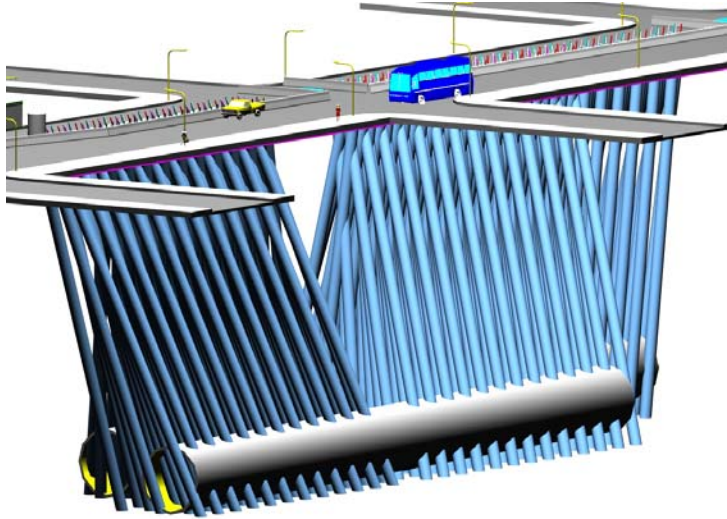


## Layne Christensen Project Freezes Traffic

Closing off two of five traffic lanes on 11th Avenue in bustling downtown Manhattan to drill more than 200 freeze holes as part of a subway system upgrade was not the biggest problem facing Keith Myers and Joe Sopko of Layne Christensen.

Even the material being drilled – a bedrock valley below overburden – was not an issue. The real problem was avoiding the myriad of gas, water, telephone, sewer, fiber optics and other service lines in the top 10-15ft of the two-block area.

“We had to drill double angles, compound angles and the problem was the large number of utilities in the top 15ft,” said Mr. Sopko, director of engineering from Layne Christensen’s operation at Fort Washington, Wisconsin, who is now in charge of the company’s New York projects. “We had three sonic rigs – a couple were brand new, almost prototypes. Basically, the job would not have been completed had it not been for the sonics.”



Using two conventional drills and three sonic-drill heads, with a crew of more than 50, Layne Christensen drilled 268 holes, starting on September 15, 2008 and finishing on January 17, 2009.

The company was subcontracted by S3II, a consortium of international contractors that included JF Shea, Schiavone and Skanska USA Civil, chosen by the Manhattan Transit Authority as part of a US\$1.1 billion project to build 2,100m of twin tunnel from the current 7 line terminus at Times Square west and south to 34th Street.

In existence for over a century, Layne Christensen has its division headquarters in Boston, and geo-construction locations in Los Angeles, Pittsburgh, Seattle, Richmond, Virginia and numerous smaller cities, as well as in Italy. As an established industry leader, the company draws qualified personnel from any of its divisions for special projects. For this project, Layne Christensen drilled 5in-diameter holes and installed 3½ in freeze pipes from 80-160ft depths, says Keith Meyers, general manager at the firm’s Pewaukee, Wisconsin operation. Drilling compound-angled holes, including underneath sidewalks, forced the operation to run three 8h shifts, 6-7d/w.

Once the holes and pipes were in place, a super-cooled solution of saltwater was circulated in the smaller pipes, freezing the ground into an extremely strong, watertight material that allowed tunnel-boring machines to advance through and supports to be installed without any additional ground stabilization. Most of the boring was through solid rock, but a softer section between 26th and 28th Streets required this special treatment, which has been in use in various forms in the construction industry for more than 100 years.

## Drill Pads

Depending on the application and ground, the coolant in the pipes can be brought down to below  $-150^{\circ}\text{C}$  using liquid nitrogen or a portable refrigeration plant. Once the initial freezing has been achieved, refrigeration capacity is significantly reduced to maintain the same freezing level, reducing energy consumption.

For this project, the sonic-drill heads used by Layne Christensen were retrofitted onto a couple of older rigs owned by the company.

