Epoxy Reinforcing Steel - Two Barrier Rails

Bridge Length			70'-0"			80'-0"			90'-0"			100'-0"			110'-0"			120'-0"			130'-0"			140'-0"			150'-0"		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
4c1	Rail Ties		176	6'-3"	735	196	6'-3"	818	216	6'-3"	902	236	6'-3"	985	256	6'-3"	1069	276	6'-3"	1152	296	6'-3"	1236	316	6'-3"	1319	336	6'-3"	1403
5c3	End Posts, Tie		20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136	20	6'-6"	136
5c4	End Post, Tie		4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26	4	6'-2"	26
5c6	End Post, Tie		4	5'-2"	22	4	5'-2"	22	4	5'-2"	22	4	5'-2"	22	4	5'-2"	22	4	5'-2"	22	4	5'-2"	22	4	5'-2"	22	4	5'-2"	22
6h1	Rail , Horizontal		32	29'-11"	1438	32	33'-3"	1598	32	36'-7"	1758	32	39'-11"	1919	48	33'-5"	2409	48	35'-11"	2589	48	38'-5"	2770	64	33'-5"	3212	64	35'-6"	3412
6h2	Rail, Horizontal, Ends		24	14'-10"	535	24	14'-10"	535	24	14'-10"	535	24	14'-10"	535	24	14'-10"	535	24	14'-10"	535	24	14'-10"	535	24	14'-10"	535	24	14'-10"	535
6h3	Rail, Horizontal, Ends		16	29'-11"	719	16	33'-3"	799	16	36'-7"	879	16	39'-11"	959	16	33'-5"	803	16	35'-11"	862	16	38'-5"	923	16	33'-5"	803	16	35'-6"	853
4j1	Interior Post, Tie		96	4'-9"	305	108	4'-9"	343	120	4'-9"	381	132	4'-9"	419	144	4'-9"	457	156	4'-9"	495	168	4'-9"	533	180	4'-9"	571	192	4'-9"	609
4j2	End Post, Tie		36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150	36	6'-3"	150
Total (lbs)					4066			4427			4789			5151			5607			5967			6331			6774			7146

Note: Reinforcing quantities shown are based on 45 degree skew bid lengths.

Stainless Steel Reinforcing Steel - Two Barrier Rails

Bridge Length			70'-0"			80'-0"			90'-0"			100'-0"			110'-0"			120'-0"			130'-0"			140'-0"			150'-0"		
Bar	Location	Shape	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight	No.	Length	Weight
5c2	Posts, Vertical		232	4'-11"	1190	256	5'-0"	1335	280	5'-1"	1485	304	5'-2"	1638	328	5'-3"	1796	352	5'-5"	1989	376	5'-6"	2157	400	5'-7"	2329	424	5'-9"	2543
5c5	End Posts, Vertical		72	5'-1"	382	72	5'-1"	382	72	5'-1"	382	72	5'-1"	382	72	5'-1"	382	72	5'-1"	382	72	5'-1"	382	72	5'-1"	382	72	5'-1"	382
Total (lbs)					1572			1717			1867			2020			2178			2371			2539			2711			2925

Concrete Placement Quantities

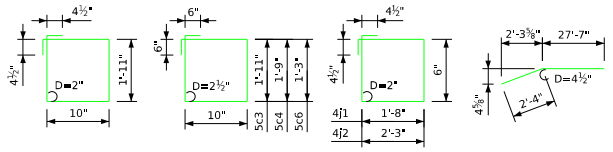
Bridge Length	70'-0	80'-0	90'-0	100'-0	110'-0	120'-0	130'-0	140'-0	150'-0
One Rail Qtys (cu. yd.)	8.0	9.0	9.9	10.9	11.9	12.9	13.8	14.8	15.8
Quant Interior Posts (One Rail)	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.6
Quantity Two End Posts	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Total Conc. Qtys -Two Rails (cu. yd.)	18.2	20.3	22.5	24.6	26.7	28.9	31.0	33.1	35.4

Note: Concrete quantities shown are based on 45 degree skew bid lengths.

Concrete Open Rail Quantites

Bridge Length	Unit	70'-0	80'-0	90'-0	100'-0	110'-0	120'-0	130'-0	140'-0	150'-0
Concrete Open Railing TL-4 0 deg skew	L.F.	162.0	182.0	202.0	222.0	242.0	262.0	282.0	302.0	322.0
Concrete Open Railing TL-4 15 deg skew	L.F.	162.2	182.2	202.2	222.2	242.2	262.2	282.2	302.2	322.2
Concrete Open Railing TL-4 30 deg skew	L.F.	162.9	182.9	202.9	222.9	242.9	262.9	282.9	302.9	322.9
Concrete Open Railing TL-4 45 deg skew	L.F.	164.5	184.5	204.5	224.5	244.5	264.5	284.5	304.5	324.5

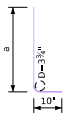
Epoxy Bent Bar Details



4c1 | 5c3, 5c4 & 5c6 | 4j1 & 4j2 | 6h3

Note: All Dimensions Are Out To Out. D = Pin Diameter.

Stainless Bent Bar Details



5c2

Bridge	Slab Depth	a Dim.	Bar Length
70'-0"	1'-2 1/2"	4'-1"	4'-11"
80'-0"	1'-3 1/4"	4'-1 3/4"	5'-0"
90'-0"	1'-4 1/4"	4'-2 3/4"	5'-1"
100'-0"	1'-5 1/2"	4'-4"	5'-2"
110'-0"	1'-6 1/2"	4'-5"	5'-3"
120'-0"	1'-8"	4'-6 1/2"	5'-5"
130'-0"	1'-9 1/4"	4'-7 3/4"	5'-6"
140'-0"	1'-10 1/2"	4'-9"	5'-7"
150'-0"	2'-0"	4'-10 1/2"	5'-9"

Note: All Dimensions Are Out To Out. D = Pin Diameter.

Open Rail Notes:

The open rail system meets **Test Level 4 (TL-4)** requirements according to the **Manual for Assessing Safety Hardware (MASH)** and includes provisions for a 3" future wearing surface height.

All barrier rail reinforcing steel is to be either epoxy-coated or stainless steel, as shown or noted. Stainless steel reinforcing steel shall be deformed bar, Grade 60, meeting the requirements of **Materials I.M. 452**.

Unless otherwise noted or shown, the minimum clear distance from the face of concrete to the nearest reinforcing bar shall be 2".

The cost of the joint sealer and bond breaker shall be considered incidental to the price bid item **"Concrete Open Rail, TL-4."**

The concrete open rail is to be bid on a linear foot basis, measured from end to end of the rail. The number of linear feet of open rail installed will be paid for at the contract price per linear foot.

The price bid for **"Concrete Open Rail, TL-4"** shall be full compensation for furnishing all materials (excluding reinforcing steel) and for all equipment and labor required to construct the rail in accordance with these plans and current specifications.

All open rail concrete is to be **Class C**.

The joint sealer shall be a light gray, non-sag latex caulking sealer marketed for outdoor use. No testing or certification is required.

The top of the open rail shall be parallel to the theoretical ℄ grade.

Note:
For **Rail Open Barrier – Details**, see Sheet **J40-51-25**.

Latest Revision Date

Approved by Bridge Engineer

IOWA DOT

Standard Design-40'-0" Roadway, 3 Span Bridge

Continuous Concrete Slab Bridge

July, 2025

Rail Open Barrier – Quantities

J40-52-25