

GIRDER 11 MOMENT TABLE												
	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.5 Sp. 3	Pier 3	0.5 Sp. 4	Pier 4	0.5 Sp. 5	Pier 5	0.6 Sp. 6	
I_s	(in ⁴)	9,044	14,313	9,044	9,044	9,044	10,639	10,639	10,639	16,067	22,624	21,839
$I_c(n)$	(in ⁴)	21,739	-	21,739	-	21,739	-	26,712	-	-	-	41,251
$I_c(3n)$	(in ⁴)	15,990	-	15,990	-	15,990	-	19,189	-	-	-	30,956
$I_c(cr)$	(in ⁴)	-	17,437	-	11,604	-	13,701	-	18,805	18,805	24,840	-
S_s	(in ³)	458	766	458	458	458	592	592	592	799	1,155	1,090
$S_c(n)$	(in ³)	642	-	642	-	642	-	818	-	-	-	1,328
$S_c(3n)$	(in ³)	581	-	581	-	581	-	743	-	-	-	1,226
$S_c(cr)$	(in ³)	-	831	-	515	-	662	-	851	851	1,145	-
DC1	(k/')	0.68	0.73	0.68	0.68	0.68	0.70	0.70	0.70	0.75	0.81	0.80
M _{DC1}	(k)	427	685	197	209	68	347	334	180	174	1,149	1,150
DC2*	(k/')	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
M _{DC2}	(k)	152	234	74	82	30	106	98	44	44	361	355
DW	(k/')	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
M _{DW}	(k)	109	167	52	54	17	86	84	43	34	252	251
M _{ℓ + IM}	(k)	857	959	699	600	544	620	708	607	659	1,148	1,289
M _u (Strength I)	(k)	2,387	3,078	1,640	1,495	1,100	1,780	1,905	1,407	1,477	4,275	4,514
Φ _r M _n	(k)	3,149	-	3,325	-	3,330	-	4,019	-	-	-	6,020
f _s DC1	(ksi)	11.2	10.7	5.2	5.5	1.8	7.0	6.8	3.6	2.6	11.9	12.7
f _s DC2	(ksi)	3.1	3.4	1.5	1.9	0.6	1.9	1.6	0.6	0.6	3.8	3.5
f _s DW	(ksi)	2.3	2.4	1.1	1.3	0.4	1.6	1.4	0.6	0.5	2.6	2.5
f _s (ℓ + IM)	(ksi)	16.0	13.8	13.1	14.0	10.2	11.2	10.4	8.6	9.3	12.0	11.7
f _s (Service II)	(ksi)	37.4	34.5	24.8	26.8	16.0	25.1	23.2	16.0	15.8	34.0	33.7
0.95R _h F _{yr}	(ksi)	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
f _s (Total)(Strength I)	(ksi)	-	45.49	-	35.59	-	33.20	-	21.22	21.03	44.67	-
Φ _r F _n	(ksi)	-	50.0	-	44.6	-	45.1	-	46.2	42.6	47.5	-
V _r	(k)	31.1	-	31.3	-	31.1	-	28.3	-	30.4	-	30.7

* Load allowance includes 0.01 k/’ for duct banks

GIRDER 11 REACTION TABLE								
	S. Abut.	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	N. Abut.	
R _{DC1}	(k)	25.51	76.96	44.15	55.73	40.48	103.37	44.33
R _{DC2}	(k)	8.80	26.46	16.49	17.74	12.62	32.32	13.47
R _{DW}	(k)	6.26	18.83	11.33	13.84	10.12	22.58	9.53
R _{ℓ + IM}	(k)	80.90	128.41	111.99	113.06	109.34	150.53	90.81
R _{Total}	(k)	121.47	250.66	183.96	200.37	172.56	308.80	158.14

GIRDER 15 MOMENT TABLE												
	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.5 Sp. 3	Pier 3	0.5 Sp. 4	Pier 4	0.5 Sp. 5	Pier 5	0.6 Sp. 6	
I_s	(in ⁴)	9,044	14,313	9,044	9,044	9,044	10,639	10,639	10,639	16,067	22,624	21,839
$I_c(n)$	(in ⁴)	21,423	-	21,423	-	21,423	-	26,290	-	-	-	40,604
$I_c(3n)$	(in ⁴)	15,715	-	15,715	-	15,715	-	18,840	-	-	-	30,536
$I_c(cr)$	(in ⁴)	-	17,437	-	11,604	-	13,701	-	18,805	18,805	24,840	-
S_s	(in ³)	458	766	458	458	458	592	592	592	799	1,155	1,090
$S_c(n)$	(in ³)	639	-	639	-	639	-	815	-	-	-	1,322
$S_c(3n)$	(in ³)	577	-	577	-	577	-	739	-	-	-	1,221
$S_c(cr)$	(in ³)	-	831	-	515	-	662	-	851	851	1,145	-
DC1	(k/')	0.72	0.77	0.72	0.72	0.72	0.74	0.74	0.74	0.79	0.85	0.84
M _{DC1}	(k)	425	726	285	270	32	328	346	131	278	1,363	1,345
DC2*	(k/')	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
M _{DC2**}	(k)	159	277	123	37	93	468	756	367	175	365	433
DW	(k/')	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
M _{DW}	(k)	116	186	76	72	9	84	89	33	55	305	297
M _{ℓ + IM}	(k)	593	673	473	454	199	411	431	367	636	1,313	1,334
M _u (Strength I)	(k)	1,497	2,206	1,097	946	368	1,532	1,942	1,039	1,285	3,931	4,002
Φ _r M _n	(k)	3,136	-	3,241	-	1,946	-	3,984	-	-	-	5,981
f _s DC1	(ksi)	11.1	11.4	7.5	7.1	0.8	6.6	7.0	2.7	4.2	14.2	14.8
f _s DC2	(ksi)	3.3	4.0	2.6	0.9	1.9	8.5	12.3	5.2	2.5	3.8	4.3
f _s DW	(ksi)	2.4	2.7	1.6	1.7	0.2	1.5	1.4	0.5	0.8	3.2	2.9
f _s (ℓ + IM)	(ksi)	11.1	9.7	8.9	10.6	3.7	7.4	6.4	5.2	9.0	13.8	12.1
f _s (Service II)	(ksi)	31.3	30.7	23.2	23.4	7.8	26.3	29.0	15.0	19.1	39.1	37.7
0.95R _h F _{yr}	(ksi)	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
f _s (Total)(Strength I)	(ksi)	-	40.26	-	30.95	-	34.22	-	19.55	25.17	51.36	-
Φ _r F _n	(ksi)	-	50.0	-	44.6	-	45.1	-	46.2	42.6	47.5	-
V _r	(k)	-	-	-	-	-	-	-	-	-	-	-

* Load allowance includes 0.01 k/’ for duct banks

** Moment includes two concentrated forces of 58.0 k each. This force is due to the unfactored reactions at the locations of the CTA canopy columns under dead, snow and wind loads.

GIRDER 15 REACTION TABLE								
	S. Abut.	Pier 1	Pier 2	Pier 3	Pier 4	Pier 5	N. Abut.	
R _{DC1}	(k)	24.38	78.14	47.61	52.54	34.00	109.96	46.01
R _{DC2}	(k)	8.76	29.11	11.23	96.96	43.55	29.60	14.66
R _{DW}	(k)	6.32	20.15	12.73	13.60	9.12	24.89	10.23
R _{ℓ + IM}	(k)	12.08	34.72	29.99	28.45	26.28	55.94	21.58
R _{Total}	(k)	51.54	162.12	101.56	191.55	112.95	220.39	92.48

I_s, S_s : Non-composite moment of inertia and section modulus of the steel section used for computing f_s (Total-Strength I, and Service II) 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-Strength I, and Service II) in uncracked sections 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-Strength I, and Service II) in uncracked sections, due to long-term composite (superimposed) dead loads (in.⁴ and in.³).

$I_c(cr), S_c(cr)$: Composite moment of inertia and section modulus of the steel and longitudinal deck reinforcement, used for computing f_s (Total-Strength I and Service II) in cracked sections, due to both short-term composite live loads and long-term composite (superimposed) dead loads (in.⁴ and in.³).

DC1: Un-factored non-composite dead load (kips/ft.).

M_{DC1}: Un-factored moment due to non-composite dead load (kip-ft.).

DC2: Un-factored long-term composite (superimposed excluding future wearing surface) dead load (kips/ft.).

M_{DC2}: Un-factored moment due to long-term composite (superimposed excluding future wearing surface) dead load (kip-ft.).

DW: Un-factored long-term composite (superimposed future wearing surface only) dead load (kips/ft.).

M_{DW}: Un-factored moment due to long-term composite (superimposed future wearing surface only) dead load (kip-ft.).

M_{ℓ + IM}: Un-factored live load moment plus dynamic load allowance (impact) (kip-ft.).

M_u (Strength I): Factored design moment (kip-ft.).
1.25 (M_{DC1} + M_{DC2}) + 1.5 M_{DW} + 1.75 M_{ℓ + IM}

Φ_rM_n: Compact composite positive moment capacity computed according to Article 6.10.7.1 or non-slender negative moment capacity according to Article A6.1.1 or A6.1.2 (kip-ft.).

f_s DC1: Un-factored stress at edge of flange for controlling steel flange due to vertical non-composite dead loads as calculated below (ksi).
M_{DC1} / S_{nc}

f_s DC2: Un-factored stress at edge of flange for controlling steel flange due to vertical composite dead loads as calculated below (ksi).
M_{DC2} / S_{c(3n)} or M_{DC2} / S_{c(cr)} as applicable.

f_s DW: Un-factored stress at edge of flange for controlling steel flange due to vertical composite future wearing surface loads as calculated below (ksi).
M_{DW} / S_{c(3n)} or M_{DW} / S_{c(cr)} as applicable.

f_s (ℓ + IM): Un-factored stress at edge of flange for controlling steel flange due to vertical composite live load plus impact loads as calculated below (ksi).
M_{ℓ + IM} / S_{c(n)} or M_{DW} / S_{c(cr)} as applicable.

f_s (Service II): Sum of stresses as computed below (ksi).
f_{sDC1} + f_{sDC2} + f_{sDW} + 1.3 f_s (ℓ + IM)

0.95R_hF_{yr}: Composite stress capacity for Service II loading according to Article 6.10.4.2 (ksi).

f_s (Total)(Strength I): Sum of stresses as computed below on non-compact section (ksi).
1.25 (f_{sDC1} + f_{sDC2}) + 1.5 f_{sDW} + 1.75 f_s (ℓ + IM)

Φ_rF_n: Non-Compact composite positive or negative stress capacity for Strength I loading according to Article 6.10.7 or 6.10.8 (ksi).

V_r: Maximum factored shear range in span computed according to Article 6.10.10.

4:33:18 PM 01/16/16-60W26-S045-SuperStruct-SteelDetail.dgn



USER NAME = rlschultz	DESIGNED - WJC	REVISED
	CHECKED - DL	REVISED
PLOT SCALE = 0:1.0000 ' = 1/8" / in.	DRAWN - RLS	REVISED
PLOT DATE = 9/15/2013	CHECKED - DL	REVISED

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURAL STEEL DETAILS 1
STRUCTURE NO. 016-1716

SHEET NO. S2-45 OF S2-81 SHEETS

F.A.U. RT.E.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
3730	2013-008R	COOK	559	405
CONTRACT NO.			60W26	
ILLINOIS FED. AID PROJECT				