

**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 2016 Annual Evaluation Report June 30, 2017**

**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 2016.

**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, a 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, the ITS Type 2 projects MDOT has let received bids based on the number of Environmental Sensor Stations (ESS) sites that can be completed and a price to complete the work included in the bid. The bid had to install a minimum number of ESS sites 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.

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, and the engineer's estimate of work.

In 2016, MDOT did not let any Type 3 CPM FPVS projects that would apply to this programmatic report. MDOT did let twelve Type 1 projects and two Type 2 projects. The Type 1 projects included HMA crack treatments/overband crack fills on roads with one project including crack treatments on two existing carpool lots. These projects resulted in completing a total of 229.03 miles more than the engineer's estimate, which is an average increase of 10.71%. The maximum miles were bid on three of the projects; therefore, it is recommended to include at least 25% additional miles than the required amount.

The bids on Southwest Region's Type 2 ESS ITS project came in 9.32% under the engineers estimate allowing MDOT to construct an additional ESS site than originally anticipated with the programmed budget. However, since the bids on North Region's ESS ITS project came in 12.81% over the engineers estimate only the minimum number sites were constructed. This included a combination of 10 ESS sites, 2 Active Warning Systems (AWS) and 5 cameras (CCTV) at traffic signal locations.

The engineer's estimate of work on FPVS projects is based on historical average unit prices from a geographic area. The 2016 letting results from the CPM FPVS projects indicate that the FPVS contracting method 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. MDOT has used FPVS on many different projects, most prevalently on crack sealing projects, and no longer has pre-bid meetings on these projects. 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 2016, MDOT has the following recommendations:

1. The maximum limits of the work should exceed the estimated amount of work. 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 (ie: 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

<http://mdotcf.state.mi.us/public/eprop/login/index.cfm>). 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 2016 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, Special on Fixed Price Variable Scope Projects \*\*
  - Special Provision for Capital Preventative Maintenance Work on Fixed Price Variable Scope Projects \*\*
  - Special Provision for the Preparation of Bid and Delivery of Bid \*\*\*
- \* 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: 2016 Bid Letting Results

Federally Funded Type 1 & 2 FPVS Projects

Type	Job No.	Region	Project Scope	Project Limits	Fixed/Max Cost	Letting Data	No. of Bidders	Max Bid (Lane Miles)	Winning Bid (Lane Miles or Low Bid)	Engineer's Estimate of Work	Bid Price Per Lane Mile	Gain/Loss (Ln Mile or Bid Savings)	Gain/Loss (%)	Other Bids	
2	107966*	Southwest	Install ITS - ESS	Various Locations in the Southwest Region	\$1,800,000	10/07/15 Item 601	2	-	\$ 1,714,775.28	\$ 1,890,967.57	-	Bid Savings of \$176,192.29	-9.32%	\$1,793,658.49	
2	113423	North	Install ITS - ESS, AWS & CCTV	Various Locations in the North Region	\$1,500,000	03/09/16 Item 601	1	-	\$ 1,656,610.47	\$ 1,468,463.15	-	Bid Increase of \$188,147.32	12.81%	-	
1	127496	University	HMA Crack Treatment	Various Locations in the Jackson TSC Area	\$371,308	02/10/16 Item 601	4	120.40	109.90	97.60	\$3,378.60	12.30	12.60%	109.5, 102, 97.6	
1	106351**	Grand	Crack Seal Existing Carpool Lot	I-96/68th Avenue SE Quadrant - Lot Item 570004	\$2,000	03/09/16 Item 605	-	-	-	-	-	-	-	-	
1	106352**	Grand	Crack Seal Existing Carpool Lot	M-104/Pine Street NE Quadrant - Lot Item 570001	\$2,000	03/09/16 Item 605	-	-	-	-	-	-	-	-	
1	126913**	Grand	HMA Crack Treatment	Various Locations in the Muskegon TSC Area	\$452,500	03/09/16 Item 605	2	172.66	133.93	155.00	\$3,378.63	(21.07)	-13.59%	133.81	
1	126137	Grand	HMA Crack Treatment	Various Locations in the Grand Rapids TSC Area	\$700,000	03/09/16 Item 603	1	218.28	186.46	171.59	\$3,754.16	14.87	8.67%	N/A	
1	127498	University	HMA Crack Treatment	Various Locations in the Brighton TSC Area	\$330,000	03/09/16 Item 604	3	118.20	99.32	94.28	\$3,322.59	5.04	5.35%	83, 70	
1	127516	University	Overband Crack Fill	Various Locations in the Jackson TSC Area	\$327,869	03/09/16 Item 606	5	158.00	115.60	114.00	\$2,836.24	1.60	1.40%	109.6, 102.7, 94.5, 90.1	
1	127581	Bay	HMA Crack Treatment	Various Locations in the Mt. Pleasant TSC Area	\$898,149	03/09/16 Item 602	2	396.29	296.90	339.00	\$3,025.09	(42.10)	-12.42%	33.15	
1	129403	Superior	HMA Crack Treatment	Various locations in the Crystal Falls TSC area	\$654,500	05/11/16 Item 601	2	276.31	276.31	240.75	\$2,368.72	35.56	14.77%	257.75	
1	129462	Superior	HMA Crack Treatment	Various Locations in the Ishpeming TSC area	\$645,046	05/11/16 Item 602	2	286.00	286.00	225.00	\$2,255.41	61.00	27.11%	250.39	
1	129463	Superior	HMA Crack Treatment	Various Locations in the Newberry TSC area	\$549,260	05/11/16 Item 603	2	281.49	275.37	191.09	\$1,994.63	84.28	44.10%	213.05	
1	127512	North	HMA Crack Treatment	Various Locations in Traverse City & Gaylord TSC areas	\$515,000	06/08/16 Item 603	2	175.61	142.78	140.00	\$3,606.95	2.78	1.99%	61.23	
1	127523	Metro	HMA Crack Treatment	Various Locations in the Metro Region	\$989,000	06/08/16 Item 601	2	297.32	254.27	224.64	\$3,889.57	29.63	13.19%	239.94	
1	128938	Metro	HMA Crack Treatment	Various Locations in the Detroit & Taylor TSC Areas	\$822,100	06/08/16 Item 602	2	223.00	223.00	177.86	\$3,686.55	45.14	25.38%	191.65	
							Total	29	2723.56	2399.84	2,170.81	\$37,497.11	229.03	128.55%	
							Average	2.42	226.96	199.99	180.90	\$3,124.76	19.09	10.71%	

Notes: Item with asterisk (\*) Calendar Year 2015 project included in Calendar Year 2016 report  
Items with asterisks (\*\*) packaged and let together