

5/7/2009 10:48:04 AM

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ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.	SHEET NO. 25
S. B. I.	#	MADISON	149	92	45 SHEETS
F. A. R. 310					
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT			
Contract #76634					
* 60-15VB-1 & 2					

	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.4 Sp. 3
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235		9,235
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914		6,914
Ss (10 ³ mm ³)	7,851	7,851	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045		11,045
Sc (3n) (10 ³ mm ³)	10,126		10,126		10,126
Q (kN/m)	11.434	10.705	9.881	9.057	9.902
M _Q (kN-m)	271	572	325	435	153
s _Q (kN/m)	6.310	6.310	6.310	6.310	6.310
M _{sQ} (kN-m)	146	315	222	104	
M _L (kN-m)	566	406	536	390	485
M _{imp} (kN-m)	153	101	129	98	131
Σ ₃ [M _L +M _{imp}] (kN-m)	1,198	845	1,108	813	1,027
M _a (kN-m)	2,100	2,252	2,152	1,976	1,669
M _u (kN-m)	4,505	4,158	4,158	3,918	
f _{sQ} non-comp (MPa)	27	73	32	55	15
f _{sQ} (comp) (MPa)	14		22		10
f _{sΣ₃} (M _L +M _{imp}) (MPa)	108	108	100	104	93
f _s (Overload) (MPa)	150	180	154	159	118
f _s (Total) (MPa)		235		207	
VR (kN)	237				270

	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235	
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914	
Ss (10 ³ mm ³)	7,851	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045	
Sc (3n) (10 ³ mm ³)	10,126		10,126	
Q (kN/m)	12.002	10.530	8.855	7.180
M _Q (kN-m)	292	553	291	396
s _Q (kN/m)	6.310	6.310	6.310	6.310
M _{sQ} (kN-m)	141	307	217	282
M _L (kN-m)	572	406	503	312
M _{imp} (kN-m)	155	102	121	87
Σ ₃ [M _L +M _{imp}] (kN-m)	1,212	847	1,040	665
M _a (kN-m)	2,138	2,219	2,012	1,746
M _u (kN-m)	4,507	4,159	4,159	
f _{sQ} non-comp (MPa)	29	70	29	50
f _{sQ} (comp) (MPa)	14		21	
f _{sΣ₃} (M _L +M _{imp}) (MPa)	110	108	94	85
f _s (Overload) (MPa)	152	178	144	135
f _s (Total) (MPa)		232		176
VR (kN)	270		217	

	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.4 Sp. 3
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235		9,235
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914		6,914
Ss (10 ³ mm ³)	7,851	7,851	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045		11,045
Sc (3n) (10 ³ mm ³)	10,126		10,126		10,126
Q (kN/m)	12.127	10.636	8.952	7.267	9.050
M _Q (kN-m)	291	535	270	358	100
s _Q (kN/m)	6.310	6.310	6.310	6.310	6.310
M _{sQ} (kN-m)	137	297	208	250	99
M _L (kN-m)	574	413	497	337	446
M _{imp} (kN-m)	155	103	119	84	121
Σ ₃ [M _L +M _{imp}] (kN-m)	1,215	860	1,027	702	945
M _a (kN-m)	2,136	2,200	1,956	1,703	1,487
M _u (kN-m)	4,512	4,173	4,173	3,930	
f _{sQ} non-comp (MPa)	29	68	27	46	10
f _{sQ} (comp) (MPa)	14		21		10
f _{sΣ₃} (M _L +M _{imp}) (MPa)	110	110	93	89	86
f _s (Overload) (MPa)	152	178	140	135	105
f _s (Total) (MPa)		231		175	
VR (kN)	275		221		255

	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235	
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914	
Ss (10 ³ mm ³)	7,851	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045	
Sc (3n) (10 ³ mm ³)	10,126		10,126	
Q (kN/m)	12.252	10.742	9.035	7.327
M _Q (kN-m)	284	537	283	388
s _Q (kN/m)	6.310	6.310	6.310	6.310
M _{sQ} (kN-m)	134	286	198	265
M _L (kN-m)	587	418	515	354
M _{imp} (kN-m)	159	104	124	103
Σ ₃ [M _L +M _{imp}] (kN-m)	1,243	870	1,065	762
M _a (kN-m)	2,160	2,201	2,010	1,839
M _u (kN-m)	4,514	4,175	4,175	
f _{sQ} non-comp (MPa)	28	68	28	49
f _{sQ} (comp) (MPa)	13		20	
f _{sΣ₃} (M _L +M _{imp}) (MPa)	113	111	96	97
f _s (Overload) (MPa)	154	179	144	146
f _s (Total) (MPa)		233		190
VR (kN)	283		231	

	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.4 Sp. 3
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235		9,235
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914		6,914
Ss (10 ³ mm ³)	7,851	7,851	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045		11,045
Sc (3n) (10 ³ mm ³)	10,126		10,126		10,126
Q (kN/m)	12.730	11.966	11.101	10.235	11.173
M _Q (kN-m)	271	574	323	439	162
s _Q (kN/m)	6.310	6.310	6.310	6.310	6.310
M _{sQ} (kN-m)	133	289	214	246	121
M _L (kN-m)	621	462	627	398	572
M _{imp} (kN-m)	168	115	150	100	154
Σ ₃ [M _L +M _{imp}] (kN-m)	1,315	962	1,295	830	1,210
M _a (kN-m)	2,235	2,372	2,382	1,970	1,941
M _u (kN-m)	4,606	4,698	4,698	4,698	
f _{sQ} non-comp (MPa)	27	73	32	56	16
f _{sQ} (comp) (MPa)	13		21		12
f _{sΣ₃} (M _L +M _{imp}) (MPa)	119	122	117	106	110
f _s (Overload) (MPa)	159	196	170	162	137
f _s (Total) (MPa)		254		210	
VR (kN)	285		276		298

	0.4 Sp. 1 & 3	Piers 1 & 2	0.5 Sp. 2
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914
Ss (10 ³ mm ³)	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045
Sc (3n) (10 ³ mm ³)	10,126		10,126
Q (kN/m)	13.160	13.160	13.160
M _Q (kN-m)	289	614	367
s _Q (kN/m)	6.310	6.310	6.310
M _{sQ} (kN-m)	140	277	200
M _L (kN-m)	645	514	182
M _{imp} (kN-m)	174	129	182
Σ ₃ [M _L +M _{imp}] (kN-m)	1,365	1,072	607
M _a (kN-m)	2,332	2,551	1,526
M _u (kN-m)	4,592	4,698	4,698
f _{sQ} non-comp (MPa)	29	78	36
f _{sQ} (comp) (MPa)	14		20
f _{sΣ₃} (M _L +M _{imp}) (MPa)	124	137	55
f _s (Overload) (MPa)	166	215	111
f _s (Total) (MPa)		279	
VR (kN)	293		308

	0.4 Sp. 1 & 3	Piers 1 & 2	0.5 Sp. 2
Is (10 ⁶ mm ⁴)	3,574	3,574	3,574
Ic (n) (10 ⁶ mm ⁴)	9,235		9,235
Ic (3n) (10 ⁶ mm ⁴)	6,914		6,914
Ss (10 ³ mm ³)	7,851	7,851	7,851
Sc (n) (10 ³ mm ³)	11,045		11,045
Sc (3n) (10 ³ mm ³)	10,126		10,126
Q (kN/m)	13.160	13.160	13.160
M _Q (kN-m)	268	613	364
s _Q (kN/m)	6.310	6.310	6.310
M _{sQ} (kN-m)	140	273	190
M _L (kN-m)	644	497	182
M _{imp} (kN-m)	174	124	184
Σ ₃ [M _L +M _{imp}] (kN-m)	1,363	1,035	1,537
M _a (kN-m)	2,303	2,497	2,718
M _u (kN-m)	4,594	4,698	4,698
f _{sQ} non-comp (MPa)	26	78	36
f _{sQ} (comp) (MPa)	14		19
f _{sΣ₃} (M _L +M _{imp}) (MPa)	123	132	139
f _s (Overload) (MPa)	164	210	194
f _s (Total) (MPa)		273	
VR (kN)	279		267

*Compact Composite Section at 0.4 Span 1 & 3, 0.5 Span 2
 **Non-compact, non-composite, partially braced section at Piers 1 & 2

Is, Ss: 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.
 Ic(n), Sc(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.
 Ic(3n), Sc(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.
 Q: Un-factored non-composite dead load.
 M_Q: Un-factored moment due to non-composite dead load.
 s_Q: Un-factored long-term composite (superimposed) dead load.
 M_{sQ}: Un-factored moment due to long-term composite (superimposed) dead load.
 M_L: Un-factored live load moment.
 M_{imp}: Un-factored moment due to impact.
 M_a: Factored design moment.
 $1.3 [M_Q + M_{sQ} + \frac{5}{8} (M_L + M_{imp})]$
 M_u: Compact composite moment capacity according to AASHTO LFD 10.50.1.1 or compact non-composite moment capacity according to AASHTO LFD 10.48.4.
 f_s (Overload): Sum of stresses as computed from the moments below.
 $M_Q + M_{sQ} + \frac{5}{8} (M_L + M_{imp})$
 f_s (Total): Sum of stresses as computed from the moments below on non-compact section.
 $1.3 [M_Q + M_{sQ} + \frac{5}{8} (M_L + M_{imp})]$
 VR: Maximum \pm impact horizontal shear range within the composite portion of the span for stud shear connector design.

DESIGNED	ADL
CHECKED	WLW
DRAWN	RJP
CHECKED	WLW

GIRDER DETAILS
FAP RTE 310 (IL RTE 255) SB & RAMP D OVER
UNION PACIFIC & KANSAS CITY SOUTHERN R.R.
SECTION 60-15VB-1 & 2
MADISON COUNTY
STATION 39+160.297
STRUCTURE NUMBER 060-0311