

# **RED RIVER DIVERSION**

## **FARGO – MOORHEAD METRO FLOOD RISK MANAGEMENT PROJECT, FEASIBILITY STUDY, PHASE 4**

### **APPENDIX G – COST ESTIMATES EXHIBIT I – ROAD BRIDGE & ROAD RAISE QUANTITIES**

**Report for the US Army Corps of Engineers, and the cities of Fargo, ND &  
Moorhead, MN**

**By: Barr Engineering Co.**

**FINAL – February 28, 2011**

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**APPENDIX G  
COST ESTIMATES**

**EXHIBIT I – ROAD BRIDGE QUANTITIES**

**G-I1.0 ROAD BRIDGE & ROAD RAISE QUANTITIES**

Attachments G-I1.1 to G-I1.6 of this Exhibit I present roadway bridge cost and road reconstruction cost for the FCP Minnesota Diversion and LPP North Dakota Diversion.

## Exhibit G-I1.0

MN Short Bridge Cost Summary

Houston Engineering Inc.

7/23/2010

MN Short Alignment 35K CFS Bridge Costs Summary									
Bridge #	Location	Bridge Length (ft)	Bridge Deck Area (ft <sup>2</sup> )	Cost per ft <sup>2</sup> Deck Area	Bridge Structure Cost	Existing Structure Removal	Approach Road Cost	Temporary Bypass Cost	Total Cost per Bridge
24	Interstate 29 South Bound	300	13,350	125	\$1,670,000	\$0	\$670,000	\$230,000	\$2,570,000
23	Interstate 29 North Bound	300	13,350	125	\$1,670,000	\$0	\$500,000	\$230,000	\$2,400,000
22	110th Ave. S	420	14,490	115	\$1,670,000	\$0	\$290,000	\$270,000	\$2,230,000
21	US Highway 75	680	34,340	110	\$3,780,000	\$0	\$390,000	\$310,000	\$4,480,000
19	80th Ave. S	680	23,460	110	\$2,580,000	\$0	\$230,000	\$280,000	\$3,090,000
18	60th Ave. S	680	23,460	115	\$2,700,000	\$0	\$70,000	\$240,000	\$3,010,000
17	County-State Highway 52	680	23,460	115	\$2,700,000	\$0	\$70,000	\$240,000	\$3,010,000
15	50th Ave. S	700	24,150	115	\$2,780,000	\$0	\$50,000	\$220,000	\$3,050,000
14	Interstate 94 East Bound	680	30,260	115	\$3,480,000	\$0	\$160,000	\$230,000	\$3,870,000
13	Interstate 94 West Bound	680	30,260	115	\$3,480,000	\$0	\$160,000	\$230,000	\$3,870,000
11	US Highway 10 East Bound	720	32,040	115	\$3,680,000	\$0	\$70,000	\$250,000	\$4,000,000
10	US Highway 10 West Bound	720	32,040	115	\$3,680,000	\$0	\$70,000	\$250,000	\$4,000,000
9	28th Ave. N	1060	36,570	120	\$4,390,000	\$0	\$70,000	\$270,000	\$4,730,000
8	57th Ave. N	700	24,150	115	\$2,780,000	\$0	\$300,000	\$300,000	\$3,380,000
7	40th St. N	700	24,150	115	\$2,780,000	\$0	\$220,000	\$280,000	\$3,280,000
6	90th Ave. N	680	23,460	110	\$2,580,000	\$0	\$400,000	\$320,000	\$3,300,000
5	100th Ave. N	680	23,460	110	\$2,580,000	\$0	\$480,000	\$340,000	\$3,400,000
4	US Highway 75	680	34,340	110	\$3,780,000	\$0	\$560,000	\$350,000	\$4,690,000
2	110th Ave. NW	660	22,770	110	\$2,500,000	\$0	\$500,000	\$340,000	\$3,340,000
1	15th St. NW	640	22,080	110	\$2,430,000	\$0	\$480,000	\$330,000	\$3,240,000
								Total	\$68,940,000





Exhibit - D  
 Bridge Cost Summary

LPP Bridge Costs Summary								
Location	Bridge Length (ft)	Bridge Deck Area (ft <sup>2</sup> )	Cost per ft <sup>2</sup> Deck Area	Bridge Structure Cost	Existing Structure Removal	Approach Road Cost	Temporary Bypass Cost	Total Cost per Bridge
County Road 81	600	23,100	120	\$2,770,000	\$0	\$550,000	\$350,000	\$3,670,000
Interstate 29 North Bound	580	24,650	105	\$2,590,000	\$0	\$840,000	\$230,000	\$3,660,000
Interstate 29 South Bound	580	24,650	105	\$2,590,000	\$0	\$830,000	\$230,000	\$3,650,000
48th St. SE	440	14,300	120	\$1,720,000	\$0	\$460,000	\$320,000	\$2,500,000
170th Ave. SE	640	19,520	125	\$2,440,000	\$0	\$70,000	\$240,000	\$2,750,000
46th St. SE	760	24,700	120	\$2,960,000	\$0	\$70,000	\$250,000	\$3,280,000
44th St. SE	700	21,350	125	\$2,670,000	\$20,000	\$70,000	\$250,000	\$3,010,000
41st St. SE	640	24,640	125	\$3,080,000	\$20,000	\$160,000	\$270,000	\$3,530,000
Interstate 94 East Bound	680	28,900	115	\$3,320,000	\$0	\$140,000	\$230,000	\$3,690,000
Interstate 94 West Bound	680	28,900	115	\$3,320,000	\$0	\$140,000	\$230,000	\$3,690,000
36th St. SE	660	25,410	115	\$2,920,000	\$0	\$130,000	\$260,000	\$3,310,000
33rd St. SE	640	24,640	125	\$3,080,000	\$0	\$200,000	\$280,000	\$3,560,000
31st St. SE	620	18,910	125	\$2,360,000	\$0	\$240,000	\$290,000	\$2,890,000
28th St. SE	620	18,910	120	\$2,270,000	\$0	\$280,000	\$290,000	\$2,840,000
Interstate 29 South Bound	580	24,650	120	\$2,960,000	\$10,000	\$520,000	\$230,000	\$3,720,000
Interstate 29 North Bound	580	24,650	120	\$2,960,000	\$10,000	\$530,000	\$230,000	\$3,730,000
County Road 81	580	22,330	120	\$2,680,000	\$10,000	\$360,000	\$310,000	\$3,360,000
25th St. SE	580	18,850	120	\$2,260,000	\$0	\$340,000	\$300,000	\$2,900,000
173rd Ave. SE	600	18,300	120	\$2,200,000	\$0	\$370,000	\$310,000	\$2,880,000
							Total	\$62,620,000

#### Assumptions for LPP Bridge Cost Summary:

- The superstructures for all bridges are prestressed concrete girders with cast in place concrete decks.
- Pile termination estimated to be 100 feet below existing grade (consistent w/ bridges in the area)
- Channel has 7:1 slopes with a 250' channel bottom (100' channel bottom on 48<sup>th</sup> St. Bridge)
- Freeboard to be 3'-0' above 500-year water surface
- Superstructure depth of approximately 5'-5" (54" prestressed girders w/ 11" deck/risers)
- Bridge lengths for bridges with a deck elevation lower than the existing ground were based on matching the bridge deck to the existing ground elevations
- Cost estimates include cost for grade raises for bridge sites that require building a bridge above existing ground elevations based on required freeboard. Maximum longitudinal CL grade assumed to be 2.5% for highways.
- Bridge lengths rounded to the nearest 20'
- Pier heights for each bridge were assumed to be the same independent of channel slope for estimating purposes
- Cost estimates include cost to construct a temporary bypass or crossover
- Approach costs for each bridge were included in the estimate. These costs include pavement, guardrail, aggregate base, embankment, and other misc. costs.
- Bridges for Cass CR 17 and CR 16 were checked to meet SA1 levee elevations. Bridge deck elevations were already above levee elevations so no changes were needed.
- 25<sup>th</sup> St. SE bridge width based on width of bridge over I-29 two miles to the west
- Co. Rd. 81 width assumed with 6' shoulders based on ADT
- Estimated 36' bridge width on Co. Roads w/ estimated higher ADT's and existing road widths
- Contingencies are not included in the bridge cost summary

**Local Preferred Plan (Phase 4)**
**Route: I-29 Road Raise**

	Bid Item Quantities	Unit	Unit Cost	Estimated Price
Reconstruct Northbound Roadway	4.10	Mile	\$ 1,400,000	\$ 5,740,000
Reconstruct Southbound Roadway	4.10	Mile	\$ 1,400,000	\$ 5,740,000
Embankment	1,610,293	CYD	\$ 7	\$ 11,273,000
Cass 18 Overpass Structure		Replacement		\$ 1,307,000
Ramp Reconstruction	1	Lump		\$ 516,000
				Subtotal = \$ 24,576,000

**Route: Hwy. 75 Road Raise**

	Bid Item Quantities	Unit	Unit Cost	Estimated Price
Estimated HBP Pvmnt	15,900	TON	\$ 60	\$ 954,000
Estimated Agg. Base Course	64,000	TON	\$ 13	\$ 832,000
Estimated Pavement Removal 1	38,000	TON	\$ 13	\$ 494,000
Estimated Pavement Removal 2	84,000	SY	\$ 7	\$ 588,000
Replace Centerline Pipes	3.00	Mile	\$ 8,000	\$ 24,000
Embankment	1,445,289	CYD	\$ 7	\$ 10,118,000
9.5'x8' Box Culvert over Ditch 36	48	LF	\$ 3,060	\$ 147,000
Double 18'x12' Box Culvert over Wolverton Creek	94	LF	\$ 5,000	\$ 470,000
				Subtotal = \$ 13,627,000

**Route: Rail Road Road Raise**

	Bid Item Quantities	Unit	Unit Cost	Estimated Price
Surfacing	13.00	Mile	\$ 7,500	\$ 98,000
Ballast	13.00	Mile	\$ 19,300	\$ 251,000
At Grade Crossing	3	Each	\$ 50,000	\$ 150,000
Culvert Extension	3	Lump	\$ 50,000	\$ 150,000
Shoulder Widening	11,500	CYD	\$ 20	\$ 230,000
				Subtotal = \$ 879,000

**General Items**

	Bid Item Quantities	Unit	Unit Cost	Estimated Price
Traffic Control	1	Lump	\$ 150,000	\$ 150,000
Right of Way	13.92	Acre	\$ 3,500	\$ 49,000
Seeding & Erosion Control	1	Lump	\$ 100,000	\$ 100,000
				Subtotal = \$ 299,000

Total Costs = \$39,381,000

Road Raise Quantities for Levees

		124th Ave. S.	49th Ave. S.	50th Ave. S.	51st Ave. S.
Fill Quantity (cyd):	CY	1300	1200	150	55
Unit price (\$/cyd):	\$ 10.00	\$ 13,000.00	\$ 12,000.00	\$ 1,500.00	\$ 550.00
Base Layer Quantity/Gravel Surface (CYD):	CY	350	250	250	250
Unit price (\$/cyd):	\$ 36.00	\$ 12,600.00	\$ 9,000.00	\$ 9,000.00	\$ 9,000.00
Asphalt Quantity (ton):	Ton	200	0	0	0
Unit Price (\$/ton):	\$ 50.00	\$ 10,000.00	\$ -	\$ -	\$ -
Removal of Pavement (SY)	SY	900	0	0	0
	\$ 5.00	\$ 4,500.00	\$ -	\$ -	\$ -
		\$ 40,100.00	\$ 21,000.00	\$ 10,500.00	\$ 9,550.00
<b>ND Road Raise for LPP HWY 17 Tie Back Levees</b>	<b>\$ 81,150.00</b>				

PD = Private Drive

		CR 59	HWY 75	RR	28th St. S	Co. Hwy. 7 (40th St. S)	50th St. S	130 Ave. off HWY 75	130 Ave. off RR	PD off 130 Ave. E of RR	
Fill Quantity (cyd):	CY	30,400	20,850	35,450	23,400	9,000	5,050	150	10,350	14,700	275
Unit price (\$/cyd):	\$ 10.00	\$ 304,000.00	\$ 208,500.00	\$ 354,500.00	\$ 234,000.00	\$ 90,000.00	\$ 50,500.00	\$ 1,500.00	\$ 103,500.00	\$ 147,000.00	\$ 2,750.00
Base Layer Quantity/Gravel Surface (CYD):	CY	1,150	1,750	0	1,050	800	700	25	850	900	30
Unit price (\$/cyd):	\$ 36.00	\$ 41,400.00	\$ 63,000.00	\$ -	\$ 37,800.00	\$ 28,800.00	\$ 25,200.00	\$ 900.00	\$ 30,600.00	\$ 32,400.00	\$ 1,080.00
Asphalt Quantity (ton):	Ton	0	1000	0	0	0	0	0	0	0	0
Unit Price (\$/ton):	\$ 50.00	\$ -	\$ 50,000.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Removal of Pavemnt (SY)	SY	0	4550	0	0	0	0	0	0	0	0
Unit Price (\$/SY):	\$ 5.00	\$ -	\$ 22,750.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
		\$ 345,400.00	\$ 344,250.00	\$ 354,500.00	\$ 271,800.00	\$ 118,800.00	\$ 75,700.00	\$ 2,400.00	\$ 134,100.00	\$ 179,400.00	\$ 3,830.00
<b>MN Road Raise for LPP Tie Back Levees</b>	<b>\$ 1,830,180.00</b>										

		Cass 16 East	Cass 21
Fill Quantity (cyd):	CY	38500	48000
Unit price (\$/cyd):	\$ 10.00	\$ 385,000.00	\$ 480,000.00
Base Layer Quantity/Gravel Surface (CYD):	CY	2100	4550
Unit price (\$/cyd):	\$ 36.00	\$ 75,600.00	\$ 163,800.00
Asphalt Quantity (ton):	Ton	1200	2600
Unit Price (\$/ton):	\$ 50.00	\$ 60,000.00	\$ 130,000.00
Removal of Pavement (SY)	SY	5450	150
	\$ 5.00	\$ 27,250.00	\$ 750.00
		\$ 547,850.00	\$ 774,550.00
<b>ND Road Raises for LPP SA1 Levees</b>	<b>\$ 1,322,400.00</b>		

New Cass 21 Alignment goes around east side of development and starts curve to tie back into existing Cass 21 alignment 1,560' North of levee.

Cass 16 West Crossing is incorporated into Bridge Costs