MEMORANDUM

Missouri Department of Transportation

Construction
Marshall Project Office

TO: Perry Allen – KC DCME

CC: File

FROM: Brian K. Iles – Resident Engineer

DATE: September 6, 2013

SUBJECT: VE Concept Proposal No. 2
Job No. J4I2352 (Contract ID 121019-C01) I-70 Lafayette County

Attached is a Construction Value Engineering Proposal for the above referenced project. Chester Bross is proposing the use of a mastic surface treatment in lieu of the Grade C Seal Coat. The Grade C Seal Coat is to be installed on 8-feet of the 10-foot shoulder in both the eastbound and westbound directions as part of the UBAWS resurfacing of the mainline.

The shoulders on this portion of Interstate 70 were resurfaced in 2006. The treatment was 3-inches of Bituminous Base Course with 1.75-inches of BP-1. The shoulders are in good condition except for some oxidation and small surface cracks.

This product is an emulsion that contains aggregate. The aggregate is similar to black beauty. It is applied in two distributor passes. The first pass is made and then a second pass is made after the first has dried, which typically is 20 to 30 minutes. Attached to this VECP is the product description along with pictures of Route 38 in Wright County, which recently received this surface treatment.

In my conversations with product representative, Mrs. Victoria Woods, I learned that Jason Blomberg has worked with Vicki's company to develop a Job Special Provision for this product. This is being let under General Services Contracts for maintenance projects around the state. The project list is detailed in the attached product description. The Job Special Provision is attached as well.

This product was recently installed on two lettered routes in Lafayette County in the Kansas City District for maintenance. Route FF (Route D to Route 131) was completed September 5, 2013, and Route T (I-70 to Davis Creek Bridge) was completed today, September 6, 2013. I spoke to Kansas City Assistant District Materials Engineer, Griffin Smith, regarding this work. He indicated he was satisfied with the sealing, coverage, and overall look of the finished product. He indicated that Mrs. Woods informed him the life expectancy is 4 to 5 years. Griffin also indicated that they are paying $0.79 per square yard with maintenance is supplying the traffic control.

The proposed savings for this VE is $39,487.05. Chester Bross has a cost break-down on the attached VECP. Based on my findings, I recommend approval of this Value Engineering Proposal. Feel free to contact me with any questions or comments.

Form C-104
Rev. 03/2012

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

☐ **Conceptual Proposal** ☒ **Final Proposal** **Date** 08-27-13

Contract ID 121019-C016 **Job No.** J4I2352

County LaFayette **Route** 70 **Original Contract Amount** $781,523.84

Contractor Chester Bross Construction Co **By** Collin Anderson

Designed By Invia Pavement Technologies **Phone** 573-619-2903

VECP# 213-49 **(to be completed by C.O.)** **VECP** ☐ **or** **PDVECP** ☒

1. **Description of existing requirements and proposed change(s). Advantages/Disadvantages**
   Existing requirements for shoulder treatment contracted as Seal Coat, Grade C - 87,749 SY @ $1.45 = $127,236.05
   Proposed Change:
   Surface Sealer (Mastic) for shoulder treatment in lieu of Seal Coat, Grade C. Surface Sealer 87,749 SY @$1.00 = $87,749.00
   Advantage: Proposed Surface Sealer is a duraable mastic surface treatment delivered and appplied mixed, in constrast to seal coat with loose aggregate within the workzone; please see attachments.

2. **Estimate of reduction in construction costs.** $ 39,487.05

3. **Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.**
   None

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

   08-30-13
   (date)

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

   09-15-13 (date) None (effect)

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

   None
   (date and/or dates)

Additional Comments:
Please see attachments

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

Comments: See Attached Memo

Digitally signed by Brian K. Iles
DN: cn=Brian K. Iles, o=MoDOT Marshall Project Office, ou=7CCD, email=Brian.Iles@modot.mo.gov, c=US
Date: 2013.09.06 14:23:25 -05'00'

Submitted By Resident Engineer | Date

Comments:

Based on the information provided by the Resident Engineer and his favorable review and recommendation as provided, I concur with his recommendation for approval.

☒ **Approval Recommended**

☐ **Rejection Recommended**

Digitally signed by Perry Allen
DN: cn=Perry Allen, o=MoDOT, ou=Construction and Materials, email=perry.allen@modot.mo.gov, c=US
Date: 2013.09.06 15:25:54 -05'00'

District Engineer | Date

Comments:

☐ **Approval Recommended**

☐ **Rejection Recommended**

Federal Highway Administration
Required for FHWA Full Oversight Projects

Date

Comments: This is approved as a practical design VE since we are currently assessing whether a surface sealer mastic is equivalent to a seal coat

☒ **Approval**

☐ **Rejection**

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**

8-27-13

Attachment

Contract ID 121019-C01

VE J4I2352 Rt 70 LaFayette

Product: The Surface Sealer is a mastic surface treatment that is a mixture of emulsion, angular aggregate, and polymers. The chemistry of the sealer is designed to break quickly to allow quick release to traffic. The sealer is applied at ambient temperature. The sealer is produced and delivered to the project totally mixed, and applied through a distributor.

A Job Mix Formula (attached) is supplied and quality control testing of product is performed during production to meet MoDOT Job Special Provision. The surface sealing product proposed for use meeting MoDOT's Job Special Provision is Onyx, see attached Product Data Bulletin.

Application: The surface sealing treatment (Onyx) is applied by distributor, in two passes, with a total shot rate of 0.2 gal/ SY. The two pass application provides a more thorough coverage and faster dry time. The sealer has been applied successfully day and night, and averages 20-30 minutes dry time, but is dependent on humidity. High humidity and night work will slightly increase these dry times. The production rate of the surface seal treatment and the traditional seal coat are comparative, but the production rate of the surface sealing treatment is includes dry time, not solely application. The distributor moves at approximately 8 miles per hour.

Product History: The attached Job Special Provision was developed last year by Central Office Pavement Group. Onyx, the proposed product for use, meets the specifications of this Job Special Provision. Onyx has been used considerably in Kansas and recently used in Missouri on Rt A Jefferson County (mainline). Onyx was also awarded for use under this Job Special Provision for maintenance work let under General Services Contracts; Rt V Gasconade County, Rt 18 Bates, Rt FF Layfayette, Rt CC Ralls, Rt 38 Wright.

Advantages: The surface sealing treament is delivered to the project and applied mixed; this eliminates any loose aggregate within the work zone during construction. The exposure of equipment and workers is greatly reduced in the work zone using the surface sealing treatment compared to traditional seal coat process.

Durability and life expenctancy comparative to traditional seal coat for shoulder application.

INVIA PAVEMENT TECHNOLOGIES | Onyx®

Opening the road to innovation

Quick and tough, Onyx® frictional mastic surface treatment combines the durability you want from a pavement maintenance application with frictional characteristics achieved from improving micro texture on the pavement surface.

Onyx is a mixture of asphalt emulsion, increased levels of angular fine aggregates, recycled materials, polymers and catalysts. Onyx is designed to protect your investment, minimize future maintenance treatments and get traffic back on your pavement more quickly.

Why You Should Insist On Onyx®:

Speed to Open

Onyx frictional mastic surface treatment has been engineered to develop early strength. Using Onyx minimizes the often unseen cost of downtime with faster application and return to traffic.

Friction

Onyx has been designed with an increased level of high quality fine aggregate material. The design procedure relies on industry standard testing and allows you to feel comfortable with the frictional characteristics of Onyx .

Engineered Toughness

Onyx is a central plant manufactured technology that is applied without dilution. This manufacturing method allows for increased quality control and quality assurance. Additionally, Onyx has significantly higher loadings of unique polymers and catalysts that deliver the long-term performance you demand.

Color

Onyx is consistently black and is formulated to reduce ultraviolet damage to the pavement. Additionally, the black color of an Onyx surface provides significant contrast to striping for motorists.

Innovations insider

Road Owner
Sedgwick County, KS

Contact
Joe Brand
316.660.1754
jbrand@sedgwick.gov

Scope of Project
40 Miles Addressed Using Onyx®

Location
Sedgwick County, KS
Multiple Locations

Date Placed
7.1.2012

Prime Contractor
Lafarge

Subcontractor
Innovative Roadway Solutions

Material Supplier
Vance Brothers

Equipment Used
Black Roads FD-3000 Distributor
6,000 Gallon Mobile Storage Trailer

Challenge

Like many agencies in today's political and economic environment, Sedgwick county finds themselves needing to find ways to address more roads with a dwindling budget. Additionally, the county needed to address their 5-10 year old novachip pavements. Onyx® drew the county's attention due to its durability, ability to seal, black color providing marking contrast and most importantly, Onyx is cost effective. After a trial project in 2011, Sedgwick County chose Onyx to address 40 miles of 7 year old novachip.

Process

Vance Brothers delivered Onyx to the mobile storage trailer stationed at the jobsite. Lafarge set up traffic control, for the maximum allowed 3 miles, and swept the pavement thoroughly. Then, Innovative Roadway Solutions used their FD-3000 to spray 0.10 gal/sy going each direction in the same lane, making two passes for a total of 0.20 gal/sy, with 15 to 20 minutes between each pass.

Result

The specification, while requiring certain raw material features, provided confidence to Sedgwick County due to the wet track abrasion measurement. Showing minimal wet track loss in the mix design, Onyx was anticipated to last the expected life. With traffic being returned approximately 30 minutes after application, and showing no signs of wear, Onyx had met expectations. Months after the application the county reviewed the streets that were treated. Seeing positive results, Sedgwick County has put together an even larger program for the application of Onyx in 2013.

INVIA PAVEMENT TECHNOLOGIES | Onyx®

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SURFACE SEALING TREATMENT

1.0 Description. This work shall consist of furnishing surface sealing material. The surface sealing material shall contain a mixture of cationic polymer modified asphalt emulsion, fine aggregate, water, and other additives as needed.

2.0 Material Requirements.

2.1 Bituminous Material. The bituminous material shall be a polymer modified asphalt emulsion in accordance with the following table. The bituminous material shall show no separation after mixing. The emulsion shall be sampled in accordance with AASHTO T 40.

Asphalt Emulsion (CSS)			
	Min.	**Max.**	**Test Method**
Viscosity, Saybolt Furol at 25 C, s	15	100	AASHTO T 72
Particle charge test	Positive[b]		AASHTO T 59
Residue, %	60	--	AASHTO T 59
Test on Residue from Distillation	**Min.**	**Max.**	**Test Method**
Penetration, 25 C, 100 g, 5 s,	15	150	AASHTO T 49

[b]If the particle charge test is inconclusive, material having a maximum pH value of 6.7 will be acceptable.

2.2 Mineral Aggregate. Fine aggregates materials shall be in accordance with Section 1002.3 of the Standard Specifications; except as modified herein:

2.2.1 Noncarbonated Aggregate Requirement. The aggregate blend shall contain a minimum of 50 percent non-carbonate aggregate. The aggregate blend shall have an acid insoluble residue (AIR), MoDOT Test Method TM 76, of at least 85 percent insoluble residue.

2.2.2 Aggregate sources not meeting the absorption limits of Section 1002.3 shall be in accordance with the following lightweight aggregate requirements:

Property	Percent Maximum Limit
Absorption, AASHTO T 85, percent, max	n/a
Micro-Deval, AASHTO TP 58, percent, max	20
Los Angeles Abrasion for Lightweight Aggregate, MoDOT Test Method TM 78, percent, max	50

2.2.3 Aggregate Gradation Requirement. The aggregate blend shall have a 100 % of the material passing the No. 8 (2.36 mm) sieve. For spraying applications, the following gradation shall be used:

Sieve	Percent Passing
No. 8 (2.36 mm)	100
No. 16 (1.18 mm)	80-100
No. 30 (600 μm)	75-100
No. 50 (300 μm)	50-85
No. 100 (150 μm)	40-65
No. 200 (75 μm)	25-65

2.3 Water. Water shall be potable and free of harmful soluble salts.

2.4 Additives. Any other material added to the mixture or to any of the component materials shall be listed in the job mix formula with the product certifications.

2.5 Mix Design. The mix design that lists the specific materials to be used on the project shall be submitted to the engineer at least 30 days before the surface sealant treatment work commences. The mixture shall contain a minimum of 25% aggregate by weight of wet mixture and shall meet the following requirements:

	Min.	Max.	Test Method
Maximum Wet-Track Abrasion Loss (3 day soak), grams per square feet.	--	7.5 g/ft^2	TB 100 (ISSA) Modified
Asphalt Content by Ignition Method, percent	30%	--	AASHTO T-308-08[c]

[c]This method is modified to account for a fine emulsion mixture.

2.1 Basis of Payment. The accepted quantity of surface sealer, delivered and applied to the project, will be paid for at the contract unit (SY) price. No separate payment will be made for transportation delivery costs. Manufacturer shall report the unit weight (lbs/gallon) of the surface sealing material on the bill of lading.

2.2 Environmental Protection. The equipment provider shall comply with all federal, state, and local laws and regulations controlling pollution of the environment.

2.3 Surface Preparation. The surface shall be thoroughly cleaned immediately prior to placing the surface treatment.

2.4 Placement. The commission shall direct placement of surface sealing material. The target application rate per pass based upon an undiluted bituminous material will be shown in the contract. The actual application rate may be adjusted based upon the existing pavement surface condition, recommendations of the polymer modified emulsion manufacturer, and the approval of the engineer. Placement of the mix shall be required in two passes.

Equipment provider shall provide a mat ensuring total uniform coverage. The roadway will remain closed until the surface is tack-free and capable of being open to traffic without tracking**.**

3.0 Method of Measurement. Final measurement of the surface treatment will be made during construction. Measurement of the surface treatment, complete in place, will be made to the nearest square yard. The revision or correction will be computed and added to or deducted from the contract quantity.

4.0 Basis of Payment. The accepted quantity of surface treatment, in place, will be paid for at the contract unit (square yard) price. No separate payment will be made for any additional construction methods, processes or mobilization.

Gradation Sheet

Aggregate & Fine Components

Surface Sealing Treatment JSP - Missouri Sec 2.2.3

August 28 2013

Percentage

Passing 0.55 0.45

Sieve Size (US)	Aggregate	Fines	Blend Total
No. 8	100	100	100.0
No. 16	100	100	100.0
No. 30	91.2	100	95.2
No. 50	19.9	100	55.9
No.100	1.2	100	45.7
No. 200	0.2	97.7	44.1

Surface Sealing Mix Design

Date:	29-Aug-2013	**Contract / Job #:**	121019-C01/J4I2352
Agency:	MODOT	**Contractor:**	Chester Bross Construction Co
Location:	Rt 70 LaFayette	**Supplier:**	Innovative Roadway Solutions

ASPHALT EMULSION

			Specification		Test Method
Emulsified Asphalt (1) :		**Results**	**Min.**	**Max.**	
Viscosity, Saybolt Furol:	25°C(77°F), s	26.2	15	100	AASHTO T-72
Particle Charge:		Pos	Positive		AASHTO T-59
Residue:	%	60.6%	60	---	AASHTO T-59
Residue from Distillation (1) :					
Penetration:	25°C(77°F), 100g, 5sec., dm	32	15	150	AASHTO T-49

(1) Test data provided by emulsion producer.

AGGREGATE (2)

Sieve Analysis		**MODOT 2.2.3**	
Sieve	**% Passing**	**Min**	**Max**
#8 (2.36mm)	100%	100%	100%
#16(1.18mm)	100%	80%	100%
#30 (600µm)	95%	75%	100%
#50 (300µm)	56%	50%	85%
#100 (150µm)	46%	40%	65%
#200 (75µm)	44%	25%	65%

(2) Test data provided by material supply.

MIX DESIGN TESTING

			Specification		Test Method
		Results	**Min.**	**Max.**	
Wet Track Abrasion Test:	3 day soak	5	---	7.5g/ft² (80 g/m^2)	ISSA TB 100 Modified
Asphalt Content by Ignition:	%	38	30	---	AASHTO T 308-8 (3)

(3) This method is modified to accommodate fine aggregate emulsion.