February 1, 2007

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

Re: 2007 Awards for Excellence: MoDOT Practical Design Contest Submittal

Dear Mr. Bestgen:

HDR Engineering is pleased to enter the Route 61 bridge replacement over Establishment Creek project for consideration for the 2007 Awards for Excellence competition. HDR recognizes that this will be a challenging competition and are confident that our submittal will demonstrate the significant practical design effort that was undertaken and the resultant cost savings from this process, and the Route 61 project will stand apart from the remaining contest submittals.

The bridge replacement of Rte. 61 over Establishment Creek (J0P0673) is located approximately 0.3 miles north of Rte. V in Ste. Genevieve County. The existing 246' long, 2-span truss structure, built in 1931, is functionally obsolete due to a 20-foot width and 14'3" height limitation. The bridge is structurally deficient with ratings for the deck, superstructure, and substructure of 5, 5, and 6, respectively. Overhead truss members have received significant damage in the recent past from over-height construction equipment (see Appendix 1).

A. Scope Comparison

The original project design called for realigning Rte. 61 and building a new structure, while maintaining traffic on the existing bridge (see Appendix 2). This plan called for approximately 2,900 feet of new roadway, acquiring 5.98 acres of right-of-way from 8 parcels, raising the profile along the north approach through the floodplain, a significant rock cut along the south approach, utility relocations, impacts to forested wetlands on the northwest quadrant, and possible cultural resource issues.

Through the efforts of the MoDOT project core team, led by Andy Meyer, and HDR's application of the practical design process, the redesign of this project will build a new structure on the existing alignment, utilizing a road closure during construction (see Appendix 3). The practical redesign of this project now calls for approximately 430 feet of roadway reconstruction, acquiring 0.02 acres of right of way from two parcels, maintaining the existing vertical profile, minimal utility and environmental impacts, and no cultural resource issues.

The overall scope of the project and the resultant impacts to the surrounding parcels, utilities, and the environment have been significantly reduced through the consistent application of practical design principles at all stages of the design process.

B. Purpose and Need

The purpose and need for this project is clearly demonstrated by the structural ratings of the existing structure and by the height and width limitations. The proposed design will replace the current truss structure with a plate girder structure and a wider typical section will be constructed. This will eliminate the deficiencies in the current height and width limitations. The accident rate for this stretch of Rte. 61 is well above the statewide rate for similar class roadways. The majority of the accidents are a direct result of the narrow roadway width on the bridge and the limited vertical clearance due to the truss structure.

A replacement structure on the existing alignment will provide the smallest degree of impacts to the surrounding homeowners while still satisfying the needs of the traveling public. HDR proposed design exceptions to match the existing horizontal clearances and for installation of long post guardrail to limit excessive fill slopes, which will minimize impacts while still providing a safe, efficient, and effective design.

C. New Techniques, Methods, and Non-Traditional Design

The use of advanced surveying techniques allowed for faster collection of data and a more accurate existing terrain model. LiDAR (Light Detection and Ranging) is a scanning and ranging laser system that allows for accurate contour modeling and data collection even while leaves are on the trees. This technique was chosen for this project to accurately model a 50-foot rock bluff on the south side of the creek and the existing rock outcroppings along the south roadway approach to the structure. The enhanced accuracy of the contour model (0.5 feet) allowed for delineation of the forested

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wetlands on the northwest quadrant of the structure while requiring no additional field work. A significant amount of field work was saved by utilizing this technique. Another benefit of the LiDAR system was that there was no delay in the schedule while having to wait for optimum field conditions to begin surveying. The aerial survey commenced immediately and the LiDAR scans were utilized to fill in the gaps in coverage where vegetation obscured the aerial mapping. This new surveying technique allowed for more accurate data collection, a faster surveying schedule, and provided additional savings to the overall project budget.

The complete road closure, in conjunction with a signed detour along Interstate 55, which runs parallel to Rte. 61, will allow the contractor uninhibited access to the site. By utilizing this option, it is anticipated that the project can be completed within 90 working days. This will limit the disruption to the surrounding communities and eliminate conflicts with the start of a new school year and existing bus routes.

Another practical design methodology that was applied to this project was the use of a design exception to match the existing hydraulic performance. Through interviews with MoDOT maintenance personnel and adjacent landowners it was determined that the existing structure has never been overtopped, including the 1993 Mississippi River backwater condition. The approach roadway north of the structure has flooded infrequently in the past, but the existing structure has not been impacted. This design exception allows the use of a minimal grade raise and further limits the impacts to the surrounding area, including the forested wetlands in the northwest quadrant.

D. Cost Savings

The project is currently listed on the 2009 STIP, with a total program cost of $1.98 million, including incidentals (see Appendix 4). The current engineers estimate shows a total program cost of $1.63 million, including incidentals (see Appendix 5). This savings of 17.6% is directly attributable to the efforts in implementing the practical design process on this project. The original award estimate was $1.52 million and the current award estimate is $1.23 million, a 19.1% reduction. Rep. Carnahan earmarked $1.2 million for this project in a recent transportation reauthorization bill. This earmark shows the importance of this project for the entire region. The design team has consistently found ways to provide a quality project and still drive down the overall construction cost. While giving the traveling public an efficient and safe roadway, this process has allowed a significant reduction in the project impacts and a substantial cost savings which can be applied towards other priority needs in the region.

E. Roadway User Expectations

The users of this roadway currently encounter a narrow width crossing that has a low vertical clearance. The structure has been damaged in multiple locations, the truss members are rusting, the side rails are broken, and in some instances, the last remaining evidence of the barrier edge curb is the longitudinal reinforcing steel. This design will replace a crossing which allows for efficient travel along Rte. 61 and provides a link to Rte. Y and Rte. V. The expectations for project are that none of the above conditions will remain when the new structure is completed, that accidents through this area will decrease, that the proposed road closure will shorten the construction schedule, that a well marked detour will minimize traffic disruptions during construction, and that the most "bang for the buck" can be gotten out of each dollar that is allocated to this bridge replacement. An indication that the proposed design meets roadway user expectations is that recent newspaper articles about the project and announcements regarding an upcoming public meeting have generated no negative responses towards the concept. This indicates that the project is meeting the public's goals and expectations for a successful project.

HDR Engineering is proud of the steps that were taken during the Route 61 bridge replacement over Establishment Creek project. The practical design methods that were implemented will provide the traveling public a highway system that serves their needs. This project is representative of the desire to deliver a transportation system better, faster, and cheaper than before. It illustrates the need to rebuild the highway system and not overbuild our future projects. It demonstrates our commitment to providing efficient, safe, and cost-effective design solutions to MoDOT and the motorists who travel the highway system everyday.

Sincerely,
HDR, Inc.

Kevin Kriete

Kevin Kriete, PE
Project Manager

Barry Rolle

Barry Rolle, VP, PE
Project Principal

HDR Engineering, Inc.

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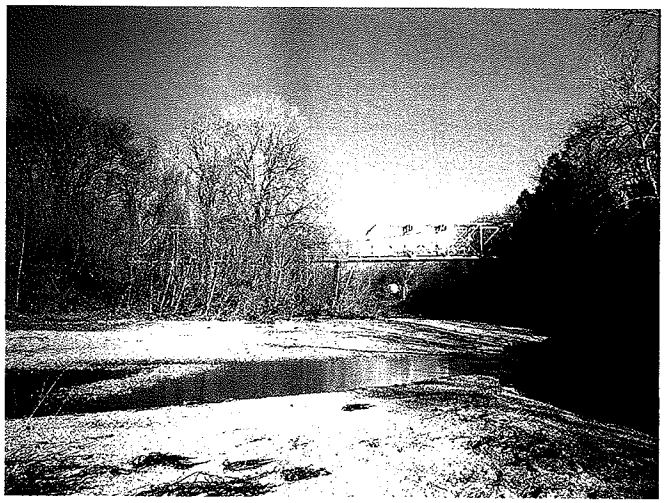
Aerial: Route 61 over Establishment Creek



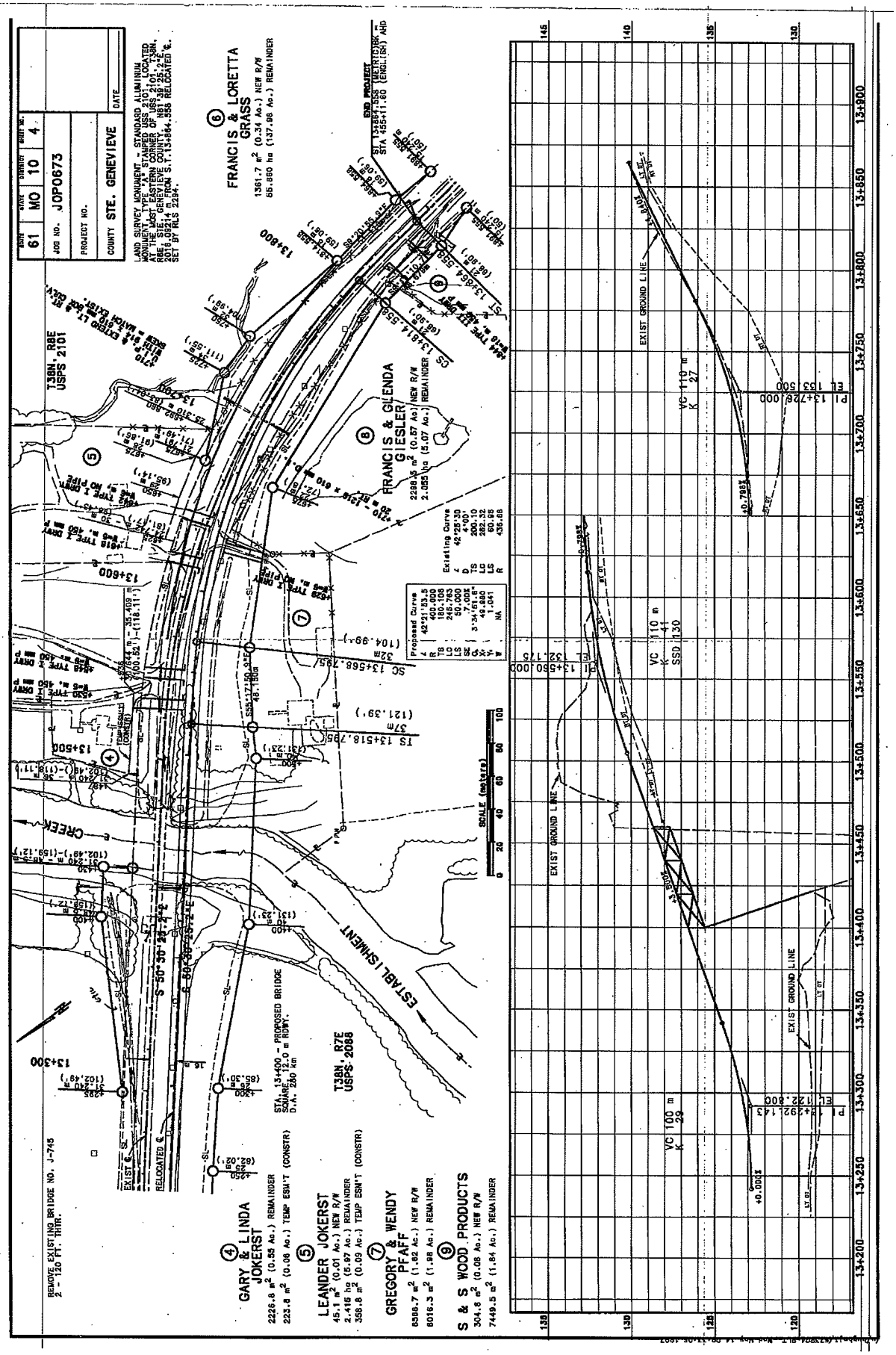
Looking East along Establishment Creek

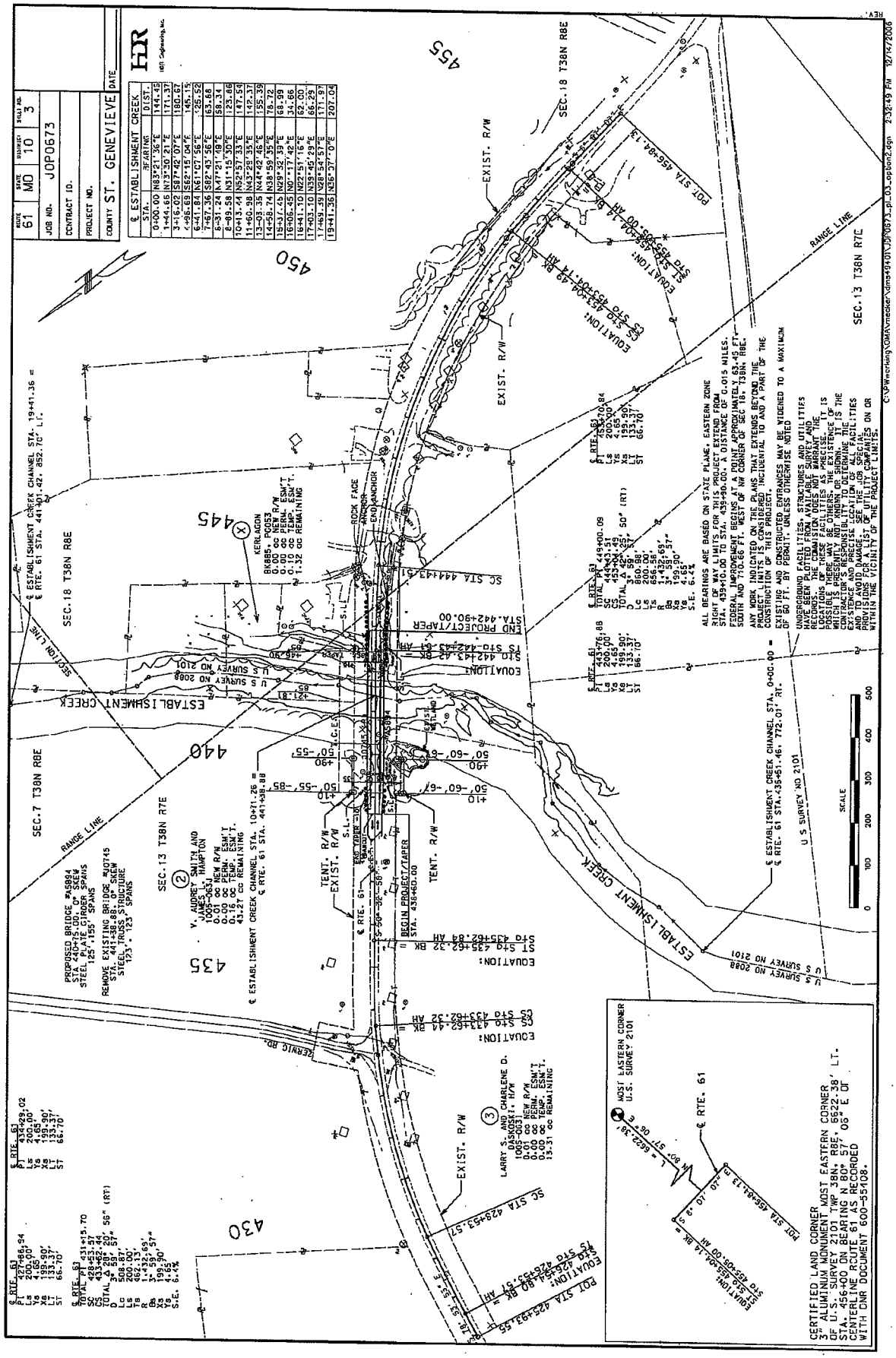
Southbound Heavy Equipment

West Side Edge Barrier

Northbound Roadway Approach

Looking South along Proposed Realignment


61 MO 10 4
JOB NO. J0P0673
PROJECT NO.
COUNTY STE. GENEVIEVE
DATE
LAND SURVEY MONUMENT - STANDARD ALUMINUM MONUMENT - TYPE "A" STAMPED USS 2101, LOCATED AT THE MOST EASTERN CORNER OF USS 2101, 2.73m. RIGHT OF THE CENTERLINE OF ROUTE 61 STA. 13+814.558, 2016.09214 m FROM S.P. 13+864.558 RELOCATED & SET BY RLS 2294.
FRANCIS & LORETTA GRASS
1361.7 m² (0.34 Ac.) NEW R/W
55.860 ha (137.98 Ac.) REMAINDER
END PROJECT
BL 13+864.558 (METRIC)BK =
STA 455+11.860 (ENGLISH) AHD
T38N, R8E
USPS 2101
FRANCIS & GLENDA GIESLER
2288.5 m² (0.57 Ac.) NEW R/W
2.055 ha (5.07 Ac.) REMAINDER
Existing Curve
Δ 42°28'30"
Δ 4°00'
D 28°10'
R 200.000
TS 245.763
LS 50.000
LC 7.001
SE 3°34'18"
SD 49.986
V 1.041
W NA
Proposed Curve
Δ 42°21'53.5
D 40°00'
R 160.100
TS 245.763
LS 50.000
LC 7.001
SE 3°34'18"
SD 49.986
V 1.041
W NA
SC 13+568.795
CS 13+814.558
ST 13+864.558
TS 13+518.795
13+300
13+500
13+600
13+800
S 50°36'25" E
R 50°36'25" E
ESTABLISHMENT
CREEK
EXIST ℄
RELOCATED ℄
REMOVE EXISTING BRIDGE NO. J-745
2 - 120 FT. THTR.
STA. 13+400 - PROPOSED BRIDGE
DESIGN ℄ 0.0 m ROWT.
D.A.: 280 km
T38N, R7E
USPS 2088
GARY & LINDA JOKERST
2226.8 m² (0.55 Ac.) REMAINDER
223.8 m² (0.06 Ac.) TEMP ESM'T (CONSTR)
LEANDER JOKERST
45.1 m² (0.01 Ac.) NEW R/W
2.416 ha (5.97 Ac.) REMAINDER
358.8 m² (0.09 Ac.) TEMP ESM'T (CONSTR)
GREGORY & WENDY PFAFF
8356.7 m² (1.92 Ac.) NEW R/W
8016.3 m² (1.98 Ac.) REMAINDER
S & S WOOD PRODUCTS
304.8 m² (0.08 Ac.) NEW R/W
7449.5 m² (1.84 Ac.) REMAINDER
SCALE (meters)
EXIST GROUND LINE
VC 110 m
K 27
PI 13+728.000
EL 153.500
VC 110 m
K 41
SSD 130
PI 13+580.000
EL 132.175
VC 100 m
K 29
PI 13+392.143
EL 122.800
+0.798%
+0.012
-2.500%
-3.385%


ROUTE 61
STATE MD
DISTRICT 10
SHEET NO. 3
JOB NO. J0P0673
CONTRACT ID.
PROJECT NO.
COUNTY ST. GENEVIEVE
DATE
HR
℄ ESTABLISHMENT CREEK
STA. BEARING DIST.
0+00.00 N83°21'36"E 144.45
1+44.66 N73°30'21"E 171.37
3+16.02 S87°42'07"E 180.67
4+96.69 S62°15'04"E 145.15
6+41.84 N61°07'56"E 125.52
7+67.36 S82°43'56"E 63.68
8+31.24 N47°21'18"E 59.34
8+89.58 N31°15'30"E 123.86
10+13.44 N52°57'33"E 147.54
11+60.98 N43°28'35"E 142.37
13+03.35 N44°42'46"E 135.39
14+38.74 N38°35'35"E 78.72
15+17.45 N69°32'35"E 68.99
16+06.45 S70°13'42"E 34.86
16+41.31 N02°15'12"E 62.20
17+03.10 N39°46'19"E 62.20
17+49.39 N28°54'57"E 171.97
19+41.36 N36°37'0"E 207.04
SEC.18 T38N R8E
SEC.18 T38N R7E
SEC.13 T38N R7E
SEC.7 T38N R8E
SECTION LINE
RANGE LINE
ESTABLISHMENT CREEK
EXIST. R/W
TENT. R/W
EQUATION:
END PROJECT/TAPER
BEGIN PROJECT/TAPER
ROCK FACE
ANCHOR
PROPOSED BRIDGE #5894
STA. 441+38.88
4 SPAN PLATE GIRDER SPANS
125', 155' SPANS
REMOVE EXISTING BRIDGE #107 45
STA. 441+38.88
STEEL TRUSS STRUCTURE
123' + 123' SPANS
℄ ESTABLISHMENT CREEK CHANNEL STA. 19+41.36 =
℄ RTE. 61 STA. 441+01.42, 852.70' LT.
℄ ESTABLISHMENT CREEK CHANNEL STA. 10+11.26 =
℄ RTE. 61 STA. 441+38.88
℄ ESTABLISHMENT CREEK CHANNEL STA. 0+00.00 =
℄ RTE. 61 STA. 435+61.46, 772.07' RT.
U.S. SURVEY NO 2101
U.S. SURVEY NO 2088
U.S. SURVEY NO 2101
SCALE
0 100 200 300 400 500
CERTIFIED LAND CORNER
3" ALUMINUM MONUMENT MOST EASTERN CORNER
OF U.S. SURVEY 2101 TWP 38N, R8E, 6622.38' LT.
STA. 456+00.00 ALIGNMENT BEARING S57° 06' E OF
CENTERLINE ROUTE 61 AS RECORDED
WITH DNR DOCUMENT 600-35108.
MOST EASTERN CORNER
U.S. SURVEY 2101
℄ RTE. 61
L = 6622.38'
S57° 06' E
C:\PWworking\OMA\vmecker\dms49401\J0P0673_pl_03_option2.dgn 2:32:49 PM 12/14/2006
REV.

ORIGINAL BUDGET:

Grading & Drainage +	Base & Surface +	Bridges +	Misc. +	Estimated Contract Total =		PE Spent	ACT RW Spent
$72	$84	$1,070	$291	$1,517		104	0
				+ Construction Contingency (est. @2% of contract total)	Contract Total+ Construction Contingency =		
				$30	$1,547		
				+ Utilites			
				$26			
				+ Non Contractual Items	Total Construction Cost =		
				$14	$1,587		
				+ R/W Acquisition			
				$20			
R/W Incidentals +	Preliminary Engineering Incidentals +	Construction Engineering (est. @7% of contract total) +		+ Total Incidentals			
$5	$160	$106		$271			
				+ Construction Incentives / Contract Acceleration			
				$0			
				Program Estimated Total =		Prj. Ttl.	
				$1,878		1,980	

REVISED BUDGET (practical design implemented):

Grading & Drainage +	Base & Surface +	Bridges +	Misc. +	Estimated Contract Total =		PE Spent	ACT RW Spent
$25	$24	$1,070	$114	$1,233		104	0
				+ Construction Contingency (est. @2% of contract total)	Contract Total+ Construction Contingency =		
				$25	$1,258		
				+ Utilites			
				$7			
				+ Non Contractual Items	Total Construction Cost =		
				$14	$1,279		
				+ R/W Acquisition			
				$5			
R/W Incidentals +	Preliminary Engineering Incidentals +	Construction Engineering (est. @7% of contract total) +		+ Total Incidentals			
$5	$155	$86		$246			
				+ Construction Incentives / Contract Acceleration			
				$0			
				Program Estimated Total =		Prj. Ttl.	
				$1,530		1,634	

2007 APPLICATION FORM

(required for each entry)

Job No. J0P0673 **Route** 61 **County** Ste. Genevieve

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

Grading, paving, and replace bridge over Establishment Creek located 0.3 miles north of Route V. Project involves Bridge J0745.

Project Manager (could have both)

MoDOT Andy Meyer, PE (District 10) **Consultant** Kevin Kriete, PE

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

Dale Kinneman, PE (MoDOT)	David Peyton, EIT (MoDOT)	Donald Crites (MoDOT)
Randy Richardet (MoDOT)	Russell Weisman (MoDOT)	Daniel M. Smith, PE, SE (MoDOT)
Matt Malone, PE (MoDOT)	Melissa Scheperle (MoDOT)	Mike Ecker, PE (HDR)
Lynelle Luther, PE (MoDOT)	Bruce Green, PE (MoDOT)	Tim Rogaczewski, PE (HDR)
David Wyman, PE (MoDOT)	Tonya Wells (MoDOT)	

Project Contacts (will have both for consultant entry)

District Andy Meyer, PE **Consultant** Kevin Kriete, PE

STIP budget $1.95 million or **Award cost** $ 1.63 million (estimate)

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) The Rte. 61 bridge replacement over Establishment Creek illustrates how practical design philosophy can significantly reduce the impacts to the surrounding public, save construction costs, and still meet user expectations. Through the use of a roadway closure, targeted design exceptions, and the efforts of all members of the core team and design staff, the total program cost has been reduced by 17.6%, the project length reduced by 85%, and right-of-way acquisition was reduced by 99%. The resulting project will satisfy all the needs of the traveling public while saving money to be used toward other vital enhancements.

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