| EXTERIOR GIRDER 1 MOMENT TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | 0.4 Sp. 9 | Pier 9 | 0.6 Sp. 10 |
| $I_s$ | ($in^4$) | 60,578 | 109,515 | 55,695 |
| $I_c(n)$ | ($in^4$) | 136,556 | - | 122,915 |
| $I_c(3n)$ | ($in^4$) | 98,611 | - | 89,851 |
| $I_c(cr)$ | ($in^4$) | - | 120,077 | - |
| $S_s$ | ($in^3$) | 2,021 | 3,221 | 1,775 |
| $S_c(n)$ | ($in^3$) | 2,671 | - | 2,356 |
| $S_c(3n)$ | ($in^3$) | 2,430 | - | 2,141 |
| $S_c(cr)$ | ($in^3$) | - | 3,330 | - |
| $S_{xc}$ | ($in^3$) | 81 | 162 | 81 |
| DC1 | (k/') | 1.07 | 1.22 | 1.05 |
| $M_{DC1}$ | ('k) | 919 | 3,375 | 1,452 |
| DC2 | (k/') | 0.29 | 0.29 | 0.29 |
| $M_{DC2}$ | ('k) | 238 | 693 | 345 |
| DW | (k/') | 0.28 | 0.28 | 0.28 |
| $M_{DW}$ | ('k) | 311 | 866 | 516 |
| $M_{L+IM}$ | ('k) | 2,554 | 2,975 | 2,683 |
| $f_f$ (Strength I) | (ksi) | 5.53 | 6.15 | 3.80 |
| $M_u + \frac{1}{3} f_f S_{xc}$ | ('k) | 6,532 | 11,922 | 7,818 |
| $\phi_f M_n$ | ('k) | - | - | - |
| $f_s$ DC1 | (ksi) | 5.46 | 12.57 | 9.82 |
| $f_s$ DC2 | (ksi) | 1.18 | 2.50 | 1.93 |
| $f_s$ DW | (ksi) | 1.54 | 3.12 | 2.89 |
| $f_s$ ($L$+IM) | (ksi) | 11.47 | 10.72 | 13.67 |
| $f_f$ (Service II) | (ksi) | 4.19 | 4.76 | 2.91 |
| $f_s + f/2$ (Service II) | (ksi) | 25.18 | 34.51 | 33.86 |
| $0.95R_hF_{yf}$ | (ksi) | 47.50 | 47.50 | 47.50 |
| $f_s + f/3$ (Total)(Strength I) | (ksi) | 32.52 | 44.33 | 44.21 |
| $\phi_f F_n$ | (ksi) | 50.00 | 50.00 | 50.00 |
| $V_f$ | (k) | 78.90 | 80.30 | 71.30 |

| INTERIOR GIRDER 2 MOMENT TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | 0.4 Sp. 9 | Pier 9 | 0.6 Sp. 10 |
| $I_s$ | ($in^4$) | 60,578 | 109,515 | 55,695 |
| $I_c(n)$ | ($in^4$) | 141,074 | - | 126,787 |
| $I_c(3n)$ | ($in^4$) | 102,099 | - | 92,932 |
| $I_c(cr)$ | ($in^4$) | - | 121,335 | - |
| $S_s$ | ($in^3$) | 2,021 | 3,221 | 1,775 |
| $S_c(n)$ | ($in^3$) | 2,694 | - | 2,376 |
| $S_c(3n)$ | ($in^3$) | 2,457 | - | 2,165 |
| $S_c(cr)$ | ($in^3$) | - | 3,342 | - |
| $S_{xc}$ | ($in^3$) | 81 | 162 | 81 |
| DC1 | (k/') | 1.16 | 1.31 | 1.14 |
| $M_{DC1}$ | ('k) | 911 | 3,550 | 1,426 |
| DC2 | (k/') | 0.29 | 0.29 | 0.29 |
| $M_{DC2}$ | ('k) | 150 | 544 | 243 |
| DW | (k/') | 0.41 | 0.41 | 0.41 |
| $M_{DW}$ | ('k) | 333 | 986 | 508 |
| $M_{L+IM}$ | ('k) | 1,946 | 2,468 | 2,066 |
| $f_f$ (Strength I) | (ksi) | 4.45 | 5.72 | 6.81 |
| $M_u + \frac{1}{3} f_f S_{xc}$ | ('k) | 5,351 | 11,224 | 6,648 |
| $\phi_f M_n$ | ('k) | - | - | - |
| $f_s$ DC1 | (ksi) | 5.41 | 13.23 | 9.64 |
| $f_s$ DC2 | (ksi) | 0.73 | 1.95 | 1.35 |
| $f_s$ DW | (ksi) | 1.63 | 3.54 | 2.82 |
| $f_s$ ($L$+IM) | (ksi) | 8.67 | 8.86 | 10.43 |
| $f_f$ (Service II) | (ksi) | 3.38 | 4.45 | 5.22 |
| $f_s + f/2$ (Service II) | (ksi) | 20.73 | 32.47 | 29.98 |
| $0.95R_hF_{yf}$ | (ksi) | 47.50 | 47.50 | 47.50 |
| $f_s + f/3$ (Total)(Strength I) | (ksi) | 26.77 | 41.70 | 38.49 |
| $\phi_f F_n$ | (ksi) | 50.00 | 50.00 | 50.00 |
| $V_f$ | (k) | 55.10 | 57.40 | 52.20 |

| EXTERIOR GIRDER 1 REACTION TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | Pier 8-W | Pier 9 | Pier 10-E |
| $R_{DC1}$ | (k) | 50.5 | 175.1 | 62.7 |
| $R_{DC2}$ | (k) | 12.5 | 40.6 | 14.8 |
| $R_{DW}$ | (k) | 14.9 | 47.6 | 19.4 |
| $R_{L+IM}$ | (k) | 101.9 | 165.0 | 103.2 |
| $R_{Total}$ | (k) | 179.8 | 428.2 | 200.0 |

| INTERIOR GIRDER 2 REACTION TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | Pier 8-W | Pier 9 | Pier 10-E |
| $R_{DC1}$ | (k) | 48.9 | 236.8 | 57.9 |
| $R_{DC2}$ | (k) | 8.4 | 41.4 | 10.6 |
| $R_{DW}$ | (k) | 16.3 | 70.4 | 20.4 |
| $R_{L+IM}$ | (k) | 93.0 | 191.7 | 94.9 |
| $R_{Total}$ | (k) | 166.7 | 540.4 | 183.7 |

| INTERIOR GIRDER 5 MOMENT TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | 0.4 Sp. 9 | Pier 9 | 0.6 Sp. 10 |
| $I_s$ | ($in^4$) | 51,681 | 100,800 | 51,681 |
| $I_c(n)$ | ($in^4$) | 115,351 | - | 115,351 |
| $I_c(3n)$ | ($in^4$) | 85,467 | - | 85,467 |
| $I_c(cr)$ | ($in^4$) | - | 112,575 | - |
| $S_s$ | ($in^3$) | 1,566 | 2,965 | 1,566 |
| $S_c(n)$ | ($in^3$) | 2,113 | - | 2,113 |
| $S_c(3n)$ | ($in^3$) | 1,921 | - | 1,921 |
| $S_c(cr)$ | ($in^3$) | - | 3,088 | - |
| $S_{xc}$ | ($in^3$) | 54 | 134 | 54 |
| DC1 | (k/') | 1.13 | 1.28 | 1.13 |
| $M_{DC1}$ | ('k) | 686 | 2,878 | 1,052 |
| DC2 | (k/') | 0.29 | 0.29 | 0.29 |
| $M_{DC2}$ | ('k) | 142 | 382 | 195 |
| DW | (k/') | 0.41 | 0.41 | 0.41 |
| $M_{DW}$ | ('k) | 269 | 809 | 372 |
| $M_{L+IM}$ | ('k) | 1,493 | 2,056 | 1,629 |
| $f_f$ (Strength I) | (ksi) | 4.92 | 5.39 | 3.50 |
| $M_u + \frac{1}{3} f_f S_{xc}$ | ('k) | 4,140 | 9,127 | 5,031 |
| $\phi_f M_n$ | ('k) | - | - | - |
| $f_s$ DC1 | (ksi) | 5.26 | 11.65 | 8.06 |
| $f_s$ DC2 | (ksi) | 0.89 | 1.48 | 1.22 |
| $f_s$ DW | (ksi) | 1.68 | 3.14 | 2.32 |
| $f_s$ ($L$+IM) | (ksi) | 8.48 | 7.99 | 9.25 |
| $f_f$ (Service II) | (ksi) | 3.74 | 4.19 | 2.69 |
| $f_s + f/2$ (Service II) | (ksi) | 20.72 | 28.76 | 24.97 |
| $0.95R_hF_{yf}$ | (ksi) | 47.50 | 47.50 | 47.50 |
| $f_s + f/3$ (Total)(Strength I) | (ksi) | 26.68 | 36.91 | 32.44 |
| $\phi_f F_n$ | (ksi) | 50.00 | 50.00 | 50.00 |
| $V_f$ | (k) | 58.20 | 63.10 | 58.30 |

| EXTERIOR GIRDER 6 MOMENT TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | 0.4 Sp. 9 | Pier 9 | 0.6 Sp. 10 |
| $I_s$ | ($in^4$) | 51,681 | 100,800 | 51,681 |
| $I_c(n)$ | ($in^4$) | 111,971 | - | 111,971 |
| $I_c(3n)$ | ($in^4$) | 82,710 | - | 82,710 |
| $I_c(cr)$ | ($in^4$) | - | 111,326 | - |
| $S_s$ | ($in^3$) | 1,566 | 2,965 | 1,566 |
| $S_c(n)$ | ($in^3$) | 2,095 | - | 2,095 |
| $S_c(3n)$ | ($in^3$) | 1,899 | - | 1,899 |
| $S_c(cr)$ | ($in^3$) | - | 3,076 | - |
| $S_{xc}$ | ($in^3$) | 54 | 134 | 54 |
| DC1 | (k/') | 1.04 | 1.19 | 1.04 |
| $M_{DC1}$ | ('k) | 720 | 2,702 | 863 |
| DC2 | (k/') | 0.29 | 0.29 | 0.29 |
| $M_{DC2}$ | ('k) | 192 | 512 | 227 |
| DW | (k/') | 0.28 | 0.28 | 0.28 |
| $M_{DW}$ | ('k) | 223 | 680 | 291 |
| $M_{L+IM}$ | ('k) | 1,588 | 2,317 | 1,722 |
| $f_f$ (Strength I) | (ksi) | 5.18 | 5.41 | 3.28 |
| $M_u + \frac{1}{3} f_f S_{xc}$ | ('k) | 4,347 | 9,334 | 4,872 |
| $\phi_f M_n$ | ('k) | - | - | - |
| $f_s$ DC1 | (ksi) | 5.52 | 10.94 | 6.61 |
| $f_s$ DC2 | (ksi) | 1.21 | 2.00 | 1.43 |
| $f_s$ DW | (ksi) | 1.41 | 2.65 | 1.84 |
| $f_s$ ($L$+IM) | (ksi) | 9.10 | 9.04 | 9.86 |
| $f_f$ (Service II) | (ksi) | 3.94 | 4.19 | 2.51 |
| $f_s + f/2$ (Service II) | (ksi) | 21.93 | 29.43 | 23.96 |
| $0.95R_hF_{yf}$ | (ksi) | 47.50 | 47.50 | 47.50 |
| $f_s + f/3$ (Total)(Strength I) | (ksi) | 28.17 | 37.77 | 31.17 |
| $\phi_f F_n$ | (ksi) | 50.00 | 50.00 | 50.00 |
| $V_f$ | (k) | 54.90 | 62.40 | 54.60 |

| INTERIOR GIRDER 5 REACTION TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | Pier 8-W | Pier 9 | Pier 10-E |
| $R_{DC1}$ | (k) | 40.8 | 187.7 | 48.9 |
| $R_{DC2}$ | (k) | 8.1 | 28.6 | 9.5 |
| $R_{DW}$ | (k) | 14.3 | 57.2 | 17.1 |
| $R_{L+IM}$ | (k) | 90.6 | 167.1 | 94.2 |
| $R_{Total}$ | (k) | 153.8 | 440.5 | 169.7 |

| EXTERIOR GIRDER 6 REACTION TABLE - UNIT V | | | | |
|---|---|---|---|---|
| | | Pier 8-W | Pier 9 | Pier 10-E |
| $R_{DC1}$ | (k) | 40.5 | 208.7 | 42.9 |
| $R_{DC2}$ | (k) | 10.2 | 44.4 | 10.6 |
| $R_{DW}$ | (k) | 11.3 | 54.2 | 12.3 |
| $R_{L+IM}$ | (k) | 74.9 | 173.9 | 75.0 |
| $R_{Total}$ | (k) | 136.9 | 481.1 | 140.8 |

$I_s$, $S_s$: 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.$^3$).

$S_{xc}$: Section modulus about the major axis of section to the controlling flange, tension or compression, taken as yield moment with respect to the controlling flange over the yield strength of the controlling flange (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.).
$1.25 (M_{DC1} + M_{DC2}) + 1.5 M_{DW} + 1.75 M_{L+IM}$

$f_f$: Factored calculated normal stress at edge of flange for controlling flange plate due to lateral bending, Strength I or Service II as applicable (ksi).

$\phi_f M_n$: 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).
$M_{DC1} / S_s$

$f_s$ 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 plus impact loads as calculated below (ksi).
$M_{L+IM} / S_c(n)$ or $M_{L+IM} / S_c(cr)$ as applicable.

$f_s + f/2$ (Service II): Sum of stresses as computed below (ksi).
$f_{s\,DC1} + f_{sDC2} + f_{sDW} + 1.3 f_s(L+IM) + f/2$

$0.95R_hF_yf$: Composite stress capacity for Service II loading according to Article 6.10.4.2 (ksi).

$f_s + f/3$ (Total)(Strength I): Sum of stresses as computed below on non-compact section (ksi).
$1.25 (f_{sDC1} + f_{sDC2}) + 1.5 f_{sDW} + 1.75 f_s(L+IM) + f/3$

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

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

Note:
$M_{L+IM}$ and $R_{L+IM}$ include the effects of centrifugal force and superelevation.

0161705-60W28-S094-SuperStruct.dgn

AECOM

| | | | |
|---|---|---|---|
| USER NAME = floresg | DESIGNED - DD | REVISED | |
| | CHECKED - ATB | REVISED | |
| PLOT SCALE = N.T.S. | DRAWN - MRK | REVISED | |
| PLOT DATE = 5/7/2014 | CHECKED - DD | REVISED | |

**STATE OF ILLINOIS**
**DEPARTMENT OF TRANSPORTATION**

**GIRDER MOMENT AND REACTION TABLES – UNIT V**
**STRUCTURE NO. 016-1705**
SHEET NO. S-94 OF S-165 SHEETS

| F.A.I. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
|---|---|---|---|---|
| 90/94/290 | 2013-010R | COOK | 747 | 410 |
| | | CONTRACT NO. 60W28 | | |
| | ILLINOIS FED. AID PROJECT | | | |