BARTLETT & WEST
ENGINEERS
SERVICE. THE BARTLETT & WEST WAY.

December 14, 2007

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

Re: 2008 Practical Design Awards for Excellence

Dear Judges:

Bartlett & West is pleased to submit the Gasconade County Route H bridge replacement project for your consideration. This bridge was one of the first to be designed using the Practical Design philosophy and is a prototype for a "good" rather than "perfect" project that eliminates deficiencies with cost-effective solutions while considering the expectations of its roadway users and impacted landowners.

The replacement of bridge No. N0682 over Big Berger Creek is located approximately 4.2 miles south of Route Z and 10 miles south of Hermann. The existing 127' long, 20' wide, 3-span concrete tee-beam bridge was structurally deficient based on the deck and superstructure condition ratings of 3, each. Furthermore, the structural condition and the deck geometry ratings contributed to this bridge's sufficiency rating fast approaching single digits on the 0 to 100 scale. However, there was good news. The bridge had always sufficiently handled the occasional high water events: the flood discharges were carried through the structure without going over the road or bridge, drift passed satisfactorily and a minimal amount of scour had ever occurred.

A. Scope

The 2001 scope was to widen the road to 32', raise the grade so as to allow a deeper bridge superstructure to have one foot of clearance to the design high water, and span the floodplain with three 70' spans so that the bridge's increase of the water surface elevation upstream was limited to one foot of backwater - backwater being the measure of the bridge's effect on natural conditions. The higher, wider roadway and the flattening of the side slopes to meet the then-current standards would have resulted in the taking of nine "century" trees that the McClanes, the property owners whose driveway came out at the end of the bridge, had enjoyed over the years.

In 2004 and 2005, the Core Team took a step back and took a fresh look at what really needed to be accomplished with this project. The existing bridge was understrength and its condition getting worse every year, but it did work hydraulically and traffic accident rate data indicated that there wasn't a significant problem for the approximate 310 vehicles that traveled that route daily. The

1719 SOUTHRIDGE DRIVE SUITE 100 ■ JEFFERSON CITY MO 65109-4000
573.634.3181 ■ FAX 573.634.7904 ■ 866.869.8031
WWW.BARTWEST.COM

Practical Design scope for the new bridge was to use a 26' roadway, keep the original grade at much as possible, and size the new structure to essentially match the hydraulic opening so that none of the hydraulic measures were worsened and to improve conditions where possible. Slopes were steepened to help minimize right of way – those limits were reduced from 110' left & right of centerline to 50'. The overall project length was reduced from 900' to 505'.

B. Purpose and Need

Construction was completed in fall of 2007 and we can see tangible benefits of implementing the Practical Design philosophy. The new excellently-conditioned, low-maintenance, integrally-constructed concrete bridge still handles the flow. Drainage through, on and around the bridge site have all been improved. The bridge used steel piles for the intermediate bents (far more economical than concrete footings!), the shortest girders possible (shape and concrete strength were structurally optimized), integral concrete construction (low maintenance) and its length results in the bridge's upstream backwater value to be one-hundredth of one foot lower than the previous structure's. The bridge could not have been made any smaller and still have met the hydraulic needs and the future levels of traffic. And yes, the Core Team saved the McClane's trees as shown in the attached pictures.

C. Cost Savings

By decreasing both the length and width, the square footage of the bridge was reduced from 7335 to 3879 – a reduction of 47%. The February 2007 bid tabs (attached) show that the Practical Design bridge cost $74.30 per square foot. By using the Practical Design philosophy, approximately $257,000 was saved on the bridge and this estimate does not include the savings for bridge approach slabs (estimated $25,000) and taller girders that would have been used for the pre-Practical Design bridge. For the roadway, it is estimated that $100,000 to $150,000 in savings were realized.

D. Roadway User Expectations

The roadway was closed during construction to allow the contractor to get in and get out. The use of precast concrete components (girders and deck panels) and steel piles for the foundations increased the speed of construction as well. Users probably had seldom noticed the bridge in the past because of Route H's straight, flat alignment along with the relatively short bridge length. Current and future users of the newly-constructed bridge should expect to be similarly unaware.

We hope that your panel will find this project worthy of recognition. Bartlett & West is proud of our work with the Core Team that led to these significant savings – both the construction dollars and those of the McClanes.

Sincerely,

Herbert R. Bailey

Herbert R. Bailey
Project Manager

Structurally deficient concrete tee-beam superstructure was in "serious condition" but its waterway adequacy was equal to present desirable criteria.

Deck also was "serious" and the roadway width met minimum tolerable limits to be left in place.

The McClane's "century" trees along the existing driveway needed to be saved!

The biggest and best trees were all saved and the driveway safely situated relative to the bridge.

The new excellently-conditioned, low-maintenance, integrally-constructed concrete bridge still handles the flow!

Drainage through, on and around the bridge site have all been improved.

ROUTE	STATE	DISTRICT	SHEET NO.
H	MO	5	3

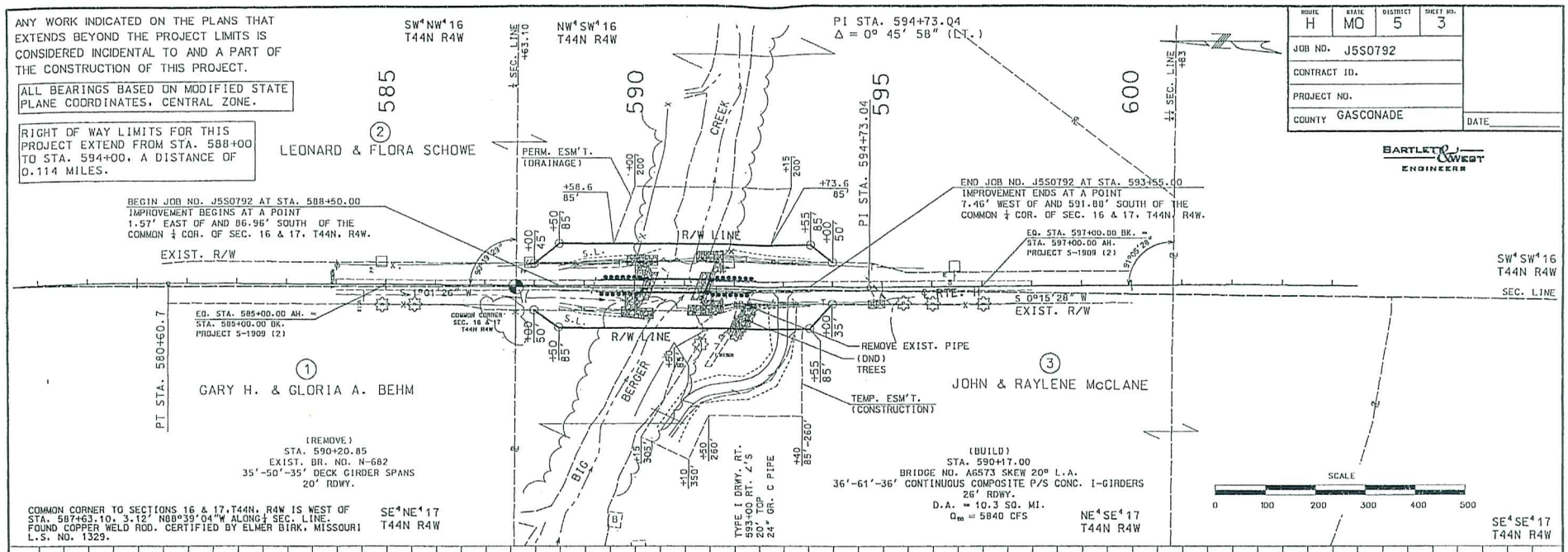
JOB NO. J5S0792
CONTRACT ID.
PROJECT NO.
COUNTY GASCONADE
DATE

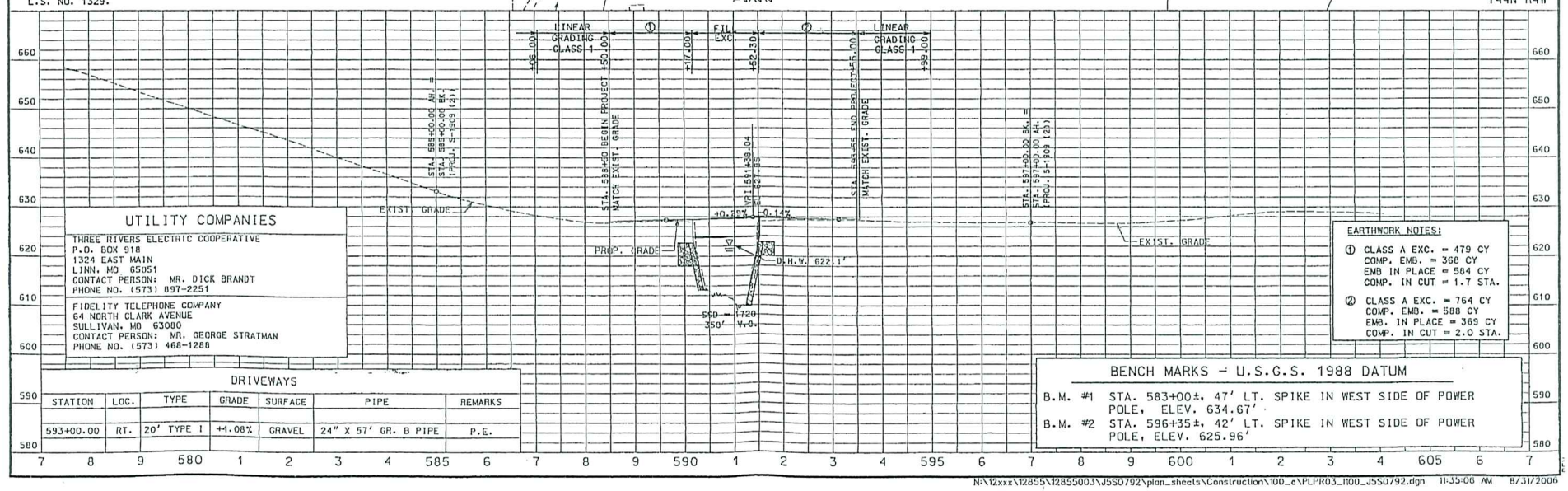
BARTLETT & WEST ENGINEERS

ANY WORK INDICATED ON THE PLANS THAT EXTENDS BEYOND THE PROJECT LIMITS IS CONSIDERED INCIDENTAL TO AND A PART OF THE CONSTRUCTION OF THIS PROJECT.

ALL BEARINGS BASED ON MODIFIED STATE PLANE COORDINATES, CENTRAL ZONE.

RIGHT OF WAY LIMITS FOR THIS PROJECT EXTEND FROM STA. 588+00 TO STA. 594+00, A DISTANCE OF 0.114 MILES.





UTILITY COMPANIES

THREE RIVERS ELECTRIC COOPERATIVE
P.O. BOX 910
1324 EAST MAIN
LINN, MO 65051
CONTACT PERSON: MR. DICK BRANDT
PHONE NO. (573) 897-2251

FIDELITY TELEPHONE COMPANY
64 NORTH CLARK AVENUE
SULLIVAN, MO 63080
CONTACT PERSON: MR. GEORGE STRATMAN
PHONE NO. (573) 468-1288

DRIVEWAYS

STATION	LOC.	TYPE	GRADE	SURFACE	PIPE	REMARKS
593+00.00	RT.	20' TYPE I	+4.08%	GRAVEL	24" X 57' GR. B PIPE	P.E.

EARTHWORK NOTES:

① CLASS A EXC. = 479 CY
COMP. EMB. = 368 CY
EMB IN PLACE = 584 CY
COMP. IN CUT = 1.7 STA.

② CLASS A EXC. = 764 CY
COMP. EMB. = 588 CY
EMB. IN PLACE = 369 CY
COMP. IN CUT = 2.0 STA.

BENCH MARKS - U.S.G.S. 1988 DATUM

B.M. #1 STA. 583+00±, 47' LT. SPIKE IN WEST SIDE OF POWER POLE, ELEV. 634.67'

B.M. #2 STA. 596+35±, 42' LT. SPIKE IN WEST SIDE OF POWER POLE, ELEV. 625.96'

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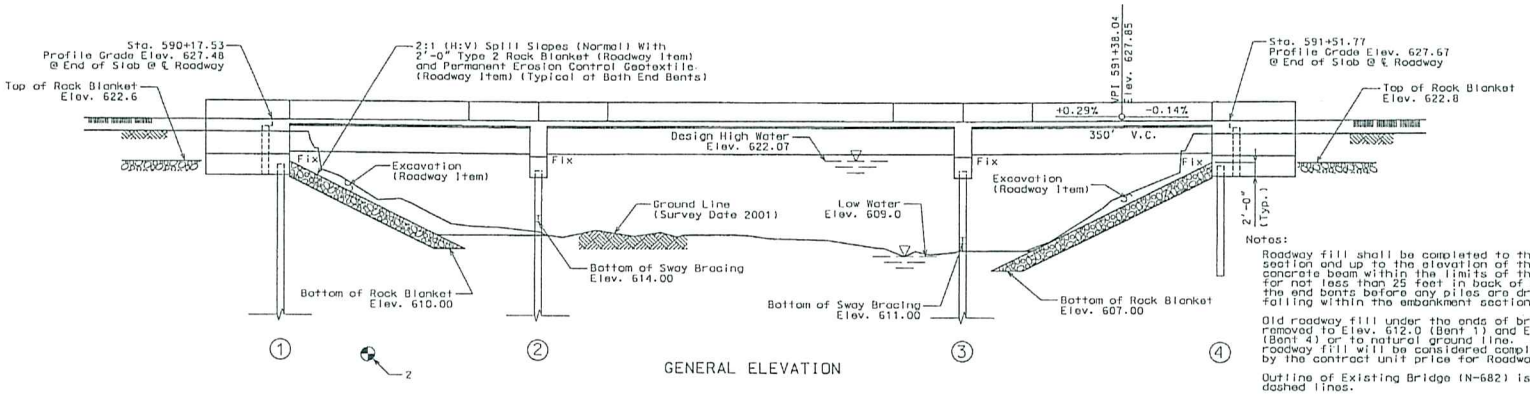
MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

36'-61'-36' PRESTRESSED CONCRETE I-GIRDER SPANS

State	Proj. No.	Sheet No.
MO		
SEC/SUR 16 TWP 44N RGE 4W		



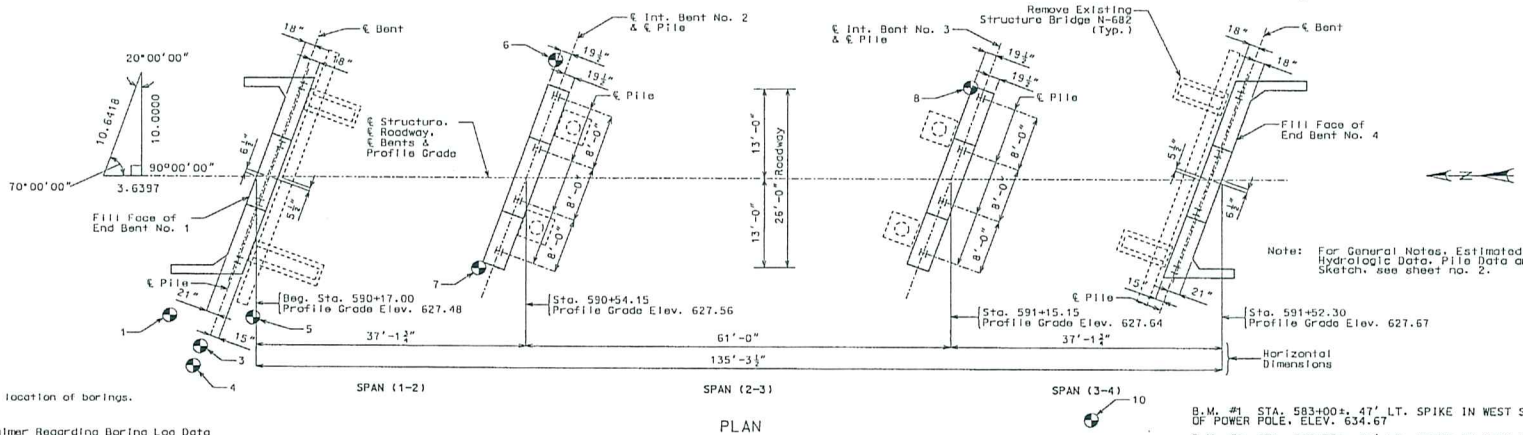
GENERAL ELEVATION

Notes:

Roadway fill shall be completed to the final roadway section and up to the elevation of the bottom of the concrete beam within the limits of the structure and for not less than 25 feet in back of the fill face of the end bents before any piles are driven for any bents falling within the embankment section.

Old roadway fill under the ends of bridge shall be removed to Elev. 612.0 (Bent 1) and Elev. 609.0 (Bent 4) or to natural ground line. Removal of old roadway fill will be considered completely covered by the contract unit price for Roadway Excavation.

Outline of Existing Bridge (N-682) is indicated by dashed lines.



Note: For General Notes, Estimated Quantities, Hydrologic Data, Pile Data and Location Sketch, see sheet no. 2.

PLAN

"⊕" indicates location of borings.

Notice and Disclaimer Regarding Boring Log Data

The locations of all subsurface borings for this structure are shown on the bridge plan sheet for this structure. Boring data for the numbered locations is shown on sheet no. 3. The boring data for all locations indicated, as well as any other boring logs or other factual records of subsurface data and investigations performed by the department for the design of the project, is available from the Project Contact upon written request as outlined in the Project Special Provisions. No greater significance or weight should be given to the boring data depicted on the plan sheets than is subsurface data available from the district or elsewhere.

The Commission does not represent or warrant that any such boring data accurately depicts the conditions to be encountered in constructing this project. A contractor assumes all risks it may encounter in basing its bid prices, time or schedule of performance on the boring data depicted here or those available from the district, or on any other documentation not expressly warranted, which the contractor may obtain from the Commission.

B.M. #1 STA. 583+00±, 47' LT. SPIKE IN WEST SIDE OF POWER POLE, ELEV. 634.67

B.M. #2 STA. 596+35±, 42' LT. SPIKE IN WEST SIDE OF POWER POLE, ELEV. 625.96

BARTLETT & WEST ENGINEERS

BRIDGE OVER BIG BERGER CREEK

STATE ROAD FROM HERMANN TO STONEY HILL

ABOUT 1.2 MILES NORTH OF RTE. E

PROJECT NO. STA. 590+17.00

JOB NO. J5S0792 RTE. H

GASCONADE COUNTY

Date:

STATE OF MISSOURI
CHRISTOPHER J. CRISWELL
NUMBER E-28605
PROFESSIONAL ENGINEER
5/31/06

STD. 617.10
STD. 706.35
A6573

Designed Jan. 2006
Detailed Mar. 2006
Checked Mar. 2006

Note: This drawing is not to scale. Follow dimensions.

Sheet No. 1 of 27

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ANY WORK INDICATED ON THE PLANS THAT EXTENDS BEYOND THE PROJECT LIMITS IS CONSIDERED INCIDENTAL TO AND A PART OF THE CONSTRUCTION OF THIS PROJECT.

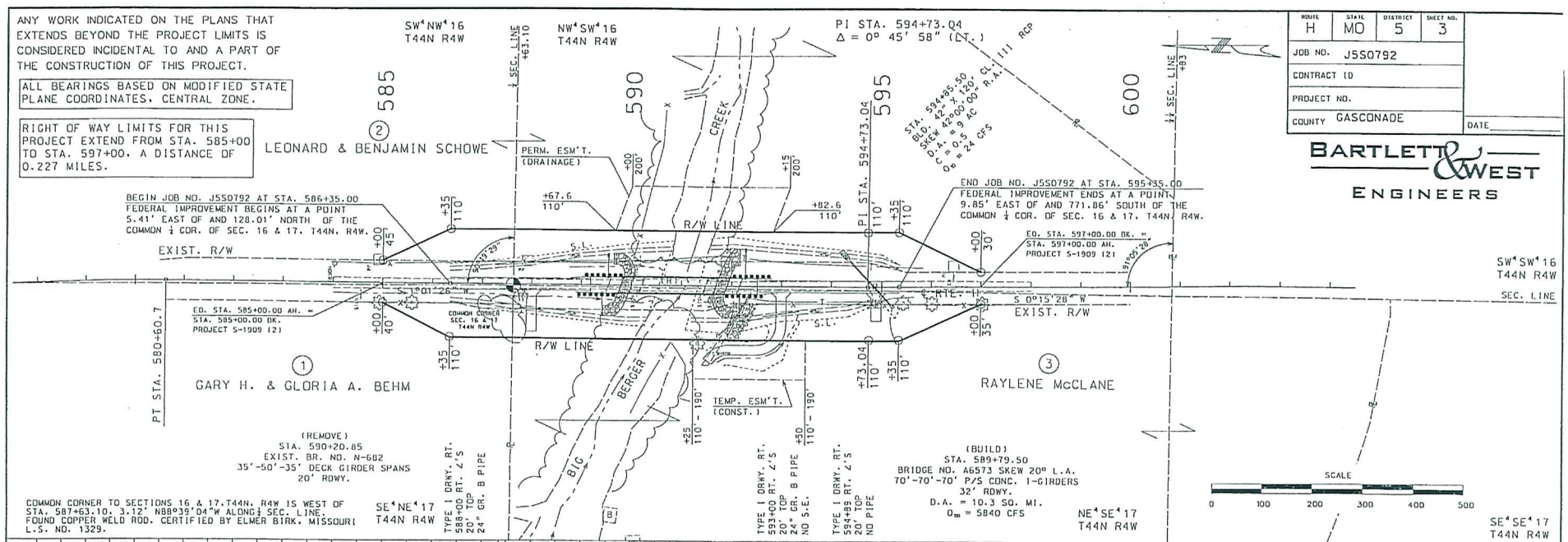
ALL BEARINGS BASED ON MODIFIED STATE PLANE COORDINATES, CENTRAL ZONE.

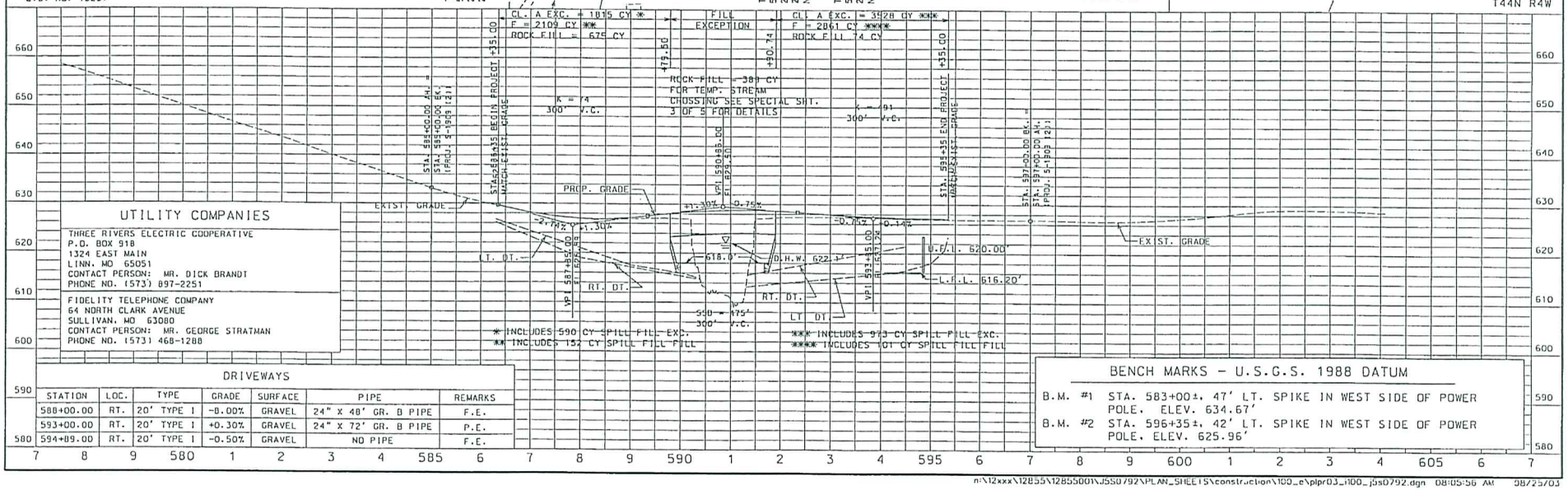
RIGHT OF WAY LIMITS FOR THIS PROJECT EXTEND FROM STA. 585+00 TO STA. 597+00. A DISTANCE OF 0.227 MILES.

ROUTE	STATE	DISTRICT	SHEET NO.
H	MO	5	3

JOB NO. J5S0792
CONTRACT ID
PROJECT NO.
COUNTY GASCONADE
DATE

BARTLETT & WEST
ENGINEERS





UTILITY COMPANIES

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PHONE NO. (573) 468-1288

DRIVEWAYS

STATION	LOC.	TYPE	GRADE	SURFACE	PIPE	REMARKS
588+00.00	RT.	20' TYPE 1	-8.00%	GRAVEL	24" X 48' GR. B PIPE	F.E.
593+00.00	RT.	20' TYPE 1	+0.30%	GRAVEL	24" X 72' GR. B PIPE	P.E.
594+89.00	RT.	20' TYPE 1	-0.50%	GRAVEL	NO PIPE	F.E.

BENCH MARKS – U.S.G.S. 1988 DATUM

B.M. #1 STA. 583+00±, 47' LT. SPIKE IN WEST SIDE OF POWER POLE. ELEV. 634.67'

B.M. #2 STA. 596+35±, 42' LT. SPIKE IN WEST SIDE OF POWER POLE. ELEV. 625.96'

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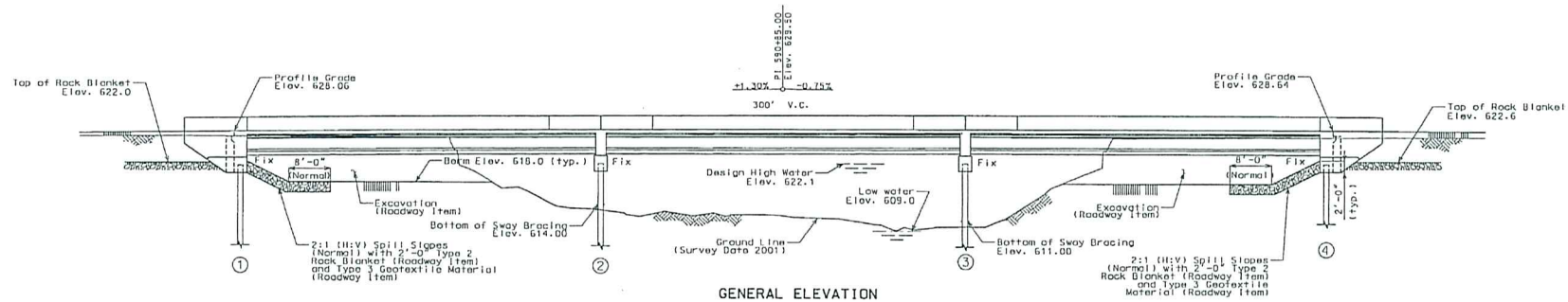
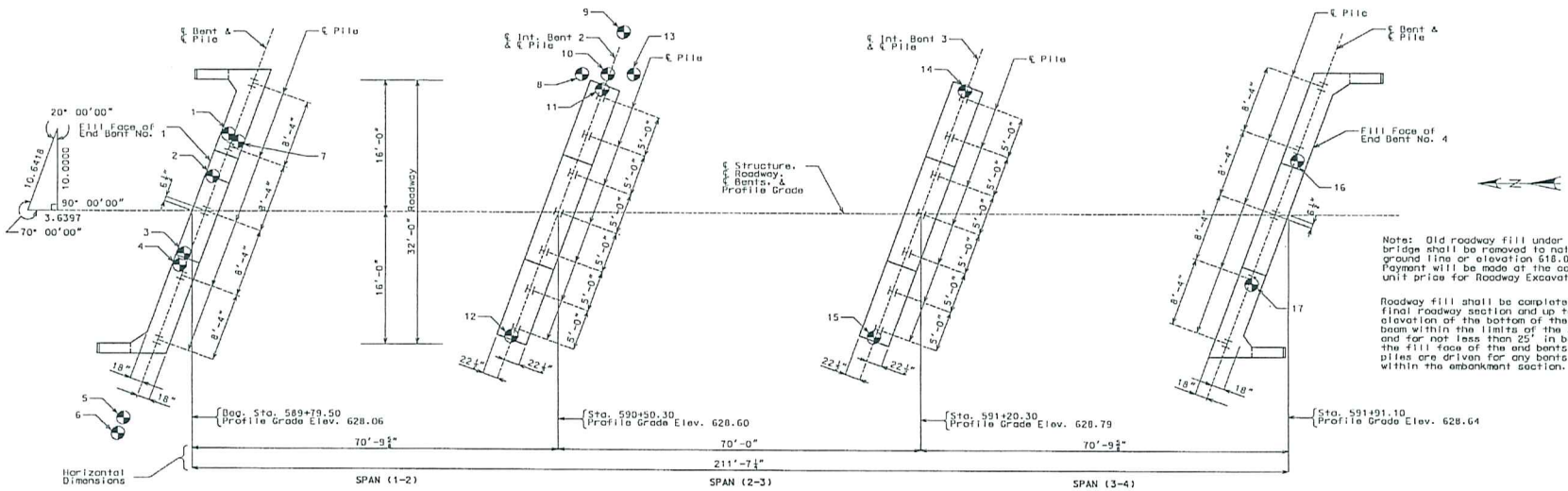
MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

(3 @ 70') PRESTRESSED CONCRETE I-GIRDER SPANS

State	Proj. No.	Sheet No.
MO		
SEC/SUR 16	TWP 44N	RGE 4W



GENERAL ELEVATION



Note: Old roadway fill under ends of bridge shall be removed to natural ground line or elevation 618.00. Payment will be made at the contract unit price for Roadway Excavation.

Roadway fill shall be completed to the final roadway section and up to the elevation of the bottom of the concrete beam within the limits of the structure and for not less than 25' in back of the fill face of the end bents before piles are driven for any bents falling within the embankment section.

"⊕" indicates location of borings.

PLAN

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The Commission does not represent or warrant that any such boring data accurately depicts the conditions to be encountered in constructing this project. A contractor assumes all risks it may encounter in basing its bid prices, time or schedule of performance on the boring data depicted here or those available from the district, or on any other documentation not expressly warranted, which the contractor may obtain from the Commission.

Note: For general notes, estimated quantities, hydrologic data, pile data, and location sketch see sheet no. 2.

B.M. #1 STA. 583.00±, 47' LT. SPIKE IN WEST SIDE OF POWER POLE, ELEV. 634.67

B.M. #2 STA. 596+35±, 42' LT. SPIKE IN WEST SIDE OF POWER POLE, ELEV. 625.96

BARTLETT & WEST
ENGINEERS

STATE OF MISSOURI
CHRISTOPHER J. CRISWELL
NUMBER E-28605
REGISTERED PROFESSIONAL ENGINEER
5/7/03

BRIDGE OVER BIG BERGER CREEK

STATE ROAD FROM HERMANN TO STONEY HILL

ABOUT 1.2 MILES NORTH OF RTE. E

PROJECT NO. STA. 589+79.50

JOB NO. J5S0792 RTE. H

GASCONADE COUNTY

Date: / /

STD. 609.00

STD. 706.35

A6573

Designed Feb. 2002
Detailed July 2002
Checked Aug. 2002

Note: This drawing is not to scale. Follow dimensions.

			BID	LOW BID
1	0010793	Muenks Brothers Construction Co.	$ 465,767.91	100.0000%
2	0010907	Don Schnieders Excavating Company, Inc.	$ 480,357.74	103.1324%
3	0010445	Emery Sapp & Sons Inc.	$ 496,715.50	106.6444%
4	0025523	HBI Construction, LLC	$ 508,326.00	109.1372%
5	0011540	Lehman Construction, L.L.C.	$ 519,865.35	111.6147%
6	0011280	All Type Excavating Inc./dba L. Krupp Construction, Inc.	$ 523,239.63	112.3391%
7	0011270	Pace Construction Company, LLC	$ 549,000.00	117.8699%
8	0010722	Robertson Contractors, Inc.	$ 549,334.90	117.9418%
9	0010181	Harry H. Houf & Sons Contractors Inc.	$ 555,336.50	119.2303%
10	0010191	J. C. Industries, Inc.	$ 575,023.68	123.4571%
11	0010130	Burk Bridge Co.	$ 818,707.15	175.7758%
12	0011379	K.J.U., Inc. dba/K. J. Unnerstall Construction Co.	$ 905,120.81	194.3287%

MISSOURI DEPARTMENT OF TRANSPORTATION

TABULATION OF BIDS

DATE : 03/13/07
PAGE : 503 -4

CALL ORDER : 503
LETTING DATE : 02/23/07 11:00 a.m.

CONTRACT ID : 070223-503
DISTRICT : 05

COUNTIES : GASCONADE

LINE NO / ITEM CODE / ALT ITEM DESCRIPTION	QUANTITY		(1) 0010793 Muenks Brothers Construction UNIT PRICE	AMOUNT	(2) 0010907 Don Schnieders Excavating Co UNIT PRICE	AMOUNT	(3) 0010445 Emery Sapp & Sons Inc. UNIT PRICE	AMOUNT
0360 2061000 CLASS 1 EXCAVATION	70.000	CUYD	18.65000	1305.50	22.00000	1540.00	17.00000	1190.00
0370 2160500 REMOVAL OF BRIDGES		LUMP	16650.00000	16650.00	31000.00000	31000.00	16900.00000	16900.00
0380 7021012 STRUCTURAL STEEL PILES (12 IN.)	466.000	LF	67.00000	31222.00	61.70000	28752.20	55.00000	25630.00
0390 7026000 PRE-BORE FOR PILING	100.000	LF	125.00000	12500.00	75.70000	7570.00	72.00000	7200.00
0400 7027000 PILE POINT REINFORCEMENT	16.000	EA	110.00000	1760.00	115.00000	1840.00	120.00000	1920.00
0410 7032003 CLASS B CONCRETE (SUBSTRUCTURE)	47.700	CUYD	450.00000	21465.00	598.00000	28524.60	630.00000	30051.00
0420 7034213 SLAB ON CONCRETE I-GIRDER	428.000	SQYD	230.00000	98440.00	223.00000	95444.00	260.00000	111280.00
0430 7034215 SAFETY BARRIER CURB	299.000	LF	64.00000	19136.00	69.35000	20735.65	62.00000	18538.00
0440 7051136 PRESTRESSED CONCRETE I-GIRDER, 36 FT SPAN	8.000	EA	4344.00000	34752.00	4635.00000	37080.00	4775.00000	38200.00
0450 7051161 PRESTRESSED CONCRETE I-GIRDER, 61 FT SPAN	4.000	EA	9500.00000	38000.00	9465.00000	37860.00	7760.00000	31040.00
0460 7061060 REINFORCING STEEL (BRIDGES)	2260.000	LB	1.15000	2599.00	1.50000	3390.00	1.25000	2825.00
0470 7121000 FABRICATED STRUCTURAL CARBON STEEL (MISC)	960.000	LB	1.25000	1200.00	5.60000	5376.00	2.80000	2688.00
0480 7123301 STEEL INTERMEDIATE DIAPHRAGM FOR P/S CONCRETE GIRDERS	3.000	EA	400.00000	1200.00	700.00000	2100.00	380.00000	1140.00
0490 7123610 SLAB DRAIN	18.000	EA	190.00000	3420.00	200.00000	3600.00	200.00000	3600.00
0500 7151001 VERTICAL DRAIN AT END BENTS	2.000	EA	400.00000	800.00	1000.00000	2000.00	1275.00000	2550.00
0510 7161002 LAMINATED NEOPRENE BEARING PAD	24.000	EA	155.00000	3720.00	140.00000	3360.00	200.00000	4800.00
SECTION TOTALS			$	288,169.50	$	310,172.45	$	299,552.00
CONTRACT TOTALS			$	465,767.91	$	480,357.74	$	496,715.50

$$\frac{\$288,169.50}{(135.30' \text{ LENGTH})(28'8'' \text{ WIDTH})} = \$74.30/ft^2$$

ROADWAY COSTS = \$465,767.91 − \$288,169.50
= \$177,598.41

ROADWAY LENGTH = 505' − 135.30' = 369.7'

LENGTH OF ROADWAY WORK (2001) = 900' − 211.60' = 688.4'
(2004/2005) = 505' − 135.3' = 369.7'

$$\text{COST/FT} = \frac{\$177,598.41}{369.7'} = \$480.39/1'$$

∴ ROADWAY SAVINGS = (688.4' − 369.7')(\$480.39/1')
= \$153,100

MoDOT PROJECTS
2008 APPLICATION FORM

Job No. J5S0792 **Route** H **County** Gasconade

STIP Description (Scoping or Construction, state which STIP) February 2007 letting

STIP 2007-2011 Bridge replacement over Berger Creek 4.2 miles south of Route Z. Project involves bridge N0682.

Is the submittal for the entire project or just a portion of the project? Please explain: Entire project

Project Manager (could have both) **MoDOT** Jason Vanderfeltz **Consultant** Herb Bailey

Key core team members as approved by the MoDOT PM (may include consultants) (limit of 9)

David Johns	Jim Honse	John Sweet
Greg Sunde	Alan Trampe	Trent Brooks
Bruce Green	Melissa Shiver	Chris Criswell

Project Contacts: District Jason Vanderfeltz (D5) Greg Sunde (BR) **Consultant** Herb Bailey

Project Budget:

Conceptual budget $ 895,000 **Initial STIP Budget** $ 895,000?

Final STIP budget $ 598,000 **Award amount** $ 465,767.91

Other : _____

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

Total VE savings implemented $ _____ **VE Contact Person** _____

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

Total VECP savings $ _____ **VECP Contact Person** _____

What would make this entry stand out from the rest of the entries when considering MoDOT's practical design philosophy? (In layman's terms - 100 words or fewer) This bridge is a prototype project for eliminating existing deficiencies through cost-effective solutions while considering its roadway users and impacted landowners. The understrength bridge's problems were serious – its condition was deteriorating almost to the point of closure. It did however pass floodwater adequately. The existing bridge was replaced with one of similar length than matches or improves the functionality of the previous bridge. The key difference is that the strong, new bridge is in excellent condition and the impacts minimized to both the roadway users and the property owners who stood to lose the trees along their driveway.