

Final Evaluation Report – SEP-14

Fixed Price Variable Scope Contracting

Missouri Department of Transportation
Fixed Price Variable Scope Contracting
Job No. J5I3303 & J2I3225
February 19, 2020

Introduction

The Missouri Department of Transportation (MoDOT) used Fixed Price Variable Scope (FPVS) contracting to maximize the work performed on the construction project while maintaining the fixed budget.

Scope of Work

The purpose of the contract was to install wrong way countermeasures on the maximum number of ramps as the budget would allow. MoDOT budgeted \$559,000 for these projects.

The initial project scope of work included installation of 232 Wrong Way and Do Not Enter signs along with corresponding removals of existing signs and traffic control. The sign installations were along Interstate 70 through MoDOT's Central and Northeast Districts. The variable scope portion of the project included sign installation on Route 61 in the Northeast District on Route 63 in both the Central and Northeast Districts.

Bid Process and Results

These projects (J5I3303 & J2I3225) were bid in required combination in the April 19, 2019 bid opening. MoDOT made plans available to contractors on March 13, 2019 and held a virtual pre-bid meeting on March 21, 2019 to provide an opportunity for contractors to ask questions on the new contracting method. Ten people from industry attended the meeting along with MoDOT and FHWA – MO Division Office in attendance. The meeting was recorded and made available online for anyone who could not attend.

MoDOT received bids from 3 bidders on the project with the following bids based on the initial quantities:

Bidder	Total Bid	Percent of Low Bid
No.1	\$257,303.27	100.000
No.2	\$417,264.00	162.168
No.3	\$570,881.06	221.871

The award of the contract was made to the lowest responsible bidder on May 3, 2019 by the Missouri Highways and Transportation Commission. One of the goals of using FPVS was to complete as much work with the budget as possible, especially if we received good bids. For these projects, the low bidder was below the budgeted amount so MoDOT was able to accomplish all of the variable scope set up in the contract. Below is a comparison of the initial quantities and final quantities for the contract:

Pay Item	Unit	Initial Quantity	Final Quantity	Difference
Do Not Enter (R5-1) – 48"x48" on 2 - 2" PSST Post with sleeves and concrete footings	Each	97	122	25
Do Not Enter (R5-1) – 48"x48" on back of existing posts	Each	18	0	-18
Removal of Existing Signs from Existing Post	Each	33	60	27
Removal of Existing Signs, Post and Footings	Each	58	102	44
Wrong Way (R5-1a) – 42"x30" on 1 – 2" PSST Post with sleeve and concrete footing	Each	99	118	19
Wrong Way (R5-1a) – 42"x30" on back of existing posts	Each	1	8	7
Truck or Trailer Mounted Attenuator (TMA)	Each	58	64	6
Partial Ramp Closure	Each	58	44	6
Shoulder Work Ahead	Each	40	111	61

The final contract cost is \$470,309.51. This is an increase of \$213,006.24 above the original project bid that was used to install an additional 33 signs. The 33 additional signs that were installed are a result of completing all of the variable scope included in the contract.

MoDOT bid two similar projects that did not utilize the FPVS contracting. The other two projects also received good bids. From this, we do not believe that the FPVS contracting led to receiving better bids. The good bids received were likely the result of the economies of scale due to the size of the signing contracts and the bidding environment at the time of bids. We did not anticipate that FPVS contracting would lead to better bids so this was not considered a negative of using FPVS contracting.

Lessons Learned

The variable scope portion of the project that was set up did not include enough work to use the entire budget. For future projects, the department will need to ensure enough work is set up to fully utilize the budget.

Summary

The major benefit of using the FPVS contracting method is to maximize the use of the project's budget without exceeding the budget. For this project, MoDOT was able to complete additional safety improvements by utilizing FPVS rather than traditional bidding methods. With traditional bidding methods, MoDOT would have waited until project closeout to identify the budget savings, then an additional project would have been programmed to use the savings, the project would then be designed, bid and awarded. By using the FPVS, MoDOT was able to save the additional time and expense of developing a new project to spend the savings. An additional benefit is the increased safety the traveling public realized by having additional safety devices installed sooner using FPVS rather than traditional contracting methods.

One important item to note is the time and cost savings are only realized if the contractor's bid is less than the budget. If the contractor's bid is equal to or more than the budget, the benefit realized from FPVS would only had been budget control. In conclusion, MoDOT believes that FPVS contracting is a good tool to have for the right project and when budget control is a primary concern.

Additional Documents

Appendix A – Approved Workplan and attachments

Appendix A

SEP-14 Work Plan
Missouri Department of Transportation
Fixed Price Variable Scope Contracting
Job No. JSI3303 & J2I3225

February 7, 2019

Introduction

The Missouri Department of Transportation (MoDOT) proposes to use Fixed Price Variable Scope Contracting (FPVS) on a project for the installation of Wrong Way Countermeasures along Interstate 70, US Highway 63, and US Highway 61 in Central and Northeast Missouri.

Purpose and Scope

The purpose of the contract is to install the wrong way countermeasures on the maximum number ramps as our budget will allow. The project area for Central Missouri is I-70 in Cooper, Boone and Callaway Counties. It will also include US Hwy 63 in Boone County. The project area for Northeast Missouri is I-70 in Montgomery and Warren Counties. It will also include US Hwy 61 in Lincoln County. The contract will include installation of additional Wrong Way Signs and Do Not Enter Signs to increase safety along these freeway corridors. MoDOT has budgeted \$567,000 for these projects.

Procurement Process

MoDOT proposes to use FPVS procurement to accomplish these projects. This contract method will allow MoDOT to vary the amount of work to be completed to match the budget set for the projects. The work included in the bid proposal is established in priority order to be completed and will exceed the amount of work that is expected to be completed by the budget in order to capitalize on getting better than expected bids. This procurement method will have the contractor bid a unit price for the estimated quantities for each item of work in the contract. The estimated quantities included in the contract represent the amount of work that can be completed for the budgeted amount. Once the project has been awarded, the MoDOT construction office would then manage the contract by adjusting the contract quantities to hit the budgeted amount.

Procurement Overview:

- (a) MoDOT develops estimated quantities for the pay items in the project that will deliver the budget amount that is included in the project specifications.
- (b) Locations of the work are established in priority order in the project specifications.
- (c) MoDOT advertises the project through our traditional bidding processes.

- (d) The contractor will bid unit prices for the pay items and submits their bids through our traditional bidding processes.
- (e) MoDOT awards the contract to the lowest responsive bidder.
- (f) MoDOT manages the contract quantities based on the unit bid prices, work completed and the project budget following the priorities set in the specifications.

MoDOT will utilize pre-bid meetings or industry meetings with contractors to familiarize them with the FPVS process.

Schedule

This project is scheduled for a Spring 2019 bid opening date with construction to be completed by the Fall 2019.

Evaluation and Reporting

MoDOT will provide FHWA's Missouri Division Office an evaluation of the contract within 6 months of the project's completion. This evaluation will include any relevant information related to efficiencies realized by the FPVS process including, but not limited to, quicker project delivery, cost savings compared to expected costs using the traditional bidding method, and recommendations for improving the use of FPVS. MoDOT has similar projects that will be bid using our traditional bid approach at the same time and those projects will be used for comparison.

FPVS - Job No. J5I3303 & J2I3225 Work Plan Attachments

Example Pay items

Project J5I3303

Pay Item	Quantity	Unit	Bid Price	Total
Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing	69	Each		
Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings	69	Each		
Wrong Way (R5-1a) – 42"x30" on back of existing posts	17	Each		
Do Not Enter (R5-1) – 48"x48" on back of existing posts	17	Each		
Removal of Existing Signs, Post and Footings	43	Each		
Removal of Existing Signs from Existing Post	22	Each		
Truck or Trailer Mounted Attenuator (TMA)	43	Each		
Partial Ramp Closure	43	Each		
Shoulder Work Ahead	43	Each		

Note: The amount of work established for bidding is based on spending the estimated budget amount.

Project J2I3225

Pay Item	Quantity	Unit	Bid Price	Total
Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing	30	Each		
Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings	28	Each		
Wrong Way (R5-1a) – 42"x30" on back of existing posts	1	Each		
Do Not Enter (R5-1) – 48"x48" on back of existing posts	1	Each		
Removal of Existing Signs, Post and Footings	15	Each		
Removal of Existing Signs from Existing Post	11	Each		
Truck or Trailer Mounted Attenuator (TMA)	15	Each		
Partial Ramp Closure	15	Each		
Shoulder Work Ahead	7	Each		

Note: The amount of work established for bidding is based on spending the estimated budget amount.

Contract Award and Management

The bidding documents will include set quantities for each pay item that all contractor will be required to bid by entering a unit bid price. The award of the contract will be given to the lowest responsible bidder based on the set quantities and unit bid price for the combination of the two projects, J5I3303 and J2I3225. After the project is awarded to the lowest responsible bidder, the contract will be managed by changing the quantities of each pay item to deliver the project budget.

There are two scenarios that could occur. The first scenario is the awarded bidder's total bid is lower than the project budget. The second scenario is the awarded bidder's bid is higher than the project budget. Here is how the scenarios would be handled after the award of the project:

Scenario 1: The awarded Contractor's total bid is less than the project budget.

Project Budget: \$424,000

Awarded Contractor's Bid: \$400,400. Contractor's Bid:

Pay Item	Quantity	Unit	Bid Price	Total
Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing	69	Each	1500	103,500
Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings	69	Each	1500	103,500
Wrong Way (R5-1a) – 42"x30" on back of existing posts	17	Each	500	8500
Do Not Enter (R5-1) – 48"x48" on back of existing posts	17	Each	500	8500
Removal of Existing Signs, Post and Footings	43	Each	400	17,200
Removal of Existing Signs from Existing Post	22	Each	200	4400
Truck or Trailer Mounted Attenuator (TMA)	43	Each	700	30,100
Partial Ramp Closure	43	Each	2500	107,500
Shoulder Work Ahead	43	Each	400	17,200
	Total Bid			400,400

Since the contractor's total bid is less than the budget identified in the project special provisions, MoDOT would look at the priority list of routes identified in the special provisions to add additional quantities of work from the next highest priority. The remaining budget of \$23,600 would allow MoDOT to add work on one additional interchange using MoDOT's standard change order process. The quantity increase at the contractor's bid price would be:

Pay Item	Quantity	Unit	Bid Price	Total
Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing	3	Each	1500	4500
Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings	3	Each	1500	4500
Wrong Way (R5-1a) – 42"x30" on back of existing posts	1	Each	500	500
Do Not Enter (R5-1) – 48"x48" on back of existing posts	1	Each	500	500
Removal of Existing Signs, Post and Footings	2	Each	400	800
Removal of Existing Signs from Existing Post	2	Each	200	400
Truck or Trailer Mounted Attenuator (TMA)	2	Each	700	1400
Partial Ramp Closure	2	Each	2500	5000
Shoulder Work Ahead	2	Each	400	800
	Total Change			+18,400

With the additional work, the final contract price would be \$418,800 which is below the project budget amount of \$424,000.

Scenario 2: The awarded Contractor's total bid is more than the project budget.

Project Budget: \$424,000

Awarded Contractor's Bid: \$441,800.

Contractor's Bid:

Pay Item	Quantity	Unit	Bid Price	Total
Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing	69	Each	1800	124,200
Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings	69	Each	1800	124,200
Wrong Way (R5-1a) – 42"x30" on back of existing posts	17	Each	500	8500
Do Not Enter (R5-1) – 48"x48" on back of existing posts	17	Each	500	8500
Removal of Existing Signs, Post and Footings	43	Each	400	17,200
Removal of Existing Signs from Existing Post	22	Each	200	4400
Truck or Trailer Mounted Attenuator (TMA)	43	Each	700	30,100
Partial Ramp Closure	43	Each	2500	107,500
Shoulder Work Ahead	43	Each	400	17,200
	Total Bid			441,800

Since the contractor's total bid is more than the budget identified in the project special provisions, MoDOT would look at the priority list of routes identified in the special provisions to remove quantities of work from the lowest priority included in the bid quantities. The project is over budget by \$17,800 and therefore MoDOT would need to remove the work for one interchange using MoDOT's standard change order process. The quantity decrease at the contractor's bid price would be:

Pay Item	Quantity	Unit	Bid Price	Total
Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing	-3	Each	1800	5400
Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings	-3	Each	1800	5400
Wrong Way (R5-1a) – 42"x30" on back of existing posts	-1	Each	500	500
Do Not Enter (R5-1) – 48"x48" on back of existing posts	-1	Each	500	500
Removal of Existing Signs, Post and Footings	-2	Each	400	800
Removal of Existing Signs from Existing Post	--2	Each	200	400
Truck or Trailer Mounted Attenuator (TMA)	-2	Each	700	1400
Partial Ramp Closure	-2	Each	2500	5000
Shoulder Work Ahead	-2	Each	400	800
	Total Change			-20,200

With the contract change to reduce the quantities, the final contract price would be \$421,600 which is below the project budget amount of \$424,000.

Site Locations

Project J5I3303

The following locations are included in the initial bid quantities:

- Route I-70 in Cooper, Boone and Callaway Counties from Exit 89 (Route K) to Exit 161 (Routes D/YY), including rest areas and truck parking areas.

Exception: Route 87 Interchange in Cooper County

The following locations are included as the variable scope portion of the contract:

- Route 63 in Boone County from Routes M/Y to Route WW.
- Route 63 in Boone County from Vandiver Dr. to Routes F/22

Project J2I3225

The following locations are included in the initial bid quantities:

- Route I-70 in Warren and Montgomery Counties from Exit 175 (Route 19) to Exit 200 (Routes F/J), including rest areas and truck parking areas.

Exception: Route 161 Interchange in Montgomery County

Exception: Route F Interchange in Montgomery County

The following locations are included as the variable scope portion of the contract:

- Route 61 in Lincoln County from Route 47 to Route U.
- Route 63 in Randolph County from Morley Street to Route M

Example FPVS Special Provisions

Contract Liquidated Damages

1.0 Description. Liquidated Damages for failure or delay in completing the work on time for this contract shall be in accordance with Sec 108.8. The liquidated damages include separate amounts for road user costs and contract administrative costs incurred by the Commission.

2.0 Period of Performance. Prosecution of work is expected to begin on, or before, the date specified below in accordance with Sec 108.2. Regardless of when the work is begun on this contract, all work shall be completed on or before the completion date specified below. Completion by this date shall be in accordance with the requirements of Sec 108.7. No extension of the completion time will be granted due to an increase of quantities per the Scope of Work special provision.

Notice to Proceed: June 3, 2019

Completion Date: December 1, 2019

Calendar Days. The count of calendar days will begin on the date the contractor starts any construction operations on the project.

Job Number	Calendar Days	Daily Road User Cost
J2I3225	30	\$7600
J5I3303	65	\$7600

3.0 Liquidated Damages for Contract Administrative Costs. Should the contractor fail to complete the work on or before the completion date specified in Section 2.0, or

within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged contract administrative liquidated damages in accordance with Sec 108.8 in the amount of **\$500** per calendar day for each calendar day, or partial day thereof, that the work is not fully completed. For projects in combination, these damages will be charged in full for failure to complete one or more projects within the above specified completion date or calendar days.

4.0 Liquidated Damages for Road User Costs. Should the contractor fail to complete the work on or before the completion date specified in Section 2.0, or within the number of calendar days specified in Section 2.1, whichever occurs first, the contractor will be charged road user costs in accordance with Sec 108.8 in the amount specified in Section 2.1 for each calendar day, or partial day thereof, that the work is not fully completed. These damages are in addition to the contract administrative damages and any other damages as specified elsewhere in this contract.

Scope of Work – J2I3225

The scope of work for this project is to provide Do Not Enter and Wrong-Way sign assemblies installation as shown in the Typical Signing Layouts in the plans on interchange ramps along the following routes:

The following locations are included in the initial bid quantities:

- a.** Route I-70 in Warren and Montgomery Counties. Starting at Exit 175 (Route 19) and progressing to Exit 200 (Routes F/J), including rest areas and truck parking areas.

Exception: Route 161 Interchange in Montgomery County

Exception: Route F Interchange in Montgomery County

The following locations are included as the variable scope portion of the contract:

- b.** Route 61 in Lincoln County. Starting at Route 47 and progressing to Route U.
- c.** Route 63 in Randolph County. Starting at Morley Street and progressing to Route M.

2.0 The above routes are listed in priority order. The Commission has budgeted \$135,000 for installation of these signs. The contractor shall begin installation on the first route and continue down the list until all funds have been used. If the contractor will not be able to complete the entire route, the contractor shall begin at the starting point listed and progress along the route with sign installation on the interchange ramps, without skipping interchanges, until the funds are expended. It is the responsibility of the contractor to not exceed the budget listed above. Any contract costs incurred above this amount will be the responsibility of the contractor, unless approved by change order.

3.0 The award of the contract will be based on the lowest responsible bidder based on their total bid for the itemized quantities in the proposal and unit price bid.

4.0 Contract quantities will be adjusted after the award of the contract as necessary to match the budgeted amount stated in section 2.0. In the event there is an increase in quantities to the contract, an extension of contract time will NOT be granted.

Scope of Work – J5I3303

1.0 The scope of work for this project is to provide Do Not Enter and Wrong-Way sign assemblies installation on Ramps along the following Routes:

The following locations are included in the initial bid quantities:

- a.** Route I-70 in Cooper, Boone and Callaway Counties. Starting at Exit 89 (Route K) and progressing to Exit 161 (Routes D/YY), including rest areas and truck parking areas.

Exception: Route 87 Interchange in Cooper County

The following locations are included as the variable scope portion of the contract:

- b.** Route 63 in Boone County. Starting at Routes M/Y and progressing to Route WW.
- c.** Route 63 in Boone County. Starting at Vandiver Dr. and progressing to Routes F/22.

2.0 The above routes are listed in priority order. The Commission has budgeted \$424,000 for installation of these signs. The contractor shall begin installation on the first route and continue down the list until all funds have been used. If the contractor will not be able to complete the entire route, the contractor shall begin at the starting point listed and progress along the route with sign installation on the interchange ramps, without skipping interchanges, until the funds are expended. It is the responsibility of the contractor to not exceed the budget listed above. Any contract costs incurred above this amount will be the responsibility of the contractor, unless approved by change order.

3.0 The award of the contract will be based on the lowest responsible bidder based on their total bid for the itemized quantities in the proposal and unit price bid.

4.0 Contract quantities will be adjusted after the award of the contract as necessary to match the budgeted amount stated in section 2.0. In the event there is an increase in quantities to the contract, an extension of contract time will NOT be granted.

Sign Assemblies and Installation

1.0 Description. The work shall include furnishing all the necessary materials and installing the sign assemblies as shown in Typical Signing Layouts, or as designated by the engineer.

1.1 Sign Assemblies:

Wrong Way (R5-1a) – 42"x30" on 1 – 2.5" PSST Post with sleeve and concrete footing

Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Post with sleeves and concrete footings

Wrong Way (R5-1a) – 42"x30" on back of existing posts

Do Not Enter (R5-1) – 48"x48" on back of existing posts

Post lengths shall not exceed 15 feet when measured from the ground to the bottom of the sign. For any location where the post could potentially exceed 15 feet, the contractor shall contact the engineer.

2.0 Material. Posts, sign sheeting and concrete footings shall be in accordance with Sec 903.

3.0 Construction. The contractor shall stake the proposed location of each sign along the ramp and provide the engineer the opportunity to review the location prior to installation. Installation of the sign assemblies shall be in accordance with Sec 903 and Standard Plan 903.

3.1 The contractor shall pour the concrete footings on the same day as the hole is excavated.

3.2 The contractor will be allowed to attach signs to the back of green shoulder mounted signs on the ramp, which are typically destination signs. Signs shall not be attached to the back of green signs with specific tourist oriented destinations displayed or to the back of blue or brown signs located on ramps as these are maintained by the department's supplemental guide sign contractor. Signs may also be attached to the upright columns of overhead sign structures with approval from the engineer, using banding materials per MoDOT standards and specifications.

4.0 Method of Measurement. Measurement of each sign installation, including all materials, excavation, equipment and labor will be per each complete sign assembly installed.

5.0 Basis of Payment. The accepted quantity of sign installations will be paid for at the contract unit price for:

903-99.02, Wrong Way (R5-1a) – 42"x30" on 1 - 2.5" PSST Post, per each
903-99.02, Do Not Enter (R5-1) – 48"x48" on 2 - 2.5" PSST Posts, per each
903-99.02, Wrong Way (R5-1a) – 42"x30" on back of existing posts, per each
903-99.02, Do Not Enter (R5-1) – 48"x48" on back of existing posts, per each

The unit bid price shall include the cost of all labor, equipment and materials to install the sign assemblies.

Bonds

1.0 The amount of the Bid Bond shall be 5% of the anticipated budget for this project.

2.0 The amount of the Performance Bond shall be 100% of the anticipated budget for this project.