

## **NEW VOIDS DETECTED IN METRO LINK TUNNEL TROUBLE SPOTS FOUND ON LIGHT-RAIL ROUTE**

By Thom Gross St. Louis Post  
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An infrared survey of the Metro Link tunnel downtown has found 33 possible voids near the tunnel walls.

Metro Link officials ordered the study after a 175-foot section of the tunnel collapsed July 27 at Broadway and Washington Avenue. Authorities have theorized that a large void outside the tunnel walls led to the collapse.

The study called seven of the 33 spots high priorities for investigation and repair. It also found 10 spots where steam lines appear to be leaking near the tunnel. The study recommends digging out all 43 spots from the street to find the cause, repair it and fill the void with grout.

Metro Link officials say they have yet to decide which spots to dig up or when or by whom the work would be done.

The study makes no recommendations on how soon the voids should be repaired. In any case, the work will have no effect on the start of Metro Link, scheduled for July, said spokeswoman Linda Hancock.

"There will be further investigative work done,"

Hancock said. "What kind of investigation specifically has not been determined. . . . This is a long-term process; it's going to take time."

A void is a subsurface area where dirt fill has eroded. Voids adjacent to the tunnel are undesirable, engineers say, because they could destabilize the archway structure.

The ceiling of the tunnel consists of twin archways, five bricks thick. Engineers explain that arches are very strong as long as the forces on them are balanced. Solid dirt fill around an arch provides a balanced condition, but a void on one side would make the arch unstable.

Large voids also are a concern because they could cause breaks in utility lines that span them. A leak then could damage the tunnel.

Entech Engineering of St. Louis made the study, using its patented process called infrared thermography. The photographic technique defines subtle variations of temperature. Variations can indicate a void or other stress on the structure. The greatest temperature variations were those classified as high priorities.

The study began in September and was completed Nov. 23. The Post-Dispatch got a copy of the final report last week.

Metro Link is a light-rail rapid-transit system Bi-State Development Agency is building at a cost of \$351 million. The

18-mile line will run from East St. Louis to Lambert Field.

The line will cross downtown through a 4,400-foot tunnel built in the 1870s. After replacement of the collapsed section and construction of two Metro Link stations in the tunnel, about 3,100 feet of the original structure remain.

Bi-State officials say structural work completed on the remaining 3,100 feet will prevent any future collapse for at least 100 years - even if voids or utility leaks develop.

McCarthy Construction, general contractor for the tunnel project, had suggested the infrared study in 1991, but Bi-State officials said then that it was unnecessary. Bi-State officials said they ordered the study after the collapse to help assure the public that the tunnel is safe.

The infrared study found three high-priority and seven low-priority spots where leaks had previously been reported in the tunnel.

Leaks usually signal voids, experts say, because the water would have carved a void by its flow.

Engineers who inspected the tunnel before construction began noted several leaks but made no effort to find or address voids. The section that collapsed was adjacent to the most voluminous leak.

The biggest potential void identified in the infrared study

lies immediately east of the collapsed section. That area, identified as a high priority, appears to be 1,500 square feet when photographed from above.

EnTech's report recommended the use of ground-penetrating radar to help define the depth and other characteristics of voids identified by the infrared pictures. Bi-State officials say they have yet to decide whether to employ the radar.

Most of the potential voids are near utility lines and probably were caused by leaks, the report notes. Bi-State officials say they are discussing each potential void with companies that have utility lines nearby. They say they have yet to decide who will be responsible for excavation and repair, but they have praised the cooperation of the utilities.

Utility lines in the tunnel area include cast-iron water mains and oblong brick sewers, each about 140 years old, as well as steam lines and conduits for electricity and communications.