For Cleveland Innerbelt	Job no. 49633	Sheet no. 1
Made by KDG	Checked by LER	Backchecked by KDG
Date Dec. 14, 2011	Date 12/15/11	Date 12-15-11

HNTB

RFI 00185

The RFI Requests the use of oversized holes for all connection of the Unit 3 Girder 5 to the End Diaphragm.

From BDGS At the End of Girder 5 connected to the End Diaphragm

	V (k)	M (k·ft)
DC	86.0	0
DW	12.3	0
LL truck	61.9	9
LL lane	33.1	7

Importance Factor = 1.05

Service II

$$V_u = 1.05\left[1.0(86.0+12.3)+1.3(1.33(61.9)+(33.1)\right]$$

$$V_u = 260.77$$

$$M_u = 1.05\left[0 + 1.3(1.33(9)+7)\right]$$

$$M_u = 25.9 \text{ k·ft}$$

Spacing Requirements for Oversized Holes

$S_{min} = 3\frac{1}{4}''$

$S_{edge} = 2''$

These calculations are for the Bolt Slip Resistance with factors for oversized holes included.
All other checks from the original design are still valid.

At End of Stub Girder

$$R_n = K_h \cdot K_s \cdot N_s \cdot P_t \qquad (6.13.2.8-1)$$

$$R_n = (0.85)(0.33)(2)(51) = 28.61 \text{ k/bolt}$$

$P_t = 51$ k (for 1" Bolt table 6.13.2.8-1)

$\phi_{slip} = 1.0$

There are 26 Bolts in the end of the stub girder

$$\therefore \phi R_n = 28.61(26) = 744 \text{ k}$$

$$744 > 261$$

Oversized holes OK in End of Stub girder Connection

ME101-1204

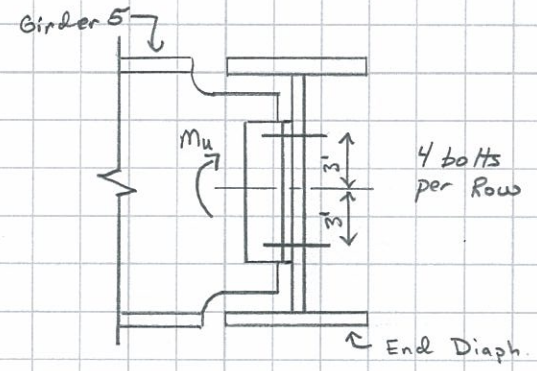
For	Cleveland Innerbelt	Job no.	49633	Sheet no.	2
Made by	KDG	Checked by	LER	Backchecked by	KDG
Date	Dec. 14, 2011	Date	12/15/11	Date	12-15-11

HNTB

RFI 00185 (Cont.)

Connection to End Diaphragm web

Find Axial Tension in Bolts



$M_u = 26$ k·ft

$T_u = 26$ k·ft $\div$ 6' $\div$ 4 bolts

$T_u = 1.08$ k/bolt

Reduction in Slip Resistance for combined Shear and Axial

$1 - \frac{T_u}{P_t}$ (6.13.2.11-3)

$1 - \frac{1.08}{51} = 0.98$

$R_n = [K_h K_s N_s P_t]\, 0.98$

$R_n = [(0.85)(0.33)(1)(51)]\, 0.98 = 14.02$ k/bolt

There are 52 bolts connecting to the web of the End Diaphragm

$\phi R_n = (14.02)\, 52 = 729$ k > 261

Oversized holes ok

Connection of End Diaphragm to Adjacent Girder Stiffener

$V_u = \frac{1}{2}(260.77) = 130.4$ k

$R_n = K_h K_s N_s P_t$

$R_n = (0.85)(0.33)(1)(51) = 14.31$ k/bolt

There Are 28 bolts connecting the End Diaphragm to the Girder Stiffener

$\phi R_n = 14.31\,(28) = 400.68$ k

$400.68 > 130.4$

Oversized holes ok

ME101-1204

Filename: N:\49633\Bridges\Design\Final Design\Unit 3\BDGS\Final Geo\Diaphragms&Camber\Camber & Deflection\2010 LRFD\UNIT 3 GDR 5.OUT

----- CAMBER DATA ----------

* * * GIRDER 5 DEAD LOAD CAMBER VALUES: (Positive Values Upward) * * *

Note: Displacements due to removable forms are not included.

SPAN.LOC FRAC	A-DC DEAD LOAD STEEL GIRDER (in)	STEEL USER STEEL (in)	CONCRETE SLAB (in)	CONCRETE USER CONC (in)	CONCRETE USER ADD. (in)	B-DC DEAD LOAD BARR (in)	SDWALK (in)	USER ADD. (in)	DW DEAD LOAD INTEGRAL WEARING SURFACE (in)	FUTURE WEARING SURFACE (in)	UTILS (in)
2.700	2.677	0.000	4.708	0.000	0.596	0.213	0.000	0.000	0.000	1.498	0.000
2.727	2.529	0.000	4.453	0.000	0.562	0.201	0.000	0.000	0.000	1.415	0.000
2.729	2.516	0.000	4.432	0.000	0.559	0.200	0.000	0.000	0.000	1.408	0.000
2.750	2.383	0.000	4.201	0.000	0.529	0.189	0.000	0.000	0.000	1.333	0.000
2.779	2.181	0.000	3.849	0.000	0.483	0.173	0.000	0.000	0.000	1.219	0.000
2.795	2.052	0.000	3.624	0.000	0.454	0.163	0.000	0.000	0.000	1.147	0.000
2.800	2.013	0.000	3.556	0.000	0.445	0.160	0.000	0.000	0.000	1.125	0.000
2.828	1.776	0.000	3.139	0.000	0.392	0.141	0.000	0.000	0.000	0.992	0.000
2.850	1.576	0.000	2.789	0.000	0.348	0.125	0.000	0.000	0.000	0.880	0.000
2.863	1.449	0.000	2.564	0.000	0.319	0.115	0.000	0.000	0.000	0.808	0.000
2.878	1.311	0.000	2.321	0.000	0.289	0.104	0.000	0.000	0.000	0.731	0.000
2.900	1.084	0.000	1.921	0.000	0.239	0.086	0.000	0.000	0.000	0.605	0.000
2.927	0.800	0.000	1.418	0.000	0.176	0.063	0.000	0.000	0.000	0.446	0.000
2.932	0.751	0.000	1.331	0.000	0.165	0.059	0.000	0.000	0.000	0.418	0.000
2.948	0.574	0.000	1.017	0.000	0.126	0.045	0.000	0.000	0.000	0.320	0.000
2.948	0.572	0.000	1.015	0.000	0.126	0.045	0.000	0.000	0.000	0.319	0.000
2.950	0.553	0.000	0.981	0.000	0.122	0.044	0.000	0.000	0.000	0.308	0.000
2.961	0.429	0.000	0.761	0.000	0.094	0.034	0.000	0.000	0.000	0.239	0.000
2.964	0.404	0.000	0.717	0.000	0.089	0.032	0.000	0.000	0.000	0.225	0.000
2.974	0.284	0.000	0.505	0.000	0.063	0.022	0.000	0.000	0.000	0.158	0.000
2.988	0.138	0.000	0.245	0.000	0.030	0.011	0.000	0.000	0.000	0.077	0.000
3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3.482	-0.012	0.000	-0.021	0.000	-0.003	-0.001	0.000	0.000	0.000	-0.007	0.000
4.000	-0.024	0.000	-0.043	0.000	-0.005	-0.002	0.000	0.000	0.000	-0.014	0.000

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----- UNFACTORED MOMENT SUMMARY ----------

* * * GIRDER 5, UNFACTORED MOMENT SUMMARY (Based on Input Section) * * *

Notes: Values do not include impact, except for COMBINED TRUCK+LANE.

MIN COMBINED TRUCK+LANE is the larger of: (1.33×TRK+LANE) and 0.9×(1.33×DTRK+LANE)

SPAN.LOC FRAC	DEAD LOAD A-DC MOMENT (ft-k)	B-DC MOMENT (ft-k)	DW MOMENT (ft-k)	HL93 TRUCK MAX (ft-k)	HL93 TRUCK MIN (ft-k)	HL93 LANE MAX (ft-k)	HL93 LANE MIN (ft-k)	DOUBLE TRUCK MIN (ft-k)	COMBINED TRUCK+LANE MAX (ft-k)	COMBINED TRUCK+LANE MIN (ft-k)	FATIGUE TRUCK MAX (ft-k)	FATIGUE TRUCK MIN (ft-k)
1.000	0	0	0	9	-3	7	-5	-5	18	-10	2	-1
1.001	-6	0	0	12	-5	9	-7	-8	25	-16	4	-1
1.003	-18	0	-2	19	-8	14	-12	-14	39	-28	7	-2
1.003	-21	0	-3	20	-9	15	-14	-16	42	-31	8	-3
1.004	-31	0	-4	26	-12	18	-18	-21	53	-41	11	-4
1.006	-43	-1	-6	33	-16	23	-23	-27	67	-53	15	-5
1.050	-370	-6	-57	241	-113	149	-162	-197	469	-382	116	-36
1.100	-760	-14	-124	429	-217	273	-309	-379	844	-732	206	-71
1.150	-1172	-23	-202	567	-314	378	-445	-548	1132	-1056	263	-102
1.187	-1489	-31	-266	653	-380	443	-536	-663	1312	-1276	301	-124
1.200	-1605	-34	-291	675	-404	466	-569	-704	1364	-1355	308	-132
1.231	-1886	-42	-351	732	-456	510	-639	-795	1483	-1527	328	-149
1.250	-2043	-48	-391	729	-474	508	-659	-826	1477	-1582	321	-155
1.300	-2477	-65	-506	725	-517	489	-704	-900	1454	-1711	329	-170
1.347	-2902	-83	-622	714	-555	463	-743	-965	1413	-1824	330	-184
1.350	-2931	-84	-630	711	-558	461	-745	-970	1406	-1832	327	-185
1.351	-2939	-84	-633	709	-558	459	-745	-970	1403	-1831	326	-185
1.351	-2939	-84	-633	709	-558	459	-745	-970	1403	-1831	326	-185
1.374	-3155	-94	-693	700	-576	443	-763	-1002	1374	-1886	322	-191
1.400	-3409	-104	-766	688	-597	424	-785	-1038	1338	-1949	313	-199
1.450	-3911	-127	-911	657	-637	382	-825	-1105	1255	-2065	294	-213
1.462	-4039	-132	-949	653	-646	371	-835	-1122	1239	-2094	295	-217
1.500	-4450	-151	-1070	616	-672	336	-871	-1166	1155	-2180	277	-227
1.520	-4676	-161	-1137	600	-687	319	-893	-1190	1117	-2228	273	-233
1.550	-5017	-177	-1239	569	-708	296	-928	-1226	1052	-2303	256	-241
1.561	-5140	-182	-1276	555	-715	287	-941	-1239	1025	-2330	249	-244
1.578	-5347	-192	-1339	541	-727	274	-964	-1259	993	-2375	243	-249
1.600	-5615	-205	-1419	516	-743	256	-993	-1286	942	-2433	234	-256
1.611	-5745	-211	-1459	502	-751	248	-1008	-1298	915	-2461	226	-259
1.636	-6065	-225	-1555	473	-769	229	-1046	-1327	858	-2530	216	-267
1.650	-6246	-234	-1610	453	-779	219	-1068	-1345	822	-2572	207	-272
1.694	-6823	-261	-1786	396	-811	192	-1142	-1397	720	-2700	180	-285
1.700	-6908	-265	-1812	382	-816	189	-1154	-1405	696	-2721	172	-287
1.747	-7574	-296	-2012	324	-851	165	-1246	-1464	596	-2874	152	-303
1.750	-7611	-298	-2023	323	-853	164	-1252	-1468	593	-2885	153	-304
1.752	-7633	-299	-2030	321	-854	163	-1255	-1470	591	-2890	153	-304
1.800	-8343	-332	-2245	256	-891	147	-1363	-1531	488	-3059	124	-321
1.809	-8485	-339	-2288	245	-898	145	-1385	-1542	471	-3093	125	-325
1.850	-9114	-368	-2478	191	-931	137	-1488	-1595	391	-3249	92	-340
1.867	-9388	-380	-2560	177	-945	136	-1533	-1618	371	-3317	93	-347
1.900	-9918	-405	-2720	153	-972	135	-1625	-1662	339	-3451	59	-359
1.925	-10332	-425	-2846	145	-993	137	-1698	-1694	330	-3556	56	-369
1.934	-10485	-432	-2892	139	-1000	138	-1725	-1706	324	-3595	46	-373
1.950	-10751	-444	-2972	140	-1014	140	-1774	-1729	326	-3667	46	-380
1.997	-11564	-482	-3218	154	-1054	151	-1924	-1793	355	-3878	50	-398
2.000	-11616	-485	-3234	154	-1056	152	-1934	-1797	357	-3891	51	-400
2.000	-11616	-485	-3235	154	-1058	151	-1935	-1800	357	-3897	51	-401
2.001	-11545	-482	-3215	154	-1051	151	-1925	-1788	356	-3872	51	-398
2.004	-11334	-473	-3155	154	-1030	151	-1892	-1748	355	-3795	50	-390
2.036	-9315	-388	-2586	168	-831	154	-1588	-1442	377	-3155	66	-314

REFERENCE ONLY

2.044	-8802	-367	-2442	174	-782	157	-1513	-1376	388	-3009	62	-296
2.050	-8450	-352	-2343	181	-753	159	-1465	-1336	400	-2917	67	-285
2.061	-7802	-325	-2161	210	-692	166	-1372	-1261	446	-2745	104	-264
2.085	-6350	-265	-1755	275	-598	190	-1173	-1104	556	-2377	139	-220
2.100	-5531	-231	-1524	310	-561	209	-1069	-1023	621	-2187	140	-212
2.110	-4969	-207	-1366	361	-539	227	-1000	-967	708	-2057	170	-206
2.113	-4843	-202	-1331	363	-536	232	-985	-954	714	-2029	167	-205

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----- UNFACTORED MOMENT SUMMARY ----------

* * * GIRDER 5, UNFACTORED MOMENT SUMMARY (Based on Input Section) * * *

Notes: Values do not include impact, except for COMBINED TRUCK+LANE.

MIN COMBINED TRUCK+LANE is the larger of: (1.33×TRK+LANE) and 0.9×(1.33×DTRK+LANE)

SPAN.LOC FRAC	DEAD LOAD A-DC MOMENT (ft-k)	B-DC MOMENT (ft-k)	DW MOMENT (ft-k)	HL93 TRUCK MAX (ft-k)	MIN (ft-k)	HL93 LANE MAX (ft-k)	MIN (ft-k)	DOUBLE TRUCK MIN (ft-k)	COMBINED TRUCK+LANE MAX (ft-k)	MIN (ft-k)	FATIGUE TRUCK MAX (ft-k)	MIN (ft-k)
2.121	-4399	-184	-1206	390	-526	249	-934	-911	768	-1930	173	-201
2.135	-3648	-153	-997	452	-513	284	-853	-845	885	-1779	194	-194
2.150	-2883	-121	-781	497	-503	326	-779	-790	987	-1647	205	-187
2.160	-2401	-101	-646	547	-496	358	-735	-758	1086	-1569	236	-182
2.181	-1380	-59	-362	617	-483	435	-654	-715	1255	-1445	260	-173
2.184	-1207	-52	-315	638	-480	449	-642	-712	1298	-1430	270	-171
2.200	-492	-22	-113	681	-470	512	-596	-698	1417	-1371	282	-165
2.209	-81	-5	2	731	-464	552	-571	-688	1525	-1338	315	-162
2.211	0	-2	24	736	-462	560	-567	0	1539	-1181	315	-161
2.216	204	6	81	757	-459	581	-556	0	1588	-1167	325	-159
2.216	204	6	81	757	-459	581	-556	0	1588	-1167	325	-159
2.234	991	38	299	836	-448	668	-520	0	1781	-1115	353	-153
2.249	1606	64	475	882	-437	742	-497	0	1914	-1079	355	-148
2.250	1644	66	486	886	-437	746	-496	0	1925	-1077	359	-148
2.283	2924	118	847	1042	-414	919	-465	0	2305	-1016	448	-137
2.300	3521	143	1013	1089	-404	1001	-453	0	2449	-990	439	-132
2.317	4116	167	1177	1164	-393	1083	-441	0	2631	-963	475	-127
2.333	4626	187	1316	1226	-383	1153	-430	0	2783	-939	494	-122
2.350	5139	208	1464	1267	-372	1224	-418	0	2909	-912	497	-118
2.382	6034	245	1716	1385	-351	1347	-395	0	3189	-861	563	-109
2.386	6117	248	1739	1390	-349	1358	-393	0	3206	-856	559	-108
2.400	6478	263	1840	1422	-340	1405	-383	0	3296	-835	554	-105
2.432	7203	291	2038	1518	-319	1501	-361	0	3520	-785	587	-97
2.450	7547	306	2139	1549	-309	1548	-349	0	3609	-759	593	-93
2.454	7617	309	2159	1562	-306	1558	-346	0	3636	-753	609	-92
2.469	7871	319	2232	1601	-297	1592	-336	0	3722	-731	627	-89
2.481	8068	327	2288	1631	-289	1618	-327	0	3788	-712	644	-86
2.500	8329	338	2362	1655	-279	1651	-315	0	3852	-686	636	-82
2.522	8593	348	2434	1686	-265	1681	-300	0	3923	-653	632	-78
2.531	8685	352	2458	1708	-260	1692	-294	0	3964	-640	649	-76
2.550	8832	358	2505	1724	-249	1709	-282	0	4002	-613	660	-73
2.580	8990	365	2552	1750	-231	1720	-262	0	4048	-568	684	-67
2.590	9021	366	2561	1745	-225	1719	-255	0	4040	-553	667	-65
2.600	9040	367	2567	1758	-218	1720	-249	0	4059	-541	684	-63
2.614	9052	367	2569	1748	-211	1712	-239	0	4037	-520	648	-61
2.630	9039	366	2564	1759	-202	1702	-229	0	4042	-497	670	-58
2.650	8965	363	2547	1758	-191	1687	-217	0	4026	-471	686	-55
2.655	8939	362	2540	1747	-188	1680	-214	0	4004	-464	675	-54
2.655	8939	362	2540	1747	-188	1680	-214	0	4004	-464	675	-54
2.659	8920	362	2535	1742	-186	1675	-211	0	3992	-459	666	-53
2.679	8778	356	2496	1743	-174	1645	-198	0	3964	-430	696	-50
2.700	8592	348	2444	1718	-163	1610	-186	0	3895	-403	686	-47
2.727	8278	335	2353	1677	-148	1545	-169	0	3776	-366	662	-42
2.729	8251	334	2345	1676	-147	1540	-168	0	3770	-363	664	-42
2.750	7927	321	2256	1626	-136	1482	-155	0	3644	-336	663	-39
2.779	7409	299	2109	1565	-121	1384	-137	0	3466	-298	664	-34
2.795	7064	285	2010	1511	-111	1318	-127	0	3327	-275	648	-32
2.800	6958	281	1981	1483	-109	1302	-125	0	3275	-270	633	-31
2.828	6290	253	1789	1390	-94	1176	-108	0	3025	-233	600	-27
2.850	5687	229	1619	1275	-82	1066	-96	0	2762	-205	570	-24
2.863	5290	213	1505	1206	-75	990	-87	0	2594	-187	527	-22
2.878	4851	195	1380	1165	-67	910	-78	0	2460	-167	541	-19
2.900	4105	164	1167	1007	-55	772	-65	0	2111	-139	472	-18
2.927	3123	124	886	842	-40	588	-48	0	1707	-102	395	-14
2.932	2944	117	836	797	-38	554	-45	0	1613	-95	375	-13
2.948	2290	90	650	639	-29	429	-34	0	1279	-72	308	-9
2.948	2284	90	649	637	-28	428	-34	0	1275	-72	307	-9
2.950	2212	87	628	624	-28	419	-34	0	1249	-71	302	-11

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----- UNFACTORED MOMENT SUMMARY ----------

* * * GIRDER 5, UNFACTORED MOMENT SUMMARY (Based on Input Section) * * *

Notes: Values do not include impact, except for COMBINED TRUCK+LANE.

MIN COMBINED TRUCK+LANE is the larger of: (1.33×TRK+LANE) and 0.9×(1.33×DTRK+LANE)

SPAN.LOC FRAC	DEAD LOAD A-DC MOMENT (ft-k)	B-DC MOMENT (ft-k)	DW MOMENT (ft-k)	HL93 TRUCK MAX (ft-k)	MIN (ft-k)	HL93 LANE MAX (ft-k)	MIN (ft-k)	DOUBLE TRUCK MIN (ft-k)	COMBINED TRUCK+LANE MAX (ft-k)	MIN (ft-k)	FATIGUE TRUCK MAX (ft-k)	MIN (ft-k)
2.961	1739	68	494	509	-22	329	-26	0	1006	-55	252	-8
2.964	1642	64	466	479	-21	310	-24	0	948	-53	237	-7
2.974	1170	46	332	360	-16	220	-17	0	699	-39	181	-7
2.988	577	22	164	187	-11	107	-8	0	356	-22	95	-7
3.000	-1	0	0	5	-13	6	-6	-16	13	-25	2	-10
3.000	0	0	0	0	-10	0	0	-10	0	-13	0	-8
3.482	0	0	0	0	-5	0	0	-5	0	-7	0	-4

REFERENCE ONLY

4.000	0	0	0	0	0	0	0	0	0	0	0	0

----- UNFACTORED SHEAR SUMMARY -----

* * * GIRDER 5, UNFACTORED SHEAR SUMMARY (Based on Input Section) * * *

Note: Values do not include impact, except for COMBINED TRUCK+LANE.

SPAN.LOC FRAC	DEAD LOAD A-DC SHEAR (kips)	DEAD LOAD B-DC SHEAR (kips)	DEAD LOAD DW SHEAR (kips)	HL93 TRUCK MAX (kips)	HL93 TRUCK MIN (kips)	HL93 LANE MAX (kips)	HL93 LANE MIN (kips)	COMBINED TRUCK+LANE MAX (kips)	COMBINED TRUCK+LANE MIN (kips)	FATIGUE TRUCK MAX (kips)	FATIGUE TRUCK MIN (kips)
1.000	-84.8	-1.2	-12.3	61.9	-25.8	33.1	-36.7	115.4	-71.0	31.7	-8.5
1.001	-84.9	-1.3	-12.4	61.7	-25.8	33.0	-36.7	115.1	-71.0	31.6	-8.5
1.003	-85.1	-1.3	-12.5	56.5	-25.8	32.6	-36.7	107.7	-71.0	28.2	-8.5
1.003	-85.1	-1.3	-12.5	56.5	-25.8	32.6	-36.7	107.7	-71.0	28.2	-8.5
1.004	-85.2	-1.3	-12.5	56.5	-25.8	32.6	-36.7	107.7	-71.0	28.2	-8.5
1.006	-85.4	-1.3	-12.6	56.5	-25.8	32.6	-36.7	107.7	-71.0	28.2	-8.5
1.050	-89.7	-1.7	-14.8	52.2	-25.8	31.7	-36.7	101.1	-71.0	25.4	-8.5
1.100	-94.7	-2.1	-17.3	48.8	-24.6	28.7	-34.7	93.5	-67.4	23.8	-8.1
1.150	-99.7	-2.5	-19.7	39.4	-23.0	24.3	-32.2	76.7	-62.7	18.4	-7.6
1.187	-103.4	-2.8	-21.5	35.4	-21.4	20.7	-29.8	67.8	-58.4	16.4	-7.1
1.200	-104.7	-2.9	-22.2	35.5	-21.4	20.7	-29.8	67.8	-58.4	16.4	-7.1
1.231	-107.8	-3.7	-24.8	31.9	-20.2	17.6	-28.0	60.0	-54.8	14.8	-8.6
1.250	-99.8	-3.8	-25.7	19.1	-17.2	6.6	-20.4	32.0	-43.4	10.6	-9.2
1.300	-104.8	-4.2	-28.2	16.9	-20.2	6.2	-21.4	28.6	-48.3	9.7	-10.8
1.347	-109.6	-4.6	-30.5	15.3	-22.0	5.6	-21.8	26.0	-51.0	8.6	-12.0
1.350	-109.9	-4.6	-30.7	14.6	-23.1	5.4	-22.6	24.9	-53.3	8.2	-12.6
1.351	-110.0	-4.6	-30.7	14.6	-23.1	5.4	-22.6	24.9	-53.3	8.2	-12.6
1.351	-110.0	-4.6	-30.7	14.6	-23.1	5.4	-22.6	24.9	-53.3	8.2	-12.6
1.374	-112.6	-4.8	-31.8	13.1	-24.1	5.0	-23.0	22.4	-55.1	7.0	-13.3
1.400	-115.6	-5.0	-33.2	13.4	-24.1	5.1	-23.4	22.9	-55.5	7.4	-13.3
1.450	-121.3	-5.4	-35.6	11.7	-26.0	4.6	-24.3	20.3	-58.9	6.2	-14.8
1.462	-126.8	-5.7	-36.9	13.2	-28.0	5.3	-26.9	22.8	-64.1	8.2	-16.3
1.500	-131.1	-6.0	-38.8	11.7	-27.6	5.1	-27.3	20.7	-64.0	7.1	-14.9
1.520	-133.5	-6.1	-39.8	11.3	-29.6	5.0	-27.9	20.0	-67.3	6.8	-16.5
1.550	-136.9	-6.3	-41.2	10.3	-30.5	4.8	-28.5	18.5	-69.0	6.2	-17.1
1.561	-138.1	-6.4	-41.7	9.4	-30.9	4.7	-28.7	17.2	-69.8	5.6	-17.4
1.578	-143.2	-6.6	-42.8	12.1	-32.0	5.2	-30.2	21.3	-72.7	7.4	-18.1
1.600	-145.7	-6.8	-43.9	11.3	-31.2	5.2	-30.5	20.3	-72.1	7.1	-16.3
1.611	-146.9	-6.8	-44.4	10.6	-32.0	5.0	-30.8	19.1	-73.4	6.7	-16.7
1.636	-150.5	-7.0	-45.6	9.7	-33.3	4.9	-31.2	17.7	-75.5	6.2	-17.9
1.650	-152.5	-7.1	-46.3	7.7	-33.8	4.6	-31.8	14.8	-76.7	5.0	-18.3
1.694	-161.4	-7.5	-48.4	9.7	-35.4	5.0	-33.1	17.9	-80.1	5.9	-19.7
1.700	-162.3	-7.5	-48.7	9.2	-34.8	4.9	-33.3	17.1	-79.6	5.9	-18.1
1.747	-169.0	-7.9	-51.0	7.8	-36.6	4.6	-33.9	15.1	-82.5	5.0	-19.6
1.750	-169.4	-7.9	-51.1	8.1	-36.6	4.7	-34.0	15.5	-82.7	5.2	-19.6
1.752	-169.6	-7.9	-51.2	7.4	-36.9	4.7	-34.2	14.6	-83.2	4.9	-19.8
1.800	-176.5	-8.3	-53.6	6.0	-38.3	4.4	-35.0	12.4	-86.0	3.8	-21.1
1.809	-180.2	-8.3	-54.0	6.5	-39.2	4.9	-36.0	13.5	-88.1	4.8	-21.9

----- UNFACTORED SHEAR SUMMARY -----

* * * GIRDER 5, UNFACTORED SHEAR SUMMARY (Based on Input Section) * * *

Note: Values do not include impact, except for COMBINED TRUCK+LANE.

SPAN.LOC FRAC	DEAD LOAD A-DC SHEAR (kips)	DEAD LOAD B-DC SHEAR (kips)	DEAD LOAD DW SHEAR (kips)	HL93 TRUCK MAX (kips)	HL93 TRUCK MIN (kips)	HL93 LANE MAX (kips)	HL93 LANE MIN (kips)	COMBINED TRUCK+LANE MAX (kips)	COMBINED TRUCK+LANE MIN (kips)	FATIGUE TRUCK MAX (kips)	FATIGUE TRUCK MIN (kips)
1.850	-186.1	-8.6	-56.0	5.8	-39.6	4.6	-36.7	12.3	-89.4	3.4	-21.4
1.867	-188.5	-8.8	-56.8	5.3	-41.0	4.6	-37.2	11.6	-91.7	3.4	-22.8
1.900	-193.3	-9.0	-58.4	4.5	-41.5	4.5	-38.0	10.4	-93.2	1.9	-23.3
1.925	-196.9	-9.2	-59.6	5.0	-44.1	4.8	-39.1	11.4	-97.7	2.2	-25.3
1.934	-198.2	-9.2	-59.9	4.6	-43.9	4.7	-39.4	10.8	-97.8	1.6	-25.2
1.950	-200.5	-9.4	-60.6	4.5	-45.1	4.7	-39.9	10.7	-99.9	1.3	-26.0
1.997	-207.3	-9.7	-62.9	4.5	-47.6	4.7	-41.0	10.7	-104.3	1.3	-27.9
2.000	-207.8	-9.7	-63.0	4.5	-47.6	4.7	-41.1	10.7	-104.4	1.3	-27.9
2.000	283.3	11.9	80.1	50.9	-3.7	45.2	-2.4	112.9	-7.4	29.2	-1.2
2.001	282.9	11.9	80.0	50.9	-3.7	45.2	-2.4	112.9	-7.4	29.2	-1.2
2.004	281.5	11.8	79.6	50.9	-3.7	45.2	-2.4	112.9	-7.4	29.2	-1.2
2.036	268.8	11.3	75.8	47.8	-5.6	43.1	-2.6	106.7	-10.0	26.5	-2.7
2.044	265.3	11.1	74.6	45.2	-4.4	42.3	-2.2	102.4	-8.1	23.8	-2.1
2.050	262.9	11.0	74.0	45.5	-4.4	42.3	-2.2	102.8	-8.1	24.2	-2.1
2.061	258.4	10.8	72.5	45.5	-4.0	42.3	-2.1	102.8	-7.4	24.2	-1.9
2.085	247.8	10.3	69.4	44.4	-9.3	40.4	-2.7	99.5	-15.0	23.6	-5.9
2.100	239.7	10.0	67.5	42.4	-6.8	39.3	-2.2	95.7	-11.2	21.9	-4.4
2.110	235.3	9.8	66.1	42.4	-6.0	39.2	-2.1	95.7	-10.1	21.9	-3.9
2.113	234.3	9.7	65.8	41.8	-9.1	38.5	-2.5	94.0	-14.5	21.2	-5.9
2.121	230.8	9.6	64.7	40.3	-10.0	37.8	-2.7	91.4	-16.0	19.5	-6.5
2.135	225.6	9.3	62.8	41.8	-12.5	37.6	-3.1	93.2	-19.6	22.3	-8.0
2.150	216.3	9.0	60.8	40.0	-8.8	36.1	-2.5	89.2	-14.2	20.7	-5.7
2.160	212.7	8.8	59.5	40.0	-8.1	36.0	-2.3	89.2	-13.0	20.7	-5.1
2.181	204.8	8.3	56.6	37.9	-13.5	34.6	-3.4	85.0	-21.4	18.3	-8.4
2.184	203.4	8.4	56.9	40.6	-15.1	34.5	-3.7	88.5	-23.7	22.3	-9.3
2.200	195.1	8.1	54.8	39.0	-10.4	33.2	-2.7	85.0	-16.5	20.9	-6.2
2.209	191.6	7.9	53.5	39.0	-9.6	33.2	-2.5	85.0	-15.2	20.9	-5.5
2.211	191.0	7.8	53.3	38.3	-12.4	32.6	-3.2	83.5	-19.6	20.3	-7.7
2.216	189.2	7.7	52.7	36.7	-13.1	31.9	-3.5	80.6	-20.9	18.5	-8.2
2.216	189.2	7.7	52.7	36.7	-13.1	31.9	-3.5	80.6	-20.9	18.5	-8.2
2.234	182.0	7.5	51.0	40.6	-15.7	31.6	-4.1	85.6	-25.0	23.2	-10.0
2.249	172.2	7.2	49.0	37.7	-11.3	30.2	-3.2	80.3	-18.3	20.2	-6.4
2.250	171.9	7.2	48.9	39.1	-11.3	30.3	-3.2	82.3	-18.3	21.5	-6.4
2.283	158.4	6.5	44.3	37.0	-13.5	29.1	-3.9	78.2	-21.9	19.5	-7.8
2.300	151.7	6.1	42.1	35.5	-16.2	27.8	-4.8	75.1	-26.3	18.2	-9.7
2.317	144.6	5.8	39.7	33.3	-18.7	26.8	-5.6	71.0	-30.4	16.3	-11.2
2.333	138.2	5.6	38.3	38.3	-21.8	26.5	-6.4	77.4	-35.5	21.8	-13.4
2.350	125.9	5.2	35.9	36.7	-16.2	24.9	-5.1	73.6	-26.6	20.5	-8.8
2.382	112.3	4.5	31.4	34.0	-17.9	23.6	-5.8	68.9	-29.6	18.2	-9.9
2.386	111.0	4.5	30.9	31.1	-20.9	22.5	-7.0	63.9	-34.7	15.7	-12.1
2.400	104.9	4.2	29.0	32.7	-20.6	22.5	-7.0	66.0	-34.4	17.2	-12.1

REFERENCE ONLY

2.432	91.4	3.6	25.3	37.3	-26.0	21.2	-8.9	70.8	-43.4	21.6	-15.9
2.450	78.2	3.3	22.7	36.1	-18.7	19.8	-6.8	67.8	-31.6	20.4	-10.1
2.454	76.6	3.2	22.1	36.1	-17.2	19.8	-6.5	67.8	-29.4	20.4	-9.0
2.469	70.1	2.9	20.0	32.7	-21.4	18.4	-7.8	61.9	-36.3	17.8	-11.8
2.481	64.6	2.6	18.2	32.7	-21.4	18.4	-7.8	61.9	-36.3	17.8	-11.8
2.500	56.5	2.2	15.6	31.5	-23.8	17.4	-8.8	59.3	-40.4	16.8	-13.5
2.522	46.7	1.8	12.5	28.5	-25.6	16.2	-9.7	54.1	-43.8	14.3	-14.7
2.531	42.8	1.6	11.7	35.9	-29.6	16.4	-11.0	64.1	-50.4	20.6	-17.5
2.550	29.2	1.3	8.9	34.3	-22.5	15.9	-9.5	61.5	-39.4	19.4	-11.9
2.580	15.5	0.6	4.5	30.4	-24.1	14.2	-10.3	54.6	-42.4	16.5	-12.9
2.590	11.0	0.4	3.1	27.7	-27.8	13.0	-11.6	49.8	-48.6	14.5	-15.5
2.600	6.6	0.2	1.7	29.3	-30.8	13.0	-12.5	52.0	-53.4	15.6	-17.6
2.614	0.0	-0.1	-0.4	25.4	-29.4	11.9	-12.6	45.7	-51.7	12.9	-16.6
2.630	-11.1	-0.4	-2.6	36.1	-34.1	14.3	-14.0	62.3	-59.4	20.6	-19.8
2.650	-20.4	-0.8	-5.4	34.9	-24.6	13.8	-12.9	60.2	-45.6	19.5	-12.7
2.655	-22.7	-0.9	-6.1	30.3	-25.9	11.6	-13.7	52.0	-48.2	16.2	-13.5
2.655	-22.7	-0.9	-6.1	30.3	-25.9	11.6	-13.7	52.0	-48.2	16.2	-13.5
2.659	-24.4	-1.0	-6.6	30.3	-25.9	11.6	-13.7	52.0	-48.2	16.2	-13.5

----- UNFACTORED SHEAR SUMMARY ----------

* * * GIRDER 5, UNFACTORED SHEAR SUMMARY (Based on Input Section) * * *

Note: Values do not include impact, except for COMBINED TRUCK+LANE.

SPAN.LOC FRAC	DEAD LOAD A-DC SHEAR (kips)	B-DC SHEAR (kips)	DW SHEAR (kips)	HL93 TRUCK MAX (kips)	HL93 TRUCK MIN (kips)	HL93 LANE MAX (kips)	HL93 LANE MIN (kips)	COMBINED TRUCK+LANE MAX (kips)	COMBINED TRUCK+LANE MIN (kips)	FATIGUE TRUCK MAX (kips)	FATIGUE TRUCK MIN (kips)
2.679	-34.2	-1.4	-9.6	30.3	-25.9	11.6	-13.7	52.0	-48.2	16.2	-13.5
2.700	-43.9	-1.8	-12.6	24.6	-33.8	9.1	-16.1	41.8	-61.1	12.2	-18.6
2.727	-56.8	-2.4	-16.5	24.6	-32.1	9.1	-16.1	41.8	-58.9	12.2	-17.4
2.729	-61.2	-2.5	-17.0	34.9	-37.7	11.7	-18.3	58.2	-68.4	19.5	-20.9
2.750	-71.3	-2.9	-20.1	28.1	-31.4	9.1	-19.7	46.4	-61.5	14.6	-16.1
2.779	-85.2	-3.5	-24.3	28.1	-30.3	9.1	-19.7	46.4	-60.1	14.6	-15.0
2.795	-93.4	-3.9	-26.7	25.1	-35.1	7.6	-21.1	41.1	-67.8	12.6	-18.3
2.800	-95.8	-4.0	-27.5	21.0	-38.3	6.2	-22.4	34.1	-73.4	9.9	-20.3
2.828	-112.7	-4.6	-31.9	29.9	-43.2	8.0	-25.2	47.7	-82.7	15.4	-23.1
2.850	-123.7	-5.1	-35.3	20.2	-38.6	5.4	-26.9	32.3	-78.2	10.8	-18.7
2.863	-130.5	-5.3	-37.3	20.2	-37.9	5.4	-26.9	32.3	-77.2	10.8	-17.8
2.878	-137.7	-5.6	-39.3	20.2	-37.9	5.4	-26.9	32.3	-77.2	10.8	-17.8
2.900	-149.2	-6.1	-42.7	11.9	-46.6	3.7	-30.2	19.5	-92.2	6.3	-23.6
2.927	-165.7	-6.7	-47.0	13.1	-53.7	4.1	-32.6	21.4	-104.1	8.4	-27.6
2.932	-168.1	-6.8	-47.7	14.1	-50.7	3.9	-32.8	22.6	-100.2	7.9	-24.2
2.948	-176.7	-7.1	-50.1	9.3	-54.3	3.4	-34.1	15.7	-106.3	5.5	-26.7
2.948	-176.7	-7.1	-50.1	9.3	-54.3	3.4	-34.1	15.7	-106.3	5.5	-26.7
2.950	-177.7	-7.2	-50.4	9.5	-54.3	3.4	-34.2	16.1	-106.4	5.7	-26.7
2.961	-183.6	-7.4	-52.1	6.0	-57.1	3.2	-35.3	11.2	-111.3	4.0	-28.4
2.964	-184.8	-7.4	-52.5	6.0	-57.1	3.2	-35.3	11.2	-111.3	4.0	-28.4
2.974	-190.5	-7.5	-54.1	3.5	-61.1	3.0	-36.6	7.7	-117.9	2.3	-31.0
2.988	-197.5	-7.7	-56.1	2.5	-66.0	3.0	-38.1	6.2	-125.8	1.0	-33.9
3.000	-204.0	-7.9	-57.9	2.5	-68.2	3.0	-38.6	6.2	-129.2	1.0	-37.1
3.000	1.1	0.0	0.3	19.1	0.0	0.1	0.0	25.5	0.0	15.7	0.0
3.482	0.6	0.0	0.2	18.8	0.0	0.1	0.0	25.1	0.0	15.7	0.0
4.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

----- GIRDER 5 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) ----------

SPAN.LOC FRAC	TOP FLANGE INP AREA (in²)	REQ AREA (in²)	NG	WIDTH (in)	THICK (in)	STRESS RATIO	BOTTOM FLANGE INP AREA (in²)	REQ AREA (in²)	NG	WIDTH (in)	THICK (in)	STRESS RATIO
1.000	24.0	24.0		24.0000	1.0000	0.00	24.0	24.0		24.0000	1.0000	0.00
1.001	24.0	24.0		24.0000	1.0000	0.00	24.0	24.0		24.0000	1.0000	0.00
1.003	24.0	24.0		24.0000	1.0000	0.01	24.0	24.0		24.0000	1.0000	0.01
1.004	24.0	24.0		24.0000	1.0000	0.01	24.0	24.0		24.0000	1.0000	0.01
1.006	24.0	24.0		24.0000	1.0000	0.01	24.0	24.0		24.0000	1.0000	0.01
1.050	24.0	24.0		24.0000	1.0000	0.08	24.0	24.0		24.0000	1.0000	0.10
1.100	24.0	24.0		24.0000	1.0000	0.16	24.0	24.0		24.0000	1.0000	0.20
1.150	24.0	24.0		24.0000	1.0000	0.24	24.0	24.0		24.0000	1.0000	0.30
1.187	24.0	24.0		24.0000	1.0000	0.30	24.0	24.0		24.0000	1.0000	0.37
1.200	24.0	24.0		24.0000	1.0000	0.32	24.0	24.0		24.0000	1.0000	0.40
1.231	24.0	24.0		24.0000	1.0000	0.37	24.0	24.0		24.0000	1.0000	0.46
1.250	24.0	24.0		24.0000	1.0000	0.40	24.0	24.0		24.0000	1.0000	0.49
1.300	24.0	24.0		24.0000	1.0000	0.46	24.0	24.0		24.0000	1.0000	0.57
1.347	24.0	24.0		24.0000	1.0000	0.53	24.0	24.0		24.0000	1.0000	0.65
1.350	24.0	24.0		24.0000	1.0000	0.53	24.0	24.0		24.0000	1.0000	0.65
1.351	24.0	24.0		24.0000	1.0000	0.53	24.0	24.0		24.0000	1.0000	0.65
1.351	41.3	41.3		30.0000	1.3750	0.37	41.3	41.3		30.0000	1.3750	0.42
1.374	41.3	41.3		30.0000	1.3750	0.39	41.3	41.3		30.0000	1.3750	0.45
1.400	41.3	41.3		30.0000	1.3750	0.42	41.3	41.3		30.0000	1.3750	0.48
1.450	41.3	41.3		30.0000	1.3750	0.47	41.3	41.3		30.0000	1.3750	0.54
1.462	41.3	41.3		30.0000	1.3750	0.48	41.3	41.3		30.0000	1.3750	0.55
1.500	41.3	41.3		30.0000	1.3750	0.52	41.3	41.3		30.0000	1.3750	0.59
1.520	41.3	41.3		30.0000	1.3750	0.54	41.3	41.3		30.0000	1.3750	0.62
1.550	41.3	41.3		30.0000	1.3750	0.58	41.3	41.3		30.0000	1.3750	0.66
1.561	41.3	41.3		30.0000	1.3750	0.59	41.3	41.3		30.0000	1.3750	0.67
1.578	41.3	41.3		30.0000	1.3750	0.61	41.3	41.3		30.0000	1.3750	0.69
1.600	41.3	41.3		30.0000	1.3750	0.64	41.3	41.3		30.0000	1.3750	0.72
1.611	41.3	41.3		30.0000	1.3750	0.65	41.3	41.3		30.0000	1.3750	0.74
1.611	82.5	82.5		30.0000	2.7500	0.38	82.5	82.5		30.0000	2.7500	0.39
1.636	82.5	82.5		30.0000	2.7500	0.39	82.5	82.5		30.0000	2.7500	0.41

----- GIRDER 5 FLANGE PLATE AREA REQUIRED FOR STRENGTH/CONSTRUCTIBILITY (* = DIFFERENT THAN INPUT) ----------

SPAN.LOC FRAC	TOP FLANGE INP AREA (in²)	REQ AREA (in²)	NG	WIDTH (in)	THICK (in)	STRESS RATIO	BOTTOM FLANGE INP AREA (in²)	REQ AREA (in²)	NG	WIDTH (in)	THICK (in)	STRESS RATIO

REFERENCE ONLY