

SECTION 31 05 15 CEMENT TREATED FILL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Controlled low-strength material (CLSM) requirements.

1.2 REFERENCES

- A. ASTM C 25: Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime.
- B. ASTM C 33: Standard Specification for Concrete Aggregates.
- C. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- D. ASTM C 51: Standard Definitions of Terms Relating to Lime and Limestone (As Used by the Industry).
- E. ASTM C 110: Standard Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone.
- E. ASTM C 150: Standard Specification for Portland Cement.
- F. ASTM C 260: Standard Specification for Air-Entraining Admixtures for Concrete.
- G. ASTM C 494: Standard Specification for Chemical Admixtures for Concrete.
- H. ASTM C 595: Standard Specification for Blended Hydraulic Cement.
- I. ASTM C 618: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- J. ASTM D 4832: Standard Test Method for Preparation and Testing of Soil-Cement Slurry Test Cylinders.

1.3 SUBMITTALS

- A. Material analysis.
- B. Engineered design calculations.

1.4 ACCEPTANCE

- A. General:
 - 1. Acceptance is by Lot. One Lot is one day's production.
 - 2. If non-complying fill material has been installed and no price for the material is specified, apply price adjustment against cost of work requiring material as part of its installation. Section 01 29 00.
 - 3. Dispute resolution, Section 01 35 10.
- B. Lime or Asphalt Cement Treated Backfill: Data sheet.
- C. Cement Treated Flowable Fill:
 - 1. Sub-lot Size:
 - a. Trench backfill, 100 cubic yards.
 - b. Roadway backfill, 250 cubic yards
 - 2. Lot is acceptable if strength deviations are within pay factor 1.00 limits. At

ENGINEER's discretion, a Lot with a sub-lot test deviation in Reject may stay in place at 50 percent cost.

<u>Pay Factor</u>	<u>28-Day Compressive Strength, psi</u>
1.00	less than 60
0.75	60 to 120
Reject	greater than 120

1.5 SAFETY

- A. Protect persons and property from lime or quicklime handling operations.

PART 2 PRODUCTS

2.1 CEMENT TREATED FLOWABLE FILL

- A. Cement:
 - 1. Types I or II, ASTM C 150
 - 2. Types IP or IS, ASTM C 595. M C 33.
- B. Slump: 5 inches to 10 inches.
- C. Water: Non-detrimental.
- D. Admixtures: As needed for strength and flowability.
 - 1. Pozzolan (fly ash): ASTM C 618.
 - a. Class C or Class F.
 - b. Loss on ignition plus or minus 3 percent.
 - 2. Air: 4 percent to 35 percent, ASTM C 173.
- E. Mix Design: 60 psi maximum in 28 days per ASTM D 4832.

2.2 LEAN CONCRETE

- A. Physical Characteristics:
 - 1. Cement: ASTM C 150, Type II .
 - 2. Slump: 1 to 4 inches.
 - 3. Strength: 750 psi minimum in 7 days.
- B. Aggregate: Section 03 30 04. Submit substitute gradations for acceptance prior to beginning construction. Do not substitute gradations without approval.

2.3 LIME TREATED FILL

- A. Aggregate: Non-plastic crushed aggregate base, Section 32 11 23; or Common fill, Section 31 05 13.
- B. Water: Non-detrimental.
- C. Lime: Dry hydrated lime or quicklime, ASTM C 25, ASTM C 51, and ASTM C 110.
 - 1. Minimum Chemical Composition:
 - a. Hydrated Lime (Ca(OH)₂); 85 percent of chemical.
 - b. Quicklime (CaO); 90 percent of chemical.
 - 2. Gradation: ASTM C 136.

Table 1 - Hydrated Lime and Quicklime Percent Passing by Weight		
Sieve	Hydrated Lime (Ca(OH) ₂)	Quicklime (CaO)
No. 4	100	100
No. 30	95 - 100	-
No. 100	-	0 - 20
No. 200	75 - 100	-
<p>NOTES</p> <p>(a) Hydrated Lime: Washed Sample for 15 minutes plus or minus 1 minute, ASTM C 110.</p> <p>(b) Quicklime: Dry sieving only.</p>		

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Cement Treated Fill (Flowable Fill):

1. Mold 3 test cylinder, ASTM D 4832. Test cylinders at 28 days.
2. If a cylinder test shows improper sampling, molding, handling, curing, or testing, discard the cylinder. Use remaining cylinders to determine average strength.

END OF SECTION