MEMORANDUM

Missouri Department of Transportation
District 6
I-270 @ Dorsett-Page Team

To: Matt Budd-cm6

CC: Travis Koestner-cm
Jim Smith-de
Denis Glascock-cm

From: Niall Jansson
Deputy Director / RE – Dorsett/Page

Date: October 15, 2009

Subject: Conditional Conceptual Approval – VE No. 2 (Page)
Job No.: J6U1045B
Route 364 – St. Louis County
Contract ID: 090626-601

Attached please find a copy of Form C-104, submitted by Fred Weber Inc., on the above noted project. The proposal, henceforth known as Value Engineering Proposal No. 2, is to replace the planned Ramp 3 Flyover Bridge with two single span bridges and a wide loop within the current interchange footprint. See the attachments entitled "Current Design" and "Hybrid". Please note, both contain data on a future project, called Phase 2, that will be built sometime in the future. Both have Phase 1 (the project in question today) shown in orange and Phase 2 shown in green. The design in question for approval as a VE is being referred to as "The Hybrid Design". The original VE Design submitted by Fred Weber was not compatible with the Phase 2 project and was modified by us to accommodate Phase 2 and became known as "The Hybrid".

MoDOT's Consultant Designer, Consultant Traffic Engineers, Project Manager, Area Team, District Management and Division Management have all been involved in this VE. The Federal Highway Administration has now granted conditional approval to proceed with this VE Concept. See the attached email from Greg Budd for the conditions that must be met.

We are recommending that Value Engineering Concept No. 2 be approved contingent upon satisfactory resolution of the concerns expressed by FHWA. If you have any questions, please call me at (314) 877-2770.

V.E. No. 2

Form C-104
Rev. 2/2009

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

☐ **Conceptual Proposal** ☐ **Final Proposal** **Date** July 14, 2009

Contract ID 090626-601 **Job No.** J6U1045B

County St. Louis **Route** Rt. 364 **Original Bid Cost** $34,815,241.53

Contractor Fred Weber, Inc. **By** Thomas E. Hayes

Designed By URS **Phone** 314-316-6154

VECP# 09-84 **(to be completed by C.O.)** **VECP** ☐ **or** **PDVECP** ☐

1. **Description of existing requirements and proposed change(s). Advantages/Disadvantages**
   Existing: Ramp 3 connection from NB I-270 to WB Rt. 364, requires extensive MSE walls, longer bridge, impacts traffic on I-270 and Rt. 364 to install bridge piers in the median, impacts two ramps that must be reconstructed, and requires the relocation of Basston.

   Proposed: Change the location of ramp 3 to allow 90 degree bridge crossing on Rt. 364 and I-270 which eliminates the need for center piers and eliminates the traffic impacts on Rt. 364 and I-270, eliminates the need to reconstruct ramps 4 & 5 and saves the associated traffic impacts caused by closing/detouring these ramps, eliminates the bridge on Ramp 2, and eliminates the need to relocate Basston. The decreased traffic interference should result in reduced backups on I-270 and Rt. 364 which will provide a positive impact on the public's perception of the project and project a safer work zone for both the traveling public and the construction workers.

2. **Estimate of reduction in construction costs..**$4,000,000.00

3. **Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.** Long term maintenance will be lower on the proposed Ramp 3 bridges and eliminates the bridge on Ramp 2.

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

   July 17, 2009
   (date)

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

   August 1, 2009 (date) — Extensive redesign required needs to be stared ASAP to avoid impacting the construction schedule and to secure materials, particularly long lead time items such as structural steel (effect)

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

   NA
   (date and/or dates)

JUL 17 2009

Additional Comments:

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

Comments:
The original Value Engineering Concept was modified by MoDOT's consultant to be compatible with current and future needs. Now called the "Hybrid Design", it meets the approval of the Project Manager, Area Team, District Management and the consultant designer. Attached as Appendix 1, is a list of FHWA concerns that need to be remedied prior to consideration of ultimate approval. Obviously, approval of the final version is dependent on the design being acceptable to all parties. Conceptual approval recommended.

Matthew N. Jansson — 10-09-09

Submitted By Resident Engineer JANSSON — Date

Comments: AS NOTED ABOVE.

☑ **Approval Recommended**

☐ **Rejection Recommended**

Ed Hassinger — 10-19-09

District Engineer — Date

Comments:

☐ **Approval Recommended**

☐ **Rejection Recommended**

Federal Highway Administration
Required for FHWA Full Oversight Projects — Date

Comments: This VE is conceptually approved. Futher action is dependent on resolution of FHWA concerns. Denis Glascock. 10/19/2009

☒ **Approval**

☐ **Rejection**

David D. Gaines — 10/19/2009

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

<Gregory.Budd@dot.gov>
10/08/2009 02:08 PM

To <Lee.Hillner@modot.mo.gov>
cc <Ed.Hassinger@modot.mo.gov>, <Bill.Schnell@modot.mo.gov>, <Kenneth.Voss@modot.mo.gov>,
bcc
Subject RE: VECP 09-64 , Contract ID 090626-601 (270 @ Page Interchange)

Thanks so much Lee, I really do appreciate all of your efforts to keep us in the loop during this very busy time.

I met with our office management and HQ folks earlier this week to discuss the 270@Page interchange issues that have been under discussion and review for the past couple of months, hoping to reach some final decisions regarding the acceptability of the proposed modifications to the as-awarded design. It was a good meeting with some very good discussions. It was concluded that FHWA could support the proposed modification to the interchange design contingent upon the following:

- A formal modification to the approved AJR be submitted and approved by FHWA. The submittal must clearly show that the proposed modification is equal to or better than the approved interchange configuration, and must include all supporting documentation and assumptions used in the traffic/LOS analysis to justify the "equal or better" determination. Of particular concern to FHWA are the reconfiguration and weave modifications proposed at the Ramp2/Ramp 3/Bennington Slip Ramp area, and the proposal to maintain the existing loop ramp configuration and short weave length along eastbound Page Ave in lieu of the approved Ramp 6 (future) flyover;
- A safety analysis of the proposed design be included in the AJR modification request; again, the analysis must clearly show that the proposed modification is equal to or better than the approved interchange configuration;
- A detailed cost analysis of the proposed design, showing cost savings of the proposed modification as compared to the approved design;
- All geometric information for the proposed modification be submitted, along with a summary of any reductions in geometrics or standards as compared to the approved design, and the anticipated effect those reductions will have on the operation and safety of the interchange.

Based upon your email correspondence over the past month or so, it appears that most of the above requested information is available from the design and traffic analysis work that has been done as you analyzed and optimized the proposal. I understand that time is critical for this action, so we will expedite our review, and make a final approval determination, as quickly as we can.

Thanks again, and please let me know if I need to clarify anything.

Greg Budd
Urban Transportation Engineer
Missouri Division Office
(573) 638-2621
gregory.budd@fhwa.dot.gov

-----Original Message-----

October 1, 2009

Lee Hillner, P.E.
MoDOT District 6
1590 Woodlake Drive
Chesterfield, MO 63017

RE: I-270/Page Avenue/MO364 Interchange Concept Evaluation
Comparison of MoDOT and Hybrid Concepts

Dear Mr. Hillner:

Crawford, Bunte, Brammeier (CBB) and URS has completed an analysis of various alternatives for the I-270/Page Avenue/MO364 interchange in western St. Louis County. The purpose of this memorandum is to provide a comparative summary between two concepts: 1) the original design proposed by MoDOT (Figure 1.1) and 2) a an alternate concept – Hybrid Concept (Figure 6.1).

This study considered 2010 and 2030 AM and PM commuter peak periods. SYNCHRO, VISSIM, and VISUM traffic models were created for a study area including: 1) I-270 between and including interchanges with Olive Boulevard, Page Avenue/MO364, and Dorsett Road and 2) Page Avenue/MO364 between and including the Bennington Interchange, I-270 interchange, Lackland Interchange, and Schuetz Road intersection. This expanded study area was incorporated to evaluate freeway weaving and facilitate updates to the project's Access Justification Report (AJR).

2010 traffic volumes were derived from a wide set of available traffic data, including: historical traffic volumes, traffic.com data, count data provided by MoDOT, and recent field traffic counts collected by CBB. Adjustments were made to account for impacts from the ongoing I-64 closure, where appropriate. 2030 traffic forecasts were derived from historical growth trends, output from the regional TransEval model, East-West Gateway's land use forecasts, and known (re)development. These forecasts consider the Page Avenue extension, MO141/Maryland Heights Expressway extension, and the airport expansion plans. In general, the final 2030 forecasts result in about 10-15% growth on I-270.

Phase I - MoDOT Design

Phase I of the current MoDOT design would replace the existing northbound to westbound loop ramp (Ex. Ramp 3) with a flyover ramp (Ramp 3). The design includes a braided slip ramp (BSR) from westbound Page aimed at bringing the traffic exiting at Bennington to the right of the northbound and southbound I-270 ramp merge points. The design also includes the reconstruction of northbound I-270 to create an auxiliary lane between Olive Boulevard and Page Avenue, resulting in a dual exit for the northbound ramps.

VISSIM analysis shows that the concept improves the operations along northbound I-270 by eliminating the weaving movements along northbound I-270, between existing Ramp 3 and existing Ramp 5 and westbound Page Avenue between existing Ramp 3 and existing Ramp 4. This alternative improves the LOS on northbound I-270 south of Page Avenue from D to C during the AM and PM Peak Hours. Additionally, the average speed on this segment increases by approximately 20% (10 mph) during the PM Peak Hour from about 50 mph to 60 mph. The Collector-Distributor road segment along westbound Page Avenue operates at LOS A during the AM Peak Hour and LOS B during the PM Peak Hour.

Phase I – Hybrid Concept

The Hybrid concept provides similar movements and benefits as the MoDOT design. One major difference is that the westbound BSR ramp is relocated east of I-270. The result is a minor weave between the Ramp 2 traffic and the BSR traffic. This would be a "type C" weave with the Ramp 2 traffic being required to make two lane changes to reach westbound Page Avenue. BSR traffic would not be required to make any lane changes. Critically, however, the Ramp 3 traffic could travel through the interchange without making any lane changes, making full use of both lanes. The weave section would operate at LOS A in the AM peak period and LOS B in the PM peak period with 2030 traffic. This represents no change in LOS from that of the current MoDOT design

This weave is acceptable for a couple of reasons. First, weaving volumes are relatively low. The projected 2030 PM peak traffic on Ramp 2 is 1300 vph. However, origin-destination counts taken over the past several years show that about one-half of this traffic exits at Bennington. The 2030 PM peak BSR traffic is projected to be less than 400 vph – allowing for ample gaps for the Ramp 2 traffic. Moreover, weaving would occur on a CD road (and thus in an environment anticipated by drivers). In summary, the Hybrid concept provides very similar traffic operations as compared to MoDOT's original concept.

The addition of lanes, Bennington Slip Ramp and Ramp 2, along the outside of Ramp 3 horizontal alignment are a change from the current design. Typically, when ramps merge with freeways, longer acceleration lengths are recommended. Given the lower speeds of Ramp 3 and the converging Ramp 2 and Slip Ramp, this alignment functions more as Collector-Distributor road than a high-speed directional ramp. Additionally, only motorists on Ramp 2 wishing to travel westbound on Page will need to change lanes, keeping all remaining movements in their current lanes.

Phase II - MoDOT Design

Phase II of MoDOT's original concept provides a southbound to eastbound flyover ramp (Ramp 4). VISSIM analysis shows that with this concept, southbound I-270 north of Page Avenue operates at LOS C during the AM and PM Peak Hours. Additionally, eastbound Page Avenue between I-270 ramps and Lackland Road operates at LOS C in the AM Peak Hour and LOS A during the PM Peak Hour. Improvements would be required along Page Avenue east of I-270 to add additional capacity to the Page Avenue/Schuetz Road intersection (e.g., restriping for three through lanes such as was done for the I-64 closures).

Phase II – Hybrid Concept

Phase II of the Hybrid concept would construct a westbound to southbound flyover ramp (Ramp 4) instead of the southbound to eastbound flyover ramp (Ramp 6, Current MoDOT design). The interchange's heavier traffic movements are all to and from the south, and this change would provide for directional ramps for all of these movements. The 2030 peak period traffic forecasts to and from the south are shown below.

- Ramp 7 – 2,875 vph (AM)
- Ramp 3 – 2,030 vph (PM)
- Ramp 8 – 2,575 vph (AM)
- Ramp 4– 1,725 vph (PM)

All of these movements are over 2,000 vph with the exception of the Ramp 4 movement. However, the primary reason that this movement is lower than the others is that it is metered by the Page Avenue/Schuetz Road traffic signal, which is over-capacity during the peak periods. True demand is likely on the order of 2,000 vph. Conversely, the 2030 peak period traffic movements to and from the north are much smaller and include:

- Ramp 6 – 1,260 vph (AM)
- Ramp 2 – 1,300 vph (PM)
- Ramp 5 – 1,080 vph (AM)
- Ramp 1 – 1,195 vph (PM)

Thus, the revised design accommodates all of the interchange's heaviest movements via fully directional ramps. The loop ramps would carry two of the interchange's lowest movements.

Another difference of the hybrid design is that it maintains the current weave on eastbound Page Avenue over I-270. Thus, the existing "type A" weave would be maintained, with both traffic streams being required to make one lane change. With 2030 design traffic this weave segment would operate at LOS C in the AM peak period and LOS A in the PM peak period, which is an acceptable condition. Again, weaving volumes are relatively low. The critical time period is the AM peak where the 2030 forecasted traffic volumes are 1,260 vph for the Ramp 6 movement and 1,080 vph for the Ramp 5 traffic movement. Overall, this concept provides similar traffic operations compared to MoDOT's original design plan.

Conclusion

Both the MoDOT and Hybrid concepts provide similar traffic operations. Both would resolve the interchange's major weaving problems (northbound I-270, westbound Page Avenue, and southbound I-270). The Hybrid concept includes two weave areas that are not present in the current MoDOT concept (Ramp 2 traffic weaving with the BSR traffic and the eastbound Page Avenue traffic over I-270). However, these are both "minor" weaving movements and would operate under acceptable conditions for 2030 traffic. Conversely, the Hybrid concept would provide fully directional ramps for all of the interchange's heaviest traffic movements (to and from the south). While hard to quantify, this design is logical from a transportation systems perspective.

We trust this information is suitable for your needs. Please do not hesitate to contact us with comments or questions.

Sincerely,

Michael L. Brown, P.E.
URS Corporation
Project Manager

Shawn Leight, P.E., PTOE, PTP
CBB
Transportation Planning Manager

CURRENT DESIGN
FIGURE 1.1

SCALE
0 200 400 600

MARINE AVE.
ROTH HILL
MC KELVEY
DAWN VALLEY
EXIST. R.O.W.
FEE FEE RD.
WESTLINE INDUSTRIAL DR.
BASSTON
OBERLIN
WALL
EXIST. R.O.W.
BASSTON
BENNINGTON
WB ROUTE 364 (PAGE AVE.)
EB ROUTE 364 (PAGE AVE.)
EX. RAMP
RAMP 2
RAMP 4
RAMP 6
RAMP 3
RAMP 5
RAMP 7
RAMP 8
EX. RAMP 1
EX. RAMP 3
EX. RAMP 6
EX. RAMP 6 TO BE REMOVED DURING PHASE 2
SB I-270
NB I-270
BSR
ROSS RD.
LACKLAND RD.
CRAIGSHIRE
WESTPORT PLAZA DR.

LEGEND

- PHASE I ROADWAY
- PHASE II ROADWAY
- PHASE I BRIDGE
- PHASE II BRIDGE
- RAMP REMOVAL

URS

RTE. 364 @ I-270
INTERCHANGE
J6U1045B
OCTOBER 1, 2009

MoDOT

HYBRID - RAMP 3 FILL/ RAMP 4 CUT

FIGURE 6.1

SCALE

0 200 400 600

MARINE AVE.

ROTHWELL

MC KELVEY

DAWN VALLEY

EXIST. R.O.W.

BASSTON

OBERLIN

RAMP 2

RAMP 3

SB I-270

NB I-270

WALL

BSR

RAMP 1

EX. RAMP 4 (PHASE 1)

RAMP 4 TO BE REMOVED DURING PHASE 2

EX. RAMP 3

RAMP 4

WB ROUTE 364 (PAGE AVE.)

EB ROUTE 364 (PAGE AVE.)

FEE FEE RD.

WESTLINE INDUSTRIAL DR.

WESTPORT PLAZA DR.

BENNINGTON

EX. RAMP

RAMP 6 TO REMAIN IN PLACE PHASE 1 & PHASE 2

RAMP 6

RAMP 8

RAMP 4

RAMP 3

RAMP 7

EX. RAMP 5

ROSS RD.

LACKLAND RD.

CHARSHIRE

LEGEND

- PHASE I ROADWAY
- PHASE II ROADWAY
- PHASE I BRIDGE
- PHASE II BRIDGE
- RAMP REMOVAL

URS

RTE. 364 @ I-270
INTERCHANGE
J6U1045B
OCTOBER 1, 2009

MoDOT

VE#2 Narrative and History as of October 2, 2009

Awarded Job number J6U1045B improves the I-270 @ Page Interchange by adding a dual lane flyover ramp for NB I-270 to WB Page (Ramp 3). It includes modifications to WB Page between the I-270, and the Bennington Interchanges as necessary to tie in the new flyover ramp. This project is referred to as the Phase I improvement to the interchange, and the future unfunded project is referred to as Phase II.

VE#2 as presented, would reconfigure the new Ramp 3 with an alignment that goes around the outer limits of the interchange along embankment and crosses Page, and then I-270 with single span transverse structures in lieu of the arcing flyover. We have determined that the Weber plan, as proposed, is not advantageous because it would cost more to complete the future interchange improvements, which consist of a corresponding flyover for SB I-270 to EB Page (Ramp 6).

As part of the engineering review and analysis of the VE proposal MoDOT, with assistance from our consultant URS, has modified the original VE by developing a phase II design that is compatible with future improvements at the interchange, which also results in some modifications to the original VE phase I design. This modified option is referred to as the **Hybrid Design**. Essentially, the Hybrid Design relocates the SB to EB movement (Ramp 4), instead of replacing Ramp 6 in Phase II. This eliminates the weave within the cloverleaf on SB I-270, and is less expensive than constructing a new Ramp 6 flyover.

We have completed extensive engineering, traffic and cost analysis of the Hybrid Design and the awarded design for comparison and contrast. The Hybrid has an estimated cost advantage of saving **$1.5M in phase I**, and **$2.3M in Phase II**. Plus, the Hybrid Design has the advantage of **minimizing traffic impacts** during construction of both phases, as it eliminates all work in the median of I-270. However, during our discussion and correspondence with FHWA they have listed several concerns about the Hybrid Design proposal:

- Fair bidding concern due to the global nature of the design change
- Traffic operational concerns:
    - Ramp 2 / Bennington Slip Ramp merge.
    - Converging of Ramp 2, Ramp3 and Bennington Slip ramps along horizontal curve alignments.
    - Leaving in place the cloverleaf merge of Ramp 5 and Ramp 6 on EB Page after the completion of Phase II.

Our traffic analysis and modeling, as completed by CBB, indicates that these operational issues are not a problem (see memo dated 10-1-09). Other issues identified include any required adjustments to NEPA clearances, possible utility conflicts and adjustments, plus impacts to the adjacent property owners including Westport Plaza and homes in the NE quadrant.

An AJR was approved on the project in 2005. The Hybrid Design would require a modification to the approved AJR. General review information was submitted to Greg Budd of FHWA on 9-17-09, and updated on 9-28-09 and 10-2-09. We are awaiting comments from FHWA on review of the latest info prior to any further pursuit of the VE/Hybrid Design.

Route 364 (Page Avenue) & Interstate 270 Interchange
J6U1045B - District 6 - St. Louis County

Value Engineering
Summary Relative Cost Analysis

CATEGORY	CURRENT DESIGN PRELIMINARY ESTIMATE	FRED WEBER OPTION PRELIMINARY ESTIMATE	HYBRID OPTION PRELIMINARY ESTIMATE Ramp 3 Fill / Ramp 4 Cut	 Ramp 3 / 4 Cut
PHASE 1				
GRADING	$3,359,005	$3,570,000	$3,918,000	$0
PAVING	$4,876,314	$5,293,000	$5,069,000	$0
BRIDGES	$5,721,818	$2,270,000	$2,950,000	$0
WALLS	$836,222	$956,000	$889,000	$0
DRAINAGE	$1,579,150	$1,714,000	$1,642,000	$0
SIGNING	$734,841	$798,000	$764,000	$0
LIGHTING	$386,490	$420,000	$402,000	$0
TRAFFIC CONTROL	$649,943	$605,000	$676,000	$0
ROADSIDE SAFETY	$1,531,062	$1,662,000	$1,592,000	$0
PAVEMENT MARKING	$207,775	$226,000	$216,000	$0
SIGNALS	$200,251	$217,000	$208,000	$0
MISCELLANEOUS	$2,107,727	$1,286,000	$1,220,000	$0
PHASE 1 TOTAL	**$22,190,597**	**$19,017,000**	**$19,546,000**	**$0**
PHASE 1 SAVINGS		**$3,173,597**	**$2,644,597**	
PHASE 2				
GRADING	$2,859,000	$3,968,000	$1,493,000	$0
PAVING	$1,128,000	$1,163,000	$2,063,000	$0
BRIDGES	$3,934,000	$5,482,000	$1,828,000	$0
WALLS	$1,750,000	$4,889,000	$834,000	$0
DRAINAGE	$365,000	$352,000	$668,000	$0
SIGNING	$170,000	$164,000	$311,000	$0
LIGHTING	$90,000	$86,000	$164,000	$0
TRAFFIC CONTROL	$151,000	$145,000	$520,000	$0
ROADSIDE SAFETY	$346,000	$341,000	$648,000	$0
PAVEMENT MARKING	$47,000	$46,000	$88,000	$0
SIGNALS	$45,000	$45,000	$85,000	$0
MISCELLANEOUS	$693,000	$1,100,000	$561,000	$0
PHASE 2 TOTAL	**$11,578,000**	**$17,781,000**	**$9,263,000**	**$0**
PHASE 2 SAVINGS		**-$6,203,000**	**$2,315,000**	
TOTAL - PHASE 1 + 2 (2009 Dollars)	**$33,768,597**	**$36,798,000**	**$28,809,000**	**$0**
COST STAVINGS - TOTAL PROJECT		**($3,029,403)**	**$4,959,597**	**$0**

VALUE ENGINEERING CHECK SHEET

TYPE OF WORK

(Check one that applies)

- ❑ Bridge/Structure/Footings
- ❑ Drainage Structures (RCP, RCB, CMP's, ect.)
- ❑ TCP/MOT
- ❑ Paving (PCCP, ect.)
- ❑ Grading/MSE Walls
- ❑ Signal/Lighting/ITS
- ➢ Misc.

SUMMARY OF PROPOSAL

(If needed, condense summary to a couple of lines)

This VE involves a significant redesign of the interchange, reducing the length, number, and placement of bridges and reconfiguring the approach to those bridges.

_____
_____
_____
_____

SCANNING OF DOCUMENT

If the proposal is large, please mark or make note, which pages need to be scanned into the database. If there are special instructions, make note of them here.

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