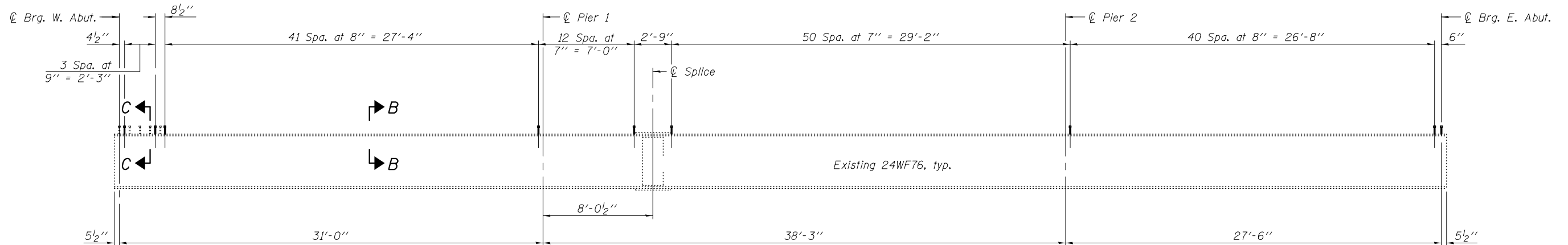


BEAM ELEVATION

(Showing shear stud spacing, typ. beams 1 thru 7)



BEAM ELEVATION

(Showing shear stud spacing, typ. beams 8 thru 14)

Note:
Existing shear studs on approach end of each structure are to be cleaned and reused if possible. (2 rows of 5 studs at 9" cts., each beam)

	W. Abutments	Pier 1	Pier 2	E. Abutments
R ₀ (k)	*46.6	47.3	44.1	*44.5
R ₁ (k)	27.2	36.8	36.6	25.9
R ₂ (k)	8.2	11.0	11.0	7.8
R _{Total} (k)	82.0	95.1	91.7	78.2

* Dead load reaction at abutments include 32.7 kips for concrete diaphragm and approach pavement.

	0.4 Sp. 1	Pier 1	0.5 Sp. 2	Pier 2	0.6 Sp. 3
I _s (in ⁴)	2100	2100	2100	2100	2100
I _c (n) (in ⁴)	7012	7012	7012	7012	7012
I _c (3n) (in ⁴)	5261	5261	5261	5261	5261
S _s (in ³)	176	176	176	176	176
S _c (n) (in ³)	289	866	289	866	289
S _c (3n) (in ³)	260	432	260	432	260
Z (in ³)	-	-	-	-	-
Q (k/')	0.76	0.76	0.76	0.76	0.76
M ₀ (k)	50	95	50	83	36
s ₀ (k/')	0.45	0.45	0.45	0.45	0.45
M _{s0} (k)	30	56	30	49	21
M ₁ (k)	139	122	143	118	117
M ₂ (k)	42	37	43	36	35
S ₃ [M ₂ + I] (k)	302	265	310	256	254
M ₀ (k)	497	541	507	504	404
M _u (k)	1270	933	1270	933	1270
f _s Q non-comp (ksi)	3.4	6.5	3.4	5.7	2.4
f _s Q (comp) (ksi)	1.4	1.6	1.4	1.4	1.0
f _s S ₃ [M ₂ + I] (ksi)	12.5	3.7	12.9	3.6	10.6
f _s (Overload) (ksi)	17.3	11.8	17.7	10.7	14.0
f _s (Total) (ksi)	-	-	-	-	-
VR (k)	39.6	43.8	45.0	45.0	38.9

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.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 and Overload) 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 and Overload) due to long-term composite (superimposed) dead loads (in.⁴ and in.³).

Z: Plastic Section Modulus of the steel section in non-composite areas (in.³).

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

M₀: Un-factored moment due to non-composite dead load (kip-ft.).

s₀: Un-factored long-term composite (superimposed) dead load (kips/ft.).

M_{s0}: Un-factored moment due to long-term composite (superimposed) dead load (kip-ft.).

M₁: Un-factored live load moment (kip-ft.).

M₂: Un-factored moment due to impact (kip-ft.).

M_u: Factored design moment (kip-ft.).

1.3 [M₀ + M_{s0} + $\frac{5}{3}$ (M₁ + M₂)]

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.).

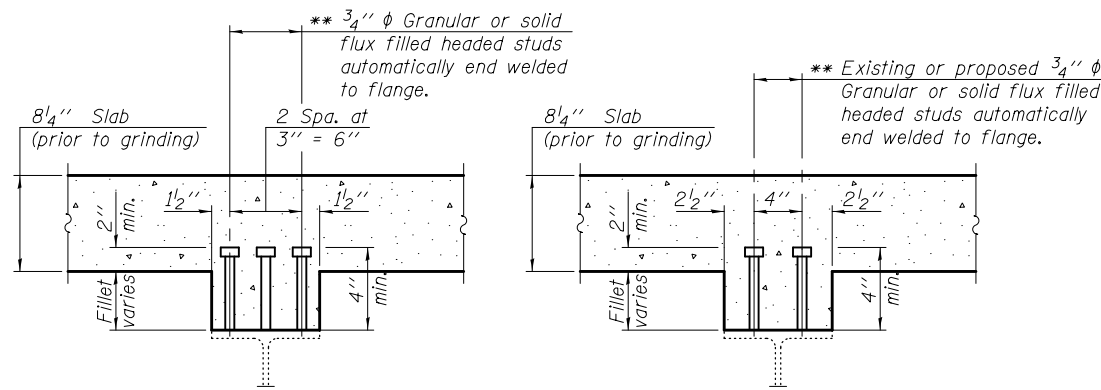
f_s (Overload): Sum of stresses as computed from the moments below (ksi).

M₀ + M_{s0} + $\frac{5}{3}$ (M₁ + M₂)

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

1.3 [M₀ + M_{s0} + $\frac{5}{3}$ (M₁ + M₂)]

VR: Maximum live load + impact shear range within the composite portion of the span for stud shear connector design (kips).



SECTION B-B

SECTION C-C

** Total required Shear Studs
S.N. 018-0040 (EB) = 3,122
S.N. 018-0041 (WB) = 3,122

DESIGNED - FESSEHA TEKLEHAIMANOT	EXAMINED - <i>Joanne F. J...</i>	DATE - SEPTEMBER 16, 2014
CHECKED - JOSUE ORTIZ-VARELA	PASSED - <i>Carl...</i>	REVISED
DRAWN - MICHAEL B. MOSSMAN	ACTING ENGINEER OF BRIDGES AND STRUCTURES	REVISED
CHECKED - F.T. / J.O.V. / G.R.A.		

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURAL STEEL DETAILS
STRUCTURE NO. 018 - 0040 & 018 - 0041

SHEET NO. 22 OF 36 SHEETS

F.A.I. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
70	(18-45HB-1)BR	CUMBERLAND	43	29
CONTRACT NO. 74187				
ILLINOIS FED. AID PROJECT				