



DSI References

Owner Rhode Island Department of Transportation, Providence, USA+++ **General Contractor** Aetna Bridge Company Inc, Pawtucket, USA+++ **Engineers** Parsons Brinckerhoff, New York, USA

DSI Unit DSI USA, BU Post-Tensioning, USA

DSI Scope Location of voids in ducts with ground penetrating radar (GPR); inspection of existing post-tensioning tendons with videoscope; volumeter measurement; vacuum grouting of tendon voids



Efficient Repair with DSI: Vacuum Grouting on the Jamestown Verrazano Bridge

32% of the surface area of Rhode Island, the smallest US state, consists of water. In the past, travelers either had to put up with a long ferry trip or take a long detour along Narragansett Bay in order to get from one part of the state to another. That is why the first bridge to allow a direct crossing from Jamestown to Newport was opened as early as 1940.

Because the old bridge was in a state of disrepair and no longer able to cope with increasing traffic volumes, it was replaced by the Jamestown Verrazano Bridge in 1992. This new bridge is part of a route network that leads over Narragansett Bay, providing a faster connection between the states of Rhode Island and Massachusetts.

The Jamestown Verrazano Bridge is a 2-cell box girder bridge of variable cross section that is post-tensioned with tendons and bars. During inspections in 2002 and 2005, some post-tensioning ducts in the bridge structure were found to be empty of grout, while others were found to contain voids. Voids often occur where conventional or outdated grouting methods are used and are undesirable because they can result in corrosion of the tendons, when water infiltrates and collects in those voids.

The detection of these deficits prompted a more extensive inspection and repair program in 2007. Within the scope of the repair work that was carried out on the bridge, DSI was awarded a contract to fill all known voids and to repair the post-tensioning tendons.

During this project, DSI employed a special non-destructive testing method (NDT). This special method uses ground penetrating radar (GPR), Impact Echo Scanners and videoscopes to detect voids in the ducts from the outside.

As a result, faulty ducts can be identified with absolute certainty. Since NDT technology is fairly new to the Rhode Island Department of Transportation, and since most of the work is being done "below the visible surface", the responsible project managers have to receive extensive training from experienced DSI staff personnel.

This project is one of many vacuum grouting projects undertaken by DSI in the USA. In fact, many Departments of Transportation in the USA have realized that voids in grouted PT tendons can severely compromise the load bearing capacity of bridges.

In particular, DSI is conducting a similar operation on two bridges on the Sawgrass Parkway near DSI's Miami, Florida office.

