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Trusted to help mitigate risk

PROJECT BRIEF

# Chicago Tarp Tunnel Instrumentation & Monitoring

## PROJECT PROFILE

CLIENT:
Metropolitan Water Reclamation District of Greater Chicago

LOCATION:
Chicago, IL

VALUE:

- Strain data supported revised wheel design enabling project completion with limited tire failure
- Minimal delay in contractor schedules avoiding contractual penalties
- Minimized volume of rock required for temporary plug saved cost and time

SERVICES PROVIDED:

- Instrumentation of critical components
- Finite element analysis (FEA)
- FEA- based modeling of emperical data at various load scenarios supported rapid retrofit of wheels

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## INSTALLATION OF GEOTECHNICAL INSTRUMENTS & DATA AUTOMATION

Geocomp's first task was to determine the loads that were being exerted on the traveling form's wheels. This needed to be accomplished without affecting the 24-hour concreting cycle. Geocomp installed strain gauges on the wheel supports during one cycle and monitored the loads during the following cycle. These measurements indicated that the wheels were overloaded. Geocomp then assessed the stresses in the polyurethane of the wheels using the measured loads and finite element analysis (FEA). The analysis resulted in the development of a revised wheel geometry and polyurethane molding process. The revised wheels were then placed on the cars. The remaining 46,000 feet of tunnel were completed with limited failures. The correction of the problems with the wheels was invaluable to the success of the contractor in lining the tunnel. Geocomp also designed the minimum sized temporary rock plug required to be left in place within a connection corridor between two bored tunnels. The design allowed the contractor to remove the plug in a single drill and blast operation during the final construction stage, providing cost and schedule savings.

## BACKGROUND

The North Branch of the Chicago River Tunnel and Reservoir Plan (TARP) consisted of 50,000 feet of machine-bored tunnel, lined with concrete. For concreting, the contractor assembled a traveling form which consisted of a set of five cars which carried collapsible forms. Each car rode on four wheels running over a curved concrete invert. Within the first 2,000 feet of concreting, several of the tires experienced catastrophic failure. This problem posed a major threat to the project schedule and cost. The challenge was to assess the failure and rapidly develop retrofit, working with the contractor, mechanical engineers, and component.