Missouri
Department
of Transportation

MoDOT

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

December 12, 2007

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

Dear Mr. Bestgen:

The implementation of "Practical Design" has provided many opportunities for our district to showcase our ability to innovate and meet our customers' transportation needs in the most cost effective manner available. Our box culvert project on Route 65 in Carroll County, Job Number J2P0766, is an excellent example of our District employing innovation and teamwork to resolve a transportation issue and delight our customers at minimal cost to the Department.

Project Purpose and Need

In Carroll County, 11-miles north of Carrollton, on Route 65 (major), MoDOT had a double 12'x12' box culvert that was structurally deficient (Rating-4). This structure was eighty years old and had horizontal cracking running the length of the north and south exterior walls. Furthermore, measurements indicated that the exterior walls had begun to bow in, hinging along the horizontal crack. There was concern that one, or both, of these walls would cave-in and require the complete closure of Route 65 until the structure could be replaced. The primary purpose and need, as defined by the Core Team, was as follows:

- To remove a structurally deficient structure from MoDOT's bridge inventory.

Scope Comparison

Before Practical Design: The original scope called for the removal and replacement of the large box culvert structure with a similar structure. This project would have taken at least two months to complete. During construction, traffic was going to be handled via a temporary bypass adjacent to the project. Existing Right of Way through this segment of Route 65 is narrow, so additional Right of Way and easements would have had to be obtained for construction of the new structure and the temporary bypass.

After Practical Design: After extensive investigation, the Core Team determined the purpose and need could be met by inserting 10-foot diameter 10-gauge Aluminum-Coated Corrugated Metallic Pipe Culverts into each barrel of the box culvert and filling the void space with a

flowable concrete mix. After significant input from our maintenance Core Team members, the analysis found that this project could be completed earlier and more cost-effectively by MoDOT forces than by letting the work through contract. Since the improvements took place inside the existing box structure, a bypass was not needed, and our customers were minimally impacted. In addition, these improvements were able to take place within our existing Right of Way, so no additional land acquisitions were required.

Cost & Time Savings

The pre-practical design scope was estimated to cost approximately $337,000 in 2003; inflated at 3% to today's dollars that would equate to $379,000. The post-practical design scope cost less than $41,000 in materials, and was installed by MoDOT forces. This represents an 89% decrease in cash expenditures.

The improvements, as identified in the pre-practical design scope, would have taken at least two months to construct. The improvements, as revised by the Core Team, took approximately three weeks to complete by MoDOT forces. This represents a 65% decrease in construction time.

The improvements in the pre-practical design scope would not have been added to the STIP until 2009, or later, depending on funding. However, the improvements, as revised by the Core Team, have already been completed by our MoDOT staff. This structure was re-inspected in August, during our normal routine bridge inspection cycle, and was rated to be in very good condition (Rating-8).

Conclusion

The Practical Design Philosophy, as practiced by District 2, involves more than controlling a project's scope. It involves collaboration among many disciplines and using a teamwork approach to find the best solution and the most cost effective means of implementing that solution. We feel that this project is but one example of our District employing innovation and teamwork to resolve transportation issues and delight our customers at minimal cost to the Department.

If you have any further question regarding this project, please contact Preston Kramer or myself.

Sincerely,

Daniel Niec, PE
District Engineer

MoDOT PROJECTS
2008 APPLICATION FORM

Job No: J2P0766 (2007–2011 PE STIP) **Route:** 65 **County:** Carroll

STIP Description (Scoping or Construction, state which STIP)

This project was originally included in the 2007 – 2011 Scoping and Design STIP as follows: Scoping bridge improvements over Willow Creek 11.4 miles north of Carrollton. Project involves bridge H0605.

Is the submittal for the entire project or just a portion of the project? Please explain: This submittal is for the entire length of J2P0766.

Project Manager **MoDOT:** Preston Kramer **Consultant:** N/A

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

Bryan Hartnagel	James Gillespie	Keith Hartwig	Michael McGrath
John Bales	Kenneth Foster	Travis Wombwell	Kathleen Hepworth
John S. Cline			

Project Contacts: District: Preston Kramer **Consultant:** N/A

Project Budget:

Conceptual budget: $379,000 (2007 $) **Initial STIP Budget:** N/A

Final STIP budget: N/A **Award amount:** N/A

Other: Improvements performed by MoDOT personnel for less than $41,000 in materials.

Value Engineering study during design? yes ☐ no ☒

Total VE savings implemented: N/A **VE Contact Person:** N/A

Construction-stage VE (VECP)? yes ☐ no ☒

Total VECP savings: N/A **VECP Contact Person:** N/A

What would make this entry stand out from the rest of the entries when considering MoDOT's practical design philosophy?

Pre-practical design, the conceptual construction estimate for this project was $379,000. Through application of the Practical Design Philosophy, we satisfied the purpose and need for less than $41,000 in materials. This 89% cost decrease was the direct result of an effective Core Team. Once the Core Team precisely identified the "purpose and need", they then formulated creative alternatives that reduced project cost, project time, and traffic impacts. Ultimately, the Core Team produced a solution that maximized value (benefit/cost), minimized traffic impacts, and removed a structurally deficient structure from our inventory more than two years ahead of schedule.

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 DECEMBER 15, 2007.

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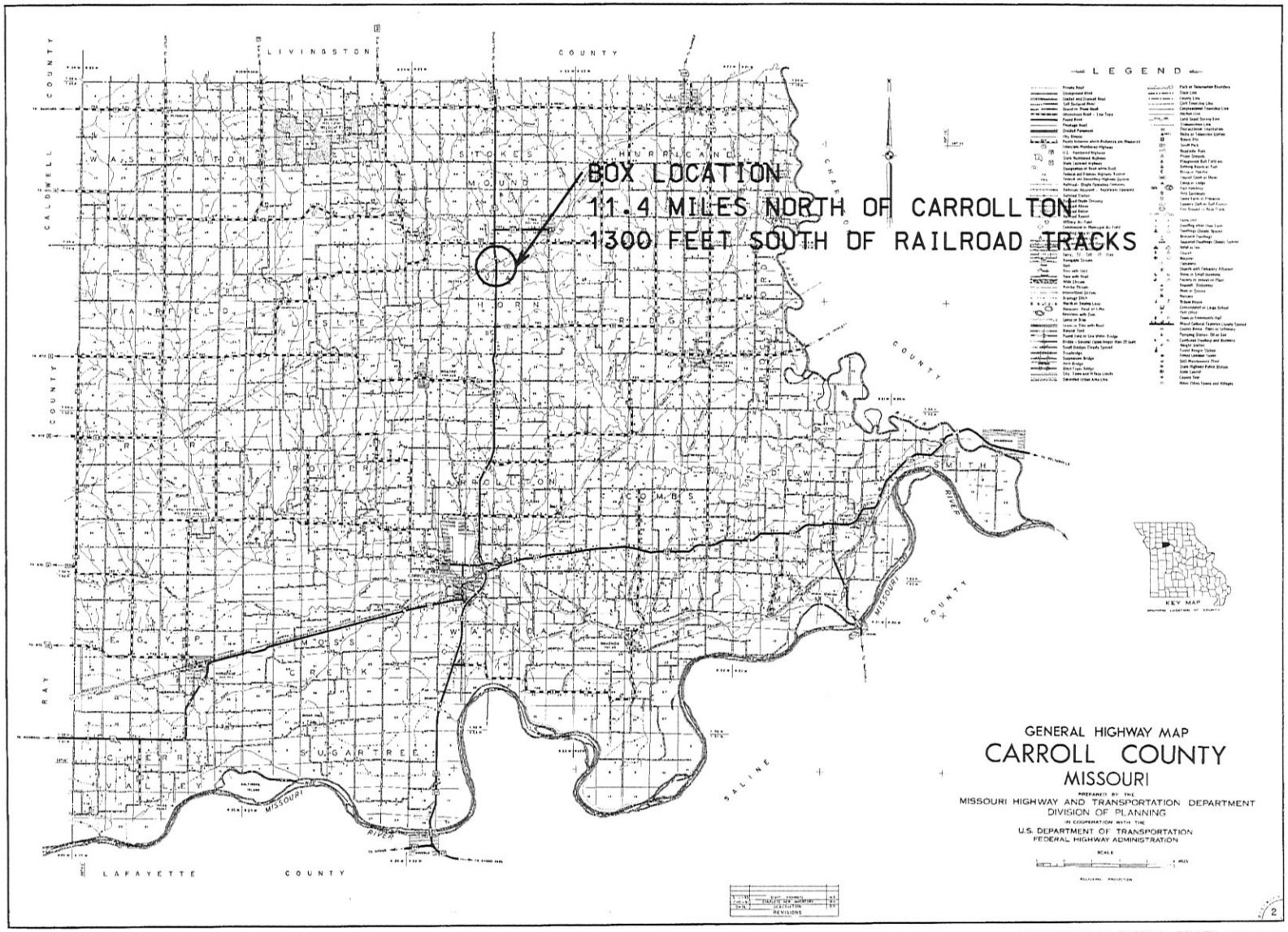
Effects of Practical Design Implementation

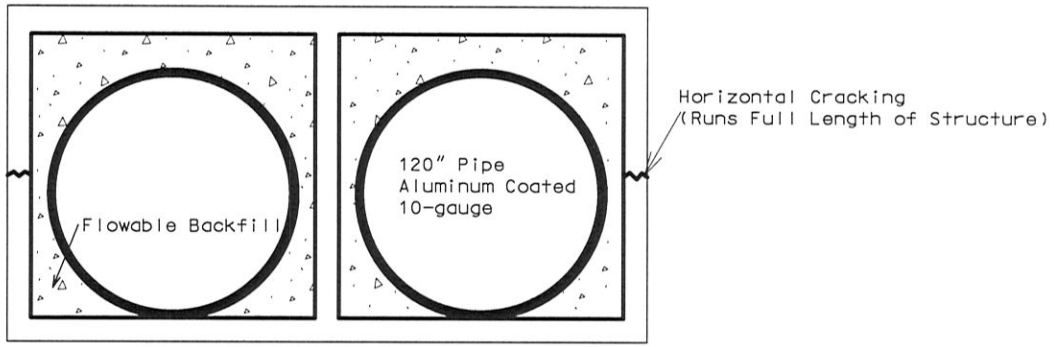
Summarized

Job J2P0766, Carroll County

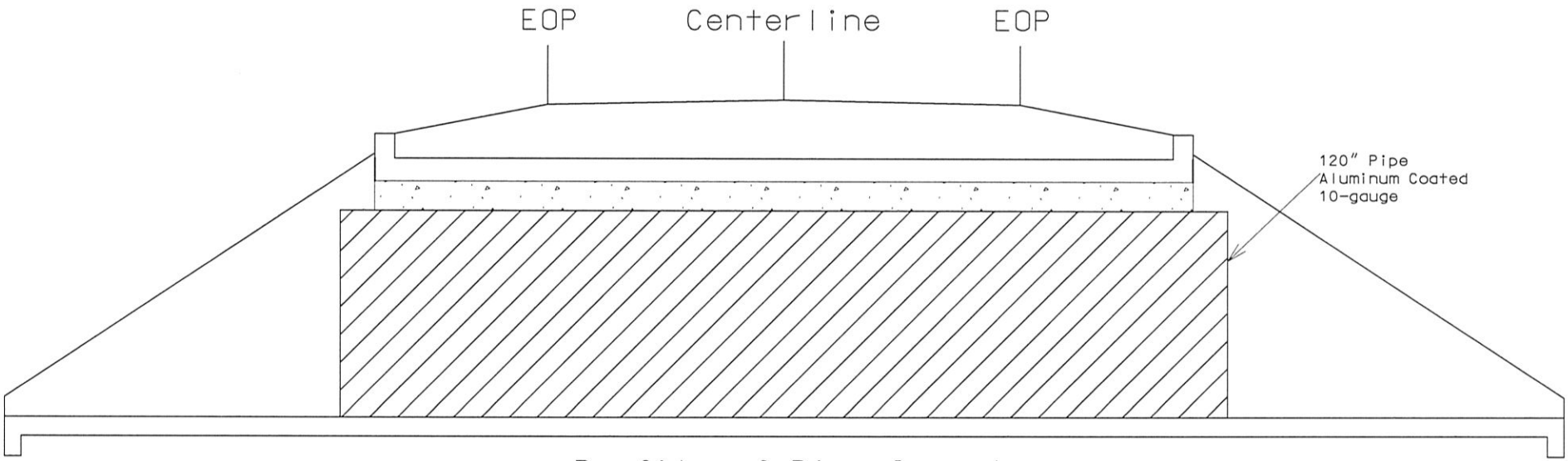
	Pre-practical Design	Post-practical Design
Estimated Project Cost	$379,000	$41,000 in Materials Work performed by MoDOT
Decrease in Cash Expenditures	----	**89%**
Estimated Time for Construction	At least two months	Three weeks (Actual)
Decrease in Construction Time	----	**65%**
Estimated Date for Completion of Improvements	FY09, or later, Depending on funding	**Finished** 7/15/2007
Bridge Rating After Improvements	Rating-9 (Probable)	**Rating-8** (Actual)
Handling of Traffic During Construction	Maintain Traffic on Temporary Bypass	Short-term Lane Closure
Right-of-Way Needs	Additional Right-of-Way and/or Easements Needed	None


BOX LOCATION
11.4 MILES NORTH OF CARROLLTON
1300 FEET SOUTH OF RAILROAD TRACKS
LEGEND
KEY MAP
GENERAL HIGHWAY MAP
CARROLL COUNTY
MISSOURI
PREPARED BY THE
MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT
DIVISION OF PLANNING
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALE
REVISIONS
LIVINGSTON COUNTY
CALDWELL COUNTY
RAY COUNTY
LAFAYETTE COUNTY
CHARITON COUNTY
HOWARD COUNTY
SALINE COUNTY
MISSOURI RIVER
WASHINGTON
STOKES
MOUND
HURRICANE
FAIRFIELD
LESLIE
HORN
RIDGE
CARROLLTON
COMBS
DEWITT
SMITH
MOSS
CREEK
WATERLOO
SUGARTREE
CHESTER
VALLEY

Job J2P0766
Bridge H0605
Route 65
Carroll County
Post-practical Design



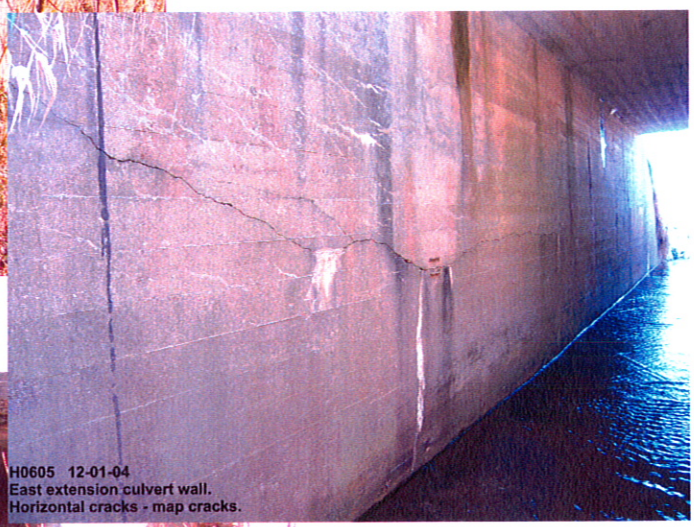
End View of Pipe Insert



Profile of Pipe Insert

Bridge H0605

Before.....



Bridge H0605

During.....

Bridge H0605

After.....