
**CONTROLLED LOW-STRENGTH MATERIAL (CLSM): 2022
CBC**

Disciplines: Structural**History:** Revised 09/25/23 Under 2022 CBC
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Division of the State Architect (DSA) documents referenced within this publication are available on the [DSA Forms](#) or [DSA Publications](#) webpages.

PURPOSE

This Interpretation of Regulations (IR) clarifies design, inspection, and testing requirements for controlled low-strength material (CLSM) used on construction projects under DSA jurisdiction.

SCOPE

This IR is applicable to the use of CLSM as fill material in lieu of compacted soil below foundations, within building pads, or adjacent to retaining walls and other structures. This IR does not apply to the use of CLSM as trench backfill in locations remote from such structures.

BACKGROUND

CLSM is defined in Chapter 2 of the California Building Code (CBC). The use of CLSM requires the geotechnical engineer to define in the geotechnical report its properties and conditions of use in accordance with CBC Sections 1803A.5.9 and 1803A.7, Item #10. Additional information is available in the American Concrete Institute (ACI) publication Report on Controlled Low-Strength Materials (ACI PRC-229R).

1. GENERAL**1.1 Definition**

CLSM is defined by the CBC as “a self-compacted, cementitious material used primarily as backfill in place of compacted fill.” CLSM commonly consists of cement, fine aggregate, and water, but may include other components (e.g., admixtures). Cured CSLM typically achieves a compressive strength between 50 pounds per square inch (psi) and 1,200 psi. CLSM is not concrete and shall not be considered part of the structural foundation or slab system supporting buildings or similar structures.

1.2 Geotechnical Report

Per CBC Section 1803A.7, Item #10, the use of CLSM under or adjacent to foundations shall be addressed in the site-specific geotechnical engineering report as prepared by a California registered geotechnical engineer.

1.2.1 In addition to the requirements of CBC Section 1803A.5.9, the geotechnical report shall address the effects of CLSM on the foundation design such as bearing capacity, friction coefficient, drainage, etc.

1.2.2 If the construction documents do not specify CLSM per Section 2 below, but it is proposed as an alternative to compacted fill during construction, then DSA review and approval of a construction change document (CCD) is required. Refer to *IR A-6: Construction Change Document Submittal and Approval Process*. If the geotechnical report does not address CLSM, then the CCD shall include a signed letter from the geotechnical engineer of record, approving the use of CLSM, providing all information required by CBC Section 1803A.5.9 and Section 1.2.1 above, and stating any limitations of use.

CONTROLLED LOW-STRENGTH MATERIAL (CLSM): 2022 CBC**2. CONSTRUCTION DOCUMENTS**

The DSA-approved construction documents shall specify the requirements for the use of CLSM including but not limited to locations, approximate depths, specifications for site preparation, specifications for CLSM materials and properties, and CLSM testing and inspection requirements.

2.1 Specifications

Specifications for CLSM shall include all of the following:

2.1.1 Site preparation requirements including, but not limited to, minimum soil compaction beneath CLSM, minimum and maximum soil moisture content, etc. Site preparation requirements shall be as defined in the geotechnical report.

2.1.2 Required properties of CLSM including minimum compressive strength, consistency (i.e., slump or flow), and any other relevant requirements specified in the geotechnical report. Other relevant properties may include, but are not limited to, maximum aggregate size, unit weight, and time to reach specified strength. If excavation of the CLSM is anticipated, it is recommended the compressive strength be limited to a maximum of 150 psi. Refer to ACI PRC-229R for additional information.

2.1.3 Mix design requirements including relative proportions by weight of cementitious materials, aggregates, water, and any admixtures.

2.1.4 Relevant requirements regarding mixing, conveying, placement, and curing. Leftover concrete from an earlier placement or other construction waste materials shall not be used in place of CLSM.

2.2 Drawings

Location, approximate depth, and dimensions (including minimum and maximum thickness) of CLSM placement shall be shown on DSA-approved documents. CLSM is typically not reinforced, and the minimum reinforcing requirements of CBC Chapter 19A are not applicable.

3. TESTING AND INSPECTION

Inspection and testing requirements shall be in accordance with CBC Chapter 17A and this section.

3.1 Inspection

Placement of CLSM shall be inspected by the project inspector and the geotechnical engineer (or their qualified representative) in accordance with CBC Section 1705A.6. Per CBC Section 1705A.3.3.2, Item #3 batch plant inspection is not required.

3.2 Sampling

CLSM shall be sampled in accordance with ASTM D5971. Unless more frequent sampling is required by the geotechnical report in accordance with CBC Section 1803A.5.9, Item #4, a set of cylinders shall be taken for each 150 cubic yards, or fraction thereof, of CLSM placed.

3.3 Testing

CLSM shall be tested as required by the geotechnical engineer per CBC Section 1803A.5.9, Item #3. Compressive strength testing shall comply with ASTM D4832. Field testing for unit weight, air content, or other properties may also be required by the geotechnical engineer per CBC Section 1803A.5.9, Items #3 and #4.

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REFERENCES:

2022 California Code of Regulations (CCR) Title 24

Part 2: California Building Code (CBC), Sections 1803A.5.9, 1803A.7.

This IR is intended for use by DSA staff and by design professionals to promote statewide consistency for review and approval of plans and specifications as well as construction oversight of projects within the jurisdiction of DSA, which includes State of California public schools (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 subject to revision at any time. Please check DSA's website for currently effective IRs. Only IRs listed on the webpage at www.dgs.ca.gov/dsa/publications at the time of project application submittal to DSA are considered applicable.