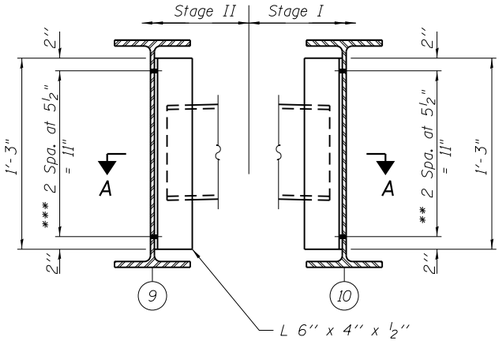


INTERIOR DIAPHRAGM D

(8 Required)

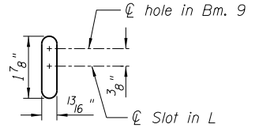
For details not shown see Diaphragm D1

Diaphragm D Notes:

2¾" x 2¾" x 5/16" ℄ washer shall be required over long slotted holes for Diaphragms D. 13/16" ϕ holes in ℄ washer.

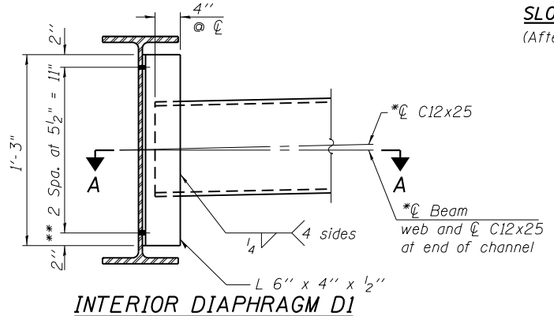
Bolts for the long slotted holes shall be finger-tightened prior to the Stage II deck slab pour and then be fully-tightened after completion of the pour.

*** ¾" ϕ HS bolts. 15/16" ϕ holes in beam. 13/16" x 1⅞" long slotted holes in L6x4. See Slot Detail.



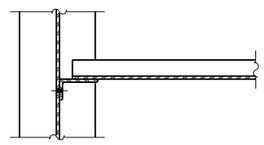
SLOT DETAIL

(After erection)



INTERIOR DIAPHRAGM D1

(120 Required)



SECTION A-A

INTERIOR BEAM MOMENT TABLE						
		0.4 Sp. 1	℄ Pier 1	0.5 Sp. 2	℄ Pier 2	0.6 Sp. 3
I_s	(in^4)	6310	6310	7020	7020	6310
$I_{c(n)}$	(in^4)	15818	----	17183	----	15818
$I_{c(3n)}$	(in^4)	11399	----	12327	----	11679
$I_{c(cr)}$	(in^4)	----	8017	----	8766	----
S_s	(in^3)	458	458	505	505	458
$S_{c(n)}$	(in^3)	645	----	708	----	645
$S_{c(3n)}$	(in^3)	580	----	635	----	580
$S_{c(cr)}$	(in^3)	----	505	----	554	----
DC1	(k/')	0.83	0.83	0.83	0.83	0.83
M_{DC1}	('k)	227	299	105	368	274
DC2	(k/')	0.41	0.41	0.41	0.41	0.41
M_{DC2}	('k)	112	148	52	180	135
DW	(k/')	0.26	0.26	0.26	0.26	0.26
M_{DW}	('k)	71	94	33	115	86
M_{L+IM}	('k)	616	545	556	627	681
M_u (Strength I)	('k)	1609	1655	1218	1956	1832
$\phi_f M_n$	('k)	3008	2061	3266	2259	3008
f_s DC1	(ksi)	5.9	7.8	2.5	8.7	7.2
f_s DC2	(ksi)	2.3	3.5	1.0	3.9	2.8
f_s DW	(ksi)	1.5	2.2	0.6	2.5	1.8
f_s (L+IM)	(ksi)	11.5	13.0	9.4	13.6	12.7
f_s (Service II)	(ksi)	24.6	30.4	16.4	32.8	28.2
$0.95R_hF_{yf}$	(ksi)	47.5	47.5	47.5	47.5	47.5
f_s (Total)(Strength I)	(ksi)	----	----	----	----	----
$\phi_f F_n$	(ksi)	----	----	----	----	----
V_r	(k)	29.2	51.1	28.5	50.9	30.2

INTERIOR BEAM REACTION TABLE					
		W Abut.	Pier 1	Pier 2	E Abut.
R_{DC1}	(k)	19.4	55.5	60.7	21.3
R_{DC2}	(k)	9.6	27.4	29.9	10.5
R_{DW}	(k)	6.1	17.4	19.0	6.7
R_{L+IM}	(k)	69.0	106.7	110.1	69.3
R_{Total}	(k)	104.1	207.0	219.7	107.8

**** Cost of Timber Block Posts is included with Structural Steel.

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.).
$1.25\ (M_{DC1} + M_{DC2}) + 1.5\ M_{DW} + 1.75\ M_{L+IM}$

$\phi_f M_n$: 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_{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.

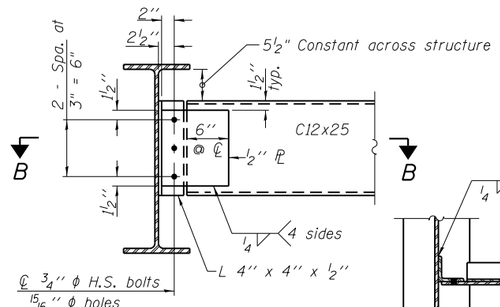
f_s (Service II): Sum of stresses as computed below (ksi).
$f_{sDC1} + f_{sDC2} + f_{sDW} + 1.3\ f_s(L+IM)$

$0.95R_hF_{yf}$: 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).
$1.25\ (f_{sDC1} + f_{sDC2}) + 1.5\ f_{sDW} + 1.75\ f_s(L+IM)$

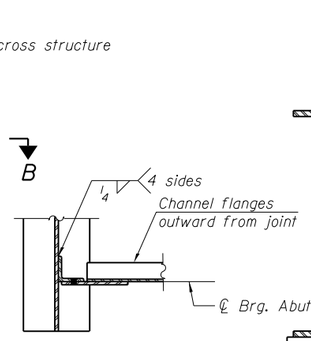
$\phi_f F_n$: Non-Compact composite positive or negative stress capacity for Strength I loading according to Article 6.10.7 or 6.10.8 (ksi).

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

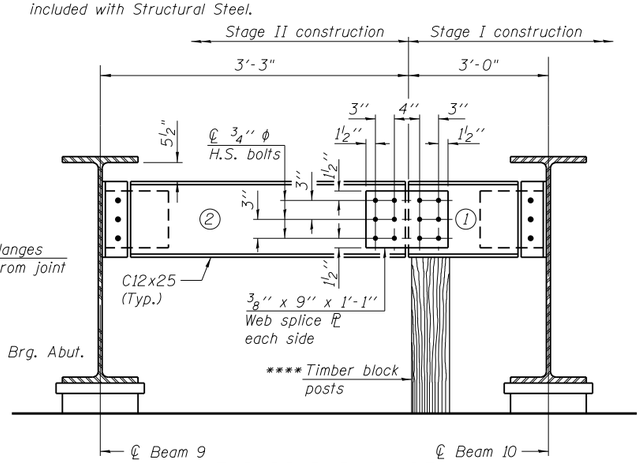


END DIAPHRAGM D2

(30 Required)



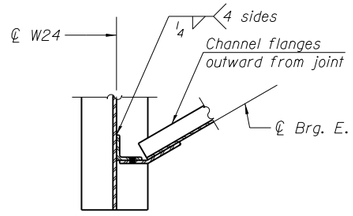
SECTION B-B



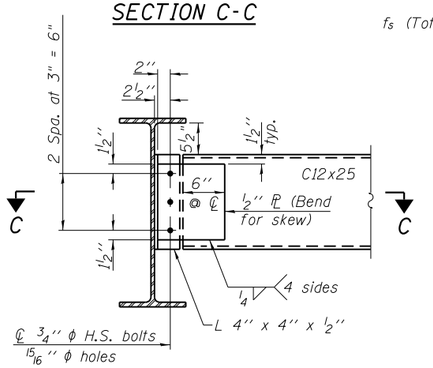
END DIAPHRAGM D3

(2 Required)

For details of connections to beams see End Diaphragm D2



SECTION C-C



END DIAPHRAGM D4 & D5

(Beam 17a shown, 1a similar) (1 Ea. Required)

Diaphragm Notes:

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.

Two hardened washers required for each set of oversized holes.

*Alternate C12x30 channels are permitted to facilitate material acquisition. Calculated weight of structural steel is based on the lighter section.

The alternate, if utilized, shall be provided at no additional cost to the Department.

**¾" ϕ HS bolts. 15/16" ϕ holes

END DIAPHRAGM STAGE CONSTRUCTION SEQUENCE

1.) Order diaphragm in two sections.
2.) Attach section ① of diaphragm to beam
3.) Place timber block posts between section ① of diaphragm and abutment bearing section.
4.) Attach section ② of diaphragm to both beam 9 and section ① of diaphragm during stage II construction with splice plates.
5.) Remove timber block posts.

FILE NAME = W:\191-138.IDOT.IL64\CADD\Sheets\structural\D16OJ11-sht-28_StrucSteelDet.dgn

Bollinger, Lach & Associates, Inc.
ITASCA, ILLINOIS

USER NAME =	DESIGNED - JJI	REVISED	
	CHECKED - JMT	REVISED	
PLOT SCALE =	DRAWN - GM	REVISED	
PLOT DATE = 8/16/2013	CHECKED - JMT	REVISED	

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

STRUCTURAL STEEL DETAILS II
STRUCTURE NO. 016-3035
SHEET NO. 33 OF 62 SHEETS

F.A.P. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
307	541Y-3-B	COOK	143	94
		CONTRACT NO. 60J11		
	ILLINOIS FED. AID PROJECT			