Final Evaluation Report
Special Experimental Project 14 (SEP-14)
Fixed Price Variable Scope Contracting

Michigan Department of Transportation
HMA Crack Treatment and Overband Crack Fill
Hillsdale, Ingham, Jackson, and Lenawee Counties
CS 84916 – JN 113613A

Introduction

The Michigan Department of Transportation (MDOT) experimented with a Fixed Price Variable Scope innovating construction contracting method in an effort to maximize the work performed on the construction project. This method of contract procurement allowed MDOT the ability to establish a final project budget and select a contractor based on the best value for the established budget.

Project Timeline

02-03-2012	MDOT request for SEP-14 Approval
02-08-2012	FHWA SEP-14 Approval
02-09-2012	MDOT/Industry (MITA/MRPA) Partnering Meeting
04-13-2012	Notice of Bid Advertisement
04-23-2012	Mandatory Contractor Pre-Bid Meeting
05-11-2012	Project Bid Letting
06-13-2012	Contract Award
07-09-2012	Construction Start Date
09-10-2012	Construction Completion Date
10-18-2012	Final Inspection/Acceptance Date

Scope of Work

The project scope of work included a maximum of 103.78 miles of hot mix asphalt crack treatment and overband crack filing on 15 segments of various roadways in MDOT's University Region. Roadway cross sections included rural 2 lane, rural 4 lane, urban 3 lane, and rural 4 lane freeway sections. Condition of the various roadway sections added another variable component to the project. HMA crack treatment was used on 3 of 15 sections that exhibited good base characteristics with minor visible surface distress. The more severely cracked sections received the overband crack filing treatment.

The project was classified as a programmatic categorical exclusion and was approved as part of the General Program Account (GPA) for capital preventative maintenance projects. The portions of the project that were not constructed will be included in future crack sealing projects funded by the GPA.

Bid Process and Results

Early in the project development process MDOT met with representatives from Industry to discuss the innovative contracting method. MDOT used information from that meeting to develop a unique bidding process. In an effort to inform prospective contractors of the new process, MDOT required contractors to attend a pre-bid meeting.

The bid opening for the project was held on May 11, 2013. The project had 3 bidders, each providing the maximum number of roadbed miles of work that could be completed for the established project budget of $387,000. In addition, bidders were required to compile their bids in priority order which was set by the Department. The bid results are as follows:

Bidder	Rbmi Bid	Cost per Rbmi
No.1	74.43	$5,199.52
No.2	70.50	$5,489.36
No.3	53.46	Bid Not Considered

The bid document submitted by Bidder No.3 did not follow the requirements set forth by the Department which were discussed in detail at the Pre-Bid Meeting as well as being defined in the Notice To Bidders For Low Bid Determination included in the Proposal. Because the bid was incorrectly submitted, the bid was not considered.

Industry Reaction

There were 3 bidders on this experimental project which when compared to other conventionally bid HMA crack treatment projects in MDOT's University Region, was slightly lower than average. The other University Region projects averaged 5 bidders.

The Department received feedback from contractors at the completion for the project. The only comment received suggested the maintaining traffic requirements for each section of roadway be more clearly defined in the specifications. Industry agreed with MDOT that this procurement method worked well for this type of project.

Typically if there is bid savings, the additional money may go to projects with other types of fixes. With this project, the crack sealing industry performed the work estimated and any bid savings came in the form of additional crack sealing work. Industry informed MDOT that one of the benefits they view with this method of contracting is that their niche market received a fixed dollar amount of work, and the allocated budget stayed within their segment of the industry and within the same geographic location.

Summary

Evaluation of Construction Cost Effectiveness:

The letting results from this project were compared with two other conventionally bid HMA crack treatment projects in MDOT's University Region. The contract award for each of the conventionally bid projects yielded low bids 7.68% and 18.81% below Engineers Estimates, covering 66.90 roadbed miles and 52.09 roadbed miles, respectively. These bids resulted in un-used funding originally intended for crack treatment coverage. Conversely, using the Fixed Price Variable Scope innovating construction contracting method, 100% of the programmed project cost was utilized to treat a maximum coverage of 74.43 roadbed miles. In addition, using average unit prices, the Department estimated a total coverage length of 70.62 roadbed miles for the fixed funding amount of $387,000. Therefore the use of the Fixed Price Variable Scope method yielded an additional 3.81 roadbed miles of coverage. The use of the Fixed Price Variable Scope

procurement method effectively used all available funding to provide maximum roadbed mile coverage. The conventionally bid projects did not use all available funding due to low bids and thus did not maximize roadbed mile coverage. This approach met the Department's expectations

Job Number	Construction Year	Budget	Work Type	Expected Work*	As-Constructed Work	Results
113613	2012	$387,000	HMA Crack Sealing	70.62 Rbmi	74.43 Rbmi	+ 3.81 Rbmi

* Based on Average Unit Prices

One of the goals of using FPVS is to reduce the amount of work required by staff to manage MDOT's program. A project with a constrained budget reduces the burden on staff to reallocate funds from projects if the estimate is exceeded or reduced. By using a fixed amount of funds, MDOT did not have to search for additional projects to allocate any bid savings to, or conversely find additional funds from un-let projects. This process saved the Department staff time and effort. .

Additional Documents

Appendix A – Schedule Of Items.
Appendix B – Special Provision For HMA Crack Treatment, Special.
Appendix C – Special Provision For Warranty Work Requirements For HMA Crack Treatment, Special.

Appendix A

CONTRACT ID: 84916-113613 PROJECT(S): 113613A
LETTING : 120511
CALL : 601

CONTRACTOR :_____

IMPORTANT NOTICE:
If the proposal establishes a maximum quantity for any of the following work items, and if you bid a quantity higher than that maximum quantity, your bid will be considered to have quoted the maximum quantity and your bid total will be adjusted to reflect that maximum quantity.

If the proposal provides a specified bid quantity for any of the following work items, and if you bid a quantity higher than that specified quantity, your bid will be considered to have quoted the specified quantity and your total bid quantity will be adjusted to reflect that specified quantity. If you bid a quantity lower than the specified quantity, all the subsequent bid quantities will be changed to zero, if they aren't already, and your total bid quantity will be adjusted to reflect the specified quantities.

If your bid is the highest roadbed mile bid, and if you refuse to accept the award of the contract due to the change in what you quoted as a maximum roadbed miles, you will forfeit your bid guaranty.

SECTION 0001 Mobilization

LINE NO	ITEM DESCRIPTION	UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0010	_8507051 Mobilization	LUMP	LUMP		43000.00	
	SECTION 0001 TOTAL				43000.00	

SECTION 0002 Road Work

LINE NO	ITEM DESCRIPTION	UNITS	QUANTITY	BID QUANTITY ROADBED MILES
0020	_Priority 01, Overband Crack Fill, Roadbed	Rbmi	7.740	7.740
0030	_Priority 02, Overband Crack Fill, Roadbed	Rbmi	5.270	5.270
0040	_Priority 03, HMA Crack Treatment, Roadbed	Rbmi	0.340	0.340

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	UNITS	QUANTITY	BID QUANTITY ROADBED MILES
0050	_Priority 04, HMA Crack Treatment, Roadbed	Rbmi	5.760	5.760
0060	_Priority 05, Overband Crack Fill, Ramp	Rbmi	1.560	1.560
0070	_Priority 05, Overband Crack Fill, Roadbed	Rbmi	6.050	6.050
0080	_Priority 06, Overband Crack Fill, Roadbed	Rbmi	1.030	1.030
0090	_Priority 07, Overband Crack Fill, Roadbed	Rbmi	8.680	8.680
0100	_Priority 08, HMA Crack Treatment, Roadbed, Warranty	Rbmi	4.320	4.320
0110	_Priority 09, Overband Crack Fill, Roadbed	Rbmi	4.850	4.850
0120	_Priority 10, Overband Crack Fill, Roadbed	Rbmi	16.400	
0130	_Priority 11, Overband Crack Fill, Roadbed	Rbmi	18.430	
0140	_Priority 12, Overband Crack Fill, Roadbed	Rbmi	5.620	
0150	_Priority 13, Overband Crack Fill, Roadbed	Rbmi	7.750	

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	UNITS	QUANTITY	BID QUANTITY ROADBED MILES
0160	_Priority 14, Overband Crack Fill, Roadbed	Rbmi	0.620	
0170	_Priority 15, Overband Crack Fill, Roadbed	Rbmi	9.360	
	SECTION 0002 TOTAL			.
	TOTAL ROADBED MILES BID			.

CONTRACTOR: _____

ADDRESS: _____

_____

DATE: _____

SIGNATURE: _____

Appendix B

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
HMA CRACK TREATMENT, SPECIAL

JAK:JRP 1 of 1 C&T:APPR:KK:CJB:00-00-12

a. Description. This work consists of treating cracks in Hot Mix Asphalt (HMA) surfaces in accordance with section 502 of the Standard Specifications for Construction, except as specified in this special provision.

b. Materials. Provide material in accordance with subsection 502.02 of the Standard Specifications for Construction.

c. Construction. Complete all work in accordance with subsection 502.03 of the Standard Specifications for Construction and as modified on the plans.

d. Measurement and Payment. The completed work, as described, will be paid for at the established unit price, which will be determined by dividing the fixed construction cost amount, excluding mobilization, by the Contractor's total completed roadbed mile bid quantity. Completed work will be paid for using the following pay items:

Pay Item	**Pay Unit**
Priority __, Overband Crack Fill, Roadbed	Roadbed Mile
Priority __, Overband Crack Fill, Ramp	Roadbed Mile
Priority __, HMA Crack Treatment, Roadbed	Roadbed Mile

Priority __, Overband Crack Fill, Roadbed will be measured in roadbed miles, and the established unit price will include all labor, equipment, and materials required to complete crack sealing as specified on the plans. Maintaining traffic and lighting items of work will not be paid for separately, but will be included in the item **Priority __, Overband Crack Fill, Roadbed**.

Priority__, Overband Crack Fill, Ramp will be measured in roadbed miles, and the established unit price will include all labor, equipment and materials required to complete crack sealing as specified on the plans. Maintaining traffic and lighting items of work will not be paid for separately but will be included in the item **Priority __, Overband Crack Fill, Ramp, Priority**.

Priority __, HMA Crack Treatment, Roadbed will be measured in roadbed miles, and the established unit price will include all labor, equipment and materials required to complete crack sealing as specified on the plans. Maintaining traffic and lighting items of work will not be paid for separately but will be included in the item **Priority__, HMA Crack Treatment, Roadbed**.

Appendix C

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
WARRANTY WORK REQUIREMENTS FOR HMA CRACK TREATMENT, SPECIAL

a. Description. The work consists of furnishing all labor, equipment, and materials necessary to treat cracks in HMA surfaces using the following operations. This special provision must be used in conjunction with 12SP500(B) to perform warranted, hot-mixed-asphalt (HMA) surface crack treatment.

1. Saw/Rout and Seal. This operation consists of sawing or routing a reservoir at the crack of an existing HMA surface, cleaning the sawn surface, and placing sealant into the reservoir to prevent the intrusion of water into the pavement structure.

2. Overband. This operation consists of cleaning the crack in an existing HMA surface and placing material into and over the crack to eliminate water infiltration.

b. Limits of Warranted Work. The warranted work includes all HMA crack treatment applications on driving lanes and shoulders within the project limits unless otherwise indicated on the proposal.

c. Warranty Period. The length of warranty is to be 2 years from the Acceptance Date of Warranted Work.

d. Amount of Warranty Bond. Supply a warranty bond equal to 100 percent of the warranted work for HMA crack treatment.

e. Materials. Provide materials in accordance with subsection 502.02 of the Standard Specifications for Construction.

f. Construction. Construction must be in accordance with subsection 502.03 of the Standard Specifications for Construction, with the following modification:

1. Initial Acceptance. At the construction completion of the HMA Crack Treatment, or a portion as determined by the Department, the Department and Contractor will review the crack treatment for compliance with the contract and the project specifications. If the crack treatment is determined by the Department to not be in compliance, then the Contractor must repair and make good at its own expense any and all defects. The Department and the Contractor will document and execute the initial acceptance on a form furnished by the Department when the crack treatment is determined by the Department to be in compliance. This date is then the Acceptance Date of Warranted Work. A copy of initial acceptance will be sent to the Contractor's Warranty Bond surety agent by the Department.

The Department may accept the HMA Crack Treatment and begin the warranty period, excluding any area needing corrective work, due to seasonal limitations.

g. Measurement and Payment. The completed work, as described, will be paid for at the established unit price, which will be determined by dividing the fixed construction cost amount, excluding mobilization, by the Contractor's total completed roadbed mile bid quantity. Completed work will be paid for using the following pay item:

Pay Item	Pay Unit
Priority __, HMA Crack Treatment Roadbed, Warranty	Roadbed Mile

Priority __, HMA Crack Treatment Roadbed, Warranty includes all materials, equipment, and labor for preparing, filling, and sealing the cracks and complying with all requirements, including the warranty, for full coverage as specified on the plans. **Priority__, HMA Crack Treatment Roadbed, Warranty** will be measured in roadbed miles along the roadway centerline and will include the traffic lanes, the paved shoulders, and all auxiliary lanes (including ramps until the 2 foot gore point). For a divided highway, the roadbed will be measured separately in each direction. Maintaining traffic and lighting items of work will not be paid for separately, but will be included in the established unit price for **Priority __, HMA Crack Treatment, Roadbed, Warranty**.

h. Warranty Requirements. If any of the following minimum performance criteria are not met, warranty work is required. The warranty work must be performed prior to conclusion of the warranty period or within such other time frame as agreed to by the Department and the Contractor, unless safety concerns dictate otherwise.

One segment (528 feet in length) per one roadbed mile will be selected to review in detail. One driving lane will be reviewed for measuring the performance of the crack treatment. One segment will be reviewed for any projects or remaining portions of a project less than 1 mile, but greater than 2 segments (1056 feet).

A separate measurement and calculation of treatment failure will be made for material placed in a saw and seal configuration and material placed in an overband configuration. The measurement will define the amount of failure as a percentage of the total length of cracks in the segment by the following formula:

1. Single Segment Failure. The allowable threshold limit for material failure must not exceed 30 percent of any one segment. Corrective action for this parameter requires the Contractor to reseal the entire deficient segment plus all other deficient segments that exceed 30 percent failure within that mile, including shoulders, unless the shoulders, or portions thereof, were exempted in the proposal from treatment due to a high concentration of cracks.

2. Multiple Segment Failure. The allowable threshold limit for material failure must not exceed 10 percent of all segments evaluated. Corrective action for this parameter requires the Contractor to reseal the entire project location, including shoulders, unless the shoulders, or portions thereof, were exempted in the proposal from treatment due to a high concentration of cracks.

3. Catastrophic Failure. If at any time during the warranty period, 30 percent of the cracks treated as part of this contract fail, the Contractor will correct all failures as soon as weather conditions permit.