



SP 4.2-002 (2013)

Standard Specifications for Construction City of Waco 2013 Special Provision to Section 4.2 Excavation and Backfill

November 19, 2020

The Standard Specifications for Construction City of Waco 2013

Section 4.2: Excavation and Backfill

Part 2: Product

A. Materials

3. Trench Backfill

f. Flowable Backfill

is hereby replaced as follows:

f. Flowable Fill - Flowable backfill shall be Controlled Low Strength Material (CLSM) meeting the following material, performance, installation, and testing requirements. This item will be measured by the linear feet of trench backfill completed.

CLSM Material - CLSM is a low-strength, non-shrink, flowable backfill material made from Portland cement, sand, water, and admixtures. CLSM shall contain 250 pounds of cement per cubic yard, no fly ash permitted, and with the remainder of the volume composed of sand, water, and any approved admixtures. Any aggregate used shall be primarily granular, with a plasticity index (PI) less than 12 and with a 100 percent passing a 3/4-inch sieve, but not more than 30 percent passing the #200 sieve. The unit weight of the CLSM shall be between 100 to 130 lb/ft³ and the air content shall be between 10 to 30% as measured by ASTM D6023. Admixtures approved for use are Daraset 400 conforming to ASTM 494 Type C, Daravair 1000 and/or Darafill. Other admixtures conforming to the same requirements and achieving the required results will be considered. CLSM consistency shall be tested in accordance with ASTM D6103 with minimum diameter of 8 inches.

CLSM Performance – CLSM shall be capable of being pumped and placed in a trench and shall achieve adequate consolidation and fill all voids without the use of vibration or tamping. The allowable 28-day compressive strength shall be in the range

of 100 to 500 psi. Prior to placement, the Contractor shall submit a mix design with test results completed within the last 12 months and showing conformance with specified requirements for compressive strength.

CLSM Installation – Batching, mixing, delivery, storage, and handling of CLSM shall be in accordance with the ACI 229R. In addition, CLSM shall be installed in accordance with the details shown in the plans. For trench backfill, CLSM shall be placed continuously. To contain CLSM when filling long open trenches in stages, the end points shall be adequately bulkheaded to prevent movement. Pavement may be placed directly upon the CLSM as soon as the surface will withstand the paving process without displacement or disruption. If the placement of the CLSM is not completed in time to allow permanent paving to be completed the same day, the Contractor shall prevent traffic contact with the CLSM until paving is completed.

CLSM Testing – During CLSM backfill placement, sampling and testing to determine compliance with the specifications shall be done as follows. Sampling and testing to determine compressive strength shall be in accordance with ASTM D4832. Compression strength cylinders shall be broken with a 10 kN load frame rate applied at a constant rate such that the cylinder will fail in no less than 2 minutes. One set of 4x8 cylinders (7, 14, 2x28 day & 1 hold) shall be taken for every 300 linear feet (LF) of trench backfilled. The material placed shall be accepted only if the 28-day compressive strength is between 100 to 500 psi. Sections of CLSM with compressive strengths exceeding 500 psi are subject to review and approval by the City Engineer and may require removal and replacement by the Contractor at the Contractor's expense.

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