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5.1 Factors Governing Bridge Costs

Bridge costs are tabulated based on the bids received for all bridges let to contract. While these costs indicate some trends, they do not reflect all the factors that affect the final bridge cost. Each bridge has its own conditions which affect the cost at the time a contract is let. Some factors governing bridge costs are:

1. Location - rural or urban, or remote regions
2. Type of crossing
3. Type of superstructure
4. Skew of bridge
5. Bridge on horizontal curve
6. Type of foundation
7. Type and height of piers
8. Depth and velocity of water
9. Type of abutment
10. Ease of falsework erection
11. Need for special equipment
12. Need for maintaining traffic during construction
13. Limit on construction time
14. Complex forming costs and design details
15. Span arrangements, beam spacing, etc.

Figure 5.2-1 shows the economic span lengths of various type structures based on average conditions. Refer to Chapter 17 for discussion on selecting the type of superstructure.

Annual unit bridge costs are included in this chapter. The area of bridge is from back to back of abutments and out to out of the concrete superstructure. Costs are based only on the bridges let to contract during the period. In using these cost reports exercise care when a small number of bridges are reported as these costs may not be representative.

In these reports prestressed girder costs are grouped together because there is a small cost difference between girder sizes. Refer to unit costs. Concrete slab costs are also grouped together for this reason.



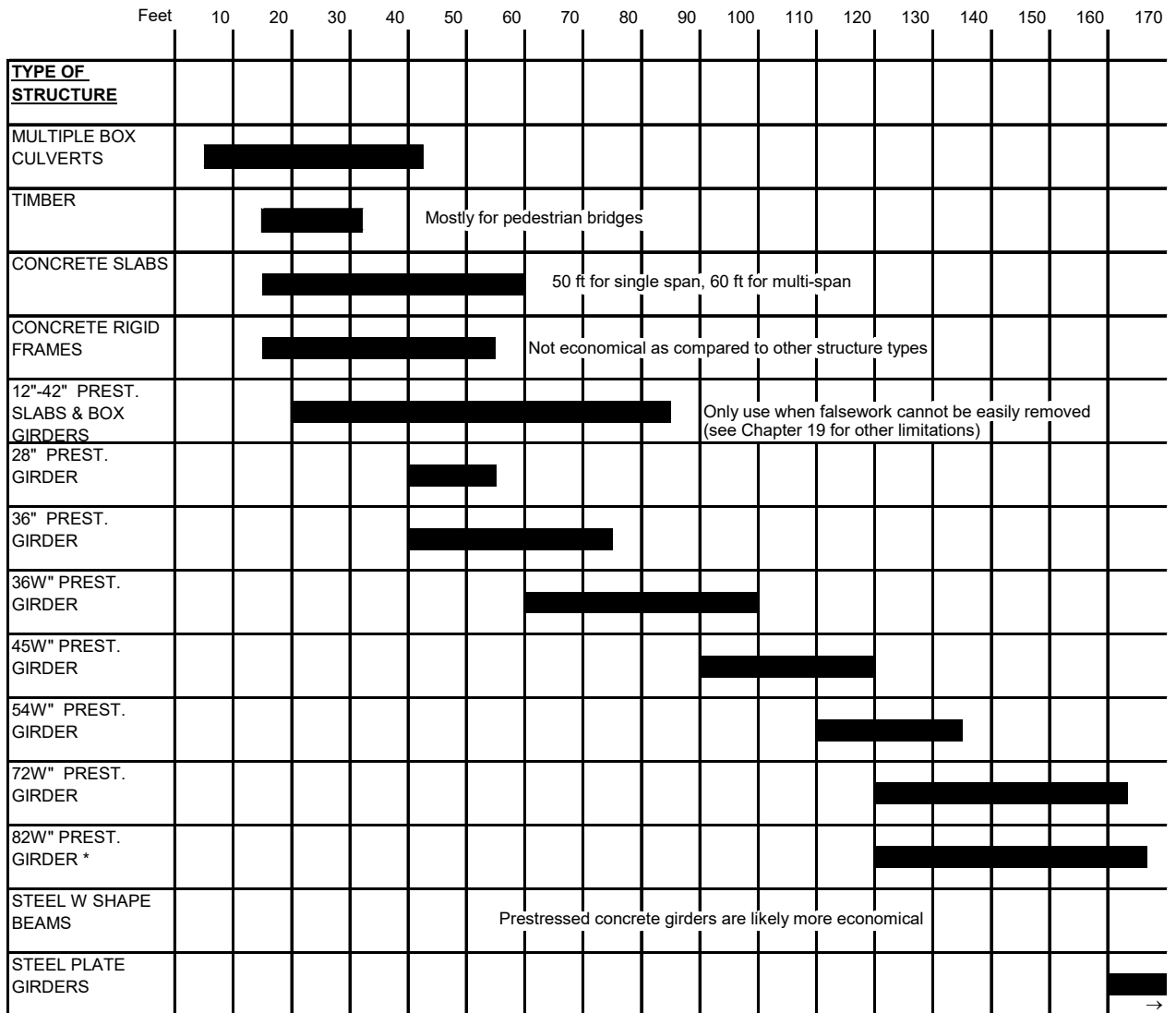
No costs are shown for rolled steel sections as these structures are not built very often. They have been replaced with prestressed girders which are usually more economical. The cost of plate girders is used to estimate rolled section costs.

For structures over a railroad, use the costs of grade separation structures. Costs vary considerably for railroad structures over a highway due to different railroad specifications.

Other available estimating tools such as *AASHTOWare Project Estimator* and *Bid Express*, as described in Facilities Development Manual (FDM) 19-5-5, should be the primary tools for structure project cost estimations. Information in this chapter can be used as a supplemental tool.



5.2 Economic Span Lengths



*Currently there is a moratorium on the use of 82W" prestressed girders in Wisconsin

Figure 5.2-1
Economic Span Lengths



5.3 Contract Unit Bid Prices

Refer to FDM 19-5-5 when preparing construction estimates and use the following estimating tools:

- Bid Express
- AASHTOWare Project Estimator
- [Estimating Tools](#) website



5.4 Bid Letting Cost Data

This section includes past information on bid letting costs per structure type. Values are presented by structure type and include: number of structures, total area, total cost, superstructure cost per square foot and total cost per square foot.

The square foot costs include all items shown on the structure plan except removing old structure. Costs also include a proportionate share of the project’s mobilization, as well as structural approach slab costs, if applicable. However, square footage does not include the structural approach slabs, and is based on the length of the bridge from abutment to abutment. (It is realized that this yields a slightly higher square footage bridge cost for those bridges with structural approach slabs.)

5.4.1 2016 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	19	199,367	26,157,660	57.97	131.20
Reinf. Conc. Slabs (Flat)	36	72,066	10,985,072	63.40	152.43
Reinf. Conc. Slabs (Haunched)	5	22,144	2,469,770	50.63	111.53
Prestressed Box Girders	3	4,550	773,098	80.85	169.91

Table 5.4-1 Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	25	343,165	40,412,805	60.62	117.76
Reinf. Conc. Slabs (Haunched)	5	33,268	4,609,286	59.21	138.55
Steel Plate Girders	3	127,080	18,691,714	90.78	147.09
Pedestrian Bridges	1	4,049	846,735	91.35	209.13

Table 5.4-2 Grade Separation Structures



Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	18	1,694.52
Twin Cell	10	2,850.45
Single Pipe	1	1,268.42

Table 5.4-3
Box Culverts

Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
MSE Block Walls	10	10,310	558,347	54.16
MSE Panel Walls	21	112,015	8,681,269	77.50
Modular Walls	5	6,578	419,334	63.75
Soldier Pile Walls	2	13,970	1,208,100	86.48
Steel Sheet Pile Walls	1	3,440	104,814	30.47

Table 5.4-4
Retaining Walls

Sign Structure Type	No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.	
Butterfly (2-Signs)	Conc. Col.	1	25.25	89,102	3,528.80
	1-Steel Col.	1	24.34	44,176	1,814.97
Cantilever	Conc. Col.	5	171	384,487	2,248.46
	1-Steel Col.	18	536.25	758,646	1,414.72
Full Span	Conc. Col.	0	--	--	--
	1-Steel Col.	7	430.25	400,125	929.98
	2-Steel Col.	7	590	611,292	1,036.23

Table 5.4-5
Sign Structures



5.4.2 2017 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super Only Cost per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	24	238,956	33,970,344.86	60.05	142.16
Reinf. Conc. Slabs (Flat)	44	69,095	11,063,299.53	57.75	160.12
Reinf. Conc. Slabs (Haunched)	8	48,434	6,759,897.64	55.41	139.57
Prestressed Box Girders	2	2,530	691,474.35	117.93	273.31

Table 5.4-6
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	28	302,672	37,247,580.94	52.67	123.10
Reinf. Conc. Slabs (Flat)	25	58,076	9,561,823.06	42.14	164.64
Reinf. Conc. Slabs (Haunched)	6	49,160	9,444,012.75	43.73	192.11
Steel Plate Girders	0	--	--	--	--
Pedestrian Bridges	2	12,864	2,141,133.01	53.53	166.44

Table 5.4-7
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	18	1,849.26
Twin Cell	3	3,333.61
Single Pipe	1	1,752.93
Precast	1	2,204.32
Precast Three-Sided	3	8,754.76

Table 5.4-8
Box Culverts



Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
CIP Cantilever	17	30,808	3,277,766.33	106.39
CIP Facing (MSE)	3	10,611	1,683,447.67	158.65
MSE Block Walls	6	13,378	1,457,896.15	108.98
MSE Panel Walls	21	137,718	11,789,074.54	85.60
Modular Walls	3	3,643	254,004.30	69.72
Precast Panel and Wire Faced	3	17,270	2,294,507.57	132.86
Soldier Pile Walls	0	--	--	--
Steel Sheet Pile Walls	5	15,056	1,442,741.15	95.82

Table 5.4-9
Retaining Walls

Sign Structure Type	No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.
Butterfly (1-Sign)	Conc. Col.	0	--	--
	1-Steel Col.	4	84.5	221,728.47
Butterfly (2-Signs)	Conc. Col.	0	--	--
	1-Steel Col.	6	217.22	417,307.35
Cantilever	Conc. Col.	0	--	--
Cantilever Full Span	1-Steel Col.	28	825.75	1,165,570.03
	2-Steel Col.	2	199	245,997.03
	Conc. Col.	2	185	349,166.59
Full Span	1-Steel Col.	6	466.03	589,773.11
	2-Steel Col.	21	1,773.5	1,789,041.14

Table 5.4-10
Sign Structures



5.4.3 2018 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	45	276,821	40,483,970	66.45	146.25
Reinf. Conc. Slabs (Flat)	49	72,180	11,489,979	68.04	159.19
Reinf. Conc. Slabs (Haunched)	10	51,532	9,546,594	63.57	185.26
Prestressed Box Girder	1	1,864	400,675	113.39	214.95

Table 5.4-11
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	52	727,872	108,975,613	59.90	149.72
Reinf. Conc. Slabs (Haunched)	6	56,580	9,478,579	57.14	167.53
Steel Plate Girders	0	--	--	--	--
Trapezoidal Steel Box Girders	0	--	--	--	--

Table 5.4-12
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	13	1,911
Twin Cell	6	2,901
Three Cell	1	6,262

Table 5.4-13
Box Culverts

Bridge Type	Cost
Twin Pipe Culvert	2,078 Lin. Ft.

Table 5.4-14
Miscellaneous Bridges



Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
CIP Cantilever	0	--	--	--
CIP Facing (MSE)	0	--	--	--
MSE Block Walls	3	4,693	567,547	120.93
MSE Panel Walls	49	378,371	44,841,726	118.51
Modular Walls	3	2,402	204,002	84.93
Precast Panel and Wire Faced	1	5,945	948,347	159.53
Soldier Pile Walls	4	8,531	1,570,107	184.05
Steel Sheet Pile Walls	2	16,620	1,639,380	98.64

Table 5.4-15
Retaining Walls

Sign Structure Type	No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.	
Butterfly (1-Sign)	Conc. Col.	6	118	273,756	2,319.97
	1-Steel Col.	0	--	--	--
Butterfly (2-Signs)	Conc. Col.	5	88	277,787	3,156.67
	1-Steel Col.	4	73	326,652	4,474.68
Cantilever	Conc. Col	8	234	588,676	2,515.71
	1-Steel Col	32	850.83	1,380,710	1,622.78
Cantilever Full Span	Conc. Col.	16	1267	2,909,973	2,296.74
	1-Steel Col.	2	184.2	279,115	1,515.28
	2-Steel Col.	17	1469	2,236,464	1,522.44
Full Span	1-Steel Col.	10	675.5	513,623	760.36
	2-Steel Col.	0	--	--	--

Table 5.4-16
Sign Structures



5.4.4 2019 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	23	120,327	17,518,289	67.10	145.59
Reinf. Conc. Slabs (Flat)	44	69,664	11,879,548	70.13	170.53
Reinf. Conc. Slabs (Haunched)	10	43,057	6,148,879	100.04	142.81
Prestressed Box Girder	1	1,253	268,037	101.17	213.92

Table 5.4-17
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	19	170,986	27,970,532	75.00	163.58
Reinf. Conc. Slabs (Haunched)	3	18,772	3,060,054	63.04	163.01
Steel Beams	1	7,964	1,522,389	95.77	191.16
Steel Plate Girders	3	130,986	30,430,624	144.97	232.32

Table 5.4-18
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	8	2,496
Twin Cell	5	3,392
Three Cell	1	3,283

Table 5.4-19
Box Culverts



Bridge Type	Cost
(none)	--

Table 5.4-20
Miscellaneous Bridges

Retaining Wall Type	No. of Walls	Total Area (Sq. Ft.)	Total Costs	Cost per Square Foot
CIP Cantilever	0	--	--	--
CIP Facing (MSE)	0	--	--	--
MSE Block Walls	7	17,195	2,490,957	144.87
MSE Panel Walls	27	85,496	10,517,536	123.02
Modular Walls	0	--	--	-
Precast Panel and Wire Faced	0	--	--	--
Soldier Pile Walls	3	6,290	1,378,911	219.22
Steel Sheet Pile Walls	1	1,940	92,512	47.69

Table 5.4-21
Retaining Walls

Sign Structure Type	No. of Structures	Total Lineal Ft. of Arm	Total Costs	Cost per Lin. Ft.	
Butterfly (1-Sign)	Conc. Col.	0	--	--	
	1-Steel Col.	0	--	--	
Butterfly (2-Signs)	Conc. Col.	0	--	--	
	1-Steel Col.	0	--	--	
Cantilever	Conc. Col	0	--	--	
	1-Steel Col	2	56	42,520	1,518
Cantilever Full Span	Conc. Col.	--	--	--	
	1-Steel Col.	--	--	--	
	2-Steel Col.	10	735.5	126,495	1,719.86
Full Span	1-Steel Col.	3	187	45,069	723.04
	2-Steel Col.	0	--	--	--

Table 5.4-22
Sign Structures



5.4.5 2020 Year End Structure Costs

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	28	236,564	35,597,272	70.46	150.48
Reinf. Conc. Slabs (Flat)	35	57,402	10,783,692	72.40	187.86
Reinf. Conc. Slabs (Haunched)	7	53,236	6,866,154	65.48	128.98
Prestressed Box Girder	2	9,050	2,694,672	157.15	297.75
Steel Plate Girders	1	19,076	5,258,732	120.51	275.67

Table 5.4-23
Stream Crossing Structures

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	22	211,991	34,051,252	71.64	160.63
Reinf. Conc. Slabs (Flat)	1	2,179	379,028	62.35	173.95
Reinf. Conc. Slabs (Haunched)	1	5,563	870,732	43.94	156.52

Table 5.4-24
Grade Separation Structures

Box Culvert Type	No. of Culverts	Cost per Lin. Ft.
Single Cell	17	1,708
Twin Cell	1	2,073
Three Cell	0	--

Table 5.4-25
Box Culverts