
**DESIGN AND CONSTRUCTION OF REVIEWING STANDS,
GRANDSTANDS, AND BLEACHERS: 2007 CBC**

IR 16-10

References:

2007 California Building Code, Sections 1025.1.1, and 3401.1
ICC/ANSI 300-02

Issued 08-06-09

Discipline: Structural

This Interpretation of Regulations (IR) is intended for use by the Division of the State Architect (DSA) staff, and as a resource for design professionals, to promote more uniform statewide criteria for plan review and construction inspection of projects within the jurisdiction of DSA which includes State of California public elementary and secondary schools (grade K-12, Community Colleges and state-owned or state-leased essential services buildings. This IR indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered by DSA.

This IR is reviewed on a regular basis and is subject to revision at any time. Please check the DSA web site for currently effective IRs. Only IRs listed in the document at <http://www.dsa.dgs.ca.gov/Pubs/default.htm> (click on "DSA Interpretation of Regulations Manual") at the time of plan submittal to DSA are considered applicable.

Purpose: This IR clarifies the structural design requirements for bleachers with an overall height of 20 feet or less from the top of foundation at the front to the uppermost seatboard. Bleachers exceeding the height 20' shall be designed, constructed and inspected in compliance with the requirements of the current California Building Code (CBC).

Do not use this IR for any other structures. This IR is applicable only to projects submitted to DSA for review under the 2007 CBC. For projects submitted under the 2001 CBC, see IR 16-5.

1. Definitions: In addition to those in ICC/ANSI 300, Section 202, the following terms are defined for this IR. Please note that ICC 300 defines bleachers, and grandstands identically. The terms "bleacher" and "grandstand" will be used interchangeably in this IR. All provisions pertaining to bleacher will also be applicable to grandstand and vice versa.

- 1.1 School Buildings:** DSA reviews and approves the construction of school buildings. Section 4-314, Part 1, Title 24, California Code of Regulation defines reviewing stands, grandstands and bleachers more than five rows of seats above grade as school buildings.
- 1.2 Portable Bleachers:** Seating facilities located outside of a building and not attached to permanent foundations. The maximum height of any portable bleachers may not exceed eleven rows, or nine feet above grade to the top seating board.
- 1.3 Temporary Portable Bleachers:** Portable bleachers that remain at a location for less than 90 days. They are exempted from DSA review, but must be in compliance with the requirements of ICC/ANSI 300.
- 1.4 Folding and Telescoping Seating Facilities:** Structures used for tiered seating whose overall size and shape may be reduced without being dismantled for purposes of moving or storing. All provisions in this IR pertaining to bleachers and grandstands will also be applicable to this type of seating facilities.
- 1.5 Approved Bleacher Fabrication Shops:** Fabrication shops shall be accredited or certified by International Accreditation Service (IAS) or other independent accreditation agencies to fabricate bleachers. The accreditation shall be based on the review of the fabricator's written procedural, quality control manuals and unannounced annual visit and audit of fabrication practices by an auditor approved by the accreditation agency.

A bleacher fabrication shop accredited for steel fabrication and welding in a manner similarly to the above paragraph is also considered an approved bleacher fabrication shop, provided the fabrication shop has a minimum of five years of documented continuous experience in the fabrication of bleachers. Proof of experience may include past certification, and a history of projects completed. Upon request by DSA, the fabrication shop shall provide proof with a cover letter on the fabrication shop's stationary, signed and stamped by the manufacturer's (California registered) civil or structural engineer per Section 4.3 below.

2. Footings: Footings for portable bleachers are required to comply with CBC, Section 1805A. Temporary portable bleachers as defined in Section 1.2 above maybe supported by wood sills or steel plates directly bearing on the ground surface, provided the soil pressure does not exceed 1200 pounds per square foot (psf).

3. Relocation: DSA approval is only for the specific location originally shown. Any subsequent move to another location voids the approval and will require submittal of an application for approval at the new site.

4. Structural Design: The structural design shall be in accordance with ICC/ANSI 300, Section 303. Also see Table 1607A.1, CBC.

4.1 Sway Loads: The design of bleachers shall consider sway loads as live loads in accordance with Footnote (d), Table 4-1, ASCE 7-05. See Appendix A for applicable load combinations for bleacher design.

4.2 Seatboards and Footboards as Structural Elements: On the basis of previously approved designs, and engineering data that were submitted, DSA has determined that seatboards and footboards are acceptable alternate structural elements, per Title 24, Part 1, Sections 4-304 and 4-305, for the following applications:

- Bracing the compression flanges of stringers,
- Torsional restraint of the stringers or girders, and
- Diaphragm action for distribution of forces.

Note: The provisions of this section will be valid only for projects design under the 2007 CBC. See Section 8.2 below.

4.3 Professional Stamps and Signatures: A California licensed architect or registered structural engineer shall prepare and submit construction documents, which include plans and specifications, along with any supporting documents such as calculations to DSA for review and approval. All construction documents shall bear the stamp and signature of the architect or structural engineer per [IR A-19, Design Professional's Signature and Seal \(Stamp\) on Construction Documents](#).

The architect or structural engineer who is in general responsible charge of a project as defined by Title 24, Part 1, may exercise the option to use plans and specifications prepared by the manufacturer's (California registered) civil or structural engineer. The requirements for using this option are provided in [IR A-18, Use of Construction Documents Prepared by Other Professionals](#).

4.4 Approval by Comparison With Previously Approved Similar Designs: Subject to the limitations and exceptions shown this section, approval of the design drawings and specifications for site-specific outdoor and indoor telescopic bleachers, which have already been approved at a DSA Regional Office or through the Pre-Check (PC) process, will be approved on the basis of a comparison review. Site-specific outdoor and indoor telescopic bleachers that are smaller than a previously approved bleacher will be approved with a limited review if it meets the conditions in the sub-sections below.

***Exception:** site adopted ancillary attachments such as ramps and walkways may require a full review.*

4.4.1 Structural Element Limitation: Structural elements and connections, such as welds, bolts, etc., must be the same or stronger than those used in the previously DSA approved drawings and specifications. The length of structural elements must be the same or shorter than previously approved.

4.4.2 Span Limitation: The spans of the structural system must be the same or less than shown on the previously DSA approved drawings and specifications.

4.4.3 Additional Limitations:

- There are no conceptual changes to the configuration of the structural system.
- There have been no subsequent structural code changes that would adversely affect the bleacher design.
- The design loads are no greater than those indicated in the previously DSA approved design.
- Material Specifications (sizes and grades) shall remain unchanged.

4.4.4 Soil Condition Limitation: The soil conditions must provide equal or greater capacity to support the structure than indicated in the previously DSA approved design. If the soil conditions provide less capacity, DSA will review the affected portions of the design. Once DSA determines that the site specific foundation system complies with the code requirements, the design will be approved.

5. Testing and Inspection Requirements:

5.1 Approved Fabrication Shops: In accordance with CBC Section 1704A.2.2, special inspections are not required where the bleachers are fabricated on the premises of an approved bleacher fabricator as defined in Section 1.5 above. Proof of accreditation for the fabrication shop shall be included with the construction documents that are submitted to DSA for review.

5.1.1 Documentation: At the completion of the fabrication, manufacturer shall submit a Certificate of Compliance, form [DSA-130](#), per CBC Section 1704A.2.2 to the owner, project inspector, the engineer or architect in general responsible charge, and DSA. The certificate of compliance shall meet the following requirements. See sample certificate of compliance in Appendix A.

- It must be signed and stamped by the manufacturer's (California registered) civil or structural engineer in accordance with Section 4.3 above.
- The engineer shall state in the Certificate of Compliance that he/she has personal knowledge of the fabrication, as defined in Title 24, Part 1, Section 4-336, and certify, under the penalty of perjury, that the materials used and works performed are in accordance with DSA approved construction documents.

5.2 Unapproved Fabrication Shops: Where bleachers or grandstands are fabricated on the premises of an unapproved fabricator's shop, special inspection shall be required per CBC, Section 1704A.2. The special inspector shall inspect the fabrication, verify the fabricator's quality control procedure, and the fabricator's ability to conform to approved construction documents and referenced standards per CBC Section 1704A.2.1.

The special inspector shall be employed by the school district (owner) and approved by DSA in accordance with Title 24, Part 1, Section 4-333(c).

5.2.1 Material Certification: The special inspector is responsible for ensuring all bleacher material are identifiable or traceable to the certificates of compliance, such as mill certificates for steel and fasteners, lumber inspection certificates, etc. The DSA approved special inspector shall attach copies of these certificates, or completed forms [DSA-131](#), to his or her daily inspection reports ([DSA-250](#)).

5.2.2 Material Testing: If any material testing is required, such as for unidentifiable steel, testing must be performed by a test laboratory employed by the school district and acceptable to DSA. A list of acceptable [test laboratories](#) can be found on DSA website.

Test reports shall be submitted by the laboratory within 14 days of the testing, and a final verified report ([DSA-292](#)) shall be submitted at the conclusion of the fabrication.

5.2.3 Special Inspection for Welding: If welding is required in the fabrication shop, an AWS-certified welding inspector (CWI) approved by DSA shall inspect welding in accordance with the CBC and [IR 17-3, Structural Welding Inspection](#). The welding inspector shall provide daily inspection reports (DSA 250). At the completion of the work, he/she shall submit a verified report (DSA 292).

6.0 Inspection in the Field: When the bleacher or grandstand is delivered to the job site, the project inspector (PI) shall be responsible for, but not limited to, the following:

- Ensure all the required documents per Sections 5.1 or 5.2 are submitted by the manufacturer.
- Review the manufacturer's submitted documents for compliance with DSA approved construction documents.
- Inspect the bleacher or grandstand for defects and compliance with DSA approved construction documents.
- Inspect the field installation, including site work.

6.1 Special Inspection of Field Welding: If welding is required in the field, an AWS-certified welding inspector (CWI), approved by DSA, shall inspect welding in accordance with the CBC and IR 17-3. The field welding inspector shall provide daily inspection reports (DSA-250). At the completion of the work, the field welding inspector shall submit a verified report (DSA-292).

7. Yearly Inspection: After the installation, the owner shall conduct annual inspections as required by ICC/ANSI 300, Section 105.2. The owner will also maintain copies of all annual inspection reports and make them available on site for DSA review upon request.

8. Load Tests: For the 2007 CBC, load tests when approved by DSA may be used to check bleacher design or as a basis for approval in lieu of engineering analysis.

The load test procedure must be approved by DSA prior to testing. Test loads will be applied in not less than four, approximately equal increments, without shock to the structure and in a manner to avoid arching of the loading materials or stiffening of the structure. The strength of the material in the test bleacher should not exceed the minimum specified strength by more than 5 percent.

8.1 Test Load Factors: When load tests are made to check design or as a basis for approval of bleachers, the test load should not be less than twice the design vertical load combined with twice the design lateral load.

8.2 Testing Beyond 2007 CBC: When the 2010 CBC becomes effective, load tests for verification of primary structure of fixed bleachers shall not be permitted. They shall be designed in accordance with the requirements of CBC and ICC 300, Section 303.1. Seatboards and footboards may not be considered as providing torsional restraint for stringers or girders, nor distributing lateral forces by diaphragm action.

8.2.1 Folding Bleachers: Load tests for the verification of primary structure of folding bleachers may be permitted on a case by case basis. Testing protocols and procedures must be submitted for review and approval prior to testing.

8.2.2 Accessories: Load tests for minor accessories such as hand rails may be verified by tests on a case by case basis. Testing protocols and procedures must be submitted for review and approval prior to testing.

Exception: Testing shall not be permitted for structural verification of press boxes.

9. Existing Bleachers, Seating and Grandstands: Structures that were installed prior to the adoption of ICC/ANSI 300 shall comply with Chapter 5 of ICC/ANSI 300.

Attachments

Appendix A – Load Combinations for Bleacher Design

**Attachment 1 – Form DSA-130 – Certificate of Compliance – Bandstand/Grandstand
Approved Fabricator**

**Attachment 2 – Form DSA-131 – Bleacher/Grandstand Material Certification
Unapproved Fabricator**

Appendix A – Load Combinations for Bleacher Design

CBC Section 1605A.2.1 (Strength or LRFD)^{1,2}	Equations	1/3 Increase?
1.4 (D + F)	Equation 16A-1	No
1.2(D + F + T) + 1.6 (L + L _{sway} + H) + 0.5 (L _r or S or R)	Equation 16A-2	No
1.2D + 1.6(L _r or S or R) + (f ₁ (L + L _{sway}) or 0.8 W)	Equation 16A-3	No
1.2D + 1.6 W + f ₁ L + 0.5(L _r or S or R)	Equation 16 A-4	No
1.2D + 1.0E + f ₁ L + f ₂ S	Equation 16A-5	No
0.9D + 1.6W + 1.6 H	Equation 16A-6	No
0.9D + 1.0E + 1.6H	Equation 16A-7	No
CBC Section 1605A.3.1 ASD Basic^{1,2}	Equations	
D + F	Equation 16A-8	No
D + H + F + L + L _{sway} + T	Equation 16A-9	No
D + H + F + (L _r or S or R)	Equation 16A-10	No
D + H + F + 0.75 (L + L _{sway} + T) + 0.75 (L _r or S or R)	Equation 16A-11	No
D + H + F + (W or 0.7 E)	Equation 16A-12	No
D + H + F + 0.75 (W or 0.7 E) + 0.75L + 0.75 (L _r or S or R)	Equation 16A-13	No
0.6D + W + H	Equation 16A-14	No
0.6D + 0.7 E + H	Equation 16A-15	No
CBC Section 1605A.3.2 ASD Alternate Basic^{1,2,3}		
D + L + L _{sway} + (L _r or S or R)	Equation 16A-16	Yes except... ³
D + L + ωW	Equation 16A-17	Yes except... ³
D + L + ωW + S/ 2	Equation 16A-18	Yes except... ³
D + L + S + ωW/ 2	Equation 16A-19	Yes except... ³
D + L + S + E/ 1.4	Equation 16A-20	Yes except... ³
0.9D + E/ 1.4	Equation 16A-21	Yes except... ³

Notes:

1. Sway loads shall be considered as live loads per ASCE 7-05, Table 4-1, Footnote (d)
2. For seismic analysis, bleachers shall be considered as "all other self-supporting structures" per ASCE 7-05, Table 15.4-2 (the last non-building structural type in the table, R=1.25).
3. ICC 300, Section 303.4 allows stresses permitted in the design standards of the various materials to be increased by one-third due to sway or wind loads or by a combination of sway or wind loads and vertical loads. The 2007 CBC allows stress increase only in Section 1605A.3.2 (ASD alternate basic load combinations) and only where permitted by the material chapter or the referenced standard. The steel chapter and the referenced standard AISC 360 does not permit stress increase for steel design. Therefore, ICC 300, Section 303.4 is not adopted for materials such as steel that does not permit stress increase.



Certificate of Compliance – Approved Bleacher / Grandstand Fabricator

Certification form to be completed by the manufacturer of the Bleacher or Grandstand at the completion of fabrication.
 Completed form is to be submitted to the owner, project inspector, the engineer or architect in general responsible charge, and DSA

DSA File # _____
Application # _____

Bleacher/Grandstand ID: _____

I certify (or declare) under the penalty of perjury that the following statements are true: All boxes must be checked for the submittal to be considered complete.)

- I have personal knowledge, as defined in Title 24, Part 1, Section 4-336, of the fabrication of the bleacher/grandstand identified above.
- The materials and works performed for the fabrication of the bleacher/grandstand identified above are in accordance with DSA approved construction documents.

Attachments:

- Proof of accreditation of the fabrication shop where the bleacher/grandstand identified above was fabricated
- Welding inspection reports for shop welds
- Certificates for seatboards and footboards, i.e. mill certification.

Signed: _____ **Date:** _____
 Engineer LEA Lab. Engineer

Print Name: _____ **CA Reg./ License No.:** _____

Engineer Stamp:

