

**CASE 17-13**  
**SECTION 728 – REVISED 7-5-17**

**CONTROLLED LOW STRENGTH MATERIAL**

**728.1 GENERAL:**

Controlled Low Strength Material (CLSM) is a mixture of cementitious materials, aggregates, admixtures/additives, and water that, as the cementitious materials hydrate, forms a soil replacement. CLSM is a self-compacting, flowable, cementitious material primarily used as a backfill, structural fill, or a replacement for compacted fill or unsuitable native material. Placement and usage of each type of CLSM is described in Section 604.

**728.2 MATERIALS:**

Cementitious materials shall conform to Section 725.2.

Coarse aggregate shall conform to ASTM C33 grading size No. 57. The size and gradation of fine aggregates (sand) shall conform to ASTM C33. Alternate materials meeting the applicable requirements of Section 701 or 702 such as combinations of other aggregates, Aggregate Base Course (ABC) or Reclaimed Concrete Material (RCM) may be used to replace the required coarse and fine aggregate as long as the approved mix design meets the requirements of Table 728-1 and is approved by the Engineer.

Water shall conform to Section 725.4.

**728.3 PROPORTIONING OF MIXTURES AND PRODUCTION TOLERANCES:**

Proportioning of the mixture shall comply with Section 725.6 and Table 728-1. The CLSM shall have consistency, workability, plasticity, and flow characteristics such that the material when placed is self-compacting. A minimum of 40% coarse aggregate shall be used. A mix design shall be submitted for the Engineer's approval prior to the excavation for which the material is intended for use. Sampling shall be in accordance with ASTM D5971. The flow consistency shall be tested in accordance with ASTM D6103. Unit weight (when applicable) shall be obtained by ASTM D6023. Compressive strength shall be tested in accordance with ASTM D4832.

<b>TABLE 728-1</b>	
<b>CONTROLLED LOW STRENGTH MATERIAL REQUIREMENTS</b>	
Portland Cement Content, Sack/cu yd	Flow, inches
1/2 Sack	9±2
1 Sack	9±2
1 1/2 Sack	9±2
<b>2 Sack</b>	<b>9±2</b>

Note for Table 728-1:

- (1) CLSM mixes meeting the table requirements will not generally be placeable by means of a concrete pump or may not provide the needed workability for certain conditions. When pumpable mixes or increased workability are required, the addition of fly ash or a natural pozzolan in excess of the required Portland Cement Content may be used.
- (2) Ready-mixed structural concrete or grout shall not be used in lieu of CLSM without prior approval from the Engineer and shall be subject to rejection.

**728.4 MIXING:**

CLSM mixing shall comply with Section 725.7 Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Mixes shall be homogenous, readily placeable and uniformly workable.

- End of Section -

**CASE 17-13**  
**SECTION 604 – REVISED 8-9-17**

PLACEMENT OF CONTROLLED LOW STRENGTH MATERIAL

**604.1 DESCRIPTION:**

The work covered by this specification consists of furnishing all materials, labor and equipment for the placement of controlled low strength material (CLSM).

The type of backfill to be used shall be as specified in the special provisions, plans or by the Engineer. The following is a brief description of the types of CLSM and their intended uses:

**1/2 SACK:** General trench backfill in areas where future excavation into the backfill with conventional hand tools is anticipated or in areas of low loading such as streets, parking areas, behind retaining walls, etc.

**1 SACK:** General trench backfill and backfill behind retaining walls where additional strength is required above that of 1/2 sack CLSM.

**1-1/2 SACK:** Structural backfill under foundations and as thermal fill and/or mechanical protection of duct banks and conduits.

**2 SACK: General pipe bedding and encasement around Vitrified Clay Pipe.**

**604.2 MATERIALS:**

CLSM shall conform to the requirements of Section 728. Ready-mixed concrete shall not be used in lieu of CLSM without prior approval from the Engineer and shall be subject to rejection.

**604.3 PLACEMENT:**

The controlled low strength material shall be placed directly into the excavation. The CLSM shall be placed in a uniform manner that will prevent voids in or segregation of the material. Foreign material which falls into the trench prior to and during placing of the CLSM shall be immediately removed. The CLSM shall have consistency, workability, plasticity, flow characteristics and pumpability (when required) such that the material when placed is self-compacting. Mechanical compaction or vibration may be used to consolidate around structures, pipes, multiple conduits, etc., otherwise no mechanical compaction or vibration shall be required. The total elapsed time between the initial addition of water to the CLSM and the completed placement shall not exceed 90 minutes.

When CLSM is used for backfill around pipes or conduits, the CLSM shall be placed equally on both sides of pipe or conduit to prevent lateral displacement. Also, the CLSM shall be placed in lifts. The height of each lift shall not exceed the depth that will cause floating of the pipe or conduit. When placing the CLSM in greater lift depths, sufficient anchorage shall be provided so the pipe or conduit will not float.

Where CLSM is used for backfill around pipes or conduits with a depth less than 20 feet, the width of the excavation shown on the plans or in Section 601 may be reduced so that the minimum clear distance between the outside of the pipe or conduit and the side of the excavation (each side) shall be 12 inches for pipes or conduits 42 inches and larger, 6 inches for pipes or conduits between 4 inches and 42 inches and 3 inches for pipes or conduits 4 inches and smaller.

When CLSM is used behind retaining walls, the depth of each lift shall be limited so it will not induce hydraulic loads greater than the design loads.

For long trenches or installations which require a large amount of CLSM, bulkheads of wood, dirt, sand bags, etc. can be used to control the material's flowability. The bulkhead shall be removed prior to the continuation of the backfilling.

CLSM shall NOT be permitted to come in contact with any aluminum, copper or brass materials, e.g.,