

SPECIAL EXPERIMENTAL PROJECT (SEP-14)

Alternative Pavement Bidding

Michigan Department of Transportation
US-31 Project Final Report
Control Section 64015 Job Number 90073A

Prepared by:

LeighAnn Mikesell, P.E.
Operations Manager Muskegon TSC
Michigan Department of Transportation

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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 and cost savings for MDOT and FHWA.

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, 2009 and 2010, 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 US-31 in Oceana County. Additional reports will be provided as alternate pavement bidding projects are completed.

US-31 Project Background (MDOT Control Section 64015, Job No. 90073A)

The US-31 freeway corridor in Oceana County was constructed with continuously reinforced concrete in the 1970's. Since that time, there have been various projects to overlay or add expansion to address the cracking and spalling problems associated with this type of pavement. In 2008, the 5.75 mile segment from Polk Road to the north branch of the Pentwater River was programmed for a heavy mill and resurface fix, but the fix was changed to reconstruct a year later due to the rapid deterioration of the pavement. When the initial life cycle cost analysis was completed, the cost difference between HMA and concrete was so small that the project team was asked to consider alternative bidding. Due to the rural nature of the project site, and the wide right of way and medians, the side impacts for either pavement would be similar, and the design changes would be minimal. The project was added to the SEP-14 work plan shortly thereafter.

In addition to the roadway reconstruction, the US-31 project included reconstruction of two ramps and the rehabilitation of one bridge. Design of the project was accomplished throughout most of 2010, the project was let in March of 2011, and construction was

substantially complete in the 2011 construction season with final acceptance on July 16, 2012.

US-31 Project Procedures

Life Cycle Cost Analysis

MDOT developed the concrete and hot mix asphalt (HMA) pavement designs through the department's standard procedures, which utilize the 1993 AASHTO Guide for Design of Pavement Structures. During the advertisement of this project, contractors were not permitted to propose changes to the design of the pavement structure or to the maintaining traffic scheme. 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 contractor's 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 user delay 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 ramp traffic. MDOT provided the daily rates contractors would be charged for each day they had lane restrictions on US-31 or on ramps within the project limits. Exhibit 3 contains the final Alternate Pavement Bid Calculations Special Provision used on this project.

The US-31 project incorporated MDOT's frequently used special provisions for concrete paving and unique special provisions for HMA paving, and for the material and workmanship warranty requirements (Exhibits 4, 5 and 6).

Two sets of plans were prepared, one showing the concrete reconstruction alternative, and one showing the HMA reconstruction alternative. Two separate proposals were prepared as well, one for each pavement type. The typical cross sections used were those developed through the Life Cycle Cost Analysis process. MDOT's Construction & Technology division followed the 1993 AASHTO "Guide for Design of Pavement Structures" and used AASHTO pavement software DARWin Version 3.1, 2004. The Equivalent Uniform Annual Cost calculation is based on the revised pavement selection process as approved by the Engineering Operations Committee on June 3, 1999.

Contracting Industry Involvement

Through this project, MDOT has reinforced the concept that coordination with industry is critical when venturing into new methods of contract procurement. Industry was made aware of the life cycle cost analysis results, and questions regarding those results were

answered. As part of the SEP-14 process, a packet of information which included the project title sheet, typical cross sections for both pavement designs (including ramp typicals), notice to bidders and special provisions relative to the alternative bid, the maintaining traffic plan, and the EUAC equation with background calculations was prepared for industry. This information was given to industry during the design process to solicit comments prior to completing the plans for advertisement.

US-31 Bid Evaluation

Five (5) contractors bid on the US-31 project. Bidders were to bid on either the concrete or HMA design, but not both. The first four placed bids for the concrete pavement design while the highest bid was for HMA pavement. 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 five bids are listed below.

	Material	Bid Price	EUAC	User Delay Cost		total
				ramps	freeway	
Low Bid	conc	\$12,518,748	\$725,768	\$111,640	\$413,502	\$11,993,606
Second Bid	conc	\$13,434,270	\$775,229	\$88,137	\$635,140	\$12,710,993
Third Bid	conc	\$14,583,740	\$837,869	\$111,640	\$625,216	\$13,846,884
Fourth Bid	conc	\$14,636,703	\$840,190	\$104,902	\$527,629	\$14,004,172
Fifth Bid	HMA	\$16,436,977	\$961,332	\$111,640	\$330,802	\$15,994,535

All but one of the final bids received were under the engineer's estimate which was \$15,062,460. The low bid was \$11,993,606 with the user delay cost calculated and included. In examining the bids, it is interesting to note that the highest bidder had the smallest amount of user delay costs.

MDOT does not believe the alternate pavement bidding component of the project added significant cost to the development of the US-31 contract. Additional costs to develop the alternate pavement bidding component were minimal because the profiles were held constant for both pavement designs. The additional effort needed was in developing typical sections for two separate pavements.

Final Evaluation of the US-31 Alternative Pavement Project

The US-31 project was constructed with concrete pavement except for a portion of NB & SB near the south branch of the Pentwater River that has a history of settling and resurfacing projects. About a 1000' section was reconstructed with HMA due to the poor soils and the Region's belief that maintaining this segment is better handled with an HMA pavement. Once awarded the contract, the contractor submitted an alternate traffic control plan. The plan included combining stages and was analyzed by the design and construction staff to insure the change would not have given the contractor an unfair advantage. The new traffic control plan did not change the number of days with lane

closures submitted in the original bid, but the new plan eliminated some of the need for moving concrete barrier wall, thereby saving construction cost. The alternate pavement component provided for competitive bids among the contractors.

Update on Other Current Alternate Pavement Bidding Projects

In December 2012, MDOT will let an alternate pavement bid project on US-10 in the Bay Region.

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