

OUTDOOR BLEACHERS

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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 five rows of seats. Any configuration of five 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, 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 bleacher, 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.

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.

Additionally, designers are reminded of General Statute 133-2 which states: "It shall be unlawful for any architect, engineer, designer or draftsman, employed on county, state, or city works, to employ or allow any manufacturer, his representatives or agents, to write, plan, draw, or make specifications for such works or any part thereof."

In compliance with federal law, including the provisions of Title IX of the Education Amendments of 1972, N C Public Schools administers all state-operated educational programs, employment activities and admissions without discrimination because of race, religion, national or ethnic origin, color, age, military service, disability, or gender, except where exemption is appropriate and allowed by law.

NCDPI, SCHOOL PLANNING SECTION RECOMMENDATIONS

1. Bleachers containing more than 5 rows shall be anchored to a continuous, leveled 4” minimum thickness concrete slab under the full footprint of the bleachers. The concrete shall be minimum $f_c' = 3000$ psi compressive strength and reinforced with minimum 6x6w 2.9 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 five rows or less shall sit on leveled “mud sills” at the support frame; a continuous concrete slab within the footprint of the bleachers is 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 in the design process, coordinate with the local building inspector in securing approval of the bleacher construction.
6. Repair damaged hot-dipped galvanized coating with galvanized repair paint in accordance with ASTM A780 and manufacturer’s written instructions.
7. Any field modifications to the bleachers shall be carried out under the supervision of the engineer of record.
8. Chain link fencing is a good choice for use as guards at the ends and backs of bleachers.
9. Minimum drawings for bleacher/grandstand projects for DPI, School Planning review:
 - site plan showing relationship to playfields, drives, walks, parking areas, other buildings and site improvements and handicapped accessibility,
 - plan 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 enlarged 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
10. Except for concrete footings, piers, slabs, etc. needed, an all-metal construction is recommended; no wood.
11. Where bleachers are raised on a platform requiring a ramp for handicapped accessibility, the ramps must occur at both ends. (One end having steps only is prohibited.) It is recommended that steps and ramps be provided at both ends.

CODES AND DESIGN STANDARDS

The following outline of various codes' and standards' requirements for bleachers/grandstands is not intended to be a complete and comprehensive list of what may be applicable to any bleachers/grandstands facility project. Instead, it is an attempt to highlight some of the major issues that will arise. Hopefully, this information will be helpful in the design process. Keep in mind, however, that codes and design standards may change over time. A detailed search of the applicable codes and standards having jurisdiction must be done by the designers involved.

2009 N.C. State Building Code (NCSBC)

1. Occupancy classification for bleachers is "A-5" assembly.
2. Bleachers shall comply with ICC 300 "Standard for Bleachers, Folding and Telescopic Seating, and Grandstands" International Code Council / American National Standard. (Section 1025.1.1 N.C. State Building Code).
3. Toilets: Shall be within 400 feet of the closest bleacher exit from each set of bleachers that the toilet facility serves. (Section 403.9.4 NCSBC)

ICC 300-2007 (Note: Outdoor bleachers are considered "Smoke-protected assembly seating")

1. Siting; Section 301: Outdoor bleachers shall be located at least 10 feet from adjacent lot lines and from other buildings on the same lot unless the exterior walls and openings are protected in accordance with the building code.
2. Structural design; Section 303:
 - uniform live load: 100 lbs/sf
 - other components: per table 303.2
 - deflection: 1/200 of the span, maximum
3. Accessibility: Bleacher seating shall be handicapped accessible as required by the NC State Building Code (Section 1108.2.2; Table 1108.2.2.1 as follows:)

ACCESSIBLE WHEELCHAIR SPACES

CAPACITY OF SEATING IN ASSEMBLY AREAS	MINIMUM REQUIRED NUMBER OF WHEELCHAIR SPACES
4 TO 25	1
26 TO 50	2
51 TO 100	4
101 TO 300	5
301 TO 500	6
501 TO 5,000	6, plus 1 for each 150, or fraction thereof, between 501 through 5,000
5,001 and over	36 plus 1 for each 200, or fraction thereof, over 5,000

4. Open spaces at footboards and seatboards located 30 in. or more above the ground shall be closed with construction such that a 4" diam. Sphere cannot pass through.

5. Egress; Sections 405, 406 and 407:
- occupant load: one person per 18 in. of bench length
 - number of exits: per section 404 and the following:

OCCUPANT LOAD	REQUIRED MEANS OF EGRESS
0-250	1
251-750	2
751-2,500	3
Over 2,500	4

- travel distance from each seat to the perimeter of the bleachers shall not exceed 400 ft. (not travel over seats if aisles provided)
- required aisle width: occupant load served by the various egress elements multiplied by factors in table 404.5 (3).
 - Minimum aisle width:
 - 48 inches for aisle stairs having seating on each side
 - Exception: 36 inches where aisle does not serve more than 50 seats.
 - 36 inches for aisle stairs having seating on only one side.
 - 23 inches between an aisle stair handrail or guard and seating where the aisle is subdivided by handrail.
 - Converging aisles: If aisles converge, the single aisle shall not have less egress capacity than the combined capacity of the converged aisles.
 - Uniform width: Aisles allowing egress in both directions shall be uniform in required width.
 - Dead ends: The length of a dead end aisle shall not exceed 21 rows. (Exception: 21 rows may be exceeded if seats beyond the 21st row are no more than 40 seats from another aisle if the aisle accessway along these rows has a clear width of 12 inches plus 0.3 inch for each additional seat beyond seven in a row.
 - Dead end cross aisles shall not exceed 20 feet.
 - An aisle is not required in bleachers where all of the following conditions exist:
 - Seats are without backrests.
 - The rise from row to row does not exceed 6 inches per row.
 - The row spacing does not exceed 28 inches unless the seat boards and footboards are at the same elevation.
 - The number of rows does not exceed 16 rows in height.
 - The first seating board is not more than 12 inches above the ground or floor below or a cross aisle.
 - Seat boards have a continuous flat surface.
 - Seat boards provide a walking surface with a minimum width of 11 inches.
 - Egress from seating is not restricted by rails, guards or other obstructions.
 - Refer to Section 405 for additional aisle requirements
 - Aisle stairs:
 - Tread depth: 11 inches minimum
 - Riser height: 4 inches minimum / 8 inches maximum
 - Risers shall be of solid construction and uniform in size and shape (See Sections 406.5 and 406.6 for exceptions, respectively)
 - Aisle Accessways:
 - Aisle accessways more than 30 inches above the ground: openings shall not allow passage of a 4 inch diameter sphere.
 - 9 inch minimum seat depth
 - Aisle accessways minimum width:
 - 14 or fewer rows: 12 inch clear horizontal distance from back of row ahead to nearest projection of row behind.

- Rows of seating with aisles at both ends:
 - Maximum 100 seats per row
 - Aisle accessway minimum width shall be increased by 0.3 inch for every additional seat over 21 (14 if seats have backrests), but not to exceed 22 inches total.
 - Rows of seating with aisle at only one end:
 - Minimum aisle accessway width of 12 inches shall be increased by 0.6 inch for each additional seat beyond 10 seats, (7 seats with back seats), but not to exceed 22 inches total. (See Table 407.5 for increase in number of seats permitted to have 12 inch minimum aisle accessway.)
 - The Path of egress travel shall not exceed 50 feet from any seat to a point where a person has a choice of two paths to two exits. (See Section 407.4 for additional information and exceptions)
6. Guards; Section 408
- Guards are required along open-sided walking surfaces, cross aisles, stepped aisles, ramps and landings of bleacher seating areas more than 30 inches above the grade below.
 - Guard height: 42 inches minimum measured vertically above leading edge of tread, adjacent walking surface or adjacent bench seat.
 - Bleachers located adjacent to a wall when space between the wall & bleachers is less than 4 inches does not require a guard.
 - Cross aisles and adjacent floor or grade below with 30 inches or less difference in elevation: guards 26 inches above aisle floor are required.
 - Aisle with lowest point more than 30 inches above grade: A guard the full width of the aisle and 36 inches high minimum shall be required. Provide a minimum of 42 inches measured diagonally between the top of the rail and the nosing of the nearest aisle step. (See Section 408.1.4 for additional information)
 - Opening limitations: Open guards shall be constructed such that a 4 inch diameter sphere will not pass through any opening up to a height of 34 inches. From a height of 34 inches to 42 inches above the adjacent walking surfaces, a sphere 8 inches in diameter shall not pass.
 - Exception: The triangular opening formed by the riser, tread and bottom rail at the open side of an aisle stair shall be of a maximum size such that a 6 inch diameter sphere cannot pass through the opening. (See Section 408.2 for additional information)
 - Guard design: See Section 303 for structural design requirements.
7. Handrails; Section 409
- Required handrails:
 - Seats on one side of an aisle stair: one handrail on the side with no seats.
 - Seats on both sides of an aisle stair: One mid-isle handrail that is discontinuous, to allow crossing the aisles. The gaps in the handrail shall be at intervals not exceeding five rows and shall be at least 22 inches and not greater than 36 inches in horizontal, clear width. An additional rail parallel to and 12 inches below the top of the handrail shall be provided.
 - Handrail height: Measured above the aisle stair tread nosings: not less than 34 inches and not more than 38 inches and uniform in height.
 - Additional handrail requirements: See Sections 409.3 through 409.7.
 - Handrail design: See Section 303 for structural design requirements.

ICC / ANSI A117.1,2003

1. Wheelchair spaces and their locations shall comply with section 802.
2. A single wheelchair space shall be 36 inches minimum in width.
3. Where two adjacent wheelchair spaces are provided, each space shall be 33 inches wide (minimum).
4. Wheelchair space depth (minimum):
 - Space can be entered from front or rear: 48 inches
 - Space can be entered only from the side: 60 inches
5. The accessible route shall not overlap the wheelchair space
6. The wheelchair space shall not overlap the required aisle width
7. Wheelchair space locations shall be an integral part of any seating area.
8. A companion seat, complying with section 802.7 shall be provided beside each wheelchair space.

ADDITIONAL RESOURCES

“Guidelines for Retrofitting Bleachers,” U. S. Consumer Products Safety Commission.

(available on School Planning’s website: www.schoolclearinghouse.org)