



MEMORANDUM

Missouri Department of Transportation Project Development District 10

TO: Jay Bestgen, P.E.
Assistant State Design Engineer

FROM: Barry Horst, P.E.
District Design Engineer

DATE: January 31, 2007

SUBJECT: 2007 Awards for Excellence in Practical Design

Please find attached District 10's submittal of our Route 72 rehabilitation for consideration in the practical design competition. The corridor will be delivered in four sections due to budget constraints. These four sections are represented by jobs JOP0847, JOP0848, JOP0851 and JOP0887. Half the corridor is under contract with the remaining jobs scheduled for construction in 2008. Our practical design efforts cover the entire corridor so we're submitting the jobs that comprise the results of those efforts.

This project addresses needs arising from a narrow roadway with many sections of poor horizontal alignment. There has been a longstanding expectation on the part of the public as well as our planning partners for improvement of this corridor.

Development of the corridor improvement began 3 years before practical design became the philosophy under which we operate. Our goal was to deliver a "3R" type improvement and to make some changes in horizontal alignment to allow more passing opportunities as well as safer driving conditions. When this route was originally designed the majority of horizontal curves were designed using 10 degree curves. Our plan called for "flattening" these curves so that a design speed of 50 miles per hour could be achieved.

During development of the corridor, extensive public involvement helped shape the expectations for the corridor improvement. There was concern about the safety of the route, lack of passing opportunities and dissatisfaction with the condition of the pavement.

As mentioned above, two of the four sections are under contract. We have collaborated with the contractor for these two sections, Iron Mountain Construction Services, to identify methods whereby savings could be achieved. We've applied this thinking as well as input from MoDOT Operations personnel to trim the project cost for each of the four sections.

Scope Comparison

As mentioned before, our goal was to accomplish a "3R" type improvement for this corridor. This would consist of performing base widening to accomplish 12 foot lanes, construction of a 6 foot wide asphalt shoulder and extension of drainage structures. In addition, the existing 10 degree curves were to be flattened to achieve 7.5 degree curvature. The project location occurs in a rugged portion of the district and widening requirements led to difficult embankment preparation.

With practical design in mind, we began to brainstorm ways to meet the public expectations while providing an appropriate solution at a reasonable price. We questioned slope widening requirements, drainage structure requirements and lane width/configuration requirements.

Purpose and Need

The needs of this corridor are basically two-fold, improve the existing pavement condition and make those safety improvements that can achieve the most bang for the buck.

Rehabilitation of the pavement is fairly straightforward and accomplished by asphalt overlay. Safety improvements is the area where many deliberations occurred to gauge the benefit against the cost. Throughout the public involvement opportunities we were consistently and insistently told that 6 foot shoulders are necessary. For large stretches of the corridor this could be accomplished by utilizing the existing roadway template. As mentioned before, the problems arose in those areas of high fills.

The core team worked to apply practical design to those areas that achieved savings while delivering most of the public's expectations. For this project that amounted to shoulder width. Techniques were employed that resulted in approximately 90% of the project receiving the desired shoulder width while intermittent small sections of road received 3 foot shoulders.

We believe this compromise solution will meet the spirit of our commitment to the public while meeting the base purpose and need of the project.

New Techniques, Methods, and Non-Traditional Design

Listed below are some of the solutions that make the biggest contribution to savings on this project.

As mentioned, we are striving for 12 foot lane widths. This necessity calls for a base widening operation. After some analysis we determined that this route had received based widening in the past. The lanes were 10 feet wide and the past operations resulted in lane widths averaging 11 feet 9 inches. Coring indicated the widening material was in very good condition so we opted to eliminate widening on this project and settle for a lane 3 inches less than previously planned.

Every drainage structure was examined to determine the necessity and efficacy of extension. Many structures had headwalls that existed just outside the desired shoulder width. The decision was made to leave these structures as they exist and to provide markers to delineate their location.

A significant contributor to project cost was the need to widen fills to accomplish desired shoulder width. The decision was made to employ guardrail on very high fills and to utilize a slightly steeper slope on intermediate fills. This led to reductions in earthwork volumes as well as drainage structure extensions.

The methods by which superelevation corrections were undertaken was also examined. Widespread corrections were necessary and the "high sides" of these locations led to embankment widening in the original design. Utilization of guard rail and existing slopes eliminated the need for earth work operations in these locations.

Cost Savings

For purposes of comparison the budget for this corridor is comprised of the awarded costs for the two sections under contract and the newest estimates for this years STIP preparation. The total corridor cost is \$23,289,616 (awarded cost plus 06-10 STIP estimates for remaining sections). The practical design cost is \$18,462,671. This represents a 21% decrease in corridor cost.

Roadway User Expectations

The practical design changes described above will significantly decrease the duration of construction and thereby decrease the time motorists will be inconvenienced.

The shoulder width issue has been mentioned often and with the changes we propose the vast majority of this corridor will realize a shoulder design meeting the publics expectation. Those areas of lesser shoulder width are intermittent and isolated and occur in areas that should not conflict with the safe function of the roadway.

2007 APPLICATION FORM

(required for each entry)

Job No. JOP0851, JOP0887, JOP0847, JOP0848 Route 72 Corridor County Madison, Bollinger, Cape Girardeau
STIP Description (Scoping or Construction, state which STIP) 05-09 06-10 07-11
Widen and resurface with paved shoulders from Route 00 in Fredericktown to Route 34.

Project Manager (could have both)

MoDOT Tim Richmond

Consultant _____

Active core team members as approved by the MoDOT PM (may include consultants)

Jeff Wachter - D10

Dale Kinneman - D10

David Blalock - D10

Iron Mountain Construction Services

Donna Petrich - D10

Matt Malone - D10

Project Contacts (will have both for consultant entry)

District Tim Richmond

Consultant \$ _____

STIP budget \$ 23,289,616

or Award cost \$ 18,462,671

Value Engineering study during design? yes no (if yes) Project Stage _____

VE Contact person _____

Construction-stage VE (VECP)? yes no (if yes) Explain _____

Total VECP savings \$ _____ VECP Contact Person _____

Why is this entry the "poster" image for MoDOT's practical design philosophy?

(In layman's terms - 100 words or fewer - attach additional sheet if necessary) This corridor began "pre-practical design."

A design concept was proposed that was more readily identified with our past thinking on project delivery. This concept was presented to the public as well as the affected cities and counties. Having established an expectation, it became our focus to deliver in a practical design manner. Past thinking pertaining to drainage structure design, embankment geometry, roadside ditch configurations and pavement widening necessities were challenged to fit practical design into the public's expectations. Using input from multiple sources inside MoDOT as well as the construction industry, the price to deliver this corridor improvement decreased by \$4.8 million.

Send entries to: MoDOT Design Division, ATTN: Jay Bestgen
1320 Creek Trail Dr.
Jefferson City, Missouri 65109

All entries must be received no later than close of business on February 1, 2007