

Slope Stabilization on the Missouri River Gasconade, Missouri

DBA Client: Hayward Baker, Inc.

Owner:

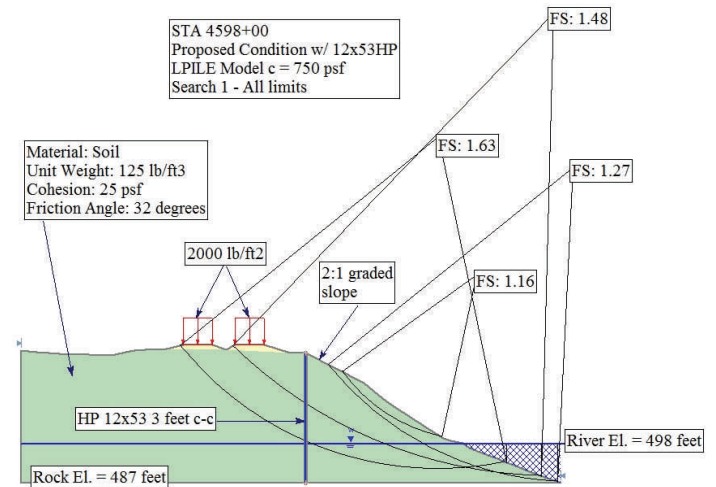
Union Pacific Railroad

Specialty Geotechnical Contractor:

Hayward Baker, Inc.

DBA Services:

- Reviewed as-bid design
- Observed drilling for additional soil data
- Performed slope stability analyses to analyze both "as-bid" and proposed slope configurations.



Project Highlights:

In order to increase rail traffic capacity, a rail line owner added an additional track adjacent to an existing main line along the Missouri River near Gasconade, MO. The new track was placed on the existing railroad embankment between the existing track and the Missouri River, requiring measures to improve the stability of existing embankment slopes. The initial design included permanent soldier pile retaining walls along portions of the project alignment and jet-grout "shear pins" in other locations to provide the required slope stability. After the project was awarded, it was determined that the available space between the river and the existing rail line was often less than needed to safely operate jet grouting equipment while keeping the rail line open to traffic. The specialty contractor determined that HP 12x53 driven piles could be safely installed, resulting in the proposal of an "equal or better" alternate to the jet-grouted columns.

DBA performed slope stability analyses evaluations to demonstrate equivalency of the driven steel H-piles and jet-grouted columns. A multi-step approach was used that included the following general steps:

- Stability analyses of the existing and proposed conditions for the embankments to replicate results from the original design.
- Back analyses of the existing embankment to estimate minimum undrained shear strength values for the embankment soils that would result in a factor of safety of 1.
- Lateral pile-soil response analyses were performed to predict the shear resistance developed in the piles as the soil moves relative to the piles.
- Embankment stability analyses were performed to evaluate the embankment stability with the effect of the piles included.
- Stability analyses were performed for the embankment with the proposed jet-grouted column shear pins for direct comparison with results of analyses performed for the H-piles.

The alternate was accepted and constructed with substantial cost and schedule benefits to the overall project