

## **SECTION 2310**

### **FLOWABLE FILL**

#### **PART 1 - GENERAL**

##### **1.1 Description**

###### **A. Description of Work**

The work shall consist of furnishing and placing a flowable mortar fill material at the locations shown on the drawings or as directed by the Engineer.

###### **B. Related Work Specified Elsewhere**

Trench Excavation & Backfill	Section 2300
Storm Drain Construction	Section 2500
Culvert Construction	Section 2520
Waterline Construction	Section 2550
Sewer line Construction	Section 2560

##### **1.2 Submittals**

###### **A. Materials**

Material must come from a plant with a current Certificate of compliance demonstrating the ability of the mix design to meet the specified requirements. Certificates shall be provided to the City on a yearly basis or if the mix design is modified. Certificates must contain the name of the supplier, date, contract number and mix design data on each delivery ticket.

For each individual project the contractor shall provide to the Engineer a mix design (as will be provided by the supplier) proposed for the project. This proposal shall be considered part of the normal material submittal process.

## **PART 2 - MATERIALS**

### **2.1 Cement**

#### **A. Cement**

Cement shall be ASTM C150, Type V.

#### **B. Aggregate**

Sand shall be fine sand that will stay in suspension during placement and setting. The suggested gradation of the aggregate is as follows:

<b>Sieve Size</b>	<b>Percent by Weight Passing</b>
3/4"	100
No. 200	0-10

#### **B. Mix Design**

Flowable fill shall achieve sufficient aggregate bond for aggregate compressive strength to support anticipated loads. The compressive strength may be higher for material used strictly as structural backfill and as indicated in the detailed specifications for the specific project.

Flowable fill utilized for water main encasement and sewer main encasement shall achieve sufficient aggregate bond for aggregate compressive strength to support anticipated loads. The compressive strength of the material after curing shall remain in a condition that it can be readily removed using hand tools and small excavating equipment. A minimum and/or maximum compressive strength may be specified for the product in the plans.

Flowable fill shall obtain a minimum 28-day bearing strength of seventy-five (75) pounds per square inch and shall achieve a twenty (20) pounds per square inch bearing strength prior to backfilling on the material.

The suggested mix design for controlled low strength material is as follows:

Quantity of Dry Material per Cubic Yard

Cement	50 pounds (minimum)
Aggregate	2600-2800 pounds

The weight of the cement shall be adjusted to achieve adequate compressive strength. The amount of water shall be such that the material flows properly without excessive segregation.

These quantities of dry materials, mixed with an appropriate quantity of water (approx. 50-70 gallons), should yield approximately one (1) cubic yard of flowable fill.

The contractor may submit alternate mix designs to the Engineer for approval prior to the placement of the flowable fill. The Engineer reserves the right to reject the mixed material if a flowable mortar suitable for placement cannot be produced.

**PART 3 - EXECUTION**

**3.1 Placement**

Flowable fill may be placed into the area to be filled directly from the mixer truck, by pumping or by any other reasonable means. Flowable fill may not be placed on frozen ground, snow or ice.

If proposed depth of flowable fill warrants, the material shall be placed in layers. Maximum lift thickness shall be three (3) feet, except where such thickness would cause lifting or displacement of the utility, pipe or structure. In such case, depth of flowable fill shall be limited to prevent displacement of the utility, pipe or structures. If possible, both sides of the structure shall be filled simultaneously to avoid displacement. If it is not possible to fill both sides simultaneously, fill shall be alternated side to side in shallow lifts. Each filling stage shall be as continuous as possible to prevent cold joints. Additional lifts shall not be placed until the material has lost sufficient moisture to walk on without indenting more than two inches.

**3.2 Temperature Limitations**

Batching, mixing and placing may be started when air temperature is at least thirty-four (34) degrees F and rising. Material temperature at the time of placement shall be a minimum of forty (40) degrees F.

### **3.3 Backfill**

Backfilling and compacting on top of the in-place flowable fill shall not proceed until the in-place material achieves a minimum bearing strength of twenty (20) pounds per square inch.

### **3.4 Protection**

The in-place flowable fill shall be protected using normal methods used for protection of other concrete structures, except that the temperature shall be maintained at fifty (50) degrees F or above for a period of twenty-four (24) hours or until the strength requirement is met and the backfill is completed.

## **PART 4 - MEASUREMENT AND PAYMENT**

### **4.1 Measurement**

Flowable fill shall be measured to the nearest cubic yard of material placed, unless other measurement provisions are specified. Measurement provisions shall be consistent with the Bid proposal. In lieu of actual field measurement for volume of material placed, truck delivery tickets may be used.

### **4.2 Payment**

Flowable fill will be paid at the unit price established in the Bid Proposal.