

NEW REPAIR METHOD SAVES TIME AND MONEY



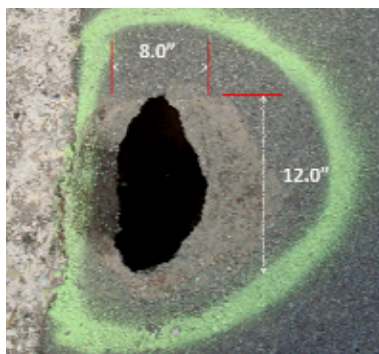
Municipality repairs sink hole without excavation using latest Uretek Deep Injection[®] process combined with TKP method.



BY TOSH KANO – ENGINEER, HOLLADAY CITY, UTAH

When we receive a call from a citizen regarding a sink hole in our streets, we contact the sewer and the water companies to determine any active leaks. When their investigations show no leaks anywhere, we normally start cutting the asphalt with a saw and excavate the sink hole for repair.

We excavate deep enough to fill it with imported barrow material and with road base. When we achieve the specified compaction for the barrow and road base material, we finish with an asphalt repair at the surface.



Below the 8x12-inch opening, the sink hole measured 160 Cu. Ft.

A water line break washes sub-grade soils from under an asphalt-covered municipal roadway. When a small hole in the surface of the asphalt is discovered, City officials immediately take action to repair the hazardous sinkhole caused by the erosive force of the underground water movement.

This method of repair often takes from a one-half day to a full day or more to complete. This “normal” method usually costs \$ 600 to \$ 5,000 depending on the size of the sink hole. Our goal is to complete a quality repair at low overall cost, and keep traffic interruption to a minimum.

The sink hole at Oakcrest Circle in Holladay City was caused by an old water break which occurred about two months ago.

The sink hole occurred above the sewer line. The water break caused the water to follow the sewer trench and washed away the material around the pipe. It created a huge void around the pipe. Finally, the surrounding soil collapsed and created a twelve inch hole at the surface of the asphalt.

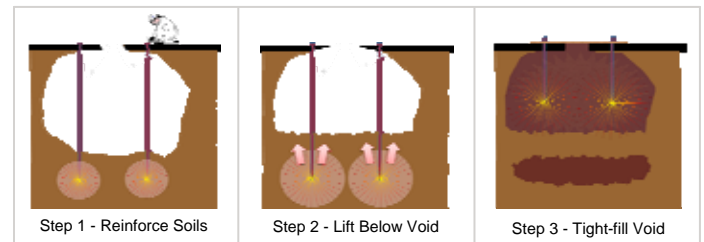


Figure 1: Uretek Deep Injection[®] Sink hole repair steps

The underlying sink hole measured 160 cubic feet. Our estimate for repairing it in the normal manner was around \$4,000 plus 1-2 days of traffic interruption at the site.

We decided to repair this sink hole utilizing the Uretek Deep Injection[®] method which reinforces sub-grade soil with high-density hydro-insensitive expansive polyurethane to push out water, fill micro-fissures and voids in

(Continued on next page...)



Concrete Stabilization Technologies, Inc., is the Rocky Mountain Region's exclusive provider of Uretek polyurethanes. CST's home office is in Denver, Colorado with satellite facilities in Salt Lake City, Utah and Wheatland (Cheyenne), Wyoming.



CST is your best solution for concrete lifting, foundation repair, road and pavement preservation, soil compaction, soil repair, and subgrade stabilization. Our patented UDI method uses specially-formulated high-density polyurethanes designed to work in the presence of water. CST technicians are experienced using specialized chemical grouts to solve water intrusion issues. We are a licensed Magnum[®] piercing contractor and exclusive provider of EcSS 3000[™] expansive clay treatments. Call CST today at 888-306-9191 for a project evaluation.

Sinkhole (Continued from previous page)

the surrounding soil, and compact, lift, and stabilize the soil in situ. CST provided immediate response for the job.

The initial injection is set at an elevation below the sink hole, allowing compressive lift of existing soils to partially fill the sink hole.



Compressive strength of the polyurethane rises as density is increased. Here, CST uses a temporary cap of double-layered plywood to contain the expansion.

Then, since this hole was located under an asphalt surface, we applied the TKP method, to fill and stabilize the sink hole itself with expansive polyurethane. This method uses a temporary surface

cap retained by a heavy surface load to attain high density / compression within the main void area. We selected a polyurethane formulation strong enough to support the expected live load on the road above.

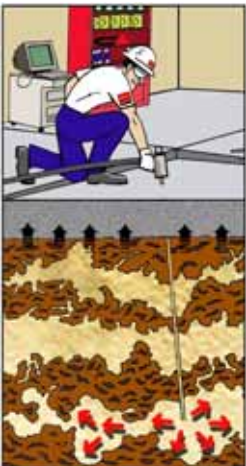
A concrete cap was poured in the top 6 inches to form an acceptable drive surface. The total time to repair this sink hole was 2.5 hours, a major savings in traffic interruption. The total cost was \$2,700, a respectable savings in direct costs for the City.



Tosh Kano, P.E., is a member of Holladay City's engineering department.

UDI Method Recognized for Soil Reinforcement Properties

Recent government testing of Uretek Deep Injection® (UDI) method confirm expectations that its high-density polymers can be used to reinforce soil.



The latest news in soil rehabilitation comes from Defense studies conducted in 2007-2008 where UDI is used to repair bomb craters in military airfields. The studies show that polymers injected according to patent have sufficient shear and compressive strength to restore soil bearing properties, allowing surface support of heavy live overburden.

Engineers interested in learning more about UDI can contact CST Stabilization or Uretek USA.

DCP Testing a Component of Subgrade Soil Repair

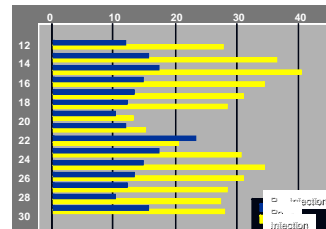
A tool often used to determine relative soil densities is the Dynamic Cone Penetrometer. This helpful examination of below-ground elevations is known as a DCP or DP test.

Geotechnical reports often define the type, classification, water content, and plasticity of soil. When reports like these are unavailable, or when the nature of the project suggests a need for more specific data, a Dynamic Cone Penetrometer test gives the engineer and technicians immediate and timely understanding of underlying strata.

“DCP tests give the engineer immediate and timely understanding of underlying strata.”

The test is accomplished by first drilling a 3/4-inch hole in the surface concrete or asphalt. Then, a small steel cone is attached to the end of a specially-designed steel rod, and is driven into the ground using a motorized hammer.

Each rod is scored around its circumference with easily-seen markings set at one decimeter apart. As each hammer blow is recorded, uniform markings on the rod indicate how much vertical distance the rod has moved. Higher blow counts indicate stronger soil.



Penetrometer test report graphics show blow counts before and after Deep Injection® soil compaction.

Multiple rods can be connected together to reach the desired depth for a test.



Prior to completing subgrade soil compaction and reinforcement with polymers, a DCP test is performed. A hole is drilled through the concrete or asphalt surface (left). Then an automated hammer (right) drives a steel cone into the soil using a metered rod. Blow counts recorded indicate the relative density of the soil.

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