



**HAYWARD
BAKER**
Geotechnical Construction
KELLER

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Use of Grout Technology for Stabilization of Soft Ground and Sinkholes

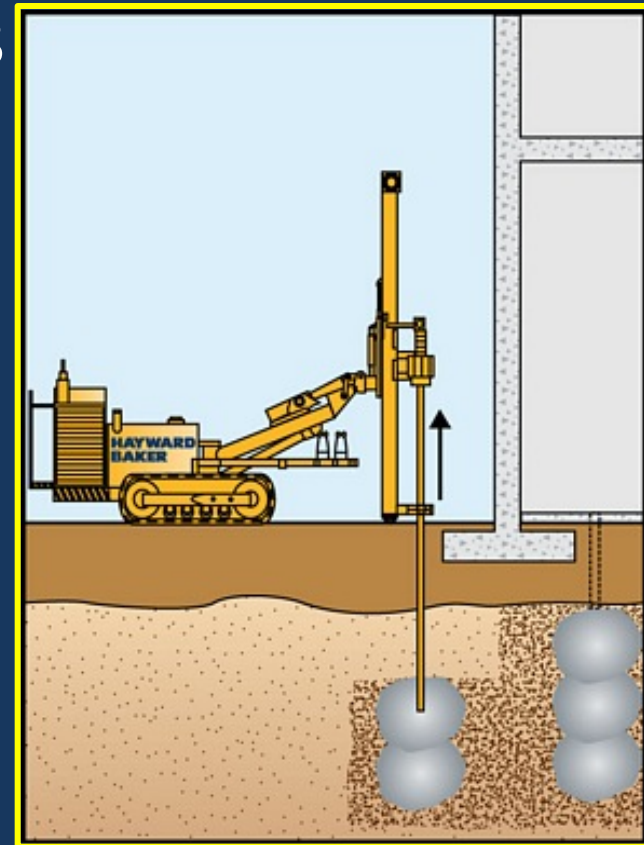
Matthew Hammett, PE
Area Manager (TN, KY)

Ever Seen This?



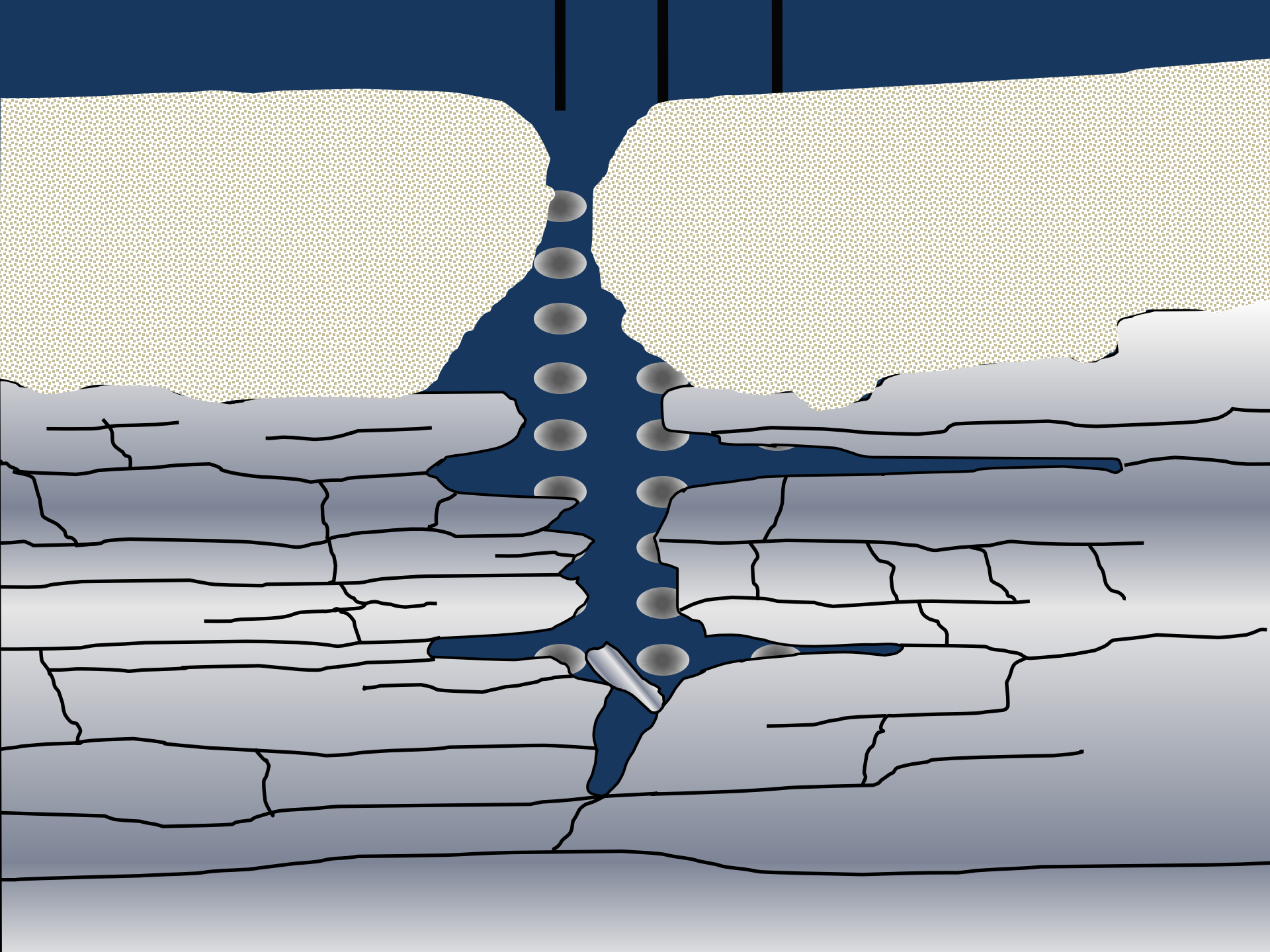
Low Mobility Grouting

- Grouting technique that displaces and densifies loose granular soils, reinforces fine grained soils and stabilizes subsurface voids or sinkholes, by the staged injection of low-slump, low mobility aggregate grout.



Typical Installation Pattern





CSX Casky Siding - Hopkinsville, KY











Worker in light blue polo shirt and orange hard hat.

Worker in yellow t-shirt and brown hard hat.

Worker in yellow t-shirt with "HAYWARD BAKER" and "KELLER" printed on it, wearing a brown hard hat.

Worker in white t-shirt with "HAYWARD BAKER" and "KELLER" printed on it, wearing an orange hard hat.

Worker in dark blue shirt, partially visible on the right side of the image.

US 321 - Lenoir City, TN













VOLVO RENTS
Construction Equipment

NOT POTABLE
WATER











Pellissippi Parkway – Oak Ridge, TN



07/26/2007



07/26/2007



CSX Verlie – Verlie, AL



8th Avenue – Birmingham, AL



01/30/2008



01/30/2008



01/30/2008



















EMERGENCY WORK

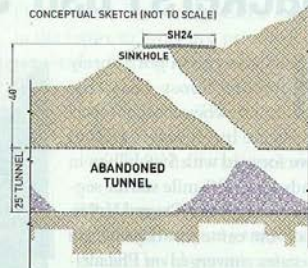
80-Ft Sinkhole Repair Near Abandoned Colorado Rail Tunnel a Tricky Job

The Colorado Dept. of Transportation began repairs on July 18 on a 35-ft-wide sinkhole that opened on a Colorado highway 100 miles west of Denver. The sinkhole, estimated by CDOT to be at least 80 ft deep, developed on July 9, when timbers collapsed in an abandoned railroad tunnel that crosses under U.S. 24 near the 10,315-ft-high summit of Tennessee Pass. CDOT says the road, which runs from Leadville to Minturn, will remain closed until repairs are complete.

The Rio Grande railroad built the tunnel in 1890 and abandoned it in the early 1900s because "it had a history of collapses," says CDOT spokeswoman Ashley Mohr. CDOT built a road over it in 1925. The Union Pacific Railway opened a second train tunnel 50 ft west of the highway during World War II.

Contractor Hayward Baker Inc., Broomfield, Colo., won the repair contract with a bid of \$829,748 and a \$5,000-per-day incentive for an early opening; the firm will be fined \$5,000 for each day the highway remains closed past August 6. Total repair costs, including traffic control and design, are estimated at \$1.5 million. CDOT began the expedited emergency bidding process for highway repairs after the sinkhole opened up on July 9. After receiving repair bids, CDOT selected the contractor based on the lowest bid amount and the time estimated to complete the project.

To repair the sinkhole, Hayward Baker crews



are drilling nearly 200 holes in a grid pattern across the site and injecting 5,000 cu ft of low-mobility compaction grout into the edges of the void on the north and south sides of the highway. Then, crews will add 1,200 cu yd of back-fill and another 1,200 cu yd of flow-fill and pressurized grout to fill any remaining voids and compress the materials underneath the highway.

The work is tricky because no one is sure if the other wooden braces in the old tunnel are stable, says Joe Elsen, CDOT program engineer for Region 3 East. "This is my ninth emergency repair and my first sinkhole, but what concerns us is what we can't see—whether there's another void below this one after we start filling it," Elsen says.

Repairs are scheduled to be completed well before Aug. 23, when the USA Pro Challenge bicycle race will go through the area. ■

Mark Shaw



SINKING FEELING
Work started on July 18 to repair a 35-ft-dia sinkhole on U.S. 24 in the Colorado Rockies.

Colorado Rail Tunnel



SINKING FEELING
Work started on July 18 to repair a 35-ft-dia sinkhole on U.S. 24 in the Colorado Rockies.



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Questions?