

# Non-Shrinkable Backfill

## Save time and money restoring utility cuts

Street cuts for utility installation or repair are a major problem because utility contractors are not frequently monitored or monitored sufficiently in accordance with good specifications. It is not that locals don't want better quality control, but funding levels frequently dictate the supply of equipment and manpower available, which is less than what is required to provide good quality street cut repairs. As a result, many street cut repairs fail, leaving the public with a rough riding road surface.

Four years ago Fort Collins, Colorado began looking for ways to address the failure of street cut repairs. They found an interesting backfill mix that was being used in Toronto, Canada. Around the same time Prescott, Arizona also began experimenting with the mix. Just recently the Maine Local Roads Center has looked into using this material in New England. So far, everyone has realized positive results.

The objectives behind finding a new backfill material were simple but rigorous. Demands for on-site inspection had to be reduced and the growing number of callbacks to re-repair utility cuts had to be eliminated. The mix to be used was to be made with locally available aggregates. It had to flow nicely, and it needed to be delivered in existing ready-mix trucks. It also had to be reasonably priced and easily removable for additional cuts and patching. Installation would have to be uncomplicated and foolproof. Finally, the surface had to be capable of supporting traffic loads within two or three hours.

Mike Downing of Prescott wrote to T.H. Johnston with the City of Toronto's Roads and Traffic Department to receive more information on the new mix. The first pours were too wet, had too much portland cement, not enough coarse aggregate, and too much sand. When it became necessary to retrench, excavation was extremely difficult. Over the next few months, with help from other local agencies, concrete suppliers, and consulting engineers, Downing was able to develop a suitable mix design.

For each cubic yard of material mix:

- 2,600 lbs., 3/8-inch minus coarse aggregate
- 800 lbs. mortar sand

- 94 lbs. (or one sack) of portland cement
- 11 gallons of water

Mike Downing has found that this material is solving his city's backfill problems. However, there are a few occasional difficulties for which Downing offers a few tips:

- On higher-volume collector streets with speeds of 25 to 35 mph, the material will crush and settle if driven on within two hours of installation. Solution: Have an asphalt cold mix on hand and temporarily patch until hot mix is available.
- Water content in the mix is critical. Do not exceed 11 gallons per cubic yard. Make sure drivers do not have excess water in their mixer drum from previous cleanup.
- Our suppliers tell us that spin trucks with longer fins are better for mixing. It is essential that loads be thoroughly mixed at a relatively high rate of speed.
- Don't compact or finish the surface. Just strike off with a square-nose shovel or asphalt rake.
- Educating suppliers and contractors on use of the mix has been a problem. We've had 5 "bad" loads that were the result of either too much water or insufficient mixing. Also, contractors should not compact the material in lifts.

In spite of the few difficulties experienced, both Colorado and Arizona have found that the material's advantages outweigh the few minor problems. Their search for a new backfill material has paid off and they list advantages such as the following:

- Prolonged life of the roadway's traveled surface.
- Roadways reopened in a short time.
- No subgrade failure in patches.
- Significantly reduced on-site inspection time and decreased liability for the City.
- Fewer number of call backs to correct problems.
- No apparent swell/shrink from freeze/thaw or from wet/dry conditions.
- Usable in areas where compaction equipment is difficult to use.
- Does not require geotechnical testing.
- Performs better than granular fills.
- Less time spent on-site, allowing people to be better utilized (backfilling a 12-18 foot utility trench takes about 15 minutes of one person's time.
- Reduced cost: Colorado did a cost comparison and found that with the conventional method their inspector's time at the job site for monitoring the contractor was doubled or tripled over the time required with the non-shrink material. This time savings alone, not including the mix's long term benefits, showed substantial cost savings

The above article was composed using excerpts from *Non-Shrink Backfill Saves Time, Money In Restoring Utility Cuts, Arizona Roads, Vol. 4, No. 4, Oct., 1988; Use of Non-Shrinkable Backfill In Fort Collins, The Wheel, Summer 1989; Non-Shrink Backfill Improves Utility Cuts, Better Roads, August, 1990.* ●

