STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GIRDER MOMENT TABLE - RAMP 3 FLARE

I_s, S_s: Non-composite moment of inertia and section modulus of the steel section used for computing f_s (Total and Overload) due to non-composite dead loads (in.[4] and in.[3]).

$I_c(n)$, $S_c(n)$: Composite moment of inertia and section modulus of the steel and deck based upon the modular ratio, "n", used for computing f_s (Total and Overload) due to short-term composite live loads (in.[4] and in.[3]).

$I_c(3n)$, $S_c(3n)$: Composite moment of inertia and section modulus of the steel and deck based upon 3 times the modular ratio, "3n", used for computing f_s (Total and Overload) due to long-term composite (superimposed) dead loads (in.[4] and in.[3]).

Z: Plastic Section Modulus of the steel section in non-composite areas (in.[3]).

DL: Un-factored non-composite dead load (kips/ft.).

M DL: Un-factored moment due to non-composite dead load (kip-ft.).

s DL: Un-factored long-term composite (superimposed) dead load (kips/ft.)

M_s DL: Un-factored moment due to long-term composite (superimposed) dead load (kip-ft.).

M LL: Un-factored live load moment (kip-ft.).

M_I: Un-factored moment due to impact (kip-ft.).

M_a: Factored design moment (kip-ft.).
$1.3\ [M_{DL} + M_{sDL} + \frac{5}{3}(M_{LL} + M_I)]$

M_u: Compact composite moment capacity according to AASHTO LFD 10.50.1.1 or compact non-composite moment capacity according to AASHTO LFD 10.48.1 (kip-ft.).

f_s (Overload): Sum of stresses as computed from the moments below (ksi).
$M_{DL} + M_{sDL} + \frac{5}{3}(M_{LL} + M_I)$

f_s (Total): Sum of stresses as computed from the moments below on non-compact section (ksi).
$1.3\ [M_{DL} + M_{sDL} + \frac{5}{3}(M_{LL} + M_I)]$

VR: Maximum LL + impact shear range within the composite portion of the span for stud shear connector design (kips).

S_l: Section modulus of one flange plate for lateral flange bending (in.[3]).

M_{bl}: Factored lateral bending moment for flange plate (kip-ft.).

f_l: Factored calculated normal stress at the edge of flange due to lateral bending (ksi).

F_{cr} (Overload): Critical average flange stress at overload computed according to the 2003 AASHTO Guide Specifications for Horizontally Curved Steel Girder Highway Bridges Section 9.5 (ksi.).

F_{cr}: Critical average flange stress (smaller of F_{cr1} or F_{cr2} for partially braced flanges and F_y for continuously braced flanges) computed according to the 2003 AASHTO Guide Specifications for Horizontally Curved Steel Girder Highway Bridges (Sections 5.2, 5.3 and 5.4) (ksi).

		Girder 3.1, & 3.18-3.20		Girder 3.2			Girder 3.3 to 3.8			Girder 3.9	Girder 3.11	Girder 3.17, 3.10, 3.10A & 3.13-3.16	Cross Head Girder	
		0.5 Sp. R3-1	0.5 Sp. R3-2	0.4 Sp. R3-1	R3 Pier	0.6 Sp. R3-2	0.4 Sp. R3-1	R3 Pier	0.6 Sp. R3-2	0.4 Sp. R3-1	0.5 Sp. R3-1	0.5 Sp. R3-1	0.4 Span	at G3.12
Is	(in^4)	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	49,795	15,000	9,040	131,400	131,400
Ic (n)	(in^4)	31,876	31,876	31,876		31,876	31,876		31,876	88,605	29,661			
Ic (3n)	(in^4)	23,429	23,429	23,429		23,429	23,429		23,429	67,636	21,883			
Ss	(in^3)	837	837	837	837	837	837	837	837	1,747	837	504	4,074	4,074
Sc (n)	(in^3)	1,096	1,096	1,096		1,096	1,096		1,096	2,110	1,073			
Sc (3n)	(in^3)	995	995	995		995	995		995	1,948	971			
Z	(in^3)				943							575	4541	4541
DL	(k/')	0.98	1.18	0.89	1.57	1.42	0.98	1.38	0.98	1.41	1.11	1.29		
M DL	('k)	705.0	318.0	396.0	1,111.0	584.0	671.0	1243.0	340.0	1644.0	228.0	357.0	2758.0	5970.0
s DL	(k/')	0.40	0.40	0.36		0.57	0.40		0.40	0.60	0.80			
Ms DL	('k)	288.0	113.0	179.0		249.0	292.0		157.0	708.0	147.0			
M LL	('k)	640.0	329.0	565.0	348.0	560.0	703.0	413.0	560.0	857.0	270.0	334.0	1049.0	1336.0
M (Imp)	('k)	160.0	95.0	141.0	87.0	139.0	162.0	103.0	140.0	197.0	81.0	96.0	262.0	347.0
5/3[M LL+M(Imp)]	('k)	1,333.3	706.7	1,177.0	725.0	1,165.0	1,441.7	860.0	1,166.7	1,756.7	585.0	716.7	2,185.0	2,805.0
Ma	('k)	3,024.2	1,479.0	2,278.0	2,387.0	2,598.0	3,126.1	2,734.0	2,162.8	5,341.3	1,248.0	1,395.8	6,425.9	11,407.5
* Mu	('k)	5,073.0	5,073.0	5,073.0	3,929.0	5,073.0	5,073.0		5,073.0	10,286.0	4,897.0	2,397.0	18,920.0	18,920.0
fs DL (non-comp)	(ksi)	10.1	4.6	5.7	16.0	8.4	9.6	17.8	4.9	11.3	3.3	8.5	8.1	17.6
fs DL (comp)	(ksi)	3.5	1.4	2.2	-	3.0	3.5	-	1.9	4.4	1.8	-	-	-
fs 5/3 (LL+Imp)	(ksi)	14.6	7.7	12.9	10.4	12.8	15.8	12.3	12.8	10.0	6.5	17.1	6.4	8.3
fs (Overload)	(ksi)	28.2	13.7	20.8	26.4	24.2	28.9	30.1	19.5	25.6	11.6	25.6	14.6	25.8
** fs (Total)	(ksi)							39.2						
VR	(k)	52.6	49.9	55.4		55.5	50.0		56.5	53.0	46.0			

* Compact section
** Braced non-compact and partially braced section

		Girder 3.12		
		0.4 Sp. R3-1	R3 Pier	0.6 Span R3-2
Is	(in^4)	78,863	78,863	78,863
Ic (n)	(in^4)	127,048	85,300	127,048
Ic (3n)	(in^4)	99,626	3,100	99,626
Ss	(in^3)	2719	2719	2719
Sc (n)	(in^3)	3154	85,300	3154
Sc (3n)	(in^3)	2941	3,100	2941
S_l	(in^3)	161	161	161
DL	(k/')	3.1	2.1	1.6
M DL	('k)	784	1358	765
s DL	(k/')	1.3	0.73	0.5
Ms DL	('k)	326	497	246
M LL	('k)	512.0	470.0	626.0
M (Imp)	('k)	133.0	117.0	150.0
5/3[M LL+M(Imp)]	('k)	1075.0	979.0	1294.0
Ma	('k)	2841.0	3685.0	2997.0
M_{bl}	('k)	26.0	73	42.0
fs DL (non-comp)	(ksi)	3.5	6.0	3.4
fs DL (comp)	(ksi)	1.4	2.0	1.0
fs 5/3 (LL+Imp)	(ksi)	4.1	3.8	5.0
Fl	(ksi)	2.0	5.4	3.1
fs (Overload)	(ksi)	9.0	11.8	9.4
fs (Total)	(ksi)	11.7	15.4	12.3
Fcr (Overload)	(ksi)	47.5	47.5	47.5
VR	(k)	59.1		56.3
Fcr	(ksi)	49.3	32.3	44.3

GIRDER REACTION TABLES - RAMP 3 FLARE

		Girder 3.1				Girder 3.2			Girder 3.3 to 3.8			Girder 3.9		Girder 3.11		Girder 3.17	Cross Head Girder	
		Carrier Girder	Pier R3 (West)	Pier R3 (East)	FB 3.4	Carrier Girder	Pier R3	℄ Bearing Abutment	Carrier Girder	Pier R3	℄ Bearing Abutment	Carrier Girder	Pier R3	℄ N. Brg C. Abut 1	G3.9	Carrier Girder & FB3.6	South Bearing	North Bearing
R_{DL}	(k)	53.2	53.2	36.0	34.5	41.6	142.2	50.1	52.5	147.6	38.3	88.3	78.5	39.6	39.4	31.1	554.0	1034.0
R_{LL}	(k)	41.8	41.8	38.6	38.6	40.8	47.8	40.8	42.0	51.2	41.0	42.8	38.3	35.4	35.4	38.6	100.0	160.0
R_I	(k)	10.4	10.4	11.1	11.1	10.3	11.7	10.2	9.6	12.2	10.2	9.8	8.8	10.6	10.6	11.2	25.0	40.0
R_{TOTAL}	(k)	105.4	105.4	85.7	84.2	92.7	201.7	101.1	104.1	211.0	89.5	140.9	125.6	85.6	85.4	80.9	679.0	1234.0

	Girder 3.12		
	G1	R3 Pier	R3 Abut
R_{DL}	71.0	254.0	59.0
R_{LL}	41.0	55.0	42.0
R_I	10.0	14.0	10.0
R_{TOTAL}	122.0	323.0	111.0

MOMENT TABLE
RAMP 3 FLARE
STRUCTURE NO. 016-0724

TY·LIN INTERNATIONAL	DESIGNED - JPN	REVISIONS	
	CHECKED - AMD.	NAME	DATE
	DRAWN - MAU		
	CHECKED - AMD.		
	DATE - 03/25/2011		

SHEET NO. 150	F.A.I RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
239 SHEETS	55	0711.2R & 1011.1BR	COOK	741	474
			CONTRACT NO. 60999		
	FED. ROAD DIST. NO. 1	ILLINOIS	FED. AID PROJECT		