

**SECTION 121  
FLOWABLE FILL**

**121-1 Description.**

Furnish and place flowable fill as an alternative to compacted soil as approved by the Engineer. Applications for conventional flowable fill include beddings; encasements; closures for tanks and pipes; and general backfill for trenches, embankments and walls. Applications for cellular concrete flowable fill include beddings; encasements; closures for tanks and pipes; and general backfill for embankments and walls.

**121-2 Materials.**

Meet the following requirements:

- Fine Aggregate<sup>(1)</sup>.....Section 902
- Portland Cement (Types I, II, or III).....Section 921
- Water.....Section 923
- Admixtures<sup>(2)</sup>.....Section 924
- Ground Tire Rubber (GTR)<sup>(3)</sup>.....Section 919
- Fly Ash, Slag and other Pozzolanic Materials ....Section 929
- Preformed Foam.....ASTM C 869

1. Any clean fine aggregate with 100% passing a 3/8 inch mesh sieve and not more than 15% passing a No. 200 sieve may be used.
2. High air generators or foaming agents may be used in lieu of conventional air entraining admixtures and shall be added at jobsite and mixed in accordance with the manufacturer's recommendation. GTR may reduce the amount of high air generators or foaming agents used.
3. GTR may replace up to 20% of the fine aggregate.

**121-3 Mix Design.**

Conventional flowable fill is a mixture of portland cement, fly ash, fine aggregate, admixture and water. Flowable fill contains a low cementitious content for reduced strength development. Cellular concrete flowable fill is a low density concrete made with cement, water and preformed foam to form a hardened closed cell foam material. Cellular concrete flowable fill may also contain fine aggregate, fly ash, slag and admixtures.

Submit mix designs to the Engineer for approval. The following are suggested mix guides for excavatable, non-excavatable and cellular concrete flowable fill:

	Excavatable	Non-Excavatable	Cellular Concrete
Cement	75-100 lb/yd <sup>3</sup>	75-150 lb/yd <sup>3</sup>	Min 150 lb/yd <sup>3</sup>
Pozzolans or Slag	None	150-600 lb/yd <sup>3</sup>	Optional
Water	*	*	*
Air**	5-35%	5-15%	****
28 Day Compressive Strength**	Maximum 100 psi	Minimum 125 psi	Minimum 80 psi
Unit Weight **	90-110 lb/ft <sup>3</sup>	100-125 lb/ft <sup>3</sup>	20-80 lb/ft <sup>3</sup>
Fine Aggregate	***	***	Optional

	Excavatable	Non-Excavatable	Cellular Concrete
<p>*Mix designs shall produce a consistency that will result in a flowable self-leveling product at time of placement.</p> <p>**The requirements for percent air, compressive strength and unit weight are for laboratory designs only and are not intended for jobsite acceptance requirements.</p> <p>***Fine Aggregate shall be proportioned to yield 1 yd<sup>3</sup>.</p> <p>****In cellular concrete, preformed foam shall be proportioned at the job site to yield 1 yd<sup>3</sup> in accordance with the design requirements.</p>			

#### **121-4 Production and Placing.**

Use flowable fill manufactured at a production facility that meets the requirements of 347-3. Deliver flowable fill using concrete construction equipment. Revolution counter are waived. Place flowable fill by chute, pumping or other methods approved by the Engineer. Tremie flowable fill through water. Cellular concrete flowable fill may not be placed within three feet of the bottom elevation for roadway base courses.

#### **121-5 Construction Requirements.**

Use straps, soil anchors or other approved means of restraint to ensure correct alignment when flowable fill is used as backfill for pipe or where flotation or misalignment may occur.

Protect flowable fill from freezing for a period of 36 hours after placement.

Place flowable fill to the designated fill line without vibration or other means of compaction. Do not place flowable fill during inclement weather, e.g. rain or ambient temperatures below 40°F. Take all necessary precautions to prevent any damages caused by the hydraulic pressure of the fill during placement prior to hardening. Provide the means to confine the material within the designated space.

#### **121-6 Acceptance.**

Acceptance of flowable fill will be based on the following documentation and a minimum temperature of flowable fill at the point of delivery of 50°F.

Submit a delivery ticket to the Engineer for each load of flowable fill delivered to the worksite. Ensure that each ticket contains the following information:

1. Project designation,
2. Date,
3. Time,
4. Class and quantity of flowable fill,
5. Actual batch proportions,
6. Free moisture content of aggregates,
7. Quantity of water withheld.

Leave the fill undisturbed until the material obtains sufficient strength. Sufficient strength is 35 psi penetration resistance as measured using a hand held penetrometer in accordance with ASTM C-403. Provide a hand held penetrometer to measure the penetration resistance of the hardened flowable fill.

#### **121-7 Basis of Payment.**

When the item of flowable fill is included in the Contract, payment will be made at the Contract unit price per cubic yard. Such price and payment will include all cost of the mixture, in place and accepted, determined as specified above. No measurement and payment will be made for material placed outside the neat line limits or outside the adjusted limits, or for unused or wasted material.

Payment will be made under:

Item No. 121- 70- Flowable Fill - per cubic yard.