



STANDARD OPERATING PROCEDURE
FOR
CONTROLLED LOW-STRENGTH MATERIAL BACKFILL
(22 October 2021)

A controlled low-strength material (CLSM) is designed to be an excavatable soil replacement to encase pipes, surround structures, or fill excavations. The mix design in Table 1 (per cubic yard) produces a material suitable for general placements but it is not recommended for placement on slopes. The mix design in Table 2 has been successfully used on 3H:1V slopes in above freezing temperatures.

Table 1: CLSM Mix for General Placement

Table with 2 columns: MATERIAL and DOSAGE. Rows include Portland Cement, Fly Ash, Sand, Potable Water, Air Content, Unit Weight, and Shrinkage Reducing Material.

Table 2: CLSM Mix for Placement on Inclines

Table with 2 columns: MATERIAL and DOSAGE. Rows include Portland Cement, Fly Ash, Sand, Potable Water, Air Content, Bentonite, and Slump.



Important Notes:

- The addition of a Shrinkage Reducing Material is not optional.
- The 28-day strength should be between 30 and 300 psi.
- The increased air content is obtained using an admixture according to ASTM C 260.
- Higher Fly Ash amounts will increase the long-term strength gain.
- Increasing the fly ash will typically lower the water demand.
- CLSM will set faster in warmer weather and slower in colder weather.
- The higher the air content the more excavatable the final product will be.
- In addition to traditional placement, the CLSM can be placed by belt or pump truck and is more easily pumped by increasing the air content.
- It is possible to ‘float’ the pipe when placing CLSM, so it should be determined if anchoring the pipe or placing the CLSM in lifts is necessary.
- Any ‘bleed’ water must be suctioned off the top or allowed to migrate off the top of the CLSM pour if the surrounding soil is too cohesive to absorb it.
- The 3-, 5- or 7-day compressive breaks are not necessarily indicators of the 28-day breaks.
- The fresh CLSM mixture should have a consistency similar to that of batter and not be thin and watery. It shall be tested by filling an open-ended 3-inch diameter, 6-inch-high cylinder to the top with the mixture and immediately pulling the cylinder straight up. The correct consistency will produce an approximate 8-inch diameter circular-type spread with no segregation.
- Mixes with stiffer consistencies may require minor vibration to ensure the areas beneath the pipe and within the haunches are fully filled, but the vibration should not induce bleed water.

