2007 APPLICATION FORM

(required for each entry)

Job No. J2P0448 **Route** 136 **County** Putnam / Schuyler

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

(Construction STIP) Right of way acquisition, replace bridges over Chariton River, and overflow channels. Project involves bridges K0025, K0026 and K0060 from approx. 0.1 mile west of Rte. N to approx. 0.6 mile east of Putnam-Schuyler County line and over Old Chariton River Channel.

Project Manager (could have both)

MoDOT Ronald L. Perkins **Consultant** _____

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

Jeff Gander	Bret Davidson	Dan Skouby
Dennis Brucks	Erin Gruber	James Harcourt
Jason Blomberg	Kelly Lucas	Paula Gough
Phil Sandifer	Tim Redmond	Anousone Arounpradith

Project Contacts (will have both for consultant entry)

District Ron L. Perkins **Consultant** $_____

STIP budget $3,160,000 ($5.6 million in 06 STIP) or **Award cost** $_____

($1.4 million in 08 STIP)

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) _____

Pre-practical design, the original estimate for this project was $5.68 million. Through application of practical design, the current construction estimate is $1.4 million, approximately a 75% reduction in construction costs. This cost decrease was achieved through a practical scope reduction, application of practical design to our typical sections, and a thorough analysis of the actual hydraulic need for the project area.

_____

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

Missouri
Department
of Transportation

Daniel Niec, District Engineer

North Central District
Route 63
P.O. Box 8
Macon, MO 63552
(660) 385-3176
Fax (660) 385-4195
Toll free 1-888 ASK MoDOT
www.modot.org

February 1, 2007

Jay Bestgen
MoDOT Design Division
1320 Creek Trail Dr.
Jefferson City, MO 65109

Dear Mr. Bestgen:

The implementation of "Practical Design" has provided a great opportunity for our district to showcase our ability to innovate and meet our customers' transportation needs in the most cost effective manner available. The J2P0448 project, involving the replacement of threes bridges on Route 136 near the Putnam/Schuyler County Line, is a "poster" image of our ability to meet the public's needs during a time of increasing fiscal pressures.

Project Purpose and Need

There are three bridges in approximately a half-mile length of Route 136 on the Putnam/Schuyler County Line. Bridge No. K0026 is a 227' long truss over the Chariton River that is rated deck-5, superstructure-6 and substructure-6. This bridge has a 22' driving width and restricts trucks over 21 tons to 15 mph. Bridge No. K0060 is a 223' long overflow bridge and is rated deck-6, superstructure-6, and substructure-5. Bridge No. K0025 is a 383' long bridge over the old channel and is rated deck-6, superstructure-6, and substructure-5. Both of these two latter bridges have timber piling and are have the same width and load restrictions as the truss bridge.

The primary purpose and need is to remove these functionally obsolete and structurally deficient structures from our inventory.

Scope Comparison

Before Practical Design: The original scope called for the replacement of these three bridges while maintaining traffic through the corridor. This was to be accomplished through use of a new alignment to the south of existing. To maintain the freeboard on the new channel structure, an increase in profile grade across the bridge and approaches would be necessary. However, the hydrology of the area had changed significantly since the construction of the three bridges – a reservoir had since been constructed upstream. Hydraulic analysis indicated the overflow and old channel structures might no longer be operating at capacity. In addition to the replacement of these three structures, we were going to remove an existing bridge over

an abandoned railroad several miles to the east on Route 136. That bridge (A116) is rated 5-7-6, was constructed in 1958 and is 28' wide.

After Practical Design: Upon re-evaluation, it was determined that through application of practical design, we could maximize the effectiveness of this project (cost vs. output) through scope reduction, and closure of the route. Highway 136 is a minor route in District 2, and the local traffic generators and traffic count indicate that closure is a viable option. Closure of this route in the location of these three bridges allows replacement to occur along the existing alignment without the time/expense associated with constructing along a new alignment or those associated with temporary bypasses. Further hydraulic analysis confirmed the overflow bridge and old channel bridges were no longer functioning as designed and that they could be replaced with smaller structures. The old channel bridge will be replaced with a box culvert, while the overflow bridge will be replaced with a reinforced concrete pipe. Furthermore, it was determined that it would not be necessary to maintain the existing freeboard on the new bridge structure. This allowed the existing profile grade to remain, which reduced roadway costs associated with raising the grade. In addition, it was determined that removing the bridge over the abandoned railroad did not fall within the primary need of this project, and was not immediately necessary, so was therefore delegated to some future time.

Cost & Time Savings

The pre-practical design scope was estimated to cost approximately $5.6 million and would have likely taken two construction seasons. The post-practical design scope is estimated to cost approximately $1.4 million and will likely take less than three months. The new scope addresses the primary need, the replacement of the deficient bridges, without addressing the superfluous items originally included in the scope. In addition, practical design efforts led us to re-evaluate the hydraulics at, and upstream, of the project site, which further allowed for effective cost savings through redesign of the new bridge structures. Furthermore, the reduced cost of this project allowed us to accelerate it one year forward in our STIP.

Through the application of practical design policies, we will be able to meet our customers' expectations for this project while minimizing construction time and saving the tax-payers' money. We feel that this project is but one example of how our district is striving to meet our customers' expectations under the current economic climate.

If you have any further question regarding this project, please contact Ron Perkins or myself.

Sincerely,

Daniel Niec, PE
District Engineer

Missouri
Department
of Transportation

Daniel Niec, District Engineer

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Effects of Practical Design Implementation

Summarized

Job J2P0448, Putnam / Schuyler County

	Pre-practical Design	Post-practical Design
Estimated Cost to Replace Bridges	$5.6 Million	$1.4 Million
Percentage of Original Estimate	----	25%
Estimated Completion Date for Project	Fall 2010	October 2008
Estimated Cost of New Right of Way	$49 Thousand	$0 (No new R/W)
Estimated Cost of Utility Relocation	$70 Thousand	$19 Thousand
Handling of Traffic During Construction	Maintain Traffic on Existing Alignment, Build Bridges on New Alignment	Close Road, Replace Bridges on Existing Alignment
Maintenance of Freeboard	Maintain Existing Freeboard, Raise Profile Grade	Decrease Freeboard, Maintain Profile Grade

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
PLANS FOR PROPOSED
STATE HIGHWAY
PUTNAM/SCHUYLER COUNTIES

ROUTE	STATE	DISTRICT
136	MO	2

JOB NO J2P0448

CONTRACT ID

PROJECT NO

COUNTY PUTNAM/SCHYLER

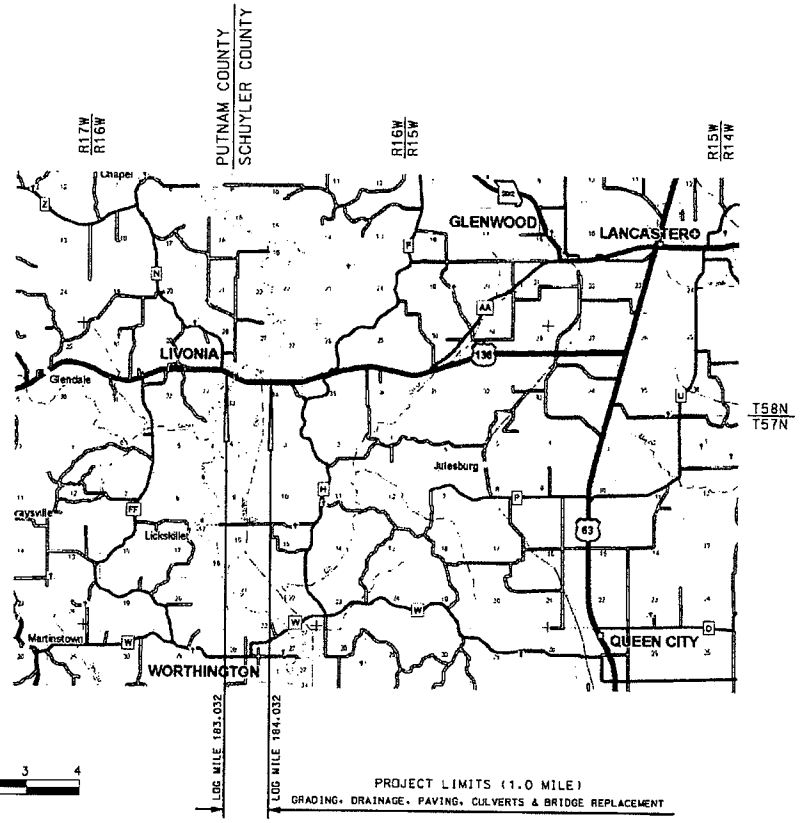
DESIGN DESIGNATION

A.D.T. - 2009 = XXXX
A.D.T. - 2029 = XXXX
D.H.V. = XX%
T = XX%
V = XX M.P.H.

CONVENTIONAL SYMBOLS
(USED IN PLANS)

	EXISTING	NEW
BUILDINGS AND STRUCTURES		
GUARD RAIL		
CONCRETE RIGHT-OF-WAY MARKER		
STEEL RIGHT-OF-WAY MARKER		
LOCATION SURVEY MARKER		
UTILITIES		
FIBER OPTICS	—FO—	—FO—
OVERHEAD TELEPHONE	—O—	—O—
UNDERGROUND TELEPHONE	—T—	—T—
OVERHEAD POWER	—□—	—■—
UNDERGROUND POWER	—P—	—P—
GAS	—G—	—G—
WATER	—W—	—W—
MANHOLE		
FIRE HYDRANT		
WATER VALVE		
WATER METER		
DROP INLET		
DITCH BLOCK		
GROUND MOUNTED SIGN		
LIGHT POLE		
H-FRAME POWER POLE		
TELEPHONE PEDESTAL		
FENCE		
CHAIN LINK	—V—	
WOVEN WIRE	—X—	
GATE POST		
BENCHMARK		

NOTE: DASHED OR OPEN SYMBOLS INDICATE EXISTING FEATURES



1 ½ 0 1 2 3 4
SCALE IN MILES

PROJECT LIMITS (1.0 MILE)
GRADING, DRAINAGE, PAVING, CULVERTS & BRIDGE REPLACEMENT

INDEX OF SHEETS

DESCRIPTION	SHEET NUMBER
TITLE SHEET	1
TYPICAL SECTIONS (_ SHEET))	2
SUMMARY (_ SHEET)	2-A
SUMMARY (_ SHEET)	2-B
PLAN-PROFILE	-
REFERENCE POINTS	-
COORDINATE POINTS	-
SPECIAL SHEETS	-
TRAFFIC CONTROL SHEETS	-
EROSION CONTROL	-
LIGHTING	-
SIGNALS	-
SIGNING	-
PAVEMENT MARKING	-
CULVERT SECTIONS	-
BRIDGE DRAWINGS	-
CROSS SECTIONS	-
COMPUTER DATA	-

LENGTH OF PROJECT

BEGINNING OF PROJECT STA. XXX + XX.XX
END OF PROJECT STA. XXX + XX.XX

APPARENT LENGTH XXXXX.XX FEET

EQUATIONS AND EXCEPTIONS

TOTAL CORRECTIONS XXXXX.XX FEET
NET LENGTH OF PROJECT XXXXX.XX FEET

STATE LENGTH XX.XXX MILES

DATE _____

REV.

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STIP -- Pre-practical Design

BUDGET:

Grading & Drainage +	Base & Surface +	Bridges +	Misc. +	Estimated Contract Total =
$625	$1,087	$2,915	$825	$5,452

	Construction Contingency (est. @ 2% of contract total)	Contract Total+ Construction Contingency
	$109	$5,561
+	Utilities $70	
+	Non Contractual Items $0	Total Construction Cost = $5,631
+	R/W Acquisition $49	

R/W Incidentals +	Preliminary Engineering Incidentals +	Construction Engineering (est. @ 7% of contract total) +		Total Incidentals
$21	$240	$382		$643

+	Construction Incentives / Contract Acceleration $0
	Program Estimated Total = $6,323

STIP -- Post-practical Design

BUDGET:

Grading & Drainage +	Base & Surface +	Bridges +	Misc. +	Estimated Contract Total =
$166	$10	$1,108	$48	$1,332

	Construction Contingency (est. @ 2% of contract total)	Contract Total+ Construction Contingency
	$27	$1,359
+	Utilities $19	
+	Non Contractual Items $0	Total Construction Cost = $1,378
+	R/W Acquisition $0	

R/W Incidentals +	Preliminary Engineering Incidentals +	Construction Engineering (est. @ 7% of contract total) +		Total Incidentals
$21	$240	$93		$354

+	Construction Incentives / Contract Acceleration $0
	Program Estimated Total = $1,732

Post-Practical Design Estimates

Job No. J2P0448
Route 136, Putnam & Schuyler Counties
February 1, 2007

Right of Way - **$0** – No new r/w or esmts. should be needed.

Utilities - **$19,000** (estimate from Utilities Engineer)

Bridge -
$743,000 – New Bridge over channel (estimate from bridge)
$250,000 – Box culvert at old channel location (est. from historical prices)
$35,412 – Removal of Br. No. K0026 – (227'X22')($6/sq. ft.)
$50,556 – Removal of Br. No. K0025 – (383'X22')($6/sq. ft.)
$29,436 – Removal of Br. No. K0060 – (223'X22')($6/sq. ft.)
Total Bridge costs = $1,108,404

Grading -
Approx. 18,000 cu. yds. of embankment will be needed to fill where bridges K0060 and K0025 have been removed.
Assumptions: Avg. height of fill is 10'.
4:1 inslopes
38' roadbed
Price of $7.75 per cu. yd. for Embankment in Place taken from reviewer's suggested price on Job No. J2P0442b.
Total Grading = $139,500 Embankment in Place

Drainage -
60"X179' RCP to replace overflow structure K0025
179' of 60" RCP @ $125/ft. = $22,375
2 – 60" Flared end sections = $4,000
Total Drainage = $26,375

Base & Surface -
2 – 12' lanes and 7' shoulders
Will replace only the base and surface needed from removal of K0060 and K0025.
9.5" Asphalt on roadway (Pav't. Selection)
-7.75" Plant Mix Bit. Pvmt. BP-1
-1.75" Plant Mix. Bit. Base
4" Type 1 Base on roadway
8" Type 1 or 2 Aggregate for shoulders.

Base - (223'+383')(24')/9 = 1616 sq. yds. of 4" Type 1 Aggr. (roadway)
1616 sq. yds. @ $6/sq. yds. = $9,696
Total Base = $9,696

Surface - (223'+383')(14')/9 = 943 sq. yds. of 8" Type 1 Aggr. (shoulders)
943 sq. yds. @ $9/sq. yds. = $8,487

[(223'+383')(24')(7.75/12)]/27 = 348 cu. yds. @ 2.005 ton/cu.yd.
= 697.5 tons PMBB
697.5 tons PMBB @ $65/ton = $45,339

[(223'+383')(24')(1.75/12)]/27 = 78.6 cu. yds. @ 1.987 ton/cu.yd.
= 156.1 tons PMBB
156.1 tons PMBP @ $75/ton = $11,708
Total Surface - $65,534

Miscellaneous - 20% of Grading, Drainage, Base, and Surface

0.20($65534 + $9696 + $26,375 + $139500) = $48,221
Total Miscellaneous = $48,221

Note: Unless noted otherwise, unit prices were taken from Bid Tabs Pro.

[redacted]