

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

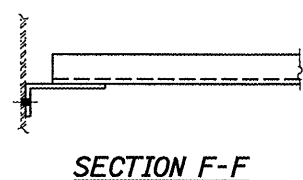
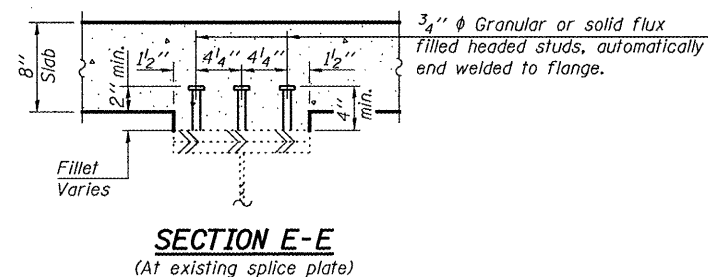
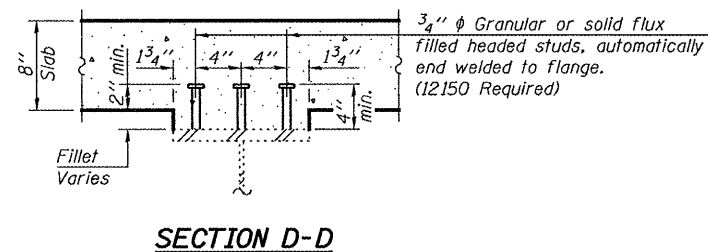
ROUTE NO.	SECTION	COUNTY	TOTAL SHEETS	SHEET	SHEET NO. 25
F.A.P. 313	(21-HB-11)	KNOX	55	42	35 SHEETS
FED. ROAD DIST. NO. 7	ILLINOIS	FED. AID PROJECT			

Contract #68216

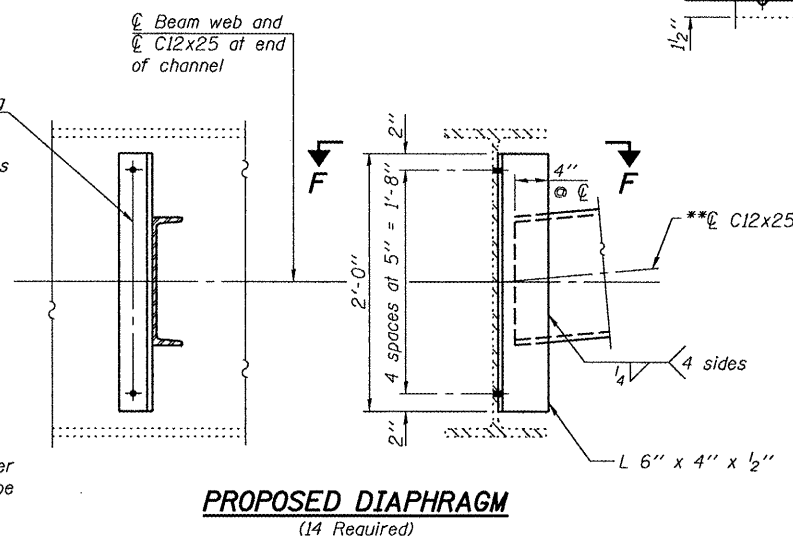
		0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.5 Sp. 3	Pier 3	0.6 Sp. 4
$I_s$	(in <sup>4</sup> )	7450	7450	7450	11227	7450	7450	7450
$I_c(n)$	(in <sup>4</sup> )	19570		19570		19570		19570
$I_c(3n)$	(in <sup>4</sup> )	14331		14331		14331		14331
$S_s$	(in <sup>3</sup> )	448	448	448	650	448	448	448
$S_c(n)$	(in <sup>3</sup> )	652		652		652		652
$S_c(3n)$	(in <sup>3</sup> )	589		589		589		589
$Q$	(k/')	0.905	1.338	0.905	1.338	0.905	1.338	0.905
$M_D$	(k)	85	438	215	671	196	414	95
$s_D$	(k/')	0.433		0.433		0.433		0.433
$M_{sD}$	(k)	54		140		129		57
$M_L$	(k)	270	215	446	296	434	210	273
$M_{Imp}$	(k)	80	58	112	75	110	57	81
$^{5/8} [M_L + M_{Imp}]$	(k)	584	455	930	617	907	445	589
$M_a$	(k)	940	1161	1671	1675	1601	1117	964
$M_u$	(k)	1967		2693		2049		1983
$f_s$ non-comp	(ksi)	2.3	11.7	5.8	12.4	5.2	11.1	2.5
$f_s$ (comp)	(ksi)	1.1		2.8		2.6		1.2
$f_s^{5/8} [M_L + M_{Imp}]$	(ksi)	10.7	12.2	17.1	11.4	16.7	11.9	10.8
$f_s$ (Overload)	(ksi)	14.1	23.9	25.7	23.8	24.5	23.0	14.5
$f_s$ (Total)	(ksi)		31.1		30.9		29.9	
VR	(k)	48.9		44.7		44.9		44.8

	W. Abut.	Pier 1	Pier 2	Pier 3	E. Abut.	
$R_D$	(k)	*50.0	85.7	104.2	83.6	*50.8
$R_L$	(k)	33.2	42.1	47.2	41.8	33.3
Imp.	(k)	9.8	11.4	11.9	11.4	9.8
$R_{Total}$	(k)	93.0	139.2	163.3	136.8	93.9

\*Dead load reactions include 30.3 kips for concrete diaphragm and approach pavement.



Field drill 3/16 inch diameter holes in existing beams thru 1/16 inch diameter holes in new connection angles for 3/4 inch diameter H.S. Bolts. Cost of field drilling is included with Furnishing and Erecting Structural Steel.



$I_s, S_s$ : 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<sup>4</sup> and in<sup>3</sup>).

$I_c(n), S_c(n)$ : 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<sup>4</sup> and in<sup>3</sup>).

$I_c(3n), S_c(3n)$ : 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<sup>4</sup> and in<sup>3</sup>).

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

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

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

$M_{sD}$ : Un-factored moment due to long-term composite (superimposed) dead load (kip-ft.).

$M_L$ : Un-factored live load moment (kip-ft.).

$M_{Imp}$ : Un-factored moment due to impact (kip-ft.).

$M_a$ : Factored design moment (kip-ft.).

$1.3 [M_D + M_{sD} + \frac{5}{8} (M_L + M_{Imp})]$

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

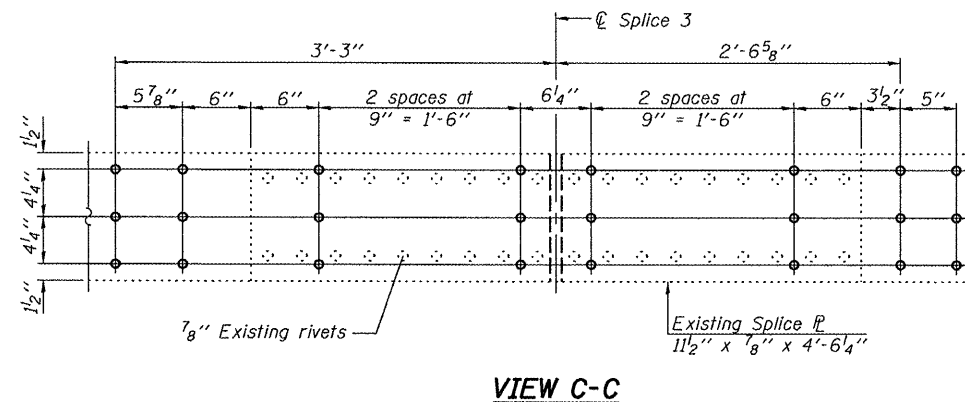
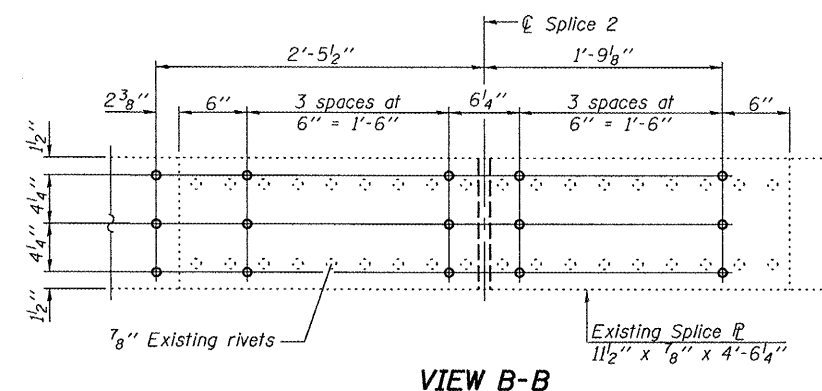
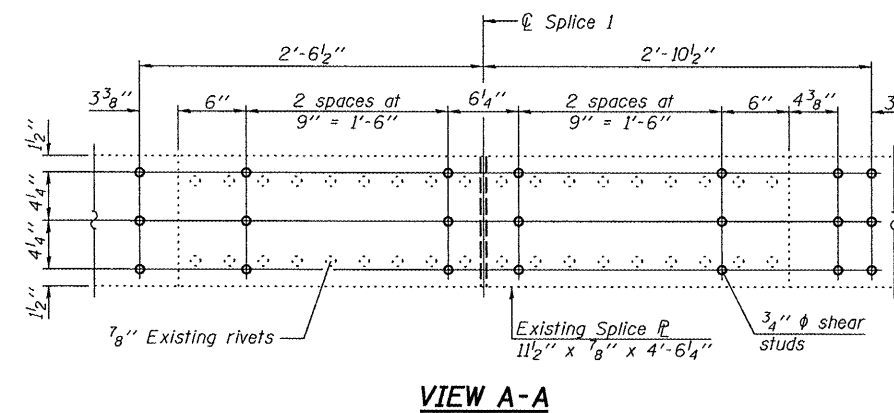
$f_s$  (Overload): Sum of stresses as computed from the moments below (ksi).

$M_D + M_{sD} + \frac{5}{8} (M_L + M_{Imp})$

$f_s$  (Total): Sum of stresses as computed from the moments below on non-compact section (ksi).

$1.3 [M_D + M_{sD} + \frac{5}{8} (M_L + M_{Imp})]$

VR: Maximum  $\pm$  impact horizontal shear range within the composite portion of the span for stud shear connector design (kips).



STRUCTURAL STEEL DETAILS  
F.A.P. ROUTE 313 - SECTION (21-HB-11)  
KNOX COUNTY  
STA. 495+98.72  
STRUCTURE NO. 048-0021  
STRUCTURE NO. 048-0022

DESIGNED FT  
CHECKED DPN  
DRAWN Gregory D. Farmer  
CHECKED FT/DPN

April 28 2008  
EXAMINED Thomas J. Demagalli  
PASSED Ralph E. Anderson

\*\*Alternate channel C12x30 may be used to facilitate material acquisition. The calculated weight of structural steel is based on the lighter section C12x25. The alternate, if utilized, will be provided at no extra cost to the department.