



## Conestoga-Rovers & Associates Project Summary

### KEY PROJECT ELEMENTS

- Design/Build
- Slope Reconstruction
- Pile Installation
- Concrete Pile Cap Construction
- Structural Steel

### PIPE RACK IMPROVEMENT PROJECT MEMPHIS, TENNESSEE



CLIENT: PETROLEUM TERMINAL  
DURATION: OCT 2006 TO JAN 2007  
COST: \$340,000

CRA was retained to provide a complete turnkey design/build project to construct a new pipe rack that would replace an existing one at a large petroleum terminal in Memphis, Tennessee. The existing pipe rack extended down a 1.3:1 slope from a tank farm. The foundation system consisted of below grade concrete footers that were being undermined by a failing slope. The pipe rack supplied fuel to the terminal's loading rack. The new pipe rack was to be constructed while maintaining service to the loading rack.

The work included the complete geotechnical and structural design and implementation of the design to improve the foundation system. Design elements included geotechnical analysis to evaluate the effectiveness of small diameter piles that would support the new steel columns and beams. In addition, a structural analysis was completed to size the concrete pile caps and steel columns and beams. Once the analysis was complete, CRA specified four sets of foundations that included three helical piles per foundation. The specified capacity of the helical piles was 10 kips each and these were installed to a depth of 10 feet. CRA specified 4,000 psi concrete for the pile caps, W8x21 steel columns, and W14x38 steel beams.

Following completion of the design, CRA Services, the construction division of CRA, mobilized work crews, materials, and equipment to construct the improvements.

The work included the following elements:

- Access road construction
- Clearing of brush, small trees, and kudzu from the work area
- Slope reconstruction with compacted clay fill
- Installation of helical piles
- Concrete pile cap construction
- Erection of the steel columns and beams
- Secure the existing pipes to the new rack with pipe clamps

The field work was particularly challenging in that the majority of the activity was done on the 1.3:1 slope. This made safety, specifically fall protection, very important. All work on the slope was completed with harnesses that were securely tied off at the top of the slope. The work was completed within a 2-month timeframe without incident.

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