

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

| | | | | |
|-----------------------|---------------|------------------|--------------|-----------|
| ROUTE NO. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
| F.A.I. 57 | (X1-6-2) VB-2 | WILLIAMSON | 917 | 861 |
| FED. ROAD DIST. NO. 7 | ILLINOIS | FED. AID PROJECT | | |

SHEET NO. 28
51 SHEETS

Contract #98950

| | | 0.4 Sp. 1 or 0.6 Sp. 3 | Pier 1 or 2 | 0.5 Sp. 2 |
|--------------------------------|--------------------|------------------------|-------------|-----------|
| I_s | (in ⁴) | 3990 | 3990 | 3990 |
| I_c (n) | (in ⁴) | 11789 | - | 11789 |
| I_c (3n) | (in ⁴) | 8801 | - | 8801 |
| S_s | (in ³) | 269 | 269 | 269 |
| S_c (n) | (in ³) | 417 | - | 417 |
| S_c (3n) | (in ³) | 377 | - | 377 |
| Z | (in ³) | - | 312 | - |
| DC1 | (k/') | 0.788 | 0.788 | 0.788 |
| M DC1 | (k) | 33.9 | 206.1 | 152.4 |
| DC2 | (k/') | 0.082 | 0.082 | 0.082 |
| M DC2 | (k) | 5.7 | 16.1 | 21.3 |
| DW | (k/') | 0.354 | 0.354 | 0.354 |
| M DW | (k) | 24.6 | 69.3 | 91.8 |
| M $\frac{1}{2}$ + Imp | (k) | 368.3 | 307.0 | 611.0 |
| Mu (Strength I) | (k) | 730.9 | 919.0 | 1423.9 |
| $\phi_r M_n$, $\phi_r M_{nc}$ | (k) | 2099.6 | 1300 | 2099.6 |
| f_s DC1 | (ksi) | 1.5 | 9.2 | 6.8 |
| f_s DC2 | (ksi) | 0.2 | 0.7 | 0.7 |
| f_s DW | (ksi) | 0.8 | 3.1 | 2.9 |
| f_s 1.3($\frac{1}{2}$ +I) | (ksi) | 13.8 | 17.8 | 22.9 |
| f_s (Service II) | (ksi) | 16.3 | 30.8 | 33.3 |
| f_s (Total)(Strength I) | (ksi) | - | - | - |
| Vsr | (k) | 36.5 | - | 50.4 |

| | Abutment | Pier |
|-----------------|----------|-------|
| R DC1 | (k) 7.9 | 43.5 |
| R DC2+DW | (k) 5.2 | 23.3 |
| R $\frac{1}{2}$ | (k) 45.9 | 76.2 |
| R Imp | (k) 12.6 | 16.6 |
| R Total | (k) 71.6 | 159.6 |

*Data shown is for SN 100-0086 (N.B.), data for SN 100-0087 (S.B.) similar.

| | |
|----------|--------------------|
| DESIGNED | Michael D. Cima |
| CHECKED | Fess Teklehaimanot |
| DRAWN | BECKY M. LEACH |
| CHECKED | M.D.C. & F.T. |

January 22, 2007
EXAMINED *Thomas J. Demagala*
PASSED *Ralph E. Anderson*
ENGINEER OF BRIDGE DESIGN
ENGINEER OF BRIDGES AND STRUCTURES

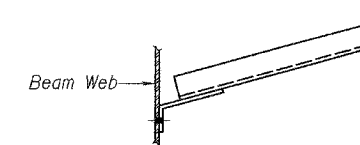
I_s , S_s : Non-composite moment of inertia and section modulus of the steel section used for computing f_s (Total-Strength I, and Service II) due to non-composite dead loads (in⁴ and in³).

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) due to short-term composite live loads (in⁴ and in³).

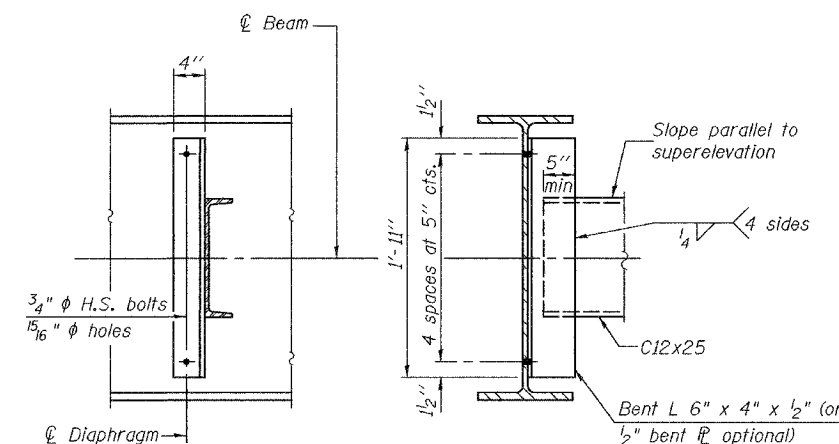
I_c (3n), S_c (3n): Composite moment of inertia and section modulus of the steel and deck based upon 3 times the modular ratio, "3n", used for computing f_s (Total-Strength I, and Service II) due to long-term composite (superimposed) dead loads (in⁴ and in³).

Z: Plastic Section Modulus of the steel section in non-composite areas. Omit line in Moment Table if not used in design calculations (in³).

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 $\frac{1}{2}$ + Imp: Un-factored live load moment plus dynamic load allowance (impact) (kip-ft.).
Mu (Strength I): Factored design moment (kip-ft.).
 $1.25 (M_{DC1} + M_{DC2}) + 1.5 M_{DW} + 1.75 M_{\frac{1}{2} + Imp}$
 $\phi_r M_n$: Compact composite positive moment capacity computed according to Article 6.10.7.1 (kip-ft.).
 $\phi_r M_{nc}$: Compact non-composite negative moment capacity computed according to Article A6.1.1 (kip-ft.).
 f_s (Service II): Sum of stresses as computed from the moments below (ksi).
 f_s (Total)(Strength I): Sum of stresses as computed from the moments below on non-compact section (ksi).
 $1.25 (M_{DC1} + M_{DC2}) + 1.5 M_{DW} + 1.75 M_{\frac{1}{2} + Imp}$
Vr: Factored shear range computed according to Article 6.10.10.



TOP VIEW



DIAPHRAGMS

| Diaphragm | # Required |
|-----------|------------|
| D | 90 |
| D1 | 72 |
| D2 | 3 |
| D3 | 3 |
| D4 | 3 |
| D5 | 3 |
| D6 | 3 |
| D7 | 3 |
| D8 | 3 |
| D9 | 3 |
| D10 | 3 |

Note:
Two hardened washers shall be required over all oversize holes for diaphragms. Use $\frac{1}{16}$ x $\frac{1}{2}$ vertical slotted holes in top and bottom connection angles. 6 x 4 x $\frac{1}{2}$ (or bent L) for east side of Beam 6 and west side of Beam 18 only. Provide $\frac{5}{16}$ plate washers for slotted holes. Bolts for slotted holes shall be finger tightened prior to the deck pour for Stage II Construction and then fully tightened after completion of the Stage II deck pour. All diaphragms shall be installed as steel is erected and secured with erection pins and bolts except as otherwise noted. Individual diaphragms at supports may be temporarily disconnected to install bearing anchor rods.

**TOP OF BEAM ELEVATIONS

| Location | ☉ Brg. N. Abut. | ☉ Brg. Pier 1 | ☉ Splice 1 | ☉ Splice 2 | ☉ Brg. Pier 2 | ☉ Brg. S. Abut. |
|----------|-----------------|---------------|------------|------------|---------------|-----------------|
| Beam 1 | 464.57 | 464.73 | 464.76 | 465.05 | 465.09 | 465.36 |
| Beam 2 | 464.95 | 465.11 | 465.14 | 465.44 | 465.48 | 465.74 |
| Beam 3 | 465.33 | 465.49 | 465.52 | 465.82 | 465.86 | 466.12 |
| Beam 4 | 465.71 | 465.87 | 465.90 | 466.20 | 466.24 | 466.50 |
| Beam 5 | 465.99 | 466.13 | 466.16 | 466.41 | 466.45 | 466.70 |
| Beam 6 | 466.11 | 466.24 | 466.27 | 466.53 | 466.57 | 466.82 |
| Beam 7 | 466.20 | 466.33 | 466.36 | 466.62 | 466.66 | 466.90 |
| Beam 8 | 466.09 | 466.22 | 466.25 | 466.51 | 466.55 | 466.79 |
| Beam 9 | 465.96 | 466.09 | 466.12 | 466.38 | 466.42 | 466.67 |
| Beam 10 | 465.81 | 465.95 | 465.98 | 466.23 | 466.27 | 466.52 |
| Beam 11 | 465.66 | 465.80 | 465.83 | 466.08 | 466.12 | 466.37 |
| Beam 12 | 465.67 | 465.80 | 465.83 | 466.08 | 466.12 | 466.37 |
| Beam 13 | 465.81 | 465.94 | 465.97 | 466.23 | 466.27 | 466.51 |
| Beam 14 | 465.95 | 466.08 | 466.11 | 466.37 | 466.41 | 466.66 |
| Beam 15 | 466.07 | 466.21 | 466.24 | 466.49 | 466.53 | 466.78 |
| Beam 16 | 466.18 | 466.31 | 466.34 | 466.60 | 466.64 | 466.88 |
| Beam 17 | 466.11 | 466.24 | 466.27 | 466.53 | 466.57 | 466.81 |
| Beam 18 | 466.00 | 466.13 | 466.16 | 466.42 | 466.46 | 466.70 |
| Beam 19 | 465.85 | 465.98 | 466.01 | 466.27 | 466.31 | 466.56 |
| Beam 20 | 465.71 | 465.84 | 465.87 | 466.13 | 466.17 | 466.41 |
| Beam 21 | 465.61 | 465.73 | 465.76 | 466.00 | 466.04 | 466.26 |
| Beam 22 | 465.52 | 465.62 | 465.64 | 465.87 | 465.90 | 466.12 |
| Beam 23 | 465.42 | 465.51 | 465.53 | 465.74 | 465.77 | 465.97 |

**For fabrication only

STRUCTURAL STEEL DETAILS
F.A.I. RT. 57 SEC. (X1-6-2)VB-2
WILLIAMSON COUNTY
STA. 1516+58.56
S.N. 100-0086 (N.B.)
S.N. 100-0087 (S.B.)