Practical Design

2007 Awards for Excellence

MoDOT

ACEC Missouri

American Council of Engineering Companies of Missouri

2007 APPLICATION FORM

(required for each entry)

Job No. J1P0924 **Route** 36 WBL **County** Buchanan

STIP Description (Scoping or Construction, state which STIP) 05-09 ☐ 06-10 ☒ 07-11 ☐

As described in the STIP -- Resurface westbound lanes with 1 3/4" asphalt from 0.75 miles east of Rte AC to Rte 31 south.

Project Manager (could have both)

MoDOT Adam Watson **Consultant** _____

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

Adam Watson	Troy Slagle	Tim Redmond
Jim Muehlbach	John Hackwoeth	
Lyn Stroughy	Jody Carlson	
Jason Blomberg	Scotty Williams	

Project Contacts (will have both for consultant entry)

District Tom Skinner **Consultant** $ N/A

STIP budget $ 1,884,000 or **Award cost** $ 901,352

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 project saved lots of money. It utilized a best practice of placing a 1/2" scratch coarse in lieu of cold milling. The approach also increased the pavement structure, reduced the collateral damage to the pavement caused by cold milling and added structure to the shoulders. The revised scope also allow the addition of rumble strips, increasing roadway safety.

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

MEMORANDUM

Missouri Department of Transportation
Project Development
District 1

TO: Jay Bestgen-de

CC: Don Wichern-1ld
Tony McGaughy-1ld

FROM: Tom Skinner
District Design Engineer

DATE: January 27, 2007

SUBJECT: 2007 Awards for Practical Design Excellence
Buchanan County, Route 36
Resurface Westbound Lanes from
0.75 miles East of Route AC to Route 31, South Junction.
Project Length 5.476 miles

Purpose and Need The purpose of the project was to resurface 5.476 miles of the westbound lanes of Route 36, from the south junction of Route 31 to 0.75 miles east of Route AC. The project was needed to provide a smooth riding surface and to arrest the accelerating deterioration of the driving lanes.

Scope Comparison The traditional approach for the resurfacing of Route 36 would be to perform approximately 2% full depth pavement repair, then cold mill the surface 1 ¾" and place a 1 ¾" thick bituminous pavement (SP125C) over each of the 12-foot driving lanes. Both the inside and outside shoulder would be either fog sealed as part of the construction contract or MoDOT maintenance forces would place a scrub seal on both the inside and outside shoulders after construction was completed. With this as the initial scope of work, the estimated contract cost of the project was $1,884,000 and was reflected as such in the STIP.

Later in the project design stage, the core team conducted a second project field check, and after careful consideration and thoughtful review, it was determined that a 1 ¾" mill was an excessive rehabilitation treatment and not warranted. To focus on only the need of the project, and not over react to the pavement condition, the core team elected to change the project scope. The core team retained the 2% full depth pavement repair but elected to use a ½" cold mill on the two 12-foot driving lanes and the 4-foot inside shoulder. After the milling was complete, the contractor would place a 1 ¾" SP125C mix on the driving lanes and inside shoulder. Also, in lieu of scrub sealing the 10-foot outside shoulder, a 1 ¼" BP-1 surfacing would be placed over the outside shoulder. (See the Typical Section shown on Sheet 5). The shoulder paving now provided the opportunity to install rumble strips, providing additional roadway safety. This practical approach not only increased the pavement structure and improved safety by adding the rumble strips, but also generated an estimated project savings of nearly $535,000 by reducing the milling depth from 1 ¾" to 1/2". With this practical design scope of work, final plans were prepared and the contract documents were sent to Central Office for the letting.

Engineered Practical Design After the plans were submitted to Central Office, but before the letting date, the project was again reviewed by Central Office staff. It was also during this time period that the engineering and construction sentiment regarding the benefits of asphalt pavement cold milling were changing. As a last minute practical design approach, the scope of the work was changed for a second time. Two significant scope changes were made to the project. First, all the pavement repair was deleted

from the project and the District Maintenance forces were charged with performing the pavement repair. Second, the cold milling was completely deleted from the project and a ½" scratch coarse of BP-3 mix was added to the project. The ½" scratch coarse would be placed over the two 12-foot driving lanes and the inside 4-foot shoulder. The driving lanes and inside shoulder would then capped with 1 ¾" SP125C. The 10-foot outside shoulder was then capped with a 2 ¼" BP-1 mix to complete the roadway and shoulder paving (See the Typical Section shown on Sheet 6).

These scope and plan changes were made after the project documents were printed and available to contractors for bidding. To incorporate the changes, the District revised 23 of the 25 final plan sheets as well as the final plan quantities and sent the revised drawing to Central Office for processing and distribution to the bidders. The District and Central Office worked together to issues the plans changes to the bidders in a timely manner without delaying the letting.

After two major project scope changes, this project demonstrates that determining the appropriate scope of work for a project is a continuous task, that is the responsibility of each and every individual that contributes to the success of the project. It should also be noted that practical design can be and should be implemented at any time during the project design life. Just because a project is "out" for bids, does not mean that it is too late to incorporate the best design practices available to MoDOT.

Cost Savings Roadway paving costs were escalating at the time of this project and yet the Core Team and Central Office Staff each offered their engineering contributions to make this an overwhelming successful project.

	STIP	Actual Cost
Roadway/Misc.	$1,884,000	$901,352

The contract savings was $982,648, which is a 52% below the STIP estimate. However, it is very important to note that approximately $200,000 of the savings on the project should not be considered a true savings. The $200,000 cost of the pavement repair, which was deleted from the construction contract, was deferred to the District Maintenance forces to complete. Therefore, a net savings of $780,000 is a more appropriate reflection of the project construction cost savings.

Additional Project Benefits The practical design for this project provided three additional significant benefits that would not have been realized with the conventional mill and relay approach. First, additional structure was added to the roadway surface, which is generally good engineering practice. Second, the collateral damage to the pavement caused by the cold milling process, was eliminated. Finally, by paving the shoulders in lieu of a scrub seal or fog seal, safety rumble strips could be added to both the shoulders.

This project reflects the fundamental principals of practical design, by understanding, that as "best design practices" are identified (utilizing a bituminous scratch coarse overlay in lieu of cold milling) MoDOT can quickly implement new design and construction strategies and realize the best possible project for the most economical price. In addition, this project demonstrates that practical design is a process of continuous review and dialog between individuals and teams with diversified experiences and training in various disciplines. The combination of roadway, traffic, construction, environmental, maintenance and right of way staff as well as support from Central Office provided MoDOT with a project that realized the best value for every dollar spent. In short, this project will provide better roads and a brighter future for MoDOT and satisfy our customer's driving expectations for many years to come.

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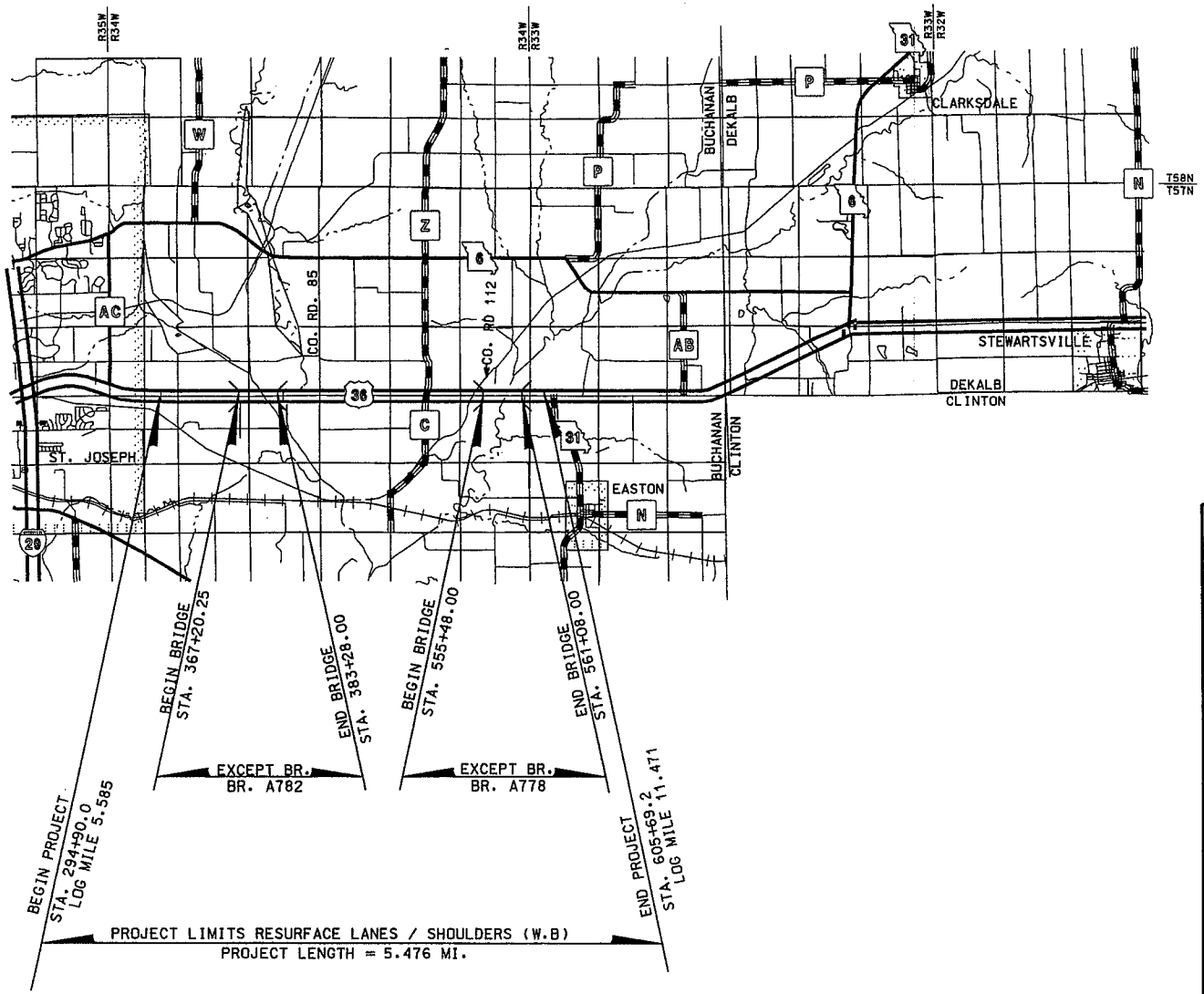
LOCATION SKETCH



STATE OF MISSOURI
ADAM K. WATSON
NUMBER E-30031
REGISTERED PROFESSIONAL ENGINEER

DATE: 09/06/06

ROUTE 36
JOB NO. J1P0924
CONTRACT ID
PROJECT NO.
COUNTY BUCHANAN

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LENGTH OF PROJECT

(WEST BOUND LANES)

BEGIN PROJECT	STA.	294+90.00
END PROJECT	STA.	605+69.20
APPARENT LENGTH		31,079.20 FT.

EXCEPTIONS:

BR. OVER PLATTE RIVER BR. A0782	
STA. 367+20.25 TO 383+28.00	-1,607.75 FT.
BR. OVER THIRD FORK PLATTE RIVER BR. A0778	
STA. 555+48.00 TO 561+08.00	-560.00 FT.

TOTAL CORRECTION:	-2,167.75 FT.
NET LENGTH OF PROJECT	28,911.45 FT.
STATE LENGTH	5.476 MI.

2

STATE OF MISSOURI
ADAM K. WATSON
NUMBER E-30031
REGISTERED PROFESSIONAL ENGINEER

09/06/06

ROUTE 36
JOB NO. J1P0924
CONTRACT ID
PROJECT NO.
COUNTY BUCHANAN

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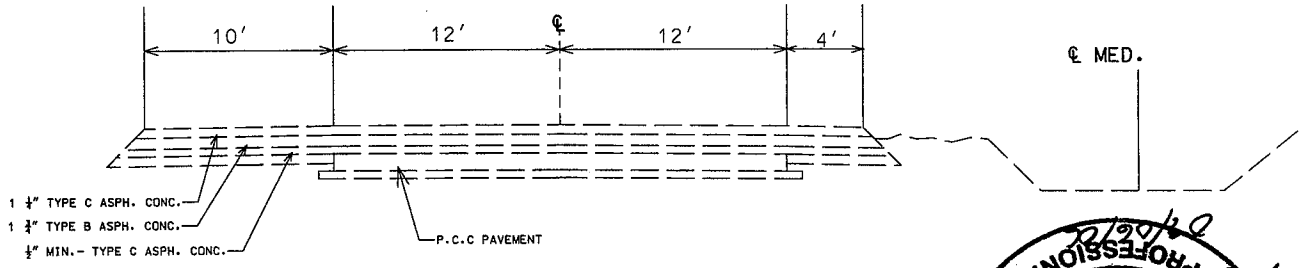
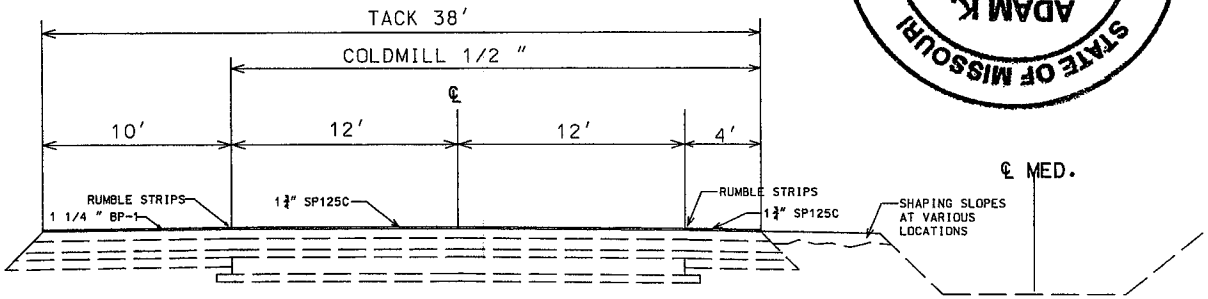


EXISTING RTE. 36 WEST BOUND LANES
STA. 294+90.00 TO STA. 605+69.20



PROPOSED RTE. 36 WEST BOUND LANE
STA. 294+90.00 TO STA. 605+69.20

(3)

RATES:

SP125 – 1.976 TONS/YD^3

BP1 – 1.966 TONS/YD^3

TACK – 0.05 GAL./YD^2

SURFACE IRREGULARITIES

CALCULATED AT 200 TONS/MILE

STATE OF MISSOURI
ADAM K. WATSON
NUMBER
E-30031
REGISTERED PROFESSIONAL ENGINEER

First Practical Design Approach

TYPICAL SECTIONS

ROUTE 36
JOB NO. J1P0924
CONTRACT ID
PROJECT NO.
COUNTY BUCHANAN

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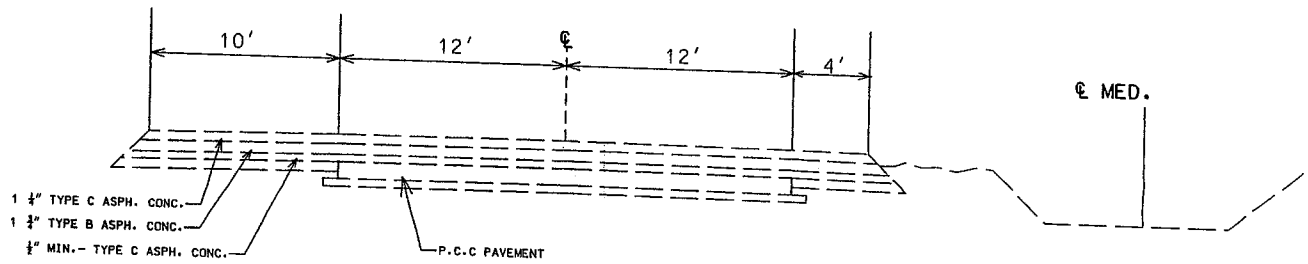
STATE OF MISSOURI
THOMAS ALTON GARNER
NUMBER E-16172
REGISTERED PROFESSIONAL ENGINEER

10-25-06



EXISTING RTE. 36 WEST BOUND LANES
STA. 294+90.00 TO STA. 605+69.20

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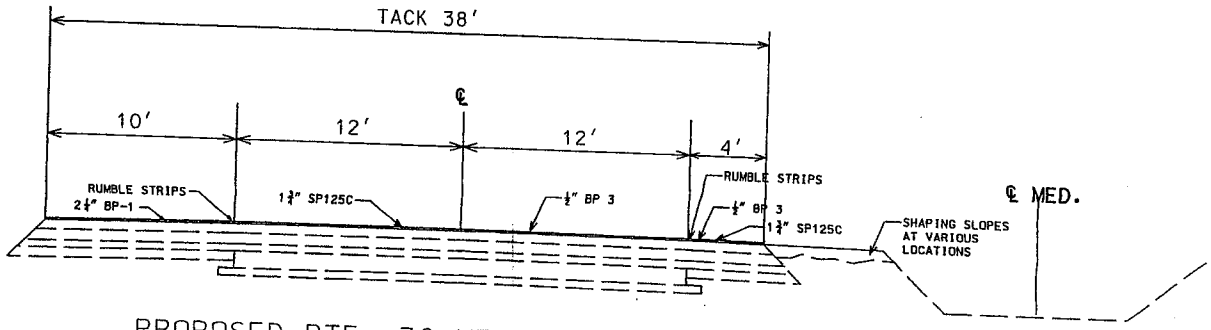

PROPOSED RTE. 36 WEST BOUND LANE
STA. 294+90.00 TO STA. 605+69.20

RATES:

SP125 – 1.976 TONS/YD³
BP1 – 1.966 TONS/YD³
TACK – 0.05 GAL./YD²
SURFACE IRREGULARITIES
CALCULATED AT 200 TONS/MILE
BP 3 – 1.987 TONS/YD³

Second Practical Design Approach,

TYPICAL SECTIIONS

ROUTE 36
JOB NO. J1P0924
CONTRACT ID
PROJECT NO.
COUNTY BUCHANAN

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6