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Acronyms in this issue

AASHTO	American Association of State Highway and Transportation Officials	Iowa DOT	Iowa Department of Transportation
CTRE	Center for Transportation Research and Education	ISU	Iowa State University
FHWA	Federal Highway Administration	LTAP	Local Technical Assistance Program
		MUTCD	Manual on Uniform Traffic Control Devices

Flowable mortar helps prevent settling of bridge approaches

IOWA DOT materials technicians and Iowa County engineers have been experimenting with flowable mortar as fill material for bridge approaches. The goal: Eliminate the bump where approach meets bridge deck.

Problem

To install concrete abutments during bridge construction, crews must over-excavate the bank (see photo). When construction is finished, the excavated dirt is commonly used to fill the space under and around the approach slab.

However, it's difficult to completely fill the space and compact the dirt effectively. The dirt generally settles and, with it, the bridge approach. If it settles significantly, moving vehicles experience a jolting thump-thump where the approach meets the bridge deck.

Fix

In recent years Bill Kirk, portland cement (PC) technician for Iowa DOT District 6, and his crew have backfilled four bridge approaches with flowable mortar instead of dirt. This is a new application for flowable mortar, which is commonly used as fill material around or within box culverts and in trenches.

Kirk has discovered that, as bridge approach backfill, flowable mortar has two advantages:

- It doesn't settle. It effectively fills the space and hardens to a durable concrete. Of the four locations where flowable mortar has been used, "... none of the bridge approaches have settled at all," Kirk says.
- It's economical. Kirk estimates that flowable mortar costs only about \$40 per cubic yard, substantially less than the cost of replacing and compacting excavated dirt.

"Recipe"

Flowable mortar is a relatively fluid mixture of sand, water, fly ash, and cement.

One cubic yard of flowable mortar for bridge approach fill:

- 100 pounds portland cement
- 400 pounds fly ash (coal byproduct)
- 2,600 pounds sand
- approximately 67 gallons water
- 3 ounces air agent

This mixture uses coarser sand and more fly ash, air agent, and water than called for in the Iowa DOT's general specifications for flowable mortar. The extra fly ash and air agent help keep the concrete flowable and the sand in suspension.

For more information

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The area excavated to install concrete abutments during bridge construction must later be backfilled. *Photo provided courtesy of Iowa DOT District 6.*