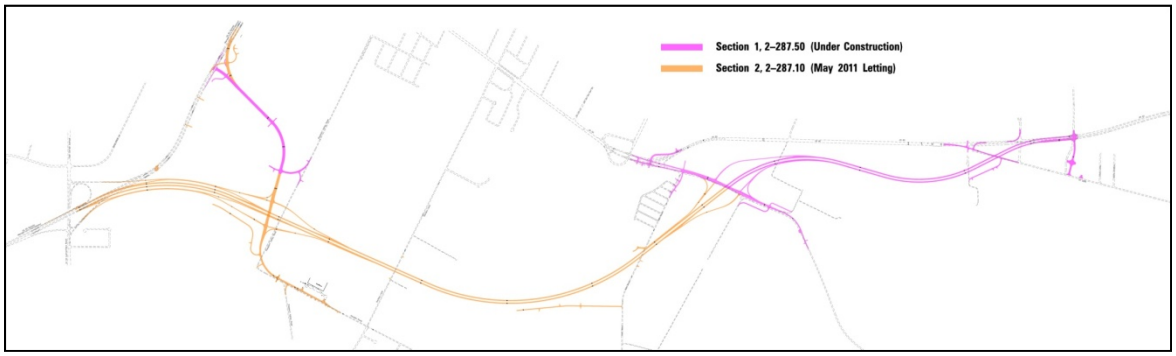
US60: Owensboro Bypass Section 2

Value Engineering & Constructability Study



VE#201101
Item #02-0287.10
February 9-10, 2011
Prepared by Brent A. Sweger
Quality Assurance Branch
Division of Highway Design

KENTUCKY TRANSPORTATION CABINET

Final Report: March 1, 2011

Introduction & Methodology

This report documents the results of a value engineering and constructability study on the second section of the project to relocate the Owensboro Bypass on the east side of Owensboro. The study took place on February 9 and 10, 2011 at the Kentucky Transportation Cabinet offices in Frankfort, Kentucky.

Typically, a value engineering study takes up to five days to complete in order to fully review the project, investigate alternatives, and develop recommendations. Because the Quality Assurance Branch was made aware of this project so close to construction letting, it was decided to do a condensed and combined value engineering and constructability review. This study was conducted to fulfill the federal value engineering requirements prior to construction letting.

The project team followed the conventional value engineering process of the following six steps:

1. Investigation
2. Speculation
3. Evaluation
4. Development
5. Presentation
6. Report Preparation

Project Team

Brent Sweger	Highway Design (Quality Assurance Branch)
Boday Borres	Highway Design (Quality Assurance Branch)
Marshall Carrier	Highway Design (Drainage)
Rachel Catchings	Highway Design (Quality Assurance Branch)
Byron Johnson	Highway Design (Quality Assurance Branch)
Kevin Sandefur	Structural Design

Project Description

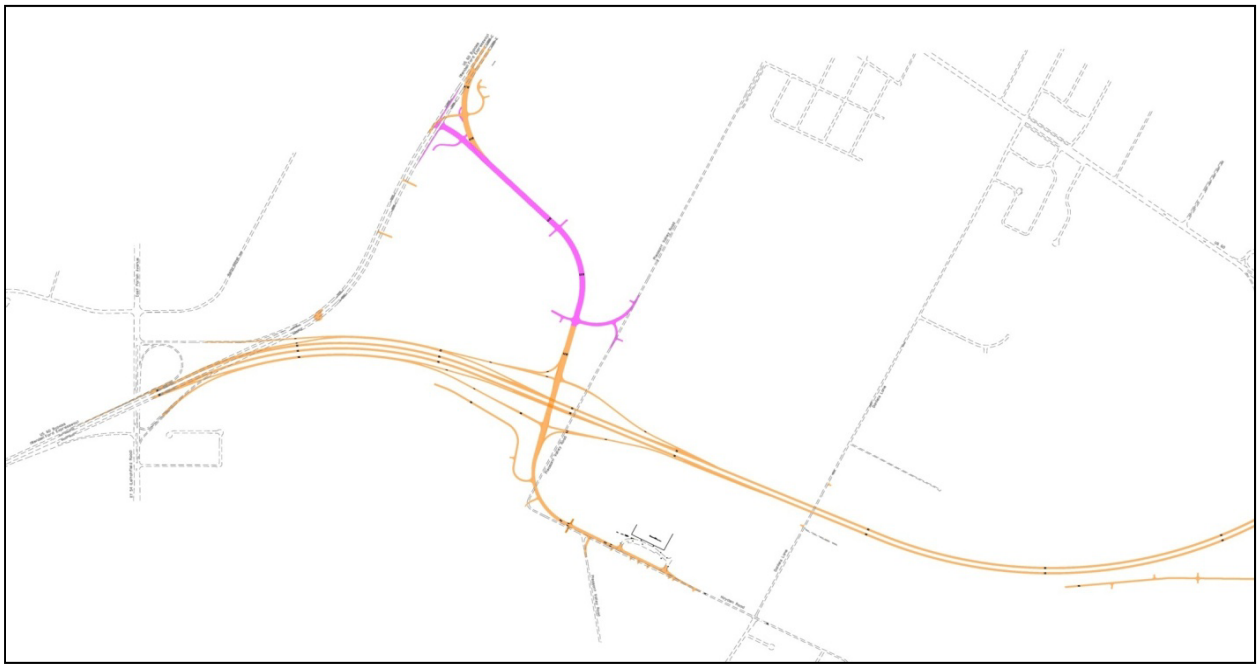
This project was developed as a means to reduce congestion and improve system linkage between the Owensboro Bypass and the new Natcher Bridge east of Owensboro. It will also serve for greater emergency response times to the hospital that is currently under construction on Pleasant Valley Road. The access controlled Owensboro Bypass ties into US 60 at a signalized intersection. Currently, traffic must travel through an area with commercial and industrial development, high truck volumes, and multiple traffic signals.

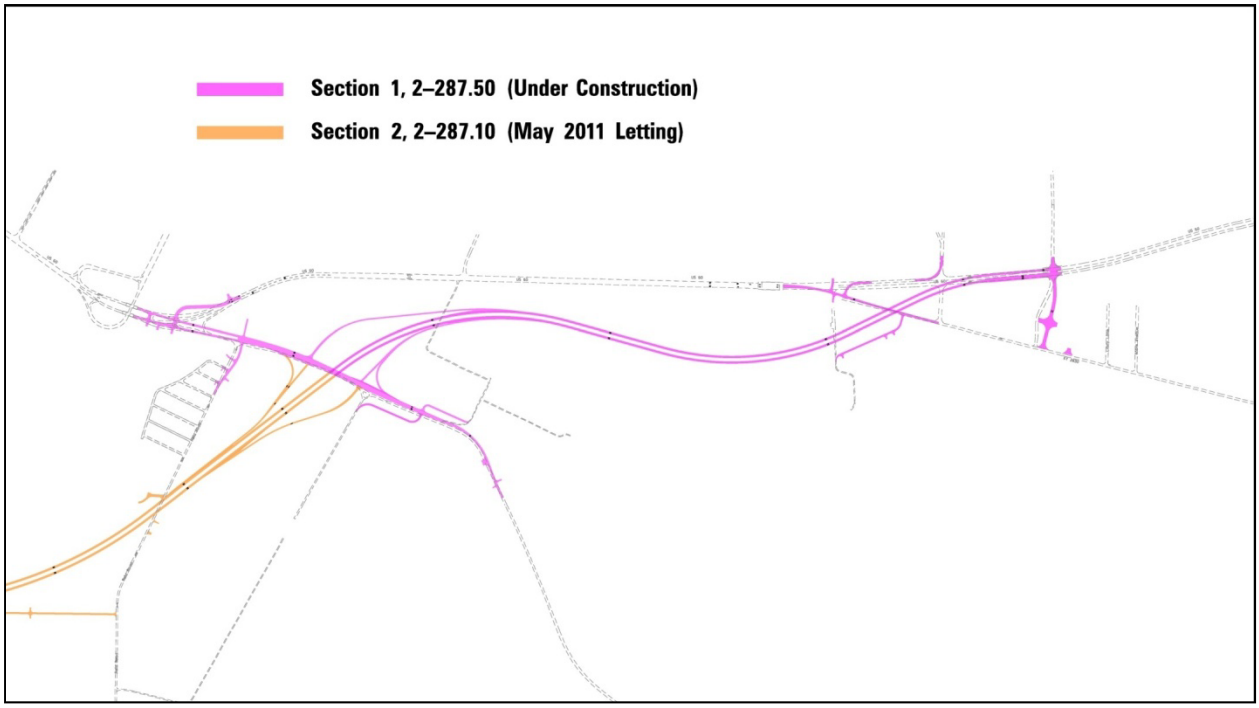
The new connection ties in near the KY 54 interchange on the Owensboro Bypass to US60 near KY 144. It will be fully-access controlled with two new interchanges.

To facilitate construction, it was divided into two sections. The first section of the project (Item Number 287.50) begins near KY 2830 and stops at an interchange with KY 144. This project was under construction during the time of this study. This study

focused on the second section, which falls begins at the interchange of KY 54 and ties in at the interchange of KY 144. The second section is scheduled to be let to construction in May 2011.

The following diagrams show the two sections of the overall project.





Value Engineering

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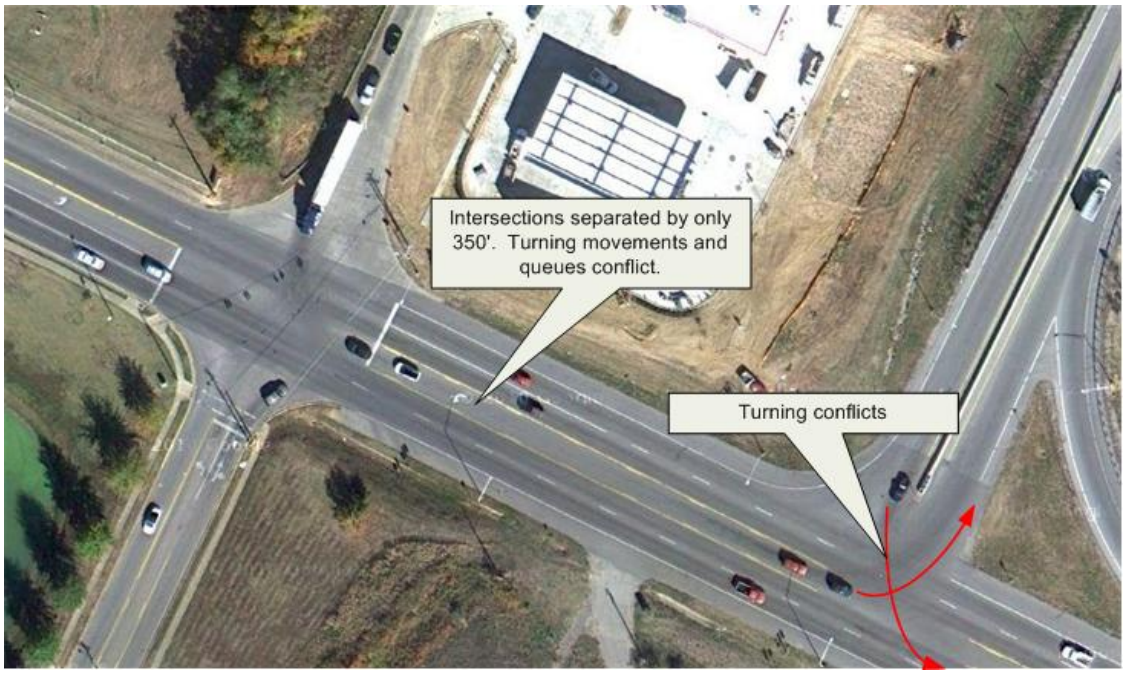
Constructability Recommendations

VE# 1
Reconfigure WB entrance ramp to US60 at KY54 Interchange

Original Design

The current ramp configuration has diamond-style ramps on three of the quadrants, but has a cloverleaf-style entrance ramp for US60 westbound traffic. The project plans do not call for modifying the WB entrance ramp.



Value Engineering Recommendation

The VE team recommends that the project be amended to build a new eastbound KY54 to westbound US60 entrance ramp to a diamond-style ramp. The cloverleaf ramp would remain in place for westbound KY54 to westbound US60 traffic.

The area served by this interchange has grown significantly over the last several years. Many new businesses have emerged that have caused large traffic growth through the interchange area. Because of this and the current layout, there are turning movement conflicts that cause traffic delays and queues, and raise the potential for crashes at the interchange area. The completion of this recommendation will eliminate the turning conflicts at the ramp and will allow for more usable length for the left-turn lane to Byers Avenue.

The VE team understands that parcel 6 had once contained a building eligible for the National Historic Register. Currently, that building has been removed from the site. The VE team also learned that the property owner of parcel 6 may be in the process of planning a development for this quadrant. It is important for KYTC to address this change by at a minimum purchasing the right-of-way before any development takes place to allow for future construction of the ramp.

VE#1

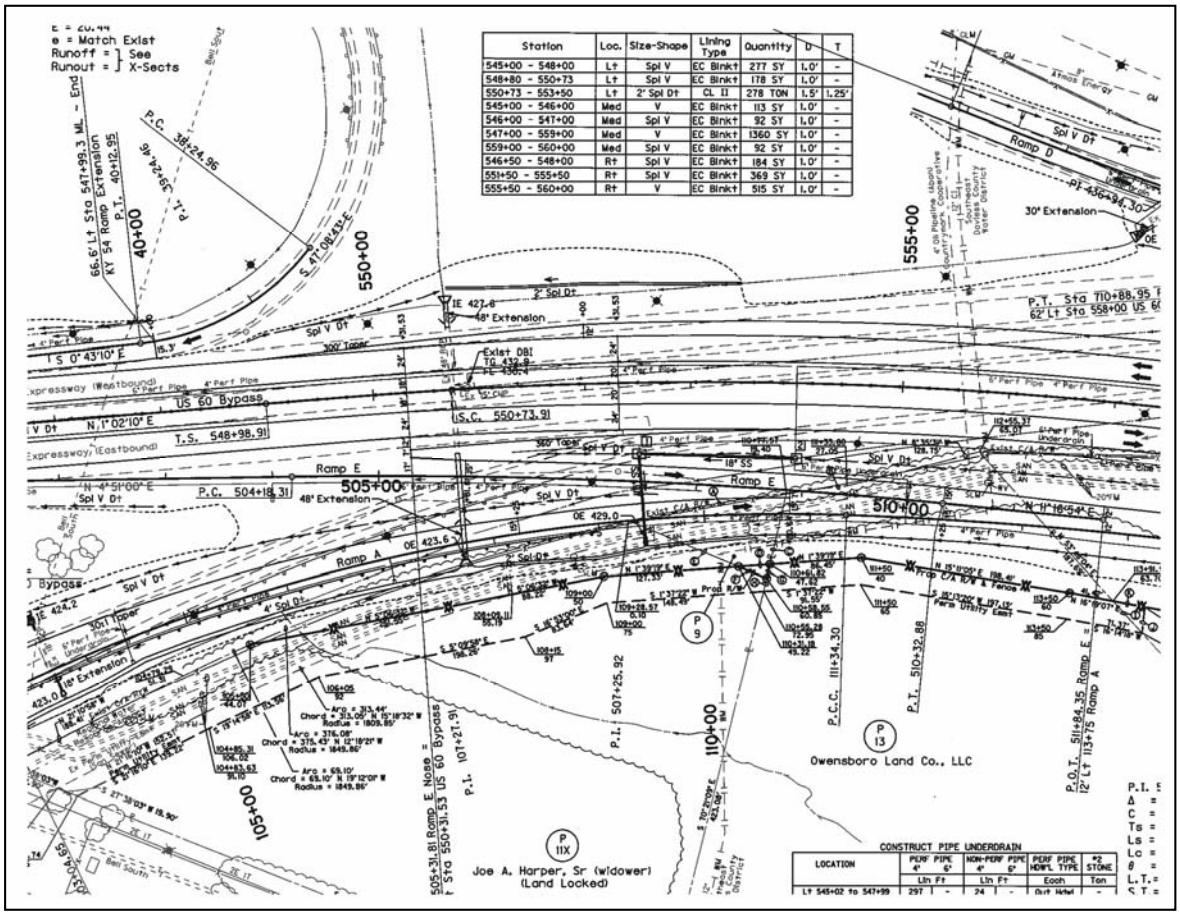
DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Paving (includes cement stabilization, striping, chip/seal treatment)	Ea	$150,000.00	0.0	$0.00	1.0	$150,000.00
Earthwork (includes removal of exisiting pavement and regrading)	LF	$75,000.00	0.0	$0.00	1.0	$75,000.00
Right-of-Way Purchase	Acre	$70,000.00	0.0	$0.00	5.0	$350,000.00
TOTAL				**$0.00**		**$575,000.00**

POSSIBLE SAVINGS: -$575,000

VE# 2
Regrade ditch near station 552+50 to eliminate storm box #2 and associated pipe run.

Original Design

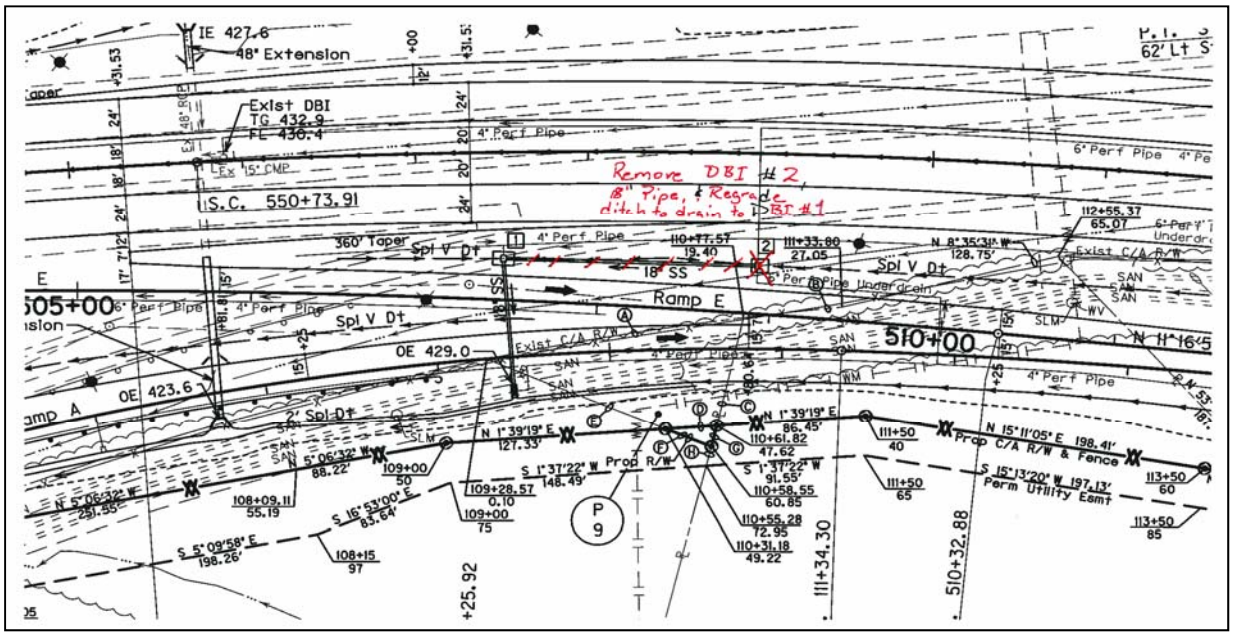
At approximate station 552+50, the proposed plans show junction boxes labeled 1 and 2 in series within the depressed median. Between the two boxes, there seems to be a break in the ditch, allowing both boxes to receive its own contributing runoff from opposite directions. Junction box 2 seems to be receiving more of the inflow as compared to junction box 1.



Value Engineering Recommendation

By eliminating junction box 2 and the connecting 145' of 18" storm sewer pipe, the break between junction boxes 1 and 2 could be eliminated as well. The contributing inflow to box 2 would then be carried to box 1. The boxes are close enough to each other and the corresponding break may be subtle enough that this can be accomplished.

This change would reduce construction cost as well as reduce possible future maintenance issues for the storm sewer itself. This would also eliminate the swell between the two boxes, which would make the median easier to mow.

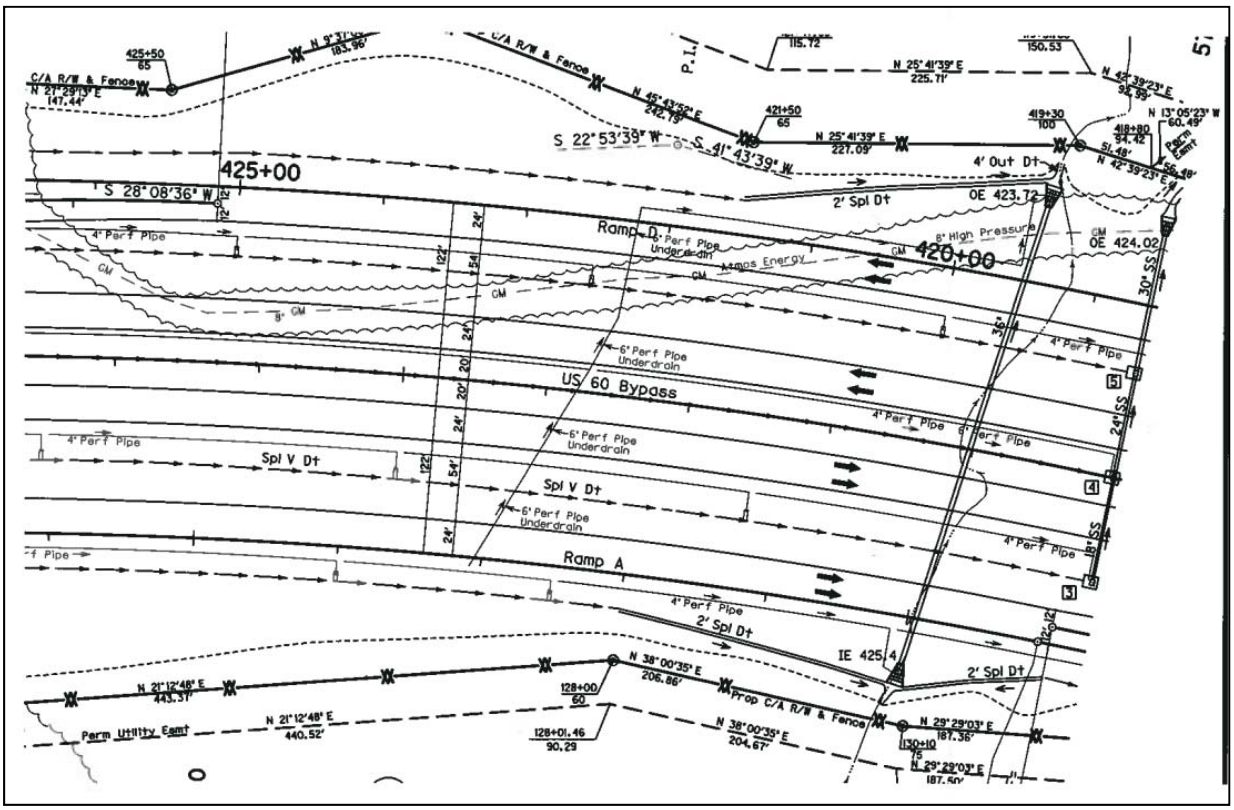


VE#2						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
Drop Box Type SF	Ea	$4,000.00	1	$4,000		$0.00
18" Pipe	LF	$36.00	145	$5,220		$0.00
TOTAL				**$9,220**		**$0.00**
POSSIBLE SAVINGS:				**$9,220**		

VE# 3
Combine downstation storm sewer pipe and headwalls inlet into a single 36” run at station 575+00.

Original Design

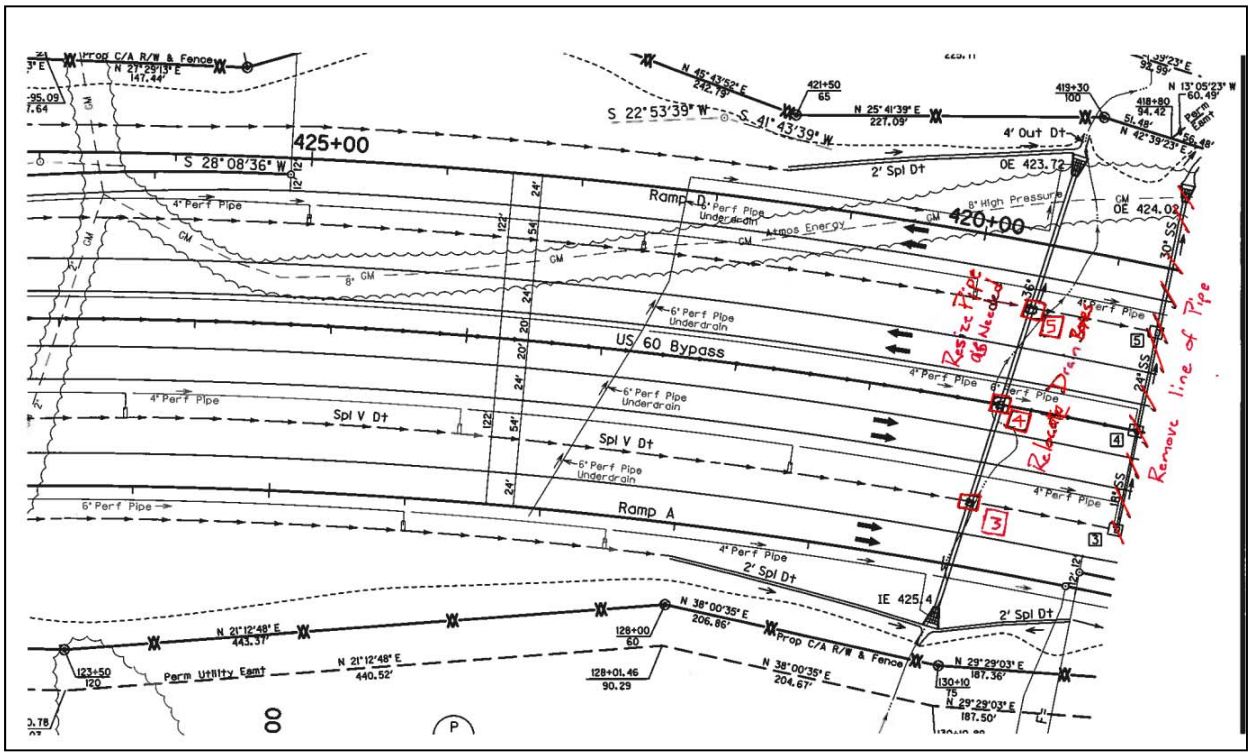
At station 575+00, the proposed plans show a proposed 30” storm sewer system with three drop boxes contributing inflow out of the median and ditches. This inflow is then carried to a 30” slope and flared headwall outlet into the ditchline on the north side of the proposed alignment.

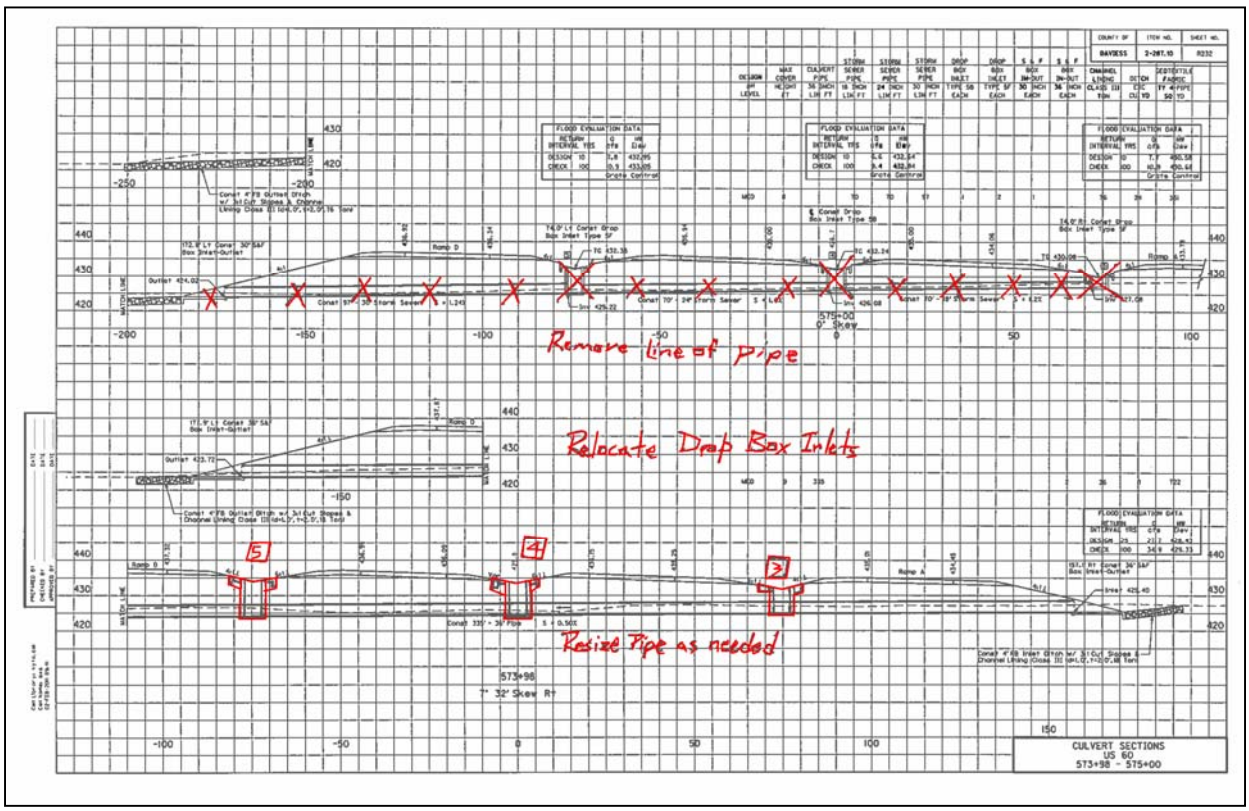


Value Engineering Recommendation

There is a crossing located at station 573+98. Due to the close proximity of the 30" storm sewer system and the proposed 36" crossing just back station of it, it may be possible to combine the two. The drop boxes would still need to be installed to account for contributing ditch flow, however (if capacity allows) the 30" system could be eliminated as well as its corresponding headwall. It should also be noted that the proposed 36" pipe at station 573+98 may need to be upsized to a 42".

This change would reduce future maintenance cost associated with the 30" storm sewer pipe and its resulting headwall. This would also reduce construction cost.



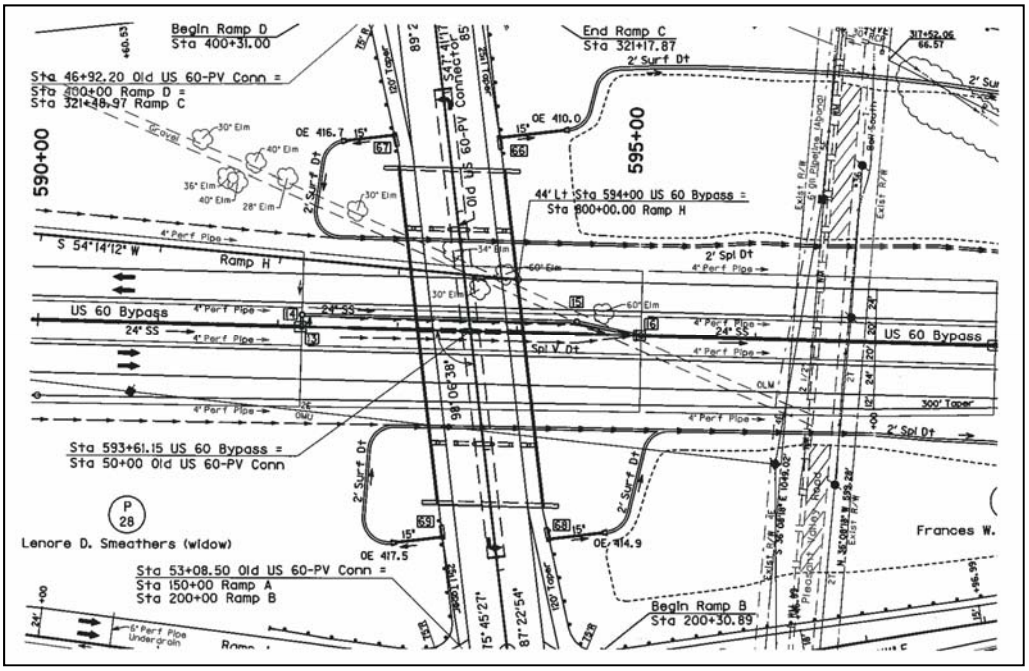


VE#3						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
30" Pipe	LF	$63.00	237.0	$14,931.00		$0.00
S&F Box Outlet 30"	EA	$3,640.00	1.0	$3,640.00		$0.00
TOTAL				**$18,571.00**		**$0.00**
POSSIBLE SAVINGS:				**$18,571**		

VE# 4
Daylight center ditch instead of continuing run through median at station 592+20.

Original Design

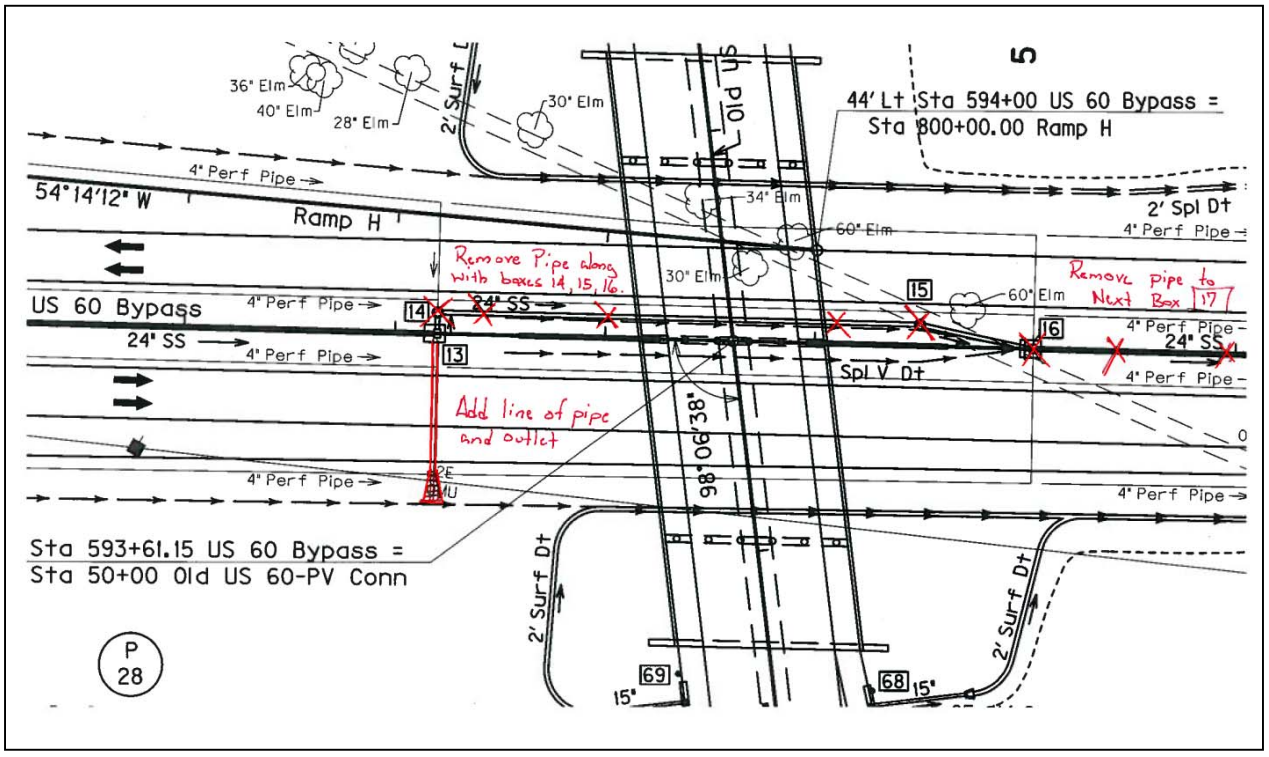
At station 592+20, the proposed storm sewer system that travels along the depressed median is approaching the piers associated with the overpass. The contributing ditch runoff enters junction box 13, then travels around the piers via manholes 14 and 15. It is brought back into the median to junction box 16 and carried to box 17 through a 24" storm sewer pipe. Then flow continues underground along the proposed alignment from there.



Value Engineering Recommendation

The contributing inflow and ditch flow that enters junction box 13, could possibly be diverted the opposite way via a 24" storm sewer pipe to the ditch on the south side of the proposed alignment. This would then travel through a 24" headwall at the proposed ditch. Proposed manholes 14 and 15 could then be eliminated; as well as junction box 16 and all 24" storm sewer pipe in-between. The storm sewer pipe between boxes 16 and 17 could also be eliminated, and the contributing ditch runoff could be picked back up via junction box 17. This may also allow for the reduction of the proposed 24"storm sewer pipe between junction box 17 and 18 to be reduced to an 18" pipe. This design would also necessitate regarding of the receiving ditch in this area.

This change would reduce maintenance cost as well as construction cost. This change would also possibly eliminate constructability issues related to the installation of a storm sewer network around the existing piers for the overpass.


5
44' Lt Sta 594+00 US 60 Bypass =
Sta 800+00.00 Ramp H
36" Elm
40" Elm
28" Elm
2' Surf Dt
30" Elm
Old US 60
34" Elm
60" Elm
2' Spl Dt
4" Perf Pipe
54°14'12" W
Ramp H
Remove Pipe along with boxes 14, 15, 16
24" SS
Remove pipe to Next Box 17
US 60 Bypass
24" SS
14
13
15
16
Spl V Dt
Add line of pipe and outlet
98°06'38"
Sta 593+61.15 US 60 Bypass =
Sta 50+00 Old US 60-PV Conn
P
28
2' Surf Dt
69
68
15"

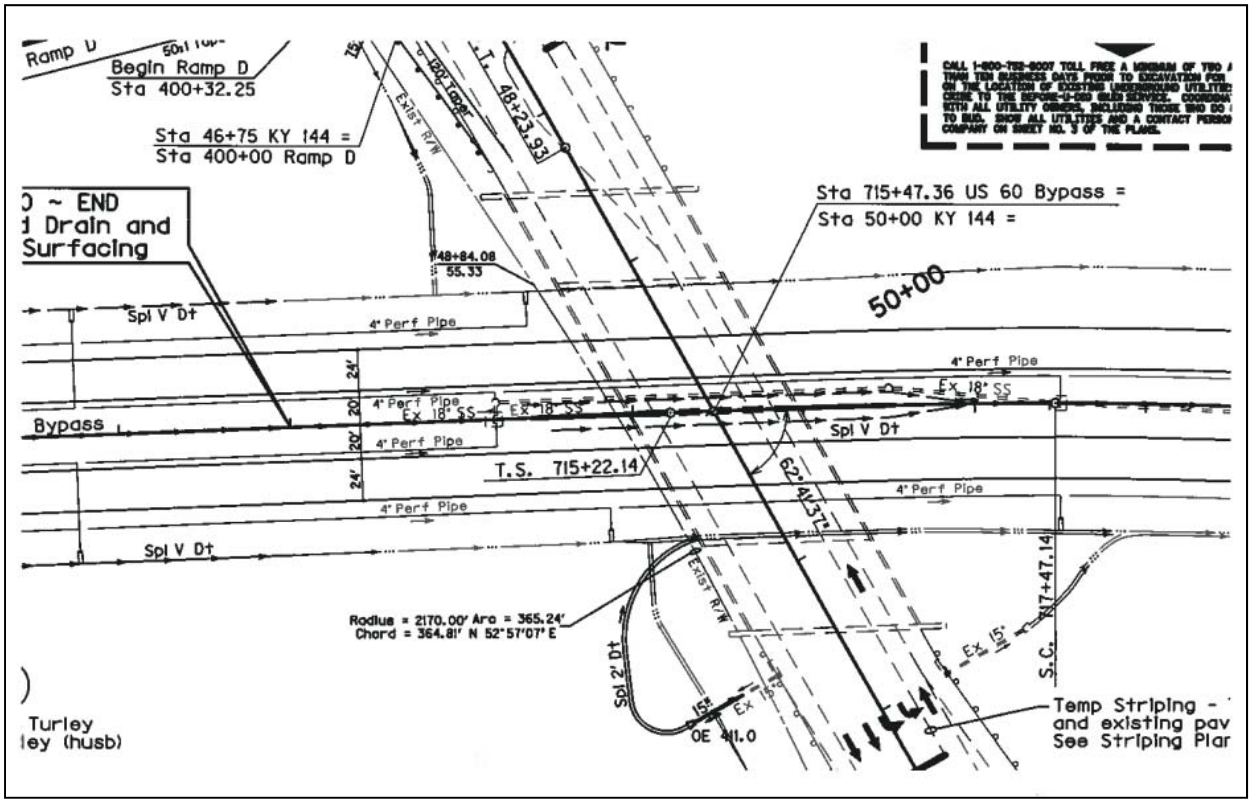

Const 52' - 29' Storm Sewer
Regrade Ditch
Add Pipe & outlet
Const 307' - 24' Storm Sewer
Const 307' - 18" Storm Sewer
Ramp H
Ramp F
594+50
0° Skew
592+20
0° Skew
589+10
0° Skew
FLOOD EVALUATION DATA
CULVERT SECTIONS
US 60
589+10 - 592+20 - 594+50

VE#4						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
Drop Box 5B	Ea	$3,082.00	1.0	$3,082.00		$0.00
Manhole Type A	Ea	$1,620.00	2.0	$3,240.00		$0.00
24" Pipe	LF	$54.00	874.0	$47,196.00	72.0	$3,888.00
18" Pipe	LF	$36.00		$0.00	297.0	$10,692.00
S&F Box Outlet 24"	Ea	$2,316.00		$0.00	1.0	$2,316.00
TOTAL				**$53,518.00**		**$16,896.00**
POSSIBLE SAVINGS:				$36,622		

VE# 5
Eliminate storm sewer run and related boxes at station 712+00.

Original Design

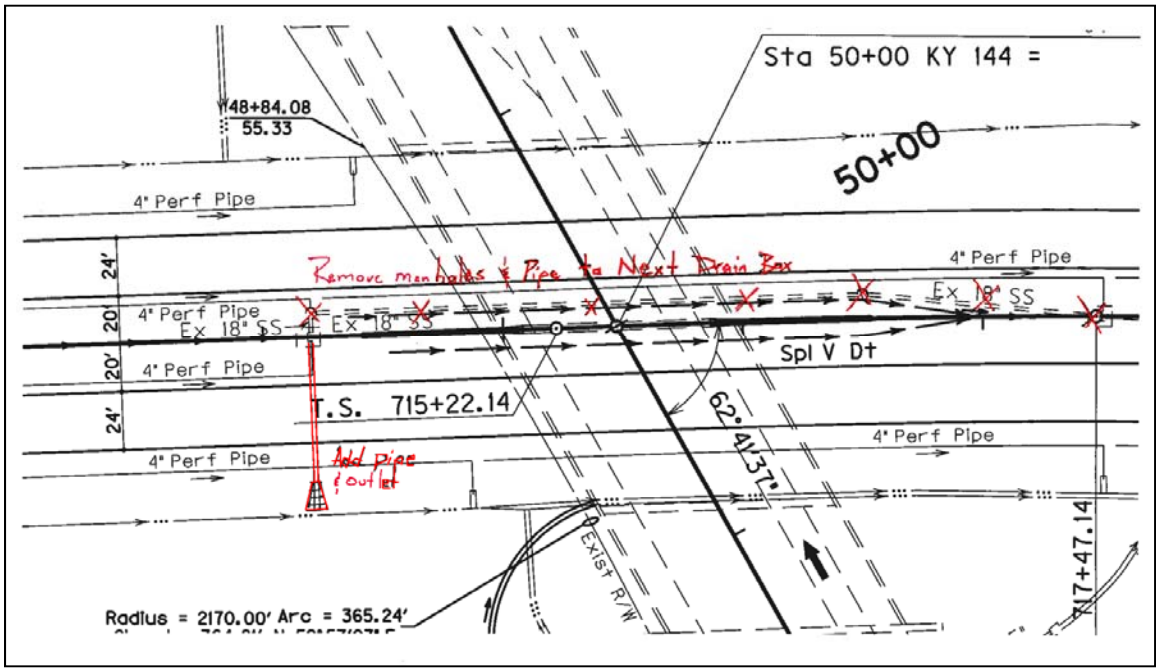
Though this is relative to another phase of construction, the following may be applied depending upon if the storm sewer network has been installed at this point. At station 712+00, the proposed storm sewer system that travels along the depressed median is approaching the piers associated with the overpass. The contributing ditch runoff enters a junction box, then travels around the piers via two manholes. It is brought back into the median to a junction box and carried to a box through an 18" storm sewer pipe. Then flow continues underground along the proposed alignment from there.



Value Engineering Recommendation

The contributing inflow and ditch flow that enters the first junction box could possibly be diverted the opposite way via a 18" storm sewer pipe to the ditch on the south side of the proposed alignment. This would then travel through a 18" headwall at the proposed ditch. The proposed manholes could then be eliminated; as well as a junction box 16 and all 18" storm sewer pipe in-between. Additional 18" storm sewer pipe could also be eliminated, and the contributing ditch runoff could be picked back up via the downstream junction box. This may also necessitate regarding of the receiving ditch in this area.

This change would reduce maintenance cost as well as construction cost. This change would also possibly eliminate constructability issues related to the installation of a storm sewer network around the existing piers for the overpass.



VE#5						
DESCRIPTION	**UNITS**	**UNIT COST**	**PROP'D QTY.**	**PROP'D COST**	**V.E. QTY.**	**V.E. COST**
Drop Box 5B	Ea	$3,082.00	1.0	$3,082.00		$0.00
18" Pipe	LF	$36.00	577.0	$20,772.00	72.0	$2,592.00
MH Type A	Ea	$1,620.00	2.0	$3,240.00		$0.00
S&F Box Outlet 18"	Ea	$1,800.00		$0.00	1.0	$1,800.00
TOTAL				**$27,094.00**		**$4,392.00**
POSSIBLE SAVINGS:				**$22,702**		

VE# 6
Change MOT plan at tie-in to existing US60 in proximity of KY 54 interchange.

Original Design

Traffic Control Plan – Phase 2 & Phase 3
Sequence A thru D @ US 60 Bypass and US 60B/KY 54 interchange Ramps
Plan Sheets R191 thru 195

The original traffic control plan spells out the traffic patterns and construction phasing for the US 60 Bypass and the US 60B/KY 54 interchange in Phase 2 & Phase 3. Both phases have sequence A through D. Each phase covers all work, from beginning to end, that is needed to complete that direction of travel. Phase 2 covers the eastbound traffic on US 60 Bypass and Ramp A. Phase 3 covers the westbound traffic on US 60 Bypass and Ramp D. Phase 2 calls for first building the eastbound lanes to two lanes. It also allows Ramp D to be built to two lanes. This is the final typical section for the eastbound mainline and ramp A. This will allow for full traffic volume capacity. Phase 3 calls for constructing the westbound lanes and Ramp D to their final typical sections and full traffic capacity. Therefore eight total steps are needed to complete both phases and open the US 60 Bypass and the Ramps for the US 60 B/KY 54 interchange.

Plan Sheets are included on the subsequent pages.