IR 17-4

BASICS OF STRUCTURAL TESTS AND SPECIAL INSPECTIONS

Disciplines: Structural **History:** Revised 08-18-14 Revised 01-12-11 Issued 11-08-08

PURPOSE: The purpose of this Interpretation of Regulations (IR) is to clarify general structural test and special inspection requirements for projects under Division of the State Architect (DSA) jurisdiction.

- See IR 17-5 for further information on test requirements.
- See IR 17-6 for information on special inspection requirements.
- See IR 17-7 for information regarding soil testing requirements.

BACKGROUND: The California Building Code (CBC) requires the special inspection and/or testing of various construction work, materials, or completed components. These requirements were adopted from the model code applicable to construction nationwide where a project inspector is generally not required. For this reason, some issues require clarification in their application to projects under DSA jurisdiction. Issues addressed in this IR include:

- Definition of the structural tests and special inspections required for a project, and the difference between a "structural test" and a "special inspection."
- "Statement of Structural Tests and Special Inspections" (form DSA-103) also known as a test and inspections (T&I) list.

Definitions:

LEA Approved Testing Laboratory – A testing laboratory that has been accepted into the DSA Laboratory Evaluation and Acceptance (LEA) program. LEA approved laboratories are listed on the DSA website at: https://www.apps.dgs.ca.gov/tracker/ApprovedLabs.aspx.

Project Inspector – An individual employed by the school district and approved by DSA to provide continuous, personal inspection of all aspects of construction for a project.

Special Inspection – The careful and thorough examination and documentation of a specific construction procedure (e.g., welding, masonry placement, etc.) for a project. Note that material identification and other related responsibilities are also generally a part of the special inspector's duties. See Appendix A for a list of common special inspections.

Special Inspector – A specially qualified individual employed by an LEA approved testing laboratory or hired directly by the school district to perform special inspection.

Technician – A qualified employee of a testing facility properly trained and supervised to sample, handle, transport, and conduct tests on structural materials or on completed assemblies.

Test – A procedure performed on a structural material or on a completed element of the structure to determine strength, ductility, or other properties of the material or element. All structural tests must be conducted by an appropriately qualified technician or inspector employed by an LEA approved testing laboratory. See Appendix A for a list of common structural tests.

1. BASIC REQUIREMENTS: The architect or structural engineer in general responsible charge of a project is responsible for defining the structural tests and special inspections required for the project. All test and special inspection requirements shall be thoroughly

described in the project specifications or on the drawings. Also, the Statement of Structural Tests and Special Inspections (form DSA-103) shall be completed by the project architect or structural engineer and submitted to DSA for approval along with project plans and specifications.

1.1 Statement of Structural Tests and Special Inspections (form DSA-103): After it is completed, form DSA-103 may be referred to as the "T&I List." Common structural tests and special inspection requirements are included on the form and are accessible by expanding the menus for the various construction categories (soil, concrete, masonry, steel, and wood) and subcategories. Mandatory tests and special inspections within each category are already checked for convenience. Depending on the structural elements included in the project, items in applicable categories must be checked by the architect or structural engineer.

1.2 Changes to testing or special inspection requirements during construction: All changes to the testing and inspection program that are made after a construction contract has been awarded shall be accomplished by construction change document (see IR A-6) and approved by DSA.

2. TESTS, SPECIAL INSPECTIONS, AND SOIL TESTING: Procedures, responsibilities, and verified report requirements vary for tests, special inspections, and soil testing. See IR 17-5 for tests, IR 17-6 for special inspections, and IR 17-7 for soil testing.

2.1 The following table clarifies the differences in requirements for tests v. special inspections. The Statement of Structural Tests and Special Inspections (T&I List: form DSA-103) also indicates which tasks are considered tests and which are considered special inspections. See Appendix A for a list of common tests and special inspections.

Structural Tests:	Special Inspections:
Performed on materials or on completed elements of the structure.	Performed during specific construction processes as the process is occurring. (Note that certain aspects of a special inspection also occur before and after the actual process.)
Performed by an appropriately qualified and/or certified technician under the supervision of the laboratory civil engineer.	Performed by a qualified and/or certified special inspector (or the project inspector) employed either by the testing laboratory or directly by the school district.
Test reports are required within 14 days of the test date.	Special inspection reports are required within 14 days from the date of the special inspection (or semi-monthly when performed by the project inspector).
Tests are included in the Laboratory of Record Verified Report (form DSA-291) signed by the laboratory engineer at the conclusion of the testing program for the project.	Each individual special inspector employed directly by the school district must sign a Special Inspection Verified Report (form DSA-292) for the work inspected.

REFERENCES:

California Code of Regulations, Title 24
Part 1: California Administrative Code, Sections 4-333 and 4-335
Part 2: California Building Code, Chapter 17A

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This Interpretation of Regulations is intended for use by 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 website for currently effective IRs. Only IRs listed on the Web page at www.dgs.ca.gov/dsa/Resources/IRManual.aspx at the time of plan submittal to DSA are considered applicable.

Appendix A

Sample List of Structural Tests and Special Inspections
(This list is not all inclusive)

Structural Tests:	Special Inspections:
Soil: • Fill material acceptance tests • Fill compaction • Pile load tests	**Soil:** • Fill placement (includes verification of site preparation, excavation depth, etc.) • Pile driving (count blows, verify pile depth, also includes verifying pile materials, size and length prior to driving) • Pier drilling (depth, diameter, location)
Concrete: • Rebar • Air content • Slump • Temperature • Compression • Prestressing tendons and anchorage • Testing of post-installed anchors (wedge, sleeve, epoxy, shot-pins, etc.)	**Concrete:** • Verify mix • Batch plant inspection • Formwork • Rebar and embedded item placement • Concrete placement • Curing • Form removal • Application of prestressing force and grouting of bonded tendons, (includes measuring prestressing force applied and elongation of tendons) • Precast concrete fabrication • Shotcrete placement • Installation of post-installed anchors (wedge, sleeve, epoxy, shot-pins, etc.)
Masonry: • Rebar • Units, mortar and grout • Prisms • Core-drilled samples • Veneer bond • Testing of post-installed anchors (wedge, sleeve, epoxy, shot-pins, etc.)	**Masonry:** • Verify proportions of mortar and grout • Preparation of prisms for testing • Verify size, location, and condition of all construction supporting masonry, dowels, etc. • Placement of units, mortar, rebar, embedded items, and grout • Curing and weather protection • Installation of post-installed anchors (wedge, sleeve, epoxy, shot-pins, etc.)
Steel: • Tensile, (yield, ultimate, elongation) • HS bolt tests, (hardness, tension, wedge, chemical, etc.) • Non-destructive examination of welds • Fireproofing thickness* • Fireproofing bond test • Fireproofing density * Thickness testing of spray applied fireproofing may be performed as a test or as part of the application inspection.	**Steel:** • Verify material size, grade, mill certificates, and markings • HS bolt installation and tightening (including Skidmore-Wilhelm bolt tension verification testing) • Welding • Joist and truss fabrication • Shop fabrication • Spray applied fireproofing (substrate condition application, thickness*)
Wood: • Moisture Content	**Wood:** • Glued-laminated member fabrication • Open-web truss fabrication