
DESIGN AND CONSTRUCTION REQUIREMENTS FOR RELOCATABLE BUILDINGS

IR 16-1

References:

California Code of References (CCR) Title 24,
Part 1: California Administrative Code (CAC), Section 4-314

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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 (grades 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.dgs.ca.gov/dsa/Resources/IRManual.aspx> at the time of plan submittal to DSA are considered applicable.

Purpose: The purpose of this Interpretation of Regulations (IR) is to define special requirements for all relocatable buildings as well as exceptions to the foundation durability requirements for single classroom-size relocatable buildings intended for non-permanent use. When foundation durability requirements are waived, conditional approval will be issued by DSA. The conditional approval will state that the approval is based on modified durability requirements. The procedures for processing conditional approval are outlined below and are intended to follow the intent of Sections 17292 and 17405 of the Education Code.

1. Basic Requirements: All portions of relocatable school buildings are to conform to all requirements of the building standards adopted for public schools in Title 24 except as specifically described in this IR. The State Fire Marshal regulations and the regulations for accessibility are to be followed without modification. Each time relocatable buildings are moved, plans shall be submitted to the Division of the State Architect (DSA) for approval.

1.1 Site Plan Requirements: A site plan is required with all of the following:

- 1.1.1** Fully dimensioned location of the proposed relocatable building(s) in relation to other buildings on the site. Show all buildings and structures on the site and their DSA application numbers.
- 1.1.2** Elevation of finished and original grade at each corner of each building and the elevation of the finished floor. Show elevation of adjacent exterior finished grade at each corner of the building if different from foundation grade, and the elevation of the top and bottom of stairs and ramps.
- 1.1.3** Location of means of access and egress to and from each building including access compliance requirements and location of safe dispersal area(s).
- 1.1.4** Location of all utilities, including underground fire alarm cables, serving each building from the source to the point of connection. Include a signed statement, on the drawings, from the appropriate responsible engineer indicating his or her verification of the location of the utilities shown as existing and that their capacity is adequate for the additional load. If the source of utilities is in or on an existing building, show the DSA application number under which the building was approved.
- 1.1.5** Approval (sign off) of the Local Fire Authority for water requirements, fire department emergency vehicle access, and statement whether the project is

located in a Very High Hazard Fire Severity Zone as identified by CAL FIRE (California Department of Forestry and Fire Protection).

1.1.6 Where automatic fire sprinklers are required to be installed in the relocatable building, the site plan shall include:

- Water flow test data,
- Underground fire water source, routing, pipe type and size,
- Underground pipe thrust block or restraint types and locations,
- Post indicator valve and fire department connection locations, and
- Reference to details for seismic expansion loops for utility connections between buildings.

1.2 Protection Against Deterioration: To reduce problems of deterioration, dry rot, or rust, drainage shall be provided to prevent water from ponding beneath buildings. Under-floor ventilation, underfloor clearance, and the treatment of wood members in close proximity to exposed ground, shall be in accordance with 2007 and 2010 CBC, Sections 1203.3 and 2304.11 (Section 2306A in the 2001 CBC). A minimum clearance of two inches is required under floor members at all points.

1.2.1 The minimum thickness of steel deck diaphragms and steel structural members permitted is 20 gage. The minimum thickness of non-structural steel roof decking and wall siding is 26 gage, protected with a durability coating. Steel members shall be given a rust inhibitive coating.

1.3 Electrical, Mechanical and Plumbing: All utility installations shall conform to the requirements of Title 24, Parts 3, 4 and 5. Provisions shall be made for grounding the electrical system and equipment for each individual building and this shall be shown on the drawings.

1.3.1 A bonded common grounding electrode shall be provided for each metal building, exposed metal frame, ramp, stair and the electrical system per IR E-1.

1.3.2 A means of access shall be provided per Section 1209.1 to all under-floor utilities such as electrical, mechanical and plumbing.

1.4 Permanent Foundations: Permanent foundations are required for all buildings when:

- the height between the underside of the lowest floor framing members and the supporting grade exceeds 18 inches,
- the building floor area exceeds 2,160 square feet, or
- the building is more than one story in height.

Permanent foundation design shall conform to all requirements of Title 24, Part 2. See Sections 3 and 4 of this IR for alternative non-permanent foundation requirements.

Note: A minimum connection between isolated piers and the building floor structure is required in accordance with ASCE 7-05, Section 11.7.4.

2. Special Requirements for All Relocatable Buildings.

2.1 Building Module Identification. The manufacturer or builder shall place two permanent metal identification labels on each building module, one mechanically fastened and visible from the exterior and the other mechanically fastened to the

interior frame above the ceiling, at the end of the module. The labels shall show the DSA application number under which the building construction was authorized, the manufacturer or builder's name, the serial number, the design climate zones (per Title 24, Part 6, Section 143(a)8), the design live loads for the roof and floor framing, and the design wind speed and exposure category. The location of the identification labels shall be shown on the building plans.

For buildings that are manufactured in-plant, the in-plant inspector is to attach a verified report inside each building, which shall indicate the manufacturer's name and the serial number for each building module as well as the DSA file and application numbers.

2.1.1 Elevator Tower Identification: For elevator towers that are manufactured in-plant, the elevator tower manufacturer or builder shall place two permanent metal identification labels on each tower, one mechanically fastened and visible from the exterior and the other mechanically fastened to the interior wall adjacent to the door opening. The labels shall show the DSA application number under which the building construction was authorized, the manufacturer or builder's name, the serial number, the design climate zones (per Title 24, Part 6, Section 143(a)8), the design live loads for the roof, and the design wind speed and exposure category. The location of the identification labels shall be shown on the Pre-Checked building plans.

2.1.2 For elevator towers that are manufactured in-plant, the in-plant inspector shall attach a completed and signed verified report (Form DSA-6) inside each tower. The verified report shall indicate the manufacturer's name and the serial number for each tower as well as the DSA file and application numbers.

2.2 Floor Live Load and Roof Snow Load Posting: When buildings are designed and constructed for a floor live load exceeding 50psf, or for any roof snow load, the building manufacturer shall post signs in a conspicuous location on each building depicting the design floor or roof load in accordance with Section 106.1 of Title 24, Part 2. The Building Module Identification Tags required by Section 2.1 shall not be construed as meeting this requirement.

2.3 Building Placement: Individual buildings may be placed adjacent to each other provided that any building will be capable of being relocated without affecting adjacent buildings and building area does not exceed limits in CBC Table 503 with allowable increases. The clear separation between buildings shall not be less than four inches and the joint may be covered with flashings or other materials that do not prevent differential movement of the buildings. Details of covered joints shall be shown on the drawings. Details shall be provided for all utilities (e.g. fire sprinklers, etc) passing between seismically separated buildings; flexible joints, loops, etc that can accommodate the seismic relative displacement are required per ASCE 7-05, Section 13.3.2.

2.4 Fire Alarm and Fire Sprinkler Requirements: Fire alarm and fire sprinkler requirements for relocatable buildings depend on building use, project funding source, the date on which the school campus was initially submitted to DSA for approval, and other factors. Fire alarm and fire sprinklers are required in accordance with Education Code Sections 32001 and 17074.50 through 17074.56 and the California Building Code, Chapter 9; see PL 11-01 for further information." Also see Sections 5.5 and 5.6 below.

3. Alternative Foundation Requirements: The modified foundation requirements described in Section 4 of this IR may be applied only when all of the following

conditions are met. If any one of the following conditions is not met, permanent foundations must be provided in accordance with Section 1.4 of this IR:

- 3.1 Request for Waiver of Durability:** The applicant shall initiate a request for waiver of durability requirements for permanent foundations at the time the application for plan approval is filed. The applicant thereby acknowledges that a conditional approval is acceptable. The request for waiver may be made on the application form or by letter from the applicant or an agent of the applicant. A request for waiver from the building manufacturer or leasing company will not be accepted. This written request shall be submitted to DSA before the construction documents are approved by DSA. The DSA project approval letter will indicate that "the owner must periodically inspect for, and correct, deterioration in the building in order to maintain it in a safe condition," and the final DSA certification letter will note that a "waiver of durability" was requested.
- 3.2** Buildings must be individual, one-story relocatable buildings with 2,160 square feet or less of floor area.
- 3.3** The distance below the underside of the lowest floor framing member to the supporting grade shall not exceed 18 inches.
- 4. Non-permanent Foundations:** When all of the requirements of Section 3 of this IR are met, the following modifications will be permitted for non-permanent foundations:
 - 4.1** A wood sill plate of foundation grade redwood or preservative pressure-treated sawn lumber may bear directly on soil or paved surface. Grass or turf shall be cleared to bare soil under the entire area of the building. The wood sill plate may support wood cripple studs, posts, or continuous blocking and sheathing which need not be treated.
 - 4.2** Isolated piers may be constructed of stacked wood members nailed together with hot-dipped zinc coated galvanized or equivalent corrosion resistant nails. Nailing shall be sufficient to transfer the required lateral forces to grade level. The bottom layer of wood shall be foundation grade redwood or preservative pressure-treated sawn lumber. Note: A minimum connection between isolated piers and the building floor structure is required in accordance with ASCE 7-05, Section 11.7.4.
 - 4.3** Where the surface of the adjacent exterior grade is higher than the bottom of the floor joists on any side of the building, all wood in the substructure and floor framing (excluding the floor sheathing) shall be foundation grade redwood or preservative pressure-treated sawn lumber with flashing, mow strip or paving, and drain in accordance with Figure 1. Nails used in the foundation or floor framing, except for floor sheathing attachment nails, shall be hot-dipped zinc coated galvanized or equivalent corrosion resistant nails. See also Section 1.2 above.
 - 4.4** Foundation walls or pedestals may be constructed of reinforced concrete or reinforced, fully grouted, concrete block masonry. Provisions shall be made to transfer the required lateral forces.
 - 4.5** Metal frame jacks, specifically designed or justified by testing for the project, may be used as isolated piers. Metal jacks shall be attached to the structure by mechanical means. Overturning and bending forces due to vertical and lateral loads are to be resisted in accordance with the applicable provisions of Title 24, Part 2.
 - 4.6** The maximum bearing pressure for wood foundations bearing on soil or paving shall not exceed 1000 psf, unless substantiating soil data for a higher value is submitted to, and approved by, DSA. The maximum allowable soil bearing pressure for concrete foundations designed in accordance with 2010 CBC, Section 1808A (Section

1805A in the 2007 CBC) shall not exceed 1500 psf, unless substantiating soil data for a higher value is submitted to, and approved by, DSA.

- 4.7** The footings and foundation structure shall be capable of resisting all loads specified in Title 24, Part 2. Unless the individual modules of the building are positively fastened together at intervals not exceeding 10'-0" o.c. at the roof and floor level, each module and its diaphragm shall be designed as a separate unit.
- 4.8** The foundation shall be designed to prevent sliding on the supporting surface by attaching the wood foundation plates for the building, ramps and stairs to the ground with restraining devices. An acceptable design would incorporate one-inch diameter Standard Weight (1.315" actual O.D.) hot dipped galvanized pipes or one-inch diameter solid steel rods spaced at not more than 10'-0" o.c. One pipe/rod shall be located a maximum of two feet from each corner in both directions and a minimum of two pipes/rods per discontinuous foundation strip. Pipes should penetrate into soil and/or paving a minimum of 12" measured vertically. Alternate or equivalent designs, when provided with structural calculations and details, will be considered.

5. Relocation of Existing Relocatable School Buildings: When DSA certifies relocatable buildings as part of a project, the certification applies only to the building locations shown on the DSA approved site plans for that project. (Exception: in the case of "stockpile" projects certification applies only to the construction of the buildings themselves; a separate DSA application is required to relocate the buildings from the stockpile to an actual site before the buildings can be used.) To relocate buildings from one location to another (even on the same school site) DSA approval is required and all Code requirements shall be met with the following clarifications and modifications:

- 5.1** Application shall be made to DSA to relocate a building to a different location. The filing fee for the project shall be based on the estimated value of the work shown on the plans and specifications, including moving costs. The value of the existing buildings need not be included.
- 5.2** When relocating buildings constructed and certified to previous building codes, the design parameters for the new site (wind, seismic, snow, etc) shall be within the limits indicated on the original design and based upon the previous building code under which the building was constructed and certified. If the limits are exceeded, then the building shall be analyzed and rehabilitated as necessary in accordance with current Code for the increased loading per Title 24, Part 1, Section 4-309(c).

Exceptions:

1. Relocatable buildings constructed and certified based on the 2001 CBC and earlier Codes may be relocated without analyzing the building for the topographic wind load factor (K_{zt}).
 2. If the existing building has deteriorated, or is not in compliance with the building code in effect at the time of its construction, it must be rehabilitated in accordance with the current building code.
- 5.3** Any alterations to existing buildings (whether permanent or relocatable) shall comply with Title 24 requirements in effect at the time the project application is received by DSA. Existing elements of the construction directly affected by the alterations must also be brought into compliance. See Section 6 for requirements for CALGreen Code compliance.

Note: Accessibility requirements may be triggered. See CBC Section 1134B. Consult with the DSA Regional Office if any questions.

5.4 The following note shall be placed on the drawings:

“Deterioration or Existing Non-Compliant Construction: If any condition is discovered which, if left uncorrected, would make the building non-compliant with the requirements of the edition of the CBC in force at the time of original construction, the condition must be corrected in accordance with current code requirements. A change order, or a separate set of plans and specifications detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work.”

5.5 All fire sprinkler and fire alarm devices are required to be tied into the campus fire alarm system per California Fire Code, Section 903.4.

5.6 Fire sprinkler systems shall be added to buildings (if not already installed) as required. The structural framing shall be reviewed/reinforced as necessary to support the weight of the new sprinkler system; complete details for any necessary reinforcement of framing shall be provided.

5.7 Complete site plans shall be provided to facilitate review of electrical, mechanical, utility, fire and panic work as well as access compliance.

5.8 In addition to site plans, plans and details for the existing relocatable buildings are required as follows:

5.8.1 Plans shall indicate the application number of the original DSA certified project which included the construction of the buildings.

5.8.2 Plans shall indicate whether the buildings will be moved as complete buildings, or whether they will be separated into modules and then reconnected at the new location.

5.8.3 Drawings of existing building construction shall be included as necessary to detail module interconnection (if required), frame to foundation connections, floor plan layout, etc. It will expedite plan review to provide complete DSA approved “Stockpile” or “Construction of” plans of the existing building for reference only.

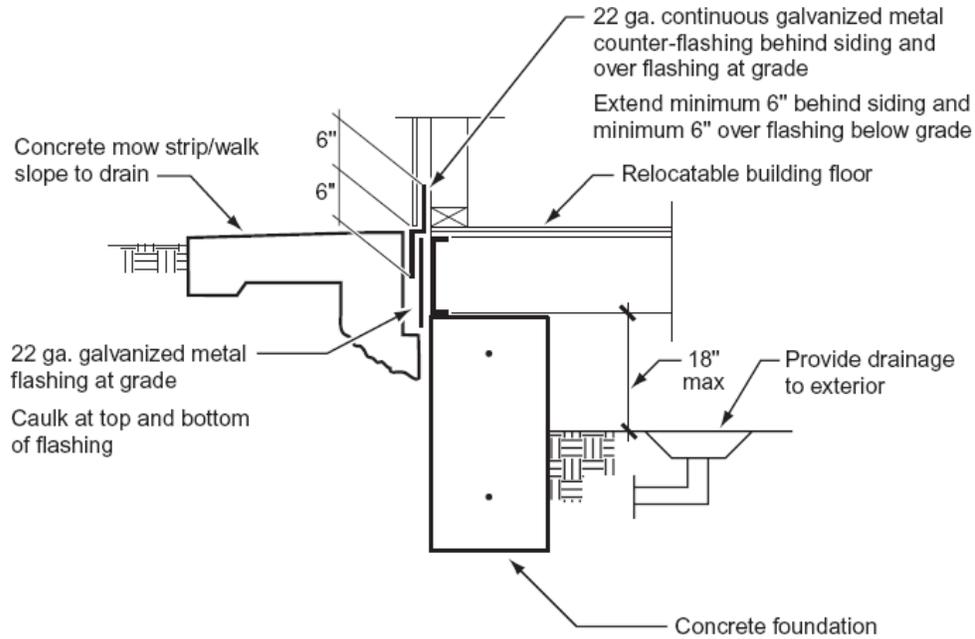
5.8.4 If high-strength (ASTM-325) bolts are required plans shall clearly indicate that new bolts are required; existing high-strength bolts shall not be re-used.

5.9 Projects that include relocation of existing buildings which are part of a previously uncertified project (defined as “Relocation of” on the DSA application form DSA-1) are only permitted for the relocation of buildings for which the original building construction is compliant. Evidence of relocatable building compliance can be either the DSA final certification letter for the original project wherein the building was constructed, or a final verified report from the in-plant (RBIP) inspector and the welding inspector for the original construction of the buildings. See the DSA project certification guide (Section 6.3 and Appendix B) for methods of addressing certification issues.

6. Compliance with CALGreen Code (Title 24, Part 11): For projects submitted to DSA after January 1, 2011 for alterations to buildings being relocated to a “new campus site”, (as defined in the 2010 Title 24, Part 11, Section 105.1.1) the work must comply with the Mandatory Measures of 2010 CALGreen Code, Title 24, Part 11.

Existing certified relocatable buildings relocated to a different campus without any alterations are not required to be retrofitted to conform to the mandatory measures of the 2010 CALGreen Code

Figure 1 – See Section 4.3



Note: Cross-ventilation at underfloor spaces is required per 2007/2010 CBC, Section 1203.3 (2001 CBC, Section 2306A.7)

Provide underfloor access as required per 2007/2010 CBC, Section 1209.1 (2001 CBC, Section 2306A.3)