

CPR: REBUILT TO LAST



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Interstate 94, Minnesota

>>> FULL- AND PARTIAL-DEPTH REPAIR, BURIED TREASURE

IN 2009, the Minnesota Department of Transportation (MnDOT) began concrete rehabilitation on the original 65-mile stretch of Interstate 94 between Minneapolis and St. Cloud. The existing pavement had seen heavy use, including a large amount of truck traffic, so the ride quality of the surface had begun to suffer. The road's original design had used 1-inch black steel dowels with no epoxy coating and water infiltration was causing those dowels to rust, which reduced the pavement's load transfer efficiency between slabs. (Current common practice calls for 1-1/2-inch diameter dowels with a thick epoxy coating.) As early as 2004, minor faulting (less than 1/4 inch) had been noticeable in the truck lane.

Many concrete pavement preservation treatments were used in the initial repair effort, which took place across approximately 40 miles of the 65 mile stretch, including full- and partial-depth repair with diamond grinding. Due to monetary constraints, the district was not able to replace the load transfer at every joint, so faulting was expected to return. The project was completed with minimal disruption to the traveling public, primarily using night closures.

Despite the overall success of the rehabilitated concrete pavement, by 2012, minor faulting had returned, but only in the truck lane. A concrete overlay project was implemented on 14 miles of the 25 miles of concrete remaining to be fixed. This portion of the project was performed on an accelerated timeline. The roadway repairs were completed on schedule and the total cost for this project was \$1,176,647 per mile, with the concrete pavement items totaling \$525,680 per mile.

Although the concrete overlay is expected to provide the longest-term fix of at least 40 years, having the I-94 traffic restricted to one lane in each direction during construction of the overlay was difficult for the public. The District planned for the second concrete project to be completed



only at night and have both lanes open for rush hour traffic each day. The final phase of repair began in 2013 and used the method known as "Buried Treasure" – a method referred to as such because non-destructive testing tools allow for the collection of enough information on previously overlaid pavements to determine which ones can be exposed and repaired utilizing a newly constructed diamond ground surface and thereby continue to provide service life.

Pavement evaluation had revealed that only 5 percent of all pavement cracks were occurring at mid-panel locations. It was clear that lack of load transfer was at the heart of the faulting issue. MnDOT then realized that an effective solution would be to remove the micro surfacing that had been placed on I-94 in 2006 and replace all the transverse joints and cracked slabs using full depth repair. An initial project was scheduled, along a 10-mile section of the westbound lane and 1.2 miles of the eastbound lane of I-94. This solution was able to meet the required 20-year design life and be constructed under traffic. With traffic diverted to one lane, the work hours on the I-94 project were restricted from 9 p.m. to 8 a.m. six nights per week, with designated times that the contractor could not interfere with traffic.

"While the cost of removing every transverse joint followed by diamond grinding sounds expensive, the overall project cost is far less than

TEAM MEMBERS

- Minnesota Department of Transportation (Owner)
- Interstate Improvement Inc. (Prime contractor)
- Cemstone Products Company (Concrete supplier)
- Husqvarna Construction Products (Equipment supplier)
- Simplex Construction Supplies (Equipment supplier)

the overall project cost of the other treatment options available," said John Roberts, executive director of the IGGA. Considering all the factors, full-depth patching coupled with diamond grinding was the most economical solution that can exceed a 20-year minimum life and be constructed at night under traffic, Roberts notes.

The 11.2 miles of Buried Treasure rehab and diamond grinding totaled \$8,422,705, with the cost at \$752,027 per mile for the total project and the concrete items at \$537,134 per mile. The cost of the full-depth repairs was \$420,089 per mile. The project was completed in the summer of 2013.

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