

The strength of flowable mortar

FLOWABLE FILLS are gaining popularity in projects where material fluidity and eventual excavation of fill are factors.

The mother of invention

Most states have developed or are developing specifications for flowable fills. The Iowa DOT, a leader in the use of flowable fill, most commonly refers to this material as flowable mortar.

Flowable mortar is an engineered material consisting of portland cement, fine aggregate, fly ash, and water. Flowable mortar is a favorable backfill because it's pliable enough to fill small or winding spaces.

The Iowa DOT developed a flowable mortar when it needed a fluid fill around box culverts placed beneath existing bridges left in place during construction. This procedure allows the road to remain in service as the culvert is built, and completely fills the void between the new culvert and the old bridge opening.

Since this initial use, the department has discovered other uses for flowable mortar as an alternative to earth or granular backfill (sand or crushed stone): in sewer trenches, utility trenches, and conduit trenches, and for road base, mud jacking, sub footing, floor slab base, and pipe bedding.

Common uses for flowable mortar in Iowa are placement under existing bridges, around or within box culverts or culvert pipes, and in open trenches.

Advantages

In addition to its fluidity, flowable mortar can be excavated relatively easily. This characteristic makes it a useful fill for utility trenches in residential areas, where utility lines are often moved or require regular maintenance. A lower strength material is being developed for urban use, so excavation will be easier. (The specifications for this material will be available through the Iowa DOT and the *Urban Standard Specifications for Public Improvements* manual.)

At the same time, flowable mortar is durable, and requires infrequent maintenance or replacement. Construction sites that use flowable mortar can be safer than those using granular fill, because generally workers can fill a trench with flowable mortar without having to enter the trench.

Finally, flowable mortar mixes provide a useful way to recycle fly ash byproducts from local power plants.

Disadvantages

Flowable mortar is generally not a good choice in cold, wet conditions.

In dry, warm weather, flowable mortar will harden enough to support traffic within approximately 24

Flowable mortar specifications

IOWA DOT specifications for flowable mortar may be appropriate for local projects. The specs, for both residential and non-residential construction, require the following:

- Type I cement (portland cement)
- natural sand fine aggregate, consisting of mineral aggregate particles or foundry sand from the castings of ferrous material
- fly ash meeting specific requirements and from a source approved by the engineer

After the project engineer approves material samples, the mortar is mixed using the following proportions:

- cement: 100 pounds
- fly ash: 300 pounds
- fine aggregate: 2,600 pounds

Approximately 70 gallons of water is added to these materials to make one cubic yard of flowable mortar.

For Iowa DOT specifications online, see www.dot.state.ia.us/specifications/index.htm. Flowable mortar is described in section 2506 of the standard specifications. •

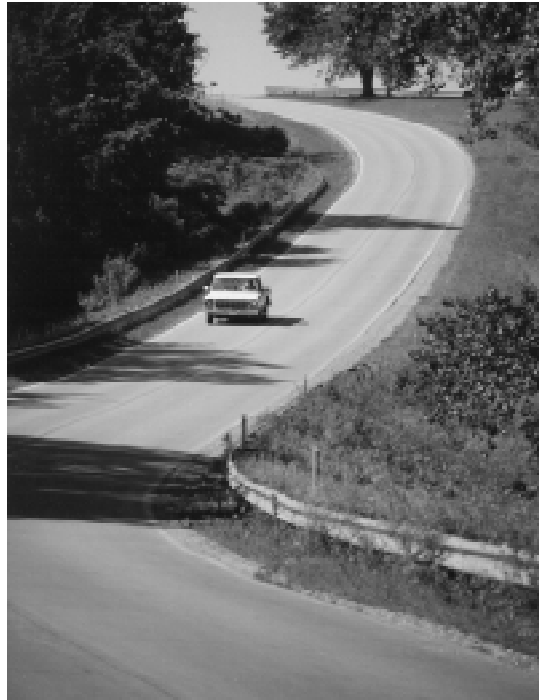
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Year 2000 data ready for your pavement management program

THE IOWA PAVEMENT MANAGEMENT PROGRAM (IPMP) year 2000 highway distress data are ready for delivery. Data will be sent on CD to all counties and cities above 5,000 in population for the following Regional Planning Affiliations (RPAs): 1, 2, 3, 4, 5, 6, 7, 12, 17, and 18. CDs will also be sent to the RPAs.

In addition, Omar Smadi and Zach Hans are available to conduct presentations and training on the IPMP data and GIS tools on an RPA basis.

For more information regarding the data and/or training, contact Omar Smadi, CTRE's pavement management specialist, or Zach Hans, CTRE's GIS specialist, 515-294-8103, smadi@iastate.edu, zhans@iastate.edu. •



hours after placement. If it is placed during rainy conditions or cold weather, however, the rate of hydration will be affected, slowing the setting process. If flowable mortar is placed on frozen ground, the mortar will set unevenly or not at all.

If flowable mortar is placed where water is standing, its rate of hydration will be affected and the mortar will not set properly.

For more information

Contact David Heer, Iowa DOT earthwork field engineer, 515-239-1280, david.heer@dot.state.ia.us; or Todd Hanson, Iowa DOT PCC engineer, 515-239-1226, todd.hanson@dot.state.ia.us. •

Details of backfill over culvert where special backfill depth is 150 mm to 900 mm (created from Iowa DOT Roadway Typical Drawings, 4300 series)

