SECTION 31 23 23.53

CEMENT STABILIZED SAND BACKFILL

(Sentences and/or paragraphs that are double underlined indicate revisions that were made from the 2012 specification.)

PART 1 – GENERAL

1.1 DESCRIPTION

A. At the discretion of the Engineer, Cement Stabilized Sand meeting the following specification may be allowed as trench backfill.

1.2 MEASUREMENT AND PAYMENT

A. Cement-stabilized sand shall be considered a part of the backfill requirement for the unit installed and shall be considered subsidiary to the length of the unit bid. If the cement stabilized sand is indicated to be a separate construction item for bulk backfill then the cement stabilized sand shall be measured per cubic yard as indicated on the plans.

1.3 SUBMITTALS

A. Mix Design

PART 2 – PRODUCTS

2.1 MATERIALS

A. CEMENT - Type I/II Portland Cement conforming to ASTM C150.

B. SAND - Clean durable sand meeting grading requirements for fine aggregates of ASTM C33, and the following requirements:

1. Classified as SW, SP, or SM by the United Soil Classification System of ASTM D2487.
2. Deleterious materials:
    a.) Clay lumps, ASTM C142; less than 0.5 percent.
    b.) Lightweight pieces, ASTM C123; less than 5.0 percent.
    c.) Organic impurities, ASTM C40; color no darker than standard color.
    d.) Plasticity index of 4 or less when tested in accordance with ASTM D4318.
3. Water: Potable water, free of oils, acids, alkalis, organic matter, or other deleterious substances, meeting requirements of ASTM C94.

C. Submittals of above items shall be provided.

2.2 TESTING REQUIREMENTS

A. Mixing plant inspections may be performed periodically. Material samples shall be collected and tested for change in material characteristics.

B. Random samples of delivered product will be taken in the field at point of delivery for each day of placement in the work area. Specimens will be prepared in accordance with ASTM D1632 and tested for compressive strength in accordance with ASTM D1633 within three (3) hours of collection of sample.

C. The cement content may be tested at the discretion of the City.

D. Calibration of Pugmill to be provided to city monthly.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. DESIGN REQUIREMENTS

Design sand-cement mixture to produce a minimum unconfined compressive strength of 50 pounds per square inch in 48 hours and 100 pounds per square inch in 7 days when compacted to 95% in accordance to ASTM D558 and when cured in accordance with ASTM D1632, and tested in accordance with ASTM D1633. Mix for general use shall contain a minimum of 1-½ sacks of cement per cubic yard. Mix for use as sanitary sewer embedment within 9 feet of waterlines shall contain 2 sacks of cement per cubic yard. Compact mix with moisture content between 0% to 2% above optimum.

The maximum compressive strength in 7 days shall be 400 psi. Backfill that exceeds the maximum compressive strength shall be removed by the contractor.

B. MIXING

1. Thoroughly mix sand, cement, and water in proportions specified by the Design Requirements using a pugmill-type mixer. The plant shall be equipped with automatic weight controls to ensure correct mix proportions.

2. Stamp batch ticket at plant with time of loading directly after mixing and time delivered to site. Material not placed and compacted within 3 hours after mixing shall be rejected. Provide copy of ticket to inspector.

3. Compaction shall begin within one (1) hour after mixing.

C. PLACEMENT

1. Place sand-cement mixture in 8-inch-thick lifts and compact to 95% of ASTM D558 unless other specified by the engineer. The moisture content during compaction shall be between 0% to 2% above optimum. Perform and complete compaction of sand-cement mixture within 3 hours after addition of water at plant.

2. Do not place or compact sand-cement mixture in standing or free water.

3. Failed test can be overturned by in place testing to substantiate strength. Testing shall be by ASTM C-42 wet core method at contractor's expense.

END OF SECTION