

Purpose

The intent of Chapter 7 is to provide standards and guidelines necessary to plan, design and construct school facilities throughout the state of Arkansas. The focus is on building systems and materials that will provide buildings that are economical and reflect quality construction, along with mandatory performance standards, additional options and available choices. All items and systems, such as loose furnishings, casework, technology, etc., should be integrated early in the planning phase of the project.

Definitions

The planning and design of school facilities shall be based upon criteria described in Chapter 7 in accordance with the following definitions:

“Standards in bold” – Performance or construction required items for which there is mandatory adherence.

“Guidelines” – Performance or construction items which are recommended, but NOT required.

“Examples” – Typical component(s) of standards or guidelines.

Codes and Standards

Applicable local, state, and international building codes and standards are not repeated in this chapter. It is the responsibility of the Design Professionals to conform to the current codes in their design process. Should the standards contained in this manual be in conflict with international, state, or local codes, the established codes shall prevail. The requirements of ADAAG (Americans with Disabilities Act) should be consulted.

No attempt has been made to provide detailed specifications in Chapter 7. Standards and guidelines are available that allow architects and engineers the flexibility to design to fit the school district needs.

Applicability

The construction and performance standards and guidelines contained herein are applicable to both new construction of public school facilities and renovation of existing public school facilities. Every attempt should be made to apply these standards and guidelines to existing buildings, in gradual steps as funding and other influences allow. (refer to Chapter 1) It may be recognized that some standards may not be compatible with existing facilities in renovation projects nor may it be possible to completely conform a performance or construction standard to new a new facility. In those instances variances to those standards, upon request, may be granted by the Division.

Green Building Design (optional)

A strong motive of these building systems standards and guidelines is to promote high performance schools. High performance schools are healthy, comfortable, energy efficient, resource efficient, water efficient, safe, secure, adaptable, and easy to operate and maintain. Designing for high performance goals is a guideline. It is to be considered, but not mandatory.

Commissioning (optional)

The commissioning process is a single-point responsibility to make sure that certain systems in a building are functioning and performing according to the design intent. The independent Commissioning Agent goes far beyond the occasional Design Professional job visits during the construction period. Actual tests are performed and components are verified under the guidance of the Commissioning Agent. Several systems can be commissioned, but emphasis in the chapter is to commission the HVAC components.

Definition

Commissioning is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the Owner's operational needs.

Application

Commissioning may be applicable to both new facilities and renovation. It is a guideline to be considered, but not mandatory.

Commissioning Authority (CA)

The CA is in charge of the commissioning process and is an objective, independent advocate of the Owner.

Commissioning Authority Options

CA can be selected from an independent third party; a mechanical or installing contractor; or a design professional.

Contractor: Desirable when building is small and contractor performs all mechanical work, but a conflict of interest can arise.

Design Professional: Good idea provided that the project specifications detail the requirements. Already familiar with the design intent but may not have day-to-day experience in the process.

How To Select

Use competitive Request for Qualifications (RFQ) and follow a qualification based selection process (QBS).

CA Qualifications

Experience required:

- Designing, specifying, or installing educational building mechanical control systems or general HVAC systems
- Working with project teams and conducting "scoping meetings"
- Building systems start-up, balancing, testing, and troubleshooting
- Commissioning at least two projects involving HVAC and lighting controls
- Writing functional performance-test plans for at least two projects.

Extent of Commissioning

The degree or extent of commissioning for new buildings is recommended for the planning, design, and construction phases. However, involvement can occur only in design, construction, or post-construction phases.

What to Commission

All projects that include controls, EMCS, pneumatic equipment, integrated systems, HVAC-related equipment, and air distribution systems should be commissioned.

Benefits

- Improved performance of building equipment and building systems interactions
- Improved IAQ occupant comfort and productivity
- Decreased potential for building Owner liability related to IAQ
- Reduced operation and maintenance costs
- Maximize energy efficiency
- Provide training for school personnel

Green Building Design (optional)

The term “green building” is synonymous with “high-performance building”, “sustainable design and construction”, as well as other terms that refer to a holistic approach to design and construction. Green building design strives to balance environmental responsibility, resource efficiency, occupant comfort and well-being, and community sensitivity. Green building design includes all players in an integrated development process, from the design team (building owners, architects, engineers, and consultants), to the construction team (materials manufacturers, contractors, and waste haulers), to the maintenance staff and building occupants. The green building process results in a high-quality product that maximizes the owner’s return on investment.

Why Design Green?

The building sector has a tremendous impact on the environment. According to the U.S. Department of Energy (DOE), buildings in the United States consume more than 30% of our total energy and 60% of our electricity annually. Buildings are a major source of pollutants that cause urban air quality problems and contribute to climate change. Buildings produce 35% of the country’s carbon dioxide emissions. Green building practices can substantially reduce the negative environmental impacts associated with these buildings and reverse the trend of unsustainable construction activities. Green design also reduces operating costs, enhances building marketability, potentially increases occupant productivity, and helps create a sustainable community. Green design has environmental, economic, and social elements that benefit all stakeholders, including owners, occupants, and the general public.

Creating High Performance Schools (optional)

School districts around the country are finding that smart energy choices can help them save money and provide healthier, more effective learning environments. By incorporating energy improvements into their construction or renovation plans, school can significantly reduce energy consumption and costs. These savings can then be redirected to educational needs such as additional teachers, instructional materials, or new computers.

Establishing High Performance Goals

Cost-effective energy- and resource-efficient schools start with good planning. Working closely with the school’s design and planning staff, the architects and engineers should develop objectives that reflect local conditions and priorities, balance short-term needs and long-term savings, and address environmental issues. Goals can include reducing operating costs; designing building that teach; improving academic performance; protecting the environment; increasing health, safety, and comfort; supporting community values; and considering emerging solutions.

- A. Reducing Operating Costs - To ensure that your school is water- and energy-efficient, you must first work with the school system to establish clear consumption goals. Given your climatic region and building type, this “energy budget” must be realistic, and it must be based on the potential of current, proven energy-saving technologies. Many energy- and resource-saving options have very good financial value. Some of these solutions do not add anything to installation costs.
- B. Designing Buildings That Teach - When designing the school, consider the importance of incorporating high performance features that can be used for educational purposes. Some high performance features may be harder to rationalize financially, but from an educational standpoint are still important to consider. Solar electric systems (photovoltaics), for example, may have a longer return on investment, but if installed properly, can be a very powerful educational tool.

INTRODUCTION
Green Building Design

- C. Improving Academic Performance - During the past decade, remarkable studies have indicated a correlation between the way schools are designed and student performances. You can maximize student performance by setting air quality objectives that:
1. Define a level of indoor air quality desired during occupied times
 2. Place limitations on the use of materials, products, or systems that create indoor air quality problems.
 3. Require monitoring equipment.
- Establishing day lighting objectives will also improve classroom conditions and can help improve performance if you:
1. Include controlled day lighting in all classrooms, administrative areas, the gymnasium, and other significantly occupied spaces.
 2. Develop intentional visual connections between the indoor and outdoor environment.
- D. Protecting Our Environment - High performance school design takes into consideration not only the economic and academic impacts of design, but also environmental impacts. Environmentally sound design elements are those that:
1. Use renewable energy systems and energy-efficient technologies
 2. Incorporate resource-efficient building products and systems
 3. Promote water-conserving strategies
 4. Use less polluting transportation alternatives
 5. Establish recycling systems
 6. Incorporate environmentally sound site design
- E. Designing for Health, Safety, and Comfort - You cannot design a high performance school without including design strategies that address health, safety, and comfort issues. Goals should include objectives that:
1. Implement day lighting and indoor air quality solutions to make the school a healthier place to teach and learn
 2. Address acoustical and thermal comfort
- F. Supporting Community Values
1. Incorporating high performance strategies in your school's design results in a win-win situation for the community and the school. Through the implementation of energy-savings strategies, the school saves money and taxpayers benefit. Additionally, the energy dollars saved don't leave the immediate region but stay within the community and help to build a stronger local economy. Building to high performance standards implies the purchase of locally manufactured products and the use of local services. This approach is effective because much of the environmental impact associated with materials, products, and equipment purchased for construction involves transportation. The more transportation, the more pollution. Specifying local products benefits the community in the same way that retaining energy dollars helps: it strengthens the local economy.

Green Building Rating System (optional)

The Green Building Initiative design program called Green Globes and the program offered by the U.S. Green Building Council, LEED (Leadership in Energy and Environmental Design), are green measurement systems designed for rating commercial and institutional buildings. Both address new construction and major renovations. The programs address various environmental categories, typically sustainable sites, water efficiency, energy, indoor environmental quality, and materials and resources. Both are performance oriented systems where points are earned for satisfying performance criteria. Different levels of green building certification are awarded based on the total points earned.

- A. Sustainable Sites - Properly chosen and developed site help minimize negative project impacts of the surrounding areas, the project site, and occupants of the project site.
- B. Water Efficiency – Reduce quantity of water needed for the building and the burden of water from the site on municipal treatment facilities.
- C. Energy & Atmosphere – Establish energy efficiency to reduce operational expenses, conserve natural resources, and reduce local and global pollution.
 1. Commissioning and Training – All schools should be commissioned to ensure that the design meets the expectations of the district, and that the school is built as it was designed. Modern schools are complex buildings. Commissioning ensures that all building systems are working properly, and that the school staff knows how to operate and maintain them.
- D. Materials & Resources – Reduce the amount of materials needed. Those used should have less environmental impact. More sustainable alternatives exist and should be used as much as possible. Waste from the project should be reduced and managed. It is now possible to recycle, compost, or salvage a majority of construction and demolition waste instead of disposing it in landfills.
- E. Indoor Air Quality – Schools must protect student health, and good indoor air quality is essential for healthy schools. Good indoor environmental quality can be managed by controlling the sources of pollutants, ensuring thermal comfort and student connections to the outdoor environment.
 1. Acoustics – If not controlled to appropriate levels, noise from loud ventilation systems, outdoor sources, and neighboring rooms can significantly impeded communication between teachers and students. Young learners, students with hearing difficulties, and those learning English as a second language are particularly vulnerable. Classrooms should be designed to be accessible for all students.

Application

Green building design may be applicable to both new facilities and renovation. It is a guideline to be considered, but not mandatory.