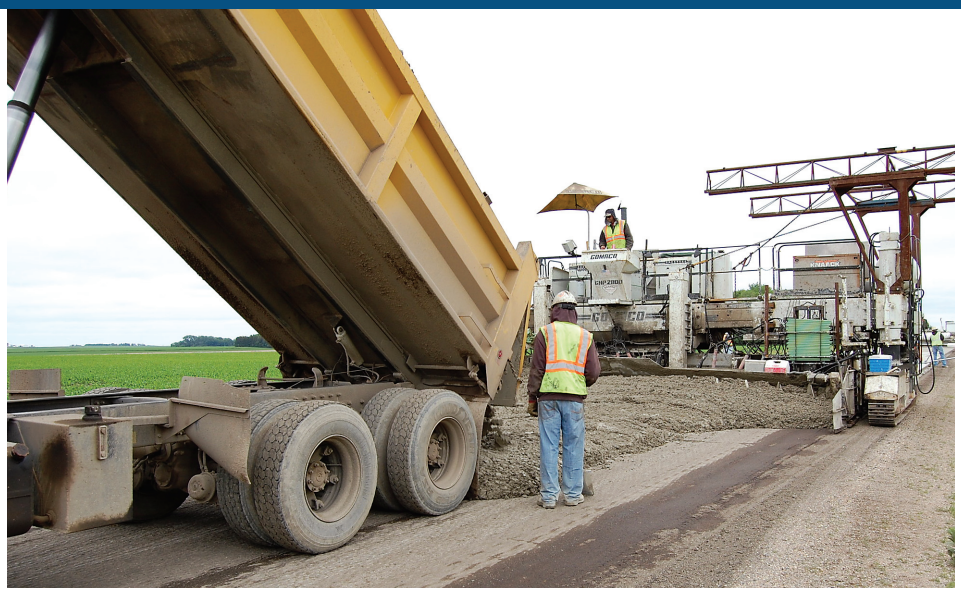
County State Aid Highway 3, Watonwan County, Minnesota



MILL & UNBONDED CONCRETE OVERLAY

A 24 FOOT WIDE BY 3.3-MILE SECTION of County State Aid Highway (CSAH) 3, east of LaSalle, Minn., had a 7.5-inch bituminous surface on top of a 13-inch aggregate base. With the last bituminous overlay performed in 1990, this stretch of highway was experiencing full depth deterioration, cracks and faults along with a rough riding surface. Watonwan County decided to perform a mill and concrete overlay to rehabilitate CSAH 3 and provide a smoother ride for travellers rather than accepting the alternate bid for bituminous reclamation and surfacing.

Prior to placing 54,080 square yards of 6-inch concrete overlay, 1.5 inches of the existing 46,550-square-yard bituminous surface was milled off. In addition, more than 23,000 pounds of steel reinforcement was used and 920 tons of bituminous paving, 15,000 square yards of aggregate shouldering and 40,700 feet of pavement markings were included in the project.

According to Roger Risser, Watonwan County Engineer, choosing the most cost-effective method of rehabilitation was key. By way of a Life Cycle Cost Analysis, the County measured the long-term savings for bituminous and concrete bids over a 45-year life cycle period.

"The Life Cycle Cost Analysis showed a future savings of $275,000 using concrete instead of bituminous," recalls Risser. "Factoring this in with the bid amount, concrete was the lowest cost solution. In addition, other comparisons were made such as ride quality, noise, how familiar we were with the construction process, traffic control and annual maintenance. In the end, concrete was the preferred choice."

The use of milling and a thin, 6-inch, concrete overlay are just a few things that make this project unique to Watonwan County. The roadway was widened from its existing 24 feet to a final width of 28 feet. In doing so, a unique jointing pattern was used, transverse joints were spaced every 8 feet, with longitudinal joints at centerline and the edge of the driving lane (12 feet). This resulted in a final panel layout of two 8-foot-by-12-foot panels for the inside 24 feet and a 2-foot-by-8-foot outside (shoulder) panel.

In order to provide a smooth and straight concrete roadway, the paving equipment used had to run on a string line. This process usually requires surveying to establish a profile and alignment for the concrete paver. To combat this challenge, workers started the milling process at the centerline and worked their way out across the roadway, locking it to grade, at the proper cross slope and depth. Next, they determined grades from the milled surface to set the string lines to the appropriate alignments and elevations, making adjustments as needed. Because of their adaptability, no surveyors were contracted.

According to Troy Vrieze, Assistant Concrete Engineer for Shafer Contracting, "It was amazing to see our foreman in the field establish a smooth profile and correct alignment without subcontracting this work to a surveyor. This was definitely a cost savings for the project and was a new experience for Shafer Contracting to handle this work in-house."

The final project cost was $1,461,560 or approximately $442,900 per mile. The result was a cost-effective solution that provided a very smooth roadway that will last into the future. The anticipated life cycle cost savings of concrete versus bituminous is approximately $83,000 per mile. The project was completed in June 2009.

According to Risser, county commissioners are anxious to use this method again. "The result has been very positive and we will likely use this method again where road geometry allows it," said Risser. "We have received several comments about the lighter surface being more reflective for driving at night, as well as the quality of the ride. The overall speed of construction on this project made this remarkable – within just two to three weeks, we had a brand new road. Concrete paving is a good fit for older asphalt county roads."

TEAM MEMBERS

- Watonwan County (Owner)
- Shafer Contracting Co., Inc. (Prime contractor, concrete paver)
- Southern Minnesota Construction Co., Inc. (Milling, aggregate supplier)
- Swanston Equipment Companies (Pavement marking)
- Highway Technologies (Traffic control)
- Cemstone (Concrete sand and pea rock supplier)
- General Resource Technology (Concrete admixtures supplier)
- Dahl Trucking (Concrete aggregate delivery)
- Holcim (Cement supplier)
- Headwaters Resources (Fly ash supplier)
- Mulder Trucking (Fly ash delivery)
- Construction Materials, Inc. (Cure and rebar supplier)