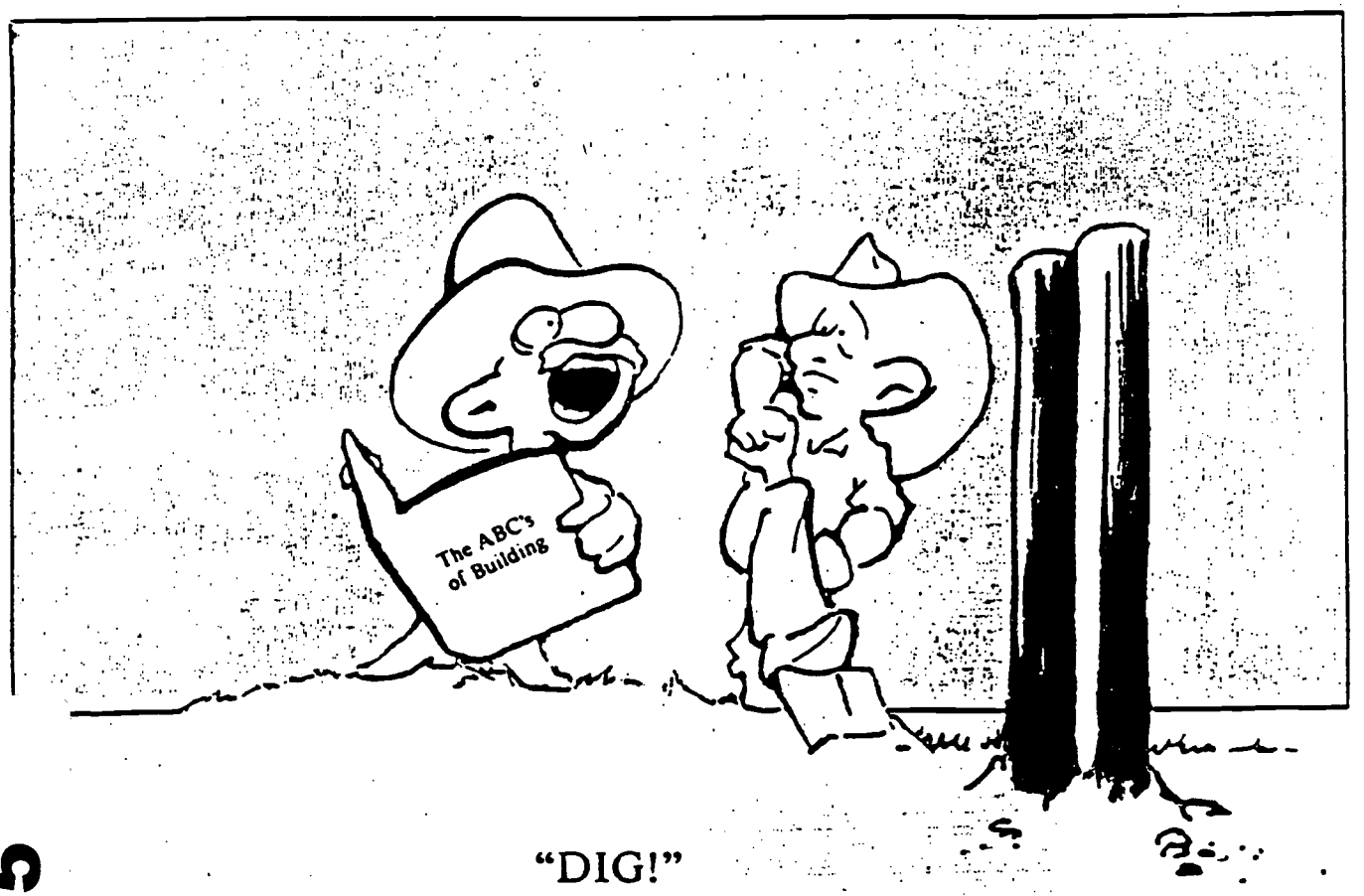
ABSTRACT

This booklet is designed for administrators who are being encouraged to build a new, or remodel an old, school facility. It describes the planning process from perceived need to the hiring of an architect; the duties of the architect, bondsman, and contractor; school bonds and finances; disability access requirements; force account; economical maintenance; the chronological order of construction; an overview of building systems and materials; applicable state laws; construction costs; and sample construction forms. Also included are Oklahoma State Fire Marshall fire resistive considerations and safety. Appendices contain a checklist for designing maintenance-free buildings; samples of the forms used in building construction projects such as contracts, bonds, and affidavits; and examples of energy conservation measures. (GR)

The ABC's Of Building A School



"DIG!"

Revised 1998

Oklahoma State Department of Education
Sandy Garrett, State Superintendent of Public Instruction

"THE ABC'S OF BUILDING A SCHOOL"

Prepared by
Capital Improvement/Transportation

Oklahoma State Department of Education
Sandy Garrett
State Superintendent of Public Instruction
Oklahoma City, Oklahoma

Revised

1998

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FOREWORD

The State Department of Education is committed to assisting school districts as they plan, build, and evaluate educational facilities. Since November 1987, over 2,500 copies of this publication have been placed in the hands of public school and vocational-technical school administrators across the state.

We appreciate the positive response to this publication. To enhance learning, adequate physical facilities are a must. We think you will find the "ABCs of Building A School" a good reference tool to use in the planning of new or remodeled schools.

Sandy Garrett
State Superintendent

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INTRODUCTION

This booklet is designed for administrators who find themselves pressured to build new or remodel school facilities. It is also intended for those who, under a logical, long-range capital improvement plan, are prudently required to build or remodel. It attempts to describe the planning process from perceived need to the hiring of an architect; description of the duties of the architect, bondsman and contractor; school bonds and finances; disability access requirements; force account; economical maintenance; the chronological order of construction; overview of building systems and materials; state laws including "Plan Review"; construction costs; and some sample construction forms.

The building and remodeling process has many built-in problems. Small mistakes in the planning and contract stages can result in large problems in the construction and subsequent phases. Legal pitfalls can result in an unsatisfactory building, unhappy patrons and/or teachers, lawsuits, liens, employment termination, or worse. This publication is not a legal document. For questions and answers to precise legal problems, we recommend that the administrative agency contact a licensed attorney or other entity exercising control.

A successful building project can result in much district and community pride. Our goal in this publication is not to make architects out of administrators; rather, it is to make you aware of the steps to follow to complete a successful building project.

THE ABC's OF BUILDING A SCHOOL

Oklahoma school administrators today are, for the most part, experiencing an era of expanding programs due to steadily increasing public demands and, with some exceptions, still burgeoning student populations. Either of these factors over a period of time can produce problems in meeting the demands for space within the school plant. Especially affected are districts with buildings already in need of replacement because of age or deterioration. As a result, more and more school administrators find themselves facing the challenge of beginning a building project.

Because there is so little literature available on how to proceed with such a task, it is sometimes difficult to know where to begin. Actually, the process can be, in a manner of speaking, "as simple as A, B, and C." The important thing to note is that on most building projects it is critical that school administrators be aware of the laws governing Architecture, Bonds, and Contracts. In addition, efforts aimed at producing a building can be more orderly when guided by a carefully planned sequence of events. Therefore, the following list and brief description of events in the building process may be helpful to those considering constructing or remodeling a school building.

Sequence of Events in a School Building Process:

(1) **Identify areas of immediate need.** Be specific and list the reasons for each identified need. This is probably the easiest step in the sequence, since it is a school district's needs or perceived needs which provide the initial impetus to the building process.

(2) **Develop goals and objectives** directed toward satisfaction of future anticipated needs. Viewing the immediate requirements as the only problem to be solved will postpone, but not offer a solution to, the inevitable problems of space and equipment for ensuing years. School improvements are becoming expensive and increasingly specialized and must be planned to respond in the most effective manner to needs that can be foreseen in the years to come. Long-range planning can better the future of education in this state and, consequently, is now a requirement set by the Oklahoma Legislature. 70 O.S. 1994 § 3-104.2

(3) **Develop a proposed building program** which will fit into future plans, as well as satisfy immediate needs. The program should list the type of improvements, number of students to be served, and the type of equipment required for the new facility to function properly. It is important to consider all possible avenues available to satisfy both educational and administrative needs. Also, try to be as realistic as possible and remain open to consideration of alternative plans of action.

(4) **Write a brief outline** or description of the proposed building program as it applies to the solution of both long-term and immediate needs. Documenting this information not only clarifies it in the mind of the administrator but also serves as a basis of communication with the school board, the public, and the persons involved in the building program.

(5) **List the proposed building project(s)** as an item of discussion on the school board meeting agenda. Board discussion and action taken should be recorded in the official minutes.

(6) **Select an architect,** if one is not already engaged in the planning process. The architect should assess existing facilities and help determine plausible building types needed to satisfy the education program that has been developed. An architect is required by law on school projects, including most metal building projects where the estimated cost is in excess of $40,000 and where new buildings or structural changes in existing buildings are involved.

(7) **Develop preliminary estimates of cost.** Include adequate allowance for cost overruns. As the planning process continues, there is always a temptation to add more and more items to the initially proposed project, which leads to higher and higher project costs. Also, a number of unforeseen contingencies may arise during the course of the work.

(8) **Determine required source or sources of funding** (building fund, general fund, grants, bond money, etc.). Know the law before authorizing expenditures from these sources. There are statutory restrictions on the use of each of the funds mentioned.

(9) **Select a bonding attorney or financial consultant** if project costs justify or require a bond issue to assist in the preparation and sale of public bonds. If no bond funds are involved, omit Steps 9, 11, 12, and 14.

(10) **Request the architect to develop preliminary plans** and sketches of the total building program anticipated, including a careful description of the portion to be financed by the proposed bond issue. It is not uncommon for architects on school projects to prepare such sketches, with reimbursement for work actually performed on an hourly fee schedule in lieu of the more traditional percentage of construction cost. However, do not assume that this is true of every architect. Verify this in your contract with your architect. In order to save time, some schools have their architect proceed with final plans even before bond issue approval, with the understanding that reimbursement would be necessary should the bond issue fail.

(11) **Contact the County Election Board** after the final school board approval. Work closely with your bond agent and vote bonds in compliance with the Bond Issue Proceeds Act. (See latest edition of *School Laws of Oklahoma*.)

(12) **Arrange a date to sell the bonds** with the bondsman and school board if the bond issue carries. Date must follow the mandated period of contestability.

(13) **Authorize the architect to proceed** with drawings and specifications if prior arrangements have not already been made. Payments to the architect should be made according to a schedule listed in the contract. Payment requests should contain a notarized affidavit, as required by the law, when the amount is $1,000 or more.

(14) **Invest all bond funds immediately.** Any delay in doing so will cost the school district money. For example, $1,000,000 invested at eight percent interest will accrue approximately $220 per day.

(15) **Submit final plans and specifications to the State Department of Education** for review.

(16) **Verify that plans have been approved by the state and/or local fire marshal** prior to bidding. Consult local authorities, the State Department of Health, etc., where necessary. Also, approval from local traffic authorities is suggested when planning a new school site.

(17) **Place a notice of bids**, after completion of the architect's drawings and specifications and final approval by the school board, in a newspaper with general circulation in the county, at least twenty (20) days prior to the date set for acceptance of bids. Also, notify construction news publications such as *Dodge Reports, Southwest Construction News Service*, etc., if the estimated project cost is in excess of $50,000. 61 O.S. 1974 § 101

(18) **Maintain a copy of plans and specifications** and all addenda on file for public inspection during the bidding.

(19) **Direct all questions during the bidding to the architect**, who is usually the person responsible for issuing bid documents, checking on bidders, answering questions during the bidding, etc.

(20) **Place a second notice of bids** in a newspaper with a general circulation in the county one week after the first notice.

(21) **Open bids** at a prearranged time and date at a formal meeting of the board of education. Only sealed bids should be accepted. Bids should be checked carefully for errors and omissions and should contain the required bid bonds, affidavits, etc., as required by law. Bids should be read aloud and witnessed by a member of the board of education. The architect often assists in procedures of the bid opening. The bid opening should be as free of irregularities as possible. Remember, the livelihood of the contractors may be at stake, and they can be extremely sensitive to decisions not publicized in the bid documents. Negotiation with the low bidder is not allowed, even when the low bid exceeds the money available. Rebidding of the project is required in such cases or the declaration of an emergency.

(22) **Award the contract**. The school board has thirty (30) days in which to consider the bids and award the contract by formal recorded action. The award should not be made until the money is available.

(23) **Execute the contract**. The contract must be executed within sixty (60) days by law; however, specifications usually stipulate a lesser number, such as ten (10) days. The architect is usually responsible for preparation of the construction contract and verification of the proposed contractor's bonds and insurance, etc. With the architect's assistance, ascertain that the low bidder has been investigated thoroughly for reliability before signing a contract. The school board attorney should inspect all documents.

(24) **Ascertain that all construction permits have been obtained**.

(25) **Assure that the contractor maintains adequate security** precautions when construction is at or near an existing school. Children are naturally curious around construction work and accidents are easily possible.

(26) **Make payments** to the contractor according to a schedule of payments included in the contract. Do not prepay for anything. The architect is usually responsible for determining when sufficient work is completed to justify partial payments. Payment requests should contain a notarized affidavit as required by law.

(27) **Obtain a certificate of substantial completion** from the architect at the close of construction. Occupancy should not occur until the certificate has been issued. Occupancy prior to issue of the certificate produces legal complexities on issues of liability in case of fire and accident, recovery of damages, acceptance of defective work, etc.

(28) **Contact your insurance agent** prior to occupancy, to have the improvements placed on the school policy immediately upon your acceptance from the contractor.

(29) **Obtain an occupancy permit** where required by state and/or local agencies prior to occupancy.

(30) **Obtain a release** from the contractor against any liens or claims for payment from the contractor, subcontractors, and/or material suppliers when the school board is satisfied that the work is complete. The final 10 percent retainage of the contract amount is due at completion. Retainage of the contractor's money after acceptance requires payment of .75 percent per month interest to the contractor.

(31) **Obtain copies of "as-built" drawings** from the contractor through the architect. Also, obtain copies of all operating manuals, guarantees, warranties, etc. Place each of these documents in a safe place where they will not be damaged or lost. Such documents can be invaluable at a later date. The preceding list is typical only of building projects which utilize conventional delivery processes. Unusual funding methods or construction methods may invalidate all or part(s) of the list. Many of the steps listed are the result of laws and regulations governing school construction. It is important to know the law. It is also important to realize building a school can be both a rewarding and frustrating process. However, keeping a cool head and a good sense of humor can go a long way toward alleviating the frustrations and enjoying the rewards.

The three commonly used methods for arriving at the selection of an architect are direct, interview, and contest.

One method may be more appropriate than others for specific projects; therefore, the well-informed client may profit from a knowledge of each.

Direct selection of an architect involves negotiation with only one firm which the client desires to engage for the proposed project. It may be a firm which has a singularly distinguished reputation or perhaps one the client has successfully worked with before. This is the easiest method of selection to use; since a simple letter or telephone call will usually suffice to start the process in motion. However, this process is only recommended as suitable when the client is very familiar with the firm involved, and the project is fairly small ($500,000 or less).

Actually, it may be more prudent on larger projects to consider the qualifications, philosophies, and working methods of several firms as described below, just as a matter of good business. Even though a particular architect performed satisfactorily for a previous project, conditions such as the project type or location, and even the architect's own in-house staffing and workload, could make the same firm less suitable for the present project.

Interview selection of an architect involves discussion with or "interviewing" several firms prior to negotiation with the firm considered most desirable after interviews and other investigations are complete. Suggested methods for locating interested firms include:

- Consultation and inquiry among peers
- Advertisement in trade news services such as *Dodge Reports, Southwest Construction News, Bond* and *Construction News*, etc.
- Advertisement in state and local news media
- Inquiry of state and local architectural associations
- Requesting a list of all state-registered architects from the Board of Governors of Registered Architects

Ordinarily, from two to ten firms among those expressing interest in the project are invited by the client to make a presentation of services which they can provide. Sufficient time should be allotted to enable each firm to adequately present its capabilities. Thirty minutes to an hour is adequate for most projects. Sufficient time between interviews is recommended in case of time overrun and also to prevent having one firm waiting while another makes its presentation. Keep the number of firms appropriate for the size of the project involved. It isn't justifiable in most cases to interview ten firms for a $50,000 project, whereas the opposite may be true if the project cost is closer to $5 million.

During the interviews, try to establish the strengths and weaknesses of each firm as they apply to the particular project. Obtain a list of former clients and contact them to verify how well the work was performed, how well the architect communicated, and to what degree their relationship with

the architect was compatible. Ascertain how long it will take each firm to do the work and, perhaps more importantly, who will be the individual in charge of the work. Often, the person representing the firm at interviews will not be the individual responsible for projects within an office structure. However, the qualifications of the person in charge may be the most important thing to establish. If a firm is evasive on this subject, it should be cause for criticism in the board's evaluation.

Sometimes it is necessary to have subsequent interviews with a smaller group of finalists for the project, to clarify certain points brought up earlier in the process. However, multiple interviews are almost always inappropriate and represent a hardship for the firms involved. After selecting a firm for the project, it is most polite to notify the unsuccessful applicants as quickly as possible.

Contest selection of an architect involves organized competition among several firms for the award of a project based upon judging an actual design which is submitted prior to awarding of the project. However, this method of selection is expensive and time-consuming and should only be considered for projects of great significance. The advantage of this method lies in the client's opportunity to view the proposed solutions beforehand and to select the one most desirable. Nevertheless, to be successful, such competitions should be well-advertised and should offer a prize or prizes other than just the award of the work itself. The American Institute of Architects publishes an architectural competitions guide, which is available through both state and national offices for those who are considering such a selection process.

Regardless of which of the three methods described is utilized, it is important to note that the selection of an architect should be based more on capability rather than the price of services. Generally speaking, architects' fees are fairly uniform, and when viewed in relation to fees or profits charged by contractors, subcontractors, real estate agents, attorneys, and others involved in the building process, they represent a bargain. In any event, architects seldom are able to reduce fees without also reducing services.

Furthermore, prior to beginning the process of selecting an architect, it is necessary to make relatively firm decisions regarding the amount of funds available, the scope of the facility to be designed, and the duties expected of the architect. Follow through with each of these decisions during the selection, and verify that they are reasonable and acceptable to the firms involved. As the last step in the selection, have an attorney review the form of agreement between the owner and architect (prior to signing) to assure that the duties expected are a part of the contract.

Services of a licensed architect are required by the "State Architectural Act" when the reasonably estimated total cost for construction, remodeling or repairing of a school exceeds the sum of $40,000. 59 O.S. 1981 § 45.1-45.45

See Appendix B for sample forms and lists related to selection of architects and other construction documents.

Duties of the Architect

Duties of the architect while the project is being designed are set by the "Contract Between the Owner and Architect." Generally speaking, most architects provide a range of services divided into five distinct phases:

1. Preliminary design; 15 per cent of total fee
2. Design development; 20 per cent of total fee
3. Construction documents; 40 per cent of total fee
4. Bidding or negotiation; 5 per cent of total fee
5. Construction; 20 per cent of total fee

Usually a percentage of the total fee is charged for each phase completed by the architect. Occasionally, it is necessary to have the architect provide additional or, perhaps, even fewer services than those listed above, in which case an adjustment in fee may be appropriate. Furthermore, the contract between the owner and architect usually lists items for which the owner is responsible that are not included in the architect's fee. For example, site surveys, soil tests, and the cost of blueprints and specifications are common items for which additional charges are made. It is important to know these items prior to signing the contract with the architect so that no misunderstanding occurs.

During the Design Phases

The architect:

1. Consults with the owner to ascertain requirements of the project.
2. Prepares drawings and other documents describing the appearance, size, and character of the project for the owner's approval.
3. Prepares statements of probable construction cost.
4. Assists the owner in filing required documents for the approval of governmental authorities.
5. Prepares for approval by the owner, the necessary bidding information, bidding forms, conditions of the contract, and the form of agreement between the owner and contractor.

During the Bidding Phase

The architect:

1. Assists the owner in obtaining bids.
2. Issues plans and specifications to the bidders.

3. Answers questions regarding the proposed work.

4. Issues addenda when necessary.

5. Approves substitutions when necessary.

6. Assists the owner in determining reliability of bidders involved.

7. Assists with the bid letting.

8. Reviews successful bidder's bonds, affidavits, etc., to assure compliance with state statutes.

9. Prepares agreement between owner and contractor.

10. Issues work order or notice to proceed.

During the Construction Phase

Should the owner/architect agreement stipulate that the architect provide services in conjunction with the administration of the construction contract, such services may be additionally described under the "General Conditions of the Contract for Construction," which is commonly included in the construction documents prepared by the architect. Typically, the architect will provide services as follows:

1. Serve as the owner's representative.

2. Visit the site at intervals to familiarize himself/herself with the extent and quality of the work.

3. Determine amounts owed the contractor.

4. Act as interpreter of the contract documents.

5. Make initial judgments on all claims and disputes between the owner and contractor in relation to the work.

6. Review shop drawings.

7. Prepare change orders.

8. Determine date of substantial completion.

It is important to reiterate that these and other services are dependent upon the contract between the owner and architect, as well as related construction documents. Consultation with an attorney is recommended prior to signing contract documents.

Experiencing success in school bond issue elections is the result of long-range planning, good communications, and hard work. There aren't any miracle methods available to guarantee success. If a need truly exists, and the public can be convinced that the proposal is in the best interest of the majority of the community, the bond issue is likely to be approved. But, promoting a school bond issue is continuous work. Needs and plans should be discussed in an ongoing, year-round process.

The school administrator must have a thorough understanding of the bond issue process, the purposes, debt limitations, timetables, and "pitfalls." Even though legal and financial advisers are available as consultants, the administrator must deal with the issue on a day-by-day basis.

Financing capital improvement is a precise process. The following list should prove beneficial:

Purposes and Debt Limits

1. School districts can issue general obligation bonds for the following purposes:

   a. Construction of new buildings.
   b. Addition to existing buildings.
   c. Remodeling of existing buildings.
   d. Purchase of school buses.
   e. Purchase of land.
   f. Purchase of school furniture and fixtures.

2. The amount of indebtedness a school district can incur is limited. All indebtedness of the school district cannot exceed ten percent of the "net" assessed valuation of the district. That amount is the valuation after deduction of homestead exemption. The amount of indebtedness outstanding at any one time is calculated in the following manner:

   Total value of "bonds" and "judgments" outstanding
   Less: Sinking Fund balance (principal and interest accrual)
   Equals: "Net" indebtedness.

A point to consider is that any interest payments which become due on the outstanding issues from the time the voting capacity is calculated until the bond issue is delivered must also be deducted, since these interest payments reduce the sinking fund and, therefore, the voting capacity.

Type of Indebtedness and Security

1. When there is a desire to construct facilities and funds are not available with monies previously collected (cash on hand or existing appropriations which are not obligated), a school district may issue general obligation bonds that are secured by the "full faith and credit" of the school district.

2. Obligations of this type are paid entirely from an unlimited tax upon all taxable property within the corporate limits of the school district. That taxable property includes real estate, personal property, and holding of public utilities.

3. The final security of the bonds is the actual taxable property within the corporate limits of the school district. If taxes are not paid on a specific piece of property, it could be sold and the proceeds used to meet the tax liability. The "under-collection" of taxes can create a problem if there is a sufficient amount of property in that category.

4. From an investment standpoint, interest paid on general obligation bonds is exempt from federal income tax. The interest, though, is not exempt from Oklahoma income tax.

5. Because there is a large property base supporting the bonds, and because of the tax-exempt status, school districts are often able to borrow money more "cheaply" than can other levels of government.

Calling the Election

1. An election is called by a formal resolution of the local board of education. A copy of the resolution calling the election and fixing the place or places where the election will be held must be served by the clerk (or designated representative) upon the office of the county election board at least 30 days prior to the date of the election. A financial adviser will normally assist in this aspect of the election.

2. The resolution, which includes the date, place and purpose of the election, must be published on two consecutive Thursday publications of a newspaper of general circulation in the school district and at least ten days prior to the date of the election.

3. The election must be held on a Tuesday.

4. A separate proposition is required if the bond issue includes purchase of buses.

5. The election will be conducted by the county election board. When a school district is in two counties, the election board of the county in which the district's office is located will be in charge of the election and will coordinate with the other county election board.

6. Polling places are open from 7 a.m. to 7 p.m.

7. There is no provision for recount and there is no provision for absentee ballots in a bond issue election.

8. Any qualified registered voter in the district is eligible to vote. There is not a requirement that one be a property owner or taxpayer.

9. Bond issue elections require a 60 percent margin of approval.

10. Once approved, notice of the sale of the bonds is published in two consecutive Thursday publications in a newspaper of general circulation in the school district

and at least ten days prior to the date set for the sale. Either sealed bids or auction bids may be received. Once sealed bids have been opened, the bidding cannot be opened to auction bidding at that time. If the best interest rate is not satisfactory, all bids may be rejected and a new sale date set and advertised.

11. The bonds must be approved by the Attorney General (AG) of the State of Oklahoma after the sale. Once approved by the Attorney General's office, a 30-day protest period begins. Any suit contesting the legality of the bond issue would be instigated at this time in district court. No legal action may be brought against the bond issues after the 30-day protest period.

Collection of Taxes

1. The required levy for a bond issue(s) is made on July 1 of each fiscal year. The first half of taxes is due by December 31. The second half of taxes is due by March 31. As a result of this system, if the "dating" of a bond issue (date the school receives the proceeds of the bond sale) is in April, May or June, the bond issue would result in an "extra levy." This allows a school district to pay back a fixed number of dollars with one more payment than could be obtained by dating the bonds at other times in the year. The result of the extra levy would be a lower levy in each of the years a levy is made.

2. The levy for the sinking fund (to retire bond debt) is calculated to provide a certain number of dollars in taxes to meet principal and interest requirements. This is different from the traditional school taxes, which are stated in number of dollars per $1000 of net assessed valuation. If the number of dollars required to meet principal requirement are lowered, the tax levy will also be lowered. If the net assessed valuation of the district increases, the levy required for the sinking fund decreases, or, if the net assessed valuation decreases, the levy required for the sinking fund increases.

3. The first levy of a new bond issue would include one full year's interest requirement, as well as the number of dollars required to meet interest requirements for the months the bond issue is outstanding prior to the first levy. The levy for the sinking fund is composed of principal and interest requirements. The principal requirements are constant each year. As an example, for a 10-year levy, the principal shall be levied one-tenth of the principal each time.

4. State law requires the levy for the sinking fund purposes to be 105 percent of actual requirements. The extra five percent would be collected to cover delinquencies. However, in many districts only a portion or none of the additional five percent is levied. This delinquency provision may be carried through the life of the bond issue and used to pay a portion of the final maturity.[1]

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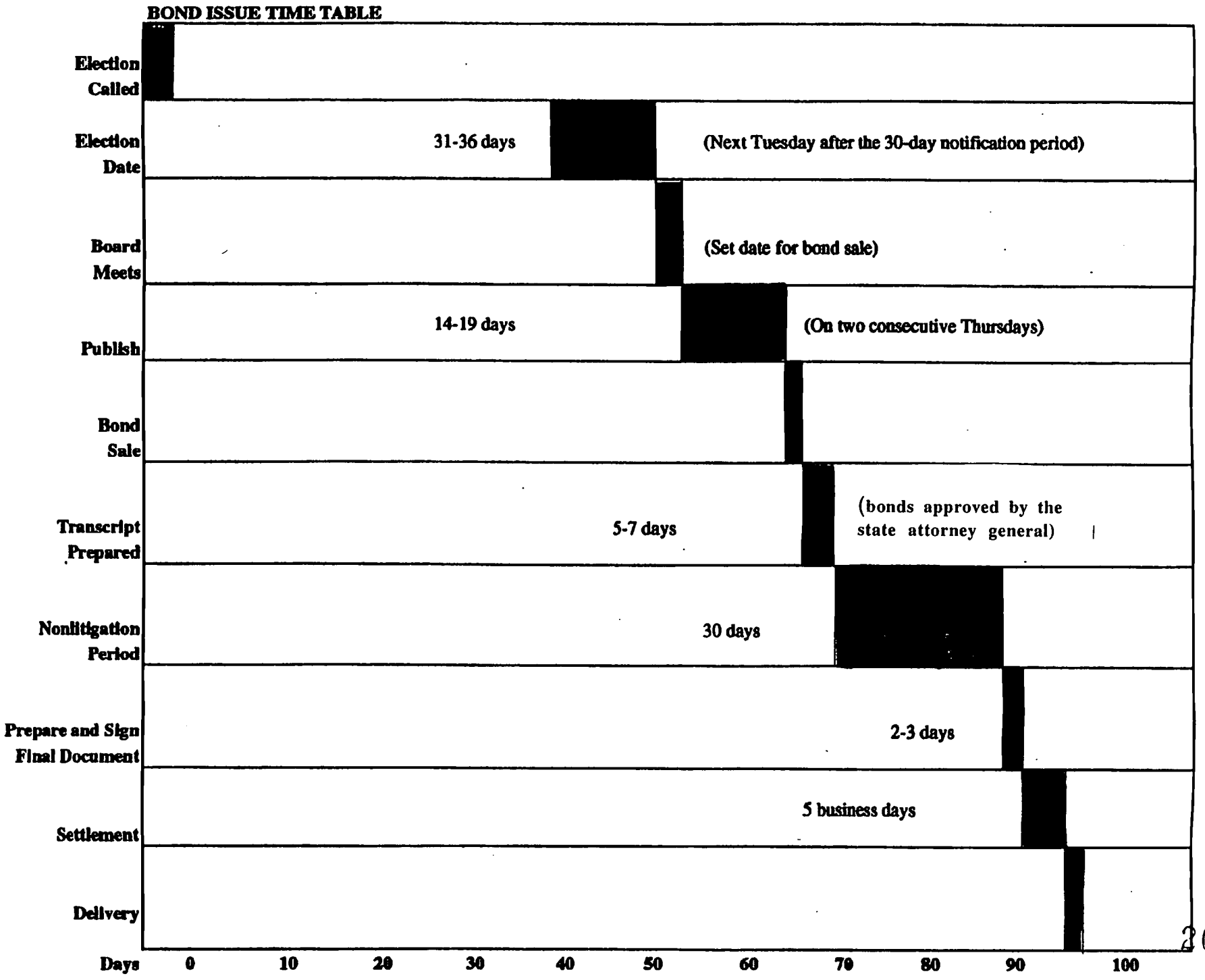

DUTIES OF THE BONDSMAN

The bondsman, in connection with the proposal and issuance of general obligation bonds for school districts, performs financial advisory services according to an agreement reached with the owner. Such services may vary, however, from those represented as typical here. The contract between owner and bondsman is not required to be bid, since it is considered a "professional contract."

Prior to the Call for Election

The bondsman:

1. Prepares a written financial analysis for the school district, including a survey of financial resources and borrowing capacity.

2. Analyzes existing debt and tax structure of all levels of government involved and devises a financing program to fund the proposed maturities, estimated interest rate and cost on the proposed bonds.

3. Prepares and furnishes publicity material where desired, in the form of news articles, brochures and other promotional material.

4. Attends public meetings to explain the financing program to interested individuals.

5. Provides services necessary for proper calling of the election.

After Voter Approval

The bondsman:

1. Advises the board of education of market conditions and economic data expected for the sale of the bonds to set a date favorable for sale.

2. Prepares an Official Notice of Sale.

3. Prepares a Prospectus that describes the bonds offered.

4. Prepares uniform bid documents.

5. Submits financial and economic data to the national rating services where desirable and possible to attempt to obtain a favorable rating on the bonds.

6. Attends sale of bonds and advises board of education regarding either accepting or rejecting bids submitted.

7. Provides services necessary to expedite preparation of final transcript, and to achieve delivery of the bonds approved by the Attorney General of the State of Oklahoma.

DUTIES OF THE CONTRACTOR

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Persons, firms, corporations, etc., submitting bids for all or parts of the work as advertised in the owner's Notice of Bids are known as general contractors. If the work involves a number of different trades, their bid usually represents a summation of bids from other persons or entities who are specialists in a particular trade and have submitted a bid to the contractor for performing a portion of the work on behalf of the contractor. These persons or entities are known as subcontractors. Often, the subcontractors will submit bids to several of the general contractors.

During the Bidding Phase

The contractor:

1. Investigates the site to determine conditions.
2. Studies the contract documents and reports any irregularities to the architect.
3. Solicits bids from subcontractors.
4. Ascertains bidding requirements.
5. Prepares a sealed, written bid for owner's consideration. The bid package (unless otherwise required) should contain the bid form, bid bond or cashiers check for five percent of the largest total bid, noncollusion affidavit and business relationships affidavit.
6. Provides statutory bond, performance bond, defect bond and evidence of insurance within time allotted by owner after acceptance of bid and prior to signing of agreement with owner.

During Construction Phase

The contractor:

1. Prepares a list of subcontractors and amounts for the owner's and architect's approval. **NOTE:** Rejection of any subcontractor by the owner may require adjustment of the contract price.
2. Prepares and submits for the owner's and architect's information an estimated progress schedule for the work.
3. Coordinates and supervises subcontractors and provides labor, equipment, tools, materials etc., for proper execution of the work as required by the contract documents.
4. Prepares and submits shop drawings, product data and samples.

5. Keeps the premises free from accumulation of waste materials and cleans up at completion of the work.

6. Prepares monthly certificates for payment and submits them with a claim or invoice affidavit to the architect for approval prior to payment by the owner.

7. Delivers project to the owner clean, orderly and complete according to the contract documents.

8. Delivers warranties, guarantees, operating manuals and instructions.

ACCESS FOR DISABLED PERSONS

6

Access for disabled individuals is perhaps the least considered design element in the building process. Yet if any architect, engineer or school administrator were asked if they could consider building a building that did not allow certain people from entering and receiving an education, the answer would be, "Absolutely not!" However, many buildings are constructed daily with many accessibility requirements omitted.

In September 1973, Congress passed a law that prohibits discrimination on the basis of physical or mental disability in every federally assisted program or activity in the country. That law is Section 504 of the Rehabilitation Act.

This section states that: "No otherwise qualified handicapped person... shall, solely by reason of their handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

In April 1977, a major renovation of Section 504 regulation was issued for all recipients of funds from the national agency of Health, Education and Welfare (HEW), including, but not limited to, elementary and secondary schools, colleges, hospitals and social service agencies. A subsequent revision in 1986 included private schools and the establishment of a National Advisory Committee on the Education of Handicapped Children and Youth. "The Advisory Committee shall review the administration and operation of the programs authorized by this Act and other provisions of law administered by the Secretary with respect to disabled children (including the effect of such programs in improving the educational attainment of such children) and make recommendations for the improvement of such programs . . . and shall make an annual report of its findings and recommendations to the Secretary . . ."

The regulations provide that educational programs must be made accessible to the disabled individual. It does not require that every building or part of a building must be accessible, but the program as a whole must be accessible. The intent, in this case, is to make all benefits or services available to the disabled individual. In meeting the objective of program accessibility, a school district must take care not to isolate or concentrate disabled persons in settings away from nondisabled students.

All school buildings for which site clearing began after June 3, 1977, must be designed and constructed to be accessible to disabled persons from the start. The design standards of the American National Standards Institute (ANSI) have been established to determine minimal requirements for accessibility. These standards include such things as the number of parking spaces required; location, slope and surface specifications for ramps; sidewalk, door and hallway widths; and building accessory heights--telephone, light switches, toilet height, sink height, paper towel dispenser, elevator call buttons and other controlling devices.

Most architects and engineers involved in the design of public buildings have access to these standards. Should your building consultant not have these standards, the State Department of Education or the Architectural and Transportation Compliance Board will provide copies of the rules and regulations.

FORCE ACCOUNT

7

Each year in the state of Oklahoma there are approximately 200 school construction projects. In many cases, school administrators have found it necessary to squeeze construction budgets in order to build the amount of space needed. Some administrators have been unable to meet this demand, regardless of how much they economize. Invariably, when this occurs someone makes the suggestion of building by "force account," usually along similar lines as, "Let's build this school ourselves--we'll save a ton of money by not having to pay an architect or general contractor." If the above scenario sounds familiar to you, it may be because the rising cost of construction is forcing more and more school boards and administrators into a direct role in the construction of new school facilities. If you are considering building by force account, we suggest you consider the following advice: Know the law!

Force account as defined by Enrolled House Bill 1296 of April 18, 1985, paragraph 12 of Section 1 Amendatory 40 O.S. 1981. Section 196.2: "Construction on a force account basis means construction of a public works performed by a public body, using permanent personnel on its own payroll without hiring outside supervision or direction."

Unfortunately, it is not usually possible for a school district to employ all the permanent personnel necessary to build a school itself. Rather, it could mean that during some phase of construction different laws may apply to the building process. Electrical work is a good example of a need which the school often cannot provide; thus, creating a contract between the school and a private firm is necessary to provide the required specialty. Under the above conditions, the district must conform to Section 81 of the 1997 *School Laws of Oklahoma* and the Competitive Bidding Act of 1984.

The key phrase of the definition of force account: ". . . using permanent personnel on its own payroll without hiring outside supervision or direction." Therefore, to comply with force account, construction workmen hired by the district quite literally must be employees of the district, just like teachers, cooks, custodians, etc. They must be carried on the payroll and subject to normal IRS payroll requirements, such as withholding, social security, workers' compensation, etc. A common mistake is to assume that an agreement with a worker or group of workers to work by the hour is all that is necessary to constitute legal employment. This mistake could result in a district committing itself to an agreement, which, in the eyes of the law, may be a contract.

Do not be confused. An architect can be employed, whether or not force account of general contractor is chosen for the method of construction. The administrator and board should be aware of the services offered by a professional architect. Some of the responsibilities are: (1) developing working drawings and specifications; (2) making schematic plans; (3) providing preliminary drawings; (4) selecting appropriate equipment and materials; (5) recommending to the board the contractual requirements and bonds of contractors; (6) providing programming and design solutions; and (7) many other finite areas in which a specialist may assist the administrator. The selection of an architect is a very difficult task. Careful study of the candidates is essential. Once an architect is selected, the board should be cognizant of the services offered.

If an architect is used, care should be exercised to see that the contract between those parties involved does not describe a lesser amount of service than the administrator and board expect. One

should read carefully all contracts before signing. It is appropriate to request deletions and to add supplemental sections for additional services. Keep in mind that the $40,000 architectural requirement has nothing to do with force account.

The most common form of agreement between owner and architect is AIA Form A201. These contracts specifically list services required of both parties involved. Consult with your attorney before signing such legal agreements, if any doubt or confusion exists. Several modifications of these contracts have transpired in the past few years.

One should be most careful when reading attorney general opinions from the *School Laws of Oklahoma* because of their brevity. Making application of these opinions in a general sense could be a mistake. Each opinion is a specific answer to a specific question. Examples of this are at least four AG opinions (February 1954; August 8, 1954; December 12, 1978; July 2, 1979) which use the term "engineer." Much confusion has transpired over the interpretation of the use of an engineer. The last, AG 7-161, July 2, 1979, clarifies, without a doubt, the intent of the law. It states: ". . . In no way . . . shall AG opinion December 12, 1978, be construed in a manner to suggest a school district can (utilize an engineer to) escape the statutory mandate to employ an architect . . ."

An architect must be employed by schools constructing a building that costs in excess of forty thousand dollars ($40,000). They are the only ones who are duly licensed, as stipulated by the law, to engage in planning, design and preparation of drawings and specifications for the alteration or construction of any school building. An architect's contract is considered terminated after construction and a substantial completion form has been executed.

The following comments will assist in using the force account means of construction.

1. Building projects can become more time-consuming and complicated than originally anticipated. School administrators in charge of them must be prepared to give a great deal of time and attention to a myriad of details which require quick decisions in areas with which they may or may not be familiar.

2. Secure all required building permits.

3. Make sure specifications and plans have been reviewed by the State Department of Education.

4. Pay as you go, not in advance.

5. Be sure all contractors or subcontractors are bonded properly and obtain release from lien claims or damages where appropriate.

6. Secure adequate insurance to cover liability and building protection.

7. Keep children and other nonworkers away from the construction site.

8. When advertising for bids, use construction contract form developed by the attorney general. (Copies are available from the Attorney General's Office and The Capital Improvement/Transportation Section of the State Department of Education.)

9. If architects are used, do not deviate from plans. To do so may reduce or eliminate their liability.

10. Secure State Fire Marshal or local Fire Marshal approval.

11. Be prepared financially for cost overruns and contingencies.

12. Expect and plan for unforeseen delays.

13. Finally, when building, assuming the responsibility through force account is much like being the general contractor. You assume about the same requirements. Be sure you know what you are doing before assuming this additional responsibility.

Excerpts from the School Laws of Oklahoma are included to alert the school administrator as to the legal considerations involved in building by force account. Sections of the law from which these excerpts are taken should be studied in their entirety before using the force account method for building.

If there is any question concerning the legal position of the school board in respect to construction activities of this kind, its financial obligations or the acceptance of subcontractors for the portions of the work, legal counsel should be consulted.

The school board may: (See Oklahoma School Law Book, 1997)

H.B. 1381.

Provide materials concerning bond elections and millage elections.

Section 967. Partial Payments-Retainage.

Contract shall provide for partial payment, ten percent of which shall be held as retainage. After 50 percent of project completion, the retainage can be reduced to five percent. 61 O.S. 1995 § 113.1

AG August 18, 1954.

Construct additions to school building from proceeds of bond issues on a force account basis without a contractor or architect. (An architect is required for construction, remodeling or repair when cost is in excess of $40,000.) 59 O.S. 1947 § 45.3

Section 975.

Reject all bids. 61 O.S. 1977 § 119.1

AG June 25, 1953.

Have the option to advertise for bids to demolish a building. (Explanation) "Demolition is not a part of a rebuilding process . . . in this particular situation . . . is not the making of an improvement . . . but in reality is the removal or dismantling."

Section 987.

Disregard provisions of the Public Competitive Bidding Act by declaring an emergency. "Emergency" as used in this section shall be limited to conditions resulting from a sudden unexpected happening or unforeseen occurrence or condition and situation wherein the public health or safety is endangered. 61 O.S. 1974 § 130

The school board shall: (See School Laws of Oklahoma, 1997)

Section 965.

Require that a contractor provide a performance bond against defects in workmen's liability and insurance compensation within sixty (60) days of the execution of the contract. 61 O.S. 1974 § 113

Section 959.

Require a contractor to provide a certified check, cashier's check or a bid bond of five percent (5%) for deposit upon bidding. 61 O.S. 1974 § 107

Section 632/633.

Solicit a written statement from the bidder as to his/her business relationships. 74 O.S. 1974 § 85.24

Section 963.

Let the award to the lowest responsible bidder. 61 O.S. 1974 § 111

Section 956.

Mail to all known prospective bidders who have made known in writing to the public agency an interest in bidding within the twelve (12) previous months, the date of the letting at least twenty (20) days prior to the set time. Cause to be publicized in a newspaper of general circulation in the nearby areas notices of the dates of the letting of the bids in two consecutive weekly issues. Send to the trade or construction publications whenever the estimate is above fifty thousand dollars ($50,000). 61 O.S. 1974 § 104

Section 957.

Set forth time, date, and place of opening of sealed bids.
61 O.S. 1974 § 105

Section 958.

Have one complete set of bidding documents on file at the main office at least twenty (20) days prior to the date set for opening of bids.
61 O.S. 1974 § 106

Section 962.

Receive all bids sealed and read them aloud at the bid letting. 61 O.S. 1974 § 110

Section 963.

Award bids within thirty (30) days without further negotiation. 61 O.S. 1974 § 111

Section 964.

Keep all bids for five (5) years for public inspection. 61 O.S. 1974 § 112

Section 973.

Publicize statements setting forth the reason for action. If award is made to other than the lowest bidder. 61 O.S. 1974 § 117

AG March 16, 1984.

Secure all building permits.

AG February 27, 1957.

Have cash or equivalent in U.S. Treasury Bills available when building contract is let.

Section 953, Par. 4.

Enter into a public construction contract when such contract exceeds seven thousand five hundred dollars ($7,500) in amount awarded by any public agency for the purpose of making any public improvements or constructing any public building or making repairs to the same. 61 O.S. 1974 § 102

Federal Regulations: Section 504 of the Rehabilitation Act of 1973.

Make all buildings accessible to the disabled.

Oklahoma Statutes: 59 O.S. 1947 § 45.3

Shall hire a duly licensed architect as provided in Section 45.24 of this title to engage in the planning, designing, and preparation of drawings and specifications for the alteration or construction of any building to be used as an educational building, convent, dormitory, gymnasium, hospital, library, stadium or theater where the reasonably estimated total cost for construction, remodeling, or repairing of such building exceeds the sum of forty thousand dollars ($40,000).

The school board shall not: (See School Laws of Oklahoma 1997)

Section 81.

Have expenditures greater than five hundred dollars ($500) for the purpose of erecting any public building or making improvements except in accordance with the provisions of a written contract. 70 O.S. 1974 § 5-123

Section 961.

Consider bids given more than ninety-six (96) hours (excluding Saturday, Sunday, and holidays) before the opening of the bid. 61 O.S. 1974 § 109

Section 965.

Award the bid without:

1. A written contract;
2. Required bonds provided by contractor; and
3. Insurance provided by the contractor. 61 O.S. 1974 § 113

Section 969.

Withhold final payment in excess of thirty (30) days after the work is completed under the contract without three-fourths percent per month of the final payment being due the contractor for penalty-interest.
61 O.S. 1974 § 113.3

Section 978.

a. Generate change orders or addendum to public construction contracts of one million dollars ($1,000,000) or less for more than 15 percent (15%).

b. Generate change orders of more than ten percent (10%) of contracts in excess of one million dollars ($1,000,000). (Any change orders or accumulative change orders which exceed these limits shall require readvertising for bids. Alternates or added items within the original bid and contained in the awarding contract shall not be construed as change orders.) 61 O.S. 1974 § 121

Section 977.

Award a contract to the successful bidder without written consent of the governing body of the awarding agency (evidenced by resolution).
61 O.S. 1974 § 120

Section 634.

Contract involving an expenditure of more than seven thousand five hundred dollars ($7,500) for the purpose of erecting any public building or making any improvement except upon sealed proposals and to the lowest responsible bidder. 74 O.S. 1974 § 3109

AG September 1, 1954.

Authorize additional payment (to a contractor) because of a mistake in their work.

Section 988.

Split contracts involving sums of below seven thousand five hundred dollars ($7,500) for the purpose of avoiding the requirements of the Public Competitive Bidding Act. 61 O.S. 1974 § 131

DESIGNING THE BUILDING FOR ECONOMICAL MAINTENANCE

In considering building maintenance, sufficient cost line items in the budget cannot be overlooked. Each year thousands of new buildings are constructed and opened by their owners. The newness of a building is not guaranteed by its cornerstone alone, but by its appearance. Many "new" buildings have become "old" in just a few short years due to neglect and improper maintenance. Building maintenance for the most part, is thought of as a simple task of keeping the building in a state of good repair. What most building owners find is that this simple task often costs them much more money than they are willing to pay.

George Weber, past-president of the Association of Physical Plant Administrators (APPA), concluded in a cost study that during the life of a facility most owners will spend as much as **100 times as many dollars operating and maintaining their buildings as they spend to construct them.** Industry and government alike have been turning to life-cycle costing as a means of testing initial cost factors against the lifetime building performance, capital equipment, supply and users (salaries, use of equipment), as well as replacement cost and salvage value.

Billions of dollars are spent each year in school building housekeeping and sanitation in our country. In Oklahoma, during FY 1991, schools spent in excess of $180 million in maintenance and operations. The administrator must somehow transmit an awareness of the ever-increasing cost of maintenance and operation to the board and staff and solicit their help in reducing this expenditure.

School architects and building planners should be encouraged to select quality products that might cost more initially, but whose life cycle costs (operation and maintenance) would be minimal.

As discussed in Chapter 9, the major emphasis on reducing building operating costs is in the area of energy conservation. The energy crisis has forced architects and engineers to look for ways and means of making buildings more efficient energy users. Schools are willing to invest in energy-saving equipment if it can show a reasonable pay-back period. Designing for maintenance operates in much the same way. We must make a concerted effort in this direction or the future cost of maintenance and operation will be prohibitive.

No matter how much initial design consideration is given to ease of maintenance or reduced cost of operations, the success of that design relates directly to the efficiency of custodial personnel.

The standard operating practices of many schools would be greatly improved by adopting guidelines employed by private industry. The public school can be operated as a cost-effective business enterprise. School administrators should be paying close attention to where their maintenance dollar is being spent and how effective it is. Consideration should be given to budgeting for maintenance operations, building material or system requirement versus maintenance goals, determining the cost of in-house maintenance staffs and whether maintenance contracts can reduce cost. Unfortunately, many school administrators do not have the opportunity to become effective plant managers. In Oklahoma, the average tenure of a superintendent of schools is 2.8 years. With a relatively high turnover rate, maintenance schedules and practices, as well as effective records, do not get established.

In planning a building design for maintainability, a study of your construction and/or renovation program relating to both custodial and maintenance should include: interviews with interested

and responsible management concerning objectives and limitations; interviews with involved architects, designers, interior decorator and maintenance or custodial manager. Other items to be considered should be: analysis of plans, specifications and finish schedules; investigation and research for specific problems such as specialized waste removal; review of manufacturer's literature relating to specific recommendations; and visits with other organizations of a related type or with a similar problem.

From this study, a report should be made directed toward reducing the annual operating and maintenance costs of your facility. This report, depending on your objective, would probably include: suggested maintenance storage areas; location, size and layout of custodial and other work closets; specifications for surface types such as carpet (fiber, weight, coloration, backing, weave, etc.); recommended flooring and other surfaces and accessibility for maintenance (access panels, valves, etc.). Other considerations might be: suggestions concerning soil exclusion and prevention; fenestration recommendations; protection devices at entrances, types of fixtures directed toward a facility which can be maintained at the lowest possible cost consistent with the esthetic objectives desired; and other recommendations to reduce your cost of operations and maintenance and extend the useful life of your physical facility.

A checklist for designing maintenance-free buildings for your information and consideration is included in Appendix A.

ENERGY-EFFICIENT CONSIDERATIONS

Our system of public education is experiencing a financial crisis. The urgent need to retain our most qualified teachers, the fiscal consequences of deferred maintenance and rising energy costs have all played a major role in this developing crisis.

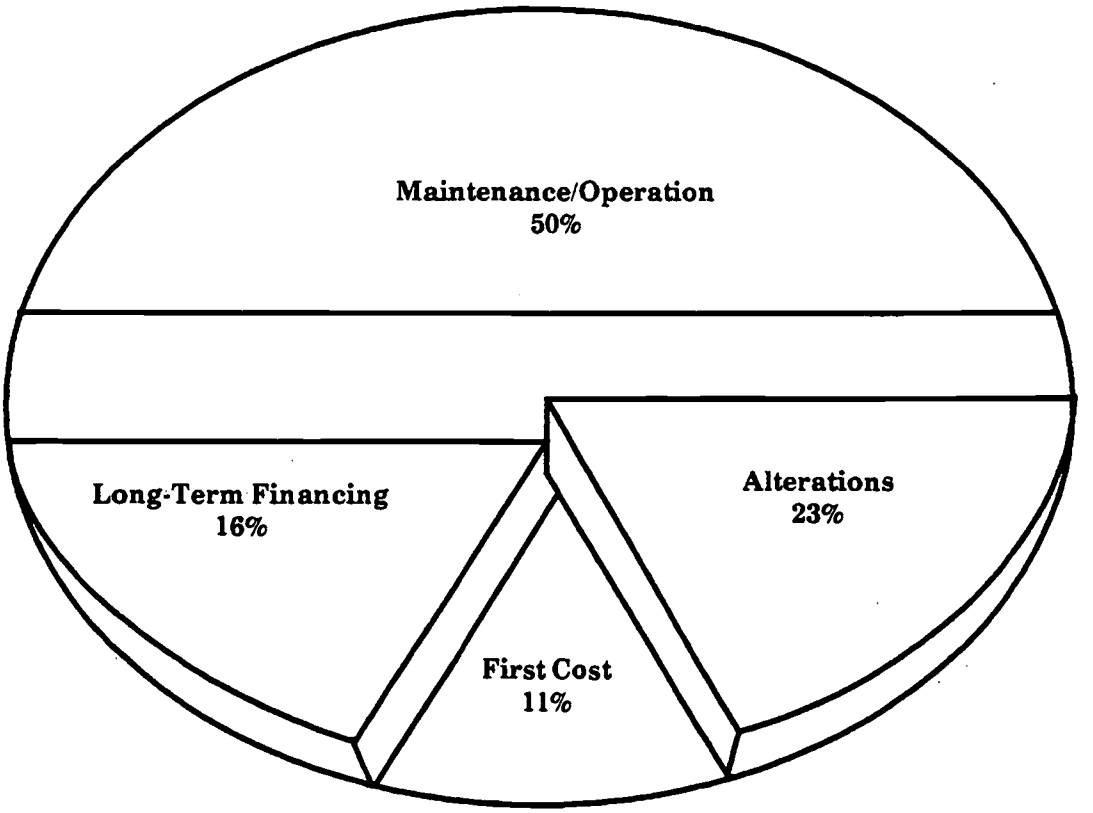
Some school administrators may argue that their job is education, not energy conservation, but every dollar that pays an unnecessarily high energy bill could be spent for a much better purpose--teaching children.

One response to the developing financial squeeze has been the widespread implementation of energy conservation programs directed at existing school buildings. This was a sound initial strategy, and many energy saving opportunities discovered through these programs have produced annual returns on investments of 20 percent or better.

Although much has been done to improve the efficiency of existing buildings, findings by the American Institute of Architects (AIA) indicate that the least costly and most effective means of holding down operating costs over the lifetime of a building is energy-efficient design. An examination of the distribution of costs in a typical school building reveals that design and construction costs are dwarfed by the magnitude of the lifetime operating and maintenance costs. Thus, it can be seen that long-term economy involves more than curtailing initial construction costs; it involves choosing design and construction options which will lower the lifetime operating costs of the building.

HOW MUCH EFFICIENCY CAN YOU AFFORD?

The steep rise in energy costs over the last decade makes it necessary for administrators to know more about design and construction today than ever before. Everyone desires the economic benefits of an energy-efficient building, but many expect that the additional first cost will be considerably larger than their building budget. However, recent findings in the field of energy analysis show that efficient building design does not always cost more.



Lifetime Building Costs

ESTABLISHING ENERGY AS A PRIORITY

Obtaining an energy-efficient school requires ranking energy efficiency among your most important priorities. Administrators must provide direction and leadership for the design team and work with them so that efficient, usable schools are designed. Most importantly, the planning process must be conceived as an ongoing evaluation, involving repeated consultation between the administrators and the design team. This evaluation process will permit energy-saving options to be identified and the trade-offs to be carefully weighed.

Although many decisions and compromises may be necessary in order to stay within the agreed-upon building budget, the design process can be accomplished in a more efficient manner if priorities are established early in the project. As soon as the educational programming is complete, the following considerations should be arranged in the order of their importance for each new building project.

Basic Facilities--Number and size of classrooms, laboratories, libraries, cafeterias, auditoriums, gyms, and shops required to support the educational program.

Floor Plan or layout.

Quality of Construction--The level of expense and durability of construction to be specified.

Construction Cost.

Energy Efficiency--This may be specified in both energy performance parameters and an annual energy budget.

Maintenance Cost.
Comfort of Occupants.
Aesthetics.

Building Flexibility--This refers to the multipurpose use of various areas in the building.

Life Cycle Costs.

Educational Programming

The first step in design--developing the educational specifications--is the responsibility of the school staff. It is important that adequate time be allowed for this task, since decisions made now will determine not only the size and arrangement of space, but also the mechanical controls necessary for efficient operation. Although often underemphasized, the process of determining how many students the building must accommodate, what they will be taught and the educational philosophy that will be the foundation of the curriculum is critical. The operating schedule is equally important since schools have intermittent use patterns which present special design concerns.

Educational programming involves the art of soothsaying and the science of econometrics. Not only do you need to determine your immediate needs, but also those for the lifetime of the building. Experienced school architects or outside educational consultants can provide advisory services at this stage, but each school district has its own unique programming criteria, and local administrators must be involved in each design decision.

Tell the architect what your needs and problems are. The information gathered at this time serves to inform the architect of the number of pupils, subjects taught, methods of instruction, school schedule and extracurricular and community activities. The architect must also be aware of any *anticipated changes* in the program or enrollment. Although good architectural design will accommodate some change, major program changes not planned for may require additional professional design services to ensure the efficient operation of all building systems.

The bottom line is this--it is better to spend a little more now, during design and construction to make a building energy-efficient than to spend more on utility bills from now on. Also, deciding to skimp now, thinking the changes can be made later, does not work either. Retrofitting is always more costly than doing it during construction. (Although, if you have an old building, energy retrofitting can often prove beneficial.)

Now we know why to think about energy during design and construction. The next question is: What can I do to use less energy? There are a lot of proven methods. The most efficient way would be to simply let your architect know that you are concerned. Make it a priority in the design phase.

As for specific tips, let us break these down into three categories: Site, Envelope, and Systems. Site considerations can have a dramatic impact on how much energy a facility uses. Orientation of the building, placement of trees and shrubs, and earth-sheltering are all potential energy savers. Of course, any use of the site depends heavily on the site used. Prevailing winds, available plants and topography can all have dramatic effects on what would be the optimum orientation and use of earth-sheltering for a building. Also, use of existing trees and shelter belts is always money-wise.

Another site factor affecting first cost and energy usage is the availability of utilities. For example, a site requiring a sewage treatment plant and lift station will increase first costs, as well as energy costs and maintenance costs. Utility availability should always be investigated before a site is purchased.

Another energy-saving idea which fits well with considerations of orientation, involves the length of eaves in relation to planned windows. Since the hot summer sun rides higher in the sky than the low (desirable) winter sun, a properly proportioned eave-to-window ratio can result in solar heat gain in the winter, but not in the summer. Natural sunlight (daylighting) is the most aesthetically pleasing and psychologically desirable form of light. Design features which incorporate daylighting can contribute significantly to the energy efficiency of a building. Daylighting is particularly effective in gymnasiums, cafeterias and large multipurpose areas. Proper window-sizing is very important because the rate of heat transmission is 10 to 20 times greater through single pane glass than through an insulated wall. The amount of heat transmitted through windows due to indoor and outdoor temperature differences can be greatly reduced by using insulating glass in place of single layer glass. Insulating glass is composed of two or three layers of factory-sealed glass separated by an air space. When double glass is used, thermal transfer may be reduced by over 40 percent. To determine the appropriate degree of investment in multilayer glass, both climate and the cost of energy must be considered. In Scandinavian countries, for example, windows of five-ply glass are now being used.

The envelope of the building is the entire outer shell, the divider between the "conditioned" interior and the exterior. Proper insulation (ceiling, wall and floor) can be extremely valuable if installed during construction. Often the cost of adding insulation to an existing wall is prohibitive, but if a wall is being built anyway, the extra cost of insulating it is minimal. Cracks and openings in the building shell allow the movement of air into and out of the building. This air movement, called infiltration, contributes significantly to the amount of heating and cooling energy that must be used

to condition a building. Although it is not possible to make a building completely air tight, infiltration can be significantly decreased by sealing the joints of dissimilar materials, caulking all penetrations in the building envelope and providing vestibules at entrances. Weatherstripping exterior doors and operable windows is another primary method of controlling air infiltration.

Shapes and Sizes

Design decisions regarding shape and size affect energy usage, and various shapes offer different advantages.

Square, multistory buildings offer the least amount of building surface to gain or lose heat. Since multistory buildings are more compact, they also have less roof area for potential leaks and maintenance problems. However, the Life Safety Code prohibits multistory buildings for preschool children, and elevators increase both first and operating costs.

Less compact building shapes offer increased opportunities for daylighting and natural ventilation. Examples of designs with larger perimeters include finger plans, in which numerous wings project from a main core, and campus plans, in which a number of small buildings are clustered and connected by open passageways. Designs with large surface areas can be made more energy-efficient if glass area is limited and strategically located to take advantage of daylighting. The use of double-pane glass should be evaluated and careful attention must be paid to orientation. Deciduous trees can provide valuable shade, and courtyards can provide areas for meetings, play and outdoor educational activities; however, campus and finger plan schools designed without climate-adaptive qualities can be energy guzzlers.

The size of a building also has an effect on energy use. Very large schools are thermodynamically different space. By grouping areas with similar use schedules, energy can be conserved when heating or cooling is confined to a relatively small part of the whole plant. When such groupings are accompanied by an appropriately zoned heating, ventilation, and air conditioning system, substantial savings can be realized.

Solar Energy

There is little question that solar power and other renewable resources will play an important role in the energy future of Oklahoma. Of the various proven technologies for using solar energy, the most cost-effective at the present time are passive design concepts and active water heating systems.

Passive design concepts take advantage of the sun and the wind without using electric pumps, fans, compressors or other mechanical devices. Instead, the temperature of a building is controlled by the architectural features of the building itself--the way it is oriented toward the sun and prevailing breezes, the mass and type of materials in walls and ceiling and the size and placement of windows and roof overhangs.

Active solar systems use mechanical or electrical power to help collect, store, and distribute solar radiation to the proper places at the proper times. An active space heating system, for example, uses pumps or fans to move air or water through a solar collector, where it is heated, and then transports the heat to the desired locations in the building. Most modern solar hot water systems are active designs; though it is possible to use a passive approach to solar water heating. A combination of both active and passive solar features, which frequently results in the most efficient total performance, is called a hybrid solar system.

Remodeling

The most important procedure for successfully undertaking a major retrofit of an existing school building is the same as that for planning a new building or an addition: Devising a program. A study should be made to identify current energy uses and losses. The majority of these losses will probably be due to deteriorated windows, insufficient or damaged attic insulation, inefficient lighting or deficiencies in mechanical equipment, controls and operation procedures. Careful coordination of mechanical, electrical and architectural components is required to make an existing school more energy-efficient when it is remodeled.

Buildings constructed before the mid-1960s, when energy costs were not a significant concern, are likely to have large glass areas and a large perimeter in relation to interior space. A decision must be made either to take advantage of its present design assets, using the existing features of natural light and ventilation, or to convert it to a building with a mechanically created interior environment. The strategies developed for remodeling based on a mechanically controlled environment will be different from those employed for the climate-adaptive school. If an addition is contemplated, the new area might be placed between two wings of the existing building, considerably reducing the perimeter of the final structure.

Some schools have been constructed with glass or windows comprising the majority of the wall area. If these schools have air conditioning, a very effective way to improve the thermal resistance of the envelope is to reduce the window area, keeping only enough glass for daylighting, emergency escape and natural ventilation. Windows to be covered can be left in place and covered on the inside and outside with thermal insulating material.

Adding insulation to the roof should be evaluated. If the built-up roofing is 18 to 20 years old, its life cycle is nearing an end, and additional board-type insulation could be applied in conjunction with new roofing. Insulation may also be installed on top of the ceiling or located on the bottom of bar joists, with a reflective layer above. This strategy is only practical when the area above the ceiling is not a plenum for return air. Consideration of any modifications which would result in a significantly heavier roof should be accompanied by an examination of the existing structure to determine its capability of carrying such a load. Since heat rises, the roof/ceiling portion of the envelope is probably the most important for reducing heat loss. Proper insulation and a good sun/waterproof roof is a definite asset in any structure. A leaky roof will allow water to seep in, causing deterioration of the building structure and mechanical systems. Water can also leak into the insulation and reduce its effectiveness.

Many of the energy-efficient aspects of new school design covered in this book can be applied to remodeling. Specific energy conservation measures including the following:

Provide exterior sun control by the use of overhangs, egg crates, louvers or screens;
Provide interior sun control on windows by the use of applied films, Venetian blinds, curtains, shades or screens;
Install new windows. Frames should have thermal breaks and insulated glass or translucent panels;
Install operable storm windows on the exterior over existing windows to reduce heat loss and infiltration;
Weatherstrip doors and windows;
Repair or replace door hardware. A door closer that does not work properly allows gross air infiltration through a partially open door;
Replace hollow metal doors with insulated doors; and
Caulk around door and window frames.

Various improvements can be rated according to their average payback periods. Simple payback is the length of time it takes to pay for an improvement from the resultant energy savings without regard to financing costs or the changing cost of energy.

Since funding for a complete remodeling job is not always available at one time, the work may have to be done incrementally, which can be more expensive. Strategic planning to prioritize and sequence installations can result in significant savings in energy and construction costs.

The following table shows average simple payback periods for typical energy-conservation measures. These values are based on actual findings:

MODIFICATION*	AVERAGE SIMPLE PAYBACK PERIOD YEARS
Close up windows not needed for daylighting and natural ventilation.	4-8
Insulate above acoustical panel ceiling.	2-6
Weatherstrip and repair hardware on malfunctioning exterior doors.	2-5
Add storm windows on exterior.	8-12
Add insulation on roof in conjunction with new roofing. (roofing cost not included)	3-6
Install Energy Management Control System.	2-8
HVAC Controls.	1-5
Modify lighting systems.	1-5
Duct and pipe system insulation and modifications.	1-5

Payback (years) = Cost of Modification ($) divided by savings ($)
*See Appendix C for additional Energy Conservation Measures

Another idea which often makes good sense to saving money/energy, is to add air-lock vestibules on exterior doors, especially opposing doors (i.e., both ends of a straight hallway). This cuts down on the infiltration of outside air into the conditioned interior.

Building systems, the last category we'll discuss here, involves such things as the heating and air-conditioning systems, lightings and specialized energy management systems (EMSs). In a modern building, the HVAC (heating, ventilation and air conditioning) system is usually the largest user of energy and can, therefore, be the greatest source of potential savings if done right. For example, if a school building of 10,000 square feet, which is already well-built for energy savings (insulated, good windows, etc.), were to install a HVAC system with a heat system efficiency of .8 and a cooling efficiency of 8.5 instead of .5 and 5 respectfully, the potential savings could be around $10,000 a year.

Estimating the savings from lighting can be very simple. (Watts of old bulb - wattage of new bulb) x .07/100 = dollars per bulb saved. Divide this number into the difference in cost between the two bulbs and you have a payback ratio (in hours--divide by 220 to get appropriate payback in months).

Another option which you may check is packaged energy management systems. These systems control the HVAC for all spaces in a building, based on both time and temperature through a central control unit. These systems often come packaged with security systems.

These are just some of the general ideas which should be considered for saving energy through proper building construction. As stated earlier, the best approach to building an energy-efficient building is to impress your design team that this is important. These methods are easily explained; so make sure your architect lets you know potential savings versus extra cost on these items (paybacks of under three years are well-worth the effort).

Legislative Authorization

In accordance with Senate Bill 524 (1982) ".... no bids shall be let for construction or major alteration of any public building until preliminary plans and specifications for such construction or alteration have been submitted to and reviewed by the State Department of Education." 70 O.S. 1981 § 3-104-2.7 The term "building" previously mentioned can be described as a structure consisting of a foundation, walls and roof, with or without other parts.

In everyday language, the above mandate gives the State Department of Education the responsibility to review your building projects. The Capital Improvement/Transportation Section has the specific assignment within the Department. The part of that section which does the review is made up of licensed architects. We use the locally adopted building codes of your area, disabled access regulations, school law, attorney general opinions and other appropriate agencies to ensure that school buildings built or remodeled are safe, energy-efficient and adaptable to program offerings and student needs. Our basis of review also includes the *Life Safety Code*, (National Fire Protection Association 101), the *BOCA (Building Officials Code Administration) Code*, and *Space Guidelines for Planning Education Facilities.* Some of the specific areas of concern to school districts that we address are prevailing wage rates, force account, competitive bidding laws and professional licensure (architects).

The information we require to make a meaningful review are the "street" or final contract documents consisting of the drawings and specifications. Preliminary drawings can be submitted, but they tend to leave more questions unanswered. We tend to point out life-safety problems which include maximum areas of buildings, special use and occupancy requirements, light, ventilation, courtyards, means of egress, structural loads, safety or wire glass, fire-resistive construction, sprinklering, heating, ventilation, air conditioning, fire lines, standpipes, fire extinguishers, kitchen hood sprinklers, manual pull stations, wiring, plumbing, building materials and energy conservation. We will write the administrator a "Notification of Review," with a copy to the architect explaining any discrepancies or concerns that we have. Projects whose estimate of construction is under $40,000 do not require a licensed architect to produce the plans and specifications. We feel that our professional staff is especially helpful to those districts that are involved in small projects and have no outside professional staff. Though we cannot produce the documents, we are available for site technical assistance and questions, research, etc., to help you get started. For districts that do employ an architect, we become the liaison between the school, architect and engineer. We work with the State Fire Marshal, who does a similar review on your project.

State history, as far as number of projects reviewed and estimated cost, are as follows:

1989-90 School Year	183 Projects	$ 75,000,000
1990-91 School Year	218 Projects	$ 89,000,000
1991-92 School Year	293 Projects	$104,500,000
1992-93 School Year	190 Projects	$108,162,993
1993-94 School Year	260 Projects	$129,809,134
1994-95 School Year	194 Projects	$123,884,467
1995-96 School Year	211 Projects	$121,777,452
1996-97 School Year	215 Projects	$143,051,101

*1997 Metropolitan Costs for Selected Cities ($/sq.ft.)

City	Elem.	Jr. High	High School
Dallas	63.07	64.80	65.36
Denver	67.96	69.83	70.43
Kansas City	68.69	70.58	71.19
New Orleans	63.15	64.88	65.44
Phoenix	66.57	68.40	68.99
St. Louis	74.10	76.13	76.78

Public School Costs in Oklahoma by Fiscal Year

	92-93	93-94	94-95	95-96	96-97
Standard Built Structures (brick, block, steel bar joists)	$50.46	$50.53	$55.25	$63.45	$67.36
Preengineered Structures (Star, Republic, Armco, etc.)	$37.03	$35.32	$39.77	$45.32	$40.18

Two federal regulations that have been implemented are the Asbestos Hazard Emergency Response Act (AHERA) and the Hazard Communication Standard (HCS). We recommend that an asbestos survey be conducted by a certified asbestos inspector and a management plan be prepared by a certified asbestos management planner for all areas being remodeled, renovated, or demolished. The Oklahoma Health and Labor Departments are the lead agencies in certification and enforcements. The State Department of Education is a resource entity to answer questions and give recommendations only. A sample asbestos management plan is available from the State Department of Education. The second federal regulation concerns hazardous chemicals. We recommend that the contractor on a new or remodeling project (local education agency on force account) have a written Hazard Communication Standard appropriate to a multi-employer work site. The program must meet the Oklahoma Labor Department regulations. It must include Material Safety Data Sheets (MSDS) and Chemical Information Lists (CIL). It must include training of all personnel who may come in contact with hazardous chemicals. It must include a central point of contact where MSDSs, CILs, and training procedures are available. Our section has published a hazardous communication book. Contact the Capital Improvement/Transportation Section for a copy of this publication.

[1]From Means Facilities Construction Cost Data 1997.

The State Department of Education reviews building plans and specifications according to legislative and agency authorization. We review your building project from the locally adopted codes. In the absence of any code, we use the same as the State Fire Marshal, i.e., *Building Officials and Code Administrators* (BOCA) 1996 and *Life Safety Code* (NFPA 101) 1994. Our basis of review also includes Handicapped Access, Public Law 93-112, Section 504 of the Rehabilitation Act of 1973, Space Guidelines for Planning Educational Facilities, attorney general opinions, state laws, and other applicable agency regulations. You, as the administrator, might ask the question, "Why are building codes important to me?" Please read on.

"As the story is often told and sometime believed, a cantankerous cow kicked over a lantern in O'Leary's barn and started what was to be the most destructive fire in United States history. The fire began in the early evening of October 8, 1871, and raged throughout the following day until midnight, when rainfall helped put an end to the disastrous conflagration. During those 27 dreadful hours in 1871, the heart of the great city of Chicago was reduced to rubble.

At that particular time, the abnormally dry condition of a city predominately built of wood structures, winds that reached speeds of 30 miles an hour and convection swirls caused by the fire itself all combined to cause a fire storm that spread quickly over an area of some 2,000 acres that included the central business district and surrounding residential communities. The final toll was appalling; nearly all of the 17,000 buildings attacked by the fire had burned to the ground; 90,000 people--more than a quarter of the city's total population--had been left homeless; and, as if by some miracle, only 250 to 300 people lost their lives.

Property losses were then estimated to be about $200 million. To put this figure into a contemporary setting, the Chicago fire losses of 1871 would be valued today at about $1.8 billion, a ninefold increase in a frame of time spanning well over a century."[2]

National cost statistics on property losses from fire are usually stated in terms of megadollars. But how many of us can readily envision what a billion dollars, for example, represents in actual building and contents? The purpose in recalling the incident of the Great Chicago Fire is to provide a pictorial dimension by which you can associate the enormous cost of fire with the huge mass of property losses.

Can a Great Fire Occur Again?

Can the likes of the great Chicago Fire ever happen again? Undoubtedly, the immediate and overwhelming response, at least from those intimately familiar with the current state of fire protection practices and applied technology, would be that in these times it is virtually impossible for such a total disaster to be repeated. And yet, this is essentially what has been happening year after year over a period of many years.

Cost of Fire

The NFPA's (National Fire Protection Association) seven year record (1978-1984) shows that property losses in the nation ranged from an estimated low of $4 billion in 1978 to $6 billion by the end of 1984. The important point to be derived from the statistics is that in recent times the nation has sustained direct property losses at an average cost of about $6.5 billion per year.

How many symbolic cities the size of Mobile, Alabama, or Dayton, Ohio, or Fresno, California, or even a municipality as large as Richmond, Virginia, can the nation afford to lose in the years ahead?

Present-day fires seldom result in total burn-out situations, and this includes both single and multibuilding involvements.

The destruction of property from fire constitutes a long-standing national problem of such gigantic proportion that it needs to be recognized and forcibly brought to public attention so that something can be done about it. But the incredible fact is that the problem continues to remain in obscurity.

The public is generally unaware of the total magnitude of national property losses, because the reporting of fire incidents by local news media usually remains local information. Only a few spectacular fires, particularly those that involve a large number of fatalities and injuries, receive national news coverage and those events are never identified as being part of a national problem on property safety.

Even super-large building fires do not necessarily receive national attention. For example, how many people who live outside Oklahoma heard of the fire in Building 3001 at Tinker Air Force Base, that occurred in November 1984? It took three days to extinguish the fire, requiring the services of 500 firefighters from 24 fire departments and the assistance of hundreds of Civil Defense and Air Force personnel. About 685,000 square feet of the sprinklered building was destroyed and another 200,000 square feet severely damaged. The total cost of the fire is estimated to be in the neighborhood of $140 million. It is purported to be the largest single U.S. building loss in a century and yet, I dare say, that nearly all of the nation's taxpayers who indirectly paid for the facility are unaware of the loss.

How does the U.S. record on property losses compare with the fire experience of other countries? Information is difficult to obtain and even harder to evaluate and provide in meaningful comparisons. In 1980, the Georgia Institute of Technology issued the results of a primordial study on fire losses in selected foreign countries. As a part of the study, a comparative analysis was made on building losses. The United States has the second worst record in the number of building fires per 1,000 persons, being outranked only by Ireland.

Japan, remarkably, has the best record, despite the traditional combustibility of its built environment. Much of Japan's good experience is attributed to societal attitudes on fire safety. Another part of this analysis shows that the United States stands fifth among 12 selected nations in building fire losses measured in terms of U.S. dollars per capita, being exceeded only by Norway, Canada, Denmark, and France. Once again, Japan had the lowest rank in this statistical category.

Generally, the U.S. record of property losses does not stand well against the fire experiences of other nations.

Recalling our earlier discussion of the Chicago fire and other massive fires--in the latter half of the 1800's, an attempt was made by private and public officials, on a very simple level, to regulate buildings, their safety and the people in them. This attempt took the form of building codes.

Developers and builders, then and now, have a profit motive to build cheap and sell high. Building codes are an attempt to balance safety with economy of construction. There are 3,900 different building codes and thousands of standards in use across the country, but only about four model codes: the Uniform, the Southern, BOCA, and Life Safety.

1. What is the significance of building codes to the administrators? Why have building codes? **Answer:** The extreme example is the Chicago fire referred to in the beginning. Closer to home is the Star Elementary School Explosion of 1982.

2. How can architects, building managers and superintendents have an impact on improving building codes? **Answer:** Become familiar with applicable codes; educate your school patrons, board, teachers, students; a healthier, safer environment will result from compliance with codes.

3. Will compliance with codes add to the cost of my building? **Answer:** Possibly! But how do you put a cost on students' and teachers' lives?

We have now reached a crucial point in the construction cycle. The plan and the money are in hand. The contractor has either been selected or the low bidder accepted and we have signed the contract. The moment of truth is upon us and our future actions are revocable only at a cost. We must exercise caution to reduce lawsuit opportunities and/or violations of state law. In general, the architect should see the owner (school district) safely through this complex procedure; however, the school administrator cannot escape the responsibility as the school board's agent. We are informed by the contractor that they will break ground within the contractual period (usually within 10 days) and will follow a "normal" construction schedule.

The schedule shown on the next page always includes a critical path that determines the minimum time necessary to complete the project. It is appropriate to check with the contractor weekly to verify on-time completion.

CHRONOLOGICAL ORDER OF CONSTRUCTION

START OF CONSTRUCTION → SEQUENCE / DURATION → FINAL CLOSE OUT

CONSTRUCTION ITEMS

- CLEARING, ROUGH GRADING, DEMOLITION, SOIL STABILIZATION
- UTILITIES, UNDERGROUND
- FOOTINGS
- SLAB, STRUCTURAL FRAMEWORK, EXTERIOR WALLS, BRICK PAVING, WATERPROOFING
- PLUMBING, MECHANICAL & ELECTRICAL ROUGH-IN, ROOF STRUCTURE, ROOFING, BUILDING INSULATION, GUTTERS & DOWNSPOUTS
- WINDOWS EXTERIOR DOORS, ROOF-TOP MECHANICAL UNITS
- INTERNAL PARTITIONS, FINAL ELECTRICAL & PLUMBING, DRYWALL, CABINETS, FINISH CARPENTRY, MECHANICAL UNITS, CEILING GRID, KITCHEN EQUIPMENT
- FLOOR FINISHES, CEILING TILES, FINISH HARDWARE, WALL COVERING, PAINT, REGISTERS & GRILLS, LABORATORY EQUIPMENT INSIDE DOORS, LOCKERS, PLAYGROUND EQUIPMENT, WALKS, TOILET PARTITIONS, KITCHEN EQUIPMENT, LANDSCAPING, LIBRARY EQUIPMENT
- FINAL CLEAN-UP, SYSTEM TESTING, MAINTENANCE CHECKS

Public Competitive Bidding Act, 61 O.S. 1974 § 101, House Bill 1189, 70 O.S. 1991 § 1-117, and Senate Bill 689, 61 O.S. 1992 § 113 have had more impact on the school construction process than any other state laws. All of these laws become effective the moment the school board approves the plans for construction and most continue until the facility is occupied by the school. House Bill 1189 restricts the use of general fund money for a capital improvement project. A subsequent amendment allows the use of some general fund money provided the district meets specific financial requirements.

Once the decision has been made to approve the plans and advertise for bids, these laws become effective. Initially, three sections control the advertising process and two of these deal with the seven thousand five hundred dollar ($7,500) limit. The first section establishes the limit and the second states, "No contract involving sums in excess of seven thousand five hundred dollars ($7,500) shall be split into partial contracts . . . all such partial contracts . . . shall be void."

The third section concerns the requirements of notification or advertising for bids. This section establishes that "notice thereof shall be mailed, by first-class mail, to all known prospective bidders...at least twenty (20) days prior to the time set for opening bids." Additionally, "notice thereof shall be given by publication in a newspaper of general circulation and published in the county where the work, or the major part of it, is to be done. Such notice by publication to be published in two (2) consecutive weekly issues of said newspaper, with the first publication thereof to be at least twenty (20) days prior to the date set for opening bids." At this time, a set of bidding documents is required to be available at the "awarding public agency" for the review by the public or any interested bidder. This notification is required to identify certain items and provide the following information:

1. "The character of the proposed public construction contract is in sufficient detail so that all bidders know exactly what their obligations will be . . ."

2. "The name of . . . the awarding public agency, the office location and address of such person from whom a complete set of bidding documents . . . may be obtained, together with the amount of the cost deposit required . . ."

3. "The date, time and place of opening of the sealed bid."

4. "The name and office location and address of the office of the awarding public agency to whom the sealed bids should be submitted . . ."

It should be noted that if the awarding public agency qualifies for and elects to establish that an emergency condition exists, the requirements for bid notification may be waived. This waiver is also conditional upon notification of the President Pro Tempore of the Senate and the Speaker of the House of Representatives by the agency within ten days.

At the bid opening, each bidder is required to submit with the bid a bid bond, a business relationship statement and a noncollusion statement. These forms have been developed and published by the Attorney General's office and may be obtained from the Construction Properties Division of the Department of Central Services.

In recent years an additional provision for "an irrevocable letter of credit" has been included. However, a one hundred thousand dollar ($100,000) limit has been placed on this option and careful thought should be taken before accepting this substitute. Senate Bill 689, 61 O.S. 1992 § 113 made certain revisions to the bonding requirements for public projects. If the bid is between seven thousand five hundred dollars ($7,500) and thirteen thousand five hundred dollars ($13,500), all bonding requirements are waived and the school may enter into a contract with the low bidder without the necessary bid performance workmanship or warranty bonds. It is important to note that all other provisions of the Competitive Bidding Act have not been modified by this law.

After all bids have been opened and read aloud, the awarding public agency should then recess and convene a "closed session" with their architect or construction consultant to review the bid proposals more closely. Care should be taken to not allow any late or incomplete bids to be considered as this would provide an unfair advantage to the late bidder or contractor who is allowed to complete his proposal after all the other bids have been made public. The awarding public agency must award the contract to "the lowest responsible bidder or bidders . . .within thirty (30) days after the opening of bids." "If an award is made other than the lowest bidder, the awarding public agency shall accompany its action with a publicized statement setting forth the reason for its action." The law also requires that all of the bids are to be placed in a file for " . . . five (5) years from the date of the bid opening or three (3) years from the date of completion of the contract . . ."

It should be noted that the awarding public agency is allowed to reject any or all bids submitted and the authority to negotiate a contract if no bids are submitted. The last provision is applicable only if the reasonably estimated cost is less than fifty thousand dollars ($50,000).

This brings us to the contract signing. At this point, the contractor is required to provide bond and insurance affidavits. These bonds include a performance bond in an amount equal to the contract price, ". . . to ensure the proper and prompt completion of the work in accordance with the provisions of the contract and bidding documents" and materials bond in an amount equal to the contract price, ". . . to protect the awarding public agency against defective workmanship and/or materials for a period of one (1) year after acceptance of the project." The contractor is also required to purchase "public liability, fire and storm damage, and workers' compensation insurance during construction in reasonable amounts."

During the construction process there are four (4) sections that apply and these again are the responsibility of the contractor. First, "all statements or invoices submitted to the awarding public agency for work performed shall contain a sworn certification by the supervising architect, engineer, or other supervisory official . . ." And that payments can be made . . . "only after proper inspection has been completed . . ." A retainage of the progress payment may be held by the awarding public agency to ensure compliance with the contract documents. This retainage is usually set at ten (10) percent of the partial payment as applied for by the contractor. Provision is made to reduce the retainage to five (5) percent once the project is fifty (50) percent complete and the owner and/or their representative have determined that satisfactory progress is being made. It should be noted that the law also provides that "the awarding public agency shall pay to the contractor, interest at the rate of three-fourths (3/4) percent per month . . . and . . . the interest shall commence thirty (30) days after the work under the contract has been completed and accepted . . ." The law also makes provisions for change orders provided, however, that the change order shall not exceed fifteen (15) percent in projects of less than one million dollars ($1,000,000) or ten (10) percent in projects greater than one million dollars ($1,000,000). If the change orders should exceed these limits, then the awarding public agency shall require a readvertising for bids on that part of the contract. The last provision of the law applicable at this time concerns the assignment of

the contract. This section states, "no public construction contract shall be assignable by the successful bidder without written consent of the governing body of the awarding public agency, evidenced by resolution."

It should be noted that nothing in this act shall be construed to prevent a public agency from doing public construction work on a force account basis.

At the close-out or final inspection of the facility, a certificate of substantial completion is issued by the owner or designated representative and at that time the Public Competitive Bidding Act comes to a close, except for the filing requirements that are in effect for several years.

OKLAHOMA STATE FIRE MARSHAL
FIRE-RESISTIVE CONSIDERATION AND SAFETY

14

The office of the State Fire Marshal was created to assist local jurisdictions with investigations of suspicious fires, to conduct inspections on certain special occupancy buildings, code enforcement for life safety in public buildings and plan review for new construction.

The agency is not generally involved in these responsibilities in cities and towns large enough to have their own enforcement personnel. However, the agency will provide assistance in any area on the request of an appropriate local official.

Title 75, Chapter 4, Section 324.11 of Oklahoma Law requires that school districts submit plans for all new construction or major renovation for review and approval by this agency.

A large majority of school buildings in the country are not as fire-safe as they should be. During one year, 13 school fires resulted in an estimated loss of $12,000,000 or an average of $900,000 per fire. A single school fire resulted in the death of 15 children and serious injury to 17 others. Over a period of years, more than 800 deaths have occurred in 60 of the more tragic school fires.

Therefore, inspection of all school buildings is necessary to safeguard the lives of our school children and administrative personnel.

It is recommended that an annual inspection be made by fire-protection or fire-prevention personnel and a monthly inspection be made by a specified member of the school administration, using inspection forms available at no cost from the Office of the State Fire Marshal.

Good housekeeping is of prime importance in prevention of school fires. The method of handling and disposing of waste paper should be investigated and all parts of the building, especially under and near stairways, searched for accumulation of waste or discarded material. In school shop and other workrooms the necessary self-closing, metal waste can should be identified.

Heating equipment, being the cause of a large portion of school fires, should be given special attention. The clearances between combustible material and furnaces, flue or vent connectors, steam pipes and all other hot surfaces should be examined to see that they are adequate.

Interior finish can play a major role in containing fire. Low-density fiberboard and bare wood should not be used unless covered with noncombustible or tested, approved materials.

Compartmentation is second only to automatic sprinklers in containing a fire. Good compartmentation can hold a fire to a single space allowing firefighters to hold damage to an acceptable minimum. Thus, there is the need to maintain fire-resistant hallways, without louvers, grills, or plain glass in doors.

Electric wiring should be inspected for improperly made extensions, misuse of flexible cords and broken electrical equipment. Fuses should be checked for proper capacity.

In connection with heating, air conditioning, and ventilation systems, the condition of air intakes should be observed to see that combustible materials are not stored where, if ignited, fire would

send smoke through the system. Also, see that discharge ducts do not terminate in the attic. This condition has contributed to the destruction of many old school buildings.

The extent to which ventilating ducts provide a means for the spread of fire through buildings should be checked, as should the need for protective devices such as dampers and fan shut-downs to stop air circulation.

Fire extinguishers should be examined to assure they are well-maintained and sufficient in number, and pressures should be noted.

Exit facilities of school buildings need careful study, particularly from the standpoint of their usefulness in time of fire. Attention should be given to the following basic requirements:

1. Each room accommodating 50 or more people has at least two means of egress, more if occupant load requires.

2. Exit stairs from upper floors are enclosed to the outside without communicating with lower floors.

3. All exit doors are equipped with the proper hardware and swing to the exterior.

Considerations should be given to the other exits available should any be blocked by fire. Fire issuing from windows frequently blocks the use of outside, open fire escapes. To guard against this, windows near fire escape stairs should be of wired glass in steel frames.

The State Fire Marshal attempts to inspect all schools annually, except those in cities and towns of sufficient size to have their own inspection capabilities. The agency will always honor requests by school officials to inspect any school or to serve in an advisory capacity within our area of responsibility.

APPENDIX A

OWNER--ARCHITECT

List For Design of "Maintenance-Free Buildings"

1. **SITE SELECTION**

   ___ Locate all utilities--Are sewer, water, gas, or electricity near?

   ___ How much of the land is available to build on?

   ___ Check substrata by test boring--it may be "rock" or a high water table.

2. **PLACEMENT OF BUILDING ON SITE**

   ___ On high ground--not low (so that drainage is away from buildings).

   ___ Near street or road, rather than on the back of the site.

   ___ Near utility locations, so costly extensions will not be necessary.

3. **APPROACHES TO THE BUILDING** (service drive and sidewalk)

   ___ Again, close to existing street or road--long approaches are expensive.

   ___ Have alternate approach, if possible, to lessen congestion.

   ___ Place them so that they drain quickly and surrounding ground does not wash onto them.

4. **TYPE OF FOUNDATION SYSTEM**

   ___ Insist upon test holes to identify substrata, unless you already have a record of it. When soil reports show a possible water problem, provide a drain tile system to divert water from under and around the building.

   ___ Cost of test holes (usually minor) paid by owner (a good investment).

   ___ Design only for the specific location, soil capacity, and characteristics, not just general.

5. **TYPE OF FILL AND COMPACTION CONTROL**

   ___ Is it balanced cut and fill?

   ___ Is fill material specified and limited good quality and low plasticity index?

   ___ Is placement of fill controlled and tested by compaction tests?

6. **EXTERIOR WALKS, STEPS, STOOP, RAMPS, PORCHES, ALCOVE, AND INDENTED OR RECESSED ENTRY AREAS**

____ Are they well-drained? Do water and mud run across?

____ Is the surface too slick or too steep for safety?

____ Canopy or coverover can help keep building dry.

7. **FLAG POLE PLACEMENT AND DESIGN**

____ Place close to administrative offices.

____ Run a concrete walk to it, or place on paving.

____ Specify rope to be inside of pole to prevent kids swinging on rope.

8. **TEACHER PARKING, STUDENT PARKING, CAR PICKUP, BUS LOADING--LOCATING AND LIGHTING**

____ Well-drained and, if possible, separate student auto parking from public and "bike" parking. Also, separate bus loading from all other parking types.

____ Have at least two or more entrances and "one-way aisles."

____ Provide good lighting of all quadrants, preferably underground wiring.

____ Provide a transitional space for children to wait on the buses, supervised.

9. **BUILDING EXTERIOR AND GROUND LIGHTS**

____ Timer or solar-switch controlled security lighting mounted at building corners and over entrances.

____ Underground wiring to grounds lights.

____ Consider light pattern for energy used and keep a supply of replacement bulbs.

10. **GRASS AREAS AND LOW-CARE LANDSCAPING**

____ Specify plant life native to the area and as hardy as possible.

____ Have mowing strips (flat paved border) around all grass areas.

____ Install automatic underground watering systems or at least well-located "frost-proof" hose bibs.

11. **TREES AND SHRUBS**

____ Protect **all** existing trees and shrubs during construction or at least until planned **in-to** or **out of** a landscaping layout for the building and grounds.

____ Allow a reasonable budget for purchase and installation, and insist the architect consider consulting with a knowledgeable landscape expert, if he is not a landscape architect.

____ Select trees which are not "dirty"--shedding leaves and seeds can be a real problem.

12. **DRAINAGE WATER--GROUNDS, PAVED AREAS AND ROOF**

____ Do not create drainage problem for neighbors.

____ Tie roof drains into watertight lines that carry water away from building. Include emergency scuppers when interior roof drains are used.

____ "Crown" paved areas and slope roof to get water off quickly without creating "ramps" and safety problems. Never design a "flat" roof.

____ Add lime stabilization to all parking, drives, or playgrounds where drainage is a problem, due to poor soil conditions, etc.

13. **UTILITIES INTO AND FROM THE BUILDING**

____ Place **all** underground, if possible, and in areas which are out of the way of future growth.

____ Place in "cushioned" fill, not rocks.

____ Mound cap of ditch to allow for normal settlement, instead of having a depression.

14. **PLAYGROUND AND ATHLETIC AREAS AND EQUIPMENT**

____ Well-drained, without directing water towards buildings or access to the areas.

____ Anchorage for stability (set in concrete).

____ Galvanized or rust-resistant.

15. **BUILDING COLOR** (exterior)

____ Almost any building exterior can be defaced--light color or dark.

____ Dark colors hold heat; light colors reflect heat.

____ Lighter surfaces utilize reflection of security lights to achieve better night control, while darker surfaces hold more shadows and shade.

16. **BUILDING TEXTURE** (exterior)

____ Rough surfaces are harder to mark, but also more difficult to clean.

____ Native stone is abused less than brick, but is more costly.

____ Exposed aggregate concrete panels also stand up well, while metal buildings get "old" quickly.

17. **PROTECTIVE WALKWAYS** (covered walks, canopies)

____ A good solution to help keep building dry.

____ Provide well-drained roofing and good night lighting.

____ Allow for vehicular access under or through removable sections.

18. **GLASS--LOCATIONS AND TYPE**

____ Consider sun and climate control--insulating glass best, but more costly.

____ Fewer windows, less breakage, additional "teaching" wall space.

____ Simplified hardware lasts longer. Match window types for ease of maintenance. Install glazing from inside.

____ Use wire glass in one-hour corridor walls.

19. **ROOF--TYPES AND SYSTEMS** (worthy of a whole seminar in itself)

____ Design for quick "run-off" is best, rather than holding the water.

____ Three- or four-ply buildup with gravel topping most often used, but usually most troublesome (single ply coming in **strong**).

____ On sloping roof, metal roofing "standing seam" is possibly a good solution, but composition shingles are less expensive.

20. **INFILTRATION**

____ On brick veneer buildings, use a plastic wrap in the void space between exterior wall sheathing and interior face of the brick to keep drafts down. Seal all joints.

21. **EXTERIOR AIR CONDITIONING--TYPES AND SYSTEMS**

____ Roof-mounted and horizontal-mounted types above ceilings are hardest to maintain, but use no floor space.

____ Ground-mounted are easy to maintain, but most susceptible to damage.

____ Central system or in-room verticals good alternative--but noisy.

22. **DOOR--TYPES AND MATERIAL**

____ One and three-quarter-inch thick wood (solid core) of good quality or hollow metal best.

____ Heavy gauge metal (not light) reinforced for hardware.

____ Weatherstripping against interior face of door, not inside frame to interfere with closing.

____ Provide 20-minute-rated fire doors with closers in all one-hour walls. Glass in doors to be wire, not over 1,296 square-inch metal frame.

23. **HARDWARE AND KEYING, AND CLOSERS**

____ Use of **heavy duty** "keyed-alike" is always best.

____ Always match existing hardware when building on additions.

____ Heavy duty closers (repairable) are best and match existing.

24. **ENTRANCE MATS AND FOOTSCRAPERS**

____ Grating first (well-drained and "heel-proof").

____ Rough mat exterior.

____ "Soft" mat interior.

25. **ENTRANCE LIGHTING**--TYPES AND AMOUNT (inside and outside)

____ Recessed in soffit. Place high to resist vandalism.

____ Consider time and/or solar switch for use of less energy and better control.

____ Use metal halide for long-life, low-energy.

26. **INSULATION--TYPE AND LOCATION** (building and pipe)

____ Floor, wall, ceiling, and/or roof. Blown, sprayed, rigid board or batts. Use a flame spread of 25 or less where exposed in walls or attic areas.

____ Select type not easily accessible (to get vandalized, wet, or moved).

____ Pipe insulation helps eliminate condensation drips. Conserves energy on hot water lines.

27. **EXHAUST SYSTEMS--TYPE AND LOCATION**

____ Safety--i.e., over state areas, spray booths, etc.

____ Cooking and fume--home economics and science. Fume hoods over science tables should be 150 cubic foot/minute. Science storage rooms to be vented and not return air to the classroom.

____ Over swimming pools and P.E. areas not air-conditioned. Provide floor drain at emergency showers.

____ Ventilation (nonreturn) is required for toilets.

28. **WATER SYSTEMS AND SERVICE CONNECTIONS**

____ Air chambers prevent "hammer" in all laboratory/shower areas.

____ Cut-off valves at crucial locations ("tagged" for control identification).

29. **DRAINAGE** (SEWER SYSTEM)

____ Septic, lagoons, tertiary, etc., must meet state health requirements.

____ Place cleanouts at each vent wherever sewer changes direction 90 degrees.

____ Place building high enough to offset necessity of lift stations.

30. **LIGHTING--TYPES AND INSTALLATIONS**

____ Use high-efficiency fluorescent bulbs indoors.

____ Ease of relamping is an important consideration.

____ Consider switching fewer on a switch--two switches per classroom or lowering lighting levels.

31. **FLOORING--TYPES AND INSTALLATION** (location)

____ Consider low-maintenance, nonslip quarry tile in high traffic and water areas.

____ Consider carpet, direct glue down in classrooms. Ensure conductive carpet is specified, especially in computer, word processing rooms. No plastic in backing; flame-retardant, smoke-developed, toxicity levels (labels) from the mill.

____ Consider resilient tile or sheet vinyl in home economics, cooking, etc. Ensure no asbestos-containing materials are found in your facility.

32. **INTERIOR WALLS**

____ Ensure smoke- and fire-rated partitions are sealed to the deck above.

33. **WALL FINISHES**

____ Hard and slick are easy to clean, but also easy to mark.

____ Oil base enamel will pay for itself in cleanability.

____ Rough textured masonry is difficult to mark and seems to last longer. Brick needs no paint, but is hard to clean, especially inside.

____ Tile needs no paint.

34. **CEILING--TYPES AND INSTALLATION (location)**

____ Hard-surfaced if within reach of students.

____ "Clip-down" in gyms and entrances.

____ Ample height in secondary classrooms and corridors.

35. **ACCESSIBILITY--CRAWL SPACE, TUNNELS AND CHASES**

____ Easy access to piping, panels, lighting and motors.

____ Light fixtures in access spaces.

____ Built-in steps and doors, rather than ladders and hatches.

36. **INTERIOR AIR CONDITIONING SYSTEMS** (ducts and registers)

____ Smooth, cleanable surface surrounding registers.

____ Flexible duct must meet UL 181 Class 0 or 1 specifications. Floor installation more expensive.

____ Adjustable only by proper tools, not by simple levers or knobs.

37. **PUBLIC ADDRESS SYSTEM AND SPEAKERS**

____ Balanced speakers of good quality placed out of reach.

____ Master unit of good quality in controlled area.

____ Standby power system in assembly area for emergency.

38. **FIRE/SMOKE ALARM SYSTEMS AND DEVICES**

____ Standby power system for major system.

____ Place devices out of reach, but not out of sight. Manual alarms at all code-required exterior doors.

____ Check frequently for proper functioning and effectiveness.

39. **FIRE EXTINGUISHERS**

____ ABC-type best overall.

____ Check charging dates frequently (yearly).

____ Mount in hazardous locations and at all required exterior doors.

40. **CHALK AND TACK BOARDS**

____ Do not use the cheapest grade and try to match existing materials.

____ Trim of aluminum or other maintenance-free material.

____ Attach securely to studding or sturdy wall (not to finish materials).

41. **CLOCK AND SIGNAL SYSTEMS**

____ Select one only after you are sure it ties into existing system.

____ Attempt to determine which ones last and function without maintenance.

____ Visual signals rather than loud audible signals are desirable.

42. **TELEPHONES** (private and public)

____ Place public phones where they can be seen by office staff.

____ Conceal private phones below counter tops.

____ Allow for future growth.

43. **ROOM NAMES AND GRAPHICS**

____ Make letters large enough to read and place high above doors on frame or wall.

____ Attach letters with glue and screws.

____ Place outside letters tight to wall so that birds will not nest behind.

44. **FIXED SEATING AND FURNITURE**

____ Make sure that support brackets have flush or concealed screws and bolts.

____ Consider permanent finishes and cleanable surfaces.

____ Minimize gimmicks and moving parts.

45. **PORTABLE FURNITURE** (folding chairs and tables)

____ Design adequate storage (sufficient for future increase in number of units.)

____ Check on style chosen to see if it has a good service history.

____ Consider permanent finishes and substantial connections.

46. GYMS AND DRESSING ROOMS

____ Make the lower six feet of walls and partitions "smooth and slick" and cleanable.

____ Provide adequate lighting and high, well-ventilated ceilings. Protect lights with wire grills and/or vandal-resistant lenses.

____ Use heavy-duty fixtures; i.e., shower heads, valves, etc.

____ Hot water temperature should be nonscalding.

47. AUDITORIUMS AND ASSEMBLY ROOMS

____ Provide easily cleaned floors; i.e., carpet throughout or vinyl tile throughout.

____ Adequate lighting, ventilation, and ease of relamping.

____ Wall surfaces without paint; i.e., brick, stone, stucco, etc.

48. SCIENCE ROOMS, ART ROOMS, SHOPS, AND HOME ECONOMICS

____ Adequate lighting and ventilation (exhaust especially important).

____ Consider cleanable wall surfaces and nonstaining floors, walls, and ceiling tile.

____ Acid- and paint-resistive counter tops.

49. KITCHENS AND CAFETERIAS

____ Walls with six-feet high minimum wainscot of tile or other smooth, slick surface.

____ Membrane ceiling tile (anything but porous).

____ No-wax vinyl or floors that are easily maintained; i.e., nonslip quarry tile.

50. STORAGE ROOMS AND CUSTODIAL CLOSETS

____ All surfaces "smooth and slick" (scrubbable).

____ Floor drains with sloping floor.

____ Good lighting and ventilation.

____ Custodial spaces are to be sprinklered.

51. BUS BARNS AND MAINTENANCE BUILDINGS

____ Good exhaust fans.

____ Large floor drains with good (slope) drainage to them and five and one-half inch thick slabs.

____ Good lighting in work areas.

____ Explosion considerations.

52. **STADIUM AND BLEACHERS**

____ Exterior seats of aluminum or durable wood and galvanized metal, if possible.

____ Well-lighted (security lights).

____ Substantial support rails and woven wire fencing around base.

53. **FFA** (show barns, sheds, and feed lots)

____ Good drainage.

____ Galvanized metal and treated lumber.

____ Good lighting and ventilation.

54. **DESIGNING FOR DUST**

____ Specify weatherstripping and glass.

____ Double entry doors help keep it out of building.

____ Close the windows on windy days.

55. **DESIGNING FOR RAIN**

____ Canopies over entrance doors.

____ Gratings and rough mat outside--soft mat inside.

56. **DESIGNING FOR SUNSHINE**

____ Cut down on glass, except where you want the sun.

____ Insulating and tinted (solar) glass good, if money is available.

____ Canopies for shade or deep-set windows and doors.

57. **DESIGNING FOR SNOW**

____ Seal around rooftop unit and at parapets above flashing.

____ Install melting cables at selected locations.

____ Canopies and covered walks help.

58. **DESIGNING FOR ICE**

____ Melting cables at critical points and entrances.

____ Good drainage to remove standing water

____ Canopies and covered walks.

59. **DESIGNING FOR MUD**

____ Place walks and slabs higher than adjacent ground and/or do not drain across.

____ Gratings, scrapers, and double mats at all entrances.

____ Seed and sod areas around walks, drives, and parking.

60. **DESIGN FOR ELEMENTARY**

____ Carpet floors except in water areas.

____ Four- or five-foot high wainscot of ceramic tile is wise in corridors and some classrooms.

____ Select and adjust closers and other hardware for elementary students.

____ Special toilet fixtures and heights.

61. **DESIGN FOR SECONDARY**

____ Carpet except in water areas, labs and shops.

____ Hard and slick wall surfaces.

____ High and heavy or clip-down ceilings.

62. **DESIGN FOR TEACHERS**

____ Design sound and vision baffles.

____ Provide good heating and cooling.

63. **DESIGN FOR PRINCIPALS**

____ Put principals behind glass at the best spot to see down the halls.

____ Put up a bulletin board for hall announcements.

____ Make room soundproof for conferences.

64. **DESIGN (bottom line) FOR THE MAINTENANCE CREW**
A "MAINTENANCE-FREE BUILDING"

____ Design to keep dust, water, and mud out of the building.

____ Leave off tricky hardware, eye-catching detail and high maintenance items.

____ Use "heavy-duty" items that have moving parts or commonly need service, and use **thick** materials on secondary schools ("fist-proof").

____ Select high-efficiency heating, ventilation, and air conditioning units. Make equipment rooms large enough for access to change filters and make repairs.

APPENDIX B

Lists and Forms

1. Sample Questionnaire for the Selection of Architects for School Building Projects
2. General Conditions of the Contract for Construction, AIA Document A201
3. Supplementary Conditions of the Contract for Construction, AIA Document A201/SC
4. Standard Form of Agreement Between Owner and Architect, AIA Document B141
5. Standard Form of Agreement Between Owner and Contractor, AIA Document A101
6. Contractor's Information Record[1]
7. Solicitation for Bids[1]
8. Bid Bond, AIA Document A310
9. Business Relationship Affidavit[1]
10. Noncollusion Affidavit[1]
11. Contract[1]
12. Certificate of Insurance, AIA Document G705
13. Performance Bond[1]
14. Statutory Bond[1]
15. Defect Bond[1]
16. Subcontract -- The Standard Form of Agreement Between Contractor and Subcontractor, AIA
17. Standard Form of Agreement Between the Architect and the Engineer, AIA Document C131
18. Sales Tax Agency Agreement[1]
19. Work Order[1]

[1] Forms enclosed for your information and use.

20. Duties, Responsibilities, and Limitations of Authority of Full-Time Project Representative, AIA Document B352

21. Application and Certificate for Payment, AIA Document G702

22. Claim or Invoice Affidavit[1]

23. Change Order, AIA Document G701

24. Certificate of Substantial Completion, AIA Document G704

25. Certificate of Insurance, AIA Document G705

26. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706

27. Contractor's Affidavit of Release of Liens, AIA Document G706A

28. Consent of Surety Company to Final Payment, AIA Document G707

29. Architect's Field Order, AIA Document G708

[1] Forms enclosed for your information and use.

SAMPLE FORM OF QUESTIONNAIRE FOR THE SELECTION OF ARCHITECTS FOR SCHOOL BUILDING PROJECTS

A. INFORMATION BY THE SCHOOL SYSTEM TO THE ARCHITECT:

1. Name of school system,
2. Name of superintendent or other person to whom questionnaire should be returned,
3. Size of system (pupil enrollment),
4. General description of proposed projects,
5. Approximate timetable for planning and construction period.

B. ARCHITECTS QUESTIONNAIRE:

1. Name;
2. Business address;
3. Telephone number;
4. Type of organization (check one);

   ____ Individual

   ____ Partnership

   ____ Corporation

5. Names of principals, professional history, professional affiliation, key personnel, staff organization (attach information if you prefer);
6. Attach list of completed buildings your firm has designed during recent years. If you have recently established your own practice, indicate prior responsible affiliation with other projects, underline those which you feel are examples of your work appropriate to our problem and which you would like to have visited. Include cost of building, type of building, location, and dates of construction.
7. Give names of persons to whom the board of education may write. These persons should have knowledge of your firm and your work.
8. Attach any other material which might help the board of education in giving you proper consideration. In Questions 7 and 8, the board is interested in finding out about your:

   A. integrity
   B. thoroughness
   C. creativeness
   D. adequacy of supervision

E. business procedures and record-keeping on the project
F. financial responsibility

9. If you are called for an interview, you will be asked to furnish information indicating:

A. that your organization is adequate to do the project,
B. that previous commitments will not prevent expeditious planning of this project,
C. that you are willing to devote time to carry out cooperative educational planning with designated school staff members or committees,
D. completeness of contract documents (drawings and specification).

CONTRACTOR'S INFORMATION RECORD

Name and Address of Business _____

___ Corporation ___ General Partnership ___ Individual

Date of Incorporation or Organization _____ State_____

Radius of Operations _____

Type of work done _____ Work usually sublet _____

Are you involved in the design aspects of construction? Yes ___ No ___

If yes, amount of liability insurance carried $ _____

All officers or partners:

Name and Title	Age	No. of Years Experience	Percent of Ownership	Face Value of Life Insurance	Beneficiary
_____	___	_____	_____	_____	_____
_____	___	_____	_____	_____	_____
_____	___	_____	_____	_____	_____
_____	___	_____	_____	_____	_____

All subsidiaries and affiliates:

Name of Company	Address-City, State	Type of Business
_____	_____	_____
_____	_____	_____
_____	_____	_____

Other businesses in which any officer or partner is actively engaged:

Name of Business	Partner or Officer interested	Extent of Interest
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Suppliers from whom you purchased most of your materials in the past two years.

Name	Address	City and State

At what banks have you an established line of credit? Give names, maximum line (if known) and amount owing now. State what, if any, security or endorsement is given the bank.

Name of Bank	Location	Maximum Line	Present Amount Owing	Nature of Security or Name of Endorser

List the most important and largest contracts completed during the past five years.

Description of Job	Owner or General Contractor	Name and Address of Architect or Engineer	Contr. Price	Year Comp.	Surety Company

Uncompleted work in process: (Attach a separate schedule, if necessary)

Description of Job	Owner or General Contractor	Name and Address of Architect or Engineer	Contr. Price	% Comp.	Comp. Date	Surety Company

Attach list of other bidders on all open jobs

Capacity:

(a) Largest job ever completed _____ Year Completed ____ Contract Price _____

(b) Are subcontractors bonded? Yes ___ No ___ What trades? _____

(c) Present line of surety credit _____

(d) Largest volume of uncompleted work on hand at any one time _____

Prior Surety and Agency Handling Account:

_____

Reasons for change

_____

_____

_____

_____

Do you have your books periodically audited by a certified public accountant? Yes ____ No ____

If "yes," give name of accountant and date of last audit:

_____

Liens, suites, judgments, defaults and contingent liabilities:

(a) Has your company or any officer or partner ever failed in business or compromised with creditors? Yes ___ No ___

(b) Has your company ever failed to complete a contract? Yes ___ No ___

(c) Has any partner or officer of your organization ever failed to complete a contract?

Yes ___ No ___

(d) Are any liens outstanding against any of your work? Yes ___ No ___

(e) Have you ever failed to qualify for a bond after an award? Yes ___ No ___

(f) Have you ever had any serious controversy with anyone on any of your work or over the payment for labor or material? Yes ___ No ___

(g) Are there any judgments, suits or claims pending against you? Yes ___ No ___

(h) Are there any judgments, suites or claims pending against your partners? Yes ___ No ___

(i) Are you acting as surety or bondsman for others? Yes ___ No ___

(j) Are you acting as endorser for others on their notes or accounts? Yes ___ No ___

(k) Does your company or any officer or partner owe any money to a bonding company?

Yes ___ No ___

(l) Has your company or any officer or partner ever required any financial assistance or borrowed any money from a bonding company? Yes ___ No ___

The above answers are true to the best of my knowledge and belief.

_____, 19 _____ Signed _____
(Contractor)

_____
(Witness)

SOLICITATION FOR BIDS
(Bid Notice)

Sealed proposals will be received by the _____ at its office,
(Name of Agency)
located at _____, _____ o'clock p.m., Central Time,
on the _____ day of _____, 19_____, at which time said bids will be opened for
furnishing all labor and materials for

_____

_____

_____

_____

Bids received more than ninety-six (96) hours, excluding Saturdays, Sundays, and holidays, before the time set for opening of bids, as well as bids received after the time set for opening of bids, will not be considered and will be returned unopened.

Bids will be publicly opened and read aloud at the above-mentioned office immediately following the closing time stated above.

Copies of the general conditions, plans, specifications, and other bidding documents are on file in the above office and are open for public inspection. The bidding documents will include the prevailing rate of wages as required by **40 O.S.1971§196.5**, if the estimate of construction exceeds $600,000.

Complete sets of general conditions, plans, specifications, and other bidding documents may be obtained by applying to the _____ at the following
(Name of Officer, Agent of Employee)
location: _____

Applications for sets of plans and specifications, etc., must be accompanied by a deposit of _____ dollars ($_____). The refund of this deposit must be claimed within seven days from the time of opening bids. (If provision for no refund or partial refund is stated in the notice for bids, the above sentence may be modified accordingly.)

A cashier's check, a certified check, or a surety bond in the amount of five percent (5%) of the base bid and all alternates shall accompany the sealed proposal of each bidder. Deposits will be returned to the unsuccessful bidders.

_____ reserves the right to reject any or all bids.
(Name of Agency)

The time period within which a contract will be executed following award to the successful bidder is _____. (State number of days not to exceed sixty [60] days.)

Additional information:

_____
(Name of Agency)

By _____

BUSINESS RELATIONSHIPS AFFIDAVIT

STATE OF _____)
) ss.
COUNTY OF_____)

_____ , of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the nature of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the architect, engineer, or other party to the project is as follows:

_____

_____

_____

Affiant further states that any such business relationship presently in effect or which existed within one (1) year prior to the date of this statement between any officer or director of the bidding company and any officer or director of the architectural or engineering firm or other party to the project is as follows:

_____

_____

_____

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

_____

_____

_____

(If none of the business relationships hereinabove mentioned exist, affiant should so state.)

_____

Subscribed and sworn to before me this _____ day of _____, 19 ____.

_____
Notary Public

My Commission Expires:

_____

BID AFFIDAVIT

The following affidavit is to accompany the bid:

Noncollusion Affidavit

STATE OF _____)
)ss.
COUNTY OF _____)

_____ of lawful age, being first duly sworn, on oath says that (s)he is the agency authorized by the bidder to submit the attached bid. Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any state official or employee as to quantity, quality, or price in the prospective contract, or any other terms of said prospective contract; or in any discussions between bidders and any state official concerning exchange of money or other things of value for special consideration in the letting of a contract.

_____

Subscribed and sworn to before me this _____day of _____, 19_____.

_____
Notary Public

My Commission Expires:

_____

_____

CONTRACT

THIS CONTRACT AND AGREEMENT, made and entered into this _____ day of _____, 19 by and between _____ (State or Other Entity) acting by and through the _____ (Name of Agency) party of the first part, hereinafter termed _____ and party of the second part, hereinafter termed "Contractor."

WITNESSETH:

WHEREAS, _____ (State or Other Entity) has caused to be prepared in accordance with law, certain plans, specifications, and other bidding documents for the work hereinafter described and has approved and adopted all of said bidding documents, and has caused Solicitations for Bids to be given and advertised as required by law, and has received sealed proposals for the furnishing of all labor and materials for:

_____

_____

_____

as outlined and set out in the bidding documents and in accordance with the terms and provisions of said Contract; and,

WHEREAS, _____ (State or Other Entity) in the manner provided by law, has publicly opened, examined, and canvassed the proposals submitted and has determined and declared the above-mentioned Contractor to be the lowest responsible bidder on the above-mentioned project, and has duly awarded this Contract to said contractor, for the sum named in the proposal, to wit:

dollars ($_____);

NOW, THEREFORE, for and in consideration of the mutual agreements and covenants herein contained, the parties to this Contract have agreed, and hereby agree, as follows:

1. The Contractor shall, in good and first-class, workmanlike manner, at his/her own cost and expense, furnish all labor, materials, tools, and equipment required to perform and complete said work in strict accordance with this Contract and the following Contract Documents.

_____

all of which documents are on file in the office of the

_____

(Name and Address of Agency)

and are made a part of this Contract as fully as if the same were herein set out at length, with the following additions and/or exceptions: (If none, so state.)

2. The _____ shall make payments to the Contractor in the
(State or Other Entity)
following manner: On or about the first day of each month, the agency engineer, or other appropriate person, will make accurate estimates of the value, based on contract prices, of work done, and materials incorporated in the work and of materials suitably stored at the site thereof during the preceding calendar month. The Contractor shall furnish to the agency engineer, or other appropriate person, such detailed information as he/she may request to aid him/her as a guide in the preparation of the monthly estimates.

3. **Each monthly estimate for payment must contain or have attached an affidavit as required by Senate Bills 469 and 565.** 61 O.S. 1974 § 115

On completion of the work, but prior to the acceptance thereof by the _____ ,
(State or Other Entity)
it shall be the duty of the agency engineer, or other appropriate person, to determine that said work has been completely and fully performed in accordance with said Contract Documents, and upon making such determination said official shall make his final certificate to the _____.
(State or Other Entity)

The Contractor shall furnish proof that all claims and obligations incurred by him/her in connection with the performance of said work have been fully paid and settled; said information shall be in the form of an affidavit which shall bear the approval of the Surety on the contract bonds for payment of the final estimate to the Contractor; thereupon, the final estimate (including retainages) will be approved and paid.

4. **The sworn, notarized statement below must be signed and notarized before this Contract will become effective.**

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed, in four duplicate originals, the day and year first above written.

Party of the Second Part:

CONTRACTOR:

_____

By _____

Party of the First Part:

_____, acting

by and through the

By _____

By _____

By _____

STATE OF_____)
)ss.
COUNTY OF_____)

_____, of lawful age, being first duly sworn, on oath says that (s)he is the agent authorized by Contractor to submit the above Contract to the _____.
(State or Other Entity)

Affiant further states that Contractor has not paid, given, or donated or agreed to pay, give, or donate to any officer or employee of_____ any money or other
(State or Other Entity)
thing of value, either directly or indirectly, in the procuring of the contract.

Subscribed and sworn to before me this_____day of_____, 19_____.

_____
Notary Public

My Commission Expires:

_____

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____,

as Principal, and _____,

a corporation organized under the laws of the State of Oklahoma, Surety, are held and firmly bound unto: _____ in the penal sum of _____
(State or Other Entity)

dollars ($_____) in lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written Contract with _____,
(State or Other Entity)

dated _____, 19_____, for _____

_____

_____

_____

all in compliance with the plans and specifications therefore, made a part of said Contract and on file in the office of _____
(Name and Address of Agency)

NOW, THEREFORE, if said Principal shall, in all particulars, well, truly, faithfully perform and abide by said Contract and each and every covenant, condition, and part thereof and shall fulfill all obligations resting upon said Principal by the terms of said Contract and said specifications; and if said Principal shall protect and save harmless said _____
(State or Other Entity)

from any pecuniary loss resulting from the breach of any of the items, covenants, and conditions of said Contract resting upon said Principal, then this obligation shall be null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in said Contract and no deviations from the plan or mode of procedure herein fixed shall have the effect of releasing the Sureties, or any of them, from the obligations of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year set forth below.

DATED this _____ day of _____, 19____.

PRINCIPAL:

_____

By _____

ATTEST:

_____

SURETY:

_____

By _____

(Attorney-in-Fact)

STATUTORY BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____,

as Principal, and _____,

a corporation organized under the laws of the State of _____ and authorized to transact business in the State of Oklahoma, as Surety, are held and firmly bound unto:

_____ in the penal sum of _____
(State or Other Entity)

dollars ($_____) in lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written Contract with _____,
(State or Other Entity)

dated _____, 19____, for _____

_____

_____

_____

all in compliance with the plans and specifications therefore, made a part of said Contract and on file in the Office of _____
(Name and Address of Agency)

NOW, THEREFORE, if said Principal shall fail or neglect to pay all indebtedness incurred by said Principal or subcontractors of said Principal who perform work in the performance of such contract, for labor and materials and repairs to and parts for equipment used and consumed in the performance of said contract after the same becomes due and payable, the person, firm, or corporation entitled thereto may sue and recover on this bond, the amount so due and unpaid.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in said Contract and no deviations from the plan or mode of procedure herein fixed shall have the effect of releasing the sureties, or any of them, from the obligations of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year set forth below.

DATED this _____ day of _____, 19_____.

PRINCIPAL:

_____

By _____
(Title)

ATTEST:

_____

SURETY: _____

By _____
(Attorney-in-Fact)

DEFECT BOND

KNOW ALL MEN BY THESE PRESENTS:

That _____

as Principal, and _____,

a corporation organized under the laws of the State of _____

and authorized to transact business in the State of Oklahoma, as Surety, are held and firmly bound

unto _____ (State or Other Entity) in the penal sum of _____

_____ dollars ($_____) in lawful money of the United States of America, said sum being equal to One Hundred percent (100%) of the contract price, for the payment of which, well and truly to be made, we bind ourselves and each of us, our heirs, executors, administrators, trustees, successors, and assigns, jointly and severally, firmly by these presents.

The condition of this obligation is such that:

WHEREAS, said Principal entered into a written Contract with _____,

dated _____, 19 _____, for _____

_____

_____

_____

all in compliance with the plans and specifications therefore, made a part of said Contract and on

file in the office of _____.
(Name and Address of Agency)

NOW, THEREFORE, if said Principal shall pay or cause to be paid to _____ (State or Other Entity) all damage, loss, and expense which may result by reason of defective materials and/or workmanship in connection with said work, occurring within a period of one (1) year from and after the acceptance of said project by _____ (State or Other Entity); then this obligation shall be null and void, otherwise to be and remain in full force and effect.

It is further expressly agreed and understood by the parties hereto that no changes or alterations in said Contract and no deviations from the plan or mode of procedure herein fixed shall have the effect of releasing the sureties, or any of them, from the obligations of this Bond.

IN WITNESS WHEREOF, the said Principal has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its duly authorized officers, and the said Surety has caused these presents to be executed in its name and its corporate seal to be hereunto affixed by its attorney-in-fact, duly authorized so to do, the day and year set forth below.

DATED this_____ day of_____, 19_____ .

PRINCIPAL:

_____

By _____

ATTEST:

_____

SURETY:

_____

By_____
Attorney-in-Fact

SALES TAX AGENCY AGREEMENT

This is an Agency Agreement made and entered into as of the _____ day of_____, 19_____, between _____SCHOOL DISTRICT NUMBER ____ of _____COUNTY, OKLAHOMA, a political subdivision of the State of Oklahoma (hereinafter referred to as "Owner"), and _____CONSTRUCTION, INC., (hereinafter referred to as "Contractor").

RECITALS:

1. Owner has solicited bids for the construction of a _____ (the "Project") in _____ , _____County, Oklahoma; and such facilities as are necessary and appropriate for the operation thereof; which Project, on or before completion shall be owned by the Owner.

2. Contractor has been awarded the contract for the construction of the Project.

3. Owner desires to purchase all materials, supplies, and equipment for the Project in its own name and to take immediate title to all materials, supplies and equipment, and to have Contractor, as general contractor for the Project, perform portions of such purchasing duties.

NOW THEREFORE, in consideration of the premises and in order to constitute and appoint Contractor as agent of Owner for the purchase of equipment and materials for the Project, IT IS AGREED AS FOLLOWS:

1. Owner, as Principal, hereby constitutes and appoints Contractor as Owner's agent, for it and in its name, to acquire materials and equipment for use in constructing the Project.

2. Title to all materials and equipment purchased by Contractor as agent for Owner will pass directly from the seller thereof to Owner.

3. Contractor acknowledges that it is an agent for Owner and agrees to act as agent for Owner in connection with the acquisition of materials and equipment for the Project in the manner above described.

4. The relationship of principal and agent created by this Agreement shall continue until terminated by either party by notice in writing to the other. The parties hereto agree that all sellers or vendors of materials and equipment for the Project shall be entitled to rely upon the existence of the Agreement until they have received written notice of the revocation.

5. Contractor agrees that it will not purchase any material or equipment pursuant to this Agreement except that authorized and intended for inclusion in the Project.

6. In executing purchase orders for equipment and materials for the Project, Contractor shall include in each purchase order a statement, to be approved as to form by Owner, that Contractor is acting as Owner's agent, individually and without power of redesignation, for the purchase of the equipment and materials covered by the purchase order.

7. All equipment and materials purchased by Contractor under this Agreement shall be delivered to owner at the Project job-site.

8. Only equipment and materials to be incorporated in the Project shall be purchased by Contractor as Owner's agent under this Agreement and no equipment and materials will be purchased except the items required by the plans and specifications for the Project. Contractor will not purchase, as agent hereunder, any equipment or materials to be used only incidentally in connection with the Project. Nothing contained herein shall alter the obligation and responsibility of Contractor under the contract between Owner and Contractor for the construction of the Project.

9. All reimbursement by Owner to Contractor for materials and equipment purchased by Contractor as Owner's agent hereunder shall be deemed to be a part payment on the Project contract price.

10. Contractor shall not be entitled to any compensation for its services as Owner's agent hereunder.

IN WITNESS WHEREOF, the parties have executed this Agency Agreement as of the date first above written.

_____ SCHOOL DISTRICT NO. _____

OF _____ COUNTY, OKLAHOMA

ATTEST:

_____ By _____

Clerk President

(SEAL)

ATTEST: _____

CONSTRUCTION, INC.

_____ By _____

Secretary President

WORK ORDER

TO: _____
(Contractor)

FROM: _____
(Awarding Public Agency)

YOU ARE HEREBY NOTIFIED that all contract documents have been executed and accepted in relation to the Contract entered into on the _____ day of _____ , 19_____, by and between _____ , acting by and through the
(State or Other Entity)

_____ , and _____ and
(Name of Agency) (Contractor)

that work may now be commenced in accordance with said Contract.

CLAIM OR INVOICE AFFIDAVIT

STATE OF _____)
) ss.
COUNTY OF _____)

The undersigned (architect, contractor, supplier, engineer, or supervisory official), of lawful age, being first duly sworn, on oath says that this (invoice, claim, or contract) is true and correct. Affiant further states that the (work, services, or materials) as shown by this invoice or claim have been (completed or supplied) in accordance with the plans, specification, orders, or requests furnished to the affiant. Affiant further states that (s)he has made no payment, given or donated or agreed to pay, give or donate, either directly or indirectly, to any elected official, officer, or employee of the State of Oklahoma, of money or any other thing of value to obtain payment or the award of this contract.

_____
Contract or Supplier

Subscribed and sworn to before me this _____ day of _____, 19____ .

_____
Notary Public

My Commission Expires:

_____

_____
Architect, Engineer, or Other Supervisory Official

Subscribed and sworn to before me this _____ day of _____, 19____ .

_____
Notary Public

My Commission Expires:

_____

APPENDIX C

Examples of Energy Conservation Measures (ECMs)

1. Daylighting in central lobby area, gymnasium and common areas.
2. Vestibule at main entrances to prevent heat loss, drafts.
3. Indirect High Indensity Discharge (HID) lighting in cafeteria.
4. Reduced wattage, energy-efficient fluorescent lighting system in classrooms and offices.
5. HID (metal halide) lighting in gym with multiple-keyed switching controls.
6. Outdoor lighting: high pressure sodium.
7. Energy-efficient, individual split-system can result in low fan horsepower requirements.
8. A central natural gas-fired boiler can provide hot water for space heating in zones with high fresh air and heating loads.
9. Outside makeup air for the kitchen hood to prevent exhausting conditioned air.
10. Roof system: Place insulation directly under roofing membrane.
11. Economizer cycle on gymnasiums, dressing areas and cafetorium.
12. Efficient utilization of space, with some areas serving multiple purposes.
13. A central microprocessor control system automatically turns HVAC systems on and off according to the building use schedule. Override timers are controlled by thermostats in each classroom.
14. Energy-efficient, individual air-conditioning units are controlled by thermostats in each classroom.
15. Energy-efficient HID lighting systems are used indoors in the cafetorium and in the multi-purpose gym.
16. Classroom windows are positioned to allow daylighting and are operable to all natural ventilation.
17. Skylights are double- or triple-walled to increase thermal performance.
18. Window glass is tinted to control solar gain.
19. Replace/modify windows.
20. Perimeter insulation.
21. New wall insulation on existing wall.

22. Opposing vane dampers for gymnasium.

23. Insulate exterior doors.

24. Carpet in lieu of tile in classrooms, especially at elementary level.

25. Lowered ceilings to reduce volume of air to be conditioned, thereby lowering air changes and equipment load.

26. Cutting off hot water in toilets.

27. Lower boiler temperature.

28. Water softening/treatment system in boilers and hot water systems.

29. Exterior shading devices on all windows, especially east and west, except on emergency escape windows.

30. Replace single-pane windows with insulated units.

31. Remove window units not needed for emergency escape and install insulated panels.

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