

Appendix H

Potential Project Cost Estimates

COLORADO HIGHWAY 71 *(Limon north to Colorado/Nebraska state line)* TRUCK FREIGHT DIVERSION FEASIBILITY STUDY

PREPARED FOR:



*CDOT Region 4
10601 W. 10th Street
Greeley, CO 80634*

PREPARED BY:

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Project No.	MP From	MP To	Description	Project Type	Length (miles) or Units	Planning-Level Project Cost	
						Low Range	High Range
1	101.97	103.64	New bypass	6	1.67	\$ 14,400,000	\$ 25,410,000
2	102	108	Pavement rehab	1	6.00	\$ 3,060,000	\$ 7,980,000
3	102.3	102.3	Bridge repair	7	1	\$ 680,000	\$ 990,000
4	107.5	108.3	Pavement rehab	1	0.80	\$ 410,000	\$ 1,070,000
5	108.3	111.2	Pavement rehab, add shoulders	2	2.90	\$ 4,380,000	\$ 8,360,000
6	108.5	110.5	Passing lanes both directions	4	2.00	\$ 6,100,000	\$ 8,440,000
7	111.45	112.2	Climbing lane	5	0.75	\$ 2,010,000	\$ 2,920,000
8	112.3	113	Pavement rehab, add shoulders	2	0.70	\$ 1,060,000	\$ 2,020,000
9	114.9	115.9	Pavement rehab, add shoulders	2	1.00	\$ 1,510,000	\$ 2,880,000
10	119.5	120.3	Passing lanes both directions	4	0.80	\$ 2,440,000	\$ 3,380,000
11	125.15	126	Passing lanes both directions	4	0.85	\$ 2,600,000	\$ 3,590,000
12	130.3	131.05	Climbing lane	5	0.75	\$ 2,010,000	\$ 2,920,000
13	132.3	133.75	Climbing lane	5	1.45	\$ 3,890,000	\$ 5,650,000
14	138.01	138.01	Intersection improvement US 36	9	1	\$ 760,000	\$ 1,120,000
15	139.43	139.43	Bridge replacement	8	1	\$ 2,630,000	\$ 5,050,000
16	140.15	140.9	Passing lane	3	0.75	\$ 1,760,000	\$ 2,700,000
17	147.64	147.64	Bridge replacement	8	1	\$ 2,630,000	\$ 5,050,000
18	147.65	147.85	Pavement rehab, add shoulders	2	0.20	\$ 310,000	\$ 580,000
19	149.2	149.95	Passing lanes both directions	4	0.75	\$ 2,290,000	\$ 3,170,000
20	153.44	173.52	Pavement rehab, add shoulders	2	20.08	\$30,330,000	\$ 57,840,000
21	156.3	156.6	Pavement rehab, add shoulders	2	0.30	\$ 460,000	\$ 870,000
22	157.1	157.85	Passing lanes both directions	4	0.75	\$ 2,290,000	\$ 3,170,000
23	158.94	159.27	Pavement rehab, add shoulders	2	0.33	\$ 500,000	\$ 960,000
24	161.42	164.42	Pavement rehab, add shoulders	2	3.00	\$ 4,530,000	\$ 8,640,000
25	165.25	166.45	Pavement rehab, add shoulders	2	1.20	\$ 1,820,000	\$ 3,460,000
26	165.72	165.72	Bridge replacement	8	1	\$ 2,630,000	\$ 5,050,000
27	166.28	167.3	Pavement rehab	1	1.02	\$ 530,000	\$ 1,360,000
28	170.5	171.25	Passing lane	3	0.75	\$ 1,760,000	\$ 2,700,000
29	171.63	172.5	Pavement rehab, add shoulders	2	0.87	\$ 1,320,000	\$ 2,510,000
30	173.52	173.52	Intersection improvement MCR R	10	1	\$ 1,120,000	\$ 1,630,000
31	174.36	178	New bypass	6	3.64	\$31,380,000	\$ 55,370,000

Notes:

1. Planning-level cost estimates include construction and contingencies for design, construction engineering, ROW and utilities.
2. See cost estimate worksheets for assumptions for each project type and determination of unit costs.
3. All projects include contingencies for signing/stripping upgrades.

Notes (cont'd):

4. Unit costs:

Description	Type	Low Unit Cost	High Unit Cost	
Pavement rehab	1	\$ 510,000	\$ 1,330,000	per mile
Pavement rehab, add shoulders	2	\$ 1,510,000	\$ 2,880,000	per mile
Passing lane	3	\$ 2,340,000	\$ 3,600,000	per mile
Passing lanes both directions	4	\$ 3,050,000	\$ 4,220,000	per mile
Climbing lane	5	\$ 2,680,000	\$ 3,890,000	per mile
New bypass	6	\$ 8,620,000	\$15,210,000	per mile
Bridge repair	7	\$ 680,000	\$ 990,000	per bridge
Bridge replacement	8	\$ 2,630,000	\$ 5,050,000	per bridge
Intersection improvement US 36	9	\$ 760,000	\$ 1,120,000	
Intersection improvement MCR R	10	\$ 1,120,000	\$ 1,630,000	
4 lanes with center turn lane*	11	\$ 4,320,000	\$ 5,910,000	per mile
Add 8' shoulders only	12	\$ 980,000	\$ 1,521,000	per mile
Interstate freeway**	13	\$18,250,000	\$24,740,000	per mile

* Widening assumes 8' shoulders already in place.

** Interchange and overpass costs prorated to a per-mile basis.

**SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 1 - Pavement Rehab Cost Per Mile - Low End (Mill/Overlay)**

Benesch 8/14/2019

Assume: Mill & 2" overlay on existing lanes. 26' width. No earthwork or ROW. Minimal drainage work.

New pavement area 0 SY per mile
Mill/overlay area 15253 SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	15,253	\$3	\$45,760	
Embankment Material (CIP)	CY	0	\$14	\$0	
Aggregate Base Course (Class 6)	CY	0	\$50	\$0	
Hot Mix Asphalt	Ton	1,708	\$80	\$136,670	
				\$0	
				\$0	
				\$0	
Total of Quantity Items				\$182,430	
Total of Quantity Items	Project Dependent		N/A	\$182,430	(A)
Contingencies	(15% - 30%) of (A)		25.00%	\$45,607	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		3.00%	\$6,841	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		3.00%	\$6,841	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$11,402	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		25.00%	\$57,009	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$21,709	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$331,840	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$39,821	(J)
Subtotal of Construction Cost	(H+I+J)			\$371,661	(K)
Design Engineering	% of (K)		15.00%	\$55,749	(L)
Construction Engineering	% of (K)		22.00%	\$81,765	(M)
Right of Way	Acre	0.00	\$5,000.00	\$0	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$509,175	(O)

**SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 1 - Pavement Rehab Cost Per Mile - High End (FDR)**

Benesch

8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes. 26' width. No earthwork or ROW. Minimal drainage work.

New pavement area 0

FDR area 15253

SY per mile

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760
Embankment Material (CIP)	CY	0	\$14	\$0
Aggregate Base Course (Class 6)	CY	0	\$50	\$0
Hot Mix Asphalt	Ton	5,125	\$80	\$410,010
				\$0
				\$0
				\$0
Total of Quantity Items				\$455,770
	% Range		% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$455,770
Contingencies	(15% - 30%) of (A)		30.00%	\$136,731
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		3.00%	\$17,775
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		3.00%	\$17,775
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$29,625
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		25.00%	\$148,125
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$56,406
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$862,207
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$103,465
Subtotal of Construction Cost	(H+I+J)			\$965,672
Design Engineering	% of (K)		15.00%	\$144,851
Construction Engineering	% of (K)		22.00%	\$212,448
Right of Way	Acre	0.00	\$5,000.00	\$0
Total Project Cost	(K+L+M+N)		Cost per mile	\$1,322,970

(A)
(B)
(C)
(D)
(E)
(F)
(G)
(H)
(I)
(J)
(K)
(L)
(M)
(N)
(O)

SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 2 - Pavement Rehab & Add Shoulders Cost Per Mile - Low End (Mill/Overlay)

Benesch 8/14/2019

Assume: Mill & 2" overlay on existing lanes (26' width). Widen 7' each side to create 8' shoulders. 6" HMA / 6" ABC. Typical sideslope of 2' fill height at 4:1. No ROW.

New pavement area 8213
Mill/overlay area 15253

SY per mile
SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	15,253	\$3	\$45,760	
Embankment Material (CIP)	CY	4,498	\$14	\$62,969	
Aggregate Base Course (Class 6)	CY	1,369	\$50	\$68,444	
Hot Mix Asphalt	Ton	4,468	\$80	\$357,444	
Rumble Strip (Grinding) (Asphalt)	LF	8,448	\$0.50	\$4,224	
				\$0	
				\$0	
Total of Quantity Items				\$538,842	
		% Range	% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$538,842	(A)
Contingencies	(15% - 30%) of (A)		25.00%	\$134,710	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$33,678	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$40,413	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$33,678	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$134,710	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$64,122	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$980,153	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$117,618	(J)
Subtotal of Construction Cost	(H+I+J)			\$1,097,771	(K)
Design Engineering	% of (K)		15.00%	\$164,666	(L)
Construction Engineering	% of (K)		22.00%	\$241,510	(M)
Right of Way	Acre	0.00	\$5,000.00	\$0	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$1,503,947	(O)

SH 71 Corridor Potential Projects Planning-Level Cost Estimates Project Type 2 - Pavement Rehab & Add Shoulders Cost Per Mile - High End (FDR)

Benesch 8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes (26' width). Widen 7' each side to create 8' shoulders. 6" HMA / 6" ABC. Typical sideslope of 4' fill height at 4:1. Assume 1/4 mile of 20' ROW acquisition needed.

New pavement area 8213 SY per mile
FDR area 15253 SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760
Embankment Material (CIP)	CY	16,622	\$14	\$232,711
Aggregate Base Course (Class 6)	CY	1,369	\$50	\$68,444
Hot Mix Asphalt	Ton	7,885	\$80	\$630,784
Rumble Strip (Grinding) (Asphalt)	LF	8,448	\$0.50	\$4,224
				\$0
				\$0
Total of Quantity Items				\$981,924
	% Range		% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$981,924 (A)
Contingencies	(15% - 30%) of (A)		30.00%	\$294,577 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$63,825 (C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		6.00%	\$76,590 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$63,825 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$255,300 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$121,523 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$1,857,564 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		1.00%	\$18,576 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$222,908 (J)
Subtotal of Construction Cost	(H+I+J)			\$2,099,047 (K)
Design Engineering	% of (K)		15.00%	\$314,857 (L)
Construction Engineering	% of (K)		22.00%	\$461,790 (M)
Right of Way	Acre	0.61	\$5,000.00	\$3,030 (N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$2,878,725 (O)

**SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 3 - Passing Lane Cost Per Mile - Low End (Mill/Overlay on Existing)**

Benesch 8/14/2019

Assume: Mill & 2" overlay on existing lanes (26' width). Widen 15' one side to create additional 12' lane and 4' shoulder. Widen 7' other side to create 8' shoulder. 6" HMA / 6" ABC. Typical sideslope of 3' fill height at 4:1. Acquire 20' new ROW width on one side to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 12907
Mill/overlay area 15253

SY per mile
SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	15,253	\$3	\$45,760	
Embankment Material (CIP)	CY	12,907	\$14	\$180,693	
Aggregate Base Course (Class 6)	CY	2,151	\$50	\$107,556	
Hot Mix Asphalt	Ton	6,045	\$80	\$483,601	
Rumble Strip (Grinding) (Asphalt)	LF	4,224	\$0.50	\$2,112	
				\$0	
				\$0	
Total of Quantity Items				\$819,722	
	% Range		% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$819,722	(A)
Contingencies	(15% - 30%) of (A)		25.00%	\$204,930	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$51,233	(C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		6.00%	\$61,479	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$51,233	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$204,930	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$97,547	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$1,491,074	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$29,821	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$178,929	(J)
Subtotal of Construction Cost	(H+I+J)			\$1,699,825	(K)
Design Engineering	% of (K)		15.00%	\$254,974	(L)
Construction Engineering	% of (K)		22.00%	\$373,961	(M)
Right of Way	Acre	2.42	\$5,000.00	\$12,121	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$2,340,881	(O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 3 - Passing Lane Cost Per Mile - High End (FDR on Existing)

Benesch 8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes (26' width). Widen 15' one side to create additional 12' lane and 4' shoulder. Widen 7' other side to create 8' shoulder. 6" HMA / 6" ABC. Typical sideslope of 4' fill height at 4:1. Acquire 25' new ROW width on one side to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 12907
FDR area 15253

SY per mile
SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760	
Embankment Material (CIP)	CY	21,316	\$14	\$298,418	
Aggregate Base Course (Class 6)	CY	2,151	\$50	\$107,556	
Hot Mix Asphalt	Ton	9,462	\$80	\$756,941	
Rumble Strip (Grinding) (Asphalt)	LF	4,224	\$0.50	\$2,112	
				\$0	
				\$0	
Total of Quantity Items				\$1,210,786	
	% Range		% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$1,210,786	(A)
Contingencies	(15% - 30%) of (A)		30.00%	\$363,236	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$78,701	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$94,441	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$78,701	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$314,804	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$149,847	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$2,290,517	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$45,810	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$274,862	(J)
Subtotal of Construction Cost	(H+I+J)			\$2,611,189	(K)
Design Engineering	% of (K)		15.00%	\$391,678	(L)
Construction Engineering	% of (K)		22.00%	\$574,462	(M)
Right of Way	Acre	3.03	\$5,000.00	\$15,152	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$3,592,481	(O)

SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 4 - Passing Lane Both Directions Cost Per Mile - Low End (M/O on Existing)

Benesch

8/14/2019

Assume: Mill & 2" overlay on existing lanes (26' width). Widen 15' both sides to create additional 12' lane and 4' shoulder. 6" HMA / 6" ABC. Typical sideslope of 3' fill height at 4:1. Acquire 20' new ROW width both sides to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 17600

SY per mile

Mill/overlay area 15253

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	15,253	\$3	\$45,760	
Embankment Material (CIP)	CY	18,773	\$14	\$262,827	
Aggregate Base Course (Class 6)	CY	2,933	\$50	\$146,667	
Hot Mix Asphalt	Ton	7,622	\$80	\$609,758	
Rumble Strip (Grinding) (Asphalt)	LF		\$0.50	\$0	
				\$0	
				\$0	
Total of Quantity Items				\$1,065,011	
	% Range		% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$1,065,011	(A)
Contingencies	(15% - 30%) of (A)		25.00%	\$266,253	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$66,563	(C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		6.00%	\$79,876	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$66,563	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$266,253	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$126,736	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$1,937,255	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$38,745	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$232,471	(J)
Subtotal of Construction Cost	(H+I+J)			\$2,208,471	(K)
Design Engineering	% of (K)		15.00%	\$331,271	(L)
Construction Engineering	% of (K)		22.00%	\$485,864	(M)
Right of Way	Acre	4.85	\$5,000.00	\$24,242	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$3,049,848	(O)

SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 4 - Passing Lane Both Directions Cost Per Mile - High End (FDR on Existing)

Benesch

8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes (26' width). Widen 15' both sides to create additional 12' lane and 4' shoulder. 6" HMA / 6" ABC. Typical sideslope of 4' fill height at 4:1. Acquire 25' new ROW width both sides to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 17600

SY per mile

FDR area 15253

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760
Embankment Material (CIP)	CY	24,249	\$14	\$339,484
Aggregate Base Course (Class 6)	CY	2,933	\$50	\$146,667
Hot Mix Asphalt	Ton	11,039	\$80	\$883,098
Rumble Strip (Grinding) (Asphalt)	LF		\$0.50	\$0
				\$0
				\$0
Total of Quantity Items				\$1,415,009
	% Range		% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$1,415,009 (A)
Contingencies	(15% - 30%) of (A)		30.00%	\$424,503 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$91,976 (C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		6.00%	\$110,371 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$91,976 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$367,902 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$175,121 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$2,676,857 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$53,537 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$321,223 (J)
Subtotal of Construction Cost	(H+I+J)			\$3,051,617 (K)
Design Engineering	% of (K)		15.00%	\$457,743 (L)
Construction Engineering	% of (K)		22.00%	\$671,356 (M)
Right of Way	Acre	6.06	\$5,000.00	\$30,303 (N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$4,211,018 (O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 5 - Climbing Lane Cost Per Mile - Low End (Mill/Overlay on Existing)

Benesch 8/14/2019

Assume: Mill & 2" overlay on existing lanes (26' width). Widen 15' one side to create additional 12' lane and 4' shoulder. Widen 7' other side to create 8' shoulder. 6" HMA / 6" ABC. Typical sideslope of 4' fill height at 4:1. Acquire 20' new ROW width on one side to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 12907
 Mill/overlay area 15253

SY per mile
 SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	15,253	\$3	\$45,760	
Embankment Material (CIP)	CY	21,316	\$14	\$298,418	
Aggregate Base Course (Class 6)	CY	2,151	\$50	\$107,556	
Hot Mix Asphalt	Ton	6,045	\$80	\$483,601	
Rumble Strip (Grinding) (Asphalt)	LF	4,224	\$0.50	\$2,112	
				\$0	
				\$0	
Total of Quantity Items				\$937,446	
		% Range	% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$937,446	(A)
Contingencies	(15% - 30%) of (A)		25.00%	\$234,362	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$58,590	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$70,308	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$58,590	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$234,362	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$111,556	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$1,705,215	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$34,104	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$204,626	(J)
Subtotal of Construction Cost	(H+I+J)			\$1,943,945	(K)
Design Engineering	% of (K)		15.00%	\$291,592	(L)
Construction Engineering	% of (K)		22.00%	\$427,668	(M)
Right of Way	Acre	2.42	\$5,000.00	\$12,121	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$2,675,326	(O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 5 - Climbing Lane Cost Per Mile - High End (FDR on Existing)

Benesch 8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes (26' width). Widen 15' one side to create additional 12' lane and 4' shoulder. Widen 7' other side to create 8' shoulder. 6" HMA / 6" ABC. Typical sideslope of 5' fill height at 4:1. Acquire 30' new ROW width on one side to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 12907 SY per mile
 FDR area 15253 SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760
Embankment Material (CIP)	CY	28,356	\$14	\$396,978
Aggregate Base Course (Class 6)	CY	2,151	\$50	\$107,556
Hot Mix Asphalt	Ton	9,462	\$80	\$756,941
Rumble Strip (Grinding) (Asphalt)	LF	4,224	\$0.50	\$2,112
				\$0
				\$0
Total of Quantity Items				\$1,309,346
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$1,309,346
Contingencies	(15% - 30%) of (A)		30.00%	\$392,804
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$85,107
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		6.00%	\$102,129
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$85,107
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$340,430
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$162,045
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$2,476,969
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$49,539
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$297,236
Subtotal of Construction Cost	(H+I+J)			\$2,823,744
Design Engineering	% of (K)		15.00%	\$423,562
Construction Engineering	% of (K)		22.00%	\$621,224
Right of Way	Acre	3.64	\$5,000.00	\$18,182
Total Project Cost	(K+L+M+N)		Cost per mile	\$3,886,711

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SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 6 - New Bypass Road Cost Per Mile - Low End

Benesch

8/14/2019

Assume: New 40' wide roadway (8-12-12-8). 6" HMA / 6" ABC. Fill of 2' under roadway prism. Acquire 150' new ROW width. Assume one 200' bridge (43' wide with rails) for creek or railroad crossing.

New pavement area 23467

SY per mile

Mill/overlay area

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost		
Removal of Asphalt Mat (Planing)	SY	0	\$3	\$0		
Embankment Material (CIP)	CY	15,644	\$14	\$219,022		
Aggregate Base Course (Class 6)	CY	3,911	\$50	\$195,556		
Hot Mix Asphalt	Ton	7,885	\$80	\$630,784		
Rumble Strip (Grinding) (Asphalt)	LF	8,448	\$0.50	\$4,224		
Bridge Structure	SF	8,600	\$250	\$2,150,000		
				\$0		
Total of Quantity Items				\$3,199,586		
			% Range	% Used	Cost	
Total of Quantity Items	Project Dependent		N/A		\$3,199,586	(A)
Contingencies	(15% - 30%) of (A)		25.00%		\$799,896	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%		\$199,974	(C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		8.00%		\$319,959	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%		\$199,974	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		5.00%		\$199,974	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%		\$344,355	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)				\$5,263,719	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%		\$105,274	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%		\$631,646	(J)
Subtotal of Construction Cost	(H+I+J)				\$6,000,639	(K)
Design Engineering	% of (K)		20.00%		\$1,200,128	(L)
Construction Engineering	% of (K)		22.00%		\$1,320,141	(M)
Right of Way	Acre	18.18	\$5,000.00		\$90,909	(N)
Total Project Cost	(K+L+M+N)			Cost per mile	\$8,611,817	(O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 6 - New Bypass Road Cost Per Mile - High End

Benesch

8/14/2019

Assume: New 40' wide roadway (8-12-12-8). 6" HMA / 6" ABC. Fill of 3' under roadway prism. Acquire 150' new ROW width. Assume two 200' bridges (43' wide with rails) for creek or railroad crossing.

New pavement area 23467

SY per mile

Mill/overlay area

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	0	\$3	\$0
Embankment Material (CIP)	CY	23,467	\$14	\$328,533
Aggregate Base Course (Class 6)	CY	3,911	\$50	\$195,556
Hot Mix Asphalt	Ton	7,885	\$80	\$630,784
Rumble Strip (Grinding) (Asphalt)	LF	8,448	\$0.50	\$4,224
Bridge Structure	SF	17,200	\$250	\$4,300,000
				\$0
Total of Quantity Items				\$5,459,097
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$5,459,097
Contingencies	(15% - 30%) of (A)		30.00%	\$1,637,729
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$354,841
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		8.00%	\$567,746
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$354,841
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		5.00%	\$354,841
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$611,037
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$9,340,133
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$186,803
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$1,120,816
Subtotal of Construction Cost	(H+I+J)			\$10,647,751
Design Engineering	% of (K)		20.00%	\$2,129,550
Construction Engineering	% of (K)		22.00%	\$2,342,505
Right of Way	Acre	18.18	\$5,000.00	\$90,909
Total Project Cost	(K+L+M+N)		Cost per mile	\$15,210,716

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SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 7 - Bridge Repair (SH 71 Over I-70) - Low End

Benesch

8/14/2019

Assume: 300' long bridge, 36' wide. Assume Class 1 deck removal and repair for one-quarter of bridge deck area. 3" HMA overlay. New expansion joints. Remove and replace bridge rail. Remove and replace approach guardrail.

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	1,200	\$3	\$3,600
Removal of Bridge Deck (Class 1)	SY	300	\$200	\$60,000
Removal of Bridge Railing	LF	600	\$40	\$24,000
Hot Mix Asphalt	Ton	67	\$80	\$5,376
Concrete Class D (Bridge)	CY	16	\$750	\$12,000
Waterproofing Membrane	SY	1,200	\$20	\$24,000
Bridge Expansion Device (0-4 Inch)	LF	96	\$280	\$26,880
Guardrail Type 3	LF	600	\$30	\$18,000
Transition Type 3G	EA	4	\$2,800	\$11,200
End Anchorage (Flared)	EA	4	\$3,000	\$12,000
Bridge Rail Type 10	LF	600	\$175	\$105,000
				\$0
Total of Quantity Items				\$302,056
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$302,056 (A)
Contingencies	(15% - 30%) of (A)		15.00%	\$45,308 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		2.00%	\$6,947 (C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		0.00%	\$0 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		2.00%	\$6,947 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		15.00%	\$52,105 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$28,935 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$442,299 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$53,076 (J)
Subtotal of Construction Cost	(H+I+J)			\$495,375 (K)
Design Engineering	% of (K)		15.00%	\$74,306 (L)
Construction Engineering	% of (K)		22.00%	\$108,982 (M)
Right of Way	Acre		\$5,000.00	\$0 (N)
Total Project Cost	(K+L+M+N)		Cost per bridge	\$678,664 (O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 7 - Bridge Repair (SH 71 Over I-70) - High End

Benesch

8/14/2019

Assume: 300' long bridge, 36' wide. Assume Class 1 deck removal and repair for one-half of bridge deck area. 3" HMA overlay. New expansion joints. Remove and replace bridge rail. Remove and replace approach guardrail. Add high contingency for other miscellaneous repairs.

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	1,200	\$3	\$3,600
Removal of Bridge Deck (Class 1)	SY	600	\$200	\$120,000
Removal of Bridge Railing	LF	600	\$40	\$24,000
Hot Mix Asphalt	Ton	67	\$80	\$5,376
Concrete Class D (Bridge)	CY	32	\$750	\$24,000
Waterproofing Membrane	SY	1,200	\$20	\$24,000
Bridge Expansion Device (0-4 Inch)	LF	96	\$280	\$26,880
Guardrail Type 3	LF	600	\$30	\$18,000
Transition Type 3G	EA	4	\$2,800	\$11,200
End Anchorage (Flared)	EA	4	\$3,000	\$12,000
Bridge Rail Type 10	LF	600	\$175	\$105,000
				\$0
Total of Quantity Items				\$374,056
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$374,056 (A)
Contingencies	(15% - 30%) of (A)		35.00%	\$130,920 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		2.00%	\$10,100 (C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		0.00%	\$0 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		2.00%	\$10,100 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		15.00%	\$75,746 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$42,064 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$642,985 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$77,158 (J)
Subtotal of Construction Cost	(H+I+J)			\$720,144 (K)
Design Engineering	% of (K)		15.00%	\$108,022 (L)
Construction Engineering	% of (K)		22.00%	\$158,432 (M)
Right of Way	Acre		\$5,000.00	\$0 (N)
Total Project Cost	(K+L+M+N)		Cost per bridge	\$986,597 (O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 8 - Bridge Replacement - Low End

Benesch

8/14/2019

Assume: Remove existing bridge. 250' approach road work each end. 6" HMA / 6" ABC. Assume 100' bridge (43' wide with rails) for creek crossing.

New pavement area 2222

SY

Mill/overlay area

SY

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	0	\$3	\$0
Removal of Bridge	EA	1	\$75,000	\$75,000
Embankment Material (CIP)	CY	1,778	\$14	\$24,889
Aggregate Base Course (Class 6)	CY	370	\$50	\$18,519
Hot Mix Asphalt	Ton	747	\$80	\$59,733
Guardrail Type 3	LF	600	\$30	\$18,000
Transition Type 3G	EA	4	\$2,800	\$11,200
End Anchorage (Flared)	EA	4	\$3,000	\$12,000
Rumble Strip (Grinding) (Asphalt)	LF	800	\$0.50	\$400
Bridge Structure	SF	4,300	\$200	\$860,000
				\$0
Total of Quantity Items				\$1,079,741
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$1,079,741
Contingencies	(15% - 30%) of (A)		15.00%	\$161,961
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		4.00%	\$49,668
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		3.00%	\$37,251
Signing and Striping	(1-5%) of (A+B) Default = 5%		2.00%	\$24,834
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$248,340
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$112,126
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$1,713,921
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$205,671
Subtotal of Construction Cost	(H+I+J)			\$1,919,592
Design Engineering	% of (K)		15.00%	\$287,939
Construction Engineering	% of (K)		22.00%	\$422,310
Right of Way	Acre		\$5,000.00	\$0
Total Project Cost	(K+L+M+N)		Cost per bridge	\$2,629,840

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SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 8 - Bridge Replacement - High End

Benesch

8/14/2019

Assume: Remove existing bridge. 400' approach road work each end. 6" HMA / 6" ABC. Assume 200' bridge (43' wide with rails) for creek crossing.

New pavement area 3556

SY

Mill/overlay area

SY

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	0	\$3	\$0
Removal of Bridge	EA	1	\$75,000	\$75,000
Embankment Material (CIP)	CY	1,778	\$14	\$24,889
Aggregate Base Course (Class 6)	CY	593	\$50	\$29,630
Hot Mix Asphalt	Ton	1,195	\$80	\$95,573
Guardrail Type 3	LF	600	\$30	\$18,000
Transition Type 3G	EA	4	\$2,800	\$11,200
End Anchorage (Flared)	EA	4	\$3,000	\$12,000
Rumble Strip (Grinding) (Asphalt)	LF	800	\$0.50	\$400
Bridge Structure	SF	8,600	\$200	\$1,720,000
				\$0
Total of Quantity Items				\$1,986,692
			% Range	% Used
Total of Quantity Items	Project Dependent		N/A	\$1,986,692
Contingencies	(15% - 30%) of (A)		20.00%	\$397,338
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		4.00%	\$95,361
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		3.00%	\$71,521
Signing and Striping	(1-5%) of (A+B) Default = 5%		2.00%	\$47,681
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$476,806
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$215,278
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$3,290,677
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$394,881
Subtotal of Construction Cost	(H+I+J)			\$3,685,558
Design Engineering	% of (K)		15.00%	\$552,834
Construction Engineering	% of (K)		22.00%	\$810,823
Right of Way	Acre		\$5,000.00	\$0
Total Project Cost	(K+L+M+N)		Cost per bridge	\$5,049,215

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SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 9 - Intersection Improvement US 36 - Low End (Mill/Overlay on Existing)

Benesch

8/14/2019

Assume: Mill & 2" overlay on existing lanes (26' width). Add right and left turn lanes both SB & NB. 500' of 2 new lanes each direction, plus 600' redirect taper each direction. Widen 28'. 6" HMA / 6" ABC. Typical sideslope of 2' fill height at 4:1. Acquire 30' new ROW width to accommodate widening/slopes.

New pavement area 4978

SY

Mill/overlay area 6356

SY

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	6,356	\$3	\$19,067	
Embankment Material (CIP)	CY	1,630	\$14	\$22,815	
Aggregate Base Course (Class 6)	CY	830	\$50	\$41,481	
Hot Mix Asphalt	Ton	2,384	\$80	\$190,748	
Rumble Strip (Grinding) (Asphalt)	LF	2,720	\$0.50	\$1,360	
				\$0	
Total of Quantity Items				\$275,471	
		% Range	% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$275,471	(A)
Contingencies	(15% - 30%) of (A)		20.00%	\$55,094	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$16,528	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$19,834	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$16,528	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$66,113	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$31,470	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$481,039	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$9,621	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$57,725	(J)
Subtotal of Construction Cost	(H+I+J)			\$548,385	(K)
Design Engineering	% of (K)		15.00%	\$82,258	(L)
Construction Engineering	% of (K)		22.00%	\$120,645	(M)
Right of Way	Acre	1.52	\$5,000.00	\$7,576	(N)
Total Project Cost	(K+L+M+N)			\$758,863	(O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 9 - Intersection Improvement US 36 - High End (FDR on Existing)

Benesch 8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes (26' width). Add right and left turn lanes both SB & NB. 500' of 2 new lanes each direction, plus 600' redirect taper each direction. Widen 28'. 6" HMA / 6" ABC. Typical sideslope of 2' fill height at 4:1. Acquire 30' new ROW width to accommodate widening/slopes.

New pavement area 4978 SY
FDR area 6356 SY

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	6,356	\$3	\$19,067
Embankment Material (CIP)	CY	1,630	\$14	\$22,815
Aggregate Base Course (Class 6)	CY	830	\$50	\$41,481
Hot Mix Asphalt	Ton	3,808	\$80	\$304,640
Rumble Strip (Grinding) (Asphalt)	LF	2,720	\$0.50	\$1,360
				\$0
Total of Quantity Items				\$389,363
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$389,363 (A)
Contingencies	(15% - 30%) of (A)		25.00%	\$97,341 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$24,335 (C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$29,202 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$24,335 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$97,341 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$46,334 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$708,251 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$14,165 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$84,990 (J)
Subtotal of Construction Cost	(H+I+J)			\$807,406 (K)
Design Engineering	% of (K)		15.00%	\$121,111 (L)
Construction Engineering	% of (K)		22.00%	\$177,629 (M)
Right of Way	Acre	1.52	\$5,000.00	\$7,576 (N)
Total Project Cost	(K+L+M+N)			\$1,113,723 (O)

SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 10 - Intersection Improvement MCR R - Low End (Mill/Ovlerlay on Existing)

Benesch

8/14/2019

Assume: Mill & 2" overlay on existing lanes (26' width). Add right and left turn lanes both SB & NB. 800' of 2 new lanes each direction, plus 780' redirect taper each direction. Widen 28'. 6" HMA / 6" ABC. Typical sideslope of 2' fill height at 4:1. Acquire 30' new ROW width for 800' south of intersection to accommodate widening/slopes.

New pavement area 7404

SY

Mill/overlay area 9129

SY

Quantity Items	Units	Quantity	Unit Cost	Cost	
Removal of Asphalt Mat (Planing)	SY	9,129	\$3	\$27,387	
Embankment Material (CIP)	CY	2,607	\$14	\$36,504	
Aggregate Base Course (Class 6)	CY	1,234	\$50	\$61,704	
Hot Mix Asphalt	Ton	3,510	\$80	\$280,826	
Rumble Strip (Grinding) (Asphalt)	LF	3,776	\$0.50	\$1,888	
				\$0	
Total of Quantity Items				\$408,308	
		% Range	% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$408,308	(A)
Contingencies	(15% - 30%) of (A)		20.00%	\$81,662	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$24,499	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$29,398	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$24,499	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$97,994	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$46,645	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$713,004	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$14,260	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$85,561	(J)
Subtotal of Construction Cost	(H+I+J)			\$812,825	(K)
Design Engineering	% of (K)		15.00%	\$121,924	(L)
Construction Engineering	% of (K)		22.00%	\$178,822	(M)
Right of Way	Acre	0.55	\$5,000.00	\$2,755	(N)
Total Project Cost	(K+L+M+N)			\$1,116,325	(O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 10 - Intersection Improvement MCR R - High End (FDR on Existing)

Benesch 8/14/2019

Assume: Full depth reclamation & 6" overlay on existing lanes (26' width). Add right and left turn lanes both SB & NB. 800' of 2 new lanes each direction, plus 780' redirect taper each direction. Widen 28'. 6" HMA / 6" ABC. Typical sideslope of 2' fill height at 4:1. Acquire 30' new ROW width for 800' south of intersection to accommodate widening/slopes.

New pavement area 7404 SY
FDR area 9129 SY

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	9,129	\$3	\$27,387
Embankment Material (CIP)	CY	2,607	\$14	\$36,504
Aggregate Base Course (Class 6)	CY	1,234	\$50	\$61,704
Hot Mix Asphalt	Ton	5,555	\$80	\$444,416
Rumble Strip (Grinding) (Asphalt)	LF	3,776	\$0.50	\$1,888
				\$0
Total of Quantity Items				\$571,898
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$571,898 (A)
Contingencies	(15% - 30%) of (A)		25.00%	\$142,975 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$35,744 (C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$42,892 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$35,744 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$142,975 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$68,056 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$1,040,283 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$20,806 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$124,834 (J)
Subtotal of Construction Cost	(H+I+J)			\$1,185,922 (K)
Design Engineering	% of (K)		15.00%	\$177,888 (L)
Construction Engineering	% of (K)		22.00%	\$260,903 (M)
Right of Way	Acre	0.55	\$5,000.00	\$2,755 (N)
Total Project Cost	(K+L+M+N)			\$1,627,468 (O)

SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 11 - 4 Lanes with Center Turn Lane Cost Per Mile - Low End (M/O on Existing)

Benesch

8/22/2019

Assume: Mill & 2" overlay on existing lanes (assume 8' shoulders have already been added [40' width]). Widen 18' both sides to create 8-12-12-12-12-12-8 cross section. 6" HMA / 6" ABC. Typical sideslope of 4' fill height at 4:1. Acquire 40' new ROW width both sides to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 21120
Mill/overlay area 23467

SY per mile
SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	23,467	\$3	\$70,400
Embankment Material (CIP)	CY	33,636	\$14	\$470,898
Aggregate Base Course (Class 6)	CY	3,520	\$50	\$176,000
Hot Mix Asphalt	Ton	9,725	\$80	\$777,967
Rumble Strip (Grinding) (Asphalt)	LF	16,896	\$0.50	\$8,448
				\$0
				\$0
Total of Quantity Items				\$1,503,713
	% Range		% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$1,503,713
Contingencies	(15% - 30%) of (A)		25.00%	\$375,928
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$93,982
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		6.00%	\$112,778
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$93,982
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$375,928
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$178,942
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$2,735,253
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$54,705
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$328,230
Subtotal of Construction Cost	(H+I+J)			\$3,118,189
Design Engineering	% of (K)		15.00%	\$467,728
Construction Engineering	% of (K)		22.00%	\$686,002
Right of Way	Acre	9.70	\$5,000.00	\$48,485
Total Project Cost	(K+L+M+N)		Cost per mile	\$4,320,404

(A)
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(L)
(M)
(N)
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SH 71 Corridor

Potential Projects Planning-Level Cost Estimates

Project Type 11 - 4 Lanes with Center Turn Lane Cost Per Mile - High End (FDR on Existing)

Benesch

8/22/2019

Assume: Full depth reclamation and 6" overlay on existing lanes which include shoulders already have been added (40' width). Widen 18' both sides to create 8-12-12-12-12-8 cross section. 6" HMA / 6" ABC. Typical sideslope of 5' fill height at 4:1. Acquire 50' new ROW width both sides to accommodate widening/slopes. Does not account for any bridge/box culvert widening.

New pavement area 21120
FDR area 23467

SY per mile
SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	23,467	\$3	\$70,400
Embankment Material (CIP)	CY	43,022	\$14	\$602,311
Aggregate Base Course (Class 6)	CY	3,520	\$50	\$176,000
Hot Mix Asphalt	Ton	14,981	\$80	\$1,198,490
Rumble Strip (Grinding) (Asphalt)	LF	16,896	\$0.50	\$8,448
				\$0
				\$0
Total of Quantity Items				\$2,055,649
	% Range		% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$2,055,649 (A)
Contingencies	(15% - 30%) of (A)		25.00%	\$513,912 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$128,478 (C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$154,174 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$128,478 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$513,912 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$244,622 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$3,739,225 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$74,785 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$448,707 (J)
Subtotal of Construction Cost	(H+I+J)			\$4,262,717 (K)
Design Engineering	% of (K)		15.00%	\$639,407 (L)
Construction Engineering	% of (K)		22.00%	\$937,798 (M)
Right of Way	Acre	13.33	\$5,000.00	\$66,667 (N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$5,906,588 (O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 12 - Add Shoulders Cost Per Mile - Low End

Benesch 11/8/2019

Assume: Widen 7' each side to create 8' shoulders. 6" HMA / 6" ABC. Typical sideslope of 2' fill height at 4:1. No treatment on existing pavement. No ROW.

New pavement area 8213

SY per mile

Mill/overlay area 0

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Removal of Asphalt Mat (Planing)	SY	0	\$3	\$0
Embankment Material (CIP)	CY	4,498	\$14	\$62,969
Aggregate Base Course (Class 6)	CY	1,369	\$50	\$68,444
Hot Mix Asphalt	Ton	2,760	\$80	\$220,774
Rumble Strip (Grinding) (Asphalt)	LF	8,448	\$0.50	\$4,224
				\$0
				\$0
Total of Quantity Items				\$356,412
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$356,412 (A)
Contingencies	(15% - 30%) of (A)		25.00%	\$89,103 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		4.00%	\$17,821 (C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$26,731 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		4.00%	\$17,821 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$89,103 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$41,789 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$638,779 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		0.00%	\$0 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$76,653 (J)
Subtotal of Construction Cost	(H+I+J)			\$715,432 (K)
Design Engineering	% of (K)		15.00%	\$107,315 (L)
Construction Engineering	% of (K)		22.00%	\$157,395 (M)
Right of Way	Acre	0.00	\$5,000.00	\$0 (N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$980,142 (O)

**SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 12 - Add Shoulders Cost Per Mile - High End**

Benesch

11/8/2019

Assume: Widen 7' each side to create 8' shoulders. 6" HMA / 6" ABC. Typical sideslope of 4' fill height at 4:1. No treatment on existing pavement. Assume 1/4 mile of 20' ROW acquisition needed.

New pavement area 8213

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost	
Full Depth Reclamation of HMA	SY	0	\$3	\$0	
Embankment Material (CIP)	CY	16,622	\$14	\$232,711	
Aggregate Base Course (Class 6)	CY	1,369	\$50	\$68,444	
Hot Mix Asphalt	Ton	2,760	\$80	\$220,774	
Rumble Strip (Grinding) (Asphalt)	LF	8,448	\$0.50	\$4,224	
				\$0	
				\$0	
Total of Quantity Items				\$526,154	
	% Range		% Used	Cost	
Total of Quantity Items	Project Dependent		N/A	\$526,154	(A)
Contingencies	(15% - 30%) of (A)		30.00%	\$157,846	(B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		4.00%	\$27,360	(C)
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$41,040	(D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		4.00%	\$27,360	(E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$136,800	(F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$64,159	(G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$980,719	(H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		1.00%	\$9,807	(I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$117,686	(J)
Subtotal of Construction Cost	(H+I+J)			\$1,108,213	(K)
Design Engineering	% of (K)		15.00%	\$166,232	(L)
Construction Engineering	% of (K)		22.00%	\$243,807	(M)
Right of Way	Acre	0.61	\$5,000.00	\$3,030	(N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$1,521,282	(O)

SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 13 - Interstate Freeway Cost Per Mile - Low End

Benesch

12/18/2019

Assume: Existing SH 71 corridor rebuilt to interstate section. Existing road prism will be rebuilt due to need to provide higher design speed. Reclaim existing pavement (26' width). 2-lane section for each direction (4-12-12-10) for 76' total concrete pavement width (10" concrete over 6" ABC). Intermittant frontage road on one side (1/2 mile of frontage road per 1 mile of freeway) with 28' width (2-12-12-2) (6" HMA over 6" ABC). 3' depth of earthwork for 100' width. Acquire 300' additional ROW width. 1 non-interchange overpass every 3 miles (36' wide x 300' long bridge). Interchange every 8 miles based on 4 ramps (25' wide x 1500' long of 10' concrete/6" ABC), 2 overpasses (38' wide x 140' long) and embankment to raise mainline over (200' width, 15' depth, 1500' length).

New concrete pavement area 44587

SY per mile

New asphalt pavement area 8213

SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760
Embankment Material (CIP)	CY	58,667	\$14	\$821,333
Aggregate Base Course (Class 6)	CY	8,800	\$50	\$440,000
Hot Mix Asphalt	Ton	2,760	\$80	\$220,774
10 Inch Concrete Pavement	SY	44,587	\$70	\$3,121,067
Non-Interchange Overpass Bridge (prorated for 1 every 3 miles)	SF	3,600	\$250	\$900,000
Interchange (prorated for 1 every 8 miles)	EA	0.12	\$6,764,811	\$811,777
				\$0
Total of Quantity Items				\$6,360,712
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$6,360,712
Contingencies	(15% - 30%) of (A)		25.00%	\$1,590,178
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$397,544
Drainage/Utilities	(3-10%) of (A+B) Default = 6%		6.00%	\$477,053
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$397,544
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$1,590,178
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$756,925
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$11,570,135
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$231,403
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$1,388,416
Subtotal of Construction Cost	(H+I+J)			\$13,189,953
Design Engineering	% of (K)		15.00%	\$1,978,493
Construction Engineering	% of (K)		22.00%	\$2,901,790
Right of Way	Acre	36.36	\$5,000.00	\$181,818
Total Project Cost	(K+L+M+N)		Cost per mile	\$18,252,054

(A)
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SH 71 Corridor
Potential Projects Planning-Level Cost Estimates
Project Type 13 - Interstate Freeway Cost Per Mile - High End

Benesch 12/18/2019

Assume: Existing SH 71 corridor rebuilt to interstate section. Existing road prism will be rebuilt due to need to provide higher design speed. Reclaim existing pavement (26' width). 2-lane section for each direction (4-12-12-10) for 76' total concrete pavement width (10" concrete over 6" ABC). Continuous frontage road on one side (2-12-12-2) for 28' width (6" HMA over 6" ABC). 6' depth of earthwork for 100' width. Acquire 300' additional ROW width. 1 non-interchange overpass every 2 miles (36' wide x 300' long bridge). Interchange every six miles based on 4 ramps (25' wide x 1500' long of 10' concrete/6" ABC), 2 overpasses (38' wide x 140' long) and embankment to raise mainline over (200' width, 15' depth, 1500' length).

New concrete pavement area 44587 SY per mile
New asphalt pavement area 16427 SY per mile

Quantity Items	Units	Quantity	Unit Cost	Cost
Full Depth Reclamation of HMA	SY	15,253	\$3	\$45,760
Embankment Material (CIP)	CY	117,333	\$14	\$1,642,667
Aggregate Base Course (Class 6)	CY	10,169	\$50	\$508,444
Hot Mix Asphalt	Ton	5,519	\$80	\$441,549
10 Inch Concrete Pavement	SY	44,587	\$70	\$3,121,067
Non-Interchange Overpass Bridge (prorated for 1 every 2 miles)	SF	5,400	\$250	\$1,350,000
Interchange (prorated for 1 every 6 miles)	EA	0.16	\$6,764,811	\$1,082,370
				\$0
Total of Quantity Items				\$8,191,856
		% Range	% Used	Cost
Total of Quantity Items	Project Dependent		N/A	\$8,191,856 (A)
Contingencies	(15% - 30%) of (A)		30.00%	\$2,457,557 (B)
SWMP/Landscaping	(0-10%) of (A+B) Default = 4%		5.00%	\$532,471 (C)
Drainage/Utilities	(3-10%)of (A+B) Default = 6%		8.00%	\$851,953 (D)
Signing and Striping	(1-5%) of (A+B) Default = 5%		5.00%	\$532,471 (E)
Construction Signing & Traffic Control	5 to 25% of (A+B) Default = 20%		20.00%	\$2,129,883 (F)
Mobilization	(4 to 10%) of (A+B+C+D+E+F) Default = 7%		7.00%	\$1,028,733 (G)
Total of Construction Bid Items	(A+B+C+D+E+F+G)			\$15,724,924 (H)
Force Account - Utilities	(1 to 2%) of (H) Default = 2%		2.00%	\$314,498 (I)
Force Account - Misc.	(10 to 15%) of (H) Default = 12%		12.00%	\$1,886,991 (J)
Subtotal of Construction Cost	(H+I+J)			\$17,926,413 (K)
Design Engineering	% of (K)		15.00%	\$2,688,962 (L)
Construction Engineering	% of (K)		22.00%	\$3,943,811 (M)
Right of Way	Acre	36.36	\$5,000.00	\$181,818 (N)
Total Project Cost	(K+L+M+N)		Cost per mile	\$24,741,004 (O)