INTERIOR GIRDERS

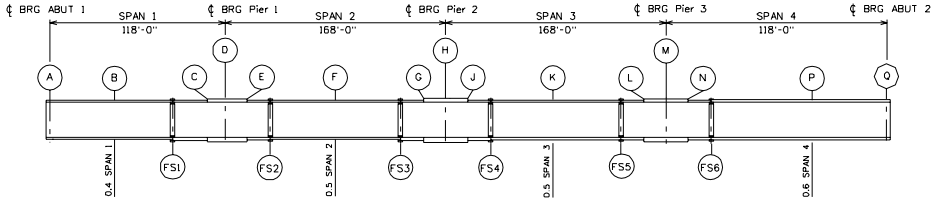
SPAN	SECTION LOCATIONS	TOP FLG WIDTH (IN)	TOP FLG THICKNESS (IN)	TOP FLG YIELD STRENGTH (KSI)	BOTTOM FLG WIDTH (IN)	BOTTOM FLG THICKNESS (IN)	BOTTOM FLG YIELD STRENGTH (KSI)	WEB DEPTH (IN)	WEB THICKNESS (IN)	WEB YIELD STRENGTH (KSI)	NON-COMPOSITE (GIRDER ONLY) S-TOP FLG (IN²)	NON-COMPOSITE (GIRDER ONLY) S-BOTTOM FLG (IN²)	COMPOSITE FOR NEGATIVE MOMENT (GIRDER AND REINFORCEMENT STEEL) S-TOP FLG (IN²)	COMPOSITE FOR NEGATIVE MOMENT (GIRDER AND REINFORCEMENT STEEL) S-BOTTOM FLG (IN²)	3n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 3n MODULAR RATIO) S-TOP FLG (IN²)	3n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 3n MODULAR RATIO) S-BOTTOM FLG (IN²)	1n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 1n MODULAR RATIO) S-TOP FLG (IN²)	1n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 1n MODULAR RATIO) S-BOTTOM FLG (IN²)	DESIGN SERVICE MOMENT AND SHEAR DL1 MOMENT (K-FT)	DESIGN SERVICE MOMENT AND SHEAR DL1 SHEAR (K)	DESIGN SERVICE MOMENT AND SHEAR DL2 MOMENT (K-FT)	DESIGN SERVICE MOMENT AND SHEAR DL2 SHEAR (K)	LLDF MOMENT	LLDF SHEAR
1	A	14	1	50	14	1.125	50	60.0625	50		1187	1250	1808	1414	3884	1628	12179	1794	0	68	0	18	0.794	1.045
1	B	14	1	50	14	1.125	50	60.0625	50		1187	1250	1808	1414	3884	1628	12179	1794	1314	12	350	3	0.794	1.045
1	FS1	14	1	50	14	1.125	50	60.0625	50		1187	1250	1808	1414	3884	1628	12179	1794	7	68	16	17	0.794	1.045
1	FS1	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	7	68	16	17	0.799	1.045
2	C	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	-1687	102	-420	26	0.758	1.045
2	D	20	1.500	70	20	1.625	70	60.0625	70		2145	2250	2786	2392	4823	2619	11613	2841	-3807	139	-963	36	0.788	1.045
2	E	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	-1699	109	-421	28	.0758	1.045
2	FS2	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	-24	77	13	20	.0726	1.045
2	FS2	14	1	50	14	1.250	50	60.0625	50		1206	1332	1829	1504	3902	1729	11969	1904	-24	77	13	20	0.725	1.045
2	F	14	1	50	14	1.250	50	60.0625	50		1206	1332	1829	1504	3902	1729	11969	1904	1731	6	473	1	0.725	1.045
2	FS3	14	1	50	14	1.250	50	60.0625	50		1206	1332	1829	1504	3902	1729	11969	1904	-87	79	7	20	0.725	1.045
2	FS3	16	1.125	70	16	1.250	70	60.0625	70		1427	1503	2056	1660	4123	1879	11842	2061	-87	79	7	20	0.731	1.045
2	G	16	1.125	70	16	1.250	70	60.0625	70		1427	1503	2056	1660	4123	1879	11842	2061	-2009	114	-487	29	0.731	1.045
3	H	20	1.750	70	20	1.875	70	60.0625	70		2442	2549	3083	2686	5103	2914	11609	3149	-4796	152	-1196	38	0.788	1.045
3	J	16	1.125	70	16	1.250	70	60.0625	70		1427	1503	2056	1660	4123	1879	11842	2061	-2009	114	-487	29	0.731	1.045
3	FS4	16	1.125	70	16	1.250	70	60.0625	70		1427	1503	2056	1660	4123	1879	11842	2061	-87	79	7	20	0.731	1.045
3	FS4	14	1	50	14	1.250	50	60.0625	50		1206	1332	1829	1504	3902	1729	11969	1904	-87	79	7	20	0.725	1.045
3	K	14	1	50	14	1.250	50	60.0625	50		1206	1332	1829	1504	3902	1729	11969	1904	1732	6	473	1	0.725	1.045
3	FS5	14	1	50	14	1.250	50	60.0625	50		1206	1332	1829	1504	3902	1729	11969	1904	-24	77	13	20	0.725	1.045
3	FS5	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	-24	77	13	20	0.726	1.045
3	L	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	-1698	109	-421	28	0.758	1.045
4	M	20	1.5	70	20	1.625	70	60.0625	70		2145	2250	2786	2392	4823	2619	11613	2841	-3806	139	-962	36	0.788	1.045
4	N	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	-1687	102	-420	26	0.758	1.045
4	FS6	14	1.125	70	14	1.250	70	60.0625	70		1291	1354	1913	1515	3977	1730	11935	1903	7	68	16	17	0.799	1.045
4	FS6	14	1	50	14	1.125	50	60.0625	50		1187	1250	1808	1414	3884	1628	12179	1794	7	68	16	17	0.794	1.045
4	P	14	1	50	14	1.125	50	60.0625	50		1187	1250	1808	1414	3884	1628	12179	1794	1315	12	350	3	0.794	1.045
4	Q	14	1	50	14	1.125	50	60.0625	50		1187	1250	1808	1414	3884	1628	12179	1794	0	68	0	18	0.794	1.045

DESIGN MOMENTS AND SHEARS (LL+I HAVE A LLDF = 1.0)

SPAN	SECTION LOCATIONS	H20 TRUCK LL+I MOMENT (K-FT)	H20 TRUCK LL+I SHEAR (K)	HS20 TRUCK/LANE LL+I MOMENT (K-FT)	HS20 TRUCK/LANE LL+I SHEAR (K)	3S2 TRUCK LL+I MOMENT (K-FT)	3S2 TRUCK LL+I SHEAR (K)	TYPE 3 TRUCK LL+I MOMENT (K-FT)	TYPE 3 TRUCK LL+I SHEAR (K)
1	A	0	27	0	79	0	67	0	56
1	B	1110	45	1798	39	1568	28	1292	27
1	FS1	838	28	1371	62	1160	51	959	43
1	FS1	838	28	-1177	62	1160	51	959	43
2	C	-667	43	-1564	78	-1142	66	-825	52
2	D	-788	48	-2623	102	-1348	78	-974	58
2	E	-470	43	-1394	86	-786	69	-578	52
2	FS2	684	39	-702	71	890	60	771	46
2	FS2	684	39	1052	71	890	60	771	46
2	F	1198	24	2038	39	1735	31	1407	26
2	FS3	817	37	1279	68	1123	56	936	43
2	FS3	817	37	-1038	68	1123	56	936	43
2	G	-615	42	-1643	84	-1058	67	-763	50
3	H	-736	46	-3095	102	-1272	76	-912	57
3	J	-615	42	-1643	84	-1058	67	-763	50
3	FS4	817	37	-1038	68	1123	56	936	43
3	FS4	817	37	1279	68	1123	56	936	43
3	K	1198	24	2038	39	1735	31	1407	26
3	FS5	684	39	1052	71	890	60	771	46
3	FS5	684	39	-702	71	890	60	771	46
3	L	-470	43	-1394	86	-786	69	-578	52
4	M	-788	48	-2623	101	-1348	78	-974	58
4	N	-667	43	-1564	78	-1142	66	-825	52
4	FS6	838	28	-1177	47	1160	51	959	33
4	FS6	838	28	1371	47	1160	51	959	33
4	P	1110	25	1798	39	1568	28	1292	27
4	Q	0	47	0	79	0	67	0	56

LOAD RATING FACTOR				
RATING	H20	HS20	3S2	TYPE 3
INVENTORY (IRF)	2.59	1.36	1.81	2.17
OPERATING (ORF)	4.32	2.26	3.01	3.61

LOAD RATING (TONS)				
RATING	H20	HS20	3S2	TYPE 3
INVENTORY (IR)	51.9	48.8	65.0	54.2
OPERATING (OR)	86.4	81.4	108.4	90.3



Notes:
1. If signifiant section loss has occured, recalculate the girder section properties to reflect those losses.
2. DL1 moment and shear is due to weight of steel girders, crossframes and details, structural deck concrete, haunches and stay-in-place forms. These force effects are resisted by the non-composite girder.
3. DL2 moment and shear is due to weight of special concrete overlay, parapets and future wearing surface. These force effects are resisted by the composite girder.
4. LL+I moments and sheears provided are critical (maximum) forces at the specific location indicated.

Flexure rating of an interior beam at 0.5L of Span 2 with an HS20 Rating Vehicle.

- Applied moment and section properties:

M_u	–	7,922 K-FT (AASHTO Standard Specification eq. 10-129c)
LLDF	–	0.725 (AASHTO LRFD live load distribution factor)
F_y	=	50 KSI
M_{DL1}	=	1,731 K-FT
M_{DL2}	–	473 K-FT
M^{ns}_{LL+I}		2,038 K-FT (live load moment based on one lane)
S_b stl	–	1,332 IN^3
S_b 3n	=	1,729 IN^3
S_b n	=	1,904 IN^3

- Convert live load moment:

M_{LL+I} LLDF (M^{ns}_{LL+I})

M_{LL+I} = 0.725 (2,038) = 1,478 K-FT

- Calculate inventory rating factor based on strength:

$$IRF = \frac{M_u - 1.3(M)_{DL1} - 1.3(M)_{DL2}}{2.17(M)_{LL+I}}$$

$$IRF = \frac{7,922 \;\; 1.3(1,731) \;\; 1.3(473)}{2.17(1,478)} = 1.58$$

- Calculate inventory rating factor based on serviceability:

$$IRF = \frac{0.95F_y - (f_b)_{DL1} - (f_b)_{DL2}}{1.67(f_b)_{LL+I}}$$

$$(f_b) \quad \frac{M}{S_b}$$

$$(f_b)_{DL1} = \frac{1,731(12)}{1,332} = 15.6 KSI$$

$$(f_b)_{DL2} = \frac{473(12)}{1,729} = 3.3 KSI$$

$$(f_b)_{LL+I} = \frac{1,478(12)}{1,904} = 9.3 KSI$$

$$IRF = \frac{0.95(50) - (15.6) - (3.3)}{1.67(9.3)} = 1.84 \text{ (does not control)}$$

- Calculate operating rating factor:

$$ORF = \frac{5}{3}(IRF)$$

$$ORF = \frac{5}{3}(1.58) = 2.63$$

- Calculate rating: (HS20 truck weighs 36 Tons)

IR = 1.58 (36) = 56.9 Tons

OR = 2.98 (36) = 107.3 Tons

Flexure rating of an interior beam at Pier 2 with an HS20 Rating Vehicle.

- Applied moment and section properties:

F_y		70 KSI
M_{DL1}	–	4,796 K-FT
M_{DL2}		1,196 K-FT
M^{ns}_{LL+I}	–	3,095 K-FT (live load moment based on one lane)
S_b stl	–	2,549 IN^3
S_b neg		2,686 IN^3
F_{cr}	–	70 KSI (AASHTO Standard Specification section 10.48.2)
R_b	=	1.0 (AASHTO Standard Specification eq. 10-103b)
LLDF	–	0.762 (AASHTO LRFD live load distribution factor)

- Convert live load moment:

M_{LL+I} = LLDF (M^{ns}_{LL+I})

M_{LL+I} = 0.762 (3,095) = 2,358 K-FT

- Calculate nominal bending stress

$F_{bn} = R_b (F_{cr})$

F_{bn} = 1.0 (70 KSI) = 70 KSI

- Calculate bending stress in bottom flange:

$$(f_b) = \frac{M}{S_b}$$

$$(f_b)_{DL1} \quad \frac{4,796(12)}{2,549} \quad 22.6 KSI$$

$$(f_b)_{DL2} = \frac{1,196(12)}{2,686} = 5.3 KSI$$

$$(f_b)_{LL+I} = \frac{2,358(12)}{2,686} = 10.5 KSI$$

- Calculate inventory rating factor based on strength:

$$IRF = \frac{F_{bn} - 1.3(f_b)_{DL1} - 1.3(f_b)_{DL2}}{2.17(f_b)_{LL+I}}$$

$$IRF = \frac{70 - 1.3(22.6) - 1.3(5.3)}{2.17(10.5)} = 1.48$$

- Calculate inventory rating factor based on serviceabil

$$IRF = \frac{0.95F_y - (f_b)_{DL1} - (f_b)_{DL2}}{1.67(f_b)_{LL+I}}$$

$$IRF = \frac{0.95(70) - (22.6) - (5.3)}{1.67(10.5)} \quad 2.20 \text{ (does not control)}$$

- Calculate operating rating factor:

$$ORF = \frac{5}{3}(IRF)$$

$$ORF = \frac{5}{3}(1.48) = 2.47$$

- Calculate rating: (HS20 truck weighs 36 Tons)

IR = 1.48 (36) = 53.3 Tons

OR = 2.47 (36) = 88.9 Tons

$$IRF \quad \frac{562 - 1.3(152) - 1.3(38)}{2.17(107)} = 1.36$$

- Calculate operating rating factor:

$$ORF = \frac{5}{3}(IRF)$$

$$ORF = \frac{5}{3}(1.36) = 2.27$$

- Calculate rating: (HS20 truck weights 36 Tons)

IR = 1.36 (36) = 48.8 Tons

OR 2.27 (36) 81.4 Tons

Shear Rating for an interior beam at Pier 2 with an HS20 Rating Vehicle.

- Applied shear and design data for section:

V_{DL1}	=	152 K
V_{DL2}	=	38 K
V^{*}_{LL+I}	=	102 K (live load shear based on one lane)
V_n		562 K
LLDF	=	1.045 (AASHTO LRFD live load distribution factor)

- Convert live load shear:

$V_{LL+I} = LLDF (V^{*}_{LL+I})$

$V_{LL+I} = 1.045 (102 K) = 107 K$

- Calculate inventory rating factor

$$IRF = \frac{V_n \quad 1.3(V)_{DL1} \quad 1.3(V)_{DL2}}{2.17(V)_{LL+I}}$$

The following rating calculation reflects a section loss of 1/8 IN in the bottom flange and 1/16 IN in the web at Pier 2 (Section 11) for Rating Example No. 1.

Flexure rating of an interior beam at Pier 2 with an HS20 Rating Vehicle.

- Applied moment and section properties:

F_y – 70 KSI
M_{DL1} – 4,796 K-FT
M_{DL2} = 1,196 K-FT
M^*_{LL+I} = 3,095 K-FT (live load moment based on one lane)
S_b stl = 2,386 IN^3 (Reduced Section)
S_b neg – 2,499 IN^3 (Reduced Section)
F_{cr} – 70 KSI (AASHTO Standard Specification section 10.48.2)
R_h = 1.0 (AASHTO Standard Specification eq. 10-103b)
LLDF = 0.762 (AASHTO LRFD live load distribution factor)

- Convert live load moment:

$M_{LL+I} = LLDF\ (M^*_{LL+I})$

$M_{LL+I} = 0.762\ (3,095) = 2,358$ K-FT

- Calculate nominal bending stress

F_{nt} $R_h\ (F_{cr})$

$F_{nt} = 1.0\ (70\ KSI) = 70$ KSI

- Calculate bending stress in bottom flange:

$$(f_b) = \frac{M}{S_b}$$

$$(f_b)_{DL1} \quad \frac{4,796(12)}{2,386} \quad 24.1 KSI$$

$$(f_b)_{DL2} = \frac{1,196(12)}{2,499} = 5.7 KSI$$

$$(f_b)_{LL+I} = \frac{2,358(12)}{2,499} = 11.3 KSI$$

- Calculate inventory rating factor based on strength:

$$IRF = \frac{F_{nt} - 1.3(f_b)_{DL1} - 1.3(f_b)_{DL2}}{2.17(f_b)_{LL+I}}$$

$$IRF = \frac{70 - 1.3\ (24.1) - 1.3\ (5.7)}{2.17\ (11.3)} = 1.27$$

- Calculate inventory rating factor based on serviceability:

$$IRF = \frac{0.95F_y - (f_b)_{DL1} - (f_b)_{DL2}}{1.67(f_b)_{LL+I}}$$

$$IRF = \frac{0.95(70) \quad (24.1) \quad (5.7)}{1.67(11.3)} = 1.94 \text{ (does not control)}$$

- Calculate operating rating factor:

$$ORF = \frac{5}{3}(IRF)$$

$$ORF = \frac{5}{3}(1.27) \quad 2.12$$

- Calculate rating: (HS20 truck weighs 36 Tons)

IR = 1.27 (36) = 45.7 Tons

OR = 2.12 (36) = 76.3 Tons

Shear Rating for an interior beam at Pier 2 with an HS20 Rating Vehicle.

- Applied shear and design data for section:

V_{DL1} – 152 K
V_{DL2} = 38 K
V^*_{LL+I} – 102 K (live load shear based on one lane)
V_n 475 K (Reduced Capacity)
LLDF – 1.045 (AASHTO LRFD live load distribution factor)

- Convert live load shear:

$V_{LL+I} = LLDF\ (V^*_{LL+I})$

$V_{LL+I} = 1.045\ (102\ K) = 107$ K

- Calculate inventory rating factor

$$IRF = \frac{V_n - 1.3(V)_{DL1} - 1.3(V)_{DL2}}{2.17(V)_{LL+I}}$$

$$IRF \quad \frac{475 - 1.3\ (152) - 1.3\ (38)}{2.17(107)} = 0.98$$

- Calculate operating rating factor:

$$ORF \quad \frac{5}{3}(IRF)$$

$$ORF = \frac{5}{3}(0.98) = 1.63$$

- Calculate rating: (HS20 truck weights 36 Tons)

IR = 0.98 (36) = 35.3 Tons

OR 1.63 (36) 58.7 Tons

GIRDER 4

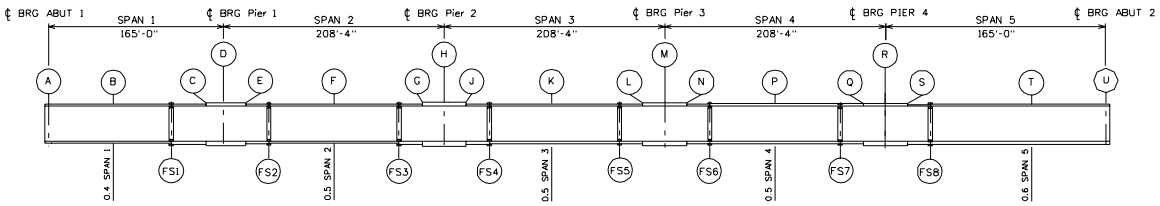
SPAN	SECTION LOCATIONS	TOP FLG WIDTH (IN)	TOP FLG THICKNESS (IN)	TOP FLG YIELD STRENGTH (KSI)	BOTTOM FLG WIDTH (IN)	BOTTOM FLG THICKNESS (IN)	BOTTOM FLG YIELD STRENGTH (KSI)	WEB DEPTH (IN)	WEB THICKNESS (IN)	WEB YIELD STRENGTH (KSI)	NON-COMPOSITE (GIRDER ONLY) S-TOP FLG (IN²)	NON-COMPOSITE (GIRDER ONLY) S-BOTTOM FLG (IN²)	COMPOSITE FOR NEGATIVE MOMENT (GIRDER AND REINFORCEMENT STEEL) S-TOP FLG (IN²)	COMPOSITE FOR NEGATIVE MOMENT (GIRDER AND REINFORCEMENT STEEL) S-BOTTOM FLG (IN²)	3n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 3n MODULAR RATIO) S-TOP FLG (IN²)	3n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 3n MODULAR RATIO) S-BOTTOM FLG (IN²)	1n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 1n MODULAR RATIO) S-TOP FLG (IN²)	1n COMPOSITE FOR POSITIVE MOMENT (GIRDER AND CONCRETE WITH 1n MODULAR RATIO) S-BOTTOM FLG (IN²)	DESIGN SERVICE MOMENT AND SHEAR DL1 MOMENT (K-FT)	DESIGN SERVICE MOMENT AND SHEAR DL1 SHEAR (K)	DESIGN SERVICE MOMENT AND SHEAR DL2 MOMENT (K-FT)	DESIGN SERVICE MOMENT AND SHEAR DL2 SHEAR (K)	LIVE LOAD CONVERSION FACTOR MOMENT	LIVE LOAD CONVERSION FACTOR SHEAR
1	A	18	0.875	50	18	0.875	70	75	0.5625	50	1697	1697	2444	1882	4291	2102	10762	2322	0	64	0	21	0.00	0.71
1	B	18	0.875	50	18	0.875	70	75	0.5625	50	1697	1697	2444	1882	4291	2102	10762	2322	1926	6	628	2	0.73	0.67
1	FS1	18	0.875	50	18	0.875	70	75	0.5625	50	1697	1697	2444	1882	4291	2102	10762	2322	259	60	86	20	0.73	0.67
1	FS1	18	0.875	70	20	1.25	70	75	0.5625	50	1812	2243	2577	2471	4448	2744	10722	3017	259	60	86	20	0.72	0.67
2	C	18	0.875	70	20	1.25	70	75	0.5625	50	1812	2243	2577	2471	4448	2744	10722	3017	-2335	97	-756	31	0.72	0.69
2	D	18	1.5	70	20	1.875	70	75	0.5625	50	2642	3184	3438	3390	5359	3666	11557	3982	-4081	115	-1319	37	0.72	0.78
2	E	18	0.875	70	20	1	70	75	0.5625	50	1755	1950	2511	2155	4371	2398	10735	2643	-2002	88	-641	29	0.72	0.70
2	FS2	18	0.875	70	20	1	70	75	0.5625	50	1755	1950	2511	2155	4371	2398	10735	2643	-321	65	-93	21	0.71	0.69
2	FS2	18	0.875	50	18	0.875	70	75	0.5625	50	1697	1697	2444	1882	4291	2102	10762	2322	-321	65	-93	21	0.75	0.69
2	F	18	0.875	50	18	0.875	70	75	0.5625	50	1697	1697	2444	1882	4291	2102	10762	2322	1642	1	549	0	0.75	0.67
2	FS3	18	0.875	50	18	0.875	70	75	0.5625	50	1697	1697	2444	1882	4291	2102	10762	2322	-534	68	-151	22	0.78	0.69
2	FS3	18	0.875	70	20	1.25	70	75	0.5625	50	1812	2243	2577	2471	4448	2744	10722	3017	-534	68	-151	22	0.78	0.69
2	G	18	0.875	70	20	1.25	70	75	0.5625	50	1812	2243	2577	2471	4448	2744	10722	3017	-2300	92	-722	30	0.72	0.71
3	H	18	1.75	70	20	2.125	70	75	0.5625	50	2976	3558	3781	3759	5717	4037	11899	4370	-4465	118	-1419	38	0.74	0.78
3	J	18	0.875	70	20	1.25	70	75	0.5625	50	1812	2243	2577	2471	4448	2744	10722	3017	-2250	95	-710	30	0.75	0.73
3	FS4	18	0.875	70	20	1.25	70	75	0.5625	50	1812	2243	2577	2471	4448	2744	10722	3017	-428	71	-128	23	0.72	0.71
3	FS4	18	0.875	50	18	1	70	75	0.5625	50	1730	1830	2482	2025	4337	2257	10753	2491	-428	71	-128	23	0.75	0.71
3	K	18	0.875	50	18	1	70	75	0.5625	50	1730	1830	2482	2025	4337	2257	10753	2491	1894	5	608	1	0.79	0.71
3	FS5	18	0.875	50	18	1	70	75	0.5625	50	1730	1830	2482	2025	4337	2257	10753	2491	47	63	1	21	0.96	0.70
3	FS5	20	0.875	70	22	1	70	75	0.5625	50	1887	2099	2649	2300	4517	2544	10857	2795	47	63	1	21	0.80	0.70
3	L	20	0.875	70	22	1	70	75	0.5625	50	1887	2099	2649	2300	4517	2544	10857	2795	-1604	97	-535	28	0.77	0.71
4	M	20	1.375	70	22	1.75	70	75	0.5625	50	2684	3256	3479	3461	5399	4737	11583	4055	-3658	110	-1200	36	0.75	0.76
4	N	20	0.875	70	22	1	70	75	0.5625	50	1887	2099	2649	2300	4517	2544	10857	2795	-1755	80	-574	26	0.75	0.73
4	FS6	20	0.875	70	22	1	70	75	0.5625	50	1887	2099	2649	2300	4517	2544	10857	2795	-265	56	-79	19	0.71	0.72
4	FS6	18	1	50	18	1.125	70	75	0.5625	50	1896	1998	2656	2189	4524	2423	10910	2664	-265	56	-79	19	0.75	0.72
4	P	18	1	50	18	1.125	70	75	0.5625	50	1896	1998	2656	2189	4524	2423	10910	2664	1099	11	410	3	0.84	0.76
4	FS7	18	1	50	18	1.125	70	75	0.5625	50	1896	1998	2656	2189	4524	2423	10910	2664	-1755	80	-443	25	1.09	0.72
4	FS7	22	1	70	26	1.25	70	75	0.5625	70	2276	2809	3058	3023	4956	3295	11159	3592	-1755	80	-443	25	1.71	0.72
5	O	22	1	70	26	1.25	70	75	0.5625	70	2276	2809	3058	3023	4956	3295	11159	3592	-3790	106	-1065	32	1.12	0.73
5	R	22	1.875	70	26	1.875	70	75	0.5625	70	3661	4091	4476	4267	6430	4523	12596	4859	-6272	172	-1815	48	0.92	0.98
5	S	22	1	70	26	1.625	70	75	0.5625	70	2352	3394	3143	3646	5052	3970	11155	4322	-3515	148	-1044	42	0.88	1.07
5	FS8	22	1	70	26	1.625	70	75	0.5625	70	2352	3394	3143	3646	5052	3970	11155	4322	507	115	85	32	0.93	1.35
5	FS8	20	1.375	70	24	1.75	70	75	0.625	70	2775	3523	3567	3746	5471	4053	11534	4415	507	115	85	32	0.90	1.35
5	T	20	1.375	70	24	1.75	70	75	0.625	70	2775	3523	3567	3746	5471	4053	11534	4415	4261	17	1161	5	1.38	0.87
5	U	20	1.375	70	24	1.75	70	75	0.625	70	2775	3523	3567	3746	5471	4053	11534	4415	0	148	0	34	0.00	1.22

LOAD RATING FACTOR				
RATING	H20	HS25	3S2	TYPE 3
INVENTORY (IRF)	3.22	1.15	1.94	2.59
OPERATING (ORF)	5.36	1.92	3.23	4.32

LOAD RATING (TONS)				
RATING	H20	HS25	3S2	TYPE 3
INVENTORY (IR)	64.4	51.8	69.8	64.8
OPERATING (OR)	107.2	86.4	116.3	108.0

DESIGN MOMENTS AND SHEARS (LL+I HAVE A LLDF = 1.0)

SPAN	SECTION LOCATIONS	H20 TRUCK LL+I MOMENT (K-FT)	H20 TRUCK LL+I SHEAR (K)	HS20 TRUCK/LANE LL+I MOMENT (K-FT)	HS20 TRUCK/LANE LL+I SHEAR (K)	3S2 TRUCK LL+I MOMENT (K-FT)	3S2 TRUCK LL+I SHEAR (K)	TYPE 3 TRUCK LL+I MOMENT (K-FT)	TYPE 3 TRUCK LL+I SHEAR (K)
1	A	0	29	0	78	0	47	0	35
1	B	1095	17	2612	36	1669	23	1303	19
1	FS1	769	25	1951	64	1140	40	901	31
1	FS1	-471	25	-1600	64	-821	40	-584	31
2	C	-605	30	-2520	87	-1053	50	-749	38
2	D	-670	31	-3762	110	-1167	53	-830	39
2	E	-430	30	-2117	90	-847	51	-607	36
2	FS2	-414	27	-1177	75	-717	45	-513	32
2	FS2	608	27	1217	75	850	45	701	32
2	F	1070	17	2755	38	1626	24	1275	18
2	FS3	618	25	1498	76	865	44	714	31
2	FS3	-476	25	-1721	76	-831	43	-590	31
2	G	-564	28	-2655	91	-984	47	-699	35
2	H	-658	31	-4283	116	-1150	52	-816	37
3	J	-575	30	-2584	94	-1006	51	-714	36
3	FS4	-487	27	-1572	79	-851	45	-604	32
3	FS4	626	27	1436	79	883	45	725	32
3	K	1092	17	3053	43	1663	24	1302	18
3	FS5	634	25	1741	77	894	43	733	31
3	FS5	-484	25	-1577	77	-848	43	-601	31
3	L	-575	28	-2497	92	-1006	47	-713	35
4	M	-660	31	-4154	113	-1159	53	-818	38
4	N	-548	30	-2477	92	-957	51	-680	36
4	FS6	-470	27	-1573	77	-819	46	-582	33
4	FS6	633	27	1538	77	899	46	734	33
4	P	1165	18	3108	45	1797	28	1394	19
4	FS7	771	24	1633	80	1150	38	903	30
4	FS7	-950	24	-2745	80	-1645	38	-1178	30
5	Q	-1136	27	-3382	95	-1966	45	-1408	34
5	R	-1320	46	-4963	147	-2284	80	-1636	58
5	S	-642	46	-3211	136	-1095	80	-793	58
5	FS8	-679	49	-2341	129	-1183	84	-841	61
5	FS8	1064	49	2834	129	1626	84	1253	61
5	T	2080	21	5498	48	3317	30	2513	25
5	U	0	45	0	140	0	78	0	55



Notes:
1. If signifiant section loss has occured, recalculate the girder section properties to reflect those losses.
2. DL1 moment and shear is due to weight of steel girders, crossframes and details, structural deck concrete, haunches and stay-in-place forms. These force effects are resisted by the non-composite girder.
3. DL2 moment and shear is due to weight of special concrete overlay, parapets and future wearing surface. These force effects are resisted by the composite girder.
4. LL+I moments and shears provided are critical (maximum) forces at the specific location indicated.
5. The load ratings shown were obtained from a finite element analysis program.
6. The conversion factors indicate the relationship of live load design moments and shears, obtained from the refined analysis, to the live load moments and shears obtained from a standard line girder analysis with a live load distribution factor = 1 lane (1 lane = 2 wheels).

Flexure rating of an interior beam at 0.6L of Span 5 with an HS25 Rating Vehicle.

- Applied moment, section properties and design data:

M_{DL1} = 4,261 K-FT
M_{DL2} = 1,161 K-FT
M^*_{LL+I} – 3,984 K-FT (live load moment based on one lane)
CF 1.38 (conversion factor based on grid analysis)
S_b stl – 3,522 IN^3
S_b 3n = 4,052 IN^3
S_b n = 4,414 IN^3
F'_{bn} 70 KSI (actual member capacity)
F_y – 70 KSI
d 13.156 FT
R = 272.75 FT
H = 6.38 FT
$S_{y\,flg}$ – 168 IN^3 (24 IN x 1 ¾ IN)

- Convert live load moment:

M_{LL+I} CF (M^*_{LL+I})

$M_{LL/I} = 1.38\ (3,984) = 5,498$ K-FT

- Calculate lateral bending moments:

$$M_{lat} \quad \frac{M(d^2)}{12\,(R)\,(H)}$$

$$(M_{lat})_{DL1} - \frac{4,261(13.156)^2}{12\,(272.75)\,(6.38)} - 35.3\ K\ \ FT$$

$$(M_{lat})_{DL2} - \frac{1,161(13.156)^2}{12\,(272.75)\,(6.38)} - 9.6\ K - FT$$

$$(M_{lat})_{LL+I} = \frac{5,498(13.156)^2}{12\,(272.75)\,(6.38)} = 45.6\ K - FT$$

- Calculate primary bending stress in bottom flange:

$$(f_b) \quad \frac{M}{S_b}$$

$$(f_b)_{DL1} \quad \frac{4,261(12)}{3,522} \quad 14.5\ KSI$$

$$(f_b)_{DL2} = \frac{1,161(12)}{4,052} = 3.4\ KSI$$

$$(f_b)_{LL/I} - \frac{5,498(12)}{4,414} - 14.9\ KSI$$

- Calculate lateral bending stress in bottom flange:

$$(f_w) = \frac{M_{lat}}{S_{y\,flg}}$$

$$(f'_w)_{DL1} = \frac{35.3(12)}{168} = 2.5\ KSI$$

$$(f'_w)_{DL2} = \frac{9.6(12)}{168} = 0.7\ KSI$$

$$(f'_w)_{LL} = \frac{45.6(12)}{168} = 3.3\ KSI$$

- Calculate inventory rating factor based on strength:

The controlling rating factor will be given by the lesser of IRF_1 or IRF_2.

$$IRF_1 = \frac{F_{bn} - 1.3(f'_b)_{DL1} - 1.3(f'_b)_{DL2}}{2.17(f_b)_{LL/I}}$$

$$IRF_2 = \frac{F_y - 1.3(f'_b + f'_w)_{DL1} - 1.3(f'_b + f'_w)_{DL2}}{2.17(f_b + f_w)_{LL+I}}$$

$$IRF_1 \quad \frac{70 - 1.3\,(14.5) - 1.3\,(3.4)}{2.17(14.9)} \quad 1.45 \ \text{(does not co}$$

$$IRF_2 \quad \frac{70 - 1.3(14.5 + 2.5) - 1.3(3.4 + 0.7)}{2.17(14.9 + 3.3)} \quad 1.08$$

IRF = 1.08

- Calculate operating rating factor:

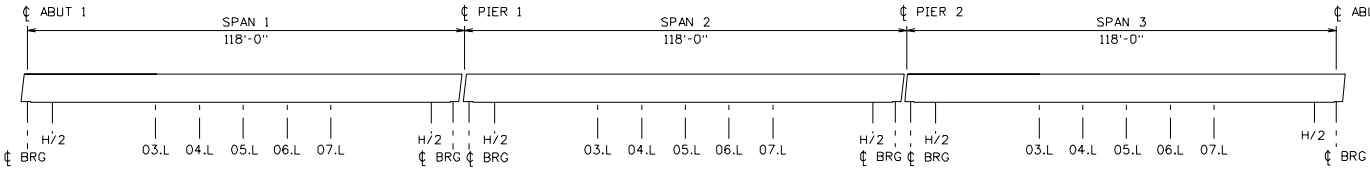
$$ORF \quad \frac{5}{3}(IRF)$$

$$ORF = \frac{5}{3}(1.08) - 1.80$$

- Calculate rating: (HS25 truck weights 45 Tons)

IR = 1.08 (45) = 48.6 Tons

OR – 1.80 (36) – 81 Tons



INTERIOR BEAMS B2 & B3

BEAM SECTION PROPERTIES

SPAN	LOCATION	SECTION MODULUS TO THE TOP AND BOTTOM FLANGES				SECTION MODULUS TO THE TOP AND BOTTOM PRESTRESSING STRANDS			
		NONCOMPOSITE		COMPOSITE		NONCOMPOSITE		COMPOSITE	
		S_{TOP} (IN³)	S_{BOT} (IN³)	S_{TOP} (IN³)	S_{BOT} (IN³)	S_{TOP} (IN³)	S_{BOT} (IN³)	S_{TOP} (IN³)	S_{BOT} (IN³)
1	BEARING	14,300	15,586	49,567	21,644	16,731	16,640	66,023	22,629
	H/2	14,300	15,586	49,567	21,644	18,884	16,640	84,951	22,629
	0.3L	14,300	15,586	49,567	21,644	56,407	16,640	43,069	22,629
	0.4L	14,300	15,586	49,567	21,644	22,809	16,640	27,666	22,629
	0.5L	14,300	15,586	49,567	21,644	22,809	16,640	27,666	22,629
	0.6L	14,300	15,586	49,567	21,644	22,809	16,640	27,666	22,629
	0.7L	14,300	15,586	49,567	21,644	56,407	16,640	43,069	22,629
	H/2	14,300	15,586	49,567	21,644	18,884	16,640	84,951	22,629
	BEARING	14,300	15,586	49,567	21,644	16,731	16,640	66,023	22,629
	PIER 1	14,300	15,586	49,567	21,644	-	-	-	-
2	BEARING	14,300	15,586	49,567	21,644	16,731	16,640	66,023	22,629
	H/2	14,300	15,586	49,567	21,644	18,721	16,640	83,335	22,629
	0.3L	14,300	15,586	49,567	21,644	87,328	16,640	49,724	22,629
	0.4L	14,300	15,586	49,567	21,644	27,998	16,640	31,130	22,629
	0.5L	14,300	15,586	49,567	21,644	27,998	16,640	31,130	22,629
	0.6L	14,300	15,586	49,567	21,644	27,998	16,640	31,130	22,629
	0.7L	14,300	15,586	49,567	21,644	87,328	16,640	49,724	22,629
	H/2	14,300	15,586	49,567	21,644	18,721	16,640	83,335	22,629
	BEARING	14,300	15,586	49,567	21,644	16,731	16,640	66,023	22,629
	PIER 2	14,300	15,586	49,567	21,644	-	-	-	-
3	BEARING	14,300	15,586	49,567	21,644	16,731	16,640	66,023	22,629
	H/2	14,300	15,586	49,567	21,644	18,884	16,640	84,951	22,629
	0.3L	14,300	15,586	49,567	21,644	56,407	16,640	43,069	22,629
	0.4L	14,300	15,586	49,567	21,644	22,809	16,640	27,666	22,629
	0.5L	14,300	15,586	49,567	21,644	22,809	16,640	27,666	22,629
	0.6L	14,300	15,586	49,567	21,644	22,809	16,640	27,666	22,629
	0.7L	14,300	15,586	49,567	21,644	56,407	16,640	43,069	22,629
	H/2	14,300	15,586	49,567	21,644	18,884	16,640	84,951	22,629
	BEARING	14,300	15,586	49,567	21,644	16,731	16,640	66,023	22,629

SECTION CAPACITY

SPAN	LOCATION	f'c (psi)	CONCRETE TENSION (PSI)	CONCRETE COMPRESSION CASE 1 (PSI)	CONCRETE COMPRESSION CASE 2 (PSI)	FLEXURAL STRENGTH (K-FT)	H20 SHEAR STRENGTH (KIPS)	HS20 SHEAR STRENGTH (KIPS)	3S2 SHEAR STRENGTH (KIPS)	TYPE 3 SHEAR STRENGTH (KIPS)
1	BEARING	7,000	-502	4,200	2,800	1,833	357	357	357	357
	H/2	7,000	-502	4,200	2,800	5,217	468	447	456	462
	0.3L	7,000	-502	4,200	2,800	10,662	211	232	213	218
	0.4L	7,000	-502	4,200	2,800	11,055	192	192	208	192
	0.5L	7,000	-502	4,200	2,800	11,058	192	192	192	192
	0.6L	7,000	-502	4,200	2,800	11,055	192	192	208	192
	0.7L	7,000	-502	4,200	2,800	10,662	211	232	213	218
	H/2	7,000	-502	4,200	2,800	-4,842	468	447	456	462
	BEARING	7,000	-502	4,200	2,800	-4,842	357	357	357	357
	PIER 1	7,000	-502	4,200	2,800	-4,842	-	-	-	-
2	BEARING	7,000	-502	4,200	2,800	-4,842	425	437	415	421
	H/2	7,000	-502	4,200	2,800	-4,842	424	436	412	418
	0.3L	7,000	-502	4,200	2,800	9,986	210	213	237	200
	0.4L	7,000	-502	4,200	2,800	10,589	194	191	191	191
	0.5L	7,000	-502	4,200	2,800	10,597	191	191	191	191
	0.6L	7,000	-502	4,200	2,800	10,589	194	191	191	191
	0.7L	7,000	-502	4,200	2,800	9,986	210	213	237	200
	H/2	7,000	-502	4,200	2,800	-4,842	424	436	412	418
	BEARING	7,000	-502	4,200	2,800	-4,842	425	437	415	421
	PIER 2	7,000	-502	4,200	2,800	-4,842	-	-	-	-
3	BEARING	7,000	-502	4,200	2,800	-4,842	357	357	357	357
	H/2	7,000	-502	4,200	2,800	-4,842	471	449	459	465
	0.3L	7,000	-502	4,200	2,800	11,031	212	234	214	220
	0.4L	7,000	-502	4,200	2,800	11,424	192	192	209	192
	0.5L	7,000	-502	4,200	2,800	11,427	192	192	192	192
	0.6L	7,000	-502	4,200	2,800	11,424	192	192	209	192
	0.7L	7,000	-502	4,200	2,800	11,031	212	234	214	220
	H/2	7,000	-502	4,200	2,800	3,234	471	449	459	465
	BEARING	7,000	-502	4,200	2,800	1,833	357	357	357	357

DESIGN MOMENTS AND AXIAL LOADS (LL+I MOMENTS HAVE A LLDF = 1.0)

SPAN	LOCATION	DEAD LOAD		PRESTRESS		H20 TRUCK		HS20 TRUCK/LANE		3S2 TRUCK		TYPE 3 TRUCK	
		DL1 (K-FT)	DL2 (K-FT)	AXIAL (KIP)	MOMENT (K-FT)	M (+) (K-FT)	M (-) (K-FT)	M (+) (K-FT)	M (-) (K-FT)	M (+) (K-FT)	M (-) (K-FT)	M (+) (K-FT)	M (-) (K-FT)
1	BEARING	0	6	303	413	18	-1	29	-3	26	-2	21	21
	H/2	322	51	1,208	1,760	155	-13	258	-23	228	-22	184	184
	0.3L	2,632	338	1,208	2,378	1,021	-135	1,650	-238	1,463	-225	1,185	1,185
	0.4L	3,013	361	1,208	2,607	1,100	-180	1,779	-317	1,574	-300	1,281	1,281
	0.5L	3,140	340	1,208	2,607	1,077	-225	1,741	-396	1,532	-375	1,251	1,251
	0.6L	3,013	273	1,208	2,607	964	-269	1,553	-475	1,366	-450	1,114	1,114
	0.7L	2,632	161	1,208	2,378	770	-314	1,213	-555	1,055	-525	876	876
	H/2	322	-365	1,208	1,760	149	-509	248	-1,444	187	-855	149	149
	BEARING	0	-433	303	413	144	-564	243	-1,682	229	-949	170	170
	PIER 1	0	-473	0	-	145	-579	256	-1,722	244	-975	179	179
2	BEARING	0	-429	352	327	148	-572	240	-1,639	213	-963	173	173
	H/2	318	-39	1,174	1,185	166	-553	237	-1,439	156	-931	169	169
	0.3L	2,573	24	1,174	2,141	758	-361	1,183	-735	1,015	-608	856	856
	0.4L	2,952	91	1,174	2,499	892	-289	1,416	-735	1,229	-487	1,022	1,022
	0.5L	3,078	113	1,174	2,499	934	-217	1,480	-735	1,280	-366	1,072	1,072
	0.6L	2,952	91	1,174	2,499	892	-289	1,416	-735	1,229	-487	1,022	1,022
	0.7L	2,573	24	1,174	2,141	756	-361	1,183	-735	1,015	-608	856	856
	H/2	318	-373	1,174	1,185	166	-553	237	-1,439	156	-931	169	169
	BEARING	0	-430	352	327	148	-572	240	-1,640	213	-963	173	173
	PIER 2	0	-473	0	-	145	-579	256	-1,722	244	-975	179	179
3	BEARING	0	-433	305	414	144	-564	243	-1,662	228	-949	170	170
	H/2	328	-365	1,193	1,707	149	-509	248	-1,444	187	-855	149	149
	0.3L	2,686	161	1,240	2,433	770	-314	1,213	-555	1,055	-525	876	876
	0.4L	3,075	273	1,240	2,659	964	-269	1,553	-475	1,366	-450	1,114	1,114
	0.5L	3,205	340	1,240	2,659	1,077	-224	1,741	-396	1,532	-375	1,251	1,251
	0.6L	3,075	361	1,240	2,659	1,100	-180	1,779	-317	1,574	-300	1,281	1,281
	0.7L	2,686	338	1,240	2,433	1,021	-135	1,650	-238	1,463	-225	1,185	1,185
	H/2	328	50	1,193	1,707	155	-13	258	-23	227	-22	183	183
	BEARING	0	5	305	414	17	-1	29	-3	26	-2	21	21

DESIGN SHEAR (LL+I SHEARS HAVE A LLDF = 1.0)

SPAN	LOCATION	DL1 (KIPS)	DL2 (KIPS)	H20 TRUCK (KIPS)	HS20 T/L (KIPS)	3S2 TRUCK (KIPS)	TYPE 3 TRUCK (KIPS)
1	BEARING	108	15	47	78	70	55
	H/2	102	14	45	75	67	53
	0.3L	43	4	30	48	40	34
	0.4L	22	0	24	38	31	28
	0.5L	0	4	25	40	34	31
	0.6L	22	8	30	50	44	37
	0.7L	43	11	35	59	53	43
	H/2	102	22	46	84	75	57
	BEARING	108	23	47	87	77	58
	PIER 1	-	-	-	-	-	-
2	BEARING	106	19	47	83	74	57
	H/2	101	18	45	80	71	55
	0.3L	43	8	30	51	45	38
	0.4L	22	4	25	44	35	31
	0.5L	0	0	24	38	30	27
	0.6L	22	4	25	44	35	31
	0.7L	43	8	30	51	45	38
	H/2	101	18	45	80	71	55
	BEARING	106	19	47	83	74	57
	PIER 2	-	-	-	-	-	-
3	BEARING	110	23	47	87	77	58
	H/2	104	22	46	84	75	57
	0.3L	44	11	35	59	53	43
	0.4L	22	8	30	50	44	37
	0.5L	0	4	25	40	34	31
	0.6L	22	0	24	38	31	28
	0.7L	44	4	30	48	40	34
	H/2	104	14	45	75	67	53
	BEARING	110	15	47	78	70	55

LRFD LIVE LOAD DISTRIBUTION FACTORS

SPAN	LOCATION	MOMENT LLDF		SHEAR LLDF	
		ONE LANE	TWO + LANES	ONE LANE	TWO + LANES
1	BEARING	0.812	0.716	0.812	0.700
	H/2	0.812	0.716	0.812	0.700
	0.3L	0.812	0.716	0.812	0.700
	0.4L	0.812	0.716	0.812	0.700
	0.5L	0.812	0.716	0.812	0.700
	0.6L	0.812	0.716	0.812	0.700
	0.7L	0.812	0.716	0.812	0.700
	H/2	0.812	0.716	0.812	0.700
	BEARING	0.812	0.716	0.812	0.700
	PIER 1	0.812	0.716	0.812	0.700
2	BEARING	0.812	0.716	0.812	0.700
	H/2	0.812	0.716	0.812	0.700
	0.3L	0.812	0.716	0.812	0.700
	0.4L	0.812	0.716	0.812	0.700
	0.5L	0.812	0.716	0.812	0.700
	0.6L	0.812	0.716	0.812	0.700
	0.7L	0.812	0.716	0.812	0.700
	H/2	0.812	0.716	0.812	0.700
	BEARING	0.812	0.716	0.812	0.700
	PIER 2	0.812	0.716	0.812	0.700
3	BEARING	0.812	0.716	0.812	0.700
	H/2	0.812	0.716	0.812	0.700
	0.3L	0.812	0.716	0.812	0.700
	0.4L	0.812	0.716	0.812	0.700
	0.5L	0.812	0.716	0.812	0.700
	0.6L	0.812	0.716	0.812	0.700
	0.7L	0.812	0.716	0.812	0.700
	H/2	0.812	0.716	0.812	0.700
	BEARING	0.812	0.716	0.812	0.700

CONTROLLING RATING FACTOR

	H20	HS20	3S2	TYPE 3
IRF	2.10	1.45	1.40	1.78
ORF	3.51	2.42	2.33	2.97

CONTROLLING RATING TONS

	H20	HS20	3S2	TYPE 3
IR	42.0	52.1	50.2	44.5
OR	70.1	87.0	83.8	74.3

H20 TRUCK

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	145.98	1224.30	815.63	59.20	98.82	-	-
	H/2	41.70	133.31	89.61	10.00	16.69	4.00	6.67
	0.3L	3.15	12.83	9.90	3.78	6.31	2.85	4.76
	0.4L	2.66	11.29	8.88	3.44	5.74	3.83	6.40
	0.5L	2.54	11.05	8.83	3.44	5.75	4.32	7.21
	0.6L	3.15	12.99	10.19	3.99	6.67	2.94	4.91
	0.7L	4.47	17.30	13.28	5.18	8.65	2.29	3.83
	H/2	5.36	6.80	6.45	5.33	8.90	3.80	6.34
	BEARING	3.46	13.04	9.28	4.31	7.19	-	-
	PIER 1	-	-	-	4.14	6.91	-	-
2	BEARING	4.55	12.91	9.17	4.25	7.10	-	-
	H/2	9.74	5.91	7.27	5.34	8.92	3.41	5.69
	0.3L	4.26	17.08	13.25	4.96	8.28	2.69	4.49
	0.4L	3.48	14.29	11.14	4.22	7.05	3.68	6.14
	0.5L	3.06	13.04	10.33	3.92	6.54	4.50	7.51
	0.6L	3.48	14.29	11.14	4.22	7.05	3.68	6.14
	0.7L	4.26	17.08	13.25	4.96	8.28	2.69	4.49
	H/2	8.99	8.17	6.89	4.90	8.17	3.41	5.69
	BEARING	4.55	12.91	9.17	4.25	7.10	-	-
	PIER 2	-	-	-	4.14	6.91	-	-
3	BEARING	3.48	13.03	9.27	4.31	7.19	-	-
	H/2	5.69	7.07	6.59	5.34	8.92	3.79	6.33
	0.3L	4.57	17.07	13.16	5.40	9.02	2.30	3.83
	0.4L	3.22	12.76	10.07	4.16	6.95	2.92	4.87
	0.5L	2.60	10.84	8.73	3.59	6.00	4.31	7.20
	0.6L	2.72	11.09	8.78	3.59	5.99	3.81	6.35
	0.7L	3.23	12.66	9.82	3.95	6.59	2.86	4.77
	H/2	40.87	132.39	89.18	10.05	16.77	3.99	6.66
	BEARING	148.14	1238.18	824.92	59.91	100.01	-	-

HS20 TRUCK/LANE

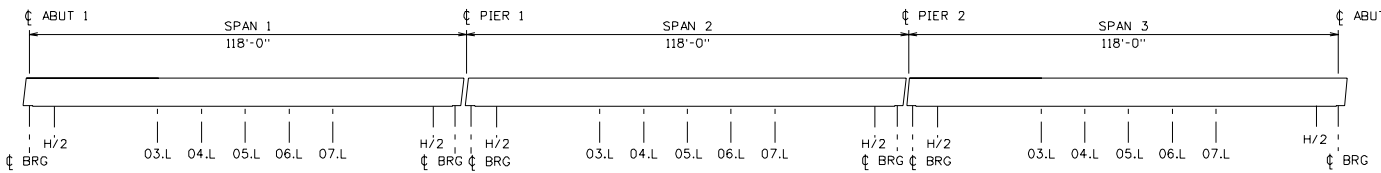
SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	87.79	736.26	490.50	35.60	59.43	-	-
	H/2	25.05	80.08	53.83	6.01	10.03	2.23	3.73
	0.3L	1.95	7.94	6.13	2.34	3.91	2.02	3.38
	0.4L	1.65	6.98	5.49	2.13	3.55	2.42	4.05
	0.5L	1.57	6.83	5.46	2.13	3.55	2.64	4.40
	0.6L	1.96	8.07	6.33	2.48	4.14	1.75	2.92
	0.7L	2.83	10.98	8.43	3.29	5.49	1.55	2.59
	H/2	1.89	2.40	2.28	1.88	3.14	1.94	3.24
	BEARING	1.17	4.42	3.15	1.46	2.44	-	-
	PIER 1	-	-	-	1.39	2.32	-	-
2	BEARING	1.59	4.50	3.20	1.48	2.48	-	-
	H/2	3.74	3.43	2.79	2.05	3.43	2.01	3.35
	0.3L	2.72	10.92	8.47	3.17	5.29	1.64	2.74
	0.4L	2.19	9.00	7.02	2.66	4.44	2.04	3.40
	0.5L	1.93	8.23	6.52	2.47	4.13	2.89	4.83
	0.6L	2.19	9.00	7.02	2.66	4.44	2.04	3.40
	0.7L	2.72	10.92	8.47	3.17	5.29	1.64	2.74
	H/2	3.45	3.14	2.65	1.88	3.14	2.01	3.35
	BEARING	1.59	4.50	3.20	1.48	2.47	-	-
	PIER 2	-	-	-	1.39	2.32	-	-
3	BEARING	1.18	4.42	3.14	1.46	2.44	-	-
	H/2	2.01	2.50	2.32	1.88	3.15	1.94	3.23
	0.3L	2.90	10.83	8.35	3.43	5.72	1.56	2.60
	0.4L	2.00	7.92	6.26	2.58	4.31	1.74	2.90
	0.5L	1.61	6.70	5.40	2.22	3.71	2.63	4.39
	0.6L	1.68	6.86	5.43	2.22	3.70	2.41	4.02
	0.7L	2.00	7.83	6.08	2.44	4.08	2.03	3.39
	H/2	24.55	79.52	53.57	6.03	10.07	2.23	3.72
	BEARING	88.68	741.19	493.81	35.87	59.87	-	-

3S2 TRUCK

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	99.40	833.67	555.39	40.31	67.29	-	-
	H/2	28.42	90.84	61.07	6.81	11.37	2.60	4.33
	0.3L	2.20	8.96	6.91	2.64	4.41	2.13	3.55
	0.4L	1.86	7.89	6.21	2.40	4.01	3.25	5.43
	0.5L	1.79	7.77	6.21	2.42	4.04	3.11	5.19
	0.6L	2.22	9.17	7.19	2.82	4.70	2.18	3.65
	0.7L	3.26	12.62	9.69	3.78	6.31	1.51	2.51
	H/2	3.19	4.05	3.84	3.18	5.30	2.24	3.73
	BEARING	2.06	7.75	5.51	2.56	4.27	-	-
	PIER 1	-	-	-	2.46	4.10	-	-
2	BEARING	2.70	7.66	5.45	2.52	4.21	-	-
	H/2	5.78	5.29	4.32	3.17	5.30	2.07	3.45
	0.3L	3.17	12.72	9.87	3.70	6.17	2.15	3.59
	0.4L	2.52	10.37	8.08	3.06	5.11	2.54	4.23
	0.5L	2.23	9.51	7.54	2.86	4.77	3.65	6.10
	0.6L	2.52	10.37	8.08	3.06	5.11	2.54	4.23
	0.7L	3.17	12.72	9.87	3.70	6.17	2.15	3.59
	H/2	5.34	4.85	6.89	2.91	4.85	2.07	3.45
	BEARING	2.70	7.66	9.17	2.52	4.21	-	-
	PIER 2	-	-	-	2.46	4.10	-	-
3	BEARING	2.06	7.74	9.27	2.56	4.27	-	-
	H/2	3.39	4.21	6.59	3.18	5.31	2.23	3.73
	0.3L	3.33	12.46	9.60	3.94	6.58	1.51	2.52
	0.4L	2.27	9.00	7.11	2.94	4.90	2.19	3.65
	0.5L	1.83	7.62	6.13	2.53	4.22	3.10	5.18
	0.6L	1.90	7.75	6.14	2.51	4.19	3.25	5.43
	0.7L	2.26	8.84	6.85	2.76	4.60	2.13	3.56
	H/2	27.84	90.18	60.75	6.84	11.42	2.59	4.33
	BEARING	100.51	840.02	559.65	40.65	67.85	-	-

TYPE 3 TRUCK

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	123.41	1035.04	689.54	50.05	83.54	-	-
	H/2	35.25	112.68	75.74	8.45	14.11	3.31	5.52
	0.3L	2.77	11.09	8.54	3.26	5.44	2.59	4.32
	0.4L	2.29	9.69	7.63	2.95	4.93	3.36	5.61
	0.5L	2.19	9.51	7.60	2.96	4.95	3.44	5.74
	0.6L	2.73	11.24	8.82	3.46	5.77	2.34	3.91
	0.7L	3.92	15.20	11.66	4.55	7.60	1.93	3.21
	H/2	4.34	5.50	5.22	4.32	7.20	3.03	5.06
	BEARING	2.80	10.55	7.51	3.49	5.82	-	-
	PIER 1	-	-	-	3.35	5.59	-	-
2	BEARING	3.68	10.44	7.42	3.44	5.74	-	-
	H/2	7.88	7.21	5.88	4.32	7.21	2.73	4.56
	0.3L	3.76	15.09	11.71	4.38	7.32	1.99	3.32
	0.4L	3.03	12.47	9.72	3.68	6.15	2.87	4.79
	0.5L	2.67	11.36	9.00	3.41	5.70	3.99	6.66
	0.6L	3.03	12.47	9.72	3.68	6.15	2.87	4.79
	0.7L	3.76	15.09	11.71	4.38	7.32	1.99	3.32
	H/2	7.27	6.61	6.89	3.96	6.61	2.73	4.56
	BEARING	3.68	10.44	9.17	3.44	5.74	-	-
	PIER 2	-	-	-	3.35	5.59	-	-
3	BEARING	2.81	10.54	9.27	3.49	5.82	-	-
	H/2	4.61	5.72	6.59	4.32	7.22	3.02	5.05
	0.3L	4.02	15.00	11.56	4.75	7.93	1.93	3.22
	0.4L	2.78	11.04	8.72	3.60	6.01	2.32	3.88
	0.5L	2.24	9.33	7.51	3.09	5.16	3.43	5.73
	0.6L	2.33	9.52	7.54	3.08	5.14	3.34	5.57
	0.7L	2.79	10.91	8.46	3.40	5.68	2.59	4.33
	H/2	34.54	111.88	75.37	8.49	14.17	3.30	5.52
	BEARING	125.02	1044.90	696.15	50.56	84.40	-	-



EXTERIOR BEAMS B1 & B4

BEAM SECTION PROPERTIES

SPAN	LOCATION	SECTION MODULUS TO THE TOP AND BOTTOM FLANGES				SECTION MODULUS TO THE TOP AND BOTTOM PRESTRESSING STRANDS			
		NONCOMPOSITE		COMPOSITE		NONCOMPOSITE		COMPOSITE	
		S_{TOP} (IN^3)	S_{BOT} (IN^3)	S_{TOP} (IN^3)	S_{BOT} (IN^3)	S_{TOP} (IN^3)	S_{BOT} (IN^3)	S_{TOP} (IN^3)	S_{BOT} (IN^3)
1	BEARING	14,300	15,586	53,263	21,884	16,731	16,640	71,991	22,861
	H/2	14,300	15,586	53,263	21,884	18,884	16,640	94,226	22,861
	0.3L	14,300	15,586	53,263	21,884	56,407	16,640	42,786	22,861
	0.4L	14,300	15,586	53,263	21,884	22,809	16,640	27,833	22,861
	0.5L	14,300	15,586	53,263	21,884	22,809	16,640	27,833	22,861
	0.6L	14,300	15,586	53,263	21,884	22,809	16,640	27,833	22,861
	0.7L	14,300	15,586	53,263	21,884	56,407	16,640	42,786	22,861
	H/2	14,300	15,586	53,263	21,884	18,884	16,640	94,226	22,861
	BEARING	14,300	15,586	53,263	21,884	16,731	16,640	71,991	22,861
	PIER 1	14,300	15,586	53,263	21,884	-	-	-	-
2	BEARING	14,300	15,586	53,263	21,884	16,731	16,640	71,991	22,861
	H/2	14,300	15,586	53,263	21,884	18,721	16,640	92,298	22,861
	0.3L	14,300	15,586	53,263	21,884	87,328	16,640	49,131	22,861
	0.4L	14,300	15,586	53,263	21,884	27,998	16,640	31,230	22,861
	0.5L	14,300	15,586	53,263	21,884	27,998	16,640	31,230	22,861
	0.6L	14,300	15,586	53,263	21,884	27,998	16,640	31,230	22,861
	0.7L	14,300	15,586	53,263	21,884	87,328	16,640	49,131	22,861
	H/2	14,300	15,586	53,263	21,884	18,721	16,640	92,298	22,861
	BEARING	14,300	15,586	53,263	21,884	16,731	16,640	71,991	22,861
	PIER 2	14,300	15,586	53,263	21,884	-	-	-	-
3	BEARING	14,300	15,586	53,263	21,884	16,731	16,640	71,991	22,861
	H/2	14,300	15,586	53,263	21,884	18,884	16,640	94,226	22,861
	0.3L	14,300	15,586	53,263	21,884	56,407	16,640	42,786	22,861
	0.4L	14,300	15,586	53,263	21,884	22,809	16,640	27,833	22,861
	0.5L	14,300	15,586	53,263	21,884	22,809	16,640	27,833	22,861
	0.6L	14,300	15,586	53,263	21,884	22,809	16,640	27,833	22,861
	0.7L	14,300	15,586	53,263	21,884	56,407	16,640	42,786	22,861
	H/2	14,300	15,586	53,263	21,884	18,884	16,640	94,226	22,861
	BEARING	14,300	15,586	53,263	21,884	16,731	16,640	71,991	22,861

SECTION CAPACITY

SPAN	LOCATION	f'c (psi)	CONCRETE TENSION (PSI)	CONCRETE COMPRESSION CASE 1 (PSI)	CONCRETE COMPRESSION CASE 2 (PSI)	FLEXURAL STRENGTH (K-FT)	H20 SHEAR STRENGTH (KIPS)	HS20 SHEAR STRENGTH (KIPS)	3S2 SHEAR STRENGTH (KIPS)	TYPE 3 SHEAR STRENGTH (KIPS)
1	BEARING	7,000	-502	4,200	2,800	1,836	356	356	356	356
	H/2	7,000	-502	4,200	2,800	3,225	482	458	469	476
	0.3L	7,000	-502	4,200	2,800	10,738	214	233	214	219
	0.4L	7,000	-502	4,200	2,800	11,132	192	192	206	192
	0.5L	7,000	-502	4,200	2,800	11,134	192	192	192	192
	0.6L	7,000	-502	4,200	2,800	11,132	192	192	206	192
	0.7L	7,000	-502	4,200	2,800	10,738	214	233	214	219
	H/2	7,000	-502	4,200	2,800	3,225	482	458	469	476
	BEARING	7,000	-502	4,200	2,800	-5,286	356	356	356	356
	PIER 1	7,000	-502	4,200	2,800	-5,286	-	-	-	-
2	BEARING	7,000	-502	4,200	2,800	-5,286	436	448	426	431
	H/2	7,000	-502	4,200	2,800	-5,286	436	447	422	429
	0.3L	7,000	-502	4,200	2,800	10,056	212	214	237	203
	0.4L	7,000	-502	4,200	2,800	10,660	193	191	191	191
	0.5L	7,000	-502	4,200	2,800	10,668	191	191	191	191
	0.6L	7,000	-502	4,200	2,800	10,660	193	191	191	191
	0.7L	7,000	-502	4,200	2,800	10,056	212	214	237	203
	H/2	7,000	-502	4,200	2,800	-5,286	436	447	422	429
	BEARING	7,000	-502	4,200	2,800	-5,286	436	448	426	431
	PIER 2	7,000	-502	4,200	2,800	-5,286	-	-	-	-
3	BEARING	7,000	-502	4,200	2,800	-5,286	356	356	356	356
	H/2	7,000	-502	4,200	2,800	-5,286	485	460	471	478
	0.3L	7,000	-502	4,200	2,800	11,113	216	235	215	220
	0.4L	7,000	-502	4,200	2,800	11,506	192	192	207	192
	0.5L	7,000	-502	4,200	2,800	11,509	192	192	192	192
	0.6L	7,000	-502	4,200	2,800	11,506	192	192	207	192
	0.7L	7,000	-502	4,200	2,800	11,113	216	235	215	220
	H/2	7,000	-502	4,200	2,800	3,242	485	460	471	478
	BEARING	7,000	-502	4,200	2,800	1,836	356	356	356	356

DESIGN MOMENTS AND AXIAL LOADS (LL+I MOMENTS HAVE A LLDF = 1.0)

SPAN	LOCATION	DEAD LOAD		PRESTRESS		H20 TRUCK		HS20 TRUCK/LANE		3S2 TRUCK		TYPE 3 TRUCK	
		DL1 (K-FT)	DL2 (K-FT)	AXIAL (KIP)	MOMENT (K-FT)	M (+) (K-FT)	M (-) (K-FT)	M (+) (K-FT)	M (-) (K-FT)	M (+) (K-FT)	M (-) (K-FT)	M (+) (K-FT)	M (-) (K-FT)
1	BEARING	0	6	303	413	18	-1	29	-3	26	-2	21	-2
	H/2	343	56	1,208	1,760	155	-13	258	-23	228	-22	184	-16
	0.3L	2,806	371	1,208	2,378	1,021	-135	1,650	-238	1,463	-225	1,185	-166
	0.4L	3,212	396	1,208	2,607	1,100	-180	1,779	-317	1,574	-300	1,281	-222
	0.5L	3,348	372	1,208	2,607	1,077	-225	1,741	-396	1,532	-375	1,251	-277
	0.6L	3,212	299	1,208	2,607	964	-269	1,553	-475	1,366	-450	1,114	-333
	0.7L	2,806	177	1,208	2,378	770	-314	1,213	-555	1,055	-525	876	-388
	H/2	343	-400	1,208	1,760	149	-509	248	-1,444	187	-855	149	-629
	BEARING	0	-475	303	413	144	-564	243	-1,662	229	-949	170	-697
	PIER 1	0	-473	0	-	145	-579	256	-1,722	244	-975	179	-716
2	BEARING	0	-471	352	327	148	-572	240	-1,639	213	-963	173	-707
	H/2	339	-409	1,174	1,185	166	-553	237	-1,439	156	-931	189	-684
	0.3L	2,743	26	1,174	2,141	756	-361	1,183	-735	1,015	-608	856	-446
	0.4L	3,147	99	1,174	2,499	892	-289	1,416	-735	1,229	-487	1,022	-357
	0.5L	3,281	124	1,174	2,499	934	-217	1,480	-735	1,280	-366	1,072	-268
	0.6L	3,147	99	1,174	2,499	892	-289	1,416	-735	1,229	-487	1,022	-357
	0.7L	2,743	26	1,174	2,141	756	-361	1,183	-735	1,015	-608	856	-446
	H/2	339	-410	1,174	1,185	166	-553	237	-1,439	156	-931	189	-684
	BEARING	0	-471	352	327	148	-572	240	-1,640	213	-963	173	-707
	PIER 2	0	-473	0	-	145	-579	256	-1,722	244	-975	179	-716
3	BEARING	0	-475	305	414	144	-564	243	-1,662	228	-949	170	-697
	H/2	349	-400	1,193	1,707	149	-509	248	-1,444	187	-855	149	-629
	0.3L	2,860	177	1,240	2,433	770	-314	1,213	-555	1,055	-525	876	-388
	0.4L	3,275	299	1,240	2,659	964	-269	1,553	-475	1,366	-450	1,114	-333
	0.5L	3,412	372	1,240	2,659	1,077	-224	1,741	-396	1,532	-375	1,251	-277
	0.6L	3,275	396	1,240	2,659	1,100	-180	1,779	-317	1,574	-300	1,281	-222
	0.7L	2,860	371	1,240	2,433	1,021	-135	1,650	-238	1,463	-225	1,185	-166
	H/2	349	55	1,193	1,707	155	-13	258	-23	227	-22	183	-16
	BEARING	0	6	305	414	17	-1	29	-3	26	-2	21	-2

DESIGN SHEAR (LL+I SHEARS HAVE A LLDF = 1.0)

SPAN	LOCATION	DL1 (KIPS)	DL2 (KIPS)	H20 TRUCK (KIPS)	HS20 T/L (KIPS)	3S2 TRUCK (KIPS)	TYPE 3 TRUCK (KIPS)
1	BEARING	115	17	47	78	70	55
	H/2	108	16	45	75	67	53
	0.3L	46	4	30	48	40	34
	0.4L	23	0	24	38	31	28
	0.5L	0	4	25	40	34	31
	0.6L	23	8	30	50	44	37
	0.7L	46	13	35	59	53	43
	H/2	108	24	46	84	75	57
	BEARING	115	25	47	87	77	58
	PIER 1	-	-	-	-	-	-
2	BEARING	113	21	47	83	74	57
	H/2	107	20	45	80	71	55
	0.3L	46	8	30	51	45	38
	0.4L	23	4	25	44	35	31
	0.5L	0	0	24	38	30	27
	0.6L	23	4	25	44	35	31
	0.7L	46	8	30	51	45	38
	H/2	107	20	45	80	71	55
	BEARING	113	21	47	83	74	57
	PIER 2	-	-	-	-	-	-
3	BEARING	117	25	47	87	77	58
	H/2	111	24	46	84	75	57
	0.3L	47	13	35	59	53	43
	0.4L	23	8	30	50	44	37
	0.5L	0	4	25	40	34	31
	0.6L	23	0	24	38	31	28
	0.7L	47	4	30	48	40	34
	H/2	111	16	45	75	67	53
	BEARING	117	17	47	78	70	55

LRFD LIVE LOAD DISTRIBUTION FACTORS

SPAN	LOCATION	MOMENT LLDF		SHEAR LLDF	
		ONE LANE	TWO + LANES	ONE LANE	TWO + LANES
1	BEARING	0.484	0.704	0.701	0.849
	H/2	0.484	0.704	0.701	0.849
	0.3L	0.484	0.704	0.701	0.849
	0.4L	0.484	0.704	0.701	0.849
	0.5L	0.484	0.704	0.701	0.849
	0.6L	0.484	0.704	0.701	0.849
	0.7L	0.484	0.704	0.701	0.849
	H/2	0.484	0.704	0.701	0.849
	BEARING	0.484	0.704	0.701	0.849
	PIER 1	0.484	0.704	0.701	0.849
2	BEARING	0.484	0.704	0.701	0.849
	H/2	0.484	0.704	0.701	0.849
	0.3L	0.484	0.704	0.701	0.849
	0.4L	0.484	0.704	0.701	0.849
	0.5L	0.484	0.704	0.701	0.849
	0.6L	0.484	0.704	0.701	0.849
	0.7L	0.484	0.704	0.701	0.849
	H/2	0.484	0.704	0.701	0.849
	BEARING	0.484	0.704	0.701	0.849
	PIER 2	0.484	0.704	0.701	0.849
3	BEARING	0.484	0.704	0.701	0.849
	H/2	0.484	0.704	0.701	0.849
	0.3L	0.484	0.704	0.701	0.849
	0.4L	0.484	0.704	0.701	0.849
	0.5L	0.484	0.704	0.701	0.849
	0.6L	0.484	0.704	0.701	0.849
	0.7L	0.484	0.704	0.701	0.849
	H/2	0.484	0.704	0.701	0.849
	BEARING	0.484	0.704	0.701	0.849

CONTROLLING RATING FACTOR

	H20	HS20	3S2	TYPE 3
IRF	2.22	1.17	1.51	1.93
ORF	3.71	2.32	2.51	3.21

CONTROLLING RATING TONS

	H20	HS20	3S2	TYPE 3
IR	44.5	42.3	54.2	48.1
OR	74.2	83.7	90.4	80.4

H20 TRUCK

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	170.20	1517.42	1010.90	68.37	114.12	-	-
	H/2	48.32	164.50	110.70	11.42	19.07	3.86	6.45
	0.3L	3.30	14.99	11.82	4.24	7.07	2.70	4.51
	0.4L	2.71	13.03	10.53	3.83	6.40	3.62	6.04
	0.5L	2.54	12.67	10.43	3.83	6.39	4.12	6.88
	0.6L	3.23	15.00	12.08	4.46	7.44	2.76	4.60
	0.7L	4.73	20.24	15.85	5.83	9.74	2.16	3.61
	H/2	6.84	7.93	7.52	6.70	11.18	3.66	6.12
	BEARING	4.27	15.11	10.77	5.42	9.05	-	-
	PIER 1	-	-	-	5.28	8.81	-	-
2	BEARING	5.61	14.96	10.65	5.35	8.93	-	-
	H/2	11.33	9.52	8.04	6.15	10.27	3.27	5.46
	0.3L	4.51	19.98	15.83	5.59	9.33	2.53	4.22
	0.4L	3.61	16.55	13.22	4.73	7.89	3.45	5.76
	0.5L	3.12	15.00	12.23	4.37	7.30	4.30	7.18
	0.6L	3.61	16.55	13.22	4.73	7.89	3.45	5.76
	0.7L	4.51	19.98	15.83	5.59	9.33	2.53	4.22
	H/2	11.32	9.52	8.04	6.15	10.26	3.27	5.46
	BEARING	5.61	14.96	10.65	5.35	8.93	-	-
	PIER 2	-	-	-	5.28	8.81	-	-
3	BEARING	4.28	15.10	10.77	5.42	9.05	-	-
	H/2	7.26	8.25	7.68	6.71	11.20	3.66	6.11
	0.3L	4.85	19.96	15.71	6.09	10.17	2.16	3.61
	0.4L	3.30	14.72	11.94	4.66	7.78	2.74	4.57
	0.5L	2.61	12.40	10.30	4.01	6.69	4.11	6.86
	0.6L	2.77	12.78	10.40	4.01	6.69	3.60	6.01
	0.7L	3.39	14.78	11.71	4.43	7.40	2.71	4.52
	H/2	47.35	163.35	110.17	11.48	19.16	3.86	6.45
	BEARING	172.72	1534.61	1022.41	69.19	115.49	-	-

HS20 TRUCK/LANE

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	102.35	912.54	607.93	41.12	68.63	-	-
	H/2	29.03	98.81	66.50	6.86	11.46	2.14	3.58
	0.3L	2.04	9.28	7.31	2.62	4.38	1.90	3.17
	0.4L	1.67	8.05	6.51	2.37	3.96	2.29	3.82
	0.5L	1.57	7.83	6.45	2.37	3.95	2.52	4.20
	0.6L	2.01	9.31	7.50	2.77	4.62	1.64	2.74
	0.7L	3.00	12.84	10.06	3.70	6.18	1.45	2.42
	H/2	2.41	2.80	2.65	2.36	3.94	1.86	3.10
	BEARING	1.45	5.12	3.65	1.84	3.07	-	-
	PIER 1	-	-	-	1.77	2.96	-	-
2	BEARING	1.96	5.22	3.72	1.87	3.12	-	-
	H/2	4.35	3.66	3.09	2.36	3.95	1.92	3.21
	0.3L	2.88	12.77	10.12	3.57	5.96	1.54	2.56
	0.4L	2.27	10.42	8.33	2.98	4.97	1.92	3.20
	0.5L	1.97	9.47	7.71	2.76	4.61	2.77	4.62
	0.6L	2.27	10.42	8.33	2.98	4.97	1.92	3.20
	0.7L	2.88	12.77	10.12	3.57	5.96	1.54	2.56
	H/2	4.35	3.66	3.09	2.36	3.94	1.92	3.21
	BEARING	1.96	5.22	3.71	1.87	3.11	-	-
	PIER 2	-	-	-	1.77	2.96	-	-
3	BEARING	1.45	5.12	3.65	1.84	3.07	-	-
	H/2	2.56	2.91	2.71	2.37	3.95	1.85	3.10
	0.3L	3.08	12.66	9.97	3.87	6.45	1.45	2.43
	0.4L	2.05	9.14	7.41	2.89	4.83	1.63	2.73
	0.5L	1.61	7.67	6.37	2.48	4.13	2.51	4.19
	0.6L	1.71	7.90	6.43	2.48	4.14	2.28	3.80
	0.7L	2.10	9.14	7.25	2.74	4.58	1.91	3.18
	H/2	28.44	98.11	66.17	6.89	11.51	2.14	3.57
	BEARING	103.39	918.64	612.03	41.42	69.14	-	-

3S2 TRUCK

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	115.90	1033.26	688.36	46.55	77.71	-	-
	H/2	32.93	112.10	75.44	7.79	13.00	2.50	4.17
	0.3L	2.30	10.46	8.25	2.96	4.94	1.99	3.32
	0.4L	1.89	9.10	7.35	2.68	4.47	3.05	5.09
	0.5L	1.79	8.91	7.34	2.69	4.49	2.96	4.95
	0.6L	2.28	10.59	8.52	3.15	5.25	2.03	3.39
	0.7L	3.45	14.77	11.57	4.26	7.11	1.40	2.33
	H/2	4.07	4.72	4.48	3.99	6.66	2.15	3.58
	BEARING	2.54	8.98	6.40	3.22	5.38	-	-
	PIER 1	-	-	-	3.13	5.23	-	-
2	BEARING	3.33	8.88	6.32	3.18	5.30	-	-
	H/2	6.72	5.65	4.77	3.65	6.09	1.97	3.29
	0.3L	3.36	14.88	11.79	4.16	6.95	2.00	3.34
	0.4L	2.62	12.01	9.60	3.43	5.73	2.39	3.99
	0.5L	2.28	10.95	8.92	3.19	5.33	3.49	5.83
	0.6L	2.62	12.01	9.60	3.43	5.73	2.39	3.99
	0.7L	3.36	14.88	11.79	4.16	6.95	2.00	3.34
	H/2	6.72	5.65	8.04	3.65	6.09	1.97	3.29
	BEARING	3.33	8.88	10.65	3.18	5.30	-	-
	PIER 2	-	-	-	3.13	5.23	-	-
3	BEARING	2.54	8.97	10.77	3.22	5.38	-	-
	H/2	4.32	4.91	7.68	4.00	6.67	2.14	3.58
	0.3L	3.54	14.56	11.46	4.45	7.42	1.40	2.34
	0.4L	2.33	10.38	8.42	3.29	5.49	2.04	3.40
	0.5L	1.83	8.72	7.24	2.82	4.70	2.96	4.94
	0.6L	1.94	8.93	7.27	2.80	4.67	3.05	5.10
	0.7L	2.37	10.31	8.18	3.09	5.16	1.99	3.33
	H/2	32.25	111.27	75.04	7.82	13.05	2.50	4.17
	BEARING	117.18	1041.13	693.64	46.94	78.35	-	-

TYPE 3 TRUCK

SPAN	LOCATION	STRESSES			FLEXURE		SHEAR	
		IRF TENSION	IRF COMP CASE 1	IRF COMP CASE 2	IRF	ORF	IRF	ORF
1	BEARING	143.89	1282.84	854.63	57.80	96.48	-	-
	H/2	40.84	139.04	93.57	9.66	16.12	3.19	5.33
	0.3L	2.84	12.92	10.19	3.65	6.10	2.41	4.03
	0.4L	2.32	11.18	9.04	3.29	5.49	3.18	5.30
	0.5L	2.19	10.91	8.98	3.30	5.50	3.28	5.48
	0.6L	2.79	12.98	10.45	3.86	6.44	2.20	3.67
	0.7L	4.16	17.78	13.93	5.13	8.56	1.78	2.97
	H/2	5.54	6.42	6.09	5.42	9.05	2.92	4.87
	BEARING	3.45	12.23	8.72	4.39	7.32	-	-
	PIER 1	-	-	-	4.27	7.13	-	-
2	BEARING	4.54	12.10	8.62	4.33	7.23	-	-
	H/2	9.16	7.70	6.50	4.97	8.30	2.61	4.36
	0.3L	3.99	17.65	13.98	4.94	8.24	1.88	3.14
	0.4L	3.15	14.44	11.54	4.12	6.88	2.70	4.51
	0.5L	2.72	13.07	10.65	3.81	6.36	3.81	6.37
	0.6L	3.15	14.44	11.54	4.12	6.88	2.70	4.51
	0.7L	3.99	17.65	13.98	4.94	8.24	1.88	3.14
	H/2	9.16	7.70	8.04	4.97	8.30	2.61	4.36
	BEARING	4.54	12.10	10.65	4.33	7.22	-	-
	PIER 2	-	-	-	4.27	7.13	-	-
3	BEARING	3.46	12.21	10.77	4.39	7.32	-	-
	H/2	5.87	6.67	7.68	5.43	9.06	2.91	4.86
	0.3L	4.26	17.53	13.80	5.35	8.94	1.79	2.99
	0.4L	2.86	12.73	10.33	4.03	6.73	2.18	3.64
	0.5L	2.24	10.68	8.87	3.45	5.76	3.27	5.46
	0.6L	2.38	10.97	8.93	3.44	5.74	3.16	5.27
	0.7L	2.92	12.74	10.09	3.82	6.38	2.42	4.04
	H/2	40.01	138.04	93.10	9.70	16.19	3.19	5.33
	BEARING	145.76	1295.06	862.82	58.39	97.46	-	-

Rating of an interior beam at 0.5L of Span 1 with an HS20 Rating Vehicle.

- Applied moment, section properties and design data:

M_{DL1} = 3,348 K-FT
M_{DL2} = 372 K-FT
M^{*}_{LL+I} = 1,741 K-FT (live load moment based on one lane)
P = 1,208 K (effective prestress after losses)
$S_{t\ flange\ N.C.}$ = 14,300 IN^3
$S_{b\ flange\ N.C.}$ = 15,586 IN^3
$S_{t\ flange\ Comp.}$ = 53,263 IN^3
$S_{b\ flange\ Comp.}$ = 21,884 IN^3
A_{beam} = 908 IN^2
Ecc. = 25.89 IN
f'_c = 7,000 PSI
LLDF = 0.704 (AASHTO LRFD live load distribution factor)
ϕM_n = 11,134 K-FT

- Convert live load moment:

$$M_{LL+I} = LLDF(M^{*}_{LL+I})$$

$$M_{LL+I} = 0.704(1,741) = 1,226 K\text{-}FT$$

Concrete Stresses

- Concrete tension (bottom of precast beam)

$$F_d = \frac{M_{DL1}}{S_{b\ flange N.C.}} + \frac{M_{DL2}}{S_{b\ flange Comp}}$$

$$F_d = \frac{3,348(12)}{15,586}(-1) + \frac{372(12)}{21,884}(-1) = -2.78 KSI$$

$$F_p = P\left[\frac{1}{A_{beam}} + \frac{Ecc.}{S_{b\ flange N.C.}}\right]$$

$$F_p = -1,208\left[\frac{1}{908} + \frac{25.89}{15,586}\right] = -3.34 KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{b\ flange Comp}}$$

$$F_{LL+I} = \frac{1,226(12)}{21,884}(-1) = -0.67 KSI$$

$$TRF = \frac{-6\sqrt{f'_c} - (F_d + F_p + F_s)}{F_{LL}}$$

$$TRF = \frac{-6\sqrt{7,000}\left(\frac{1}{1,000}\right) - (-2.78 + 3.34 + 0)}{-0.67} = 1.57$$

- Concrete compression (top of precast beam)

$$F_d = -\frac{M_{DL1}}{S_{t\ flange N.C.}} - \frac{M_{DL2}}{S_{t\ flange Comp.}}$$

$$F_d = -\frac{3,348(12)}{14,300} - \frac{372(12)}{53,263} = -2.89 KSI$$

$$F_p = P\left|\frac{1}{A_{beam}} - \frac{Ecc.}{S_{t\ flange N.C.}}\right|$$

$$F_p = 1,208\left|\frac{1}{908} - \frac{25.89}{14,300}\right| = -0.86 KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{t\ flange Comp.}}$$

$$F_{LL+I} = \frac{1,226(12)}{53,263} = 0.28 KSI$$

Case 1

$$TRF = -\frac{0.6f'_c - (F_d + F_p + F_s)}{F_{LL}}$$

$$TRF = -\frac{4.2 - (-2.89 + -0.86 + 0)}{0.28} = 7.83$$

Case 2

$$TRF = \frac{0.4f'_c - 0.5(F_d + F_p + F_s)}{F_{LL}}$$

$$TRF = \frac{2.8 - 0.5(-2.89 + -0.86 + 0)}{0.28} = 6.45$$

Positive Flexure

$$TRF = \frac{\phi M_n - |1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s|}{2.17(M)_{LL+I}}$$

$$TRF = \frac{11,134 - [1.3(3,348) + 1.3(372) + 0]}{2.17(1,226)} = 2.37$$

$$ORF = \frac{\phi M_n - |1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s|}{1.3(M)_{LL+I}}$$

$$ORF = \frac{11,134 - |1.3(3,348) + 1.3(372) + 0|}{1.3(1,226)} = 3.95$$

Rating of an interior beam at Right Bearing (Pier 1) of Span with an HS20 Rating Vehicle.

- Applied moment, section properties and design data:

M_{DL1} = 0 K-FT
M_{DL2} = -475 K-FT
M^{*}_{LL+I} = -1,662 K-FT (live load moment based on or lane)
P = 303 K (effective prestress after losses)
$S_{t\ flange\ N.C.}$ = 14,300 IN^3
$S_{b\ flange\ N.C.}$ = 15,586 IN^3
$S_{t\ flange\ Comp.}$ = 53,263 IN^3
$S_{b\ flange\ Comp.}$ = 21,884 IN^3
A_{beam} = 908 IN^2
Ecc. = 16.38 IN
f'_c = 7,000 PSI
LLDF = 0.704 (AASHTO LRFD live load distributi factor)
ϕM_n = -5,286 K-FT

- Convert live load moment:

$M_{LL+I} = LLDF(M^*_{LL+I})$

$M_{LL+I} = 0.704(-1{,}662) = -1{,}170\,K\text{-}FT$

Concrete Stresses

- Concrete tension (top of precast beam)

$$F_d = \frac{M_{DL1}}{S_{t\,flange\,N.C.}} + \frac{M_{DL2}}{S_{t\,flange\,Comp.}}$$

$$f'_d = \frac{0(12)}{14{,}300} + \frac{-475(12)}{53{,}263} = -0.11\,KSI$$

$$F_p = P\left[\frac{1}{A_{beam}} - \frac{Ecc.}{S_{t\,flange\,N.C.}}\right]$$

$$f'_p = 303\left[\frac{1}{908} - \frac{16.38}{14{,}300}\right] = -0.01\,KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{t\,flange\,Comp}}$$

$$F_{LL+I} = \frac{-1{,}170(12)}{53{,}263} = -0.26\,KSI$$

$$IRF = \frac{-6\sqrt{f'_c} - (f'_d + f'_p + f'_s)}{F_t}$$

$$IRF = \frac{-6\sqrt{7{,}000}\left(\frac{1}{1{,}000}\right) - (-0.11 - 0.01 + 0)}{-0.26} = 1.45$$

- Concrete compression (bottom of precast beam)

$$f'_d = -\frac{M_{DL1}}{S_{b\,flange\,N.C.}} + \frac{M_{DL2}}{S_{b\,flange\,Comp.}}$$

$$F_d = \frac{0(12)}{15{,}586}(-1) + \frac{-475(12)}{21{,}884}(-1) = 0.26\,KSI$$

$$F_p = P\left[\frac{1}{A_{beam}} + \frac{Ecc.}{S_{b\,flange\,N.C.}}\right]$$

$$f'_p = 303\left[\frac{1}{908} + \frac{16.38}{15{,}586}\right] = 0.65\,KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{b\,flange\,Comp}}$$

$$f'_{LL+I} = \frac{-1{,}170(12)}{21{,}884}(-1) = 0.64\,KSI$$

Case 1

$$IRF = \frac{0.6f'_c - (F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{4.2 - (0.26 + 0.65 + 0)}{0.64} = 5.12$$

Case 2

$$IRF = \frac{0.4f'_c - 0.5(F_d + F_p + F_s)}{f'_t}$$

$$IRF = \frac{2.8 - 0.5(0.26 + 0.65 + 0)}{0.64} = 3.65$$

Negative Flexure

$$IRF = \frac{\phi M_n - [1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s]}{2.17(M)_{LL+I}}$$

$$IRF = \frac{-5{,}286 - [1.3(0) + 1.3(-475) + 0]}{2.17(-1{,}170)} = 1.84$$

$$ORF = \frac{\phi M_n - [1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s]}{1.3(M)_{LL+I}}$$

$$ORF = \frac{5{,}286 - [1.3(0) + 1.3(-475) + 0]}{1.3(-1{,}170)} = 3.07$$

Shear Rating for an interior beam in Span 1 with an . Rating Vehicle.

- Applied shear and design data at 0.7L:

V_{DL1} = 46 K
V_{DL2} = 13 K
V^*_{LL+I} = 59 K (live load shear based on one lane)
ϕV_n = 233 K
LLDF = 0.849 (AASHTO LRFD live load distributio factor)

- Convert live load shear:

$V_{LL+I} = LLDF(V^*_{LL+I})$

$V_{LL+I} = 0.849(59) = 50\,K$

$$IRF = \frac{\phi V_n - [1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s]}{2.17(V)_{LL+I}}$$

$$IRF = \frac{233 - [1.3(46) + 1.3(13) + 0]}{2.17(50)} = 1.45$$

$$ORF = \frac{\phi V_n - [1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s]}{1.3(V)_{LL+I}}$$

$$ORF = \frac{233 - [1.3(46) + 1.3(13) + 0]}{1.3(50)} = 2.42$$

- Applied shear and design data at H/2 from Pier 1:

V_{DL1} = 108 K
V_{DL2} = 24 K
V^*_{LL+I} = 84 K (live load shear based on one lane)
ϕV_n = 458 K

LLDF = 0.849 (AASHTO LRFD live load distribution factor)

- Convert live load shear:

$$V_{LL+I} = LLDF(V^*_{LL+I})$$

$$V_{LL+I} = 0.849(84) = 71K$$

$$IRF = \frac{\phi V_n - [1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s]}{2.17(V)_{LL1}}$$

$$IRF = \frac{458 - [1.3(108) + 1.3(24) + 0]}{2.17(71)} = 1.86$$

$$ORF = \frac{\phi V_n - [1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s]}{1.3(V)_{LL+I}}$$

$$ORF = \frac{458 - [1.3(108) + 1.3(24) + 0]}{1.3(71)} = 3.10$$

Rating of an exterior beam at 0.5L of Span 1 with an HS20 Rating Vehicle.

- Applied moment, section properties and design data:

M_{DL1} = 3,140 K-FT
M_{DL2} = 340 K-FT
M^*_{LL+I} = 1,741 K-FT (live load moment based on one lane)
P = 1,208 K (effective prestress after losses)
$S_{t\ flange\ N.C.}$ = 14,300 IN^3
$S_{b\ flange\ N.C.}$ = 15,586 IN^3
$S_{t\ flange\ Comp.}$ = 49,567 IN^3
$S_{b\ flange\ Comp.}$ = 21,644 IN^3
A_{beam} = 908 IN^2
Ecc. = 25.89 IN
f'_c = 7,000 PSI
LLDF = 0.812 (AASHTO LRFD live load distribution factor)
ϕM_n = 11,058 K-FT

- Convert live load moment:

$$M_{LL+I} = LLDF(M^*_{LL+I})$$

$$M_{LL+I} = 0.812(1,741) = 1,414K\text{-}FT$$

Concrete Stresses

- Concrete tension (bottom of precast beam)

$$F_d = \frac{M_{DL1}}{S_{b\ flange\ N.C.}} + \frac{M_{DL2}}{S_{b\ flange\ Comp.}}$$

$$F_d = \frac{3,140(12)}{15,586}(-1) + \frac{340(12)}{21,644}(-1) = -2.61KSI$$

$$F_p = P\left|\frac{1}{A_{beam}} + \frac{Ecc.}{S_{b\ flange\ N.C.}}\right|$$

$$F_p = 1,208\left[\frac{1}{908} + \frac{25.89}{15,586}\right] = 3.34KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{b\ flange\ Comp}}$$

$$F_{LL+I} = \frac{1,414(12)}{21,644}(-1) = -0.78KSI$$

$$IRF = \frac{-6\sqrt{f'_c} - (F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{-6\sqrt{7,000}\left(\frac{1}{1,000}\right) - (-2.61 + 3.34 + 0)}{-0.78} = 1.57$$

- Concrete compression (top of precast beam)

$$F_d = \frac{M_{DL1}}{S_{t\ flange\ N.C.}} + \frac{M_{DL2}}{S_{t\ flange\ Comp.}}$$

$$F_d = \frac{3,140(12)}{14,300} + \frac{340(12)}{49,567} = 2.72KSI$$

$$F_p = P\left|\frac{1}{A_{beam}} - \frac{Ecc.}{S_{t\ flange\ N.C.}}\right|$$

$$F_p = 1,208\left[\frac{1}{908} - \frac{25.89}{14,300}\right] = -0.86KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{t\ flange\ Comp}}$$

$$F_{LL+I} = \frac{1,414(12)}{49,567} = 0.34KSI$$

Case 1

$$IRF = \frac{0.6f'_c - (F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{4.2 - (2.72 + -0.86 + 0)}{0.34} = 6.83$$

Case 2

$$IRF = \frac{0.4f'_c - 0.5(F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{2.8 - 0.5(2.72 + -0.86 + 0)}{0.34} = 5.46$$

Positive Flexure

$$IRF = \frac{\phi M_n - [1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s]}{2.17(M)_{LL+I}}$$

$$IRF = \frac{11,058 - [1.3(3,140) + 1.3(340) + 0]}{2.17(1,414)} = 2.13$$

$$ORF = \frac{\phi M_n - [1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s]}{1.3(M)_{LL+I}}$$

$$ORF = \frac{1.1{,}058\ [1.3(3{,}140) + 1.3(340) + 0]}{1.3(1{,}414)} = 3.55$$

Rating of an exterior beam at Right Bearing (Pier 1) of Span 1 with an HS20 Rating Vehicle.

- Applied moment, section properties and design data:

M_{DL1} = 0 K-FT
M_{DL2} = -433 K-FT
M^{R}_{LL+I} = -1,662 K-FT (live load moment based on one lane)
P = 303 K (effective prestress after losses)
$S_{t\ flange\ N.C.}$ = 14,300 IN^3
$S_{b\ flange\ N.C.}$ = 15,586 IN^3
$S_{t\ flange\ Comp.}$ = 49,567 IN^3
$S_{b\ flange\ Comp.}$ = 21,644 IN^3
A_{beam} = 908 IN^2
Ecc. = 16.38 IN
f'_c = 7,000 PSI
LLDF = 0.812 (AASHTO LRFD live load distribution factor)
ϕM_n = -4,842 K-FT

- Convert live load moment:

$$M_{LL+I} = LLDF(M^{R}_{LL+I})$$

$$M_{LL+I} = 0.812(-1{,}662) = -1{,}350\ K\text{-}FT$$

Concrete Stresses

- Concrete tension (top of precast beam)

$$F_d = \frac{M_{DL1}}{S_{t\ flange\ N.C.}} + \frac{M_{DL2}}{S_{t\ flange\ Comp.}}$$

$$F_d = \frac{0(12)}{14{,}300} + \frac{-433(12)}{49{,}567} = -0.10\ KSI$$

$$F_p = P\left[\frac{1}{A_{beam}} - \frac{Ecc.}{S_{t\ flange\ N.C.}}\right]$$

$$F_p = 303\left[\frac{1}{908} - \frac{16.38}{14{,}300}\right] = -0.01\ KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{t\ flange\ Comp}}$$

$$F_{LL+I} = \frac{-1{,}350(12)}{49{,}567} = -0.33\ KSI$$

$$IRF = \frac{-6\sqrt{f'_c} - (F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{-6\sqrt{7{,}000}\left(\frac{1}{1{,}000}\right) - (-0.10 - 0.01 + 0)}{-0.33} = 1.17$$

- Concrete compression (bottom of precast beam)

$$F_d = \frac{M_{DL1}}{S_{b\ flange\ N.C.}} + \frac{M_{DL2}}{S_{b\ flange\ Comp}}$$

$$F_d = \frac{0(12)}{15{,}586}(-1) + \frac{-433(12)}{21{,}644}(-1) = 0.24\ KSI$$

$$F_p = P\left[\frac{1}{A_{beam}} + \frac{Ecc.}{S_{b\ flange\ N.C.}}\right]$$

$$F_p = 303\left[\frac{1}{908} + \frac{16.38}{15{,}586}\right] = 0.65\ KSI$$

$$F_{LL+I} = \frac{M_{LL+I}}{S_{b\ flange\ Comp}}$$

$$F_{LL+I} = \frac{-1{,}350(12)}{21{,}644}(-1) = 0.75\ KSI$$

Case 1

$$IRF = \frac{0.6f'_c - (F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{4.2 - (0.24 + 0.65 + 0)}{0.75} = 4.42$$

Case 2

$$IRF = \frac{0.4f'_c - 0.5(F_d + F_p + F_s)}{F_t}$$

$$IRF = \frac{2.8 - 0.5(0.24 + 0.65 + 0)}{0.75} = 3.15$$

Negative Flexure

$$IRF = \frac{\phi M_n - [1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s]}{2.17(M)_{LL+I}}$$

$$IRF = \frac{-4{,}842 - [1.3(0) + 1.3(-433) + 0]}{2.17(-1{,}350)} = 1.46$$

$$ORF = \frac{\phi M_n - [1.3(M)_{DL1} + 1.3(M)_{DL2} + M_s]}{1.3(M)_{LL+I}}$$

$$ORF = \frac{4{,}842 - [1.3(0) + 1.3(-433) + 0]}{1.3(-1{,}350)} = 2.44$$

Shear Rating for an exterior beam in Span 1 with an HS20 Rating Vehicle.

- Applied shear and design data at 0.7L:

V_{DL1} = 43 K
V_{DL2} = 11 K
V^*_{LL+I} = 59 K (live load shear based on one lane)
ϕV_n = 232 K
LLDF = 0.812 (AASHTO LRFD live load distribution factor)

- Convert live load shear:

$$V_{LL+I} = 0.812(59) = 48\,K$$

$$IRF = \frac{\phi V_n - |1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s|}{2.17(V)_{LL+I}}$$

$$IRF = \frac{232 - [1.3(43) + 1.3(11) + 0]}{2.17(48)} = 1.55$$

$$ORF = \frac{\phi V_n - |1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s|}{1.3(V)_{LL+I}}$$

$$ORF = \frac{232 - [1.3(43) + 1.3(11) + 0]}{1.3(48)} = 2.59$$

- Applied shear and design data at H/2:

V_{DL1} = 102 K
V_{DL2} = 22 K
V^*_{LL+I} = 84 K (live load shear based on one lane)
ϕV_n = 447 K
LLDF = 0.812 (AASHTO LRFD live load distribution factor)

- Convert live load shear:

$$V_{LL+I} = LLDF(V^*_{LL+I})$$

$$V_{LL+I} = 0.812(84) = 68\,K$$

$$IRF = \frac{\phi V_n - [1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s]}{2.17(V)_{LL+I}}$$

$$IRF = \frac{447 - |1.3(102) + 1.3(22) + 0|}{2.17(68)} = 1.94$$

$$ORF = \frac{\phi V_n - [1.3(V)_{DL1} + 1.3(V)_{DL2} + V_s]}{1.3(V)_{LL+I}}$$

$$ORF = \frac{447 - |1.3(102) + 1.3(22) + 0|}{1.3(68)} = 3.24$$