

# Construction News



## DRAINAGE PROJECT *Rehabilitates Historic Tunnel*

**A Natchez, Miss., storm drainage project uses gunite shotcrete to reinforce a failing tunnel; adds over 500 feet of box culvert for added drainage capacity.**

Hemphill Construction Company and Fenton Crane & Rigging performed work on a \$3.5-million project in Natchez, Miss., to improve drainage in the central business district and repair a deteriorating tunnel that was the cause of cave-ins along Canal Street, in the heart of the city's historic district.

One of the oldest settlements on the Mississippi River, the city of Natchez, Mississippi, faces special challenges when improvements to its infrastructure are needed to its more historic areas.

The tunnel beneath Canal Street was originally built in the late 1700's as a canal used to float small barges of cotton to the Mississippi River. In 1835, the canal was converted into a 9-foot-tall by 10-foot-wide storm drainage. Greyhound busloads of tourists and other vehicular traffic further aggravated the deterioration of the mortar in the bricks, causing failures in the structure. "We've had several cave-ins over the years, where the top would collapse," says David Gardner, Natchez Water Works. "The thickness of the fill above the pop subsection is only around 6 inches to a foot."

Collapses from the top of the tunnel are costly. Repairing these failures as needed cost the city as much as \$100,000 per repair. A grant from the



Existing Brick Tunnel

U.S. Army Corps of Engineers for a surface water drainage project allowed the city to take up more preventive measures to reinforce the tunnel beneath Canal Street, add box culverts for storm drainage on either side of the tunnel, and perform surface curb and gutter work along the street. The grant also covers a second phase of the project that will replace old storm drainage pipe and add new storm drainage pipe in the north section of Natchez, which experiences a lot of surface water problems. Two separate

drainage systems will merge into one and eventually work its way into the tunnel and on the Mississippi River. The total for both phases of the project is 8 million.

Strict preservation guidelines prohibited the city from removing the brick and replacing it with something more substantial. Fenton Rigging And Contracting, Inc.'s Gunnite and Shotcrete Division lined the structure with rebar and shotcrete to reinforce it for the inside.



Reinforcement Installed, Ready for Gunite Placement



Completed Gunite Lining

Fenton Rigging specializes in railroad tunnel lining and lining underground structures such as older and deteriorating corrugated metal pipes and reinforced concrete pipes. The company uses equipment that is portable and lightweight. On the job, they used a combination of an Allentown R900 Dry-mix gunite rig and a Schwing 500 shotcrete pump.

The contractor installed a rebar and wire mesh-reinforced shotcrete liner for the 2,400-foot-long tunnel. “We used the existing tunnel as a form,” says Mike Milton, Fenton Rigging, “we installed a self standing structure inside it.” The floor of the tunnel was 6 inches thick, the sidewall and crown was 4 inches thick. The job required cleaning/dewatering the culvert and installing #4 rebar completely around the circumference of the culvert on 1-foot center. After the rebar was installed, it was secured with 1-foot-long #4 rebar rows. A layer of 2x2 12, 12 galvanized mesh was secured to the rebar before it received shotcrete lining. Construction on the tunnel portion began Thanksgiving of 2006 and was completed in mid-April.

A shotcrete liner was also chosen because of the limited access, which made slipforms and concrete pours a poor choice. “We had only four

access places in the whole tunnel,” says Milton. “We get production from our gunite equipment with a distance of 1,500 lineal feet.

The 6000-psi also makes for a very durable liner. The additional strength will be needed for an additional project Hemphill Construction is performing—milling and paving the street.

“We couldn’t mill the street until they gunited and made the tunnel structure sound,” says Earnest Garrett, Hemphill Construction. “We’ll mill and overlay the street in the next month.” In the meantime, Garrett says they are installing 2,200 feet of 8-foot wide sidewalks, with wheelchair access ramps at the intersections. Other surface work includes curb and gutter, green space between the sidewalks and the street, and restoring older brick sidewalks where failure occurred because of the collapsing tunnel.

Hemphill Construction is installing 302 feet of 10-foot by 10-foot box culvert that ties into one end of the tunnel, and 242 feet of 8-foot by 8-foot box culverts on the opposite end of the tunnel. The concrete box culverts are produced by Hanson Pipe Products in West Memphis.

“This will handle the additional storm water drainage the city is planning for the future.” ■

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