

**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 2017 Annual Evaluation Report
July 20, 2018**

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 2017.

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 2: Type 2 FPVS projects receive bids by a unit of work that can be completed for a maximum fixed price. Contractors 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 the price they bid. 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. For example, a Type 2 project MDOT has let received bids based on the square yards of epoxy overlay that can be completed and a price to complete the work included in the bid. The square yards bid had to place an epoxy overlay over an entire bridge deck (a partial bridge deck was not acceptable), and the price bid had to be below the maximum price. 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 3: Type 3 FPVS projects receive bids through traditional bidding processes where MDOT advertises the project through traditional methods and the contractor provides unit prices for the pay items provided in the schedule of items. The selected contractor would be the one that submits the low bid based on the pay items and quantities in the Schedule of items. The project is awarded to the low bidder 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 "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.

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.

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. However, MDOT's bid letting system cannot accommodate the bidding process of Type 1 and Type 2 FPVS projects, and a hand delivered paper bid is required. Type 3 projects are bid in a traditional fashion, using our current letting system. Appendix A contains the bidding results for each type of FPVS, 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 2017, MDOT did not let any Type 2 CPM FPVS projects that would apply to this programmatic report. MDOT did let fourteen (14) Type 1 and three (3) Type 3 FPVS projects that pertain. The Type 1 projects included HMA crack treatments/overband crack fills, concrete joint resealing and safety delineator installations. Nine (9) of the fourteen (14) projects were HMA crack treatments which resulted in completing a

total of 317.9 miles more than the engineer's estimate, which is an average increase of 29.11%. The concrete joint resealing project also resulted in additional lane miles than the engineer's estimate, an increase of 10.07%.

However, the maximum miles were bid on three of the crack seal projects resulting in a tie. Per "Preparation Delivery, and Consideration of Bid on FPVS Projects" SP, an adjusted bid price was required by the tied bidders to determine the winning bidder on each of the three projects. 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. A memo from the Construction Contracts Section was sent to each of the Bidders requesting an adjusted bid price and the results were as follows:

- **Bay Region (Bay City TSC) JN 131083** – Two bidders bid the max lane miles of 80.40 resulting in a tie for the fixed price of \$310,421. Per request for adjusted bid prices from the tied bidders, the results were \$306,303 and \$332,200 for the max lane miles.
- **University Region (Jackson TSC) JN 129169** – Three bidders bid the max lane miles of 117.79 resulting in a 3-way tie for the fixed price of \$334,028. Per request for adjusted bid prices from the tied bidders, the results were \$303,700, \$341,344, and \$345,300.
- **University Region (Lansing TSC) JN 129172** – Two bidders bid the max lane miles of 104.29 resulting in a tie for the fixed price of \$222,090. Per request for adjusted bid prices from the tied bidders, the results were \$255,090 and N/A.

In the event that two or more Bidders are tied after the submittals of their adjusted bid prices, the low Bidder will be determined by drawing names from a container. There are rules that apply to this; however, we have not yet had to select the low Bidder by this method.

On the other hand, the four (4) safety delineator installation projects resulted in a total of 3901 delineators less than the engineer's estimate, which is an average decrease of 14.12%. Based on these results, additional projects will need to be analyzed in order to perform a more thorough evaluation to determine if this method on safety delineators is effective for the department.

The bids on the Type 3 CPM projects in Bay, University, and Southwest Regions all came in at least 19% under the engineer's estimate allowing MDOT to resurface more roadway than what would have occurred in 2017.

The engineer's estimate of work on FPVS projects is based on historical average unit prices from a geographic area. The 2017 letting results from the CPM FPVS projects indicate that the FPVS contracting method on roadway resurfacing and crack sealing is cost effective, and that more work is being performed to preserve MDOT's roads 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.

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 2017, MDOT has the following recommendations:

1. The maximum limits of the work should exceed the estimated amount of work by at least 25% additional miles than the required amount. 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. Coordination with all stakeholders, including internal MDOT staff, industry, and federal highways is important and should be done early in the programs development. MDOT personnel that are critical to coordinate with are from the environmental, planning, contracting, design, construction and technical subject matter experts.
3. 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 their estimate of work.

Contract Information

Specific FPVS contracts can be found by looking up each project on MDOT's e-Proposal website (<https://milogintp.michigan.gov/eai/tplogin/authenticate?URL=/>). Once registered, enter the e-Proposal website by typing in the user's email address and password. Instructions for registering new users are on the left side of this page. 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 of the development of FPVS projects. This guide was incorporated as an appendix to MDOT's Innovative Construction Contracting Guide in early 2015 and is publicly posted on MDOT's website.

Unique contract items or traditional contract items modified by MDOT on the 2017 Type 1 FPVS projects are listed below.

- Schedule of Items*
- Special Provision for Hot Mix Asphalt Crack Treatment 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 Capital Preventative Maintenance Work 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 Reflective Sheeting and Flexible Delineator Post Installation on Fixed Price Variable Scope Projects **
- Special Provision for Rectangular Delineator Reflector Installation on Fixed Price Variable Scope Projects **
- Special Provision for Rectangular Delineator Reflector and Rigid Steel Post Installation on Fixed Price Variable Scope Projects **
- Special Provision for the Preparation, Delivery, and Consideration of Bids on Fixed Price Variable Scope Projects for Delineators ***

* The Schedule of Items is modified to reflect FPVS contracting and how the project is bid.

** Special Provisions are modified to reflect changes needed for FPVS contracting.

*** The Special Provision for the Preparation of Bid and Delivery of Bid provides instruction on how to submit a paper bid on a project.

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: 2017 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	131083	Bay	HMA Crack Treatment	Various Routes in Huron & Davison TSC Areas	170111 #601	3	80.4	80.4	65.00	\$3,809.74	15.4	23.69%	80.4, 72.20
1	129169	University	HMA Crack Treatment	Various Routes in the Jackson TSC Area	170208 #602	4	117.79	117.79	100.00	\$2,578.32	17.79	17.79%	117.79, 117.79, 109.81
1	131166	Bay	HMA Crack Treatment	Various Locations in Bay Region	170208 #601	3	139.9	119.56	84.14	\$3,026.97	35.42	42.10%	116.46, 94.14
1	128672	Grand	HMA Crack Treatment	Various Locations in the Cadillac TSC area - plus Oceana County	170308 #603	3	155.43	119.21	105.47	\$3,145.71	13.74	13.03%	95.21, 83.65
1	129172	University	HMA Crack Treatment	Various Locations in the Lansing TSC area	170308 #601	4	104.29	104.29	98.50	\$2,445.97	5.79	5.88%	104.29, 88.03 & 78.23
1	129877	Grand	Concrete Joint Re-Sealing	US-131: 76th St to 44th St & I-96: M-11 to W/M-6	170308 #602	2	71.58	47.76	43.39	\$23,220.27	4.37	10.07%	43.75
1	129146	University	HMA Crack Treatment	Various Location in the Brighton TSC area	170412 #602	2	133.35	121.02	75.00	\$2,726.82	46.02	61.36%	30.34 n/c
1	132997	Superior	HMA Crack Treatment	Various Locations in the Newberry TSC area	170510 #602	2	276.56	249.58	174.33	\$1,908.41	75.25	43.17%	52.84 n/c
1	133027	Superior	HMA Crack Treatment	Various Locations in the Crystal Falls TSC area	170510 #603	2	226.08	226.08	190.18	\$2,078.91	35.9	18.88%	172.06
1	133123	Superior	HMA Crack Treatment	Various Locations in the Ishpeming TSC area	170510 #601	3	273.59	273.59	201.00	\$1,740.56	72.59	36.11%	200.08, 183.44
Totals and Averages reflect HMA Crack Treatment Results (Concrete Joint Re-Sealing not included)					Total	26	1507.39	1411.52	1093.62	\$23,461.41	317.9	262.00%	
					Average*	2.89	167.49	156.84	121.51	\$2,606.82	35.32	29.11%	

Federally Funded Type 1 Traffic & Safety FPVS Projects

Type	Job No.	Region	Project Scope	Project Limits	Letting Data	No. of Bidders	Max Bid (No. of Delineators)	Winning Bid (No. of Delineators)	Engineer's Estimate of Work	Bid Price Per Delineator	Gain/Loss (No. of Delineators)	Gain/Loss (%)	Other Bids (No. of Delineators)	
1	200032	Grand	Delineator Installation	Various Locations in the Grand Region	170712 #602	3	7907	4428	6125	\$38.89	-1697	-27.71%	4190, 3940	
1	200498	Bay	Delineator Installation	Various Locations in Clare, Isabella, Gratiot & Midland Co	170906 #601	3	13046	5337	7675	\$31.95	-2338	-30.46%	5070, 4463	
1	200451	Southwest	Delineator Installation	Various Locations in Kalamazoo, Calhoun & Van Buren Counties	171011 #601	2	12044	9734	9633	\$18.31	101	1.05%	8420	
1	200452	Superior	Delineator Installation	Various Locations in the Superior Region	171108 #602	3	7553	5240	5207	\$26.81	33	0.63%	5225, 5224	
						Total	11	40550	24739	28640	\$115.96	-3901	-56.49%	
						Average	2.75	10138	6184.75	7160	\$28.99	-975.25	-14.12%	

Federally Funded Type 3 FPVS Projects

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	
3	129088	Bay	HMA Coldmill & Resurface	Geneva Road to 9 Mile Road	170208 #603	4	-	\$1,124,728	\$1,745,103	-	\$620,375	35.55%	\$1,231,810, \$1,275,177, \$1,297,728	
3	129166	University	HMA Coldmill & Resurface	Henry Road to Columbia Road	170308 #604	2	-	\$3,180,601	\$3,952,038	-	\$771,437	19.52%	\$3,388,762	
3	131592	Southwest	Conc Repair, Grind, Groove, Seal	Indiana State Line to city of Coldwater	171206 #601	2	-	\$2,524,945	\$3,120,822	-	\$595,877	19.09%	\$2,577,928	
						Total	8	-	\$6,830,274	\$8,817,963	-	\$1,987,689	74.16%	
						Average	2.67	-	\$2,276,758	\$2,939,321	-	\$662,562.98	24.72%	