

## 5th Street improvement

Goshen, Indiana

Geotechnical projects near active railroad tracks are challenging for the owner and the geotechnical contractor. Heightened safety awareness and minimal impact to rail traffic during the work are critical to a successful result.



## The project

Upgrading utilities for the City of Goshen involved the installation of a 24-in. water main and a 42-in. sanitary sewer in separate trenches along North 5th Street. Subsurface conditions consisted of 15 ft of poorly graded sand with occasional silt, sand, and clay layers, overlaying hard clay. The majority of the installation could be accomplished by the cut-and-cover method. However, the alignment crossed beneath three busy Norfolk Southern railroad tracks, requiring jack and bore techniques.

## The challenge

Given the subsurface profile, the primary concern for the client was the high risk of potential settlement of the tracks due to boring operations since rail deflection would significantly impact safe railroad operations.

## The solution

Sodium Silicate permeation grouting stabilized the soils ahead of jack and bore operations. Keller developed the drilling method, grout pipe spacing, and inclination/orientation to achieve the desired objective.

Working adjacent to active rail tracks, the safety of Keller's site personnel was integral to the grouting design. A minimum of 12 ft was maintained between the centerline of the tracks and drilling locations. All grout pipes were installed at angles as shallow as 12° from horizontal from behind a jersey barrier. This approach also ensured no disruptions to Norfolk Southern rail traffic during the work.

Grouting was performed using Tube a Manchette grout pipes through multiple manifolds and downhole packers to ensure complete treatment of the target soils, a length of approximately 48 ft and to a depth of 50 ft at each bore location. At each location, Grouting was performed until either maximum pressure or theoretical target grout volume was reached or undesirable ground movement was detected by a real-time elevation monitoring system. After grouting, hand excavation from within the jacked casing confirmed complete grouting of the excavation face along the alignments.

## Project facts

### Owner(s)

City of Goshen

### Keller business unit(s)

Keller

### Main contractor(s)

HRP Construction Inc.

### Solutions

Ground improvement

### Markets

Infrastructure  
Transportation

### Techniques

Permeation (chemical) grouting

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