

**SECTION 03500
FLOWABLE FLY ASH**

1.0 GENERAL

A. Description

1. Flowable Fly Ash fill shall include but not necessarily be limited to the filling of utility trenches, tunnels, and sleeves at the locations shown on the plans and in accordance with the Contract Documents.
2. Flowable Fly Ash fill is intended for use in tunnels, sleeves and utility trenches located within State Highway Administration right-of-ways, and shall be used only when specified in the Contract Documents or approved by the Commission. Records of each placement shall be maintained as specified herein.

B. Related Work Included Elsewhere

1. Trench Excavation, Backfill and Compaction: Section 02250
2. Boring and/or Jacking Pipe: Section 02300
3. Tunneling: Section 02400

C. Quality Assurance

The Commission will inspect all materials before, during, and after installation to ensure compliance with the Contract Documents.

2.0 MATERIALS

A. Materials Furnished by the Commission

The Commission will not furnish any materials for Flowable Fly Ash fill.

B. Contractor's Options

None.

C. Detailed Material Requirements

1. Portland Cement

Portland cement shall conform to ASTM M 85, with the fineness and time of setting determined in conformance with ASTM T 153 and ASTM T 131 respectively.

2. Fly Ash

Fly Ash shall be Class F as defined by ASTM Specifications C-618 but with no limits on chemical or physical requirements except that it must be relatively free of calcium oxide when minimum strength is required.

3. Water

Water shall be potable.

4. Admixtures

- a. Admixtures shall be as described in ASTM C-494.
- b. Admixtures included in the mixture for the purpose of affecting setting and strength characteristics shall be permitted provided they have no adverse effects on strength development nor adverse effects on any equipment which the mixture may encapsulate, i.e., pipes, valves, conduit, etc.

5. Fillers

Fillers, if required, shall be natural aggregates with a maximum size not to exceed 3/4 inch and may include sands. Bottom ash shall not be used as filler.

- D. **Material Storage Note:** Materials shall be stored in order to insure the preservation of their quantity, quality and fitness for Work. The Contractor shall place materials on wooden platforms, or other hard, clean surfaces, not on the ground, and the materials shall be placed under cover when directed by the Owner. Stored materials shall be located in order to facilitate prompt inspection by the Owner. Lawns, grass plots, or other private or public property shall not be used for storage purposes without written permission of the owner or lessee. Unless directed or noted otherwise in the Contract documents, there will be no payment for stored materials.

3.0 EXECUTION

A. Flowable Fly Ash Mixes

1. Fly Ash shall be proportioned on the basis of its dry weight. When wet fly ash is used in the batch, the moisture content shall be measured by ASTM Test Method C-566 and the mix water shall be adjusted accordingly. Moisture in the stockpile shall be determined at intervals sufficient to ensure accurate proportioning. Fly Ash shall be measured into the mix by weight or by an approved volumetric device.
2. Cementitious material shall be included in the mix in an amount sufficient to yield strength adequate for the specific application. The cementitious material shall be measured by weight or by an approved volumetric device.
3. Aggregate, when included in the mix, shall be proportioned by dry weight or by an approved volumetric device. Moisture content shall be determined by ASTM Test Method C-566.
4. Requirements for consistency shall generally control the amount of water in the mix. Total water shall be the water included with the fly ash and aggregate plus added water. Unless otherwise noted, the percentage of water in the mix shall be expressed as a percentage of the total batch weight. Measurement of water may be by weight or volume.
5. Record of the material placed in each delivery shall be submitted to the Commission. For each mix design, the record shall include strength data, type of additives, unit weight, consistency and total water.

6. No material which will decompose and allow subsidence shall be permitted as a constituent part of the mix.
 7. The self leveling consistency of the flowable fly ash mixture shall have a flow less than 140 seconds when tested in accordance with Corps of Engineers Test Method CRD-C611.
 8. Strength
 - a. Flowable Fly Ash fill for use in tunnels and sleeves shall meet a 120 day design compressive strength of 50 psi.
 - b. Flowable Fly Ash fill for use in trenches within state right-of-ways shall meet a 28 day design compressive strength of 100 psi.
 - c. Strength development within 3 days of placing shall be measured in place with a penetrometer of the type described in ASTM Test Method C-403. Minimum strength before paving over the stabilized flowable fly ash with a wearing surface shall be 50 psi as measured by the penetrometer.
 - d. Mixtures not within State right-of-way must retain workability. They must be diggable with hand tools.
- B. Mixing
1. Stabilized flowable fly ash may be mixed by ready mix truck, or other acceptable equipment or methods.
 2. After water has been added to the fly ash, mixing shall be continuous until placement to prevent premature settling.
 3. At air temperatures below 40° F (10° C), mix water should be heated to above 140° F (60° C). Temperature of the delivered material shall be between 50 and 90° F (10° - 32° C).
- C. Placement
1. Stabilized flowable fly ash shall be placed in the excavation directly from the mixer wherever possible. When pumps or conveyors are needed for placement, premature settling shall be avoided by minimizing the time in which there is no agitation.
 2. Self-leveling mixes will ordinarily require no shoveling, raking, or brooming to place.
 3. When stabilized flowable fly ash is placed in trenches with appreciable slope at the surface, removable dams shall be inserted at appropriate intervals in order to equalize the depth of material placed.
 4. Stabilized flowable fly ash shall be protected from freezing for 24 hours after placement.
 5. Flowable Fly Ash fill shall cure for a twenty-four (24) hour period (min.) prior to receiving a bituminous concrete surface.

6. Flowable Fly Ash fill shall only be placed to the limits noted on the Standard Details and Contract Documents.

4.0 METHOD OF MEASUREMENT

- A. Except when used as a contingent item or noted otherwise, measurement for flowable fly ash fill will not be made, as it will be included in the appropriate unit cost bid for the installation of pipe lines and/or filling of tunnels or sleeves.
- B. When used as a contingent item or noted otherwise, measurement for furnishing and installing flowable fly ash fill will be made on the basis of the volume of material accepted and satisfactorily placed to the lines, grades, and dimensions shown on the Standard Details, noted in the Contract Documents, or as directed by the Commission.

5.0 BASIS OF PAYMENT

- A. General
 1. Except when used as a contingent item or noted otherwise, payment for flowable fly ash fill will not be made, as it shall be included in the unit quantity item for all pipe and structures installed.
 2. When used as a contingent item or noted otherwise, payment will be made at the unit price bid. The price bid shall include furnishing all labor, tools, equipment, and materials necessary to complete the work as shown and specified in strict accordance with the Contract Documents.
 3. Payment will be made for contingent items when approved by the Commission.
- B. Flowable Fly Ash
 1. Payment for furnishing and installing flowable fly ash fill complete and in place will be made at the contingent prices established in the bid proposal. The price shall include all labor, material, equipment, necessary traffic control, and incidental items to complete the excavation and placement.
 2. Payment for removal of unacceptable foundation material will be made under the pertinent contingent item.
 3. Payment will not be made for any flowable fly ash fill which is used because of any error in the Contractor's operations, such as excavating beyond specified lines or grades, etc.

****END OF SECTION 03500****