CPR: REBUILT TO LAST

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Interstate 15, Ogden, Utah

>>> DOWEL BAR RETROFIT, DIAMOND GRINDING

IN THE SPRING OF 2013, the Utah Department of Transportation (UDOT) began concrete rehabilitation on a 15 mile stretch of freeway, both northbound and southbound lanes, from S.R. 30 in Box Elder County to the Idaho state line. Not only is I-15 the only north-south Interstate highway in Utah, it is the only major north-south road for high-speed travel within the state and is a major truck route. Nevertheless, even after decades of use, the pavement was still in good enough condition to save, so UDOT elected to perform concrete pavement preservation (CPP), a favored method of road repair in the state.

The existing pavement ranged in age from approximately 20 years old to more than 35 years old and was constructed before the use of transverse dowel bars in new pavements became standard practice. The pavement had experienced some faulting or "thumping," which produced a rough ride. CPP methods selected for the project included some partial and full panel patching where panels were cracked or spalled; slab jacking; resealing; dowel bar retrofit (DBR); and diamond grinding.

"With concrete pavement rehabilitation, you can just go on site and mark which areas will require full depth repair, which will require partial depth repair, and so on. At the most, maybe you take some cores to verify existing pavement and subgrade condition," said Mitzi McIntyre, P.E., Executive Director of the Utah Chapter of the American Concrete Pavement Association (ACPA). CPP provides a cost savings – on the I-15 project it was estimated that the cost was less than 25% of the price of a total reconstruct – and also a time savings. "UDOT does A + B bidding," explains McIntyre. "Part A is for the structure itself, and Part B adds in a time component. For this project, 118 days were bid."

DBR was included in the rehabilitation because the aggregate interlock that had originally provided load transfer capability between slabs was worn away and dowel bars were needed to re-establish load transfer at the joints. It is the largest DBR project ever conducted in the state, and according to McIntyre, it represents the final phase in the state's long history of implementing DBR in its CPP. Utah began using DBR in 2002 with a project that included 15,000 dowel bars, and the projects have grown in scope ever since. At this point, the majority of undoweled interstate concrete pavements have been dowel bar retrofitted in the state.

The dowel bars used were epoxy coated steel rods measuring 1 ½ x 18 inches (38mm x 450mm) and pre-coated with bond breaking compound at the factory. The bars were placed in groups of three, one group underneath each wheel-path, and were spaced 12 inches (300mm) center-to-center. The I-15 project specified 163,000 bars as per the bid.

Specifications that were unique to UDOT included removing the foam core board to a depth of 2 inches and resealing. UDOT also required that grinding start within 10 working days of placing the retrofits. Tests were performed on 24 retrofits, as selected by the engineer, and cores were taken to verify that concrete had been properly removed from the slots, dowels had been properly placed, and compaction had been properly performed. Traffic was kept off of the surface until a compressive strength of 3,000 psi was met.

According to John Roberts, executive director of the International Grooving & Grinding Association, the Utah Department of Transportation realized the benefits of CPP with DBR early, providing benefit to the driving public and taxpayers alike. "Looking outside the box allowed UDOT to provide a safe, smooth ride while saving considerable sums of money that could be used to improve their transportation infrastructure elsewhere in the state."

TEAM MEMBERS

- Utah Department of Transportation Region 1 (Owner)
- Multiple Concrete Enterprises, Inc. (Prime contractor)
- Western Coating (Dowel and tie bar supplier)
- Western Material and Design (Dowel bar retrofit material supplier)