

Special Experimental Project No. 14 (SEP-14) Programmatic Use of Type 1, Type 2 & Type 3 Fixed Price Variable Scope Contracting on Capital Preventative Maintenance Projects Calendar Year 2021 Annual Evaluation Report

March 7, 2022

Introduction

The Michigan Department of Transportation (MDOT) received programmatic approval to utilize Fixed Price Variable Scope (FPVS) contracting on Capital Preventative Maintenance (CPM) Projects. The purpose of FPVS contracting is to construct the greatest amount of work with the available project budget and gain more value for the dollar by using this innovative contracting method.

This annual report covers Type 1, Type 2 and Type 3 FPVS CPM projects let in calendar year 2021.

Type 1, 2 & 3 FPVS Contracting Overview

MDOT has developed three types of FPVS procurements requiring approval through this SEP-14 Work Plan. This Work Plan only applies to CPM projects using Type 1, 2 & 3 procurements. Non-CPM projects using a Type 1, 2 or 3 procurements require a separate approval unless otherwise directed by the FHWA.

Type 1: Type 1 FPVS projects receive bids by a unit of work that can be completed for a stated fixed price. The selected contractor is the bidder that proposes the most units of work for the given fixed price. For example, an HMA crack sealing project would be bid by the lane miles a contractor can complete based on the fixed price provided in the contract. In the event of a tie, bidders will be required to submit a revised price for the amount of work originally bid, and the bidder with the lowest price would be the selected contractor. Type 1 has been used for HMA crack seal, chip seal, and fog seal projects, bid by the lane mile.

Type 2: Type 2 FPVS projects receive bids by the units of work that can be completed for a maximum fixed price. Contractors will bid units of work, and may also bid a price for the work that is below the maximum price. The work that will be completed is identified at the time of the bid. The selected contractor is first determined by the bidder that proposes the most units of work for their stated maximum price. If two or more contractors propose the same amount of work, then the successful bidder is determined by which contractor proposed the lowest maximum price. Type 2 is used on a per site or priority basis, when partial completion of a site or priority is not acceptable such as bridges or ITS

Type 3: Type 3 FPVS projects receive bids through traditional bidding process. The Contractor provides unit prices for the pay items provided in the schedule of items. The selected contractor is determined by the lowest submitted bid. The project is awarded at the low bid price.

The schedule of items is made up of the normal pay items and quantities estimated by the Engineer that are required to complete a base amount of work, called "Priority 1". On federally funded projects the Priority 1 work cannot be reduced so it is typically setup to be approximately 90% of the budgeted amount. MDOT provides the Contractors with the available budget for the project. The portion of the project that is not included in the Schedule of Items is considered "Priority 2" (additional priority areas may also be identified in the plans). Priorities beyond Priority 1 are included in the design and the environmental clearance document, and the contract contains informational pay items and

quantities for these priorities. The work in Priority 1 will be completed by the project. If bids are favorable, or if additional funding becomes available to the project during construction, the project work is extended into Priority 2 until the final construction costs are approximately equal to the available funding. Type 3 has been used on concrete pavement repairs, HMA cold milling and overlay, and HMA crush and shape work.

Project Development Considerations

MDOT's CPM FPVS projects were all environmentally classified as categorical exclusions. Each project needs to be cleared through the environmental process and all permits obtained for the entire project limits and not just what is estimated to be constructed. Work cannot exceed what is environmentally cleared.

The projects were approved in the State Transportation Improvement Plan (STIP) 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 projects.

Per MDOT's commitment to FHWA, the Project Manager must track the status of completing any of the remaining work not bid. The remaining non-constructed portion of the project will need to be completed within 3 years of the original construction to avoid the penalty of reimbursement of federal funding for the entire project. As of November 2021, projects that are programmed for CPM work are exempt from the 3-year completion requirement. Other individual projects may be exempt from the 3-year completion requirement and will be evaluated on a case by case basis.

FPVS contracting can modify how projects are bid, inspected, constructed and paid. Contract documents are included, when necessary, to provide clear bidding instruction, and to modify MDOT's typical process on design-bid-build (DBB) projects. This is done to conform to the intent of the FPVS contracting method while meeting state and federal requirements. FHWA Michigan staff reviewed and approved new contract language when the original FPVS program began.

The Project Manager on each FPVS project determines when a bid would be considered for rejection. On traditional DBB projects, this occurs when the low bid is greater than 10% of engineer's price estimate. On Type 1 and Type 2 FPVS projects, rejection of a bid would be considered if the bid would perform 10% less work than the engineer estimated. Type 3 FPVS projects would use the standard process to determine bid rejection.

Bid Process and Results

MDOT receives bids electronically on all DBB projects. Appendix A contains the bidding results for each type of FPVS programmed in 2021, and includes the scope of work, lane mile cost, number of bidders, the bids from all bidders, the engineer's estimate of work and the additional work gained beyond the engineer's estimate.

In 2021, MDOT let six (6) Type 1 CPM FPVS projects and one (1) Type 1 Local Agency Safety FPVS project that pertain to this programmatic report. The CPM projects included HMA crack treatments and overband crack fills which resulted in completing a total of 171.02 miles more than the engineer's estimate, which is an average increase of 20.60%. LAP's Safety funded project allowed for an additional 28,913 feet of sinusoidal centerline rumble strips and permanent pavement markings, which resulted in approximately 42% more work than the

engineer's estimate.

Although the 2021 projects were programmed with approximately 20-30% more work than the engineer's estimate of work, maximum bids were received on three (3) of the six (6) CPM projects. Two (2) of the three projects also resulted in bid ties between two bidders. The low Bidder was determined as per Preparation, Delivery, and Consideration of Bids on Fixed Price Variable Scope Projects Special Provision, where the Department requested an adjusted bid price from each of the tied Bidders. The adjusted bid price could not be greater than the original fixed price. Also, the pay items with bid quantities entered by the Department and price for Mobilization remained at the original values, and the quantities for the pay items bid by the Bidder could not change. The Bidder with the lowest adjusted price was the winning Bidder. On the Jackson TSC's crack seal/overband crackfill project, the max bid was reached by the winning Bidder which resulted in 23% more work than the anticipated engineer's estimate. The project was programmed with sufficient amount of work and it is unclear why entire limits were bid. Possible reasons suspected are due to the winning bidder being new to the FPVS contracting method and unfamiliar with the bidding process. Also, lack of Contractor interest on this type of work in the Jackson TSC area has resulted in a reduced number of bidders compared to the 3-4 bidders in past years. Project managers of the other two (2) projects feel that the bid ties along with maximum bids were possibly due to basing unit prices on the prior year's results which reflected the hardships brought about by the Covid-19 Pandemic.

The engineer's estimate of work on FPVS projects is based on historical average unit prices from a geographic area. The 2021 letting results from both the CPM and Safety FPVS projects indicate that the FPVS contracting method on roadway crack sealing and rumble strips with pavement markings is cost effective, and that more work is being performed to preserve MDOT's roads and safety than through the use of conventional Design-Bid-Build contracts.

Industry Coordination and Reaction

When MDOT began using FPVS in 2012, MDOT met with representatives from Industry to discuss the innovative contracting methods being used on a project and required mandatory pre-bid meetings. Since then, MDOT has used FPVS on many different projects, most prevalently on HMA crack treatments. These projects have become more of a standard practice and no longer have pre-bid meetings. Other projects are evaluated independently to determine if a pre-bid meeting is required or not.

The Michigan Road Preservation Association (MRPA) represents contractors that perform preservation work including HMA crack sealing and chip seals. MRPA has indicated that its members are supportive of the use of FPVS, and feels this method keeps funding in their niche industry that is typically moved from their industry's work if there are bid savings on projects. The Innovative Contracting area participates in the quarterly meetings when requested.

Administrative Consideration

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 cost 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 also results in not having to prepare additional proposals and bid letting packages. The FPVS process saves the Department staff time and effort.

Additional Comments and Recommendations

Based on MDOT's experience in 2021, MDOT has the following recommendations:

1. For Type 1 FPVS projects, the maximum limits of the work should exceed the estimated amount of work by at least 25% of the required amount. Based on the latest bid results, it is recommended that additional work beyond 25% be programmed to avoid reaching the maximum bid and/or bid ties. If any adjustments are made after plan turn-in prior to advertisement, the PM's should confirm that the revised maximum amount still meets the required criteria. Bidding history should be reviewed for the type of work being contracted to estimate the normal variations in bids on DBB projects. This is done to estimate the minimum amount of work that should be included in the project beyond the estimated amount of work. The bid history should be examined for projects of similar geographic areas (i.e.: urban or rural settings, similar traffic control setups, etc.). MDOT has also compiled historical lane mile costs per Region to assist the Project Managers.
2. For HMA crack treatment and overband projects, the Engineer should evaluate the pavement condition and the severity of cracking. If cracking is more prevalent on some routes, the Engineer should take this into account when preparing the estimate of work. This continues to be an issue which should be noted by the PM's and evaluated at the start of each job prior to programming the priorities.
3. Implementation of electronic bidding proves to be successful on the Type 1 FPVS delivery method. Electronic bidding continues to reduce bidding errors and saves MDOT staff processing time. It is also preferred by Contractors, eliminating the need to either mail or hand deliver their paper bid.

Contract Information

Specific FPVS contracts can be found by looking up each project on MDOT's e-Proposal website through MILogin (<https://milogintp.michigan.gov/eai/tplogin/authenticate?URL=/>). Once registered for MILogin, enter the MILogin website by typing in the user's email address and password and then select MDOT e-proposal. Select the letting date from the "Lettings" area on the left side of the page, and then select the item number from the pull-down menu. The project proposal and any addenda will be available for downloading from this location.

MDOT has also developed a guide for the development of FPVS projects. This guide was incorporated as an appendix to MDOT's Innovative Construction Contracting Guide in early 2015 (updated in 2021) and is publicly posted on MDOT's website.

Unique contract items or traditional contract items modified by MDOT on the 2021 Type 1 FPVS projects are listed below.

- Special Provision for Hot Mix Asphalt Crack Treatment and Overband Crackfill on Fixed Price Variable Scope Projects*
- Special Provision for Warranty Work Requirements for Hot Mix Asphalt Crack Treatment on Fixed Price Variable Scope Projects *
- Special Provision for the Preparation, Delivery and Considerations of Bid on Fixed Price Variable Scope Projects **
- Special Provision for Pilot Car for Corrugation Milling ***
- Special Provision for Sinusoidal Corrugations and Pavement Markings on Fixed Price-Variable Scope Projects ***

- Special Provision for Sinusoidal Corrugations ***
 - * Special Provisions are modified to reflect changes needed for electronic bidding on FPVS Type 1 contracting.
 - ** The Special Provision for the Preparation of Bid and Delivery of Bid is revised to reflect electronic bidding and provides instruction on how to submit an electronic bid on a project.
 - *** These Special Provisions include the priority pay items to accommodate FPVS on LAP's safety sinusoidal corrugation and pavement marking project.

Appendix A: 2021 Bid Letting Results

Federally Funded Type 1 CPM FPVS Projects														
Type	Job No.	Region	Project Scope	Project Limits	Letting Data	No. of Bidders	Max Bid (Lane Miles)	Winning Bid (Lane Miles)	Engineer's Estimate of Work	Bid Price Per Lane Mile	Gain/Loss (Lane Mile)	Gain/Loss (%)	Other Bids (Lane Miles)	
1	208781	Grand	HMA Crack Treatment	Grand Rapids TSC Wide	201209 #601	2	145.64	135.48	117.05	\$3,801.30	18.43	16%	110.03	
1	208689	University	HMA Crack Treatment & Overband Crack Fill	Various Routes in Jackson TSC Area	210210 #301	2	133.74	133.74	108.37	\$1,951.55	25.37	23%	108.37	
1	208896	Grand	HMA Crack Treatment	Rural Grand Region Wide	210310 #601	4	104.06	104.06	84.38	\$2,708.30	19.69	23%	104.06, 90.02, 73.78	
1	211938	Superior	HMA Crack Treatment & Overband Crack Fill	Various Routes in Newberry TSC Area	210512 #603	2	273.09	230.81	212.19	\$2,239.94	18.62	9%	182.7	
1	211958	Superior	HMA Crack Treatment & Overband Crack Fill	Various Routes in Ishpeming TSC Area	210512 #601	2	204.66	204.66	153.21	\$2,402.21	51.45	34%	204.66	
1	211967	Superior	HMA Crack Treatment & Overband Crack Fill	Various Routes in Crystal Falls TSC Area	210512 #602	2	282.62	237.46	200.00	\$2,177.21	37.46	19%	216.56	
						Total Average	14 2.33	1,143.81 190.64	1,046.21 174.37	875.20 145.87	\$15,280.50 \$2,546.75	171.02 28.50	123.57% 20.60%	

Federally Funded Type 1 Safety FPVS Projects														
Type	Job No.	Region	Project Scope	Project Limits	Letting Data	No. of Bidders	Max Bid (Feet)	Winning Bid (Feet)	Engineer's Estimate of Work	Bid Price Per Foot	Gain/Loss (Number of Feet)	Gain/Loss (%)	Other Bids (Feet)	
1	210391*	Bay	Sinusoidal Centerline Rumble Strips & Permanent Pavement Markings	Various Routes/Locations in Midland County - Local Agency Project (LAP)	210609 #601	2	118,760.00	98,195.00	69,282.00	\$0.71	28,913.00	42%	97,177	
						Total Average	2 2	118,760.00 118,760.00	98,195.00 98,195.00	69,282.00 69,282.00	\$0.71 \$0.71	28,913.00 28,913.00	41.73% 41.73%	

* Maximum bid was based on the total number of feet of centerline corrugations and pavement markings.