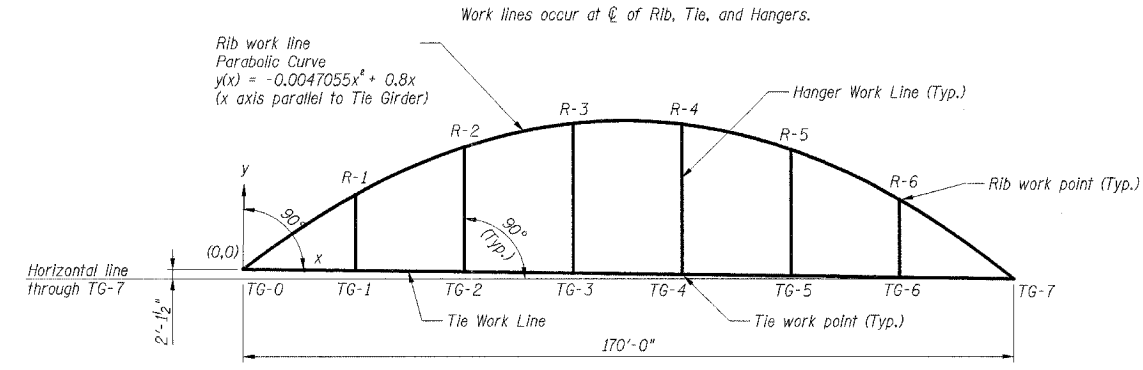


### ARCH THEORETICAL WORKING POINTS

W.P.	East Arch		West Arch	
	Station	Elevation	Station	Elevation
TG-0	99+45.14	552.34	99+20.86	552.64
TG-1	99+70.00	552.03	99+46.00	552.33
TG-2	99+94.00	551.73	99+70.00	552.03
TG-3	100+18.00	551.43	99+94.00	551.73
TG-4	100+42.00	551.13	100+18.00	551.43
TG-5	100+66.00	550.83	100+42.00	551.13
TG-6	100+90.00	550.53	100+66.00	550.83
TG-7	101+15.14	550.21	100+90.86	550.52
R-1	99+70.00	568.89	99+46.00	569.35
R-2	99+94.00	579.47	99+70.00	579.86
R-3	100+18.00	584.69	99+94.00	585.02
R-4	100+42.00	584.52	100+18.00	584.79
R-5	100+66.00	578.90	100+42.00	579.11
R-6	100+90.00	567.79	100+66.00	567.93

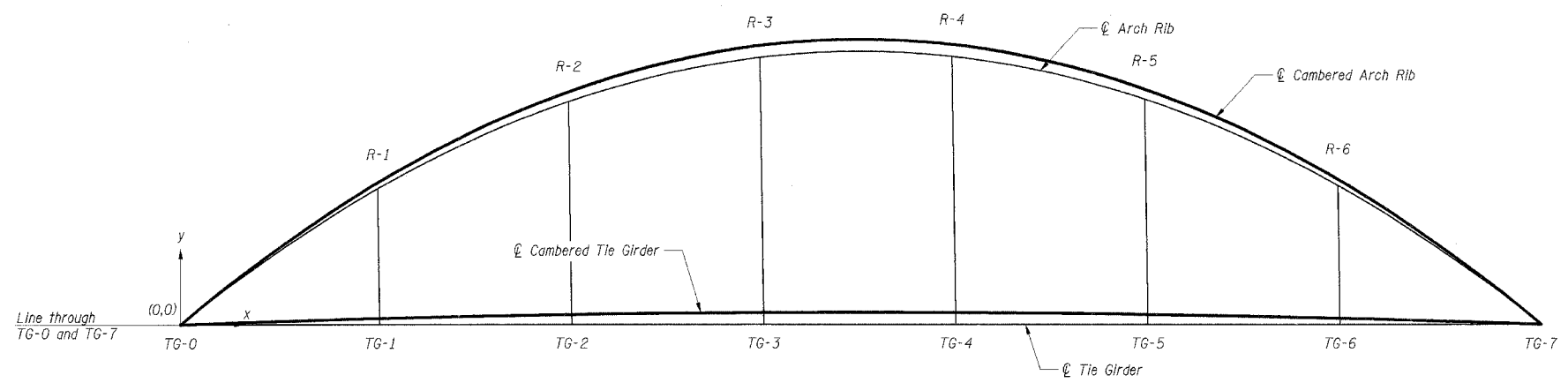


### ARCH GEOMETRY

(Final geometric shape under dead load of steel and deck slab.)

### DEAD LOAD DEFLECTIONS & CAMBER

W.P.	East Arch			West Arch		
	Steel D.L. (in.)	Deck Slab D.L. (in.)	Camber (in.)	Steel D.L. (in.)	DL1+DL2 (w/out FWS) (in.)	Camber (in.)
TG-0	0.00	0.00	0.00	0.00	0.00	0.00
TG-1	-0.09	-0.32	0.32	-0.05	-0.08	0.08
TG-2	-0.19	-0.62	0.62	-0.15	-0.37	0.37
TG-3	-0.25	-0.74	0.74	-0.23	-0.65	0.65
TG-4	-0.23	-0.65	0.65	-0.25	-0.74	0.74
TG-5	-0.15	-0.37	0.37	-0.19	-0.62	0.62
TG-6	-0.05	-0.08	0.08	-0.09	-0.32	0.32
TG-7	0.00	0.00	0.00	0.00	0.00	0.00
R-1	-0.08	-0.29	0.29	-0.05	-0.05	0.05
R-2	-0.18	-0.57	0.57	-0.14	-0.32	0.32
R-3	-0.23	-0.68	0.68	-0.22	-0.59	0.59
R-4	-0.22	-0.59	0.59	-0.24	-0.68	0.68
R-5	-0.14	-0.32	0.32	-0.18	-0.57	0.57
R-6	-0.05	-0.05	0.05	-0.08	-0.29	0.29



### CAMBER DIAGRAM

### RIB STRESS DATA TABLE

West Rib	TG-0	R-1	R-2	R-3	R-4	R-5	R-6	TG-7
East Rib	TG-7	R-6	R-5	R-4	R-3	R-2	R-1	TG-0
A	(in <sup>4</sup> )	124.5	102.75	102.75	102.75	102.75	102.75	124.5
I <sub>x</sub>	(in <sup>4</sup> )	12320	11462	11462	11462	11462	11462	12320
I <sub>y</sub>	(in <sup>4</sup> )	22074	15601	15601	15601	15601	15601	22074
S <sub>x</sub>	(in <sup>3</sup> )	1027	955	955	955	955	955	1027
S <sub>y</sub>	(in <sup>3</sup> )	1226	867	867	867	867	867	1226
P <sub>ax</sub>	(kips)	-547	-541	-495	-461	-467	-500	-557
P <sub>ay</sub>	(kips)	-47	-76	-79	-89	-85	-73	-61
P <sub>max</sub>	(kips)	-8	-13	-13	-15	-14	-12	-2
P <sub>min</sub>	(kips)	-602	-630	-587	-566	-566	-622	-571
M <sub>ax</sub>	(k-ft)	64	7	-50	-20	-67	0	156
M <sub>ay</sub>	(k-ft)	128	-73	-116	-38	-33	27	45
M <sub>max</sub>	(k-ft)	22	-12	-20	-7	-6	5	8
M <sub>min</sub>	(k-ft)	213	-79	-186	-65	-105	-112	53
M <sub>ax</sub>	(k-ft)	162	33	196	285	301	276	186
M <sub>ay</sub>	(k-ft)	48	401	459	364	328	435	460
M <sub>max</sub>	(k-ft)	8	68	78	62	56	74	78
M <sub>min</sub>	(k-ft)	217	503	733	711	685	784	724
f <sub>a</sub>	(ksi)	-4.84	-6.13	-5.72	-5.51	-5.51	-5.70	-6.05
f <sub>ax</sub>	(ksi)	2.08	-1.10	-2.57	-0.89	-1.45	-1.55	0.73
f <sub>ay</sub>	(ksi)	2.54	6.32	9.20	8.93	8.60	9.85	9.10
f <sub>a</sub> + f <sub>ax</sub> + f <sub>ay</sub>	(ksi)	9.46	13.54	17.49	15.33	15.57	17.10	15.88

### TIE STRESS DATA TABLE

West Tie	TG-0	TG-1	TG-2	TG-3	TG-4	TG-5	TG-6	TG-7
East Tie	TG-7	TG-6	TG-5	TG-4	TG-3	TG-2	TG-1	TG-0
A	(in <sup>4</sup> )	61.875	61.875	61.875	61.875	61.875	61.875	61.875
I <sub>x</sub>	(in <sup>4</sup> )	9905	9905	9905	9905	9905	9905	9905
I <sub>y</sub>	(in <sup>4</sup> )	774	774	774	774	774	774	774
S <sub>x</sub>	(in <sup>3</sup> )	655	655	655	655	655	655	655
S <sub>y</sub>	(in <sup>3</sup> )	103	103	103	103	103	103	103
P <sub>ax</sub>	(kips)	380	367	351	352	372	396	441
P <sub>ay</sub>	(kips)	30	46	43	61	51	54	37
P <sub>max</sub>	(kips)	5	8	7	10	9	9	6
P <sub>min</sub>	(kips)	415	420	402	423	432	459	485
M <sub>ax</sub>	(k-ft)	31	12	-7	-2	-11	14	42
M <sub>ay</sub>	(k-ft)	14	2	-1	0	-1	2	7
M <sub>max</sub>	(k-ft)	2	0	0	0	0	1	-7
M <sub>min</sub>	(k-ft)	-47	-14	9	2	12	-16	-120
M <sub>ax</sub>	(k-ft)	-145	0	0	97	73	74	16
M <sub>ay</sub>	(k-ft)	355	412	414	298	412	412	443
M <sub>max</sub>	(k-ft)	60	70	70	51	70	75	-3
M <sub>min</sub>	(k-ft)	271	482	485	446	556	557	534
f <sub>a</sub>	(ksi)	6.71	6.79	6.49	6.84	6.98	7.41	7.39
f <sub>ax</sub>	(ksi)	-5.46	-1.58	1.01	0.25	1.44	-1.87	-5.84
f <sub>ay</sub>	(ksi)	4.96	8.83	8.88	8.17	10.18	10.20	9.79
f <sub>a</sub> + f <sub>ax</sub> + f <sub>ay</sub>	(ksi)	17.12	17.21	16.38	15.26	18.60	19.49	23.47

Stress Table Legend:

Force sign convention is as follows:

Axial Force, P  
Positive (+) indicates tension

Out of Plane Moment, My  
Positive (+) indicates compression on exterior fiber of member

In-Plane Moment, Mx  
Positive (+) indicates compression on top fiber of member

P<sub>ax</sub> and M<sub>ax</sub> are the axial forces and moments due to permanent loads including the self-weight of the structure, parapets, and future wearing surface.

P<sub>ay</sub> and M<sub>ay</sub> are the axial forces and moments due to AASHTO HS20-44 truck or lane loading.

P<sub>max</sub> and M<sub>max</sub> are the axial forces and moments due to impact.

f<sub>a</sub> is the applied axial stress.

f<sub>ax</sub> is the applied In-Plane bending stress.

f<sub>ay</sub> is the applied Out of Plane bending stress.

Notes:

1. The arch rib shall be fabricated such that the rib axis describes the parabolic curve shown in the ARCH GEOMETRY elevation under dead load of steel and deck slab.

SHT. 5-18 OF 40

REVISIONS	
NAME	DATE

CITY OF DANVILLE, ILLINOIS  
HUNGRY HOLLOW ROAD BRIDGE

## ARCH RIB ELEVATION & GEOMETRY II

SCALE: DATE 12/06/05

DRAWN BY  
CHECKED BY

**TENG**

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ROSS/TF

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