

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 2022 Annual Evaluation Report

April 14, 2023

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 2022.

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.

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 2022, 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 2022, MDOT let six (6) Type 1 CPM FPVS projects and one (1) Type 3 Local Agency (LAP) CPM FPVS project that pertain to this programmatic report. The Type 1 CPM projects included HMA crack treatments and overband crack fills which resulted in completing a total of 173.50 miles more than the engineer's estimate, which is an average increase of 19.50%. The low bid for LAP's Single Course Chip Seal Type 3 project came in 20% under the engineer's estimate which allowed for enough funding to extend project limits into Priority 2 to complete the entire project.

Although the 2022 projects were programmed with approximately 20-30% more work than the engineer's estimate of work, maximum lane miles were bid on two crack seal projects resulting in bid ties. Per "Preparation Delivery, and Consideration of Bid on FPVS Projects" SP, an adjusted bid price was required by the tied bidders the following week to determine the winning bidder. According to contract language, the

adjusted bid price cannot be greater than the original fixed price bid. The pay items with bid quantities entered by the Department and price for Mobilization must remain at the original values, and the quantities for the pay items bid by the Bidder cannot change. The Bidder with the lowest adjusted price is the low Bidder. Therefore, a memo from the Construction Contracts Section (CCS) was sent to each of the Bidders requesting an adjusted bid price and the results were as follows on University Region's crack seal job:

- **University Region (Jackson TSC) JN 211083** – Two bidders bid the max lane miles of 137.32 resulting in a tie for the fixed price of \$255,598.80. Per request for adjusted bid prices from the tied bidders, the results were \$255,598.80 and \$449,985.40. The low bid was awarded to the lowest adjusted bid price; the bid over the fixed-priced amount was not considered.

The winning contractor was selected per requirements in the contract documents for the adjusted bid prices. However, due to a contractor's concern and one thing that was not accounted for when moving to electronic FPVS bids was the Apparent Bids on Bid Express. On MDOT's website, the lane mile bids were posted on the as-submitted and as-checked results. However, the apparent bids on Bid Express showed only a bid total and not the lane miles. This revealed one contractor's bid as \$70 less than another which made that contractor the low bidder; however, since MDOT is bound to the language in the "Preparation Delivery, and Consideration of Bid on FPVS Projects" SP, a request for the adjusted bid prices was required.

Due to this issue, the Apparent Bids will no longer be published on the Bid Express website and the contractors will not see the total bid prices of each bidder, only the lane mile bids. The "Preparation Delivery, and Consideration of Bid on FPVS Projects" SP was revised to allow MDOT to use the initial bid total and eliminate the memo from CCS to each Bidder requesting an adjusted bid price due the following week after the scheduled letting. Revised SP language included the following:

In the event that two or more Bidders are tied after subsection 102.13.A is evaluated, the Department will use the unit prices and bid total submitted in the electronic bid from each of the tied Bidders. The bid total submitted in the electronic bid will be considered as the adjusted bid price. The adjusted bid price cannot be greater than the original fixed price bid. The pay items with bid quantities entered by the Department and price for Mobilization must remain at the original values, and the quantities for the pay items bid by the Bidder cannot change. The Bidder with the lowest adjusted bid price will determine the low Bidder.

This revision was then tested during the March 2022 FPVS letting when max bids between two bidders on another HMA crack treatment job resulted in a bid tie. This allowed MDOT to use the as-submitted bid total as the first tie breaker as per revised SP which confirm improvement to the process. The bid results were posted on the scheduled letting and the project was awarded without delay:

- **Bay Region (Davison and Huron TSC) JN 211759** – Two bidders bid the max lane miles of 196.32 resulting in a tie for the fixed price of \$639,998.95. Per revised "Preparation Delivery, and Consideration of Bid on FPVS Projects" SP, the apparent bids were used with results of \$639,998.95 and \$854,188.00 for the max lane miles. Lowest apparent bid was awarded the project.

Grand Region's Pilot FPVS Type 1 project with RR protection let in November 2022 allowed for continuous HMA crack treatment work through an at-grade RR crossing. On past Type 1 crack treatment jobs, the sections through an at-grade crossing needed to be gapped out since there was not a way to pay for RR protection on a specific Priority location. Therefore, the Preparation, Delivery and Considerations of Bid on

Fixed Price Variable Scope SP was revised to incorporate RR protection on fixed priority locations that must be bid, all other additional priority locations that may or may not be bid can only gap out sections through an at-grade crossing and cannot utilize the RR protection pay item. Per feedback from the project manager and the awarded contractor, adding the RR protection component did not affect the bid since the pay item was already included as a fixed amount covered in the contract documents. No other issues or concerns were provided by the contractor. According to the bidding results, utilizing the FPVS method with RR protection resulted in completing a total of 33.81 miles more than the engineer's estimate, which is above the average lane mile gains on the FPVS projects let in 2022.

The engineer's estimate of work on FPVS projects is based on historical average unit prices from a geographic area. The 2022 letting results from all six (6) CPM crack seal FPVS projects and LAP's Single Course Chip Seal indicate that the FPVS contracting method on roadway crack sealing and chip sealing are 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 2022 and in past years, 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 PMs 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. As recommended in previous years on HMA crack treatment and overband projects, the Engineer should continue to 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 should be noted by the PMs and evaluated at the start of each job prior to programming the priorities.

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 2022 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 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, provides instruction on how to submit an electronic bid on a project and how bid ties are handled.

Items unique to Type 3 FPVS contracts are listed below.

- Notice to Bidder for Fixed Price-Variable Scope Contracting: This Notice to Bidders indicates how the contract will be managed to a pre-established budget.
- Special Provision for Significant Changes in the Character of Work on Fixed Price-Variable Scope Projects: This special provision modifies the Standard Specifications so increases or decreases in quantities do not constitute a change to the contract.
- Special Provision for Extension of Time on Calendar Date Fixed Price-Variable Scope Projects: This special provision would extend the completion date of the project if extended beyond Priority 1. This special provision is an optional document on Type 3 FPVS projects.

Appendix A: 2022 Bid Letting Results

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)
Federally Funded Type 1 CPM FPVS Projects													
1	211083	University	HMA Crack Treatment & Overband Crack Fill	Various Routes in Jackson TSC Area	220209 #901	4	137.32	137.32	104.24	\$1,901.48	33.08	32%	137.32 n/c, 122.79 n/c, 111.26
1	211759	Bay	HMA Crack Treatment	Various Routes in Davison and Huron TSC Areas	220309 #601	3	196.32	196.32	168.00	\$3,259.98	28.32	17%	196.32, 158.02
1	214077	Superior	HMA Crack Treatment & Overband Crack Fill	Various Routes in Ishpeming TSC Area	220511 #604	2	172.41	143.22	133.70	\$2,380.95	9.52	7%	137.3
1	214081	Superior	HMA Crack Treatment & Overband Crack Fill	Various Routes in Newberry TSC Area	220511 #605	2	357.99	262.74	256.34	\$2,207.51	6.40	2%	236.34
1	214259	Superior	HMA Crack Treatment & Overband Crack Fill	Various Routes in Crystal Falls TSC Area	220511 #603	2	320.07	279.37	217.00	\$2,115.47	62.37	29%	250.45
1	207873*	Grand	HMA Crack Treatment	Various Routes in Grand Rapids TSC Area	221109 #601	2	153.81	145.81	112.00	\$3,518.28	33.81	30%	100.13
* Pilot FPVS Type 1 project with Railroad protection					Total	15	1337.92	1164.78	991.28	\$15,383.67	173.50	117.00%	
					Average	2.5	222.99	194.13	165.21	\$2,563.95	28.92	19.50%	
Type	Job No.	Region	Project Scope	Project Limits	Letting Data	No. of Bidders	-	Winning Bid (Low Bid)	Engineer's Estimate of Work	-	Gain/Loss	Gain/Loss (%)	Other Bids
Federally Funded Type 3 CPM FPVS Projects													
3	214614**	Grand	Single Course Chip Seal	Up to 5 Federal Aid Route Locations in Newaygo County	221109 #602	3	-	\$1,052,871	\$1,317,000	-	\$264,129	20.00%	\$1,172,516, \$1,198,429
** Local Agency Project					Total	3	-	\$1,052,871	\$1,317,000	-	\$264,129	20.00%	
					Average	3	-	\$1,052,871	\$1,317,000	-	\$264,129	20.00%	