

Outstanding Shotcrete Project Award Winner

2007 Outstanding Repair & Rehabilitation Project

MDOT Lodge M-10 Freeway Rehabilitation

Michigan's M-10, also known as the John C. Lodge Freeway or simply as the "Lodge" to Detroiters, runs from the city's downtown core to its northwestern suburbs. Originally constructed during the 1950s and 1960s, it was in dramatic need of major rehabilitation. The Michigan Department of Transportation (MDOT) tendered this \$140 million project to repair over 14 miles (22 km) of pavement (between Lasher Road and Jefferson Avenue) and 50 bridges.

URS Corporation (Detroit, MI) was retained as the lead consultant for the project and the contract was awarded in two phases, the first to Posen Construction, Inc. (Detroit, MI) and the second to

Dan's Excavating, Inc. (Shelby Township, MI). Ram Construction Services (Livonia, MI; who at the time operated as Western Waterproofing Company) was awarded the concrete restoration subcontract for both phases.

The overall scope of work and its limited completion time led MDOT personnel to consider the use of shotcrete for the first time as an alternate to formed repairs. A Special Provision was added to the state's main construction documents and the mandatory use of ACI Certified Nozzlemen was specified.

The restoration portion of the project began in February 2007 and concluded in June 2007. Beyond those 19 weeks, the potential liquidated



Ram Construction Services had to work under adverse weather conditions in Michigan to complete the project

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Removal of delaminated and spalling concrete with chipping hammers

damages were severe—\$50,000 per day—as the Lodge was completely shut down during the project. This created a commuter nightmare around the city of Detroit, especially during both the morning and afternoon rush hours.

A majority of the Lodge is collared by twin vertical barrier walls that result in the freeway being an average of 25 ft (7.6 m) below the service roads above. Over this specific 5 mile (8 km) stretch of the Lodge, the walls are capped with cantilevered sidewalks allowing pedestrian traffic access to the roadways above.

Ram Construction Services faced many challenges over the 4 months. Original concrete repair bid quantities were 17,100 and 6500 ft² (1589 and 604 m²) of concrete for each phase, respectively, but ended up at more than double—38,000 and 13,400 ft² (3530 and 1245 m²). It should be noted that no additional time was allowed for the completion of these repairs. Chipping began in the month of February, and it wasn't uncommon during the often -5 °F (-20 °C) temperatures for hammers, hoses, and compressors to freeze, making working conditions extremely difficult for the 30-worker crew. MDOT specified that no shotcreting be performed until temperatures (both ambient and substrate) rose to over 50 °F (10 °C). Ram was approximately 60% complete on its chipping and preparation (including the installation of 2 x 2 in. [50 x 50 mm] galvanized, 10 gage wire mesh and approximately 26,000 cathodic anodes)—literally a couple of miles ahead of themselves before their first patch was even shot. Other trades continued to work in and around all of these areas while time marched on. It wasn't uncommon for Ram to have a road base



Securing reinforcing bar in chipped area prior to shooting



Shooting of prepared area. Note galvanic anodes installed around perimeter of repair area

to work on while chipping but nothing to drive on when they returned to shoot.

As April arrived, temperatures varied between 40 and 70 °F (4 and 21 °C), with portions of the wall temperature reaching as high as 85 °F

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Ram Construction Services shooting during rehabilitation of the MDOT Lodge M-10 Freeway



Shooting of elevated repair area

(29 °C). Ram chose to shoot the majority of the repairs with King Packaged Materials Company's MS-D3 Accelerated Shotcrete. This product had been used successfully on several previous Detroit-based projects (refer to the Fall 2006 issue of *Shotcrete*, pp. 16-19) and MDOT changed their temperature parameter for shotcreting to allow shooting at 40 °F (4 °C). Where temperatures rose to the point where finishing became difficult, Western switched to King's MS-D1 Shotcrete.

The flexibility of the dry-mix process was essential in Ram's ability to quickly remobilize in all of the areas and stay on schedule. The use of accelerated shotcrete provided a great advantage in maintaining the schedule, allowing Ram to shoot thicker sections in one pass. As temperatures continued to rise, they were then able to quickly switch over to nonaccelerated material, allowing them to provide the finish that the authority desired.

Again, the true significance of shotcrete being used on this project is that it was the first time MDOT allowed this repair method to be used on any of their structures. Not only did the shotcrete provide the results anticipated for this landmark project, but several more shotcrete jobs have been completed for MDOT since and shotcrete has found a home in their specifications.

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Project Name

M-10 Lodge Freeway Rehabilitation

Project Location

Detroit, MI

Shotcrete Contractor

Ram Construction Services*
(formerly Western Waterproofing Company)

Project Owner

Michigan Department of Transportation

Architect/Engineer

URS Corporation

Material Supplier

King Packaged Materials Company*

General Contractors

Phase 1: Posen Construction, Inc.
Phase 2: Dan's Excavating, Inc.

*Member of the American Shotcrete Association