

Appendix N

Draft Value Engineering Study Report



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LETTER OF TRANSMITTAL

TO: Mr. John C. Taylor, P.E. Value Engineering Coordinator Mississippi Department of Transportation 401 Northwest Street Jackson, Mississippi 39201	DATE: June 6, 2011 MACTEC PROJECT NO.: 6180-11-1028 PROJ. NAME: I-20 MS River Bridge to E of US 61N Interchange MDOT PROJ. No. IMD-0020-01(181) SUBJECT: DRAFT Value Engineering Report
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VALUE ENGINEERING REPORT

I-20, From the Mississippi River Bridge
to East of the US 61N Interchange
Project No. IMD-0020-01(181)
Warren County, Mississippi
May 23–27, 2010

DRAFT

OWNER and DESIGN TEAM:



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EXECUTIVE SUMMARY

Executive Summary

VALUE ENGINEERING STUDY

**I-20, From East of the Mississippi River Bridge
to East of the US 61N Interchange
Project No. IMD-0020-01(181)
May 23-27, 2011**

Introduction

This report presents the results of a value engineering (VE) study conducted on the proposed design for the reconstruction / upgrading of I-20 from East of the Mississippi River bridge to East of the US 61N / I-20 Interchange. This proposed project will eliminate the existing left on / off ramps through the area, provide full access at all Interchanges, improve the I-20 mainline roadway alignment and profile, widen / improve the existing Frontage Roads between Halls Ferry Road and Clay Street, construct Collector / Distributor (CD) roads through the Clay Street and US 61N / SR 27 Interchanges, and construct Frontage Road connector roads. Major Interchange improvements will also be made at the US 61S / I-20 Interchange (a new Trumpet Directional Interchange will be built) and the US 61N / I-20 Interchange (CD lanes will be added and on / off ramp improvements will be made).

This project will be constructed in eight different contracts over several years as funds become available. Major contract work items include roadway grading, excavation, and embankment construction, mainline paving, frontage road paving, bridge construction, bridge widening, bridge removal, bridge raising, and associated drainage extensions. The total estimated project cost including right-of-way (R/W) is \$207.6 million. The design is currently in the preliminary concept stage. The study took place May 23-27, 2011, at the Mississippi DOT Headquarters Office in Jackson, MS, using a six person VE team.

This report presents the Team's recommendations and back-up information, for consideration by the decision-makers. This **Executive Summary** includes a brief description of each recommendation. The **Study Identification** section contains information about the project and the team. The **Recommendations** section presents a more detailed description and support information about each recommendation. The VE team has included a "Mark-Up" calculation in the Recommendation Cost Worksheet. The mark-up calculation for this project is 15 percent and represents the percent (x 115%) shown in the MDOT cost estimate. The **Appendix** includes a complete record of the Team's activities and findings. The reader is encouraged to review all sections of the report in order to obtain a complete understanding of the VE process.

Considerations

The VE team was presented with several constraints to consider when developing their recommendations. The constraints were; stay within the projected R/W and avoid further impacts to the Vicksburg Military Park. Current project status: The project is in the preliminary

concept stage. Public informational meetings have been held and a Draft Environmental Assessment is in the final stages of development.

Results Obtained

The VE team focused their efforts on the high cost items of the project. Through the use of functional analysis and “brain storming” techniques, the team generated 47 ideas with 17 being identified for additional evaluation as possible recommendations or design considerations. The VE team developed seven independent recommendations, four alternative recommendations, and two design considerations. Implementation of the seven independent recommendations has the potential to reduce the project cost by approximately \$53.7 million. A detailed write-up of each recommendation is contained in the center portion of this report. A summary of the recommendations and design considerations follows.

Recommendation Highlights

Idea A-8: Maintain the existing 2-lane Frontage Roads in-lieu-of reconstructing them to three-lane Frontage Roads and using them to detour Interstate traffic.

The original design widens the existing Frontage Roads to three-lanes to allow their use as I-20 mainline detour roads.

This recommendation eliminates widening the Frontage Roads and would reconstruct the I-20 mainline roadways under traffic. This concept would likely require the elimination of the two proposed Frontage Road crossovers. Eliminating these crossovers would allow the mainline roadway profile to be reconstructed closer to the existing profile and eliminate the large retaining wall enclosed embankment sections. Eliminating the Frontage Roads as the I-20 mainline detour route would eliminate numerous potential operational issues.

The total potential savings if accepted is \$25,717,000

Idea A-12: Eliminate 1-lane from the 5-lane On-ramp / CD lane merge / weave section in the west quadrant of the US 61N / I-20 Interchange.

The current design includes a 5-lane merge / weave section for the WB CD lanes in the NW quadrant of the US 61N / SR 27 / I-20 Interchange.

This recommendation eliminates 1-lane from the 5-lane merge / weave section in the west quadrant of the Interchange. This concept removes the new lane for the low volume NB SR 27 to WB I-20 median crossover on-ramp requiring its traffic to merge with the SB US 61N to WB I-20 on-ramp before getting to the 4-lane weaving section. This concept improves traffic operation and saves costs.

The total potential savings if accepted is \$2,276,000

Idea C-2: Shift the WB I-20 roadway / CD lanes at the US 61N / I-20 Interchange south placing the new CD lanes on the existing WB I-20 footprint.

The current design reconstructs the WB I-20 lanes through this Interchange on the existing WB I-20 alignment and shifts the new CD / on-ramp merge lanes to the outside (north) of these lanes. This shift requires additional R/W and the construction of large retaining walls in steep terrain.

This recommendation shifts the WB I-20 mainline roadway to the inside (south) of the existing WB I-20 footprint to a new alignment in the existing median and allows the new SB on-ramp / WB CD lanes to follow the existing WB I-20 ramp and mainline footprint. This concept takes advantage of the wider median in this segment of I-20, reduces the amount of R/W required for

the Interchange reconstruction, and greatly reduces the size of the retaining wall in this quadrant of the Interchange. It also shortens the new US 61N / US 27 Bridges over I-20

The total potential savings if accepted is \$5,761,000

Idea G-4: Alternative to G-5 Defer construction of the new NB US 61S to WB I-20 on-ramp.

The current design would construct a Trumpet Interchange at the I-20 / US 61S Interchange near the west end of the project. This concept requires new R/W on the north side of I-20 and comes very close to the Military Park property.

This recommendation would defer construction of the NB US 61S to WB I-20 flyover ramp. The low traffic on this ramp (234 VPD in 2040) would be accommodated on the new Halls Ferry Road loop WB on-ramp. Deferring construct of this ramp does not preclude constructing it in the future should additional traffic dictate its need. This concept would free-up \$10 million from Project 2 that could be applied earlier to more critical needs in Projects 3-8.

The total potential savings if accepted is \$10,020,000

Idea G-5: Reconfigure the US 61S / I-20 Trumpet Interchange.

The current design would construct a Trumpet Interchange at the I-20 / US 61S Interchange near the west end of the project. This concept requires new R/W on the north side of I-20 and comes very close to the Military Park property. The new ramps are very long and contain long flyover bridges.

This recommendation modifies the original curve alignment and traffic direction (from clockwise to counterclockwise) for the NB US 61S to WB I-20 on-ramp and tightens the WB I-20 to SB US 61S off-ramp around the outside of the modified on-ramp. This concept reduces the overall on-ramp and off-ramp lengths, reduces both flyover bridge lengths, reduces cut on the north side of I-20, better follows the existing terrain, and puts the on-ramp connection on a desirable down grade. It also reduces R/W needs, impacts to Military Park, and project cost.

The total potential savings if accepted is \$6,609,000

Idea I-1: Eliminate the two Frontage Road crossovers and allow Frontage Road connectivity only at the Interchange cross streets.

The original design includes two Frontage Roads crossover roadways under I-20. These proposed crossovers are the result of an opportunity to raise the I-20 profile enough to provide the needed vertical clearance under the future profile. These crossovers also include Texas U-turn lanes with the one-way Frontage Road concept.

This recommendation eliminates the Frontage Road crossovers allowing connectivity only at the Interchange cross streets as is the case now. This concept eliminates the need to raise the I-20 mainline roadway profile approximately 25 feet to accommodate the vertical bridge clearance at the crossovers. It may allow the mainline roadway to be reconstructed under traffic with an improved profile. Eliminating these crossovers would simplify this construction phase, accelerate construction, and reduce project cost. While the crossovers are very desirable to reduce travel demand through the interchanges and at the ramps terminals and frontage road intersections, they are very expensive (\$10,521,000) and preclude the I-20 mainline improvements under traffic, which potentially saves another \$ 25,717,000 (See Idea A-8).

The total potential savings if accepted is \$10,521,000

Idea I-2: Alternative to I-1 Eliminate the Texas U- turn elements of the two Frontage Road crossovers.

The original design includes two Frontage Roads crossover roadways. The one-way Frontage Road concept also includes Texas U-turn lanes at the crossover.

This recommendation eliminates both Texas U-Turn lanes from the two crossovers thus reducing the length of the I-20 Bridges over the crossroads. The Texas U-Turns are functional only with one-way Frontage Roads. It is assumed the Frontage Roads will ultimately be converted back to two-way operation to maximize local access. With two-way Frontage Roads the cost of the Texas U-turns will ultimately be wasted. This concept would shorten this construction phase and reduce project cost.

The total potential savings if accepted is \$1,586,000

Idea I-3: Alternative to I-1 Eliminate the dual roundabout intersections and use signalized T-intersections.

The original design includes two Frontage Roads crossover roadways. The two-way Frontage Road concept adds roundabouts where the two crossovers roadways intersect the Frontage Roads on each side of I-20 resulting in the construction of four roundabouts.

This recommendation would replace the roundabouts at the Frontage Road crossovers with T-intersection. The use of T-intersections would facilitate truck turning movements by eliminating the two, 270 degree turn movements required when a vehicle makes a U-turn by crossing under I-20 from one Frontage Road to the other Frontage Road.

The total potential increase if accepted is \$66,000

Idea R-2: Modify the EB CD lane / Clay Street off-ramp configuration.

The original design includes a single off-ramp from I-20 for traffic to the new EB CD lanes and for traffic exiting to Clay Street. This concept requires widening the south Frontage Road Bridge

over Old SR 27 and the KCS Railroad, over 3,000 feet of separate 2-lane CD roadway, and a new EB CD Bridge over Clay Street.

This recommendation modifies the EB CD off-ramp configuration by starting the EB CD road with an off-ramp east of Clay Street rather than east of Indiana Avenue. This concept allows only Clay Street traffic to exit I-20 at the original CD off-ramp location east of Indiana Avenue and provides for a second exit east of Clay Street for the CD road traffic. This concept simplifies roadway signage, provides a more “standard” exit ramp configuration for the motorists, and eliminates merging of exiting Clay Street traffic with the CD road traffic.

The total potential savings if accepted is \$2,570,000

Idea T-2: Replace and widen the Indiana Avenue Bridge Superstructure with one project in-lieu-of jacking-up the bridge in one project and then widening the raised bridge in a second project.

The original concept proposes to raise the Indiana Avenue Bridge in Project 1 and widen the bridge later in Project 7.

This recommendation would replace the entire bridge superstructure with the full width superstructure in-lieu-of raising the old superstructure and widening it later. Raising and widening the bridge in two different projects results in additional disruption of Interchange traffic and increases Maintenance of Traffic cost. Replacing the superstructure will also extend the bridge service life and cut down on future maintenance costs.

The total potential savings if accepted is \$250,000

Idea Y-1: Alternative to T-2 Raise and widen the Indiana Bridge in a single project.

The original concept proposes to raise the Indiana Avenue Bridge in Project 1 and widen the bridge later in Project 7.

This recommendation would raise and widen the bridge in a single construction project. Combining all the work in a single contract will save maintenance of traffic cost, lessen construction impact on local business, and reduce disruption of Interchange traffic.

The total potential savings if accepted is \$335,000

Design Considerations

The VE team also developed various Design Considerations for consideration during the final design of the project. The suggestions are:

- Consideration should be given to shifting the southern half of the US 61N / SR 27 / I-20 Interchange inward (north) to reduce the size of the retaining wall next to the COE property. This shift would be a mirror image of the shift recommended in Idea C-2 for the northern half of the Interchange. This would take full advantage of the wider median in this section of I-20 and substantially reduce costs and disruption to abutting properties
- Consideration should be given to constructing the full-width EB Frontage Road Bridge over Old SR 27 and the KCS Railroad in one contract rather than two contracts.

I-20, From East of the Mississippi River Bridge to East of the US 61N Interchange
SUMMARY OF POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	SAVINGS POTENTIAL* (%)
RECOMMENDATIONS							
A-8	Maintain the existing 2-lane Frontage Roads in-lieu-of reconstructing them to 3-lane Frontage Roads and using them to detour Interstate traffic.	\$25,717,000	\$0	\$25,717,000	N/A	\$25,717,000	100
A-12	Eliminate 1-lane from the 5-lane On-ramp / CD lane merge – weave section in the west quadrant of the US 61N / I-20 Interchange.	\$2,276,000	\$0	\$2,276,000	N/A	\$2,276,000	100
C-2	Shift the WB I-20 roadway / CD lanes at the US 61N / I-20 Interchange south placing the new CD lanes on the existing WB I-20 footprint.	\$18,111,000	\$12,350,000	\$5,761,000	N/A	\$5,761,000	100
G-4	Alternative to G-5 Defer construction of the NB US 61S to WB I-20 on-ramp.	\$10,078,00	\$58,000	\$10,020,000	N/A	\$10,020,000	100
G-5	Reconfigure the US 61S / I-20 Trumpet Interchange.	\$22,808,000	\$16,199,000	\$6,609,000	N/A	\$6,609,000	100
I-1	Eliminate the two Frontage Road crossovers and allow Frontage Road connectivity only at the Interchange cross streets.	\$11,425,000	\$904,000	\$10,521,000	N/A	\$10,521,000	100
I-2	Alternative to I-1 Eliminate the Texas U- turn elements of the two Frontage Road crossovers.	\$7,843,000	\$6,257,000	\$1,586,000	N/A	\$1,586,000	100

I-20, From East of the Mississippi River Bridge to East of the US 61N Interchange

SUMMARY OF POTENTIAL COST SAVINGS

ITEM No.	CREATIVE IDEA DESCRIPTION	ORIGINAL INITIAL COST	PROPOSED INITIAL COST	INITIAL COST SAVINGS	FUTURE SAVINGS	TOTAL LIFE CYCLE SAVINGS	SAVINGS POTENTIAL* (%)
I-3	Alternative to I-1 Eliminate the dual roundabout intersections and use signalized T-intersections.	\$394,000	\$460,000	(\$66,000)	N/A	(\$66,000)	100
R-2	Modify the EB CD lane / Clay Street off-ramp configuration.	\$9,913,000	\$7,343,000	\$2,570,000	N/A	\$2,570,000	100
T-2	Replace and widen the Indiana Avenue Bridge Superstructure with one project in-lieu-of jacking-up the bridge in one project and then widening the raised bridge in a second project.	\$3,454,000	\$3,204,000	\$250,000	N/A	\$250,000	100
Y-1	Alternative to T-2 Raise and widen the Indiana Bridge in a single project.	\$3,454,000	\$3,119,000	\$335,000	N/A	\$335,000	100
	DESIGN CONSIDERATIONS						
M-1	At the US 61N /SR 27 / I-20 Interchange, shift the EB CD lanes inward (north) to reduce the existing EB I-20 footprint.					N/A	N/A
W-1	Build EB Frontage Road Bridge over Old SR 27 and KCS Railroad in One Contract.					N/A	N/A
* Note: Savings Potential represents how much of an individual item, exclusive of any overlapping dependent items, can be implemented.							

STUDY IDENTIFICATION

Study Identification

Project: I-20 Reconstruction / Upgrade	Date: May 23 – 27, 2011
Location: Warren County, Mississippi	

VE Team Members

Name:	Area of Expertise:	Organization:	Telephone:
Luther Boudra, PE	Geotechnical	MACTEC	205-733-7660
Jane Yang, SE, PE	Structures	MACTEC	773-380-8841
Joel Dermid, PE	Design / Environment	MACTEC	248-926-4008
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Keith Borkenhagen, PE, CVS	VE Team Facilitator	MACTEC	623-556-1875

Project Description

This project will reconstruct / upgrade I-20 from East of the Mississippi River bridge to East of the US 61N / I-20 Interchange. This project will eliminate the existing left on / off ramps through the area, provide full access at all Interchanges, improve the I-20 mainline roadway alignment and profile, widen / improve the existing Frontage Roads between Halls Ferry Road and Clay Street, construct Collector / Distributor (CD) roads through the Clay Street and US 61N / SR 27 Interchanges, and construct Frontage Road connector roads. Major Interchange improvements will also be made at the US 61S / I-20 Interchange (a new Trumpet Directional Interchange will be built) and the US 61N / I-20 Interchange (CD lanes will be added and on / off ramp improvement will be made).

This project will be constructed in eight different contracts over several years as funds become available. Major contract work items include roadway grading, excavation, retaining wall, and embankment construction, mainline paving, frontage road paving, bridge construction, bridge widening, bridge removal, and associated drainage extensions. The total estimated project cost including right-of-way (R/W) is \$207.6 million.

Conditions / Constraints

The VE team was presented with the following conditions / constraints:

- Changes should be accommodated without acquiring any new R/W.
- Changes should not adversely impact the Vicksburg Military Park.
- MSE Walls are not to be used in front of bridges or in cut sections.
- MSE Walls are not to be constructed higher than 25 feet.

Project Briefing:

Prior to beginning the study, the VE team was briefed on the current design status of the project. The following items were discussed:

- This project will be constructed in eight contracts as funds become available.
- Project 1 will raise the Indiana Avenue Bridge.
- Project 2 will construct the west end and the new Trumpet Interchange.
- Project 3 will reconstruct the Frontage Roads between Halls Ferry Road and Indiana Avenue.
- Project 4 will reconstruct the mainline roadway between Halls Ferry Road and Indiana Avenue.
- Project 5 will reconstruct the Frontage Roads between Indiana Avenue and Clay Street.
- Project 6 will reconstruct the Clay Street Interchange.
- Project 7 will reconstruct the mainline roadway between Indiana Avenue and Clay Street.
- Project 8 will reconstruct the US 61N / I-20 Interchange and the east end.
- The Frontage Roads will be widened and upgraded to serve as detour roads for the I-20 mainline traffic. The I-20 mainline roadways will be reconstructed with minor alignment and profile changes to raise the design speed to a minimum of 60 MPH. The Frontage Roads will be upgraded to a 50 MPH design speed.
- The Frontage Roads will be made one-way during the reconstruction period. They will probably be converted back to two-way traffic after the project is finished.
- The Draft Environmental Assessment is almost complete.
- Alternate B is the one-way Frontage Roads concept. Alternate C is the two-way Frontage Road concept.
- Nothing can be constructed closer than 25 feet to the Vicksburg Military Park land.

Project Site Visit

Prior to beginning the study, the VE team visited the project site. The following items were observed and discussed:

- The project lies within rolling terrain. It consists of a 4-lane Interstate with 2-lane Frontage Roads through the center portion of the project.

- The Frontage Roads are narrow with significant horizontal and vertical curves. Widening them to 3-lanes and getting them to a 50 MPH design speed may not be possible, will require significant effort, and will disrupt existing traffic and access.
- There is a cemetery between the Frontage Road and the I-20 mainline roadway on the south side of the project between Halls Ferry Road and Indiana Avenue.
- The profile of the I-20 mainline roadways under Indiana Avenue is in a slight vertical curve raising the possibility of lowering the grade to achieve the necessary vertical clearance rather than raising the bridge.
- The Frontage Road crossovers will be constructed at two low points of the mainline roadway profile where the deep sag vertical curves provide opportunity to raise the profile enough to meet vertical clearance requirements.
- The existing ramps do not meet current AASHTO or State standards for acceleration / deceleration lanes and ramp tapers.

Project Sketch Map



VE RECOMMENDATIONS

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: A-8	Sheet No.: 1 of 2	CREATIVE IDEA: Maintain the existing 2-lane Frontage Roads in-lieu-of reconstructing them to 3-lane Frontage Roads and using them to detour Interstate traffic.
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Comp By: A.S. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The original design for this project would widen the existing two-lane, two-way Frontage Roads to three-lane Frontage Roads in order to allow their use as mainline I-20 detour roads and as a local access road.

Proposed Change:

This recommendation eliminates widening the two-lane Frontage Roads and would reconstruct the I-20 mainline roadways under traffic. Reconstructing the I-20 roadways under traffic would likely require the elimination of the Frontage Road crossovers, thereby allowing the mainline roadway profile to be lowered through those areas facilitating reconstruction of the mainline roadway under traffic.

Justification:

Utilization of the Frontage Roads for mainline detour roads introduces numerous operational issues; such as, maintaining acceptable business access, maintaining available Frontage Road capacity, route trailblazing / local signing demands, additional traffic through the Interchanges, traffic signalization issues, added traffic impacts to the Interchange arterial streets, and maintaining acceptable emergency access / response time. Detouring mainline I-20 traffic to the Frontage Roads would result in slower mainline traffic speeds, introduce indirection of travel, and add more mainline traffic stops, turns, and conflicts.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$25,717,000		
Proposed	\$0		
Savings	\$25,717,000		\$25,717,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$25,717,000

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: A-12	Sheet No.: 1 of 4	CREATIVE IDEA: Eliminate 1-lane from the 5-lane On-ramp / CD lane merge – weave section in the west quadrant of the US 61N / I-20 Interchange.
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Comp By: M.M. & L.B. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The current design includes a Northbound (NB) SR 27 / US 61N to Westbound (WB) I-20 on-ramp on the north side of the US 61N / I-20 Interchange. The on-ramp is in the NW quadrant of the Interchange. This on-ramp combines with the 2-lane Southbound (SB) US 61N to Westbound (WB) I-20 on-ramp as an additional lane. The 3-lane SB US 61N to WB I-20 on-ramp combines with the 2-lane WB I-20CD lanes to form a 5-lane weaving section on the north side of the Interstate (Approximately Station 250+00 to Station 270+00).

Proposed Change:

This recommendation creates an acceleration lane by tapering the inside lane of the 3-lane SB US 61N to WB I-20 on-ramp downstream of the median crossover approaching the 2-lane WB I-20 CD lanes. This concept results in a 4-lane weaving section (Approximately Station 250+00 to Station 270+00).

Justification:

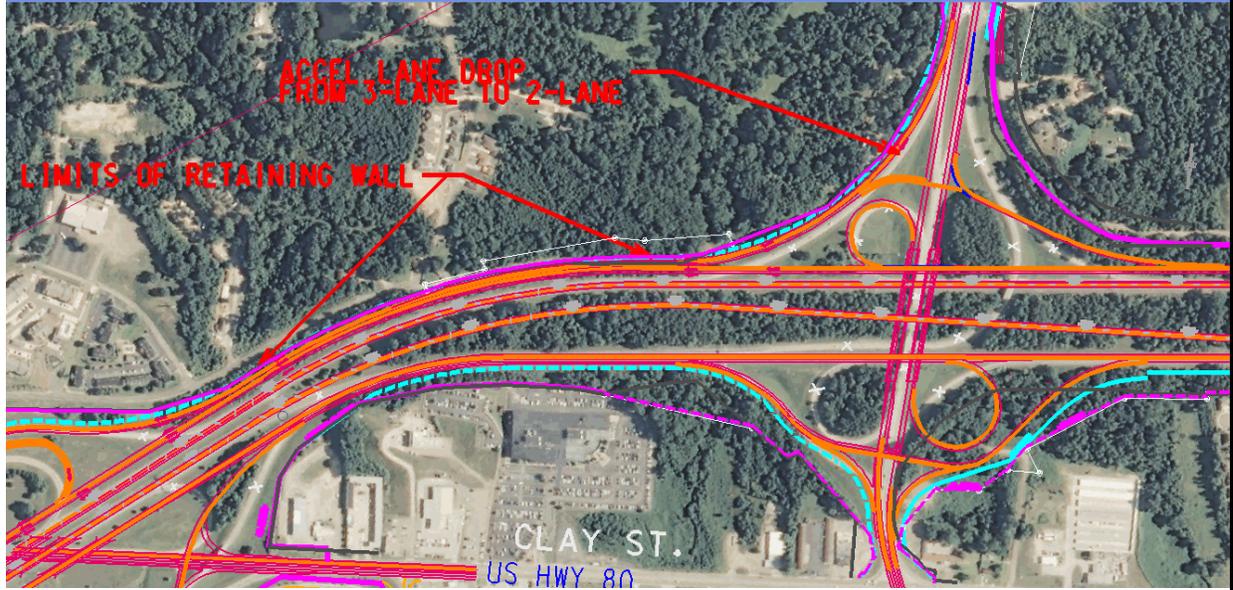
The low volume of NB SR 27 to WB I-20 traffic that would use the median crossover on-ramp and merge with the SB US 61N to WM I-20 lanes can easily be accommodated before getting to the 4-lane weaving section. The on-ramp merge (lane drop) removes one lane from the complex north side merge / weaving area and therefore simplifies the weaving movements while reducing the amount of required retaining wall adjacent to the ROW within the same weaving area limits. This concept improves traffic operation and saves costs.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST: - Original	\$2,276,000		
- Proposed	\$0		
- Savings	\$2,276,000		\$2,276,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$2,276,000

SKETCH

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: A-12
Client: MDOT
Sheet 2 of 4



CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: A-12
Client: MDOT
Sheet 4 of 4

Lane Drop Cost Reduction:

Grading:

$$1,100 \text{ ft} / 5,280 \text{ ft} = 0.20$$

Paving:

$$1,100 \text{ ft} / 5,280 \text{ ft} = 0.20$$

Retaining walls:

3,300 ft of wall

Average wall height with 5-lane section = 25 ft

Average wall height with 4-lane section = 20 ft

$$5 \text{ ft} / 25 \text{ ft} = 0.20 \text{ \% reduction}$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: C-2	Sheet No.: 1 of 4	CREATIVE IDEA: Shift the WB I-20 roadway / CD lanes at the US 61N / I-20 Interchange south placing the new CD lanes on the old existing WB I-20 footprint.
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Comp By: M.M. & L.B. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept: The current design keeps the reconstructed I-20 WB lanes between US 61N and Clay Street on the existing WB I-20 alignment and would construct the new CD / on-ramp merge lanes to the outside (north) of these lanes. This concept requires the WB I-20 to SB SR 27 Loop off-ramp and the SB US 61N to WB I-20 on-ramp to be shifted away (north) from the existing facility. This shift requires additional R/W and the construction of a large retaining walls in steep terrain.

Proposed Change:

This recommendation would shift the WB I-20 mainline roadway to the inside (south) of the existing WB I-20 footprint to a new alignment in the existing median, and allow the new SB on-ramp / WB CD lanes to follow the existing WB I-20 ramp and mainline footprint.

Justification: By shifting the WB I-20 lanes and CD / on-ramp lanes south, the requirement for extensive excavation in the US 61N / I-20 WB Quadrant requiring retaining walls will be greatly reduced. This idea also shortens the new US 61N / US 27 Bridges over I-20. Constructing the new CD lanes on the old WB I-20 mainline roadway footprint allows the WB I-20 to SB SR 27 Loop off-ramp and the SB US 61N to WB I-20 on-ramp to be reconstructed on their existing alignment. The shift in the I-20 mainline roadway would maintain the required 88-foot Type I Access median width to allow for future widening to the inside. These shifts can be accomplished with changing the current CD lane design configuration.

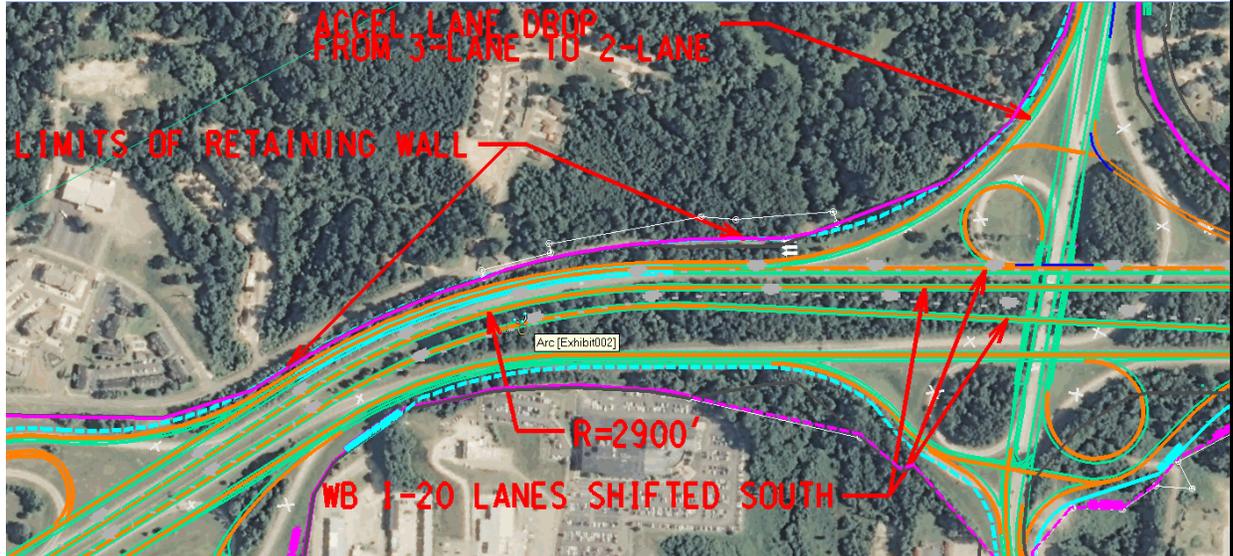
This concept would reduce the cost of the project by eliminating the need for additional R/W and eliminating a large retaining wall.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$18,111,000		
Proposed	\$12,350,000		
Savings	\$5,761,000		\$5,761,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$5,761,000

SKETCH

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: C-2
Client: MDOT
Sheet 2 of 4



CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: C-2
Client: MDOT
Sheet 4 of 4

Retaining Walls:

Station 249 to 264 WB Project 7, Phase A2(2)

MDOT Estimate = \$3,440,700 without 15%

VE Concept assumes 2/3 of the wall will not be needed.

VE estimate = $0.33 \times \$3,440,700 = \$1,135,431$

Station 10 to 28 on SB Ramp US 61N to WB I-20

MDOT Estimate Project 8C(1) = \$2,058,140

VE Concept assumes 25% of wall will remain

VE estimate = $0.25 \times \$2,058,140 = \$514,535$

Lanes for CD / Ramps:

SB US 61N to WB I-20 Project 8, Phase C1

MDOT Estimate = \$2,636,200

Lane - ft = $3,625' + (3,625' - 1,000') + (3,625' - 1,900') = 7,975$ lane - ft

VE Concept Only provide 1,100' acceleration lane for NB US 61 to EB I-20

VE Lane - ft = $3,625' + (3,625' - 1,000') + 1,100' = 7,350$ lane - ft

Cost = $7,350' / 7,975' \times \$2,636,200 = \$2,419,601$

CD lanes from US 61N to Clay Street Station 239 to 264

MDOT Estimate = Project 7, Phase A2 \$2,259,600

Lane - ft 2-lane = $2 \times (270 - 239) \times 100 = 6,200$ lane - ft

3-lane = $3 \times (264 - 239) \times 100 = 7,500$ lane - ft

Total Lane - ft = $6,200 + 7,500 = 13,700$

VE Concept $6,200 + 2 \times (264 - 239) \times 100 = 6,200 + 5,000 = 11,200$

Cost = $11,200 / 13,700 \times \$2,259,600 = \$1,847,264$

Shorten Bridges:

NB New Bridge MDOT Estimate = 660 ft @ \$2,685,300 without 15%

SB New Bridge MDOT Estimate = 660 ft @ \$2,685,300 without 15%

VE Concept

$(660' - 70') / 660' \times 2 \times \$2,685,300 = \$4,800,991$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: G-4	Sheet No.: 1 of 2	CREATIVE IDEA: Defer construction of the new NB US 61S to WB I-20 on-ramp.
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Comp By: M.M. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The current design to revise the I-20 / US 61S directional Interchange on the west end of the project would construct a “Trumpet” Interchange between Station 50 and Station 80. This concept eliminates the existing “left” on and off ramps. The current “trumpet” design requires new R/W on the north side of I-20 that comes very close to the Military Park property and long ramps with long flyover bridges.

Proposed Change:

This recommendation would defer construction of the NB US 61S to WB I-20 flyover ramp.

Justification:

This movement would be provided by directing this traffic along a separate roadway to Halls Ferry Road and then to the new Halls Ferry road WB I-20 Loop on ramp. The separate roadway would use the existing NB US 61S to EB I-20 ramp / pavement footprint to Station 85 where it would merge with the new I-20 EB off-ramp to Halls Ferry Road.

This ramps low traffic count (234 VPD in 2040) can be accommodated on the new Halls Ferry Road Loop WB on-ramp. NB traffic coming from the south and wanting to go west on I-20 also has the option of using the Washington Street Interchange. Deferring construct of this ramp does not preclude constructing it in the future should additional traffic dictate its need.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST: - Original	\$10,078,000		
- Proposed	\$58,000		
- Savings	\$10,020,000		\$10,020,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$10,020,000

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: G-5	Sheet No.: 1 of 4	CREATIVE IDEA: Reconfigure the US 61S / I-20 Trumpet Interchange.
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Comp By: M.M. & J.Y. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept: The current design to revise the I-20 / US 61S directional Interchange on the west end of the project would construct a Trumpet Interchange between Station 50 and Station 80. This concept eliminates the existing “left” on and off ramps. The current Trumpet design requires new R/W on the north side of I-20, comes very close to the Military Park property, and contains long ramps with long flyover bridges.

Proposed Change: This recommendation would reverse the curve for the NB US 61 to WB I-20 on-ramp. This concept also tightens the WB I-20 to SB US 61S off-ramp around the outside of the new reversed curve on-ramp.

Justification: The VE design provides right on / off connectivity. This concept keeps the south end of the new on-ramp on the existing NB US 61S on-ramp alignment longer and reverses the ramp curve to turn left and connect to WB I-20 near Station 55. The revised design reduces the length on the on-ramp and flyover bridge section of the ramp. It reduces the amount cut on the north side of I-20 and better follows the existing terrain as it connects to I-20. This concept put the WB on-ramp connection on a down grade improving merging.

The SB off-ramp is also shifted inward toward the revised WB on-ramp. This brings the ramp closer to the hill on the north side of I-20 thereby reducing the length of the flyover bridge. The ramp shifts reduce R/W needs, reduce impacts to the Military Park, and reduce project cost.

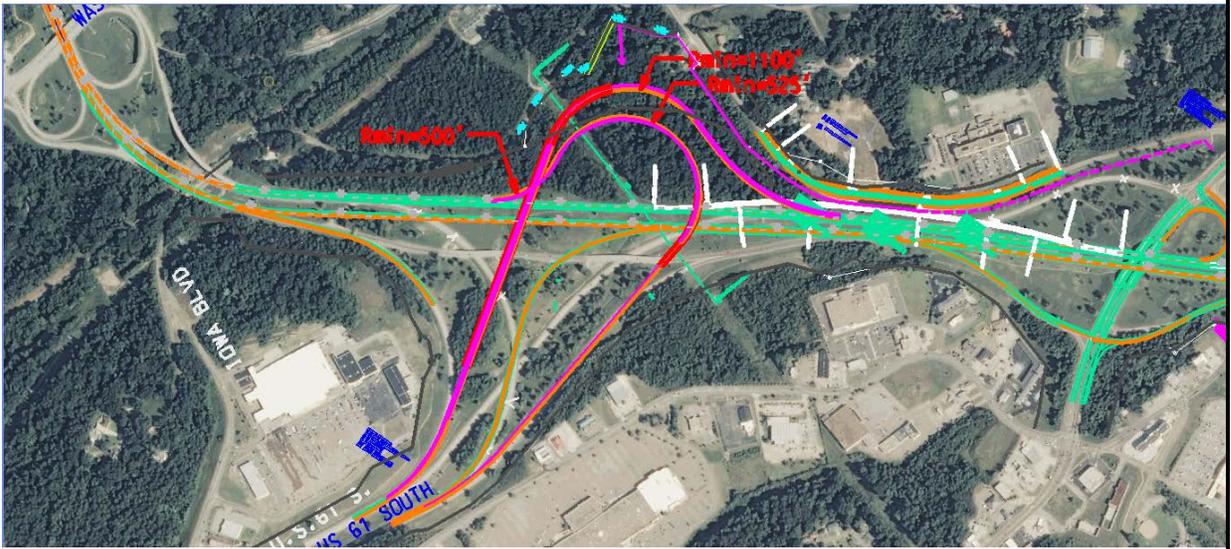
The change in the NB US 61S to WB I-20 on-ramp reduces the distance between the gore areas for the US61S to WB I-20 on-ramp and the WB I-20 to Washington Street off-ramp.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$22,808,000		
Proposed	\$16,199,000		
Savings	\$6,609,000		\$6,609,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$6,609,000

SKETCH

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: G-5
Client: MDOT
Sheet 2 of 4



VE Design

COST WORKSHEET

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: G-5
Client: MDOT
Sheet 3 of 4

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Current Design:							
On-ramp Bridge Costs (steel)	SF	18,808	\$125	\$2,351,000			
On-ramp Bridge Costs (concrete)	SF	20,550	\$85	\$1,746,750			
On-ramp Bridge Costs (steel)	SF	29,899	\$125	\$3,737,375			
On-Ramp Grading Costs	Mile	0.91	\$530,000	\$482,300			
On-ramp Paving Costs	Mile	0.91	\$490,000	\$445,900			
Off-ramp Bridge Costs (steel)	SF	35,977	\$125	\$4,497,125			
Off-ramp Bridge Costs (concrete)	SF	70,241	\$85	\$5,970,485			
Off-Ramp Grading Costs	Mile	0.59	\$530,000	\$312,700			
Off-ramp Paving Costs	Mile	0.59	\$490,000	\$289,100			
VE Design:							
On-ramp Bridge Costs (steel)	SF				22,716	\$125	\$2,839,500
On-Ramp Grading Costs	Mile				.86	\$530,000	\$455,800
On-ramp Paving Costs	Mile				.86	\$490,000	\$421,400
Off-ramp Bridge Costs (steel)	SF				30,409	\$125	\$3,801,125
Off-ramp Bridge Costs (concrete)	SF				70,241	\$85	\$5,970,485
Off-Ramp Grading Costs	Mile				.586	\$530,000	\$310,580
Off-ramp Paving Costs	Mile				.586	\$490,000	\$287,140
SUBTOTAL				\$19,832,740			\$14,086,030
MARKUP (15%)				42,974,920			\$2,112,910
TOTAL:				\$22,807,660			\$16,198,940
TOTAL ROUNDED				\$22,808,000			\$16,199,000

NOTE: The 15% Mark-up equates to the (Cost x 115%) shown in the Cost Estimate.

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: G-5
Client: MDOT
Sheet 4 of 4

Ramp Lengths

Original design:

Original WB to SB

Station 105+27.30 to Station 163+32.54 = 5,805 ft
(2,480 ft bridge + 3,325 ft roadway)

Original NB to WB

Station 100+00 to Station 155+16.0 = 5,516 ft
(1,900 ft bridge + 3,616 ft roadway)

VE design:

WB to SB 5,446 ft

(2,350 ft bridge + 3,096 ft roadway)
concrete bridge (1,640 ft x 42.83 ft = 70,241 SF)
steel bridge (710 ft x 42.83 ft + 30,409 SF)

NB to WB 5,130 ft

(585 ft Bridge + 4,545 ft roadway)
585 ft x 38.83 ft = 22,716 SF

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: I-1	Sheet No.: 1 of 4	CREATIVE IDEA: Eliminate the two Frontage Road crossovers and allow Frontage Road connectivity only at the Interchange cross streets.
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Comp By: J.D. & A.S. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept: The original design includes two Frontage Road crossover roadways, one at Station 92+50 and the second at Station 200. The one-way Frontage Road concept also includes Texas U-turn lanes at the crossovers. The two-way Frontage Road concept adds roundabouts at intersections with Frontage Roads (two roundabouts at each crossover).

Proposed Change: This recommendation would eliminate the Frontage Road crossovers allowing Frontage Road connectivity only at the Interchange cross streets.

Justification: Constructing the Frontage Road crossovers requires the I-20 mainline roadway profile to be raised approximately 25 feet through this section to accommodate the required vertical bridge clearance. This requires the construction of high mainline retaining walls to contain the raised profile. Eliminating these crossovers would reduce / eliminate the mainline profile rise and still meet the proposed mainline design speed. The VE team has assumed the profile can be raised 18 feet.

Constructing these crossovers and having to significantly raise the mainline profile through these areas is a major factor in project staging and having to upgrade the existing 2-lane Frontage Roads to 3-lanes so they can serve as detour roads to reconstruct the mainline roadway instead of reconstructing it under traffic.

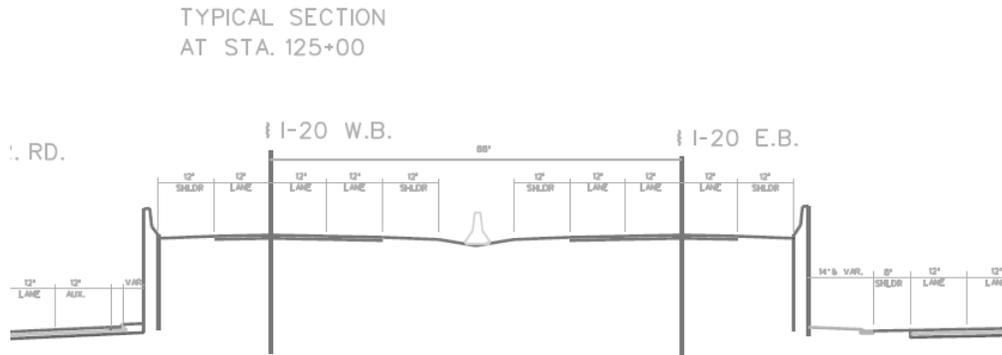
Interchanges through this area are about 1-mile apart. The existing two-way frontage roads operate without any crossovers between adjacent Interchanges. The elimination of these crossovers would simplify this construction phase, accelerate construction, and reduce project cost.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST: - Original	\$11,425,000		
- Proposed	\$904,000		
- Savings	\$10,521,000		\$10,521,000
FUTURE COST: - Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$10,521,000

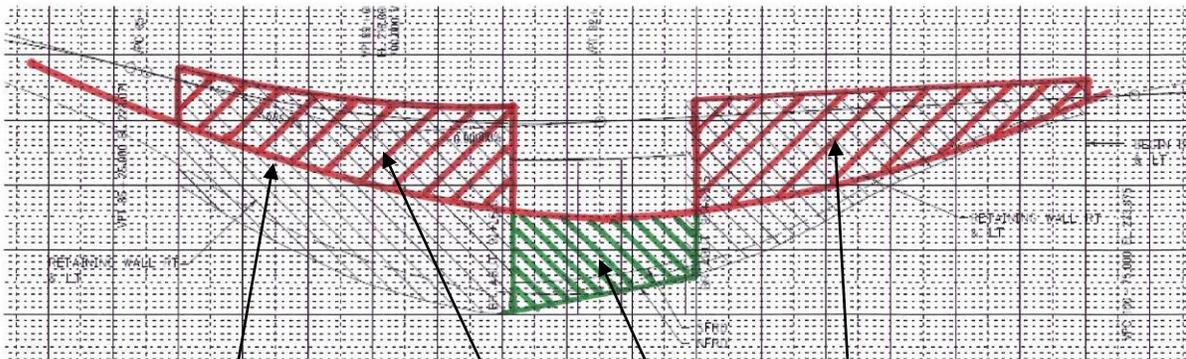
SKETCH

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: I-1
 Client: MDOT
 Sheet 2 of 4



TYPICAL SECTION
AT STA. 95+00



Likely profile change without crossovers.

Additional Walls

Wall Reduction due to profile change.

COST WORKSHEET

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: I-1
Client: MDOT
Sheet 3 of 4

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Original Design:							
Station 92+50							
Frontage Road Pavement	SY	3,360	\$45	\$151,200			
Bridge	SF	39,456	\$85	\$3,268,760			
Station 200+00							
Frontage Road Pavement	SY	4,250	\$45	\$191,250			
Bridge	SF	41,780	\$85	\$3,551,300			
Excessive Retaining Wall	SF	48,400	\$55	\$2,662,000			
Excessive Grading	Mile	0.208	\$530,000	\$110,240			
VE Design:							
Additional Retaining Walls	SF				13,350	\$55	\$734,250
Additional Grading	Mile				0.0505	\$530,000	\$26,765
Additional Pavement	Mile				0.0505	\$490,000	\$24,745
SUBTOTAL				\$9,934,750			\$785,760
MARKUP (15%)				\$1,490,213			\$117,864
TOTAL:				\$11,424,963			\$903,624
TOTAL ROUNDED				\$11,425,000			\$904,000

NOTE: The 15% Mark-up equates to the (Cost x 115%) shown in the Cost Estimate.

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: I-1
Client: MDOT
Sheet 4 of 4

Original design:

Station 92+50 Pavement

Roundabout $2 \times 20 \text{ ft} \times 377 \text{ ft} = 7,540 \text{ SF} = 1,680 \text{ SY}$

Approaches $11,925 \text{ SF} = 1,325 \text{ SY}$

Bridge \$3,268,760

Station 200+00 Pavement

Roundabout $2 \times 20 \text{ ft} \times 377 \text{ ft} = 7,540 \text{ SF} = 1,680 \text{ SY}$

Approaches $26,300 \text{ SF} = 2,925 \text{ SY}$

Bridge \$3,551,300

Excess Retaining Walls:

$(8' + 18') / 2 \times 500' = 6,500 \text{ SF} + (18' + 4') / 2 \times 600' = 6,600 \text{ SF} = 12,100 \text{ SF}$

$12,100 \text{ SF} \times 4 = 48,400 \text{ SF} @ \$55 = \$2,662,000$

Excessive Grading $500 \text{ ft} + 600 \text{ ft} = 1,100 \text{ ft} / 5280 \text{ ft} = 0.208 \text{ mile}$

VE Design: Assume the elimination of the crossovers / bridge clearance requirement allow the I-20 mainline grade to be raised 50% through the area.

New Retaining Walls:

$(16' + 9') / 2 \times 267' = 3,337.5 \text{ SF} \times 4 = 13,350 \text{ SF} @ \$55 = \$734,250$

Additional Grading / Paving $267 \text{ ft} / 5280 \text{ ft} = 0.0505 \text{ mile}$

Estimated Unit Frontage Road Pavement Cost:

Assume pavement section consisting of: 2" (top lift) + 6" (2nd lift) + 10" base

Pavement: $(8" / 12 \text{ ft} \times 3 \text{ ft} \times 3 \text{ ft}) \times 150 \text{ \#} / 1 \text{ CF} \times 1 \text{ ton} / 2,000 \text{ \#} = 0.45 \text{ tons} / \text{SY}$

Base: $(10" / 12 \text{ ft} \times 3 \text{ ft} \times 3 \text{ ft}) \times 150 \text{ \#} / 1 \text{ CF} \times 1 \text{ ton} / 2,000 \text{ \#} = 0.5625 \text{ tons} / \text{SY}$

Cost per SY = $(0.45 \times \$70) + (0.5625 \times \$24) = \$31.50 + \$13.50 = \text{\$45 / SY}$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: I-2	Sheet No.: 1 of 3	CREATIVE IDEA: <u>Alternative to I-1</u> Eliminate the Texas U- turn elements of the two Frontage Road crossovers.
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Comp By: J.D. & A.S. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The original design includes two Frontage Roads crossover roadways, one at Station 92+50 and the second at Station 200. The one-way Frontage Road concept also includes Texas U-turn lanes at the crossover. The two-way Frontage Road concept adds roundabouts at intersections with Frontage Roads (two roundabouts at each crossover).

Proposed Change:

This recommendation would eliminate both Texas U-Turn lanes and reduce the length of the I-20 bridges over the crossroads.

Justification:

The Texas U-Turns function only with one-way Frontage Roads. It is assumed that the Frontage Roads will ultimately be converted back to two-way operation to maximize access to the local business and minimize any adverse impact. Interim one-way operation of the Frontage Road system during construction will require circulation on the surface streets adversely impacting those facilities.

Eliminating the Texas U-turn lanes would save 40 feet of bridge on each side of the crossover intersection. This concept would shorten this construction phase and reduce project cost.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$7,843,000		
Proposed	\$6,257,000		
Savings	\$1,586,000		\$1586,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$1,586,000

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: I-2
Client: MDOT
Sheet 3 of 3

Original Design:

Bridge length: 3-Span @ 100' + 67' + 100' = 267 ft

VE Design:

Reduction in Bridge length:

$$[(40' + 40') \times 140 \text{ ft}] = 11,200 \text{ SF}$$

Reduced Bridge Size:

$$\text{Station 92+50} \quad 39,456 \text{ SF} - 11,200 \text{ SF} = 28,256 \text{ SF}$$

$$\text{Station 200+50} \quad 41,780 \text{ SF} - 11,200 \text{ SF} = 30,580 \text{ SF}$$

Additional Retaining Walls:

Assume 25 ft high retaining wall, unit cost = \$55/SF

$$2 \text{ sides} \times (40' + 40') \times 25\text{ft} = 4,000 \text{ SF} \times 2 \text{ locations} = 8,000 \text{ SF} @ \$55 = \$440,000$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: I-3	Sheet No.: 1 of 3	CREATIVE IDEA: <u>Alternative to I-1</u> Eliminate the dual roundabout intersections and use signalized T-intersections.
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Comp By: J.D. & A.S. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The original design includes two Frontage Roads crossover roadways, one at Station 92+50 and the second at station 200. The one-way Frontage road concept also includes Texas U-turn lanes at the crossover. The two-way Frontage Road concept adds roundabouts at intersections with Frontage Roads (two roundabouts at each crossover).

Proposed Change:

This recommendation would replace the roundabouts at the Frontage Road crossovers with T-intersection.

Justification:

The use of T-intersections would facilitate truck turning movements by eliminating the two, 270 degree turn movements required when a vehicle is going EB /(WB) on one Frontage Road to WB / (EB) on the other Frontage Road (making a U-turn on the Frontage Roads).

This concept would likely reduce the width of the I-20 bridges over the crossover roadway saving project cost.

This concept results in a slight cost increase due to adding traffic signals to the intersections.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<u>INITIAL COST:</u> - Original	\$394,000		
- Proposed	\$460,000		
- Savings	(\$66,000)		(\$66,000)
<u>FUTURE COST:</u> – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			(\$66,000)

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: I-3
Client: MDOT
Sheet 3 of 3

Original Design:

Station 92+50 Pavement

Roundabout $2 \times 20 \text{ ft} \times 377 \text{ ft} = 7,540 \text{ SF} = 1,680 \text{ SY}$

Approaches $11,925 \text{ SF} = 1,325 \text{ SY}$

Bridge \$3,268,760

Station 200+00 Pavement

Roundabout $2 \times 20 \text{ ft} \times 377 \text{ ft} = 7,540 \text{ SF} = 1,680 \text{ SY}$

Approaches $26,300 \text{ SF} = 2,925 \text{ SY}$

Bridge \$3,551,300

Excess Retaining Walls:

$(8' + 18') / 2 \times 500' = 6,500 \text{ SF} + (18' + 4') / 2 \times 600' = 6,600 \text{ SF} = 12,100 \text{ SF}$

$12,100 \text{ SF} \times 4 = 48,400 \text{ SF} @ \$55 = \$2,662,000$

Excessive Grading $500 \text{ ft} + 600 \text{ ft} = 1,100 \text{ ft} / 5280 \text{ ft} = 0.208 \text{ mile}$

VE Design:

Station 92+50

Add Signals $2 \times \$100,000 = \$200,000$

Station 200+00

Add Signals $2 \times \$100,000 = \$200,000$

Estimated Unit Frontage Road Pavement Cost:

Assume pavement section consisting of: 2" (top lift) + 6" (2nd lift) + 10" base

Pavement: $(8" / 12 \text{ ft} \times 3 \text{ ft} \times 3 \text{ ft}) \times 150 \# / 1 \text{ CF} \times 1 \text{ ton} / 2,000 \# = 0.45 \text{ tons} / \text{SY}$

Base: $(10" / 12 \text{ ft} \times 3 \text{ ft} \times 3 \text{ ft}) \times 150 \# / 1 \text{ CF} \times 1 \text{ ton} / 2,000 \# = 0.5625 \text{ tons} / \text{SY}$

Cost per SY = $(0.45 \times \$70) + (0.5625 \times \$24) = \$31.50 + \$13.50 = \mathbf{\$45 / SY}$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: R-2	Sheet No.: 1 of 4	CREATIVE IDEA: Modify the EB CD lane / Clay Street off-ramp configuration.
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Comp By: M.M. & L.B. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept: The original design exits the new EB CD lanes via an off-ramp just east of the proposed Frontage Road crossover at Station 200+00. This off-ramp serves several purposes, such as; exiting traffic to Clay Street, exiting NB US 61N traffic, and exiting SB SR 27 traffic. This design requires significant widening of the south Frontage Road Bridge over Old SR 27 and the KCS Railroad to carry the two new traffic lanes. This concept requires over 3,000 feet of separate CD 2-lane roadway and a new EB CD Bridge over Clay Street.

Proposed Change: This recommendation would split the EB CD off-ramp configuration. This concept would split the CD off-ramp traffic allowing only Clay Street traffic to exit I-20 at the original location (east of the FR crossover at Station 200) while keeping NB US 61N / SB SR 27 traffic on the mainline roadway to a new “second” exit starting just east of the I-20 bridge over Clay Street. This concept substantially shortens the CD road.

Justification: Providing separate off-ramps would simplify roadway signage, provide a more “standard” exit ramp configuration for the motorists, and eliminate merging Clay Street traffic with the CD lanes which primarily serve the NB US 61N / SB SR 27 exiting traffic.

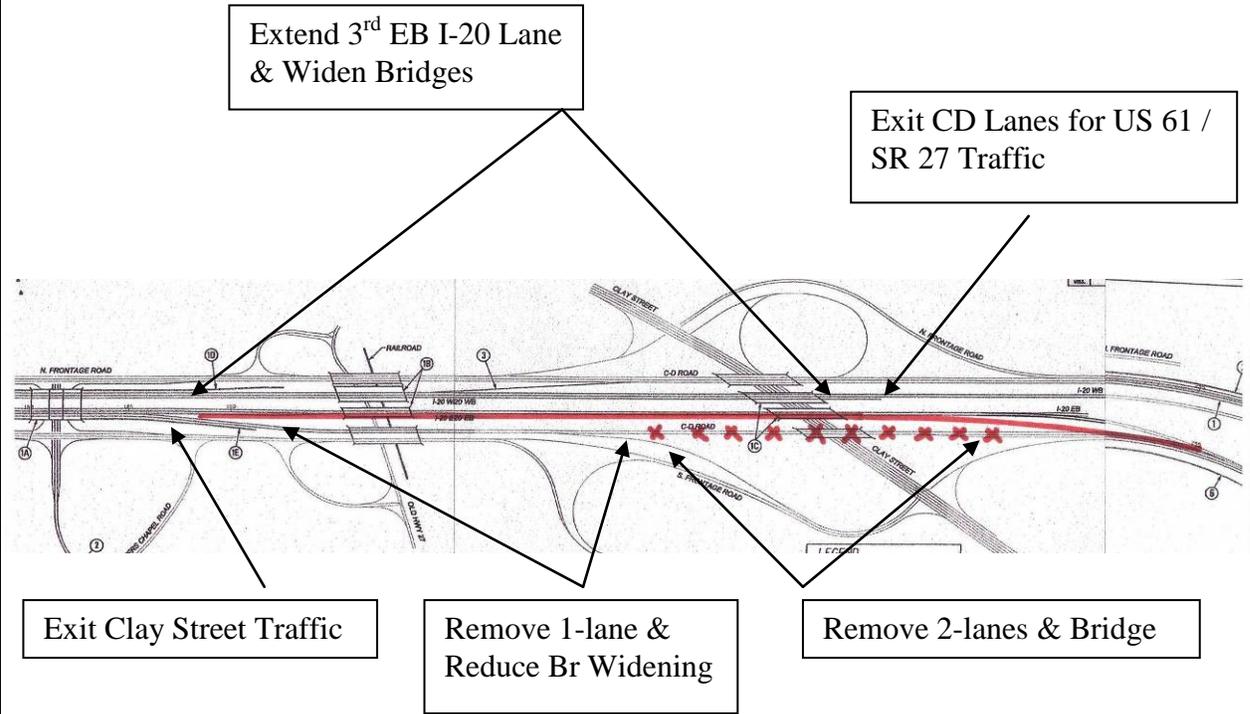
Using a “second” exit (near Station 240) for the CD roadway would eliminate approximately 2,000 feet of 2-lane CD roadway, 1,500 feet of 1-lane of the CD roadway, and the EB CD Bridge over Clay Street. This concept would require extending the third EB lane on I-20 to the new CD exit off-ramp and widening the I-20 Bridge over Clay Street.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
INITIAL COST: - Original	\$9,913,000		
- Proposed	\$7,343,000		
- Savings	\$2,570,000		\$2,570,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$2,570,000

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: R-2
Client: MDOT
Sheet 2 of 4



COST WORKSHEET

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: R-2
Client: MDOT
Sheet 3 of 4

CONSTRUCTION ELEMENT		ORIGINAL ESTIMATE			NEW ESTIMATE		
Item	Unit	No. Units	Cost/Unit	Total Cost	No. Units	Cost/Unit	Total Cost
Original Design:							
2-lane CD Grading	Mile	0.568	\$530,000	\$301,040			
2-lane CD Paving	Mile	0.568	\$490,000	\$278,320			
1-lane CD Grading	Mile	0.284	\$265,000	\$75,260			
1-lane CD Paving	Mile	0.284	\$245,000	\$69,580			
South CD Bridge over Clay	SF	20,558	\$125	\$2,569,800			
I-20 Bridge over Clay	SF	22,478	\$125	\$2,809,800			
I-20 Bridge over Old 27 & RR	SF	15,454	\$75	\$1,159,050			
South FR Bridge over Old 27	SF	9,049	\$150	\$1,357,290			
VE Concept:							
Widen I-20 Bridge over Clay	SF				28,239	\$125	\$3,529,875
Widen I-20 Bridge over Old 27	SF				19,414	\$75	\$1,456,050
Widen South FR Bridge	SF				5,089	\$150	\$763,350
Add 1-Lane to I-20 Grading	Mile				0.473	\$477,500	\$225,878
Add 1-Lane to I-20 Paving	Mile				0.473	\$867,500	\$410,328
SUBTOTAL				\$8,620,140			\$6,385,481
MARKUP (15 %)				\$1,293,021			\$957,822
TOTAL				\$9,913,161			\$7,343,303
TOTAL ROUNDED				\$9,913,000			\$7,343,000

NOTE: The 15% Mark-up equates to the (Cost x 115%) shown in the Cost Estimate.

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: R-2
Client: MDOT
Sheet 4 of 4

Original Design:

I-20 Bridge over Clay Street

$$22,478 \text{ SF} / 46.83 \text{ ft wide} = 480 \text{ ft long}$$

I-20 Bridge over Old SR 27 & RR

$$15,454 \text{ SF} / 46.83 \text{ ft wide} = 330 \text{ ft long}$$

Widen South FR Bridge over Old SR 27 & RR

$$9,049 \text{ SF} / 27.42 \text{ ft wide} = 330 \text{ ft long}$$

VE Design:

$$\text{I-20 Bridge over Clay} \quad 480 \text{ ft} \times (46.83 + 12) = 28,238.4 \text{ SF} \quad \text{Use } 28,239 \text{ SF}$$

$$\text{I-20 Bridge over SR 27 \& RR} \quad 330 \text{ ft} \times (46.83 + 12) = 19,413.9 \text{ SF} \quad \text{Use } 19,414 \text{ SF}$$

$$\text{Widening South FR Bridge} \quad 330 \text{ ft} \times (27.42 - 12) = 5,088.6 \text{ SF} \quad \text{Use } 5,089 \text{ SF}$$

$$\text{2-lane CD roadway} = 3,000 / 5,280 = 0.568$$

$$\text{1-lane CD roadway} = 1,500 / 5,280 = 0.284 \quad \text{Use } \frac{1}{2} \text{ Estimated Grading \& Paving Costs}$$

$$\text{1 lane to I-20} = 2,500 / 5,280 = 0.473 \quad \text{Use } \frac{1}{4} \text{ Estimated Grading \& Paving Costs}$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: T-2	Sheet No.: 1 of 3	CREATIVE IDEA: Replace and widen the Indiana Avenue Bridge Superstructure with one project in-lieu-of jacking-up the bridge in one project and then widening the raised bridge in a second project.
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Comp By: J.Y. Date: 5/29/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The original concept proposes to raise the bridge carrying Indiana Avenue over the I-20 mainline roadway in Project 1. The bridge will be widened 13 feet (east side) and have the existing median removed and reconstructed as a left turn lane later in Project 7. The substructure will also be widened to support the new widened superstructure.

Proposed Change:

This recommendation would replace the entire bridge superstructure and reconstruct it to its final width. The bridge would be 94'-10" wide with a 72-foot roadway, 10-foot shoulders, and 1'-5" barriers on each side. The new wider superstructure will also require that the substructure be raised and widened.

Justification:

Raising and widening the bridge in two different projects adds additional Maintenance of Traffic work adding to the cost of the project. Performing the work in two different projects will also result in additional construction traffic impacts to the local businesses. It is assumed that the normal service life for PPC I-beams is about 50 years. The existing PPC I-beams are already about 40 years old. Replacing the superstructure will extend the bridge service life and cut down on future maintenance cost.

COST SUMMARY	INITIAL COST	FUTURE COST	TOTAL L. C. COST SAVINGS
Original	\$3,454,000		
Proposed	\$3,204,000		
Savings	\$250,000		\$250,000
FUTURE COST: – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$250,000

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: T-2
Client: MDOT
Sheet 3 of 3

Original Design:

Raise the bridge in Project 1

$$320 \text{ ft} \times 85.833 \text{ ft} \times \$67/\text{SF} = \$1,840,230$$

Widen the bridge in Project 7

$$320 \text{ ft} \times 13 \text{ ft} \times \$150/\text{SF} = \$624,000$$

Pave for Project 1 and 7

$$0.49 \text{ miles} \times 1,100,000 = \$539,000$$

Total

$$\$3,003,230 \times 115\% = \$3,454,000$$

VE Concept:

Remove Superstructure in Project 1

$$320 \text{ ft} \times 85.833 \text{ ft} \times \$10/\text{SF} = \$274,660$$

Build New Superstructure, Raise and Widen Substructure in Project 1

$$320 \text{ ft} \times 94.833 \text{ ft} \times \$65/\text{SF} = \$1,972,540$$

Pave in Project 1

$$0.49 \text{ miles} \times 1,100,000 = \$539,000$$

Total

$$\$3,204,130 \times 115\% = \$3,204,000$$

Saving

$$\$3,454,000 - \$3,204,000 = \$250,000$$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.:
Y-2

Sheet No.:
1 of 3

CREATIVE IDEA: Alternative to T-2 Raise and widen the Indiana Bridge in a single project.

Comp By: J.Y. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The original concept proposes to raise the bridge carrying Indiana Avenue over the I-20 mainline roadway in Project 1. The bridge will be widened 13 feet (east side) and have the existing median removed and reconstructed as a left turn lane later in Project 7. The substructure will also be widened to support the new widened superstructure.

Proposed Change:

This recommendation would raise and widen the bridge in a single construction project (Project 1).

Justification:

Combining all the work in a single contract will save maintenance of traffic cost. Jacking the bridge in Project 1 and widening and modifying the median in Project 7 splits the work, but causes additional traffic constraints to local business and the traveling public.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<u>INITIAL COST:</u> - Original	\$3,454,000		
- Proposed	\$3,119,000		
- Savings	\$335,000		\$335,000
<u>FUTURE COST:</u> – Savings		N/A	N/A
TOTAL PRESENT WORTH SAVINGS			\$335,000

CALCULATIONS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Idea No.: Y-1
Client: MDOT
Sheet 3 of 3

Original

Raise the bridge in Project 1
 $320 \text{ ft} \times 85.833 \text{ ft} \times \$67/\text{SF} = \$1,840,230$
Widen the bridge in Project 7
 $320 \text{ ft} \times 13 \text{ ft} \times \$150/\text{SF} = \$624,000$
Pave for Project 1 and 7
 $0.49 \text{ miles} \times 1,100,000 = \$539,000$
Total
 $\$3,003,230 \times 115\% = \$3,454,000$

VE

Raise the bridge in Project 1
 $320 \text{ ft} \times 85.833 \text{ ft} \times \$67/\text{SF} = \$1,840,230$
Widen the bridge in Project 7
 $320 \text{ ft} \times 13 \text{ ft} \times \$80/\text{SF} = \$332,800$
Pave in Project 1
 $0.49 \text{ miles} \times 1,100,000 = \$539,000$
Total
 $\$2,712,030 \times 115\% = \$3,119,000$

Saving

$\$3,454,000 - \$3,119,000 = \$335,000$

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: M-1	Sheet No.: 1 of 1	CREATIVE IDEA: <u>Design Consideration</u> At the US 61N /SR 27 / I-20 Interchange, shift the EB CD lanes inside (north) the existing EB I-20 footprint.
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Comp By: M.M. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The current design shifts the reconstructed EB I-20 lanes over 100 feet north into the existing median and constructs the new EB CD lanes on the existing EB I-20 mainline footprint. This concept requires the construction of a large retaining wall in the SW quadrant alongside the COE building.

Proposed Change:

Consideration should be given to also shifting the EB CD lanes to a new alignment north of the existing EB I-20 roadway footprint.

Justification:

Shifting the EB CD lanes inward (north) and off the existing EB I-20 footprint would allow the new lanes to be constructed without impacting / encroaching on the USACE property in the SW quadrant and reduce or eliminate the need to construct the large retaining wall alongside the USACE property. This consideration would take advantage of the wider median in this section of I-20. The EB CD lane inward shift can be accomplished without any change to the original design concept for the southern half of the Interchange. This concept would also reduce the length of the new US-61N / SR 27 dual bridges over I-20 and may allow for a larger radius curve for the EB I-20 to NB US 61N loop ramp.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<u>INITIAL COST:</u> - Original	Design Consideration		
- Proposed			
- Savings			
<u>FUTURE COST:</u> - Savings			
TOTAL PRESENT WORTH SAVINGS			Design Consideration

DEVELOPMENT AND RECOMMENDATION PHASE

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

IDEA No.: W-1	Sheet No.: 1 of 1	CREATIVE IDEA: <u>Design Consideration</u> Build EB Frontage Road Bridge over Old SR 27 and KCS Railroad in One Contract.
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Comp By: J.Y. Date: 5/26/2011 Checked By: K.B. Date: 5/29/2011

Original Concept:

The current concept would construct a portion (53'-5" wide) of the bridge carrying the EB Frontage Road over Old SR 27 and the KCS Railroad under a nonrelated project (Contract STPD-0020-01(171)). This new bridge would be widened (27'-5") under Project 6 in this contract to accommodate the new EB CD / Frontage Road lanes.

Proposed Change:

Consideration should be given to constructing the entire bridge to its ultimate full width in a single contract.

Justification:

Constructing the ultimate full-width structure in a single contract would simplify railroad approval and oversight. It would also simplify construction, reduce maintenance of traffic costs and reduce construction time.

LIFE CYCLE COST SUMMARY	CAPITAL COST	FUTURE COST	TOTAL COST
<u>INITIAL COST:</u> - Original	Design Consideration		
- Proposed			
- Savings			
<u>FUTURE COST:</u> - Savings			
TOTAL PRESENT WORTH SAVINGS			Design Consideration

APPENDIX

MDOT VALUE ENGINEERING KICK-OFF MEETING

NAME	ORGANIZATION	PHONE
John C. Taylor	MDOT / ROW	601. 359. 7250
Jimmy Shirley	Near-South	601-948-3071
Robert Walker	"	"
Jim (Tom) Tanga	MACTEC	713-380-0091
Keith Brakenhagen	MACTEC	623-556-1875
Coll DeRonde	MACTEC	248-255-6194
Lutler Boudin	MACTEC	205/243-7600
Angie Schroeder	MACTEC	352/222-7227
Mike Midkiff	MACTEC	512-940-9085
Amy Mood	MDOT - ROW	601-359-7256
Meredith A. Pilon	MDOT - ROW	601-946-7111
Scott Westfield	MDOT - Bridge	601-359-7200
Adam Bigger	MDOT - ROW	601-359-7253
John Reese	MDOT - ROW	7257
Dan Smith	ROW	7457
R. (H) Wallace	MDOT - ENV.	7920
James Brown	MDOT - Planning	7685

MDOT VALUE ENGINEERING PRESENTATION

NAME	ORGANIZATION	EMAIL
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R. CHAD WALLACE	" / ENVIRONMENTAL	RCWALLACE@ ". " . " . "
JOHN REESE	" / RWD	jrees@ - - -
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Greg Williams	MDOT/RWD	williams@mdot.state.ms.us
Val Dvellis	MDOT/D3	vdavellis@mdot.state.ms.us

Sources

Approving/Authorizing Persons

Name:	Position:	Telephone:
Amy Mood	Assistant Roadway Design Engineer	601-359-7256
John Reese	Roadway Design Engineer	601-359-7256
John C. Taylor	V.E. Coordinator	601-359-7063

Personal Contacts

Name:	Telephone:	Notes:
Robert Walker	601-826-2172	Project briefing
Jimmy Shirley	601-826-2172	Project Briefing
Jimmy Shirley	601-826-2172	Discuss project construction traffic staging
Scott Westerfield	601-359-7200	Bridge Shoulder Width Requirements
Jimmy Shirley	601-826-2172	I-20 mainline vertical / horizontal profile through the I-20 US 61N Interchange

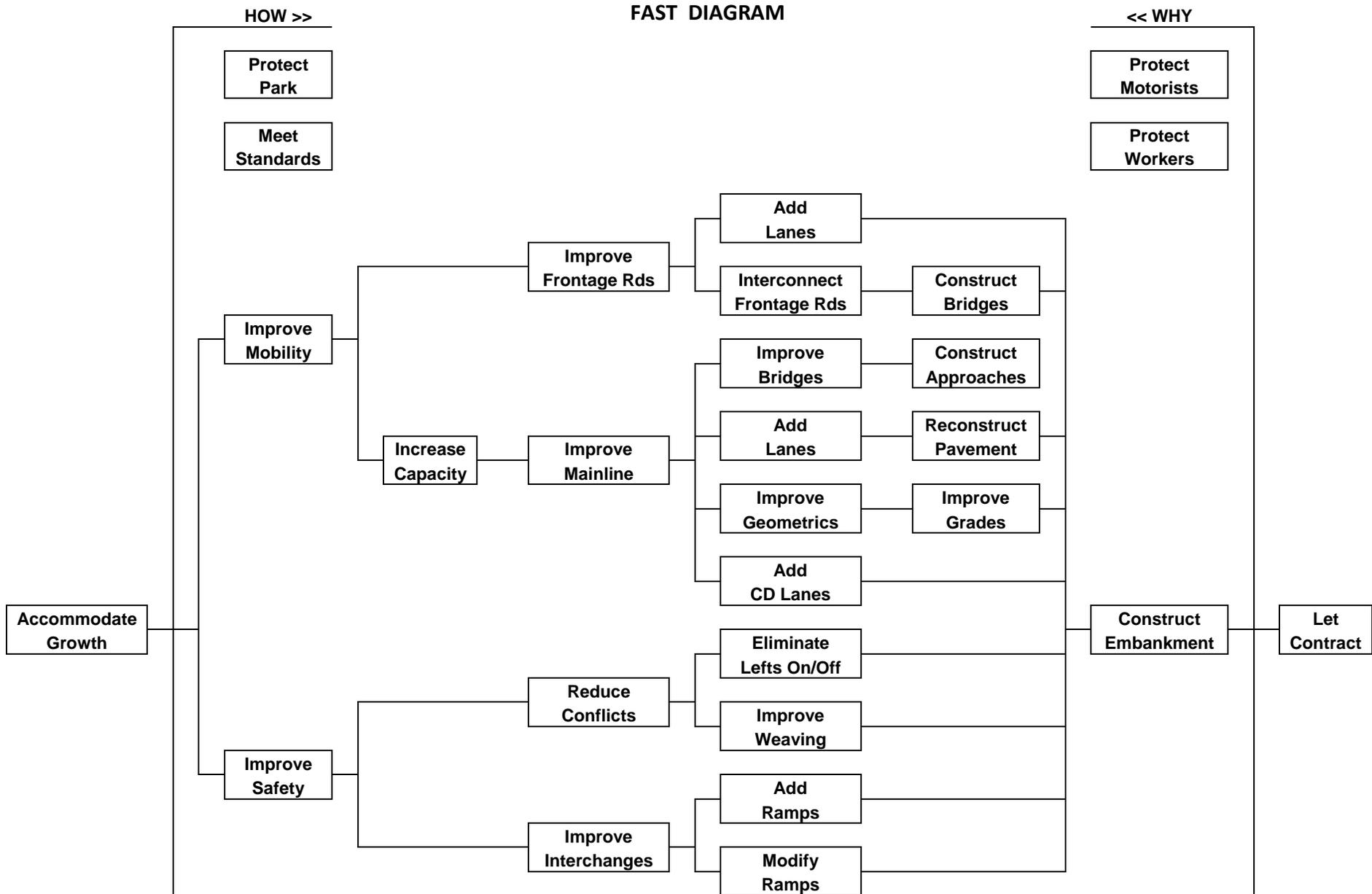
Documents/Abstracts

Reference:	Reference:
1:400 Scale Project Layout Sketches	Preliminary Copy of Draft EA
1:300 Scale Project Layout Sketches	PDF Files of Project R/W Impacts
As-Built Project Plans	PDF Files of Project Concepts
Preliminary Project B Plans (8 Contracts)	Preliminary CAD Files for Project
Preliminary Project C Plans (8 Contracts)	Preliminary Construction Staging Concepts

I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Cost Model / Distribution

Item	Description	\$ Amount	% of Project
A	Grading	\$34,191,000	16.5%
B	Paving 4-Lane New Location	\$34,161,000	16.5%
C	Retaining Walls	\$26,484,000	12.8%
D	Major Widening (Add 2 Lanes)	\$12,079,000	5.8%
E	WB I-20 to SB US 61S Flyover Bridge	\$12,038,000	5.8%
F	Miscellaneous	\$10,599,000	5.1%
G	NB US 61S to WB I-20 Flyover Bridge	\$9,011,000	4.3%
H	Right of Way	\$8,878,000	4.3%
I	Turnaround Bridges	\$7,843,000	3.8%
J	I-20 Bridges over Clay Street	\$6,462,000	3.1%
K	US 61N Bridges over I-20	\$6,176,000	3.0%
L	Municipal Reconstruction	\$5,592,000	2.7%
M	Interchange Construction	\$5,055,000	2.4%
N	North FR Bridge Over Clay Street	\$3,783,000	1.8%
O	FR Bridges over Old SR 27 & RR	\$3,712,000	1.8%
P	I-20 Bridges over Old SR 27 & RR	\$3,463,000	1.7%
Q	Paving 2-Lane New Section	\$3,451,000	1.7%
R	South FR Bridge Over Clay Street	\$2,955,000	1.4%
S	Bridge Removal	\$2,329,000	1.1%
T	Raise Indiana Avenue Bridge	\$2,116,000	1.0%
U	ROW for Utility Adjustment	\$1,968,000	0.9%
V	Widen Halls Ferry Bridges over I-20	\$1,893,000	0.9%
W	Widen South FR Bridge over Old 27 & RR	\$1,561,000	0.7%
X	Major Overlays (5.75")	\$1,126,000	0.5%
Y	Widen Indiana Bridge	\$718,000	0.3%
		\$207,644,000	100.0%



INFORMATION PHASE – FUNCTION ANALYSIS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Function: Improve Mobility & Improve Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
A	Grading	Widen	Roadways	\$34,191,000	16.5%	Yes
		Modify	Existing Grades			
		Modify	Alignment			
		Construct	New Ramps			
		Construct	New Roadway / Ramp / FR			
		Construct	New Bridge Approaches			
B	Paving 4-Lane New Location	Construct	New I-20 Lanes	\$34,161,000	16.5%	Yes
		Construct / Remove	Temporary Lanes			
C	Retaining Walls	Shift	Ramps	\$26,484,000	12.8%	Yes
		Modify	Frontage Roads			
		Allow	Different Grades			
		Hold	Embankment / Slopes			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Function: Improve Mobility & Improve Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
	Retaining Walls (continued)	Hold	Natural Slopes			
D	Major Widening (Add 2 Lanes)	Widen	Mainline	\$12,079,000	5.8%	No
		Widen	Ramps			
		Widen	Frontage Roads / Streets etc.			
E	WB I-20 to SB US61S Flyover Bridge	Separate	Roadway	\$12,038,000	5.8%	Yes
		Eliminate	Left On / Off			
		Span	Valleys			
		Improve	Operations			
		Allow	Single Lane			
F	Miscellaneous	Allow	Construction	\$10,599,000	5.1%	No
G	NB US 61S to WB I-20 Flyover Bridge	Separate	Roadways	\$9,011,000	4.3%	Yes
		Eliminate	Left On / Off			
		Span	Steep Valleys			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Function: Improve Mobility & Improve Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
	NB US 61S to WB I-20 Flyover Bridge (continued)	Span	Excessive Fill Areas			
		Improve	Operations			
		Allow	Single Lane Bridge width			
H	Right of Way	Store	Project	\$8,878,000	4.3%	No
		Avoid	Parkland Areas			
		Construct	Retaining Walls			
		Construct	Roundabouts			
		Construct	New Ramps			
		Avoid	R/W Takings			
I	Turnaround Bridges	Connect	Frontage Road	\$7,843,000	4.3%	Yes
		Construct	Roundabouts			
J	I-20 Bridges over Clay Street	Separate	Traffic	\$6462,000	3.8%	No
		Carry	Typical Section			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Function: Improve Mobility & Improve Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
K	US 61N Bridges over I-20	Separate	Grades	\$6,176,000	3.0%	Yes
		Carry	US 61 over I-20			
		Add	North C-D Road Loop			
L	Municipal Reconstruction	Widen	Cross Roads	\$5,592,000	2.7%	No
		Improve	Cross Roads			
		Reconfigure	Cross Roads			
M	Interchange Construction	Modify	Clay Interchange	\$5,055,000	2.4%	Yes
		Modify	US61 / I-20 Interchange			
		Modify	Halls Ferry Interchange			
		Improve	Traffic Operations			
		Add	C-D Roads			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Function: Improve Mobility & Improve Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
N	North Frontage Road Bridge over Clay Street	Separate	Traffic	\$3,783,000	1.8%	Yes
		Carry	C-D Roads			
O	North / South FR Bridges over Old SR 27 & RR	Separate	Grades	\$3,712,000	1.8%	Yes
		Cross	Railroads			
		Accommodate	C-D & FR			
P	I-20 Bridges over Old SR 27 & RR	Separate	Grades	\$3,463,000	1.7%	No
		Cross	Railroad			
		Accommodate	Typical			
Q	Paving 2-Lane New Section	Construct	Roadway	\$3,451,000	1.7%	No
		Facilitate	MOT			
R	South FR Bridge over Clay Street	Separate	Traffic	\$2,955,000	1.4%	Yes
		Carry	C-D Roadway			
S	Bridge Removal	Eliminate	Old Structures	\$2,329,000	1.1%	No
		Allow	Construction			

INFORMATION PHASE – FUNCTION ANALYSIS

Project: I-20, From the Mississippi River Bridge to East of the US 61N Interchange

Function: Improve Mobility & Improve Safety

ITEM No.	DESCRIPTION	FUNCTION		INITIAL DOLLARS		
		Verb	Noun	Cost	% of Total	Worth/Save
T	Raise Indiana Bridge	Achieve	Clearance	\$2,116,000	1.0%	Yes
		Raise	Approach Roadway			
U	ROW for Utility Adjustment	Accommodate	Utilities	\$1,968,000	0.9%	No
V	Widen Halls Ferry Bridges over I-20	Improve	Capacity	\$1,893,000	0.9%	No
		Accommodate	Loop Ramp			
W	Widen South FR Bridge over Old 27 & RR	Accommodate	New Lanes	\$1,561,000	0.7%	No
X	Major Overlays (5.75")	Rehab	Pavement	\$1,126,000	0.5%	No
Y	Widen Indiana Avenue Bridge	Add	Lane	\$718,000	0.3%	Yes

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A	Grading		
A-1	Eliminate the EB Frontage Road between Clay Street and SR 27.	No Frontage Road	X
A-2	Lower the I-20 Roadways under the Indiana Avenue Bridge in-lieu of Raising the Bridge.	See Idea T-1	X
A-3	Use the existing EB I-20 Roadway alignment for the new I-20 Mainline Roadway and EB CD Roadway alignment.		✓
A-4	Modify / Realign the Trumpet Interchange Ramps.	See Idea G-5	X
A-5	Utilize more of the existing EB I-20 Roadway alignment in-lieu-of shifting the new EB I-20 alignment to the north.	Reduces mainline profile	X
A-6	Restack / Flip the US 61N / I-20 Interchange.	Not possible with existing ground profile	X
A-7	Revise / modify the new Loop Ramps to increase the radius.	Widening Loops would require additional geometric changes and / or additional R/W	X
A-8	Leave the Frontage Roads as 2-Lane Roads in-lieu-of constructing 3-Lane Roadways.	Reduce cost, Simplify construction	DS
A-9	Reconstruct the I-20 Mainline Roadways under traffic.	Normal construction method	✓
A-10	Don't mix Interstate / Frontage Road traffic.	Operational problems	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
A-11	Construct a CD Lane on EB I-20 to merge the NB US 61S to I-20 and EB I-20 to Halls Ferry Road ramp entrances.	Simplify weaving	✓
A-12	Reduce / eliminate the CD Lane / Frontage Road weaving between Clay Street and US 61N. (North Side)	See Idea C-1 and C-2	X
B	New 4-Lane Paving		
B-1	Construct shoulder widening to allow traffic to use one mainline roadway and the shoulder for traffic while reconstructing the other lane and shoulder.	See Idea A-9	X
B-2	Reconstruct the I-20 Mainline using crossovers and two-way single lane traffic on one side while reconstructing the other side.	See Idea A-9	X
C	Retaining Walls		
C-1	Reduce the Frontage Road widths / shifts on the east end to reduce the amount of retaining walls.	See Idea C-2	X
C-2	Shift the Mainline Roadways east of Clay Street to the south and construct the new CD / FR inside the footprint.	Reduce retaining wall / R/W in NW quadrant	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
C-3	Revise / Modify the trumpet Interchange to minimize the amount of required retaining walls	See Idea G-5	✓
C-4	Eliminate the Roundabouts to reduce the amount of required retaining walls.	See Idea I-3	X
E	WB I-20 to SB US 61S Flyover Ramp Bridge		
E-1	Reduce the width of the flyover bridge.	Long Ramp Bridge needs wide shoulders	X
E-2	Reduce the length of the flyover bridge.	Not enough profile information available	X
E-3	Minimize the cut / fill section along ramp	See Idea G-5	X
G	NB US 61S to WB I-20 Flyover Ramp Bridge		
G-1	Reduce the width of the flyover bridge.	Long Ramp Bridge needs wide shoulders	X
G-2	Reduce the length of the flyover bridge.	See Idea G-3	X
G-3	Shift / Modify the flyover alignment.	See Idea G-5	X
G-4	Eliminate the flyover ramp and take the NB US 61S to WB I-20 traffic directly to Halls Ferry Road and up to the new WB I-20 Loop on ramp.	Defer Costs	✓
G-5	Reconfigure the Trumpet Interchange and take the WB traffic over I-20 to the left and bring the SB traffic over the WB ramp.	Reduce cost	✓
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
G-6	Reconfigure / restack the G-5 Idea by shifting the I-20 Mainlines to the south. (lower the I-20 profile)	See Idea G-5	X
I	Turnaround Bridges		
I-1	Eliminate the turnaround bridges and let the traffic turn around at the Interchange cross streets.	Interchanges only about 1-mile apart, Frontage roads operating without them today, Increase Interchange congestion,	✓
I-2	Eliminate the Texas U-turn portion of the crossovers.		✓
I-3	Eliminate the dual roundabouts and use standard T intersections.	Reduce R/W take,	✓
I-4	Use an elongated single roundabout in-lieu-of a double roundabout configuration.	Not feasible – eliminate through movement	X
K	SR 27 / US 61N / I-20 Interchange Bridge Widening		
K-1	Shorten the bridge by shifting the I-20 Mainlines and CD Lanes closer together.	Add to Idea C-2	✓
M-	Interchange Construction		
M-1	Reconfigure the SR 27 / US 61N / I-20 Interchange	See Idea A-6	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
M-2	Eliminate the CD Lane Loop Ramp and construct a flyover ramp to carry the NB US 61N traffic.	Not cost effective, Requires more R/W at the tie-in point to US 61N	X
M-3	Eliminate the NB SR 27 to WB I-20 left turn on-ramp and reroute this traffic along Clay Street and through the new Clay Street Loop on-ramp.	Eliminates an access point	X
M-4	Eliminate the CD Lanes at the Clay Street / I-20 and SR 27 / US 61N / I-20 Interchanges.	Concept needed to reconstruct mainline	X
M-5	Construct a Braided Ramp for the north side Clay Street to US 61N Ramp / CD Lanes.	May require more R/W	X
M-6	Review the off-ramp / Frontage Road connections at the Indiana Avenue Interchange to eliminate R/W take.	Rebuild Interchange – Tight Diamond or Single Point	✓
N	North CD Lane Bridge over Clay Street		
N-1	Eliminate the CD Lanes and reduce the bridge width to that needed to carry the new Loop Ramp on traffic.	See Idea M-4	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

CREATIVE PHASE Creative Idea Listing		JUDGMENT PHASE Idea Evaluation	
No.	CREATIVE IDEA	COMMENTS	IDEA RATING
O	Frontage Road Bridges over Old SR 27 and the RR		
O-1	Construct only the wider south bridge.	See Idea R-1	X
R	South CD Lane Bridge over Clay Street		
R-1	Construct and widen the bridge under one contract.	Already in separate contracts	X
R-2	Eliminate the bridge by exiting the CD lanes east of Clay	Possible cost savings	✓
T	Raise the Indiana Avenue Bridge		
T-1	Leave the current bridge in-place and lower the I-20 Mainline roadway.	Negative impact on construction staging	X
T-2	Replace and widen the entire bridge superstructure in one contract.	Extend service life	✓
T-3	Verify the cost to Jack the existing bridge.	Possible cost reduction	DS
Y	Widen the Indiana Avenue Bridge		
Y-1	Widen the bridge at the same time it is Jacked.	Eliminate a construction phase, Better price	✓
Y-2	Eliminate the widening and restripe the bridge using the existing shoulders for the additional lane.	Doesn't meet standards	X
✓ = Will be considered further; X = will be dropped; DS = Design suggestion –written for consideration by design team			

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