Form C-104
Rev. 03/2012

J6I2005 VE No 2

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

☐ **Conceptual Proposal** ☒ **Final Proposal** **Date** 9/17/2012

Contract ID 111021-F01 **Job No.** J6I2005

County ST. LOUIS **Route** I-70 **Original Contract Amount** _____

Contractor WALSH CONSTRUCTION **By** DAN BLEVINS

Designed By JACOB'S ENGINEERING **Phone** _____

VECP# 13-38 **(to be completed by C.O.)** **VECP** ☒ **or** **PDVECP** ☐

1. **Description of existing requirements and proposed change(s). Advantages/Disadvantages**
   WALSH CONSTRUCTION COMPANY IS PROPOSING TO ELIMINATE THE TEMPORARY BOLTS FOR TRUSS ERECTION.

2. **Estimate of reduction in construction costs.** $38,524

3. **Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.**
   N/A

4. **Anticipated date for submittal of detailed change(s) of items required by Section 104.6 of the Specifications.**

   _____
   (date)

5. **Deadline for issuing a change order to obtain maximum cost reduction, noting the effect of contract completion time or delivery schedule.**

   _____ _____
   (date) (effect)

6. **Dates of any previous or concurrent submission of the same proposal.**

   _____
   (date and/or dates)

Additional Comments:

**** Portion Below This Line To Be Filled Out by MoDOT ****

Comments:
This proposal is to deviate from Standard Specification 712.5.1 which requires truss connections during construction to have 3/4 of the bolt holes filled with a combination of 1/3 fit up bolts and 2/3 drift pins. The contractor requested permission to use permanent bolts in lieu of fit up bolts. MoDOT's Liaison Engineer for Structures was consulted and he verified that there is a specification change pending to allow this practice. Therefore he recommended approval of this proposal as a 50/50 VE.

M.N.W. Jansson (JANSSON) — 4/15/13

Submitted By Resident Engineer — Date

Comments:

☒ **Approval Recommended**

☐ **Rejection Recommended**

Digitally signed by Ronald Morris
DN: cn=Ronald Morris, o=MoDOT, ou=3H35, email=Ronald.Morris@modot.mo.gov, c=US
Date: 2013.04.30 14:43:53 -05'00'

District Engineer — Date

Comments:

☒ **Approval Recommended**

☐ **Rejection Recommended**

Digitally signed by Gregory Budd
DN: cn=Gregory Budd, o=FHWA, ou, email=gregory.budd@fhwa.dot.gov, c=US
Date: 2013.06.12 10:59:21 -05'00'

Federal Highway Administration — Date
Required for FHWA Full Oversight Projects

Comments:

☒ **Approval**

☐ **Rejection**

Digitally signed by Randy C. Hitt
DN: cn=Randy C. Hitt, o, ou, email=randy.hitt@modot.mo.gov, c=US
Date: 2013.05.01 06:52:05 -05'00'

State Construction and Materials Engineer — Date

Distribution: **Resident Engineer, Project Manager, District Construction & Materials Engineer, State Construction & Materials Engineer, FHWA Value Engineering Administrator – MoDOT, P. O. Box 270, Jefferson City, MO 65102**

Walsh Construction Company

Project Title: Blanchette Bridge Rehabilitation
Project Number: 111021-F01
Walsh Project Number: 211164

Change Order Description: Erection Bolt VE
Field Order Number:
Walsh Change Order Number:

WEEK ENDING: EXAMPLE

EMPLOYEE	TRADE	Monday			Tuesday			Wednesday			Thursday			Friday			Saturday		Sunday	Total Hours	Labor Rate	Payroll Amount	Insurance Amount
Month:		ST	OT	DT	ST	OT	DT	ST	OT	DT	ST	OT	DT	ST	OT	DT	OT	DT	DT				
LABORERS																							
	Lab. Fm.																			0		$0.00	$0.00
	Laborer																			0		$0.00	$0.00
Subtotal Laborer																				0			
CEMENT MASONS																							
	CMFM																			0		$0.00	$0.00
																				0			
CARPENTERS																							
	Carpenter Fm.																			0		$0.00	$0.00
	Carpenter Fm.																			0		$0.00	$0.00
	Carpenter																			0		$0.00	$0.00
	Carpenter																			0		$0.00	$0.00
Subtotal Carpenter																				0			
OPERATORS																							
	Class I																			0		$0.00	$0.00
	Class I																			0		$0.00	$0.00
Subtotal Operator																				0			
TEAMSTERS																							
	Group 1 (2-3 axle)																			0		$0.00	$0.00
Subtotal Teamster																				0			
IRONWORKERS																							
	IW Gen. Fm.																			0	$33.48	$0.00	$0.00
	IW	329	81																	410	$31.98	$14,406.99	$13,111.80
Subtotal Ironworker																				410			
Subtotal Direct Labor																						$14,406.99	$13,111.80

Laborer's Fringe Benefits	0.00	HRS	@	$21.72	$0.00
Cement Mason's Fringe Benefits	0.00	HRS	@	$21.91	$0.00
Carpenter's Fringe Benefits	0.00	HRS	@	$24.32	$0.00
Operator's Fringe Benefits	0.00	HRS	@	$27.48	$0.00
Teamsters' Fringe Benefits	0.00	HRS	@	$14.57	$0.00
Ironworker's Fringe Benefits	410.00	HRS	@	$33.55	$13,755.50
Subtotal Benefits:					$13,755.50

Insurance & Taxes on Payroll:

Workman's Compensation Insurance (Concrete NOC)	33.42%	of	$13,111.80	$4,381.96
Federal Unemployment Tax	0.80%	of	$14,406.99	$115.26
State Unemployment Tax	8.40%	of	$14,406.99	$1,181.37
Social Security Tax	7.65%	of	$14,406.99	$1,102.13
Subtotal Payroll Additives				$6,780.73

I hereby certify that the above statement is a copy of that portion of the payroll which applies to the above stated work and that the rates shown for taxes and insurance are actual costs

Signature Title Date
Walsh Construction Company

LABOR TOTAL: $34,943.22

Walsh Construction Company

Project Title: Blanchette Bridge Rehabilitation
Project Number: 111021-F01
Walsh Project Number: 211164

Change Order Description: Erection Bolt VE
Field Order Number:
Walsh Change Order Number:

WEEK ENDING: EXAMPLE

EQUIPMENT DESCRIPTION		Monday Hours	Tuesday Hours	Wednesday Hours	Thursday Hours	Friday Hours	Saturday Hours	Sunday Hours	Total Hours	Bluebook Rate	Amount
									0.0		$0.00
									0.0		$0.00
									0.0		$0.00
									0.0		$0.00
					Sub-Total Equipment						$0.00

MATERIAL EXPENSE					
DESCRIPTION	QUANTITY	UNIT		PRICE	TOTALS
		CY			$0.00
		LS			$0.00
		EA			$0.00
		CASE			$0.00
					$0.00
					$0.00
				MATERIAL TOTAL:	$0.00

SUBCONTRACTED EXPENSE					
DESCRIPTION	QUANTITY	UNIT		PRICE	TOTALS
					$0.00
					$0.00
				SUBCONTRACT TOTAL	$0.00

Project Manager

SIGNATURE — TITLE — DATE

Walsh Construction Company

SUMMARY:

LABOR	$34,943.22
EQUIPMENT	$0.00
MATERIAL	$0.00
SUBCONTRACT	$0.00
SUBTOTAL	$34,943.22
5% Overhead	$1,747.16
SUBTOTAL	$36,690.38
5% Profit	$1,834.52

Approved:

Resident Engineer — DATE

GRAND TOTAL: $38,524.90

Estimated Savings Generated by V.E. # 2 - Proposed Spec Change 712.5.1

Allowing permanent bolts to be used in place of fit up bolts

Assumptions:

Estimate 50,000 total bolts on truss

(This estimate assumes some connections assembled completely on the ground, eliminating fit-up)

Assume 2 minutes per bolt time savings (average time taken to stuff and remove temporary bolt)

Existing Specification Requires 75% fit up using 1/3 fit up bolts and 2/3 drift pins

-Results in 25% of total bolts that will be fit up bolts

Proposed Change to Specification Allows 75% fit up using 1/2 permanent bolts and 1/2 pins

-Results in 37.5% of total bolts that will be permanent bolts replacing fit up bolts

Savings of 25% of total bolts replacing fit up bolts

25% of total bolts	=	12,500 bolts at 2 minutes	=	25000 minutes

Total Time Savings = 25000 minutes or 417 hours

Round off to 410 hours

Assume 10 hour days, ~20% of labor on overtime rate

Labor savings = 329 hrs straight time, 81 hours overtime

1/2

Re: Fw: Draft spec for make-up bolts - one more edit

John V Grana to: Matthew N Jansson 05/31/2012 07:39 AM

History: This message has been replied to.

Niall,

The latest version is Kent's attachment below.

MTA started down this road but backed off when we told them it would be a VE.

I also attached an example from PACE on potential cost savings.

Hope this helps.

PACE.PDF

Randy C Hitt ----- Forwarded by Randy C Hitt/D6/MODOT on... 05/31/2012 07:17:07 AM

From: Randy C Hitt/D6/MODOT
To: John V Grana/D6/MODOT@MODOT
Date: 05/31/2012 07:17 AM
Subject: Fw: Draft spec for make-up bolts - one more edit

----- Forwarded by Randy C Hitt/D6/MODOT on 05/31/2012 07:17 AM -----

From: Randy C Hitt/D6/MODOT
To: Tim A Hellebusch/D6/MODOT@MODOT
Date: 05/29/2012 02:11 PM
Subject: Fw: Draft spec for make-up bolts - one more edit

----- Forwarded by Randy C Hitt/D6/MODOT on 05/29/2012 02:11 PM -----

From: Kent W Nelson/SC/MODOT
To: Dennis.Heckman@modot.mo.gov
Cc: Dennis H Brucks/CO/MODOT@MODOT, Scott B Stotlemeyer/SC/MODOT@MODOT, Jay Bestgen/SC/MODOT@MODOT, Randy C Hitt/D6/MODOT@MODOT
Date: 05/18/2012 12:30 PM
Subject: Re: Draft spec for make-up bolts - one more edit

I came up with some additional comments with regard to exposure of the bolts to the elements and the ability to properly tension the bolts. The bolts come prelubricated with a water based lubricant. Exposure to precipitation and regular long term exposure degrades this lubrication and thus does not bring the bolt into its proper tension which affects the slip critical design.

2/2

Kent Nelson, PE, SSPC #29496

Fabrication Operations Engineer
MoDOT Bridge Division
(573) 751-3693
Cell (573) 291-8657

AGC High strength Bolts.docx

Dennis W Heckman	Here is the latest version for your review. Plea...	05/18/2012 08:25:07 AM
Dennis H Brucks	Scott, Randy Hitt called me today to let me know...	03/22/2012 01:14:27 PM
Scott B Stotlemeyer	I'm ok with your proposed revisions. From: Den...	03/21/2012 05:02:35 PM
Dennis H Brucks	Dennis H, Attached are the combined comment...	03/13/2012 04:58:18 PM

CURRENT SPECIFICATION

MoDOT

SECTION 712

STRUCTURAL STEEL CONSTRUCTION

712.1 Description. This work shall consist of the field construction of bridges and structures made of structural steel and miscellaneous metals.

712.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Shear Connectors	1037
Paint for Structural Steel	1045
Structural Steel Fabrication	1080
Coating of Structural Steel	1081

712.3 Handling, Transporting, Storing and Erecting. Fabricated material shall be properly braced and supported at all times to prevent damage from torsional, vertical and lateral deflections. Members or shipped material showing possible damage during handling, transporting, storing or erecting will be subjected to nondestructive tests as directed by the engineer. The costs of these tests will be at the contractor's expense. Fabricated structural steel shall be stored on suitable supports. Trough sections shall be stored in a manner to provide drainage. Any material that has become bent shall be straightened before being assembled or shall be replaced, if necessary. Material intended for use in the finished structure shall not be used by the contractor for erection or temporary purposes unless such use is provided for in the contract, or with written approval from the engineer.

712.4 Falsework. Staging and falsework necessary for the erection of the structure shall be furnished and placed and, upon completion of the erection, removed by the contractor. If required, plans for falsework shall be submitted to the engineer before starting the work, but the engineer's acceptance of the plans will not relieve the contractor of the responsibility for obtaining satisfactory results.

712.5 Erection. Erection of all parts of the structure shall be in accordance with the erection diagram or working drawings. Surfaces to be in permanent contact shall have all burrs and loose scale removed. Before erection, machine finished surfaces shall be cleaned of the protective coating, other than the primer permitted by the contract, and contact surfaces shall be given a heavy coat of graphite and oil. Connections match-marked in the shop shall be erected in accordance with those match marks. Interchange or reversal of match-marked connections will not be permitted. Any damage or distortion of members will not be permitted.

712.5.1 Fit-up and Drifting. Truss spans, plate girders and continuous I-beams shall be supported to maintain required camber during erection. High-strength bolted field splices and primary connections, except for trusses and structures carrying live load erection stresses, shall have no less than one-half of the holes fitted with bolts and cylindrical drift pins using one-third fitting up bolts and two-thirds pins. Splices and primary connections carrying erection traffic during erection or truss connections shall have no less than three-fourths of the holes filled with drift pins and bolts using one-third fitting up bolts and two-thirds pins. The specified ratio of pins to bolts shall apply to each element of the splice, for example, top

flange, web and bottom flange of girders. Fitting up bolts shall be the same diameter as the high-strength bolts. Drift pins shall be at least 1/32 inch (0.8 mm) larger than the high-strength bolts to provide a driving fit. Fitting up bolts shall be placed uniformly to draw the entire splice tight. All fitting up bolts and drift pins shall be properly installed before beginning high strength bolt installation. Bolts used for fitting up shall not be used in the final assembly. Holes that do not match shall be reamed only with approval from the engineer. Drifting that would distort the metal will not be permitted.

712.5.2 Bearings. The lead plates or preformed rubber and fabric pads shall be approximately 1/8 inch (3 mm) thick and 1/2 inch (13 mm) greater in length and width than the bottom bearing plates under which the plates are to be placed. Lead plates shall weigh (have a mass of) approximately 8 psf (39 kg/m^2). Preformed rubber and fabric pads shall be in accordance with Sec 1038. Shop drawings will not be required for lead plates or preformed rubber and fabric pads. Lead plates or preformed rubber and fabric pads will be considered incidental to bearings, and payment will be considered as covered under the contract unit price for bearings.

712.5.3 Anchor Bolts. Anchor bolts for steel superstructures shall be set in the substructure units in accordance with the details shown on the plans. When anchor bolts are set during the placing of concrete, the bolts shall be accurately located and held firmly in place by a method that permits proper finishing of the surface of the concrete, and shall remain in place until the concrete has set. Where permitted or required, the anchor bolt wells may be omitted, and in lieu thereof, holes drilled into the substructure. The anchor bolt holes shall be drilled in the exact location shown, to the required depth and perpendicular to the plane of the bridge seat. The drilled holes shall be no smaller than the diameter of the holes in the steel bearing plates or castings. When the anchor bolts are set in holes or wells, the hole or well shall be clean and dry prior to grouting with an expansive mortar in accordance with Sec 1066. Excess mortar forced out of the holes shall be removed. The location of anchor bolts in relation to the center of slotted holes provided in movable plates and shoes shall be varied to compensate for the movement of spans due temperatures above or below 60 F (16 C). Nuts on anchor bolts through moving parts of expansion bearings shall be adjusted to provide ample clearance for free movement of the span.

712.5.4 Grouting. Grouting under bearing plates and castings to build the bearing plates and castings to the proper grade will not be permitted. Steel shims the full size of the plate of the bearing device may be used for this purpose. Shims shall be placed between the bottom of the stringers and the top of bearing plates, if practical, and shall be straightened to a plane surface.

712.6 Field Welding. All field welding shall be performed in accordance with Sec 1080.

712.6.1 Certification. All field welders shall be certified to weld on all steel products incorporated in MoDOT projects.

712.6.2 Testing. Field welders shall be qualified by a test facility with an established accredited AWS Certified Welder Program as defined in AWS Standard QC 4-89 or by an independent testing laboratory furnished by the contractor. If specimens are to be tested at an independent testing laboratory, the tests shall be witnessed and properly documented by the engineer. All tested specimens and radiographs, including the laboratory's test report certifying the test results, shall be delivered to the engineer for final acceptance or rejection. If the field welder was tested and certified by a facility with an established accredited AWS Certified Welder Program, as defined in AWS Standard QC 4-89, the tested specimens and radiographs will not be subject to the engineer's review. A copy of the welder's certification from the AWS test facility shall be delivered to the engineer.

PROPOSED SPECIFICATION CHANGE

712.5.1 **Fit-up and Drifting.** Truss spans, plate girders and continuous I-beams shall be supported to maintain required camber during erection. High-strength bolted field splices and primary connections, except for trusses and structures carrying live load erection stresses, shall have at least one half of the holes filled with a combination of fitting up bolts and drift pins. At least 50% of this combination shall be fitting-up bolts. Splices and primary connections carrying erection traffic during erection or truss connections shall have no less than three-fourths of the holes filled with drift pins and bolts using at least 50% fitting-up bolts and 50% drift pins. The above requirements shall apply to each element of the splice, for example, top flange, web and bottom flange of girders. Fitting-up bolts shall be the same nominal diameter as the high strength bolts. High strength bolts may be used for fitting-up bolts, and may be left in place, as long as they are not damaged during erection. High strength bolts will be considered damaged and shall be replaced if they are tensioned past snug tight, used to draw two members together, driven into place with a hammer, or have any deformation of the threads. Drift pins shall be sized to provide a driving, tight fit that maintains structure geometry during erection. Reaming of holes to aid in drifting connections will not be permitted. Fitting up bolts shall be placed uniformly to draw the entire splice tight. All fitting up bolts and drift pins shall be properly installed before completing the installation of the remaining high strength bolts. Holes that do not match shall be reamed only with approval from the engineer. Drifting that would distort the metal will not be permitted.

712.7.2 Snug Tightness of Connections. Regardless of the method of final tightening used to install the fasteners, the joint and all fasteners shall first be brought to the snug tight condition. Snug tight will be defined as the tightness where all faying surfaces of the joint are in firm contact as attained by a few impacts of an impact wrench or the full effort of a person using an ordinary spud wrench. Following the initial snug tightening of the fitting up bolts, the remaining holes shall be filled with high strength bolts and tightened to a snug tight condition. Drift pins, all damaged high strength bolts, and all non-high strength fitting-up bolts shall then be replaced with high strength bolts and installed to a snug tight condition. All final bolts completing the connection shall be high-strength and the required nominal diameter. Snug tightening shall progress systematically from the most rigid part of the connection to the free edges. Bolts shall be retightened in a similar manner as necessary until all bolts are simultaneously snug tight, and the section is fully compacted with the bolted parts of the joint in full contact. For type 3 bolts and type 1 bolts that will be field coated, if a connection is not completely tightened within five days of snug tightening, the contractor shall remove five percent or five bolts (whichever is lesser) of a given connection and conduct rotational capacity testing in accordance with Section 1080 to verify nut lubrication. For bolted field splices, the amount of bolts specified bolt removal shall apply to each element of the splice (top flange, bottom flange, and web). If the rotational capacity test is unacceptable, all bolts shall be removed, inspected, relubricated and may then be reinstalled. Any permanent bolts installed as fitting up bolts that are exposed to any type of precipitation prior to final tensioning shall be removed and relubricated and then may be reinstalled. -For galvanized bolts, the above condition shall be met as well as the threads of the bolts and nuts shall be inspected for galling prior final tensioning. Any bolts or nuts with threads that are galled shall be removed and replaced.

Savings of Proposed 712 Spec Change

Current Spec. Example

		Time Install Per Each (min)	Time Per Splice Install (min)	Please see attach Time Removal Per Each (min)
Holes Per Splice	216			
Holes Make Up Bolts	36	0.333333333	12	0.666666667
Holes Drift Pins	72	1	72	1.25

Proposed Spec Change Example

		Time Install Per Each (min)	Time Per Splice Install (min)	Time Removal Per Each (min)
Holes Per Splice	216			
Fitting Bolts Perm.	96	0.333333333	32	0
Holes Drift Pins	12	1	12	1.25

Time Savings Example	Per Each Splice	2.316666667
Iron Worker Hourly Wage	$90/hr	
Dollar Savings Labor		$208.50
Example of job had 30 splices		$6,255.00