Public Schools of North Carolina

Facilities Guidelines

Revised September 2014

Public Schools of North Carolina
State Board of Education
Department of Public Instruction

Foreword

The responsibility for providing public school facilities in North Carolina rests with the counties and the special chartered school districts within them. State support for school construction has been provided through state bond issues in 1949, 1953, 1963, 1973, and 1996 when it became apparent that local resources could not keep pace with growing facility needs. In 1987 the Public School Building Capital Fund was created to use a portion of Corporate Income Tax revenue for school construction. Additional State support for school construction has been provided through the NC Education Lottery established in 2005. Local boards of education, which are the legal owners of school facilities, are responsible for planning and erecting appropriate facilities to support instructional programs.

The "Finance Act of 1987" established the North Carolina Public School Facilities Standards. In August, 1996 the North Carolina General Assembly enacted legislation which directed that these facility *standards* become facility *guidelines.* It further directed the State Board of Education to appoint the Public School Facilities Task Force to review and make recommendations for revision of the guidelines, which define and describe minimum facilities to ensure educational program appropriateness and long-term cost efficiency. The Task Force comprised educators, facilities management professionals, design and engineering professionals, and representatives of the North Carolina County Commissioners and School Boards associations and the State Treasurer's office. This publication, originally approved by the State Board in January, 1997 reflects the conclusions of the Task Force.

The Public Schools of North Carolina Facilities Guidelines has been developed to provide school systems and designers with useful and reliable design information to use as a basis for new schools, additions and renovations. We believe that these guidelines will enhance the ability of local school systems to plan effective and efficient facilities which maximize instructional opportunities for students. It is our hope that these guidelines provide strong direction for school design, while maintaining local control of that process.

William W. Cobey, Jr., Chairman
State Board of Education

June St. Clair Atkinson, State Superintendent
NC Department of Public Instruction

NOTE: Items shown in <u>underline</u> indicate revisions in this edition.

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Purpose

In July, 1987 the North Carolina General Assembly enacted legislation to provide funds for public school construction to assist county governments in meeting their capital building needs and to provide additional funds for selected counties with the greatest critical school facility needs. The legislation follows the state's Basic Education Program, which assures every child in North Carolina "a program of instruction which is fundamentally complete and which will provide a thorough grounding in … the arts, communication, media and computer skills, second languages, healthful living, mathematics, science, social studies and vocational education."

This document, in accordance with the legislation's direction, defines and describes the educational spaces needed to support a modern, comprehensive educational program and to set minimal guidelines for types of spaces and for sizes of spaces. Consequently, it serves as a planning guide for those in the process of building, enlarging, or renovating school facilities. Administrators, teachers, lay persons and design professionals will find the document helpful as they plan and design educational spaces.

The document is also intended: (1) to serve as a guide in evaluating existing facilities for functional adequacy; (2) to determine facility needs; and (3) to develop sound, long-range building plans. Consequently, it includes guidelines and recommendations for improving facilities. The guidelines set forth in this document do not supersede or take precedence over existing laws and codes defined and enforced by other agencies.

All plans for new construction and renovations must have approval and specific permits from the appropriate state and local agencies. These reviews, permits and approvals are issued by agencies which include the following, or local jurisdictions with delegated authority:

State Dept. of Insurance/ Office of State Fire Marshal
Compliance with the State Building Code

NC Department of Health and Human Services
Approval of kitchen sanitation

NC Department of Environment and Natural Resources:
Approval for new on-site water systems
Approval of on-site waste water
Approval of soil sedimentation and erosion control plans, where one acre or more is to be disturbed.
Larger municipalities the local authority may have jurisdictional approval rights.

US Army Corps of Engineers
Approval of wetlands development (contact DENR first).

State Department of Agriculture
Approval of propane gas installations.

State Board of Education
G.S. 115C-81.4 (see Appendix)

NC Department of Transportation
Driveway approval.

The North Carolina School Facilities Guidelines are recommended *minimums* and should not be construed as averages or as standards, except where noted for science rooms. Although intended to ensure adequacy, guidelines can sometimes be restrictive to the efficient design of a facility. In an attempt to avoid such inhibiting restrictions, the guidelines do allow for minor deviations in spatial requirements where design efficiency dictates. Such flexibility is essential to good design, but cannot be allowed to become a means of lowering guidelines. It should be understood that, in certain circumstances, some guidelines will not be appropriate or cannot be met

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due to atypical programs or special conditions. Also, older existing facilities may not meet many of the guidelines and the cost of renovations to bring them into compliance may be prohibitive.

It may not be economically feasible to achieve full compliance with guidelines in a single construction project. Phased construction is often necessary and appropriate. When spaces to support the program are not provided, due to either a lack of funding or for other reasons, show it on the plans as a future phase of construction.

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Small schools may be unable to meet the guidelines, as multipurpose spaces may serve for specialized needs such as dance, theater arts or Career and Technical education labs. Multipurpose spaces should be designed so that the room, furniture, equipment and storage are compatible with the intended programs. The intent of the guideline is to ensure that adequate space is provided for those classes and activities that make up instructional programs, as indicated by the North Carolina Standard Course of Study. Where single spaces can adequately provide for multiple uses, the guideline will be considered met.

Unlike permanent school buildings which require review by the School Planning Division, modular, relocatable or mobile classroom units and method of use require the review and *approval* of the School Planning Division.

Beginning 2009 State Statutes require that plans for the science laboratory areas of Middle and High school buildings have been reviewed and *approved* to meet <u>all State Board of Education policies related to science laboratory safety.</u>

The facilities guidelines do not replace the need for educational specifications. Educational specifications should be developed that describe the educational program to be implemented. Instructional staff should be involved in the development of educational specifications and the review of facility design. From educational specifications, the planners should be able to determine the unique spatial needs to support individual programs and which spaces can serve several activities or functions.

A permanent record of deviations will be prepared for each project that differs substantially from these guidelines. Copies of this record will be forwarded to the local Board of Education and the designer, and placed in the permanent file for that facility. This information is subject to quarterly review by the State Board of Education.

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Long Range Planning

The School Facilities Finance Act of 1987 requires local boards of education to develop long-range organizational and facility plans. Specifically, the legislation states, "Local boards of education shall submit their long-range plans for meeting school facility needs to the State Board of Education by January 1, 1988 and every five years thereafter." In preparation for the 119 State Bond this cycle was changed to 1995/1996 and every five years thereafter. DPI School Planning provides software to LEAs to conduct the Facility Needs Survey every five years.

To develop a long-range plan, which includes efficient utilization of existing facilities, priorities for new construction and renovation, cost estimates, and estimates of available resources, a board of education must address the following five questions:

- How many schools are needed?
- Which grades will they serve?
- How many students will they accommodate?
- Where will they be located?
- Which students will they serve?

In the 1950s, most rural school systems were organized to serve grades 1-12 or 1-8 and 9-12, while schools in urban areas were generally organized to serve grades 1-6, 7-9 and 10-12. In recent years, there has been a significant movement toward a middle school plan of organization across the state. A typical organization based on the middle school concept serves grades K-5, 6-8 and 9-12, but organizational patterns with schools for grades K-4, 5-8, 9-12 or K-6, 7-8 and 9-12 are not uncommon.

While the movement toward a middle school plan of organization has been substantial, other organizational patterns still exist. Alternative plans of organization will continue to be appropriate in some communities because of existing facilities, natural geographic boundaries, sparsity of students, road patterns, and travel times and distances. The Department of Public Instruction and the State Board of Education do, however, believe that a three-tier plan of organization which allows a program specifically designed for students in the middle grades is desirable and that a grades K-5, 6-8 and 9-12 plan of organization is preferable. The state curriculum and the Basic Education Program are designed around this organization. Local boards of education should continue to evaluate their organizational patterns and work toward this structure, where feasible.

Many school systems in North Carolina have programs for three- and four-year-old children. For some school districts, programs for pre-school children will be more appropriately located in neighborhood centers; for others, these programs might be located on the campuses of neighborhood schools. Consideration should be given to housing three- and four-year-old children as boards of education develop long-range plans for possible reorganization and new facilities.

Some school systems have early college programs and dual enrollment programs located at community college, university, or other facilities. Consider the resources required at such remote sites.

Boards of education are also encouraged to study the issue of optimal school size. As with grade structure, local conditions may require differences in school sizes, with schools which are smaller or larger in membership than the optimum.

They are urged to keep abreast of educational trends which affect the design of school facilities. Center-oriented instruction is being seen in the upper elementary grades. Team organization for each grade level in middle schools may vary and elements of center-oriented instruction may be present. There is some interest in dividing the students within a high school into academic houses or pods.

They are encouraged, however, to continue studying this issue and to strive for schools which are large enough to offer a comprehensive program and student services at a reasonable cost, yet small enough to offer a personal, caring atmosphere.

The Department of Public Instruction and the State Board of Education believe that Elementary schools ranging from 450 to 700 students, Middle schools ranging from 600 to 800 students, and High schools ranging from 800 to 1,200 students can

offer excellent educational programs that include a comprehensive curriculum and offer the most efficient use of space and personnel at a reasonable cost per student. However, larger schools are not uncommon.

Research on school climate and safety suggest, however, that smaller school sizes may have certain advantages. There is a positive relationship between smaller school size and a number of variables associated with school climate and order. Researchers on school size indicate ideal school sizes for improved safety and violence reduction to be: Elementary: 300 to 400 students, Middle: 300 to 600 students, High: 400 to 800 students

The local school unit must determine school sizes that best serve its purposes. Often, size designation is a compromise among objectives for student achievement, student and staff safety, and effective and efficient utilization of fiscal resources. Multiple small schools, of all grade levels, within a single large facility may provide a satisfactory compromise.

As with grade structure, school size must ultimately be determined by factors such as existing facilities, areas of population density, natural geographic barriers, road patterns, transportation times and distances, objectives for student achievement, student and staff safety, effective and efficient utilization of fiscal resources, and local preferences.

The Department of Public Instruction no longer conducts comprehensive surveys of local school systems to help local boards develop long-range plans. Such surveys can be conducted by private consultants or by the school system's own staff (with guidance from School Planning) and can provide an evaluation of and recommendations for school organization and facilities.

Guidelines

Grades	Developable Acreage	Notes
K - 6	*10 + 1/100 ADM*	
5 - 8	*15 + 1/100 ADM*	
7 - 9	*20 + 1/100 ADM*	
9 - 12	*30 + 1/100 ADM*	*A high school may need an additional area of 10 acres or more if a stadium and spectator parking are anticipated*

The above guidelines assume a rural or suburban area with a one story building, room for expansion, desirable outdoor play areas and all parking, queuing and buses located on site. Urban sites and areas that follow the tenets of "smart growth" may find creative solutions on substantially smaller sites. This may involve off-site parking, bus loading only (no bus parking), limited play areas, multi-story construction and sharing of certain facilities with other adjacent entities. In these cases, innovative solutions for parking, physical education facilities and other site amenities may be required. School Planning will assist representatives of the local school unit in determining if the site will be safe and functionally adequate.

Traffic

Drives which completely circle a building or which have to be crossed when going from building to building or playground are hazardous and should be avoided. Parent auto traffic and bus traffic should be separated once on the school site. Student auto traffic and parking should be separate from all other and easily supervised. Fire lanes around the building should be closed off from maintenance and other traffic with "break-away" bollards and, preferably, hardened surface with grass sown above. Consultation with the local fire marshal may be required.

Hazards

Avoid locating facilities near electric power transmission lines and environmental hazards. All site functions (except entry drives) and facilities should observe the clearances noted in *The School Site, Land For Learning.*

Site Evaluation

Size (number of acres)	**Plant Life (trees; bushes)**
Road frontage (two or more roads are best)	**Noise/Air Pollution (airport; traffic; industrial)**
Shape (rectangular 3:5 ration preferred)	**Utilities (availability)**
Topography Drainage (Useable acreage)	**Television Signals (ETV; school TV)**
Access (to separate traffic types on size)	**Security/Protection (emergency access; lighting)**
Traffic (busses; cars; pedestrians)	**First Cost (cost per acre)**
Soil Conditions (foundations; waste disposal)	**Developed Cost (actual cost)**

Comments and Recommendations

The acreages refer to usable land (land which can be developed). Purchase additional acreage to account for areas that cannot be built upon, such as steep slopes, wetlands, rights-of-way, easements, setbacks, buffers or poor soils, as well as oddly-shaped tracts. If on-site water or sewer is required, substantial additional acreage may be needed.

Pre-kindergartens and kindergartens should have a separate shared play area. Fencing may be necessary for safety or control for kindergarten play areas. Fencing is required for licensed Pre-K by the NC Child Care Standards. If the fence or wall height exceeds 32" the gate may only be latching (not locking). Special attention should be paid to selection of equipment and surfacing. Solid resilient surfacing is recommended for ADA accessibility, for ease of cleaning/maintenance, and to avoid the regular replenishment, sifting and cleaning of mulch or other loose-fill surfacing. Consideration should also be given to the draft ADA Accessibility Guidelines for Play Areas, available on http://www.access-board.gov the Access Board website and to the selection and installation of equipment with the aid of a "Certified Playground Safety Inspector" through the playground safety program of NC State University's Recreation Resource Service, website: http://cnr.ncsu.edu/rrs/

All grade levels should have paved activity areas. The number and types of physical education fields depend on the size and grade structure of the school. Guides for athletic fields may be found in *The School Site, Land for Learning* publication. Small schools should have a minimum of a rectangular, soccer-sized, multi-purpose, grassy field. Care should be taken in the selection of artificial turf for playfields as certain fibers may release lead as the turf ages, according to the CDC: http://www.cdc.gov/nceh/lead/tips/artificialturf.htm

Provide clear lines of sight for visual supervision of facility features including site entrances, parking lots, playgrounds, athletic fields, field houses, courtyards and building perimeters. Handicapped accessibility to all site functions, including athletic facilities, is required by the North Carolina State Building Code and the Americans with Disabilities Act (ADA).

Natural features of a new school site should be considered for their potential contributions to the teaching of science. Natural areas suited to the teaching of biology, earth science and related career and technical courses should be preserved and shown in a landscape plan. Use landscaping to define boundaries and to soften hard edges. Prune trees up to allow visual surveillance. Prune shrubs down and away from structures to allow for visual surveillance and to reduce hiding places.

Provide signage, covered walkways, bicycle racks and other sites elements as necessary to define entry points without obstructing visual surveillance. Avoid external alcoves and niches. Site elements such as canopies, fences, walls, mechanical equipment, dumpsters, etc., should be arranged and designed to prevent climbing and unauthorized access.

Provide appropriate separation between different types and directions of vehicular traffic including passenger vehicles, buses, service vehicles and emergency vehicles. Pedestrian traffic in auto and bus areas should be carefully studied. Safety on the school site will carry the same importance as building safety in the review process. Provide separation between pedestrian traffic and vehicular traffic including traffic calming and raised and/or marked crosswalk when necessary to cross vehicular ways.

On-site parking needs have increased greatly. Spaces for all staff, itinerant specialists, and an additional 10-20% for visitors should be provided. Student parking for high schools should be provided for a third or more of the student population.

Noise generated by on-site mechanical equipment or by nearby industries or transportation systems can interfere with communication or create a hazard to hearing and should be avoided. To reduce potential injury from industrial accidents, avoid locating schools near industries that utilize hazardous materials or processes or that generate hazardous by-products or discharges. Consider the hazards associated with proximity to rail lines, highways, air emissions, contaminants, compromised water, power plants and other utility facilities and, potential terrorist targets.

Regular Classrooms

Guidelines

Room Sizes

Grade	Net Square Footage
Pre-K (3 & 4 Yr. Olds)*	*1,200 – 1,400*
K	*1,200*
1 – 3*	*1,000 – 1,200*
4 – 8	*850 – 1,000*
9 – 12	*750 – 850*

For classrooms less than 1,000 square feet, include an additional 15-20 square feet for each separate desktop computer workstation provided within the classroom.

*Some school systems have experimented with substantially reduced class sizes (18 children or less). In such cases, it may not be appropriate to include as many learning centers within the classroom. School Planning will assist local administrative units to evaluate spatial needs for these situations. Because of the need for shared program space and instructional amenities within each classroom, square footage-per-student ratios are not useful.

Ceiling Heights

Room Size	Ceiling Heights
850 SF or less	*9'-4"*
851 SF or more	*10'-0"*
Mobile Classrooms	*8'-0"*

Windows

Grade	Notes
K – 5	Classrooms should have windows equal to or greater than 8% of the floor area
6 – 12	Classrooms should have windows equal to or greater than 6% - 8% of the floor area
9 – 12	No more than 20% of the total number of teaching stations should be windowless

Every room or space used for classroom or other educational purposes shall have at least one outside window for emergency rescue and ventilation. Such window shall be opened from the inside without the use of tools and shall provide a clear opening of not less than 20 in. in width, 24 in. in height, and 5.7 sq. ft. in area or 5.0 sq. ft. for grade-floor openings. The bottom of the opening shall be not more than 32 in. above the floor for Grade 5 and younger pupils and 44 in. above the floor for Grades 6 through 12. Exceptions for windowless classrooms and other special exit provisions may be found in the NCSBC Section 1029. See also GS 115C-521.

"Rooms for first grade children and younger shall be located on the level of exit discharge. Rooms used for second grade children shall be located not more than one story above the level of exit discharge" (NCSBC Section 423.3). School Planning recommends that a sign similar to the one located in the Appendix (page 60) be posted in the stairwells of all schools serving first grade children and younger. On sloping sites where both floors of a 2 story building may have exit discharge at grade level, each of these two floors must have grade level discharge at each end.

Comments and Recommendations

The net square footage of a pre-K room should not be less than 1,200 sq. ft. The net square footage of a kindergarten or first grade classroom should not be less than 50 sq. ft. below the guidelines. Recessed doors, toilets, coat closets, offices, and storage rooms are not included in the net instructional area for pre-K through first grade. To avoid the expense of a second exit door, 1st-3rd-grade classrooms may be 980 net sq. ft. This does not include storage rooms, teacher offices or wall thickness.

Classrooms smaller than 1,000 square feet should not exceed a 3:2 length-to-width ratio. Because of problems with sight angles and distances, the minimum classroom width should be 24'. Individual toilets for pre-K-l classrooms may be paired with adjoining classrooms to provide a boys' toilet and a girls' toilet. Individual toilets for the first grade may be used to provide flexibility.

Classrooms should be equipped with computers or conduits for future installation. Classrooms should be equipped with a two-way communication system for informational and emergency use.

Heat-producing appliances, such as ovens or ranges, in pre-K through grade 5 classrooms are hazardous and should not be installed. A separate cooking center (local option) will not be included in the classroom net square footage. Heat-producing appliances and counter outlets in instructional kitchens should be on a "kill switch" with a power-on light, located out of reach to students.

Twenty percent (20%) of a room's ceiling may be lower than guidelines, provided the North Carolina State Building Code minimum is met.

State legislation requires the local board of education to consider the placement of windows to take advantage of the climate of North Carolina for both light and ventilation.

Cabinets
Cabinetwork should include file drawers, box drawers, wide drawers for poster paper, vertical slots, some open-front bins and a minimum of "kitchen" type cabinets. Wall units should be 60% open shelving for books and displays and 40% door cabinets. Tall reach-in cabinets are preferred for teaching supplies. Provide one section for hanging teacher coats. See Design Information (Appendix).

Wet Areas
A wet instructional area is required by the instructional program in grades K-3 and in grades 4-6 when science is taught in the classroom. Wet areas are also recommended for middle grades. See design information on page 62 for counter heights.

Wet areas should include a sink mounted in a countertop for instructional use. The location of the sink should allow maximum student participation. The Pre-K educational program requires warm water, and it is recommended for kindergarten.

Pre-Kindergarten, After-School and Pre-School programs
Session Law 2009-123 provides that a public school that voluntarily applies for a child care facility license may use an existing or newly constructed classroom in a public school for three- and four-year-old preschool students without modifications to the classroom or building if the classroom:

(1) Has at least one toilet and one sink for hand washing;
(2) Meets kindergarten standards for overhead light fixtures;
(3) Meets kindergarten standards for floors, walls, and ceilings; and
(4) Has floors, walls, and ceilings that are free from mold, mildew, and lead hazards.

Regular Classrooms

Otherwise Licensed Pre-kindergarten, after and before-school programs have special requirements because they are classified as "child care" and licensed and funded by the NC Division of Child Development. Some key provisions include providing hot water to the classroom (with temperature limits), a higher toilet ratio of 1:15 children (Pre-K), the use of protected (usually lensed) light fixtures, enhanced play area surfacing, maintenance requirements and other issues. Refer to NC Child Care Rules and Sanitation Requirements for Child Care Links on our web site

Standards / Requirements*

Science

Grade	Rooms	Square Footage
6 – 8	*Science*	*1,000 (with Limited Lab Equipment*
	Combination Math/Science	*1,000 (with Teacher Demo Table only)*
	Storage/Prep Rooms	*250 (may Be Shared up to 4 labs)*
9 – 12	*Physical Science*	*1,200*
	Biology	*1,200*
	Physics	*1,200*
	Earth Science	*1,400*
	Chemistry	*1,500*
	Multipurpose Science	*1,500 (if required)*
9 – 12	*Storage/Prep Rooms*	*250 (may be shared by 2 labs)*
	Chemical Storage Room	*80*

*Revisions per House Bill 42, Session Law 2009-59 Science Safety in the Public Schools creating G.S. 115C-81.4. Science Safety Requirements and G.S. 115C-521(c1) (approval required by State Board of Education)

The State Board of Education must approve all Middle and High School science facility plans for safety prior to occupancy. The minimum areas shown must be met unless the required scaled floor plans show adequate circulation and teaching space to ensure safe instruction with all the required and proposed equipment and furniture.*

Sinks: For work stations requiring sinks provide at least one sink per 4 students in each lab.
Demonstration Table: A teacher demonstration table shall be provided in each lab and science classroom.

Preparation/Storage Middle School: A preparation/storage room shall be provided within 150ft maximum of Middle School science rooms

Preparation/Storage High School: Preparation/storage rooms shall be adjacent to High School science rooms

Hazardous Chemicals: Hazardous chemicals stored in preparation rooms or chemical storage rooms are required to be in commercial, specially designed storage cabinets (separate cabinets each for acids, flammables and corrosives).

Gas Outlets: Do not provide gas outlets in science rooms where not required by the program.

Eye Protection/Safety Showers: Classroom/lab areas Safety goggle cabinet.

Hoods: Chemistry labs shall be equipped with fume hoods vented to the exterior.

General Safety: Fire extinguishers shall be located in each laboratory area.

Communication: Classrooms and labs shall be equipped with a 2-way communication system for informational and emergency use.

For additional requirements related to these items see School Science Facilities Planner, including Appendix A and Checklist for Science Safety Requirements.

Windows *K-12 Project and science rooms should have windows*

Ceiling Height *10'-0"*

Ceiling height should be minimum 10'-0". Twenty percent (20%) of the room's ceiling may be lower than 10'-0" provided the North Carolina State Building Code minimum is met.

Comments and Recommendations

NC General Statutes require that the NC Board of Education (through DPI School Planning) *approve* public Middle and High school science plans for safety. These requirements can be found in the *"School Science Facilities Planner"* on our website *www.schoolclearinghouse.org* .

When a middle school grade level has paired teams for language arts/social studies and math/science, there should be a 50% mix of each type of room for that grade level. For four-teacher teams (language arts, social studies, math and science) one-fourth of the classrooms should be science rooms

A multipurpose science room is appropriate in small high schools where the enrollment does not justify separate specialized science rooms.

Storage and teacher preparation rooms can be shared (square footage is not included in minimum size (lab areas above). Darkrooms, if required, could be shared with the art and career and technical education (vocational) programs. A 1,500-square-foot chemistry room includes a lecture area and work stations.

Access to a large-group instructional area, auditorium or teaching theater with AV capability is needed for special lectures.

To enhance supervision and prevent accidents, science laboratory classes should have no more than 24 students.

To enhance safe movement during power interruptions, daylight or battery-powered lighting sources should be provided in locker rooms and in laboratories containing hazardous equipment.

Fire extinguishers shall be located in all laboratory areas.

Small Group Resource Rooms

Guidelines

Area and Ceiling Heights

Description	Square Footage	Ceiling Heights
4 – 12 Student Remediation & Resource Labs	**450**	**9’ – 4”**
1 – 4 Student Testing, Speech and Guidance Rooms	**200**	**8’-0” min.**

Windows: Windows are required by the North Carolina State Building Code for all rooms subject to student occupancy to the same extent as for regular classrooms.

Comments and Recommendations

One or more small-group classroom(s) should be provided for remediation, conferencing, guidance, testing, etc., for groups of up to twelve. Some smaller rooms may also be needed in addition to the 450-square-foot rooms for smaller group activities.

Storage space for various instructional materials and equipment should be provided. Lockable cabinets keyed differently are desirable, especially where more than one teacher shares the same space.

Guidelines

Exceptional Children Self Contained

Rooms Square Footage: *Typically 8 to 12 students will require a minimum classroom size of 100 sq. ft. for each student.*

Additional support spaces may be necessary, depending upon the program (see Comments and Recommendations).

Exceptional Children Resource: (See Small-Group Resource Rooms.)

Guides for detailed information can be found in the Exceptional Children Facilities Planner available on the School Planning website.

Wet Areas*: Wet area requirements are the same as for regular classrooms except certain programs will require an instructional area with water in both classrooms and resource rooms*

Ceiling Heights

Room Size	Ceiling Heights
851 SF or more	*10'-0"*
850 SF and less	*9'-4"*
Mobile Classrooms *	*8'-0"*

**Mobile classrooms for Exceptional Children programs are not recommended.

Comments and Recommendations

Exceptional children's classrooms should be located on the level of exit discharge (preferably with a door to the exterior) for safety of those with limited mobility and to facilitate emergency evacuation with limited staff.

Programs for exceptional children vary greatly, depending on local factors. Spaces should be planned to accommodate programs identified in educational specifications. Local factors often result in spaces which are larger than the minimum guidelines.

Spaces for exceptional children should be integrated into planned areas for other programs.

If resource rooms are clustered around a shared common area, they may be smaller.

Care should be taken to ensure that the characteristics of fluorescent lighting (especially with magnetic ballasts) do not adversely affect children with certain disabilities. Fixtures with electronic ballasts are recommended.

Certain programs serving exceptional children may also require specialized support spaces, such as cooking areas, toilets, bath/shower rooms, laundries, space for changing tables, and observation rooms, and special equipment to accommodate certain disabilities. The type and extent of these support spaces will vary significantly, depending upon the exceptionality of

the children being served. Minimum requirements for handicapped accessibility outlined in the North Carolina State Building Code may not be adequate for special education programs.

Wet areas should include a sink mounted in a countertop for instructional use. Warm water is required. The location of the sink should allow maximum student participation. Storage designed for instructional supplies and student projects should be in this area. Coat and book storage may be located elsewhere.

Classrooms for hearing impaired programs will require special acoustical treatment of the finishes, the mechanical system and possibly the lighting ballasts.

Classrooms should be equipped with a two-way communication system for informational and emergency use.

Heat-producing appliances or receptacles where countertop appliances could be connected should be avoided in elementary schools and should be controlled via a "kill switch" with pilot light in middle and high schools.

If seclusion or isolation time-out areas are part of a facility please refer to the *Exceptional Children's Facility Planner* and to GS 115C, 391.1 as modified by NC Session Law 2005-205 (House Bill 1032) *Placing Students in Seclusion. Seclusion* is defined as the confinement of a student alone in an enclosed space from which the student is physically prevented from leaving by locking hardware or other means, or not capable of leaving due to physical or intellectual incapacity. The Law allows for special locking mechanisms for seclusion rooms provided there is release or disengagement in an emergency.

Guidelines

Music Rooms		
Grades		**Guidelines Square Footage**
K – 6	*General Music*	*850 – 1,000*
6 – 8	*General Music*	*850 – 1,000*
	Vocal	*1,000 – 1,200**
	Instrumental	*1,000 – 1,600**
9 – 12	*Vocal*	*1,000 – 1,500**
	Instrumental	*1, 600 – 1,800*

* This space may be small; study carefully. Some references recommend 10-18 square feet per singer for vocal rooms (more if choreographed) and 25-35 square feet per student for instrumental rooms. Class sizes for these programs are often large; 40-80 students or more are not unusual.

Support Spaces	**Square Footage**
Instrument Storage Room (varies with enrollment)	*400 – 600*
Instrument Lockers along Music Room wall (Increases Main Room [illegible] separate Storage Room)	*200-300*
Music Library	*200*
Instrument Repair	*150*
Office (each)	*150*
Uniform Storage	*Varies*
Practice Room	*55 – 60*
Ensemble Practice Room	*150 -200*
Wet Areas	
A utility sink adequate for cleaning brass instruments is required by middle and high school band programs.	
Ceiling Heights	
Room Size	*Ceiling Height*
Less than 900 SF	*9’-4”*
900 – 1,000 SF	*10’-0”*
1,000 – 1,200	*12’-0”*
1,200 – 1,800	*14’-0” to 18’-0”*
Over 1,800	*16’-0” to 18’-0”+*
High ceilings in music spaces dramatically improve acoustics. Guides for detailed information can be found in the *Arts Education Facilities Planner.*	

Comments and Recommendations

The elementary music room should be designed to accommodate general, vocal and instrumental music. Acoustical treatment is essential and windows are recommended. In smaller elementary schools, spaces to accommodate music plus other programs may be combined into a multipurpose area.

A single music room of designated size is appropriate for small middle schools. Separate rooms for band and chorus may be required as e

The room sizes indicated here do not include program support rooms, such as offices and storage. These areas are listed separately.

Band instrument and orchestra instrument storage areas should be separate.

Rooms should be equipped with a two-way communication system for informational and emergency use.

Acoustical treatment for vocal and instrumental rooms should be provided. Some flexibility for adjusting the extent of absorptive and reflective surfaces should be provided. Many schools have had good success with acoustic control by providing a “Cash Allowance” in the construction contract for acoustic treatment to be installed after the room has been constructed.

The minimum ceiling heights relate to flat-floor rooms. Risers are not necessary, but rooms with risers will need ceiling heights adjusted to the highest riser so that appropriate ceiling height and room volume are achieved.

Risers, if used, should be portable for use on the stage or other space as well. Many instructors prefer a flat floor for flexibility.

If instrument storage cabinets are used in the main room instead of a separate instrument storage room, they should be the open mesh door type or with acoustical panel facing.

At least one handicapped station within a row of regular seating should be provided in accordance with the North Carolina State Building Code.

Provide an oversized door or pair of doors into the music classroom and instrument storage room.

Designs for areas in which there will be large congregations of students, such as music or band rooms, should support visual supervision of an entire area by one individual.

A drinking fountain should be adjacent to local and instrumental music classrooms.

Provide adequate electrical accommodation to support electric keyboards, amplifiers, speakers and other equipment.

Guidelines

Art Rooms Grades	Square Footage	
K – 8	*1,000 – 1,400*	
9 – 12	*1,200 – 1,500*	

Support Spaces		Square Footage	
K – 12	*Kiln/Clay Storage**	*40 – 60*	
	Art Material Storage	*80 – 150*	

*For fire safety and air quality, place kilns in a separate room with proper ventilation and exhaust. Do not locate in a storage room other than one used for clay products and projects.

Ceiling Height	K – 12	*10' – 0"*	
Windows	*K - 12*	*An Art Classroom should have windows and direct access to an outdoor art patio is encouraged.*	

Incandescent task and display lighting should be switched separately to avoid use as general illumination.

Guides for detailed information can be found in the Arts Education Facilities Planner.

Comments and Recommendations

During the preliminary design phase, furniture and equipment plans should be developed showing studio and lecture relationships. Storage cabinets and shelving with flexibility are needed for a variety of supplies and projects.

In small elementary schools, the visual arts program may be in a project room, i.e., art, science, crafts, etc.

The ceiling heights may vary; however, the average height should not fall below the minimum guidelines. The minimum ceiling height may be reduced if the art room is the only space in the building or addition requiring more than a 9'-4" ceiling.

Light sources may vary from daylighting to artificial sources. Artificial light sources should provide full color spectrum and task-level illumination. Skylights, clerestories, light shelves and rooftop light monitors are possible alternate daylight sources. Outside work patios adjacent to classroom exterior windows and doors are recommended. Fluorescent fixtures are recommended; however, incandescent may be used for critical tasks where color is important. Provisions for darkening part or all of the room may be a design consideration.

Kilns have special electrical and ventilation requirements that should be provided for, even if the equipment is not in the contract. Paint spraying and hazardous material storage will be subject to the North Carolina State Building Code. Do not locate kilns within storage areas for paper or other flammable materials. To reduce fire and toxic hazards, kilns should be located in separate rooms with adequate exhaust and ventilation.
Rooms should be equipped with a two-way communication system for informational and emergency use.

Arts Education – Theater Arts

Guidelines

Grades	Square Footage	Ceiling Heights
K – 12	*1,800 – 2,000*	*10'-0"*

Comments and Recommendations

The K-6 theater arts room should be a large, open space which is carpeted and acoustically treated. A small raised space with simple, individually controlled directional lighting is required for the presentation and viewing of special projects. Design features such as built-in furniture should be avoided in order to provide maximum flexibility.

The middle and junior high theater arts room should be similar to the elementary room. If no other performing facility is available in the school, then this space may be designed as a small teaching theater where both instruction and performance can take place. In either case, there should be a small, raised performance area with simple, individually controlled directional lighting.

In smaller elementary schools, spaces to accommodate theater arts plus other programs may be combined into a multipurpose area. Multipurpose spaces for middle and junior high schools should be evaluated on an individual basis.

The high school theater arts room should be a large, open space for activity-based instruction. It should have a small, raised space with individually controlled directional lighting. The raised space is not essential where an adequately equipped performing facility is nearby and accessible during theater arts instructional time. If a small teaching and performing facility is available for all theater arts instruction, then a separate theater arts room may not be necessary.

Large assembly areas, such as auditoriums, should provide clear sight lines and easy traffic flow. Niches along walls should be avoided and folding partitions should recess fully into walls to eliminate barriers behind which people can hide.

Consider lockable storage for books, audio, video, and computer equipment, audiovisual materials, art supplies, classroom props, costumes, student projects, etc.

Guidelines

Grades	Seating Capacity	Auditorium Support Spaces	Square Footage
K – 5	*Fixed Seat Auditorium is Not Recommended*	*Locate stage in Cafeteria or Gymnasium*	*800 – 1,200 (stage)*
6-8	*Fixed Seat Auditorium optional 1/4 to 1/3 ADM (or use Gym or Cafeteria)*	*Stage, Storage, and Dressing Rooms*	*1,200 – 3,000 SF (stage)*
		Light-lock Vestibule, Lobby, Concessions	*800 – 1,500*
9 - 12	*1/4 to 1/2 ADM*	*Stage, Storage, and Dressing Rooms*	*3,000 – 5,000*
		Light-lock Vestibule, Lobby, Concessions	*800 – 2,000*
Support Spaces		*Toilets*	*As Required by Code*
		Scene, Costume Shops	*Provide where extensive drama program is offered*

Guides for detailed information can be found in the *Arts Education Facilities Planner*

Comments and Recommendations

By locating band, chorus and drama classrooms adjacent to backstage areas, these spaces can serve double duty as staging, green rooms, dressing and set-up areas during large performances. Consideration should be given to allow relamping and/or changes in lighting levels and types without major effort or reconstruction. Stage lights are costly and the amount and types needed vary by the types of performances. Consider the purchase of minimal lights, with circuits and grid for installation of rental units. Rooms should be equipped with a two-way communication system for informational and emergency use. Electrical and lighting controls for an auditorium should be located in a locked panel or room.

If the board of education chooses to build a high school auditorium, consideration should be given to seating the largest class (ADM) x 8 sq. ft. plus about 4,000 square feet for the stage, storage and a small lobby. The auditorium should be planned as a theater, with suitable acoustical design, lighting system, sound system, storage, and support facilities such as make-up and scenery construction spaces. The entire facility should be designed for theater arts instruction, although this will be a multipurpose space. Adjacent study and work spaces should be available to provide and support instruction in theater history, literature, design, construction, acting, directing and performance. These support spaces could be unscheduled regular classrooms.

Large, joint school/community-use auditoriums are discouraged. Large auditoriums are much more costly per square foot due to increased volume, structural spans and special building code requirements. Generally, multiple performances to smaller groups are more successful than single performances to a large group.

Handicapped accessibility to the stage that does not require a person to leave the auditorium is highly desirable. The need for a separate control booth has diminished in recent years. Handicapped accessibility to these spaces may be difficult and costly. Provisions should be made to set up a sound/light control board in the middle of the seating area.

Orchestra pits are strongly discouraged for safety reasons and because members of a student orchestra are a part of the performance and should be visible to the audience. As an alternative, provide several rows of removable seats at the front of the auditorium to provide space for an orchestra.

Generous side stage areas are encouraged for prop, scene storage and staging. Area should be 1/2 the proscenium opening minimum. Fly lofts and working stages are discouraged due to very costly building code requirements and hazardous conditions for children handling heavy weights and working at great heights unsupervised. Consideration should be given to providing overhead or oversized doors from a loading area to the stage and scene storage areas for moving large props and scene sets. Stage curtains can be left open to allow visual surveillance.

Arts Education – Dance

Guidelines

Grades	Square Footage
K – 8 Combined Dance/Drama (Include 100 SF Storage/Program)	*1,800 – 2,000**
9 – 12 (Include 100 SF Storage)	*1,800 – 2,000***

*In smaller elementary schools, spaces to accommodate dance plus other programs may be combined into a multipurpose area. Multipurpose spaces for middle and junior high schools should be evaluated on an individual basis.

**In small high schools, theater arts and dance may be combined, provided the design and additional support space required demonstrate functional adequacy.

In high schools, dressing rooms and access to showers is desirable. Where located close to the gymnasium locker rooms, this space can be combined. Otherwise, provide 200-400 square feet for this function adjacent to the dance room.

Ceiling Heights	*10'-0" Minimum*	*12'-0" Recommended*

(High ceilings are necessary where dancers perform lifts)

Windows: Recommended where possible.

Guides for detailed information can be found in the *Arts Education Facilities Planner.*

Comments and Recommendations

The dance classroom should be a large, unobstructed space with either a suspended wooden floor or a floor covered with a portable or permanent dance surface which provides a resilient surface. Many wooden gymnasium floor systems are not resilient enough for thin dance shoes or socks. Dance classrooms should not be carpeted or have only a concrete and/or tile floor. It may be desirable to have mirrors on one wall which are of a shatterproof material or mounted to prevent shattering. An adjustable-height dance barre may also be desirable. The classroom should be soundproofed or located so that music and other noises associated with dance instruction do not conflict with adjacent classrooms. There should be storage and/or closet space for students to use to store their personal belongings during the class. A separate lockable storage space for the teacher to store materials, equipment, recordings, props and other related items should be easily accessible. Bulletin boards and markerboards are needed. Storage should be provided for mats or cushions that students sit on while viewing films or during other instructional activities. It is desirable to locate the rooms near toilets and water fountains.

At the middle and high school levels, dressing room space is needed for students to change clothing.

Rooms should be equipped with a two-way communication system for informational and emergency use.

Guidelines*

Career and Technical Education (Grades 6 – 8)	Square Footage	(Exploratory Programs)
Exploring Career Decisions	*1,300 – 1,600*	
Exploring Life Skills	*1,400 – 1,600*	
Exploring Technology Systems	*1,400 – 2,000*	
Exploring Business Technologies	*1,200 – 1,400*	
Exploring Biotechnology	*1,400 – 2,000*	
Skill Development Program		
Keyboarding	*1,200 – 2,000*	
Business Computer Technology	*1,200 – 2,000*	

Career and Technical Education (Grades 9 – 12) Guidelines

Facilities for high school Career and Technical Education programs are often large, extensively equipped and much more expensive than regular classrooms, paralleling the facility needs found in industry. Because of these factors, school systems should be careful when selecting programs to offer. Because the spatial needs vary significantly from one program to another, the list below gives general guidelines for initial planning and programming of spaces.

Square footage indicated in the *Desirable* column was proposed by curricula development staff and Career and Technical Education faculty to provide a comprehensive or magnet program in an optimal space. Square footage indicated in the *Guidelines* column are sizes of spaces that have historically been provided for their respective programs and have been approved by the State Board of Education.

For many of the programs listed below, space in addition to that indicated is needed for office, storage, vocational classroom (could be shared) or other support areas.

Program and Courses	*Guidelines Square Footage*	*Desirable Square Footage*
Agricultural Education (All Courses)	*2,500 – 3,000*	*2,600 – 3,200*
Business and Information Technology Education	*1,200 – 1,400*	*1,600 – 2,500*
Career Development Education		
Career Management, Exploring Career Decisions	*N/A*	*1,400 – 1,600*
Family and Consumer Sciences Education		
Parenting & Child Development, Early Childhood Education, Advanced Studies, Teen Living, Life Management, Personal Finance	*1,400 – 1,600*	*1,400 – 1,600*
Apparel Development, Housing & Interiors I & II, Foods I, Food Science, Foods II Technology, Foods II Advanced, Culinary Arts & Hospitality	*1,600 – 2,000*	*2,000 – 2,500*

Guidelines* continued

Programs and Courses	Guidelines Square Footage	Desirable Square Footage
Health Occupations (All Courses)	*2,000 – 1,500*	*2,400 – 2,600*
Marketing Education (All Courses)	*1,000 – 1,200 (Plus Store)*	*1,500 – 2,000 (Including Store)*
Technology Education		
Fundamentals of Technology	*N/A*	*1,800 – 2,200*
Principles of Technology, Manufacturing Systems, Communication Systems	*N/A*	*1,300 – 1,600*
Transportation ?Systems, Structural Systems, Scientific & Technical Visualization	*850 – 1,000*	*1,000 – 1,200*
Trade and Industrial Education		
Trade and Industrial Work Development, Digital Media, Networking	*850 – 1,000*	*1,000 – 1,200*
Cabinetmaking, Drafting, Electrical Trades, Electro-Mechanical Technology, Welding Technology, Printing Graphics, Electronics, Network Engineering Technology, Computer Engineering Technology	1,600-2,000	*1,800-2,800*
Automotive Service Technology, Collision Repair Technology, Masonry, Construction Technology, Cosmetology, Metals Manufacturing Technology	2,500-3,000	*2,000-3,240*
Ceiling Heights	***1,200 – 2,000 SF***	***2,000 SF and above***
See Regular Classrooms for Career and Technical Education and light-equipment laboratories up to 1,200 square feet	*12' – 0"*	*14' – 0"*
Windows		
See regular classrooms for Career and Technical Education classrooms and light-duty laboratories. Laboratories with hazardous equipment should have windows, skylights, or some other daylight source.		

**Revise as necessary to reflect changes in Career and Technical Education curriculum.*

Comments and Recommendations

For middle school programs, local school districts may select from Exploratory Program courses, Business Computer Technology and Keyboarding. Smaller schools may combine certain programs in multi-use labs.

The Standard Course of Study based on the Basic Education Program expects that Career and Technical Education (Grades 9-12) will be available to all students, but not necessarily required. Courses based on essential standards are offered in eight program areas, with each area having school-based, work-based, or community-based learning opportunities. A basic high school vocational education program will include offerings in at least three of the following eight areas:

- Agricultural Education
- Business and Information Technology Education
- Career Development Education
- Family and Consumer Sciences Education
- Health Occupations Education
- Marketing Education
- Technology Education
- Trade and Industrial Education

Many high schools offer all eight programs. The number and types of laboratories will depend on courses offered locally. More than one laboratory for a program such as family and consumer sciences may be necessary in larger schools. Career centers serving several schools will affect the types and number of facilities needed at a high school.

Many Career and Technical Education programs are moving away from the large and extensively-equipped trade and industrial shops. School Planning will review facilities based on new and innovative programs, as described in the educational specifications developed by the LEA.

Multipurpose laboratories may be necessary in small high schools. A lab-type facility, for example, could serve electrical and metals programs. Multipurpose laboratories should also have a detailed layout to establish functional adequacy. In addition, a multipurpose laboratory should meet the requirements outlined in the Purpose section of this guide.

A larger darkroom or digital imaging room with additional storage could serve Art and Science, as well as Career and Technical Education programs.

A student conference area, office and storage area should be provided for cooperative method programs (Agriculture, Business, Marketing, Family and Consumer Sciences, and Trade & Industrial Education).

Laboratories that generate excess dust or other airborne pollution must have an exhaust system, as required by code, health and OSHA regulations. Dust producing activities such as woodworking shall be physically separate from activities involving ignition sources such as welding or grinding.

Career and Technical Education classrooms without an exterior wall may be windowless if they have windows into a shop or laboratory which has an ample daylight source.

Classrooms and laboratories should be equipped with a two-way communication system for informational and emergency use.

Circuits for hazardous machines and tools in shops or laboratories should be controlled via “kill switches” with pilot lights.

Space should be arranged for maximum flexibility and ease in teacher supervision of multiple activities. An area for teacher planning, record keeping, consultation, and administration is recommended

Consideration should be given to provisions for maintaining service systems and equipment in good working condition.

Facilities should have adequate provisions for the safety and health of students and teachers, and meet the relevant requirements of the Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA).

Facilities should be designed or modified to accommodate students with disabilities.

For detailed information on specific programs, refer to the School Planning publication: *Workforce Development Facilities Planner* (published May 2000 and due for revision).

Guidelines

Grades	Spaces	Guideline Square Footage	Desirable Square Footage	IMPACT Square Footage
K - 12	400 students minimum	4 – 6 SF/student over 400 Students		
K – 5	Main Room (RLV)	*1,600 minimum*	*2,400 minimum*	*2,800 minimum*
6 – 8	Main Room (RLV)	*1,600 minimum*	*2,400 minimum*	*3,400 minimum*
9 – 12	Main Room (RLV)	*1,600 minimum*	*2,400 minimum*	*3,600 minimum*
K – 5	Support Areas (See Below)	*1,200 minimum*		
6 – 8	Support Areas (See Below)	*1,800 minimum*		
9 – 12	Support Areas (See Below)	*2,000 minimum*		
K – 5	Video Production Room*	*300*		
6 – 12	Video Studio*	*400*		
	Control/Editing*	*260*		
	Equipment Storage	*80*		

**Optional. Not provided at all schools.*

Capacity: 40 students or 10% of the membership (ADM), whichever is greater.

Ceiling Heights: Main Room (RLV) 12'-0" minimum / Support Areas 9'-4"

The sizes and types of various support spaces needed are dependent upon the size and grade level of the school. Additional information can be found in *IMPACT: Guidelines for North Carolina Media and Technology Programs*, Instructional Technology Division, NCDPI. Some of the typical support areas and their recommended sizes include:

Space	Guidelines Square Footage
Media Office/Administration	*200 plus 50/add'l staff*
Workroom	*400 – 600*
Production	*400 – 600*
Professional Area	*150*
Conference/Small Group	*150*
Equipment Storage/Distribution Maintenance	*175*
Periodical Storage (If not digitally stored)	*150 – 250*
Computer Lab	*See Technology Infrastructure*

Comments and Recommendations

The school's media center should be located on the ground floor, single story and convenient to all learning areas of the school. For Pre-K through 2nd Grade classrooms a location on the same floor is preferred. Pre-K through 1st Grade children are not allowed on upper floors and must be located on the level of exit discharge. 2nd Grade rooms can not be located higher than one floor above the level of exit discharge.

The plan arrangement should not result in the RLV (reading, listening and viewing) room becoming a major thoroughfare for student traffic. Convenience to an outside entrance with access to rest-rooms allows the center to operate after hours and facilitates the delivery of materials and equipment. The media center's location should not preclude future expansion of the facility.

A proposed furniture and equipment plan should be developed during the early design development stage, in order to determine functional adequacy. The minimum media collection should be equivalent to that for a school serving 400 students.

Minimum support areas include offices, work/production rooms, conference rooms, periodical storage, some audiovisual equipment storage and spaces for a professional collection. Audiovisual equipment storage rooms should have a second door leading into a corridor, for the convenience of teachers checking out equipment for their classrooms.

Video production areas are sized for consumer-grade equipment.

The current trend is for the media center to house media retrieval head-end equipment to serve computers located in the classrooms or other labs. See the Technology section of this publication for guidelines on computer labs and infrastructure.

Elementary schools should have a group storytelling area for 29 pupils. Removable risers (carpeted) are often used. Storytelling pits are discouraged due to inflexibility, safety hazards and problems with waterproofing.

Varied ceiling heights in the main room (RLV) are desirable as part of an aesthetic, acoustical and lighting strategy.

HVAC System
The HVAC system should be separately zoned from those parts of the building that are not mechanically conditioned year-round. Special attention must be given to adequate ventilation and humidity control to prevent mold and mildew year-round. Computer hardware and software must be protected from temperature and humidity extremes.

Windows
Windows are recommended in the main media center room (RLV), but are not recommended for electronic equipment storage rooms. They are recommended in the support areas, but are not necessary if there are windows into the main room (RLV). Office windows providing for line of sight supervision of the RLV are recommended.

Wet Areas
A large, single, deep-bowl sink is needed for many tasks performed in the workroom.

Other planning data is available from:

- School Planning
- Instructional Technology Division

Lighting controls should be convenient and capable of darkening or dimming specific areas. The RLV should have a switch at the entry to control some general lighting. Electrical outlets (some with surge protection) and network technology connections should be coordinated with the furniture and equipment plan. Computer and electronic equipment will require

data outlets and more electrical outlets than required by code. Use fluorescent lighting in most areas. Metal halide lighting may be used in the main area. Incandescent fixtures should be limited to special-effect lighting if necessary.

Comments and Recommendations *continued*

Windows should neither admit distracting light nor hinder space utilization and should be equipped with draperies or darkening shades.

Intercom speaker(s) should have independent volume control(s).

Consideration should be given to providing a MATV/CCTV system for the school (specialized satellite instructional television). Provisions should be made to receive the signal from the University of North Carolina Center for Public Television and bring it into the media center workroom.

Handicapped access to the media center must meet the requirements of the North Carolina State Building Code, except that the 32" clear spacing for existing shelving will not apply to renovated or remodeled public schools. The spacing between movable furniture must allow for handicapped access.

Provisions should be made for the installation of an automated card catalog and internet search stations. This will require flexibility in power and data wiring to various locations around the RLV.

Provisions should be made for a large group instruction area big enough to accommodate the largest class. It should be provided with audiovisual and networked multimedia computer equipment with data and video projection capabilities including internet access for laptops. A digital interactive whiteboard is recommended.

Control points and the maintenance of clear sight lines in the media center should be used to minimize opportunities for theft and to eliminate possible hiding places. The reception area or circulation desk should be located to facilitate the monitoring of student traffic into and out of the facility. Interior media stacks should be a maximum of four feet in height, well-spaced, and parallel to staff lines of sight to aid in visual control and eliminate hiding places for persons or stolen goods.

Review data and electrical outlet locations and cable management for safety. Provide secure equipment storage for media and technology areas.

Technology Infrastructure

Guidelines	
Spaces	**Square Footage**
Regular/Science Classrooms	*Add 15 – 20 SF per full sized computer workstation for classrooms less*
K – 5 Computer/Keyboarding Labs	*850 SF*
6 – 8 Computer/Keyboarding Labs	*1,000 – 1,400 SF*
9 – 12 Computer/Keyboarding Labs	*1,200 – 2,000 SF* *See Business Labs*
Main Head – End Room	*450 – 800 SF*
Wiring Closet	*15 – 120 SF*

Comments and Recommendations

Personal computers have a significant impact upon regular classrooms in terms of needed instructional space, additional electrical capacity, much higher air conditioning loads, and narrow range of temperature and humidity for optimal operation.

Many school systems no longer associate computer labs with the media center. When computers are placed within the classroom, separate computer labs are used primarily for teaching keyboarding (usually in middle school), programming language, or business applications (Career and Technical Education).

The main head-end room contains the main connections to the outside, as well as the hubs, routers, file servers and other equipment to serve the school network. Racks for VCRs, Laser disk players, CD towers, DVD players and other new or legacy media equipment may be located here, or portions of this equipment may be located in a support area of the media center.

It may be more cost effective to reduce or eliminate wiring closets for regular classrooms by running fiber-optic cable from the main head-end room to a multi-station hub located on the computer wall or above the ceiling of each classroom. Wireless routers allow the use of multiple laptop computers with minimal hard wiring if provisions are made for storage, battery charging and network security. Fiber-optic can accommodate the bandwidth requirements of media streaming with appropriate routers.

When using copper cabling, network connection wiring closets must be located such that no workstation has a cable length of more than 300 feet from this space. A campus plan (separate buildings) school is likely to need a closet for each building. Large, single-story buildings may need a closet for each wing; smaller, more compact schools may be able to eliminate these closets altogether and make all connections directly at the main head-end room.

A closet serving only a few connections may require nothing more than a mounting board on the rear wall for punch-down blocks and hubs. Closets serving large numbers of connections will need space for floor-mounted racks for router and hubs, with access to both front and rear, as well as possible file servers and cross connections to telephone or other services.

Integrated communication systems combine bells, intercom, television, video, servers, telephone and/or other technology systems. The extent of and requirements for these systems vary widely by manufacturer.

Basic resources for technology infrastructure in NC schools include:

STS-1000 *Telecommunications Wiring Guidelines*, State ITS
BISCI *Telecommunications Distribution Methods Manual* (TDMM)
DPI *Technology Infrastructure Guidelines* DRAFT

Guidelines

Grades	Spaces	Square Footage
K – 6	*Multipurpose/Indoor P.E.*	*3,600 Net Minimum*
	(Play Area)	*4 SF/students over 600 students*
6 – 8	*Gymnasium*	*Varies***
Play area	*42' x 74' Court (54' x 90' with safety space*) recommended minimum for school and community use*	
	50' x 84' Court (62' x 100' with safety space) desirable for interscholastic play*	
Seating	*400 – 500 SF/100 seats*	*Recommend sufficient bleachers to seat the student body*
9 - 12	*Gymnasium*	*Varies*
Play Area	*50' x 84' Court (62' x 100' with safety space*)*	
Seating	*400 – 500 SF/100 seats*	*Recommend sufficient bleachers to seat the student body*
9 – 12	*Wrestling (competitive)*	*3,000 SF*
9 – 12	*Resistive Exercise (weight room)*	*2,000 – 3,000 SF*

** Clear (no bleachers or intrusions) safety space of 6' on each side and 8' on each end of a basketball court should be provided to reduce accidents and injury. Applies to both gymnasiums and auxiliary gymnasiums.*

***Community use gymnasiums and outdoor fields are not uncommon in elementary and middle schools. Where planned, consideration should be given to partnering with the local Parks and Recreation to share both initial and operating/maintenance costs for that portion of the facilities beyond that needed for the educational program.*

Windows: Play areas and gymnasiums should have windows or other daylight sources to provide a minimum amount of natural lighting.

Ceiling Heights

Grades	*Ceiling Height*	
K – 6 Multipurpose	*15' minimum (18' recommended)*	
The NC State Building Code will allow an exposed roof structure without fire protection if the structure is at least 20 feet above the floor and bleacher seats in buildings that otherwise would require a 1 hour rated ceiling assembly.		
6 – 8 Gymnasium	*20' – 22' minimum*	
9 – 12 Gymnasiums	*20' – 24' min (25' recommended)*	
Support Areas under 850 SF	*9'-4"*	
Dressing, Showers, etc.	*10'-0"*	
P.E. and Athletic Teaching Areas (weight, team,	*12'-0"*	

Twenty percent (20%) of the gymnasium and playroom ceiling may be lower, provided the NC State Building Code minimum is met.

Comments and Recommendations

K-5 indoor P.E. areas should include additional square footage for an office, storage and toilets for boys and girls. Add space if a stage is included. The 6-8 gymnasium should include dressing and shower areas, offices and some storage. Assembly and spectator use may require increased size. The 9-12 gymnasium should include space for two play courts, spectator seating, dressing and shower areas, office areas, storage and a lobby. Additional P.E. and athletic facilities (such as an auxiliary gym) may be needed to schedule the program in larger schools.

Although the use of showers has declined, some should be provided for both P.E. and athletics. To encourage use and maintain modesty, private shower stalls with enclosed dressing areas, small bench and several clothes hooks should be provided for both boys and girls. Locker and dressing rooms tend to be high abuse areas and should be visible and/or audible from P.E. teachers' offices to reduce vandalism and violence.

An auxiliary gymnasium with a minimum of 3,600 sq. ft. is recommended for middle schools with 1,000 or more students. An auxiliary gym of 6,500 sq. ft. and some bleacher seating is recommended for high schools with 1,200 or more students. Retractable gymnasium bleachers should be capable of being locked in place, when not in use, to prevent persons from hiding or engaging in undesirable activity in the space underneath. The NC State Building Code requires guardrails at the rear and open ends of elevated seating facilities, including tip-and-roll bleachers, where the seating height exceeds 30". When bleacher seating is provided, wheelchair accessible spaces with adjacent companion spaces are required per NC State Building Code.

Care should be taken when selecting a floor finish for elementary school multi-purpose rooms. Children of this age may spend considerable amounts of time sitting on the floor as well as in activities such as dance, basic exercise, gymnastics, ball handling skills/games and other motor skills development. Because of the wide variety of activities, a highly resilient floor such as sports carpet, foam backed synthetic sheets or wood may be desirable. Standard vinyl tile may not offer enough resilience and plain concrete is not recommended.

Resilient flooring such as high-density gym carpet is recommended for wrestling rooms and resistive exercise rooms. Resistive exercise and wrestling rooms should be located in an area accessible to both genders. Lay out exercise rooms with 2'-0" clear around extended equipment parts or limbs and allow width for spotters and circulation.

A solid, blank, durable wall is desirable in gymnasiums and play spaces for use as a teaching wall or handball and tennis practice surface. Windows in physical activity areas should be located to prevent glare. Locker rooms should have a daylight source for safety and/or emergency lighting. Mirrors, windows, and light covers in toilet and locker rooms should be impact resistant. Locker rooms and gymnasium toilets should have solid ceilings such as moisture resistant solid gypsum board or exposed concrete. Lay-in ceilings rarely last more than a few years without damage and provide hiding space for persons and contraband.

Windows should be placed so that they will not be hazard by direct impact by students or loose balls.

All playrooms and gymnasiums are teaching stations and require good acoustics. The ceiling is the best area to treat acoustically. Many systems have been very satisfied with cement fiber roof decks but less satisfied with "acoustic metal deck" and/or slotted, insulated concrete block. An allowance in construction bids for post-occupancy acoustic treatment is recommended.

Methicillin-Resistant Staphylococcus Aureus (MRSA) is a staph infection causing skin infections in high-contact sports and among athletes in locations such as locker rooms, weight rooms and other athletic facilities. K-12 physical education facilities should provide for frequent washing and for sanitizing of personal, portable and fixed equipment

Provide oversized doors for laundry rooms with commercial equipment and for paths to them from the exterior.

Guidelines

Rooms	Square Footage
Principal	*150 – 200*
Assistant Principal	*120 – 150*
Reception Area	*200 – 400*
Secretary	*100 -150*
NCWISE K – 5	*80 – 120*
NCWISE 6 – 8	*100 -150*
NCWISE 9 – 12	*150 – 200*
Other Student Services	*80 -200*
Workroom/Storage	*200**
Conference Room	*200*
Record Storage	*100*
General Storage	*200 **

**Considerably larger amounts of storage space are highly desirable.*

Comments and Recommendations

Administration areas should be contiguous to main entries, with easy visual access into and from the area. Number and size of spaces will vary according to staffing. Partition construction should allow for flexibility.

An assistant principal is funded by the state when the enrollment reaches approximately 700. Consider locating the offices of assistant principals remotely from the principal to better provide school building surveillance.

Doors to all offices should have a view panel for security. To address potential liability and safety issues, a vision panel with blinds should be provided in guidance and administration offices and other areas where one-on-one adult/child conferencing is conducted. For supervision of clients, a vision panel with blinds should be provided in health rooms. Health rooms should include locked storage for equipment and supplies. To prevent a child from blocking the door upon becoming incapacitated, toilet room doors in health rooms should swing outward.

At least two unisex toilets are recommended for the administrative staff. Group toilets are appropriate in larger schools or where guidance personnel and teachers also use these facilities. Individual toilets in private offices are inefficient, expensive, and not recommended.

Guidelines

Grade	Room	Square Footage
K – 5	*Guidance*	*450*
6 – 12	*Guidance*	*300*
9 – 12	*Reception/Career Center*	*600 – 1200 SF (Varies)*
K – 12	*Counselor Office*	*100 -150*
K – 5	*Other Student Services*	*100 -150*
6 – 12	*Other Student Services*	*100 -150*
K – 8	*Health Room*	*200*
9 – 12	*Health Room*	*150*
K – 12	*Health Room Toilet*	*50*

Comments and Recommendations

Elementary guidance areas serve small-group and individual guidance and should include a private counselor office. Schools with more than one counselor may need additional space.

The 6-12 guidance recommendation is for a small school with one counselor. Larger schools will require additional counselor offices. Depending on the size of the school, the reception area may need to be expanded to handle the number of students who may use catalogs and other materials in the guidance center. A guidance/student services center in a large high school can be in the 2,000-3,000 square-foot range.

The health room may serve the nurse and other medical professionals and as a temporary station for sick students. The health room should be located to allow for easy supervision and should include an adjacent toilet with an outswinging door. Provide an eye wash in the Health Room toilet lavatory. A large vision panel or window with blinds is helpful for supervision by office personnel.

Rooms designated for other student services may house social workers, psychologists or other health professionals. Student offices may be needed for student publications, student government and student clubs.

A vision panel with blinds in a door or wall should be provided for all guidance or consultation rooms where staff liability or issues could arise.

Guidance and other administrative offices may need additional space to accommodate students with their parents, especially if confrontations arise.

Guidelines

Grade	Room	Square Footage
K - 12	*Group Teacher Office/Planning*	*80 – 100 per Teacher*
K - 12	*Special Assistant and Itinerant Teacher Office/Work Space*	*80 – 100 per Teacher*
K - 12	*Workroom*	*Varies 300 minimum 0.75 – 1.25 SF/ADM*
K – 12	*Lounge*	*Varies 300 minimum 0.75 – 1.25 SF/ADM*
Telephones	*Faculty use: Each teacher should have access to a private telephone (preferably in their office or classroom) Telephones located in common workrooms or lounges should be enclosed in a sound booth for student confidentiality (exclusive of Child Nutrition and Administration).*	
Staff Toilets	*Faculty toilets should be located near classrooms. Teachers must not have to travel over 200' to reach a toilet, per the N.C. Plumbing Code. The minimum fixture count for the staff must be based on Table 403.1 of the North Carolina State Plumbing Code, and paragraph 403.9.3. Staff toilets should have a parcel shelf, a place to hang garments, a full-length mirror, and an appropriate area for grooming.*	

Comments and Recommendations

Combined or shared areas are recommended for efficient and flexible use of offices/workspaces. Teacher offices/workspaces should be near, but not in, the classrooms, where feasible. In addition to an appropriately sized desk and ergonomic chair, the workspace should include tables, shelving and storage.

Teachers, like other professionals, should have access to a private telephone, a networked computer, lockable storage, and a work area for planning, contacting parents, etc. Where the teacher has a permanently assigned classroom for their exclusive use, these amenities could be within the classroom. Where several teachers use the same classroom during different periods of the day, a separate teacher workspace containing these amenities should be provided.

Where separate teacher offices are provided, group office areas for four or more teachers are encouraged, to promote flexibility and improve space efficiency. Classroom area should not be reduced when separate teacher office facilities are provided. Additional desk space and, storage space for individual teachers for materials, files, wardrobe and personal items should be provided.

Staff Support Areas

The efficiency of high schools can be significantly enhanced by providing teacher office/planning areas in an area separate from but near to the classroom. Classrooms can be assigned for use by different teachers for all periods of the day if teachers have a separate space for planning, telephoning and other work.

Workspace dividers should have acoustical treatment which will allow telephone and computer use in combined or shared areas.

Workspace should be provided for instructional, lab, and clerical teacher assistants (one per 285 students in ADM). One office/workspace per projected itinerant teacher, plus an appropriate number for volunteers and student teachers, is recommended.

One or more centralized workrooms is/are recommended for copy machines, duplicators, specialized computers, and other equipment and supplies which are not typically located in teacher offices/workspaces.

Sizes and number of lounges will be determined by faculty size and building plan. Provide limited kitchenette facilities.

Vending machines are inevitable in staff lounges. They should be acoustically isolated, especially when lounges provide meeting space and/or workspace.

Some schools provide offices and storage rooms for PTA, Community Recreation, Safety Resource Officer (SRO), Bus Coordinator and other specialty staff.

Guidelines

Corridor	Widths (Minimum for safe and efficient movement)
Serving more than Two Classrooms	*8'-0"*
Serving more than Eight Classrooms	*9'-0"*
Elementary and Middle School Major Corridors	*10'-0"*
High School Major Corridors	*12'-0"*
Lockers along One Wall ADD	*2'-0"*
Lockers along Two Wall ADD	*3'-0"*

Entries: *Bus rider entries and automobile rider entries should receive equal attention.*

Stairs: *A single run of stairs should not exceed 8'-0" in height without a landing. The North Carolina State Building Code limits for height and width are not satisfactory for schools. Width should be 7'-0" or wider to allow concurrent passage of large numbers of students in both directions, especially for grades 6-12.*

Toilets: *Group toilet entries should have privacy screening that does not depend on doors. Group toilets for boys should have at least 2 water closets. Group toilets per Plumbing Code 403.9.5.2 shall have a minimum of 4 flushing type fixtures.*

Ceiling Heights: *Corridors: 9'-4"*

Doors: *Doors which open into a corridor must be recessed or protected by wing walls so that any part of the door swing does not project into the circulation path more than 7". Except for delivery areas, multiple single doors, rather than double doors, are recommended. Use oversized doors for exceptional children entries, shops, kitchens and music areas. Oversized pairs of doors (3'-6" or 4'-0" leaves) with magnetic hold-opens should be used on entrances to stairs, at corridor smoke/fire doors, etc. for visual and auditory supervision. Avoid mullions between leaves of pairs of doors.*

Comments and Recommendations

Corridors receive a high volume of traffic during class changes in middle and high schools. Wide, generous, well lit corridors significantly enhance safety and security. The minimum corridor width that should be considered is 6'-0" and 8'-0" if serving more than 2 classrooms, except that those within office suites, guidance areas and P.E. locker rooms may be 5'-0". Major corridors serve classroom feeder corridors and/or major spaces such as the cafeteria, media center, auditorium or gym. Avoid projections, deep alcoves and dead-end corridors. Flush mounted equipment and chamfered corners help flow and visibility. Corridors light switches should be keyed or remotely located.

During class changes, wide corridors in secondary schools serve a social function better than a student commons. Fire-rated doors along main egress routes should be equipped with magnetic, wall mounted hold-opens. Where doors normally remain closed, provide fire-rated glass openings for visibility. Narrow corridors may amplify unacceptable behavior. Multiple stair towers function much better than few very wide stairs for handling traffic during class changes but central stairs may have better potential for supervision.

Commons should be designed as a student social center. Location and design of commons are more important than size. Student entries and areas near the cafeteria are good locations for a commons. Ceremonial and visitor entries can be combined with student entries.

Comments and Recommendations *continued*

Locker commons located at major corridor intersections or other supervisable space with half-high lockers spaced to avoid crowding and with countertops for placing bookbags work well. Two tier lockers may be too small for the current bookbags, plus coats, PE clothes, etc. and cause conflicts when students are accessing both levels simultaneously. Consider lockers with integral combination locks, rather than student supplied (and frequently lost) loose locks that can have their combinations changed yearly. Perimeter lockers should be mounted flush to the walls to minimize opportunities to hide on top of them or to attempt access to ceiling areas.

Classrooms, water fountains and toilet rooms should be organized for ease of monitoring by staff. Visual access to the corridor, and in some instances to the building's exterior, is desirable. Group toilets should be available from classrooms and should be located on main circulation paths between classrooms and major support spaces (cafeteria, media center, gymnasium, etc.) for access and visibility. Group toilets for each gender with 5 to 7 flushing fixtures are most efficient. Lay-in ceilings are discouraged in bathrooms because of vulnerability to abuse and moisture, and because they provide hiding places for contraband. Solid ceilings are recommended.

Many schools have reduced social problems and maintenance by eliminating entry doors to group toilets and using screen walls to create a maze entry for privacy. Where vandalism is a problem, reinforced masonry privacy partitions should be used around water closets and urinals. Natural lighting is desirable in all areas. Light switches located in the toilets and corridors should be key operated or should be located in administration areas or equipment rooms not accessible to students. Large event toilet rooms should provide secondary access and should remain locked or be reduced in size during normal school operation. Hardware should permit doors to be locked open for event use.

Toilet and urinal partitions should be structurally sound and attached at floor, wall and be overhead braced or attached to the ceiling. Partition walls should not exceed 5'-6" in height and should have a 12-inch clearance above the floor to allow visual surveillance. Toilet room hand dryers, vending equipment, and trash containers should be heavy duty, recessed, fire resistant, and lockable.

Avoid mirrors over sinks as they promote socialization and result in hair-clogged traps and sat-upon sinks being torn from the wall. A single full length mirror located to avoid reflections to the exterior, but near the exit, works well and satisfies the accessibility code. Mirrors, windows, and light covers should be impact resistant. The NC Building Code allows an exception for lavatories to be visible from the corridor for bathrooms serving grades K-5. DPI recommends that the teacher be able to monitor the student's hand washing process.

Metal detectors may be required at building entrances. Covered areas at all exterior doors and covered walks between separate buildings are recommended. Consider installing an automatic door opener with H/C button at the primary entrance used by disabled students and visitors. Many disabled students do not possess the strength to open an exterior door equipped with closers.

Narrow windows or sidelights around doors enhance safety by permitting someone to see who is on the other side before opening a door and to observe circulation spaces. Where such windows are used, door hardware or glazing products should prevent the opening of a door through a broken pane. Retractable partitions should contain windows or provide other visual access into the space beyond, and should be stored in permanent, lockable niches.

Stairs should be well lighted. Enclosed stairwells should have electronic surveillance with motion detection at main access points and landings. The area under stairs should be enclosed and unavailable for any use. Stair handrails should be open for visual observation. Handrails should discourage sliding and horizontal rails should incorporate vertical pickets to discourage climbing. Risers should be enclosed on the sides to prevent ankle grabbing.

Access to elevators should be limited to authorized individuals but procedures should not place undue burdens on persons with disabilities. Elevators should be located in lobbies or other areas with higher-than-normal natural surveillance. Video surveillance in elevators can deter undesirable activity.

Guidelines

Dining Room Seating Area

Grades	Square Footage per Student	
K – 6	*12 – 14**	**Per Pupil dining includes 2 sq. ft. circulation. 15-20 sq. ft. per pupil may be needed for relaxed or intimate dining.*
5 – 8	*12 – 14**	
7 – 9	*14**	
9 - 12	*14**	

Dining Area Ceiling Heights

Minimum below 3,000 SF	*12'-0"*	
Minimum 3,000 SF or above	*14'-0"*	

Serving: *20% - 25% of Dining Area*

Kitchen: The total area for grades K-12 can vary from 856 sq. ft. per 100 meals served to 2,880 sq. ft. per 1,500 meals served.

Lunches Served	Square Footage
100	*856*
250	*1,261*
500	*1,518*
750	*1,938*
1,000	*2,208*
1,250	*2,566*
1,500	*2,880*

Other Planning Resources: *Facility Design for School Nutrition Programs,* National Food Service Management Institute, Univ. of Mississippi

Comments and Recommendations

The dining area size is determined by dividing the number of participating children by the number of seatings multiplied by the square footage per pupil (size = ADM ÷ number of seatings x sq. ft. per pupil). A very small school may have one seating. A very large school may have four seatings. For the typical school, three seatings make the best use of cafeteria facilities. A program of continuous serving and seating (equals the space required for about 2.5 seatings) requires some additional planning and may be most efficient.

These ratios relate to a complete lunch and are a valid basis for any public school child nutrition program which is operated in a self-contained cafeteria. The term "kitchen" includes all the usual support areas needed for preparing food for school children and staff.

Single, designated control points with clear sight lines should be positioned near the entrances and exits to cafeterias. Avoid overcrowding and maintain free circulation in cafeterias by providing ample space between serving counters and between dining tables. Vending machines should be located adjacent to or inside cafeterias or other well-monitored spaces, rather than in isolated areas.

Comments and Recommendations *continued*

The minimum guidelines for child nutrition facilities are based on a traditional program which includes a full-service kitchen and seating to accommodate the entire student body in shifts. The guidelines will not be appropriate where central kitchens or satellite food preparation areas are used. Likewise, the dining room area could be reduced for schools with open lunch periods which do not serve the entire student body. For these atypical situations, the board of education should provide a description of the child nutrition program which must be accommodated. Refer to Public School Laws of NC, Article 17. Supporting Services, Part 2 Food Service, 115C-263 and 115C-264.

The Department of Health and Human Services, Division of Environmental Health, Environmental Health Services Section (http://www.deh.enr.state.nc.us/ehs/food/plan2.htm) must review and approve all plans for child nutrition projects. The following are excerpts from their requirements:

1. If areas are provided for customer self service, via food buffet/salad bars, then sneeze guards must be provided to protect all unwrapped food or drink from the direct line of the customer's mouth to the unprotected food. Unprotected food must be intercepted by glass or similar type shields. The minimum standard for food shields as recommended by NSF shall be followed for this facility. Food shields should be down sized for middle school children in order to be effective.

2. When a dumpster is used, provisions must be provided for the washing of the dumpster. A dumpster pad of adequate size and facilities for cleaning the dumpster should be provided or an approved contracting service that has the facilities for cleaning the dumpster may be accepted. A contract for cleaning the dumpster is accepted as long as the manager has the control to decide when the dumpster is to be cleaned by the servicing company or when the dumpster is to be replaced with a clean dumpster by the service company. When the dumpster is to be cleaned on site then the waste water will be required to be discharged to the sanitary sewer system.

3. Painted concrete masonry walls are accepted when properly finished. The following comments shall apply:

   The concrete masonry joints of concrete masonry walls shall be struck slightly or smoothly to achieve a contoured, easily cleanable depression of no greater than 1/8 of an inch to the center of the joint. If exposed concrete masonry walls are planned for this facility, they must be properly finished.

   All concrete masonry walls for toilets, showers, janitor's closets, can wash area, all storage rooms and all rooms where food is stored, prepared or cooked shall be carefully finished to be easily cleanable and nonabsorbent.

   All pores of each concrete masonry unit of the walls must be sealed by the application of a minimum of two (2) coats of approved block filler. It has been experienced that contractors who apply block filler to masonry walls tend to accomplish this task by spraying.

   When spraying of the block filler is done, the proper spray nozzle must be used as specified by the block filler manufacturer. The block filler will then have to be rolled with the proper napped rollers as specified by the manufacturer to achieve the desired consistency of texture of the block before the paint is applied. Additional coats of block filler may be needed if the two (2) coats as required do not seal the pores of the blocks which are more porous than others.

   An alternative to the use of spray-on block filler is the sponge troweling portland cement or drywall compound over the wall in order to fill in the pores of the block. Depending on the type of block used (fine, medium or course aggregate) this may be the preferred method for filling in the pores of the blocks.

   Contractors are encouraged to check with and get approval from the local health department after block filler is applied and before final paints are applied to the concrete masonry wall.

Comments and Recommendations *continued*

4. Floor trenches are recommended in front of the cooler and freezer doors to prevent waste liquids from spillage or during cleaning from entering into the traffic areas.

Equipment Installation Recommendations

1. Equipment not readily movable (i.e. equipment without casters or rollers) or sealed to adjacent surfaces shall be spaced to allow access for cleaning. The amount of space required between and behind equipment depends on the size of the equipment and the accessibility needed for cleaning the equipment and adjacent surfaces.

   The following are equipment spacing recommendations for stationary equipment:

   A. If access is available from both ends of the equipment and the total equipment length is four feet or less, the equipment should be spaced at least six inches from walls and other equipment.

   B. If access is available from both ends of the equipment and the total equipment length is over four feet but less than eight feet, the equipment should be spaced at least 12 inches from walls and other equipment.

   C. When the total equipment length is eight feet or more, the equipment should be spaced at least 18 inches from walls and other equipment.

   D. A minimum of six inches of space should be provided between items of equipment to allow access for cleaning. Additional space may be required for large equipment when six inches is not adequate to provide access.

2. Equipment placed directly on the floor, such as counters display cases, cabinets, proofers, ovens, and retarders shall be effectively sealed to the floor using silicone, metal flashing, vinyl covered base, or other approved material. Metal kick plates which are readily removable will not be required to be sealed to the floor, provided the base of the equipment is sealed to the floor or the areas behind the kick plates are easily cleanable.

3. Equipment attached to walls, such as lavatories, preparation sinks, utensil washing sinks, dish tables, counters, and cabinets shall be effectively sealed to the wall to prevent splash, debris accumulation, and vermin harborage. Note: any combination of low profile or pan head bolts, screws, rivets, silicone sealers, or flashing that effectively closes the opening between the equipment and the walls in a smooth and sanitary manner is acceptable.

Other Recommendations:

1. Deep fat fryers are not recommended, in keeping with nutrition guidelines.

2. A door bell and vision glass should be provided at the kitchen exterior door and loading area and monitored security is recommended.

3. Space and electrical capacity should be provided for future installation of accessory vending or preparation equipment both within the kitchen and dining areas as directed by staff.

Building Support Areas

Guidelines

Rooms	Square Footage
Mechanical Rooms	*Varies*
Electrical Rooms	*Varies*
Custodial Rooms	*Varies*
Storage Areas	*Varies*
Book Storage	*Varies*
General Storage	*Varies*
Receiving	*Varies*

Comments and Recommendations

Sizes and locations of support area rooms are determined by need.

Where mechanical equipment is located on the roof or mezzanine, permanent stairs are recommended. Permanent access is required by the NC State Building Code for equipment located more than 16 feet above grade level. Ladders are difficult to traverse and by NC OSHA rules may only be used by personnel with personal toolbelts while maintaining three points of contact. Large tools, equipments, materials and parts must be elevated by a separate safe method and can not be carried up a ladder.

All support areas need ventilation.

Louvers in interior doors are not recommended; undercut doors or transom louvers are recommended instead.

A well-ventilated storage area for yard maintenance equipment and combustible materials should be provided. A building separate from the main building is preferred. A two-hour fire separation is required by the NCSBC.

Adequate space above mechanical equipment for ceiling installation and maintenance should be provided.

Separate boiler and furnace rooms with 2-hour-rated separation, with no openings except to the outside of the building (NCSBC 423.1 and 1015.3). Boiler rooms greater than 500 square feet require two exterior exits.

Adequate illumination for reading mechanical equipment controls and gauges should be provided.

The installation of up-to-date technology infrastructure for use by all students, faculty and staff is encouraged. When funds are not available for the installation of a complete system, it is suggested that the capability to install these systems at a later date be provided by the use of empty conduits and cable trays, allocated space for head-end, file servers and other equipment.

Skylights or clerestory windows on roofs should be tamper-proof and should be positioned well clear of any means of climbing down to the floor inside the building.

Comments and Recommendations

Erection of school buildings: The following is an excerpt from G.S. 115C-521:

> "Upon determination by a local board of education that the existing permanent school building does not have sufficient classrooms to house the pupil enrollment anticipated for the school, the local board of education may acquire and use as temporary classrooms for the operation of the school, *relocatable or mobile classroom units*, whether built on the lot or not, which units and method of use *shall meet the approval of the School Planning Division* of the State Board of Education, and which units shall comply with all applicable requirements of the North Carolina State Building Code and of the local building and electrical codes applicable to the area in which the school is located. These units shall also be anchored in a manner required to assure their structural safety in severe weather. The acquisition and installation of these units shall be subject in all respects to the provisions of Chapter 143 of the General Statutes."

Mobile/Modular Buildings (Freestanding, temporary, relocatable, single classroom, multiple classroom or toilet units) are a specialized type of construction and building codes and bidding laws for the purchase and installation of these are very similar to on-site, stick-built buildings. They are typically comprised of two or more transportable units and joined on site. Even though such buildings may be temporarily located and, relocated one or more times, they are required to comply with all building code and other legal requirements applicable to permanent buildings.

Modular Construction as opposed to mobile/modular buildings, consists of factory constructed modular components of steel, concrete, wood or other materials that are transported to the site that has been prepared with foundations and underground utilities. This includes buildings constructed either with entire sections of the building pre-fabricated by a mobile/modular manufacturer or a building constructed with smaller components such as wall panels, roofing panels, etc. When joined together they are known as modular construction and are a permanent building using pre-manufactured units (even if it is technically possible to disassemble the units and move them). Assembly and finish work is required at the site. Larger sections of the building, such as cafeterias and gymnasiums are usually "stick-built" on site. When modular units are assembled to form more than a single classroom and/or requiring halls, toilets, etc, it becomes permanent modular construction and it must comply with all general statutes related to construction and undergo complete state and local plan reviews.

General Requirements for Freestanding Mobile/Modular Units
The General Statutes for permanent, site-built structures must also be followed when taking bids for the purchase of these units. Formal or informal bidding procedures (depending on dollar value) must be followed. Refer to School Planning's "*Selected Laws Relating to the Construction and Repair of Public School Facilities in North Carolina"*.

Units must meet requirements of the current edition (with amendments) of the NC State Building Code for educational occupancy; applicable plumbing, mechanical, and electrical codes and other legal requirements; and local zoning ordinances. Shop drawings for each unit must bear the Approval Stamp from a third-party certification agency approved by the Department of Insurance. Manufacturers must be approved for commercial construction by the DOI's Manufactured Building Section. Listings of approved third-party certification agencies and approved modular manufacturers are available from the Department of Insurance, Manufactured Building Section (919) 661-5880.

Wind and other locale-specific code provisions must be met. Fossil fuel-fired heating devices should not be used. Units meeting functional, safety, and code requirements will generally be consistent with School Planning review guidelines.

Relocatable classrooms should be sufficiently separated to permit visual surveillance. In order not to provide hiding places for people, spaces underneath relocatables should be secured with chain link fencing or a similar material that can prevent access and maintain visibility.

Comments and Recommendations

SITE-SPECIFIC PROCEDURES (new and relocated units): Submit plans to School Planning for review and comment and to the local building inspector for approval and permitting which indicate the following information.

1. Site plans showing:

a. Proposed locations for units and any joining of multiple units
b. Distances to both student and staff toilets (200-foot maximum.)
c. Adequate number of toilet facilities, as required by building code for the entire campus. (May require the addition of modular toilet units).
d. Electric feeders, disconnects, etc., as required by code.
e. Domestic water and waste services.
f. Telephone, intercom, MATV, computer and other electronic systems.
g. Smooth-surface walks (preferably covered) from permanent buildings to meet handicap code and provide ADA access.
h. Confirmation that units are constructed by a DOI-approved manufacturer and certified by an approved third-party agency.
i. Distances between units and from adjacent buildings.

2. Foundation plans:

a. Provide foundation plans showing the location of masonry piers and tie down anchors, size of masonry piers and their footings.
b. All footings shall rest on undisturbed soil or compact fill having a minimum allowable bearing capacity of 2000 psf.
c. The bottom of masonry footings shall be a minimum of 12" below finished grade.
d. Masonry piers should be laid in Type S mortar. Masonry piers may be dry-stacked if four sides of the pier are coated with surface bonding cement and the first course above the footing is set in a bed of mortar.
e. Ramp, steps and platform support legs need footings for anchorage and support.
f. Please submit drawings and details by the third party engineer for review.
g. Drawings from third party engineers need to be updated with the engineer's signature seal and date.
h. Regardless of the date of manufacture of a modular building, foundations must be compliant with NC Building Codes current on the date of installation and, designed for specific site conditions. It is highly recommended that a local design professional provide foundation design services.

3. Building Plans:

a. Submit architectural drawings from manufacturer showing compliance with NC State Building Code, including accessibility provisions, Fire Code and Plumbing Code, and seal and signature of an architect or engineer licensed to practice in North Carolina.
b. Submit manufacturers plumbing, mechanical and electrical drawings bearing the seal and signature of an engineer licensed to practice in North Carolina.

4. Other considerations:

a. Other connections to permanent buildings should be indicated. Though not required by code, School Planning recommends two-way intercom systems for safety, computer networking, telephone systems, and MATV connections between all units and the permanent school structures.
b. Multiple classroom and large modular buildings require particular attention to life safety systems, Fire Code provisions, and to plumbing and electrical connections during on-site assembly.
c. Heating and air-conditioning units should be inspected, tuned and balanced before occupancy, especially after being moved from other locations.

Fieldhouse, Concession and Other Smaller Construction Projects

These buildings and additions include such structures as:

- ticket booths
- stadium toilets
- concessions
- dugouts
- weight rooms
- field storage buildings
- fieldhouses
- press boxes
- shelters
- playground equipment
- greenhouses
- other small structures
- bleachers (see following pages)

These structures are often designed without the aid of an architect or engineer and often funded and built by booster clubs or PTAs unfamiliar with many aspects of the Building Code or other laws and regulations pertaining to construction of public buildings and structures. The General Statutes do allow small buildings to be designed without a NC licensed architect or engineer provided that the value of new construction or major repairs (value if it were to be bid and constructed competitively) does not exceed $135,000 for the construction of, or additions to, buildings, $100,000 for the repair of buildings affecting life safety systems, $135,000 for the repair of buildings where such repair includes major structural change in framing or foundation support systems, or $300,000 for the repair of buildings where such repair does not include major structural change in framing or foundation support systems. (these values change periodically and are current as of this writing). All structures whose value is in excess of these amounts are required to be designed by an architect or engineer licensed in North Carolina. Regardless of the value of these structures, review and comment on the design documents by School Planning is required and a building permit and inspections must be obtained from the local building inspector.

School Planning urges the use of an Architect or Engineer for ALL structures, regardless of value, for the protection of the public and because they are familiar with the construction process and laws and regulations pertaining to building. General Statutes 133-1 and 133-2 require that project architects and engineers be in the employ of owners and prohibits project designers being employed by or having financial interest in manufacturers or suppliers of pre-engineered structures

1. Minimum documents for projects for DPI, School Planning review:
2.
    - Site plan showing relationship to playfields, drives, walks, parking areas, other buildings and site improvements.
    - Foundation plan showing allowable soil bearing pressure, footings and slab on grade.
    - Floor plans showing dimensions, walls, windows, doors, finishes, built-in equipment, etc.
    - Floor and roof framing plans showing floor, roof & exterior wall constructions and, mechanisms used to stabilize the building. Provide seismic reinforcements for masonry walls, connection details and lintel schedule & bearing details.
    - Plumbing, HVAC and electrical plans showing all fixtures and equipment, circuiting, ductwork sizes, piping diagrams, etc.
    - Exterior elevations showing windows and doors, wall materials, roof drainage, control joints and other features to fully describe the building.
    - Cross section through structure showing construction materials and details. Include dimensions such as heights above grade, roof slope, etc.
    - Provide enlarged details and wall sections of conditions as needed to describe project fully for construction documents for bidding purposes and construction.
    - Other drawings as necessary to fully describe the construction.
    - If a pre-engineered structure, shop drawings produced by the successful bidder shall be submitted to DPI, School Planning for review as a final step in securing a “Certificate of Review” and completion of the review process. Site plans, foundation plans, plumbing, HVAC and electrical plans are also required.
    - If drawings are prepared by an individual other than a licensed architect or engineer, then that individual must include his name and address on the drawings.
    - Obtain building permit and Certificate of Occupancy from the local Building Inspection Department.

continued on next page

Fieldhouse, Concession and Other Smaller Construction Projects

continued from previous page

Force account labor (use of school maintenance staff for all or part of construction) is a legal method of construction as long as general statutes are followed regarding dollar limits, ($50,000 labor or $125,000 total costs), structural size and licensed tradesmen. Use of Career and Technical Education student and volunteer labor is discouraged due to liability issues in the event of an accident and the perceived image of "forced labor." The school system should verify these issues with their attorney and insurance agent if student or volunteer labor is contemplated.

Seasonal Use Buildings

Many smaller buildings are only used during a particular athletic season and remain unoccupied the remainder of the year. In order to reduce mold/mildew and freezing problems as well as to facilitate easy cleaning, the following are recommended:

- Slope all water piping to allow full drainage in off-season.
- Provide adequate high and low natural ventilation to keep air circulating during non-use.
- Construct interior walls, floors and ceilings with durable, easy-to-clean materials.
- Slope floors 1/4" per foot to facilitate cleaning with a steam or hot water hose.

Equipment Storage Buildings

Tractor storage, or any other storage buildings (or portions of buildings) that will house gas powered equipment need to have adequate high and low natural ventilation to reduce/eliminate the build-up of gasoline fumes. In addition, if connected to another structure, this space should have a two hour fire separation from the other portion.

Stadium Restrooms

The number of fixtures required by the North Carolina State Plumbing Code (NCSPC) for K-12 school stadiums is based upon the number of bleacher seats and can be significant in number (see the NCSPC Table 403.1) due to the large number of bleacher seats that are provided. Whenever additional permanent bleachers are installed, additional restroom fixtures are required by the Plumbing Code as well. The following items related to these facilities are recommended.

- In large stadiums, provide separate Home and Visitor restrooms to reduce conflicts.
- In restrooms with more than eight flushing fixtures, provide two means of egress, both of which should have a maze entry.
- Locate restrooms where easily supervisable by security personnel or adult staff.
- Restrooms are required by the NCSPC to be located no more than 400 feet from the closest bleacher exit from each set of bleachers that the facility serves.

Concession Buildings

Avoid the sale of any food items other than items prepared remotely, pre-packaged and kept warm for sale. Cooking on site will classify the concession as a commercial kitchen and require substantial, very expensive investment in kitchen equipment. Coordinate requirements with the local Health Inspector.

Elevated Press Boxes

Large press boxes are required to meet the requirements for accessibility by the handicapped. Whenever possible, make use of topography to allow small ramps to the press box from the rear, with potential additional access to the top of the stadium bleachers. Where not possible, contact the Office of the State Fire Marshal to determine the specific size limitations when accessibility is not required. The 2012 NC State Building Code, paragraph 1104.3.2 Press boxes, addresses when handicap accessibility may not be required. (In general, press boxes under 500 sf in area, and that are elevated over 12 feet minimum above grade.)

Outdoor Bleachers

Plans for permanent bleachers purchased and installed for use on athletic/play fields at K-12 schools must be reviewed by the School Planning Section of the School Support Division of the North Carolina Department of Public Instruction per General Statute 115C-521. "Permanent Bleachers", for purposes of this article, shall be defined as any bleachers consisting of more than 5 rows of seats. Any configuration of 5 rows or less will be considered as "Portable Bleachers" and do not need to be submitted to School Planning for review.

Bleachers may be purchased by local school boards as a part of a regular new school project, addition or renovation project, or a stand-alone bleacher project, designed by a North Carolina licensed architect and/or engineer and submitted to School Planning for review in the normal process. In either scenario, School Planning is required to review the plans for permanent outdoor bleachers.

Structural designs for pre-engineered structures or systems used for school projects, such as grandstands or bleachers are often incomplete when bid documents are completed, although general layouts and other information necessary to conduct architectural reviews are included. Conditional certificates of review that allow mobilization and site preparation to begin prior to completion of final structural designs can be issued following review of bid documents. Per the North Carolina State Building Code, Section 1025.1.1 Bleachers and grandstands shall comply with ICC 300.

Project reviews are completed and certificates of review issued upon certification to School Planning that foundations and other structural systems have been designed by or reviewed and approved by North Carolina registered structural engineers for the projects. General Statute 133-1 requires that project architects and engineers be in the employ of owners and prohibits project designers being employed by or having financial interest in manufacturers or suppliers of pre-engineered structures.

Comments & Recommendations

1. Bleachers containing more than 5 rows shall be anchored to a continuous, leveled 4" minimum thick concrete slab under the full footprint of the bleachers. The concrete shall be fc' = 3000 psi compressive strength and reinforced with 6x6 w2.9 x w2.9 welded wire fabric. The slab control joints and bleacher anchorage details shall be shown on the construction document and/or shop drawing.

2. Bleachers containing 5 rows or less may sit on strip footings or leveled "mud sills" at the support frames. A continuous concrete slab within the footprint of the bleachers is recommended but not required.

3. Provide lateral bracing in the support frames in both directions.

4. Where aluminum and steel are fastened together, provide neoprene pads to prevent contact and avoid the possibility of corrosion due to dissimilar metals reaction.

5. Early on, work with the local building inspector in securing approval of the bleacher construction.

6. For bleacher projects containing 1,000 or more seats and projects over 20,000sf in area the North Carolina Department of Insurance, Office of the State Fire Marshal must review and approve the plans.

7. Repair damaged hot-dipped galvanized coating with galvanized repair paint in accordance with ASTM A780 and manufacturer's written instructions.

8. Any field modifications to the bleachers shall be carried out under the supervision of the engineer of record.

9. Chain link fencing is a good choice for use as guards at the ends and backs of bleachers.

Comments and Recommendations *continued*

Minimum drawings for bleacher/grandstand projects for DPI, School Planning review:

- Site plan drawn to scale showing relationship to playfields, drives, walks, parking areas, other buildings and site improvements. Also show locations of and distances to restrooms including numbers of fixtures.
- Plan drawn to scale showing seating layout, aisles, ramps, steps, railings, guards, handicapped seating cutouts, dimensions and relationships to adjacent site features and improvements.
- Cross section through bleacher/stadium construction, showing all elements such as seat/foot boards, railings/guards, foundations, concrete slab under footprint, and other features needed to fully describe the project. Include dimensions such as riser height, row spacing, heights above grade, railing/guard heights, etc.
- Provide blow-up details of conditions as needed to describe project fully for construction documents for bidding purposes.
- Bleacher/grandstand shop drawings produced by the successful bidder shall be submitted to DPI, School Planning for review as a final step in securing a “Certificate of Review” and completion of the review process.

Designing Safer Schools

The State Board of Education and the Department of Public Instruction believe in enhancing safety and discouraging violence and crime by careful consideration in the design of sites and buildings. By applying principles of CPTED (Crime Prevention through Environmental Design) and other design features to reduce or eliminate conflicts or hazardous conditions, a safe, functional and orderly environment can be established. School Planning endorses the concept that a safer environment can create a psychological advantage for positive behavior and for learning. Much of the "Facilities Guidelines" support this advantage. For additional information and references refer to the School Planning Publications entitled "*Safe Schools Facilities Planner, Improving School Climate and Order Through Facilities Design", "Design of Schools to Resist Violent Attack",* and *"The School Site, Land for Learning".*

CPTED Principles

Campus crime and violence can be significantly reduced through the application and interaction of the following seven key components of CPTED (Crime Prevention through Environmental Design).

1. **Access Control**: Controlling campus access, either through natural or formal components, is a basic concept of creating a safe school climate. Access by non-students during, as well as after, school hours should be carefully controlled, as should the timely and orderly access by students, visitors, staff and service personnel.

   Campus Perimeter: Design the campus so that visitors and guests must pass through a particular point or entrance which is clearly visible to passersby and administration.

   Entrances and Exits: Minimize the number of entrances and exits to the campus and direct traffic flow, both vehicular and pedestrian, to eliminate confusion and congestion and provide ease of observation. Design parking areas to limit and control access. Place student parking areas where clearly visible from administration and consider breaking up very large lots into smaller, more manageable ones.

   Visitor Parking: Clearly identify visitor parking with proper signage and set up visitor traffic, both vehicular and pedestrian, in a way that it can be easily supervised from the main office or by assigned security personnel.

   Visitor Screening: Clearly worded and placed signage should direct visitors to the main office or designated visitor reception area where they can be screened, using uniform visitor screening procedures, to ensure that they have legitimate business on campus.

2. **Natural Surveillance**

   Formal Gathering Areas: Gathering areas should be formally identified in locations with natural surveillance and access control or assigned to locations out of view of the would-be offender. Informal areas then become off-limits and subject to automatic scrutiny. Clear spatial definition will cause unauthorized users to feel at greater risk and staff to assume greater challenging powers.

   Natural Supervision: Enhance natural supervision by eliminating architectural barriers. Ensure open sight lines through the design and proper placement of buildings, landscaping components, lighting, and access control. Clear the under-story and low branches in wooded areas; maintain visibility of play fields and tennis courts from major site circulation routes.

3. **Formal Surveillance**

   High-risk Areas: Design high-risk areas to accommodate natural surveillance to the extent possible and to facilitate formal supervision where required. Such areas may include the main entrance or campus perimeter–especially where problems with intruders are typical. Toilet rooms and corridors, stairways, and locker clusters are often key trouble spots. Commons areas and courtyards frequently have similar problems. Remote locations, such as parking areas and outside play courts, may create additional risks.

Designing Safer Schools continued

Remote Surveillance: Where limited staff availability or a high number of identified problem areas generate a need for other, more formal surveillance options, security specialists should be consulted on equipment specifications, placement, operation, and management.

4. **Territoriality:** Territoriality is the personalization of space assigned to each person to emphasize the perception of ownership, translating to identification of territories within a school campus, assignment of internal territories to "proprietors," and assignment of general supervision and care responsibilities that go with "ownership" of identified spaces.

Delineation of Space: Space should be clearly delineated among the various areas of the campus to encourage territoriality and better control. For example, it should be clear when one is moving from the fine arts wing to the science department to the math department, or from one "house" to another in the lower grades. Smaller spaces may be assigned to individual teachers or staff. For instance, the locker area immediately outside a classroom door may be identified with that classroom teacher by means of color, pattern or other design features. Doorways and vision panels may need to be designed to facilitate natural surveillance of these areas from within the classroom.

5. **Defensible Space:** Environmental concepts can contribute to the productive management of schools by providing clearly marked transitional zones that indicate movement from spaces designated for public, combined, and private use.

Access Points: Reduce access points to parking areas to decrease the perception that they are public spaces; reduce the possible escape routes for potential offenders; and increase the perception that they are risky for the potential intruder. Use gates to close off unnecessary entrances during low-use times to control access and reinforce the perception that the parking areas are private.

6. **Target Hardening:** Effective target hardening maintains a balance between the development and implementation of appropriate security measures and visually creating a prison or fortress. It must include the vigorous pursuit of identifying, apprehending, and prosecuting criminals, to the end that the school campus becomes unattractive as a target for entertainment or challenge.

Target Hardening: Design facilities with the idea of making the perpetrator's objective difficult to attain and controlling crime by slowing the perpetrator's progress. Reduce the number of doors that are not observable from drives and parking; avoid deep recesses and potential hiding areas.

7.**Program Interaction:** Effective program interaction can be achieved through a combination of designing facilities that enhance both natural and formal supervision and the development and utilization of a close partnership among law enforcement and emergency service personnel, administration, staff, and students.

Enhanced Natural Surveillance: Activities which are easily supervised can be assigned to areas where unauthorized infringement might normally occur. Natural surveillance for these activities will be enhanced through the increased perceptions of safety for the legitimate user and risk for the potential offender. Activities which are more difficult to supervise can be assigned to areas where infringement is typically less likely to occur.

Conflict Reduction: Provide separate entrance and exit patterns to spaces with concentrated high-volume use, such as cafeterias and corridors, to reduce time required for movement into and out of spaces and to reduce the opportunity for personal conflict. Separation of student traffic flow can help define orderly movement and save time, and the illegitimate user will feel at greater risk of detection.

Communication: Design communication systems to overcome distance and isolation. Two-way intercom systems and telephones are even more critical for remote modular units (trailers) or isolated buildings.

Designing Safer Schools *continued*

Modifications: Redesign problem spaces and uses of spaces to provide natural barriers for conflicting activities. As an example, where congestion and conflict are likely to occur when classes are entering and leaving a cafeteria at the same time using the same entrance, separate the entrance and exit so that different traffic routes are utilized for moving from and returning to instructional areas.

Clear Borders: Provide clearly defined borders for controlled space. Design features such as changes in color, volume, or cased openings can be effective in defining boundaries.

Interior Arrangement: Consolidate program areas that have compatible functions and similar threat levels and, separate higher risk areas from higher value areas.

High Performance Buildings

In recent years much attention has been focused on improving our environment, reducing energy usage, use of renewable/recyclable materials, improvement to air quality, daylighting, solar heating, and conservation of resources. Out of a growth of numerous separate programs, most of these issues have been unified under the broad heading of "High Performance Buildings". School Planning encourages the design of High Performance Buildings commensurate with value engineering, building longevity and durability.

Guidelines for High Performance Buildings have been developed by NCDPI (see www.schoolclearinghouse.org). The Collaborative for High Performance Schools (CHPS, http://www.chps.net) maintains best practices and assessment tools. The US Green Building Council "LEED" (Leadership in Energy and Environmental Design) (http://www.usgbc.org/LEED) program is a "Green Building Rating System". A version of LEED specifically for new schools has since been developed. Local district guidelines can be found at: http://www.chccs.k12.nc.us/board/041502HIGHPE1.pdf (Chapel Hill/Carrboro) and at: http://www.wcpss.net/about-us/our-facilities/facilities/energy-guidelines.html (Wake County).

Various sets of these guidelines use principles and techniques that present a unified approach to building design, site selection, construction and building commissioning. It is extremely important for all aspects to be incorporated at the very beginning of the planning process.

Schools present a somewhat unique situation when incorporating many high performance principles. Schools must last for fifty or more years and do not have funds available for high maintenance, repair of systems that do not perform as expected or alterations of systems that are experimental in nature. Because of these factors, the use of experimental or non time-proven materials, methods or systems is discouraged. Instead, take advantage of lessons learned in other buildings and ensure that such systems as daylighting, passive/active solar, HVAC systems, etc. are properly designed and calculated by experts in their respective fields and that materials and equipment that are selected have proven effective for a long life with minimal maintenance. Systems such as daylighting, passive solar and other specialized techniques are of no value (and may actually hinder the building's performance) unless installed with properly designed automatic controls (including light sensors to turn off artificial lighting when not needed). School staff typically do not have the expertise, training or time available to properly operate manual controls.

Examples of Schools using High Performance elements in their design

Johnston County

- Four Oaks Elementary: Daylighting, energy conserving
- Selma Middle: Daylighting, energy conserving
- Clayton Middle: Daylighting, energy conserving
- Clayton Elementary: Daylighting, energy conserving

Wake County

- Durant Road Middle: Daylight, energy conserving
- Dillard Drive Middle: Daylight, energy conserving
- Heritage Middle: Daylighting, rainwater catchment, energy conserving: Triangle J Gold Rated

Iredell/Statesville

- Third Creek Elementary: LEED Gold Certified

Durham County

- W.G. Pearson Elementary: Daylighting, water & energy conserving

Chapel Hill Carrboro

- Smith Middle: Daylighting, grey water reclamation, energy conserving
- Mel and Zora Rashkis Elementary: Daylighting, rainwater catchment, energy conserving
- Carrboro High: Daylighting, rainwater catchment, cool roof, energy conserving

Guilford County

- Northern Middle: Daylighting, rainwater catchment, Living Machine , water& energy conserving
- Northern High: Daylighting, energy conserving

Union County

- Wolfe School: Daylighting, water & energy conserving, cool roof, geothermal heat pump

Toilet Facilities for Classroom Areas

Group toilet rooms containing five (5) flushing fixtures each for both boys and girls are recommended as an optimum size. This is based on the ability of the toilet room to accommodate a full class of students in a reasonable time, yet not be so large that violence and vandalism become a problem. Rather than increase the size of toilet facilities to six or more flushing fixtures, a safer and more functional solution is to increase the number of toilet rooms. These rooms should be appropriately placed in the building.

Carefully consider the location of toilet facilities to best serve the needs of students. The building code maximum of 200 feet may be too far, especially for elementary and middle schools. Keep in mind that this distance is also applicable to future modular or relocatable units. Because of this, it may be prudent to identify locations for such units and oversize the nearest toilet facilities so that the modular units can be legally installed without significant extra cost. Toilet rooms should also be located “on the way” to playfields, cafeteria, media center, etc. All facilities should be arranged so they are easily supervised by faculty/staff from the corridors.

Toilet Facilities for Cafeterias

Cafeterias are often used “after hours” for meetings, assemblies, dances, performances, etc. For this reason, toilet facilities must be available and sized on the basis of the building code occupancy factor of 15 square feet of cafeteria floor area per person. Other toilet rooms constructed for classroom areas can be used to partially or completely fulfill the cafeteria requirement, if they are within the prescribed distance and it is not possible for them to be “locked off” when school is not in session.

Toilet Facilities for Gymnasiums & Auditoriums

It may be prudent to locate the gymnasium and auditorium near to each other so that they can share the large and expensive “event” toilet facilities. These facilities should be sized to accommodate the larger of the two spaces, less any other facilities that are near enough (and not “locked off” during event hours) to serve a part of the need. Even with some sharing, these event toilets often are quite large and potentially susceptible to vandalism, violence or other undesirable student activities. It may be prudent to equip these toilets with lockable doors so that they are only used during events. Two means of exit, at opposite ends of the toilet room, will allow escape from a threatening situation, improve traffic flow and enhance supervision.

Toilet Facilities for Stadiums

The number of fixtures required for stadiums is even greater than for gymnasiums, due to the very large seating capacity. Stadiums often seat two to three times the student population. The situation may be compounded by the distance of the stadium from the main building or the undesirability of opening the school itself. These factors frequently preclude the use of the main building toilets for athletics or other stadium events. Separate facilities for home and visitors bleachers may reduce confrontations. Two means of exit, at opposite ends of the toilet room, will allow escape from a threatening situation, improve traffic flow and enhance supervision. Stadium toilets are required by the NC Plumbing Code to be located no more than 400 feet from the closest bleacher exit from each set of bleachers that the facility serves.

High-Temperature Hot Water Needs

The greatest need for hot water and the highest temperature requirement is in the kitchen. For this reason, it is recommended that separate generating equipment be installed to provide 140°F+ water for the kitchen alone. If possible, this heater should be solar thermal or, fossil fuel fired rather than electric, to reduce operating cost.

Plumbing *continued*

Moderate-Temperature Hot Water Needs

All hot water used for hand washing, showers, etc. should be set at a maximum of 110°F to prevent scalding.

The showers serving the gymnasium locker rooms also have a relatively high demand factor. Because of the distance from other areas requiring hot water, this is usually separately generated.

Health codes require that group toilet rooms adjacent to the cafeteria have hot water for hand washing prior to eating. These codes also require hot water within a very specific temperature range be provided to Pre-K rooms.

The art room, photographic dark room and some special vocational spaces may have limited need for moderate temperature hot water.

The health room and classrooms for very young or exceptional children subject to “accidents” may benefit from hot water for enhanced sanitation during clean-up.

Toilet Facilities for Faculty/Staff

The number of toilet facilities for faculty/staff is governed by plumbing code, using a multiplier of 1.75 times the number of classrooms to account for support staff, visitors and aides. Because the number of faculty/staff is low in relation to building area, the 200 foot distance code requirement is frequently the governing factor. For this reason, in all but the largest schools, unisex, restrooms may be appropriate if the total occupant load within 200ft is 15 or less.

Showers

Where the use of showers is encouraged or required, one shower for each four persons in the largest P.E. class may be a reasonable guideline. As a minimum, at least three showers for each gender should be provided. Personal hygiene is encouraged in Health and PE.

When designing showers, consider modesty for both boys and girls. A shower stall of at least 3 feet by 6 feet will allow a shower area and a small separate area for dressing (with a bench and clothes/towel hooks), all within a privacy curtain. Such an arrangement may encourage the use of showers after physical activity.

Miscellaneous Considerations

The traps of floor drains in toilet rooms, mechanical rooms/mezzanines and elsewhere should be primed. Automatic primers should be avoided. Make provisions for priming of drains with hose bibs or clear water fixture drains.

Countertop lavatories are subject to damage from students sitting on them and become unsightly from splashed water, spilled soap and low maintenance. Individual wall hung lavatories are recommended.

Many school systems place lavatories so that they are open to view from the hall for supervision, especially in elementary and middle schools.

In order to allow repairs without turning off water to the entire building, isolation cut-off valves should be provided to isolate each wing of the building and each group toilet room, locker area and kitchen. Where these valves are above ceilings, they must be accessible and should be located no more than 12 inches above the ceiling.

Plumbing *continued*

Methicillin-Resistant Staphylococcus Aureus (MRSA) is a staph infection causing skin infections in high-contact sports and among athletes in locations such as locker rooms, weight rooms and other athletic facilities. K-12 physical education facilities should provide for frequent washing and for sanitizing of personal, portable and fixed equipment

Exact locations of underground water and sewer lines should be indicated on the property accounting and Construction Record Drawings to simplify future maintenance or expansion.

24" or wider chases with an access door between back-to-back toilet rooms will allow maintenance of piping without costly demolition and rebuilding of walls.

Where water is provided in outbuildings, such as concession stands, stadium toilets, field houses, etc., slope all water piping to allow full drainage for a main cut-off and waste valve/drainage point to simplify winterization.

Additional Information and Resources:

Engineering Checklist for School Facilities, School Planning, Division of School Support Department of Public Instruction.

Food Establishment Guide for Design, Installation and Construction Recommendations by the N.C. Food, Lodging and Institutional Sanitation Branch, Department of Environment Health and Natural Resources.

Heating Fuel Selection

Fuel selection should be based on a combination of factors, including cost/efficiency, availability, safety, systems maintenance, ease of handling, etc.

System Type Selection

HVAC (heating, ventilating, and air conditioning) systems rank second only to roofs as the major source of problems and complaints in school buildings. They are also the major energy consumers. For these reasons and to also provide comfort conditions, sufficient thought and planning must go into selecting, designing and installing the optimum HVAC system for each building. Reasonable first cost, operating cost, ease of operation and maintenance, quietness of operation, and long life must be considered in the selection.

Good control of humidity is very important in media centers for prevention of mildew on books. Two-position, rather than modulating valves, usually result in better control of humidity conditions for chilled water systems.

There are many HVAC systems and combinations of systems available. For this reason, a competent design team should be selected to help in the system selection and design.

First cost, energy cost, maintenance cost and, replacement cost must be considered when comparing system types and determining the best system selection.

Refer to *Energy Guidelines for NC Public Schools* for guidelines in the selection process of the "best" HVAC system for each particular project. "Best" is considered the system type that provides the lowest life cycle cost over a minimum 25 year period.

Design Conditions and Recommendations:

System Types:

Recommended System

The following components of a main system are recommended because they provide long-term reliability, excellent room temperature control, low operating cost, moderate first cost, low room noise level and ease of maintenance.

A. Central Air-Cooled Chiller(s)

B. Natural Gas Fired Central Condensing Boiler(s)

C. 4-Pipe Chilled Water/Hot Water Variable Volume Piping System

D. Air Handling Units (AHUs) in localized Mechanical Rooms or Mezzanine Areas Providing a Separate Zone for Each Individual Classroom

Heating, Ventilating and Air Conditioning *continued*

The following are possible alternatives to the above-recommended system:

ALTERNATIVE COMPONENT/SYSTEM	ADVANTAGES	DISADVANTAGES
Same system except each AHU serves 2-5 classrooms	Slightly lower first cost	Having more than one classroom on a single thermostat is a compromise in comfort.
Fan Coil Units or unit ventilators mounted above ceiling in each classroom or corridor with ductwork and diffusers This system should only be considered for existing building renovations where space is limited.	Individual room control Moderately lower cost than AHUs Does not occupy floor space	Noisy. Difficult to service. (ladder) Routing of condensate drain line can be difficult. Moderate life of unit.
Unit ventilators, console or exposed below/at ceiling This system should only be considered for existing building renovations where space is limited.	Individual room control. Slightly lower cost than AHUs. (no ductwork required)	Noisy. Fresh air is difficult for interior spaces. Take up space under windows (console units). Care must be taken to avoid coil freeze-up in console units. Unsightly if piping is not concealed. Better filtration not possible
Water-cooled Chiller (in lieu of air-cooled)	Good performance and reliability Energy efficient	High first cost. Maintenance/treatment of cooling tower not practical for most school systems.
VAV system with separate zone for each classroom. Typically one large AHU per wing	Excellent individual room control.	Higher first cost. High maintenance cost.
Hydronic Heat Pumps	Relatively low first cost. Individual room control. Only one uninsulated pipe loop required. Energy savings during simultaneous heating/cooling.	Multiple compressors to maintain. Cooling tower maintenance. Noisy if mounted in or above classroom.
Geothermal (ground-coupled) Hydronic Heat Pumps	Individual room control. Good reliability. Very low operating cost. No above-ground outdoor equipment required. Renewable energy source (environmentally friendly).	Drilling of wells and ground loop piping is costly. Requires a lot of land for wells and even more for horizontal loops. Multiple compressors to maintain. Cooling tower service in hybrid systems. Noisy if mounted in or above classroom.

Notes:

a. As you approach smaller zone/individual room control, both initial and maintenance costs increase.

b. As you approach large zone/whole building with one control, reliability increases and initial and maintenance costs decrease; however, potential problems from temperature variation in rooms increases.

Heating, Ventilating and Air Conditioning *continued*

Spaces Where Separate Systems Should be Considered

The Media Center and Administration Area are operated during summer months when traditional-calendar schools are closed. For this reason, separate system(s) to cool these spaces should be considered. A split system DX or split system heat pump is recommended. Heating may be tied into the central system or be a part of the separate system.

The Main Head-End Room for computer equipment often generates so much heat that it must be cooled both summer and winter. This space should also have a separate system. A split-system DX system is recommended. A ductless split system for a small computer room may also be appropriate.

Types of Equipment that Are Not Recommended

Rooftop Units: Very difficult to maintain. Frequent cause of roof leaks. Add significantly to cost of re-roofing. Potentially shorter service life due to poor maintenance/harsh environment. Poorly maintained gas lines on roof can present fire hazards. Heavier-than-air propane on roof can seep into the building if a leak occurs. Noisy if placed over classrooms. Fresh air picked up at roof level can be very hot in summer and may also introduce odors into the building.

2-pipe chilled water/ hot water piping systems: These systems do not provide the ability to heat and cool simultaneously which is particularly important in the spring and fall. This results in poor temperature and humidity control and uncomfortable conditions.

Bypass air and/or variable temperature/ variable volume systems: Any system that reduces airflow for certain spaces to zero to allow the system to heat and cool other space does not meet the NCSBC. The Mechanical Code requires a continuous flow of fresh air to all occupied spaces.

Wall-hung self-contained heat pumps: Actual cost of installation may be deceptive due to high cost for electrical improvements. Often very noisy. Loss of windows/daylight. Poor aesthetics. Poor air distribution within classroom. Poor service life. Poor outside air control.

Window type air conditioners are very noisy and not appropriate for use in schools.

Recommended Locations for Equipment

Whenever possible, equipment should be floor-mounted in a separate mechanical room accessible from the exterior. This makes maintenance simple, without disruption of school activities.

When equipment is placed on a loft or mezzanine, permanent stairs to the mezzanine, with space for hoisting equipment, should be provided. Mechanical mezzanines should be isolated for sound and equipped with curbs and floor drains located to accommodate condensate piping.

Miscellaneous Recommendations

- Consider dedicated outside air systems.
- Provide humidity control for occupied and un-occupied periods.
- Consider energy recovery from building relief/ exhaust air to precondition fresh air.
- Use monitoring of space CO2 to reduce fresh air volume whenever there is a fall in CO2 levels

Heating, Ventilating and Air Conditioning *continued*

- High-efficiency air filters should be specified to enhance indoor air quality. Filters should have a minimum efficiency rating of MERV8.
- Classrooms should be designed for a maximum noise criteria of NC-30, with individual items of equipment being selected at or below NC-25.
- It is important that air and water flows be balanced properly. The use of a certified air balance subcontractor is recommended.
- Adequate space for mechanical equipment must be provided. Consider space requirements early in the design process.
- Air handling units shall not be placed in boiler rooms. Locate boiler rooms at or above grade with outdoor access only.
- Specify increased insulation thickness for all HVAC ductwork, piping and equipment. No ductwork should be located outside of the insulated envelope of the building. Avoid interior duct liner.
- Specify sealing of ductwork seams, joints, and connections with permanently pliable water-based mastics or sealants with a low volatile organic compound (VOC) content.
- Minimize long duct runs and unnecessary turns and curves to keep static pressure losses to a minimum and, in turn, reduce the fan's energy consumption. Duct fitting should be per SMACNA guidelines.
- Include in specifications the requirement of a building commissioning program to ensure good IAQ and energy-efficiency, good temperature and humidity control.
- Use building pressurization to limit the infiltration of moist, hot outside air into the building interior. This will reduce the exposure of interior materials and finishes to moisture, thus inhibiting the growth of molds and fungi on their surfaces.
- Avoid over sizing heating and cooling equipment. In significantly daylit spaces, downsize cooling equipment to reflect daylighting benefits associated with the lights being off during peak load conditions (when the sun is the brightest the daylighting is at its peak usage and heat-producing lights will be turned off).
- Use adjustable-throw diffusers where high ceilings, 10’-0” and above, are used.

Additional Information and Resources

Engineering Checklist for Public School Facilities, School Planning, Division of School Support, DPI

Electrical System Voltages

480Y/277 volt systems (with transformers for 208Y/120 volt uses) should be provided when connected loads exceed 500 KVA. A cost analysis may warrant maintaining the existing voltage system with addition/renovation projects. Try to avoid the use of older systems with 240/120 volt high legs. Do not over-design electrical services beyond what is needed, especially in new work where service size is usually more than ample for future loads.

Service Entrance

The impact of the short circuit interrupting capacity of the electrical utility at the secondary terminals of its transformer MUST be used when designing service entrance equipment and panels. Consider placing this capacity on a plaque on the main panelboard for future reference. Using several service entrances connected to the same transformer (i.e., a separate service for chillers or additional buildings resulting in a smaller main service) may save on installation costs without compromising safety or maintenance.

Wiring Systems

Generally, it is recommended that copper conductors be used for all wiring. At times when the cost of copper is prohibitive, feeders greater than 100 amperes may be copper-clad aluminum with mechanical connectors in situations where the Designer and school Planning find it to be beneficial and a proper maintenance protocol is established by the owner.

Electrical Panels

Verification should be made that the panels, conductors, and the over-current protection for each is coordinated. All panels and circuit breakers shall indicate interrupting capacity, voltage, and phase. Each panel schedule should indicate connected load for each phase and a load summary.

Grounding

The proper grounding electrode system should be included with the correct sizes for the grounding “electrode conductors.” Connections to ground rods and a second grounding point are required, such as the building steel or metallic water piping in contact with the earth for at least a ten-foot length, and other metal systems such as natural gas that are required to be bonded at the service equipment. This applies to service entrance panels and step-down transformers. Refer to the National Electrical Code (NEC), Section 250. Bonding and grounding diagrams should be included. Where a ground rod is used as the primary grounding electrode for the service, it is recommended that multiple rods be used to ensure below 25 ohms path to ground.

Illumination

See recommended illumination levels in the appendix. Compact fluorescent fixtures should be installed where incandescent fixtures have been used traditionally for wall washing, display cases and down lighting in traffic patterns. Fluorescent lighting fixtures of the T-8 variety and electronic ballasts are generally used in classrooms. T-5 HO fluorescent lighting fixtures are sometimes used in new construction, renovation and replacement projects, especially for indirect lighting (due to glare). Optimum efficiency for T-8 lamps is at 77°F ambient temperature and for T-5 lamps is at 97°F. Metal halide and T5 fluorescents are acceptable lighting sources for gyms and high bay shops. Metal halide, High pressure sodium and LED can be a good choice for parking lots (based on owner preference and budget). Parking lots are suitable locations for solar powered lighting. Sports field lighting is usually metal halide. Where color rendition and brightness control may be critical, such as drama class settings in auditoriums, incandescent spot lighting fixtures (track lights) may be used.

Electrical and Lighting *continued*

Incandescent fixtures should be avoided due to high operation cost and short lamp life. Light-emitting diodes (LED) exit lighting fixtures are recommended because of their very long life and very low operational cost. Incandescent exit fixtures should be avoided. Locations of exit and emergency lighting fixture are critical. See the North Carolina State Building Code. Solar tube systems can provide daylighting to fixtures in interior spaces that can be indistinguishable from conventional fixtures.

Energy Controls

The use of remote switches for lighting in corridors, rest rooms, gymnasiums and common areas is recommended. These switches should be located in areas accessible only to designated staff. Key-operated switches are a second choice. Many of the lighting systems in a building can be placed on the building energy management systems. Other refinements such as motion detectors and lighting level controls can be used to turn off lights or lower lighting levels. See HVAC section for other energy controls.

Emergency and Standby Power Systems

An emergency power source is required for critical systems such as exit signs, fire alarm systems, means of egress illumination, emergency voice/alarm communications systems, and elevator car lighting. Standby power is to be provided for smoke management systems, fire pumps, egress elevators, and emergency power loads. These systems are to be designed in accordance with applicable building codes, NEC, and in close consultation with local building officials and fire marshal. Coordinate needs with Emergency Management when facilities have potential use as shelters.

Fire Alarm System

See the North Carolina State Building Code for required locations of fire alarm pull stations and horns. Verify that enough horn/strobe lights are provided for sufficient coverage. Strobe lights are required in rest rooms and because of ADA requirements also in areas such as classrooms and conference rooms. Connect duct detectors for air handling units to the fire alarm system and design to shut down or provide a supervisory signal as required by the local building official and fire marshal. Provide connections for the kitchen fire extinguishing system to the fire alarm system and the shunt trip mechanisms to disconnect the cooking equipment and the kitchen hood fans (NFPA). Fire exits must be emergency illuminated with 2 outdoor lamps.

Communications Systems

Thoughtful planning is required to accommodate sufficient numbers and proper locations of computers, telephones, TV, intercom/paging/radio and other integrated communication equipment. If connections to the State Information Highway are desired or required, fiber optic cables are required. Isolation transformers, surge suppression and lightning protection devices should be used to protect all electronic equipment and the panels to which they are connected. Sufficient wire ways should be installed and located for ample expansion. Cable tray over lay-in ceilings in corridors is the most common method for routing communications and computer cables.

Technology Infrastructure

Advances in technology occur rapidly and the price of today's technology drops rapidly as time passes. School construction usually takes one to two years, depending upon the type and size of the school. Because of these factors it may be prudent not to include bids for technology at the same time as the bids for the construction of the rest of the school project. It may make sense for the electrical contractor to provide only the *pathways* (cable trays, conduit and

boxes) for technology in his contract and to bid the actual cabling and infrastructure equipment near the end of the construction period.

Electrical and Lighting *continued*

Miscellaneous

Verify, *with the actual equipment installed*, properly sized circuit breakers, feeders and connections to elevators; mechanical and plumbing equipment such as boilers, chillers, pumps, air handling units, heat tape, fan coil units and water heaters; kitchen equipment such as steamers, ovens, fryers, mixers, dishwashers, booster heater for the dishwashers, exhaust and make-up fans in the hood, fly fans, serving lines, freezer and refrigerator compressors and evaporators; and shop equipment and computers, intercom/paging/radio, telephone system, energy management system, intrusion equipment and TV.

Disconnect switches are required for all motors, water heaters and large laundry equipment. The fifty feet and "in sight of" rules applies for all.

Additional Reference

Engineering Checklist for Public School Facilities, School Planning, Division of School Support, DPI

Appendix

General Statute 115C-521, Erection of School Buildings

(a) It shall be the duty of local boards of education to provide classroom facilities adequate to meet the requirements of G.S. 115C-47(10) and 115C-301. Local boards of education shall submit their long-range plans for meeting school facility needs to the State Board of Education by January 1, 1988, and every five years thereafter. In developing these plans, local boards of education shall consider the costs and feasibility of renovating old school buildings instead of replacing them.

(b) It shall be the duty of the boards of education of the several local school administrative school units of the State to make provisions for the public school term by providing adequate school buildings equipped with suitable school furniture and apparatus. The needs and the cost of those buildings, equipment, and apparatus, shall be presented each year when the school budget is submitted to the respective tax-levying authorities. The boards of commissioners shall be given a reasonable time to provide the funds which they, upon investigation, shall find to be necessary for providing their respective units with buildings suitably equipped, and it shall be the duty of the several boards of county commissioners to provide funds for the same.

Upon determination by a local board of education that the existing permanent school building does not have sufficient classrooms to house the pupil enrollment anticipated for the school, the local board of education may acquire and use as temporary classrooms for the operation of the school, relocatable or mobile classroom units, whether built on the lot or not, which units and method of use shall meet the approval of the School Planning Division of the State Board of Education, and which units shall comply with all applicable requirements of the North Carolina State Building Code and of the local building and electrical codes applicable to the area in which the school is located. These units shall also be anchored in a manner required to assure their structural safety in severe weather. The acquisition and installation of these units shall be subject in all respects to the provisions of Chapter 143 of the General Statutes. The provisions of Chapter 87, Article 1, of the General Statutes, shall not apply to persons, firms or corporations engaged in the sale or furnishing to local boards of education and the delivery and installation upon school sites of classroom trailers as a single building unit or of relocatable or mobile classrooms delivered in less than four units or sections.

(c) The building of all new school buildings and the repairing of all old school buildings shall be under the control and direction of, and by contract with, the board of education for which the building and repairing is done. If a board of education is considering building a new school building to replace an existing school building, the board shall not invest any construction money in the new building unless it submits to the State Superintendent and the State Superintendent submits to the North Carolina Historical Commission an analysis that compares the costs and feasibility of building the new building and of renovating the existing building and that clearly indicates the desirability of building the new building.

No board of education shall invest any money in any new building until it has (i) developed plans based upon a consideration of the State Board's facilities guidelines, (ii) submitted these plans to the State Board for its review and comments, and (iii) reviewed the plans based upon a consideration of the comments it receives from the State Board.

No local board of education shall contract for more money than is made available for the erection of a new building. However, this subsection shall not be construed so as to prevent boards of education from investing any money in buildings that are being constructed pursuant to a continuing contract of construction as provided for in G.S. 115C-441(c). All contracts for buildings shall be in writing and all buildings shall be inspected, received, and approved by the local superintendent and the architect before full payment is made therefor. Nothing in this subsection shall prohibit boards of education from repairing and altering buildings with the help of janitors and other regular employees of the board.

In the design and construction of new school buildings and in the renovation of existing school buildings that are required to be designed by an architect or engineer under G.S. 133-1.1, the local board of education shall participate in the planning and review process of the Energy Guidelines for School Design and Construction that

are developed and maintained by the Department of Public Instruction and shall adopt local energy-use goals for building design and operation that take into account local conditions in an effort to reduce the impact of operation costs on local and State budgets. In the design and construction of new school facilities and in the repair and renovation of existing school facilities, the local board of education shall consider the placement and design of windows to use the climate of North Carolina for both light and ventilation in case of power shortages. A local board shall also consider the installation of solar energy systems in the school facilities whenever practicable.

In the case of any school buildings erected, repaired, or equipped with any money loaned or granted by the State to any local school administrative unit, no board of education shall invest any money until it has (i) developed plans based upon a consideration of the State Board's facilities guidelines, (ii) submitted these plans to the State Board for its review and comments, and (iii) reviewed the plans based upon a consideration of the comments it receives from the State Board.

(c1) No local board of education shall apply for a certificate of occupancy for any new middle or high school building until the plans for the science laboratory areas of the building have been reviewed and approved to meet accepted safety standards for school science laboratories and related preparation rooms and stockrooms. The review and approval of the plans may be done by the State Board of Education or by any other entity that is licensed or authorized by the State Board to do so.

(d) Local boards of education shall make no contract for the erection of any school building unless the site upon which it is located is owned in fee simple by the board: Provided, that the board of education of a local school administrative unit, with the approval of the board of county commissioners, may appropriate funds to aid in the establishment of a school facility and the operation thereof in an adjoining local school administrative unit when a written agreement between the boards of education of the administrative units involved has been reached and the same recorded in the minutes of the boards, whereby children from the administrative unit making the appropriations shall be entitled to attend the school so established.

In all cases where title to property has been vested in the trustees of a special charter district which has been abolished and has not been reorganized, title to the property shall be vested in the local board of education of the county embracing the former special charter district.

(e) The State Board of Education shall establish within the Department of Public Instruction a central clearinghouse for access by local boards of education that may want to use a prototype design in the construction of school facilities. The State Board shall compile necessary publications and a computer database to distribute information on prototype designs to local school administrative units. All architects and engineers registered in North Carolina may submit plans for inclusion in the computer database and these plans may be accessed by any person. The original architect of record or engineer of record shall retain ownership and liability for a prototype design. The State Board may adopt rules it considers necessary to implement this subsection. (1955, c. 1372, art. 15, ss. 5-7; 1969, c. 1022, s. 1; 1981, c. 423, s. 1; c. 638, s. 1; 1983, c. 761, s. 93; 1985, c. 783, s. 3; 1987, c. 622, s. 14; 1993, c. 416, s. 1; c. 465, s. 1; 1993 (Reg. Sess., 1994), c. 775, s. 6; 1995, c. 8, s. 1; 1996, 2nd Ex. Sess., c. 18, ss. 18.17(c), (d); 1997-222, s. 3; 1997-236, s. 1.)

115C-521.1. Building standards for preschool students.

A public school that voluntarily applies for a child care facility license may use an existing or newly constructed classroom in a public school for three- and four-year-old preschool students without modifications to the classroom or building if the classroom:

(1) Has at least one toilet and one sink for hand washing;
(2) Meets kindergarten standards for overhead light fixtures;
(3) Meets kindergarten standards for floors, walls, and ceilings; and
(4) Has floors, walls, and ceilings that are free from mold, mildew, and lead hazards.

A public school that voluntarily applies for a child care facility license shall meet all other requirements for child care facility licensure.

The 1993 session of the General Assembly of North Carolina passed House Bill 1001, “AN ACT TO ENCOURAGE LOCAL BOARDS OF EDUCATION TO RENOVATE OLD SCHOOL BUILDINGS INSTEAD OF REPLACING THEM.” This Act modifies General Statute 115C-521. It requires that “If a board of education is considering building a new school building to replace an older school building, the board shall not invest any construction money in any new building unless they submit to the State Superintendent and the North Carolina Historical Commission an analysis that compares the cost and feasibility of building the new building and of renovating the existing building and that clearly indicates the desirability of building the new building.”

FEASIBILITY AND COST ANALYSIS forms shall be submitted to School Planning, NCDPI for review along with the first submittal of plans for review, whenever a new project would replace an older school building. The address for submittal of plans and the analysis is as follows:

NCDPI School Planning
NC Education Building, 7th Floor
6319 Mail Service Center
Raleigh, NC 27699-6319
(919) 807-3554

The feasibility and cost analysis forms are provided as a guideline. Other formats may be used, but comparisons must be based on useful life and cost per student. The North Carolina Historical Commission has also requested that a small scale site plan identifying the building and photographs be included with the submission

FORMS AND ASSISTANCE ARE AVAILABLE FROM

NCDPI School Planning or Under "Publications & Guides" at the website: http://www.schoolclearinghouse.org

State Regular Classroom Teacher Allotment Ratio (Executive Order 24, July 24, 2002)

REGULAR CLASSROOM TEACHER ALLOTMENT RATIOS 2014

Grade Span	Teacher Allotment Ratio (Note 1)	Class Size (LEA Average) (Note 2)	Individual Class Size Maximum (Note 3)	Recommended Class Size (previous levels)
K	1:18	18	21	--
1 -- 3	1:17	17	20	--
4 -- 6	1:24	Any (See note 4)		26
7 -- 8	1:23			26
9	1:26.5			26
10 -- 12	1:29			29

Teacher Allotment Ratio includes the individual classroom teacher plus other support faculty/staff who serve more than just a single classroom.

Note 1: from State Initial Allotment Formulas, FY 2014-15, on DPI website http://www.ncpublicschools.org/fbs/allotments/state/

Note 2: Average class size in K-3 shall not exceed the funded allotment ratio: NC GS 115C-301.c

Note 3: An individual class size in K-3 shall not exceed the allotment ratio by more than three students: NC GS 115C-301.c.

Note 4: S.L. 2013-363, Section 3.3.(a) removed previous class size limitations in grades 4-12, and provided that "local school administrative units shall have the maximum flexibility to use alloted teacher positions to maximize student achievement."

Maximum Legal Class Sizes

A class may exceed the allotment ratio by up to three students, provided the LEA average does not exceed the allotment (G.S. 115C - 301(c)).

Pre-kindergarten Recommendations

Age	Staff/Child Ratio	Maximum Group Size
3 years*	1:10	20
4 years**	1:9	18

* NC General Statutes 110-91(7). Age 3 and younger is "child care," under GS Chpt 110.

**http://ncchildcare.nc.gov/pdf_forms/NCPre-K_Program_Requirements_Guidance_2012-2013.pdf, page 5-4. Age 4is "Pre-Kindergarten" (formerly More-at-Four).

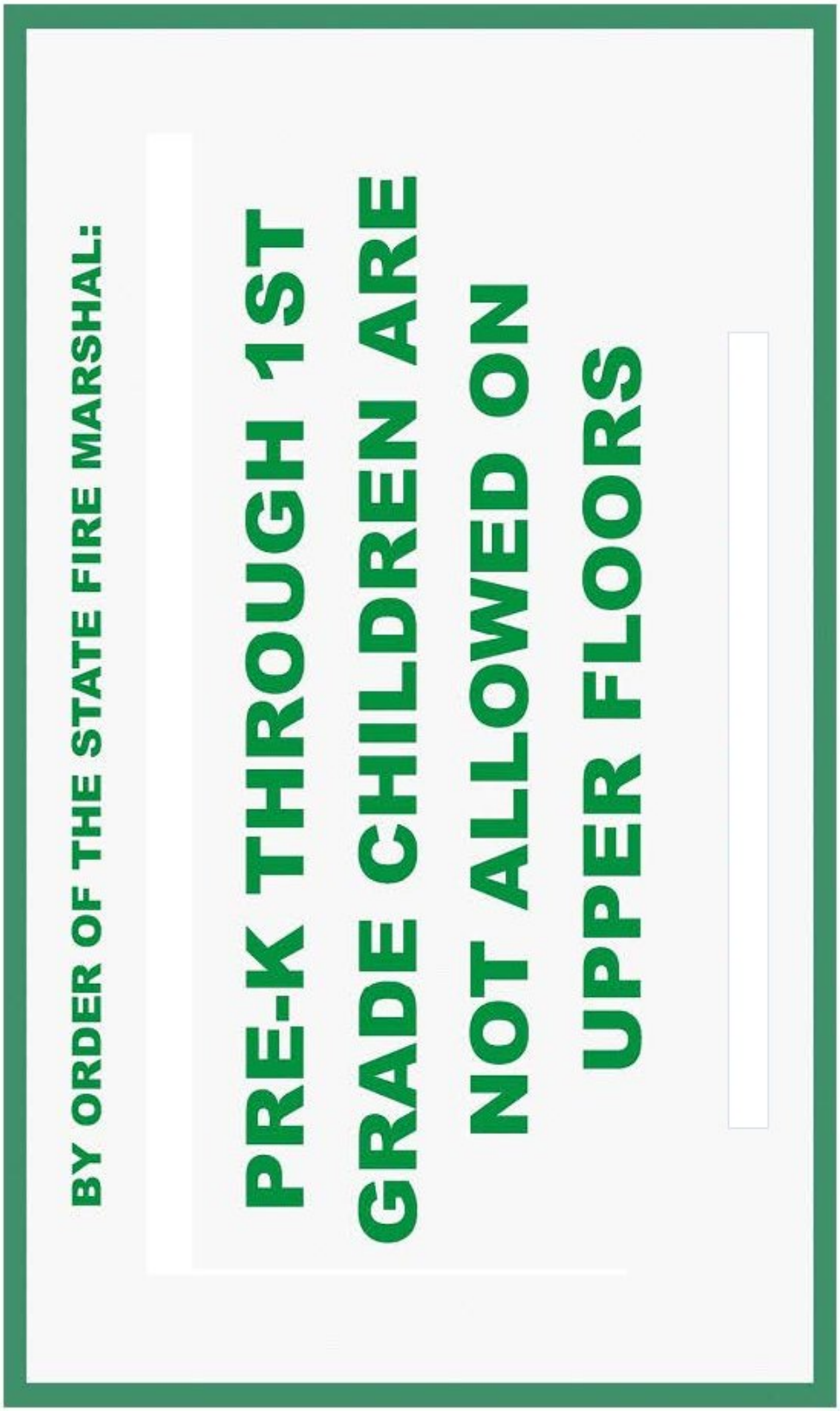
Toilets: NC Building Code, Table 2902.1 requires 1 water closet per 15 children. Therefore, a Pre-K classroom for more than 15 children would require access to 2 water closets.

The maximum daily load for teachers teaching only in grades 7-12 is 150 students. Current State Board policy establishes the maximum class size at 50 students in selected areas such as music, physical education and similar classes, with the exception of activities such as band and choral music. Keyboarding classes are subject to normal class size limits.

The maximum legal class size is a guide for determining the number of toilet fixtures required (see NC State Plumbing Code).

Teacher allotment ratios are a good guide, in the absence of more accurate information, for determining the population of individual classrooms, designing furniture layouts, etc. Note that by the use of local funds, or through the flexibility in the ABCs of Public Education, many local administrative units may reduce class sizes significantly below these allotment ratios or increase certain class sizes up to the maximum legal class size.

Session Law 2009-451, the State Budget Act, modified class size requirements for fiscal years 2009-2010 and 2010-2011: *"Notwithstanding G.S. 115C-301 or any other law, local school administrative units shall have the maximum flexibility to use allotted teacher positions to maximize student achievement in grades 4-12. Allocation of teachers and class size requirements in grades K-3 shall remain unchanged."*



Post this sign at all stairwells at level of exit to grade. Size approx. 12" x 18" green letters on white background.

Comments and Recommendations

Handicap Accessibility Standards

All schools, whether new, existing or renovation to existing, should meet the requirements for accessibility by the handicap. Accessibility requirements are now part of the International Building Code from which the NC Building Code is modeled. Resources for specific requirements can also be found at the United States Access Board website http://www.access-board.gov/ada/.

Each teaching station should have an area that meets the Accessibility requirements of the North Carolina Building Code. In regular classrooms, this can be accomplished by rearranging the student work surfaces. Laboratories and other specialized areas may need one station modified for accessibility. Programs for exceptional children may entail design features that exceed the building code requirements. See the DPI publication *Exceptional Children Facilities Planner*.

Space Profiles

Upon request, School Planning can provide a computerized space profile for a given enrollment (Pre-K-5, 6-8 & 9-12). These profiles calculate and list the number, types and areas of all the classrooms and other spaces found in a typical school for a given student population.

Construction

School Planning strongly discourages any structural use of wood or other combustible material (NCSBC Type III or Type V) in new school construction or school additions without sprinklers fully protecting the wood members and the building itself, except for Type IV (heavy timber) construction. Wood structural systems can be carefully designed and constructed to meet structural and fire code requirements, especially with sprinklers. However, the relative accessibility of wood construction in subsequent repairs, renovations, modifications and additions by minimally skilled workers without proper oversight provides opportunities to compromise the integrity of original structural and fire safety systems.

Ceilings

2x2 Lay-in ceilings are most often used and are acceptable. Gypsum board is recommended in small spaces, low-ceiling areas, toilets and dressing rooms, and unsupervised areas. Multipurpose rooms and gymnasiums should have impact-resistant ceiling or a cementitious fiber roof deck for proper acoustics.

Walls

Masonry walls are preferred. Gypsum board stud walls require more maintenance. Chair rails and double layering or abuse resistant sheetrock are recommended for increased durability. Corner guards should be specified as well. Stud walls in administration and guidance areas may be preferred for flexibility.

Floors

Primary classrooms should have a good grade of mildew resistant carpet, since many activities take place on the floor. For flexibility, large area rugs that can be removed for periodic cleaning are useful. Resilient tile is recommended for other classrooms and for wet areas in carpeted rooms. Multipurpose rooms and gymnasiums should have resilient floors such as wood, synthetic or high density carpet. Carpeting is often desirable in corridors for acoustical control. There should be a separate area of carpet at outside doors so that it can be replaced easily. Terrazzo is often used in corridors when durability is desired.

School Planning will evaluate plans for general compliance with the “Guidelines.” Note that the “Guidelines” may not be applicable to facilities with non-traditional educational programs. Such facilities will be evaluated on the basis of their individual educational program. When deviations are identified during the review process, School Planning will prepare a “Deviation from the North Carolina Public School Facility Guidelines” form for inclusion in the permanent file for the individual school property, with a copy forwarded to the designer, and the local administrative unit. The completed form will describe the nature for the deviation. Deviations identified are available for reporting to the State Board of Education each quarter. Additional comments by School Planning may be submitted to the State Board along with the deviation form, if the issues are not clearly addressed.

The deviation form is on the following page.

Deviation From the North Carolina Public Schools Facility Guidelines

Date:
Local Board of Education:
Designer:
School Facility & Project:

The items noted below are significantly less than the guidelines adopted in the "North Carolina Public Schools Facility Guidelines." The failure to construct facilities equal to or better than these guidelines may result in the inability to provide an effective educational program, reduced function of the facility, impaired performance of building systems or other significant problems.

A copy of this notice is being placed in the permanent file for this school facility.

	Guidelines	Amount Shown	Comments/Explanation
Site	No pedestrian / vehicular conflicts	Drive/parking encircling school buildings	Drive and parking is across path of travel to play fields for afternoon practice which is a major safety hazard
K Regular Classrooms	1200 sq. ft.		
1-3 Regular Classrooms	1000 sq. ft.		
4-8 Regular Classrooms	850 sq. ft.		
9-12 Regular Classrooms	750 sq. ft.		
Science Classrooms/Labs			
Exceptional Children			
Music			
Visual Arts			
Theater			
Dance			
Workforce Development			
Media Center			
Physical Education			
Staff Offices			
Circulation			
Other (Itemize)			

pc: _____Board of Education
_____Superintendent
_____Designer
_____Project File

INTERIOR LOCATIONS	Work Surface Illumination in Maintained Foot-Candles**			TYPE OF LIGHTING FIXTURES (1)
	Task Area / Recommended fc	General Area Recommended fc	Weighted Average fc	
Auditoriums				
Seating Area	0%/na	100%/20	20	Fluorescent (Dimming or Multiple Switching)
Stage Set-Up	0%/na	100%/20	20	Fluorescent
Concerts on Stage	65%/50	35%/30	43	Fluorescent
Drama with Accents	Variable	Variable		Incandescent (Tracks with Dimming Equipment)
Lobby	10%/25	90%/15	16	
Cafeterias				
Kitchen/Serving Area	50%/75	50%/40	58	Fluorescent
Dining Room	50%/50	50%/30	40	Fluorescent
Cashiers	50%/75	50%/40	58	Fluorescent (Task Lighting)
Dish Washing	50%/75	50%/40	58	Fluorescent (Listed for Wet Locations)
Classrooms				
General	65%/50	35%/30	43	Fluorescent
Art	65%/50	35%/30	43	Fluorescent
Computer	65%/50	35%/30	43	Fluorescent
Drafting	65%/50	35%/30	43	Fluorescent
Home Economics	65%/50	35%/30	43	Fluorescent
Computer Areas in Classrooms	65%/50	35%/30	43	Fluorescent indirect or parabolic lens
General Laboratories	30%/75	70%/50	57.5	Fluorescent
Speech/Lip-reading	65%/50	35%/30	43	Fluorescent
Music	65%/50	35%/30	43	Fluorescent
Sewing	50%/100	50%/30	65	Fluorescent (Task Lighting)
Shops	25%/75	75%30	41	Fluorescent (Higher Levels Can be Used for Detail Works)
Typing	65%/50	35%/30	43	Fluorescent indirect or parabolic lens
Corridors and Stairwells				
(Use Remote or Keyed Switching)				
Corridors	0%/ na	100%/15	15	Fluorescent
Stairways	0%/na	100%/20	20	Fluorescent
Trophy Cases	100%/15	0%/ na	15	Compact Fluorescent
Gymnasiums - Use Multiple Switching to Obtain Various Levels				
Competition between Schools	0%/na	100%/75	75	Metal Halide, Fluorescent
Physical Education	0%/na	100%/50	50	Metal Halide, Fluorescent
Lockers and Showers	100%/40	0%/na	40	Fluorescent Listed for Wet locations)
Elementary (Multipurpose)	0%/0	100%/30	30	Metal Halide or Fluorescent
Mechanical, Electrical & Boiler Rooms	0%/na	100%/30	30	Fluorescent (Industrial Fixtures) or Incandescent if on while “Temporarily” Occupied

Recommended Lighting Systems, with Illumination Levels

INTERIOR LOCATIONS	Work Surface Maintained Illumination in Foot-Candles**			TYPE OF LIGHTING FIXTURES (1)
	Task Area / Recommended fc	General Area / Recommended fc	Weighted Average fc	
Media Centers				
Reading Room, Check In/Out	90%/50	10%/30	48	Fluorescent
Book Stacks, Magazine Racks	80%/50	20%/20	44	Fluorescent
Office Areas	80%/50	20%/30	46	Fluorescent
Storage	100%/20	0%/na	20	Fluorescent
AV Repair	20%/50	80%/20	26	Fluorescent (Task Lighting)
Offices				
General Office Work	80%/50	20%/30	46	Fluorescent
Close Work	50%/100	50%/30	65	Fluorescent (Task Lighting)
Teacher Workroom	80%/50	20%/30	46	Fluorescent
Conference Room	50%/50	50%/30	40	Fluorescent
Storage Rooms, Pipe Chases,				
Attics, Crawl Spaces	100%/20	0%/na	20	Fluorescent (or Incandescent if on "Temporarily" While Occupied)
Swimming Pools	0%/na	100%/50	50	Metal Halide or Fluorescent (Listed for Wet Location)
Washrooms/Group Toilets	10%/50	90%/20	23	Fluorescent (Use Remote or Keyed Switching)
Washrooms/Faculty Toilets	10%/50	90%/20	23	Fluorescent

(1) LED Fixtures can be considered for many applications but may add additional cost. Consider having an alternate for LED to allow financial flexibility.

Exterior Locations (All Fixtures shall be listed for Wet Locations and Outdoor Use)

EXTERIOR LOCATIONS	Work Surface Maintained Illumination in Foot-Candles*		TYPE OF LIGHTING FIXTURES
	Minimum	Maximum	
Building Exterior			
(For Security Purposes)	1	1 1/2	High Pressure Sodium, Metal Halide, LED
Parking Lots and Walkways	1	1 1/2	High Pressure Sodium, Metal Halide, LED (Consider solar LED. Compact Fluorescent can be used for walkways)
Sports Complexes* **			
Soccer/Football Stadium Badminton/Volley Ball/	30	50	Metal Halide
Tennis Courts	20	30	Metal Halide
Baseball/Softball Outfield Infield	 20 30	 30 50	 Metal Halide Metal Halide
Separate Running Tracks (Not a Part of a Football or Baseball Stadium)	20	20	Metal Halide

* Based on IESNA Recommendations

***Refer to NCHSAA for state play-off lighting standards.

**Based on NEIS LPD (Lighting Power Density) Models

Types of Projects Reviewed	Types of Projects Not Reviewed
All New Construction, Renovations, Additions	
New athletic fields, grandstands, press box, field houses, concession stands, dugouts, etc.	
New and Relocated Modular classroom units, ramps, steps, walkways, etc. including foundations	
Repair or replacement of structural systems	
New "dropped ceiling" in existing schools	
Replacing Windows or Doors	
Hazardous material abatement in existing buildings where building systems are affected	
Upgrade or replacement of fire alarm system	
Demolition of existing *school* building	*Demolition of buildings other than school buildings*
Reroofing, over-roofing	*Roof patching or maintenance.*
Relocating partitions; adding or deleting doors	*Any repair or maintenance, such as replacing flooring, patching walls, repainting, etc.*
New Parking or Drives	*Repairing asphalt, potholes, etc. or resurfacing existing*
Improvements required by ADA	*Additions of simple ramps, etc. or signage*
Change-out of plumbing fixtures or change in type of fixtures	*Plumbing replacements in-kind; replace faucets or other minor components*
New domestic water heating system, or upgrade	*Water heater replacement with same type and size.*
New HVAC systems; new boilers; new chillers; changes in type of system; demo and replacement of air distribution system, etc.	*HVAC equipment replacement in-kind; small air handling or condensing units (5 ton or less); air diffusers and grills; fan, heaters, etc.*
Upgrade or redesign HVAC control system	*Replacement of HVAC control components*
New energy conservation system	*Repair of existing insulation*
Complete replacement of exist HVAC or plumbing piping systems; extension of existing system	*Repair of existing piping*
Major components of Power Distribution System	*Adding electrical outlets to existing systems*
New lighting systems (interior or exterior)	*Replacing or adding lighting fixtures to existing systems*
New Installations or Major changes to Technology systems, security systems, CCTV, etc. including complete replacement of systems or in cases where life systems are affected.	*Minor Renovations to technology systems (tel/data, intercom, security, CATV etc.)*
New system affecting health, or welfare of students or personnel such as fire suppression, emergency power generation, etc.	*Replacement of isolated safety components with new elements meeting code and similar to those currently in service.*

This document is available in MS Word format on the School Planning website at www.SchoolClearinghouse.org

DPI PROJECT TRANSMITTAL SHEET

Date:_____

To: School Planning
Department of Public Instruction
301 North Wilmington Street
Raleigh, NC 27601-2825

School Planning
Department of Public Instruction
6319 Mail Service Center
Raleigh, NC 27699-6319

From (Designer):_____

_____

For: Administrative Unit (LEA): _____

Name of School:_____

(Previous School Names, if any):_____

Street Address of School / Project:_____

Project Info Project Phase [S] [DD] [CD]:_____ Grades Housed:_____ No. of Students:_____

Project Description:_____

New Area (sf):_____ Renovated Area (sf):_____Site Area (Ac.):_____

Code Jurisdiction: _____

Project Delivery Method (DBB) (CM@R):_____ (Other):_____

Estimated Bid Date:_____ Estimated Start Construction Date:_____

Budget?:_____ Public-Private Contract? (Yes / No):_____

Buildings Demolished in lieu of renovation? (Yes/No):_____

Will a school be replaced with this project? (Yes/No): _____ If so, what will happen to the existing school? _____

_____

Prototype? (Yes/No):_____ If prototype, School name and LEA where first used: _____

_____NCDPI DSP No.:_____

If prototype, original design orientation:_____ Climate Zone:_____

What changes, if any, were made to the original design?_____

_____

Sustainable / High Performance / Green Building Features:_____

_____

Unique Education Features:_____

_____

DESIGN FIRM INFORMATION

Please provide the following information.

FIRM NAME:	
ADDRESS:	
CITY:	
STATE:	
ZIP:	
CONTACT:	
EMAIL:	
TELEPHONE:	
FAX:	
WEBSITE:	

ADA:	Americans with Disabilities Act
ADM:	Average Daily Membership
AFF:	Above Finished Floor
DENR:	North Carolina Department of Environment and Natural Resources
DPI, NCDPI:	North Carolina Department of Public Instruction
DSP NO.	A unique, permanent number assigned by School Planning for each real estate property owned by an LEA. The number is formatted as 000-9999 where the first three numbers indicate the LEA number and the last four digits the property number. This number is different from the DPI assigned "School Number" and never changes.
G.S.	General Statute
HVAC:	Heating, ventilating and air conditioning
LEA:	Local Education Agency. This is the school system administrative unit (county or city).
NCSBC:	North Carolina State Building Code
OSFM:	Office of the State Fire Marshal, North Carolina Department of Insurance
P.E.:	Physical Education
RLV:	Reading, Listening, Viewing Room. The main room in a media center.
SBE:	State Board of Education
Sq.ft., SF	Square foot. A common unit of area measurement consisting of 144 square inches or a square measuring 12” in each direction.
SIMS:	Student Information Management System, (superseded by NC WISE)
NC WISE:	North Carolina Window on Student Education, (replaced SIMS)
NCHSAA:	North Carolina High School Athletic Association

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