

VALUE ENGINEERING PROPOSAL

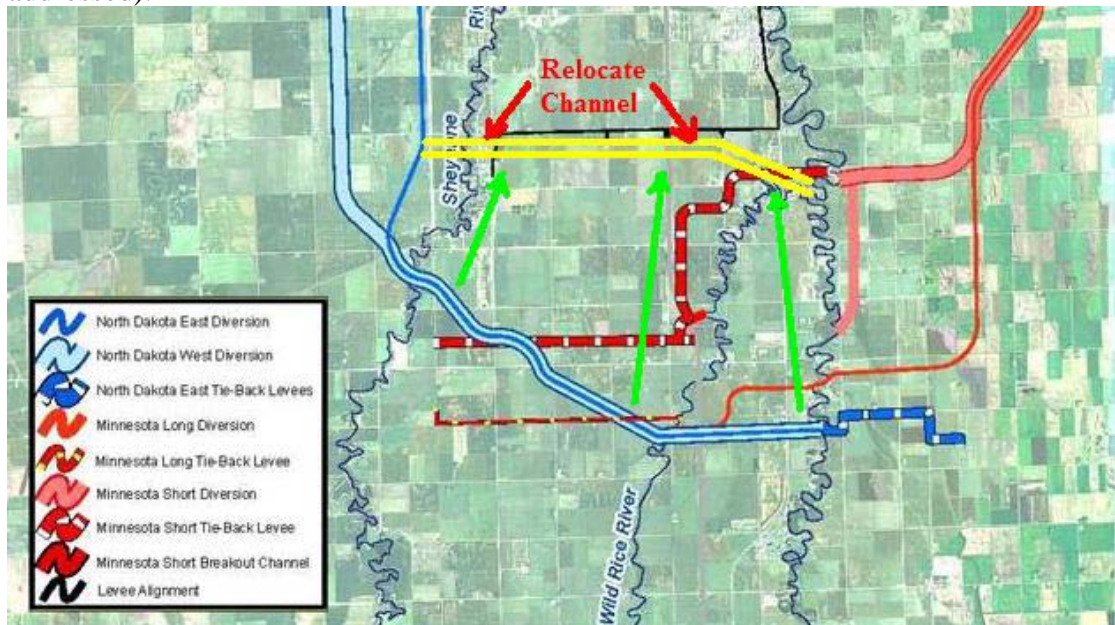
PROPOSAL NO: 3 - REJECTED

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DESCRIPTION: Shorten ND East Diversion

ORIGINAL DESIGN: The North Dakota East Diversion starts at the Red River upstream of the confluence with the Wild Rice River. It intersects the Wild Rice, Sheyenne, Maple, Lower Rush, and Rush Rivers over a total length of 191,948 feet.

PROPOSED DESIGN: Start the diversion just downstream of the confluence of the Red and Wild Rice Rivers. Proceed west to the existing Horace Diversion and join the original design path. This cuts 22,490 feet from the length of the channel, or 11.72% of the length. (Tie back levee issues not addressed).



ADVANTAGES: This eliminates the intersection structures with the Wild Rice River. Because it intersects the Sheyenne River downstream of the Horace Diversion inlet and captures the water from the West Fargo Diversion, it is possible that neither Sheyenne River crossing will require an inlet to the diversion. It shortens the diversion by about 4 miles. It eliminates the railroad bridge near Horace and the 48th Street and 46th Street (and possibly the 44th Street) road bridges. (It does require a second intersection structure with the Sheyenne River.) Because the channel is shorter, there would be less maintenance on the finished channel.

DISADVANTAGES: It significantly reduces the protected area. Because the Sheyenne River is "perched," it might not be possible to start the diversion below the confluence of the Red and the Wild Rice Rivers and flow downhill to the Sheyenne before reaching more heavily developed neighborhoods. Depending on how far the Maple River could back into the Sheyenne, an inlet might be needed at the downstream crossing or below it (after the confluence of the Sheyenne and Maple Rivers).

JUSTIFICATION: Reduced cost- \$140,000,000.

**Note that both the original estimate and this proposal do not include a necessary bridge where U.S. Highway 81 Bus. Crosses proposed channel at the south end of the diversion just west of the Red River. (This will be added to the Comment list as an omission)

COST ESTIMATE WORKSHEET

| Speculation Item # 3 - Realign ND East channel further north | | | | |
|--|-------|----------|----------------------------|----------------------|
| DELETIONS | | | | |
| ITEM | UNITS | QUANTITY | UNIT COST | TOTAL |
| | | | | \$0 |
| Delete Channel construction | ft | 11,000 | \$2,700.00 | \$29,700,000 |
| Delete local inlets | ea | 4 | \$1,100,000.00 | \$4,400,000 |
| Delete Wild Rice diversion structure | | 1 | \$79,978,800.00 | \$79,978,800 |
| Delete Sheyenne Diversion structure | | 1 | \$53,784,500.00 | \$53,784,500 |
| 44th street bridge | ea | 1 | \$2,966,900.00 | |
| 46th street bridge | ea | 1 | \$2,975,800.00 | \$2,975,800 |
| 48th street bridge | ea | 1 | \$2,975,900.00 | \$2,975,900 |
| Railroad bridge | ea | 1 | \$3,571,000.00 | \$3,571,000 |
| Less land acquisition (assume -10%) | acres | 640 | \$6,500.00 | \$4,160,000 |
| | | | | \$0 |
| | | | | \$0 |
| Total Deletions | | | | \$181,546,000 |
| ADDITIONS | | | | |
| ITEM | UNITS | QUANTITY | UNIT COST | TOTAL |
| | | | | \$0 |
| Sheyenne Diversion Structure | ea | 1 | \$55,000,000.00 | \$55,000,000 |
| Real estate (Horace) relocate houses? | acres | 10 | \$300,000.00 | \$3,000,000 |
| | | | | \$0 |
| Total Additions | | | | \$58,000,000 |
| | | | Net Cost Decrease | \$123,546,000 |
| | | | Mark-ups 15.00% | \$18,531,900 |
| Reduces E&D / CM** | | | Total Cost Decrease | \$142,077,900 |