

TENNESSEE concrete

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IT'S DELIVERED IN A READY MIX TRUCK, BUT IT'S NOT CONCRETE



WHAT IS IT?

By LK. Crouch, Ph.D., P.E.

Excavatable flowable fill (EFF) is a blend of Portland cement, fine aggregate, water, and admixtures. EFF is delivered in a ready mix truck, but EFF is not concrete. EFF was developed to serve as an alternate backfill for roadway utility cuts. The three primary advantages of EFF are:

1. Improved worker safety - requires no compaction, therefore workers spend less time in the utility trench
2. No in-service settlement - utility cut patches do not sink producing roadway hazards
3. Can be removed with conventional excavating equipment - no jack hammering

How does it differ from Concrete?

Unlike Portland cement concrete (PCC), higher compressive strength is not beneficial for EFF. PCC requires a minimum strength to perform properly in structures. EFF requires both a minimum and maximum strength to perform properly. Minimum strength recommendations are to assure that EFF has adequate bearing capacity and does not settle (deform) excessively under load. Maximum strength recommendations are to assure that EFF can be removed with conventional excavating equipment.

The Critical Elements in EFF Design

EFF mixture design requires a new mindset. The "stronger is better" idea does not work with EFF. Several well-meaning designers have produced "EFF" mixtures, which are not excavatable using the "stronger is better" idea. The paste portion of the mixture (Portland cement, water, and admixtures) is critical to EFF performance. Proper paste proportions allow EFF mixtures to be fluid, develop adequate early strength, and yet not become so strong that it cannot be excavated later. A little too much of this or that paste component can seriously jeopardize EFF performance, particularly excavatability.



Getting It Right

A certain minimum volume of paste is required to make EFF fluid and produce adequate strength. The paste volume must be achieved without using too much Portland cement or later strength will preclude excavation. EFF designers can increase paste volume using one of following:

1. Mineral admixtures - Portland cement replacements such as fly ash
2. Air entrainment - millions of air bubbles to pump up the paste volume

Each of these materials has advantages and the choice of which to use is dependent on the particular job.

How TRMCA is Helping EFF Designers Get It Right

TRMCA is:

1. Sponsoring a research project at Tennessee Technological University to determine proper EFF paste proportions
2. Applying for a federal grant with TTU and Kentucky Ready Mixed Concrete Association to do a large field study on EFF
3. Developing guide specifications and technical presentations for municipal officials and engineers
4. Consulting with government and private industry to share technical information

Together with partners in industry, government, and academia, TRMCA hopes to make utility cut problems just a bad memory.

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