

## **SPECIAL EXPERIMENTAL PROJECT (SEP-14)**

Alternative Pavement Bidding

Michigan Department of Transportation

I-475 Design Build Project Final Report

Control Section 25132 Job Number 44785A

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### **Introduction**

The Michigan Department of Transportation (MDOT) submitted a final SEP-14 report for the use of alternative pavement bidding on M-6 in August, 2001. The SEP-14 work plan was developed in September of 2000 to allow both the concrete and asphalt paving industries to compete for the paving work on M-6, a new limited access freeway near Grand Rapids, MI.

MDOT's typical process selects one pavement option early in the design based on the results of a life cycle cost analysis. The SEP-14 work plan permits MDOT to develop structurally equivalent concrete and hot mix asphalt (HMA) pavement cross sections for a project. HMA and concrete paving contractors are then allowed the opportunity to competitively bid on the project. This process is intended to increase competition which may result in more favorable bids for MDOT.

In 2008, MDOT requested to pilot an alternate pavement bidding program based on the original SEP-14 work plan developed for M-6. The pilot program allows a limited number of highway projects to proceed with an alternate pavement bidding component. In 2008 and 2009, the FHWA approved adding projects to the SEP-14 work plan developed for M-6. Several of these projects have since been removed as alternate pavement bidding candidate projects. A list of all APB projects and their current status is provided in Exhibit 1.

This report provides detailed information on the alternate pavement bidding project along I-475 in Genesee County. Additional reports will be provided as alternate pavement bidding projects are completed.

## **I-475 Design Build Project Background**

### **(MDOT Control Section 25132, Job No. 44785A)**

MDOT selected a section of I-475 in Genesee County to pilot a Design-Build (DB) project that contained an alternate pavement bidding component. The project was funded with American Recovery and Reinvestment Act funds. The I-475 DB project reconstructed a three mile section of urban divided freeway, including the reconstruction of one interchange, three miles of pavement rehabilitation north of the reconstruction, and rehabilitation of four structures.

The I-475 DB project was let on November 19, 2009. Design started in 2009 and the majority of the project was constructed in 2010. Roadway construction was completed in the fall of 2010, with landscaping items completed in 2011. The final acceptance for the project was December 7, 2011.

## **I-475 DB Project Procedures**

### **Life Cycle Cost Analysis**

MDOT developed the concrete and hot mix asphalt (HMA) pavement designs through the departments standard procedures, which utilize the 1993 AASHTO Guide for Design of Pavement Structures. During the advertisement of this DB project, contractors were not permitted to propose changes to the design of the pavement structure. In order to account for the varying life cycle costs of each pavement structure, MDOT developed equations that would consider the initial construction costs, future maintenance costs, and user delay costs for each pavement alternative. The equations convert a contractors bid to an Equivalent Uniform Annual Cost (EUAC) for each pavement type. The contractor whose bid equated to the lowest EUAC would be selected for the project. The initial construction costs and the user delay costs were to be provided by the contractor in their bid. MDOT estimated future maintenance costs based on historical data. The contractor's bid was then entered into the equation associated with the specified pavement type. The contractor's bid included all work to construct the project including the pavement, earthwork, signing, restoration, etc. Exhibit 2 contains the pay items used on this project.

To account for delays to the traveling public, MDOT incorporated lane rental costs into the project. Contractors were required to include a lump sum dollar amount in their bid that would reflect the cost of the delays to the public for both freeway and local traffic. MDOT provided the hourly rates contractors would be charged for each hour they had lane restrictions on I-475 or on local routes for the bridge work. Exhibit 3 contains the final lane rental special provision used on this project.

The I-475 project incorporated MDOT's frequently used special provisions for concrete and HMA paving, and for the material and workmanship warranty requirements (Exhibits 4 and 5).

## **Contracting Industry Involvement**

Through this project MDOT has reinforced the concept that early coordination with industry is critical when venturing into new methods of contract procurement. There were several industry meetings

regarding the DB concept, as well as the alternate pavement bidding component, prior to advertising the project.

A letter (See Exhibit 6) was provided to the Michigan Concrete Paving Association (MCPA), the Asphalt Paving Association of Michigan (APAM) and the Michigan Infrastructure and Transportation Associates (MITA) that detailed the development of the EUAC. This letter gave Michigan's contracting association's detailed information on how the EUAC equation was developed, and how it would be utilized in the I-475 DB project.

### I-475 Bid Evaluation

Four (4) contractors bid on the I-475 project. Three placed bids for the concrete pavement design with one bid for the HMA design. The HMA contractor was the highest overall bidder. MDOT speculates that an HMA pavement structure was cost prohibitive due to the additional earthwork required to construct the project with an HMA pavement. The four bids are listed below.

Bids	Material	Bid Price	Lane Rental Incentive		Lane Rental Cost		Total
			Local	Freeway	Local	Freeway	
Low Bid	Conc	\$17,323,830	\$25,000	\$75,000	\$648,000	\$1,631,040	\$19,702,870
Second Bid	Conc	\$18,686,785	\$25,000	\$75,000	\$305,040	\$792,000	\$19,883,825
Third Bid	Conc	\$21,483,100	\$25,000	\$75,000	\$425,000	\$1,600,000	\$23,608,100
Fourth Bid	Conc	\$22,532,275	\$25,000	\$75,000	\$700,000	\$2,292,000	\$25,624,275

The final bids received were under the engineer's estimate which was at \$21,019,500. The low bid was \$17,423,830 with the \$100,000 lane rental incentive added in. In examining the bids, it is interesting to note that if the second low bidder had bid approximately \$183,000 lower, the overall out of pocket cost for the project would have been approximately one million dollars higher. Since I-475 has a nearby alternate route (I-75), the effects on traffic were minimal with the total closure. Looking at the lane rental cost for the freeway and the \$600/hr cost, the low bidder had about 113 days of freeway closure, while the second low bidder would have had about 55 days. If the second low bid had won, the freeway would have been closed for half as long but MDOT would have paid an additional million dollars.

MDOT does not believe the alternate pavement bidding component of the project added any significant cost to the development of the I-475 DB contract. Additional internal costs to develop the alternate pavement bidding component were minimal because the project utilized a design-build procurement. The procedures used on I-475 to determine the pavement sections are also performed on all MDOT trunkline reconstruction projects with pavement costs over \$1,000,000. Therefore, the costs to develop the alternate pavement component would be similar to the costs needed to determine the final pavement on a traditional project.

## **Final Evaluation of the I-475 Alternative Pavement Project**

The I-475 project was constructed entirely with concrete pavement in the reconstruct section. In the north CPM section, HMA and concrete pavement repairs were combined. As part of the bidding process, the contractor submitted an alternate traffic control plan. This included closing both northbound and southbound lanes in various stages but always maintaining at least one on and one off ramp to Hill Road. This expedited the work while still providing a good project. The alternate pavement component provided for competitive bids among the concrete companies.

## **Update on Other Current Alternate Pavement Bidding Projects**

MDOT let an alternate pavement bid project on I-94 in St. Clair County that was awarded on December 16, 2009. The contractor used concrete pavement on the project.

MDOT let an alternate pavement bid project on US-31 in Oceana County that was awarded on April 15, 2011. The contractor used concrete pavement on the project.

FHWA has approved the following additional projects under the SEP-14 work plan: US-10 in the Bay Region, M-231 in the Grand Region and US-24 in the Metro Region. MDOT is in the process of designing the projects on US-10 and M-231.

MDOT will provide additional reports on each alternative pavement project once additional projects are completed, or as requested by the FHWA. MDOT expects to gather a better understanding of the effects of the alternate pavement component as more projects are placed under contract. These findings will be detailed in future reports.

(The appendices to this report are available upon request).