

CONTROLLED LOW STRENGTH MATERIAL (CLSM)

This information bulletin provides a general guideline for using controlled low strength material (CLSM), generally known as slurry in the construction industry, in lieu of soil for backfill. The 2014 Los Angeles Building Code (LABC) allows the use of CLSM for the backfill of excavations under Section 1804.2, and for the support of foundations under Section 1804.6.

I. DEFINITION

CLSM is generally defined as a mixture of soil, aggregate, cement, water, and sometimes admixtures.

II. REQUIREMENTS FOR CLSM FOR STRUCTURAL SUPPORT OF FOOTINGS

A. Standard Requirements

1. CLSM shall be ready-mixed by a City of Los Angeles approved batch plant (http://www.ladbs.org/lic_apprvd_prod/fabricator_roster.pdf).
2. CLSM shall not be placed on uncertified fill, on incompetent natural soil, nor below water.
3. CLSM shall not be placed on a sloping surface with a gradient steeper than 5:1 (horizontal to vertical)
4. Testing is required to verify bearing capacity of the CLSM. Testing shall be under the continuous inspection of a concrete deputy inspector.

Exception: Testing and a concrete deputy inspector are not required for CLSM providing support to Group U occupancies that are accessory to a residential occupancy, including, but not limited to, those listed in Section 312.1 of the LABC. This exception shall also include light poles and mechanical equipment pads. This exception only applies where a soil report has not been otherwise required by the Department or the design engineer. Where testing is not required, the minimum presumptive load bearing values from Table 1806.2 of the LABC may be used for foundation design. The cement content of the CLSM shall not be less than 188 pounds per cubic yard (2 sacks).

5. The excavation bottom shall be accepted by the soil engineer, when a soil report has been required, and the City Inspector prior to placing CLSM.
6. CSLM backfill is intended to replace soil backfill and may not be used as a substitute for concrete in the construction of surface drainage devices, or any building or structure.

7. A soil report is required.

Exception: A soil report is not required for CLSM providing support to Group U occupancies that are accessory to a residential occupancy, including, but not limited to, those listed in Section 312.1 of the LABC. This exception shall also include light poles and mechanical equipment pads. This exception only applies where a soil report has not been otherwise required by the Department or the design engineer.

B. Soil Report Requirements

A soil report prepared by a licensed civil engineer shall be submitted to the Grading Division for review and approval prior to the placement of CLSM that will be used for support of footings. The report shall contain the following:

1. Specifications including, but not limited to, the required cement proportion, mix, and the water-cement ratio of the CLSM for the intended use. The cement content of the CLSM shall not be less than 188 pounds per cubic yard (2 sacks), unless recommended otherwise by the licensed civil engineer and accepted by the Department.
2. Specifications on how to prepare the site for the placement of the CLSM.
3. Test methods to determine the compressive strength and bearing capacity of the CLSM. The ultimate compressive strength of the CLSM shall be recommended in the report by the licensed civil engineer, but shall be no less than 100 pounds per square inch when tested on the 28th-day per ASTM D4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material Test Cylinders.
4. The allowable bearing capacity of the CLSM shall not exceed the allowable bearing capacity of the soil supporting the CLSM.
5. Field tests to determine the acceptance of the CLSM, and the number and frequency of the tests. There shall be a minimum of one test (two cylinders) for each 50 cubic yards or fraction thereof.
6. Address the differential settlement of footings that will be supported on a combination of CLSM and earth material.
7. Overexcavation for CLSM placement shall extend laterally beyond the footprint of any proposed footings as required for placement of compacted fill, unless justified otherwise by the soil engineer that footings will have adequate vertical and horizontal bearing capacity.

8. When CLSM is to be placed around or adjacent to any subdrain system, the method of placing the CLSM without affecting the proper functions of the subdrain system shall be addressed in the report.

C. Testing Requirements

1. All testing shall be performed by a City of Los Angeles approved testing agency (http://www.ladbs.org/lic_apprvd_prod/testing_agency.pdf).
2. Each load delivered on-site shall be accompanied by a load ticket to verify the mix design and an approved batch plant.
3. CLSM need not be compacted.
4. At the completion of CLSM placement, a report shall be submitted to the Grading Division for approval. The report shall contain, but need not be limited to, a plot plan showing the lateral and vertical extent of CLSM placement, bottom observation and approval, concrete deputy approvals, load tickets, and test results. The report shall be prepared and stamped by the licensed civil engineer for the project.

III. REQUIREMENTS FOR CLSM FOR NON-STRUCTURAL BACKFILL

The Department may approve the use of CLSM for non-structural backfill without the requirements stated above in section II, for cases such as retaining wall or temporary shoring backfill, backfill of utility trenches, and backfill around tanks or underground utility vaults, provided all of the following conditions are satisfied:

1. Approval by the City Inspector.
2. CLSM backfill shall be located in self-contained areas where it will not be used for vertical or lateral support of footings and no hazard will be created.
3. CLSM shall either be ready-mixed by a Los Angeles approved batch plant, or a Los Angeles approved deputy inspector shall be required for site batching and testing (at the rate of a minimum of one test per 10 cubic yards or fraction thereof).
4. When placed adjacent to any subdrain system, the subdrain system shall be protected from contamination by the CLSM. As a minimum the barrier shall consist of a 6 mil visqueen or better.
5. CSLM backfill is intended to replace soil backfill and may not be used as a substitute for concrete in the construction of surface drainage devices.
6. The cement content of the CLSM shall not be less than 188 pounds per cubic yard (2 sacks).
7. Additional testing may be required whenever there is evidence that any CLSM being placed does not conform to the criteria indicated in this bulletin.

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