PRESTRESS
CONCRETE INC.

NEW SINGLE FAMILY RESIDENCE.
12700 ROLLING ROAD DR. PINECREST,FL

JOB # 3158

CALCULATIONS

REV. 1

SHOP DRAWING REVIEW

X APPROVED FOR CONFORMANCE WITH DESIGN CONCEPT
☐ APPROVED AS NOTED ☐ REJECTED
☐ REVISE AND RESUBMIT ☐ SUBMIT SPECIFIC ITEM
☐ REVIEWED FOR _____

☐ REQUIRES REVIEW AND APPROVAL BY GENERAL CONTRACTOR

This review is only for general conformance with the design concept of the project and general compliance with the information given in the contract documents. Modifications or comments made on the shop drawing, during this review do not relieve contractor from compliance with the requirements of the plans and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. Contractor is responsible for; dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods techniques, sequences and procedures of construction, coordination of the work of all trades; and for performing all work in a safe satisfactory manner.

D&SG ENGINEERING GROUP, INC.

Date: 01/29/26 By: FDG

Walter E Alvarez

Digitally signed by Walter E Alvarez
Date: 2026.01.30 13:24:28 -05'00'

WALTER E. ALVAREZ P.E.
CIVIL/STRUCTURAL
STATE OF FLORIDA
CERTIFICATE NO. 18501
AUTHORIZATION NUMBER
00009404

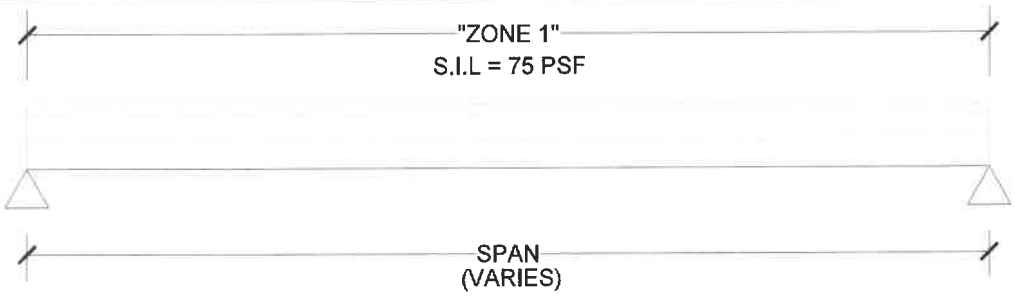
2nd LEVEL PRECAST JOIST DESIGN

PRECAST JOIST
DESIGN GROUP 1

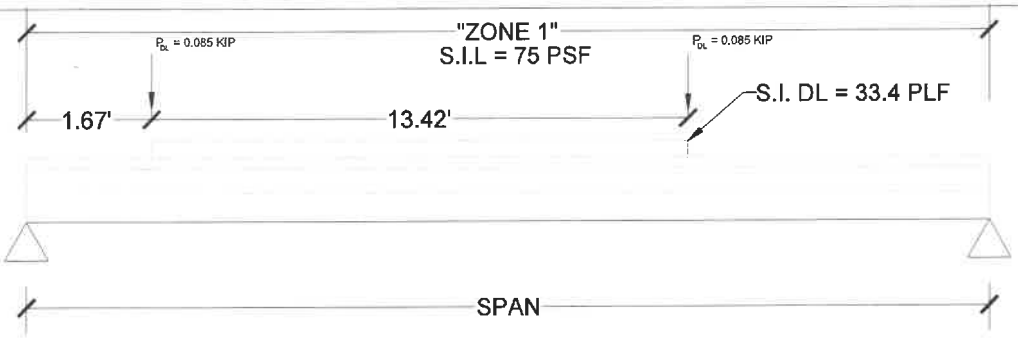
S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	34 plf; 85#		8x4 Conc Curb (33.4 plf); Add 85 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
2ND FLOOR	J1(A)	8	6	10.67	4.00	4.00	11.000	11.417	66.00	4.00	1	1	3500	4.9
2ND FLOOR	J2	8	5	14.00	4.00	4.00	14.333	14.750	54.00	4.00	1	1	3500	5.4
2ND FLOOR	J5	8	3	9.33	4.00	4.00	9.667	10.083	54.00	4.00	1	1	3500	3.5
2ND FLOOR	J6	8	6	16.33	4.00	4.00	16.667	17.083	54.00	4.00	1	1	3500	6.3
2ND FLOOR	J7	8	4	17.67	4.00	4.00	18.000	18.417	54.00	4.00	1	1	3500	6.9



J1(A),J1(B), J2, J4, THRU J16



J3

JOIST DESIGN - MODELED LOADS

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 11.42 ft	Right Cant. = 0.00 ft
Beam Length = 11.42 ft	Lift @ Left = 2.50 ft	Lift @ Right= 2.50 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	260.555 in^2	Stc(Tpg)=	605.07 in^3	Stc(P/C)=	-1866.86 in^3
Ic =	1827.85 in^4	Sbc =	203.57 in^3	Ybc =	8.979 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile:

Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	11.42	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	11.42	0.000
Composite Dead Load	0.468	0.468	0.00	11.42	0.000
Live Load	0.220	0.220	0.00	11.42	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	11.42	0.000
Composite Dead Load	0.046	0.046	0.00	11.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A)DL beam + core material (if any) + suction (if any)
Beam is supported at 2.50 ft from LEFT end and 2.50 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	206	1890	186	1911	0.00
2.50	206	1890	177	1920	0.00
3.14	206	1890	195	1902	0.00
3.78	206	1891	208	1889	0.00
4.43	206	1891	217	1879	0.00
5.07	206	1891	223	1873	0.00
5.71	206	1891	225	1872	0.00
6.35	206	1891	223	1873	0.00
6.99	206	1891	217	1879	0.00
7.64	206	1891	208	1889	0.00
8.28	206	1890	195	1902	0.00
8.92	206	1890	177	1920	0.00
9.34	206	1890	186	1911	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
1.14	162.0	151.5	72.3	72.5	89.46	55.22
2.28	162.0	151.6	132.0	132.5	29.45	18.18
3.43	162.0	151.7	132.8	133.5	28.48	17.58
4.57	162.0	151.7	133.3	134.1	27.90	17.22
5.71	162.0	151.7	133.4	134.3	27.70	17.10
6.85	162.0	151.7	133.3	134.1	27.90	17.22
7.99	162.0	151.7	132.8	133.5	28.48	17.58
9.14	162.0	151.6	132.0	132.5	29.45	18.18
10.28	162.0	151.5	72.3	72.5	89.46	55.22
11.42	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.14	3	-3	36	15	-13
2.28	6	-6	64	28	-44
3.43	8	-8	84	36	-44
4.57	9	-9	97	41	-45
5.71	9	-9	101	43	-45
6.85	9	-9	97	41	-45
7.99	8	-8	84	36	-44
9.14	6	-6	64	28	-44
10.28	3	-3	36	15	-13
11.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.57	78	421	26	40	357	37	35	318
1.14	152	846	49	80	723	70	72	651
1.71	224	1274	69	122	1100	99	110	997
2.28	276	1548	87	147	1330	124	133	1202
2.86	293	1536	102	142	1281	145	126	1130
3.43	307	1527	114	138	1241	163	120	1072
4.00	317	1519	123	135	1209	176	115	1027
4.57	325	1514	130	133	1187	186	111	994
5.14	330	1511	134	131	1174	192	109	975
5.71	331	1510	136	131	1169	194	109	968
6.28	330	1511	134	131	1174	192	109	975
6.85	325	1514	130	133	1187	186	111	994
7.42	317	1519	123	135	1209	176	115	1027
7.99	307	1527	114	138	1241	163	120	1072
8.57	293	1536	102	142	1281	145	126	1130
9.14	276	1548	87	147	1330	124	133	1202
9.71	224	1274	69	122	1100	99	110	997
10.28	152	846	49	80	723	70	72	651
10.85	78	421	26	40	357	37	35	318
11.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.57	36 {2}			73 (4)	0.75	0.97
1.14	68 {2}			144 (4)	0.75	1.36
1.71	97 {2}			214 (4)	0.75	1.64
2.28	121 {2}			295 (4)	0.76	0.21
2.86	142 {2}			349 (4)	0.77	0.25
3.43	159 {2}			402 (4)	0.79	0.28
4.00	173 {2}			451 (4)	0.80	0.31
4.57	182 {2}			497 (4)	0.82	0.33
5.14	188 {2}			539 (4)	0.83	0.35
5.71	190 {2}	519*		577 (4)	0.85	0.37
6.28	188 {2}			539 (4)	0.83	0.35
6.85	182 {2}			497 (4)	0.82	0.33

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7.42	173 {2}	451 (4)	0.80	0.31
7.99	159 {2}	402 (4)	0.79	0.28
8.57	142 {2}	349 (4)	0.77	0.25
9.14	121 {2}	295 (4)	0.76	0.21
9.71	97 {2}	214 (4)	0.75	1.64
10.28	68 {2}	144 (4)	0.75	1.36
10.85	36 {2}	73 (4)	0.75	0.97
11.42	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(3): Development length controlled by both strand and rebar.
(4): Development lengths overlap. Strength may be reduced.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	4.9	0.0	26.2	15.6	0.000	0.000	0.065 (A1)
1.14	9.60	4.4	0.0	20.6	16.3	0.000	0.000	0.065 (A1)
1.71	9.60	3.9	0.0	17.4	17.1	0.000	0.000	0.028 (C1)
2.28	9.60	3.3	0.0	14.3	17.6	0.000	0.000	0.028 (C1)
2.86	9.60	2.8	0.0	10.9	17.6	0.000	0.000	0.028 (C1)
3.43	9.60	2.2	0.0	8.5	17.6	0.000	0.000	0.028 (C1)
4.00	9.60	1.7	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
4.57	9.60	1.1	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
5.14	9.60	0.6	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
5.71	9.60	0.0	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
6.28	9.60	-0.6	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
6.85	9.60	-1.1	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
7.42	9.60	-1.7	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
7.99	9.60	-2.2	0.0	8.5	17.6	0.000	0.000	0.028 (C1)
8.56	9.60	-2.8	0.0	10.9	17.6	0.000	0.000	0.028 (C1)
9.14	9.60	-3.3	0.0	14.3	17.6	0.000	0.000	0.028 (C1)
9.71	9.60	-3.9	0.0	17.4	17.1	0.000	0.000	0.028 (C1)
10.28	9.60	-4.4	0.0	20.6	16.3	0.000	0.000	0.065 (A1)
10.76	9.60	-4.9	0.0	26.2	15.6	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.11

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Creep Before Erection	-0.08	
Erection: PS+BM DL @ 30 days		-0.19
Change Due to Non-Comp.DL	-0.02	
30 days : PS+BM DL+Non-Comp.DL		-0.21
Change Due to Comp.DL+SustLL	0.02	
60 days : PS+All DL+Sust.LL		-0.19
Long Term Creep	0.03	
Final : PS+All DL+Sust.LL		-0.16
: PS+All DL+LL		-0.15

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 10.08 ft	Right Cant. = 0.00 ft
Beam Length = 10.08 ft	Lift @ Left = 2.50 ft	Lift @ Right= 2.50 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	221.363 in^2	Stc(Tpg)=	539.57 in^3	Stc(P/C)=	-2163.84 in^3
Ic =	1727.51 in^4	Sbc =	196.35 in^3	Ybc =	8.798 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure = 0.900		Strand Developmt = 0.750	
Factors : Compression-controlled Flexure = 0.650		Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	10.08	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	10.08	0.000
Composite Dead Load	0.383	0.383	0.00	10.08	0.000
Live Load	0.180	0.180	0.00	10.08	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	10.08	0.000
Composite Dead Load	0.046	0.046	0.00	10.08	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A)DL beam + core material (if any) + suction (if any)
Beam is supported at 2.50 ft from LEFT end and 2.50 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	206	1890	186	1911	0.00
2.50	206	1890	177	1920	0.00
3.01	206	1890	188	1909	0.00
3.52	206	1890	196	1900	0.00
4.02	206	1890	202	1894	0.00
4.53	206	1890	206	1891	0.00
5.04	206	1891	207	1890	0.00
5.55	206	1890	206	1891	0.00
6.06	206	1890	202	1894	0.00
6.56	206	1890	196	1900	0.00
7.07	206	1890	188	1909	0.00
7.58	206	1890	177	1920	0.00
8.00	206	1890	186	1911	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
1.01	162.0	151.5	63.5	63.7	98.33	60.70
2.02	162.0	151.6	127.0	127.3	34.66	21.40
3.02	162.0	151.6	131.7	132.2	29.81	18.40
4.03	162.0	151.7	132.0	132.6	29.42	18.16
5.04	162.0	151.7	132.1	132.7	29.29	18.08
6.05	162.0	151.7	132.0	132.6	29.42	18.16
7.06	162.0	151.6	131.7	132.2	29.81	18.40
8.06	162.0	151.6	127.0	127.3	34.66	21.40
9.07	162.0	151.5	63.5	63.7	98.33	60.70
10.08	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.01	3	-3	24	10	-10
2.02	5	-4	42	18	-41
3.02	6	-6	55	23	-44
4.03	7	-7	63	26	-44
5.04	7	-7	65	27	-44
6.05	7	-7	63	26	-44
7.06	6	-6	55	23	-44
8.06	5	-4	42	18	-41
9.07	3	-3	24	10	-10
10.08	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.50	65	373	19	38	333	27	36	307
1.01	128	749	36	76	672	51	72	624
1.51	189	1127	50	115	1018	72	109	950
2.02	248	1507	63	155	1371	90	147	1286
2.52	267	1550	74	158	1390	105	149	1290
3.02	277	1542	83	156	1363	118	146	1251
3.53	286	1536	90	154	1342	128	143	1221
4.03	292	1532	95	153	1327	135	141	1199
4.54	295	1529	98	152	1318	139	140	1186
5.04	297	1528	99	152	1315	140	140	1182
5.54	295	1529	98	152	1318	139	140	1186
6.05	292	1532	95	153	1327	135	141	1199
6.55	286	1536	90	154	1342	128	143	1221
7.06	277	1542	83	156	1363	118	146	1251
7.56	267	1550	74	158	1390	105	149	1290
8.06	248	1507	63	155	1371	90	147	1286
8.57	189	1127	50	115	1018	72	109	950
9.07	128	749	36	76	672	51	72	624
9.58	65	373	19	38	333	27	36	307
10.08	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.50	23 {2}			64 (4)	0.75	1.01
1.01	44 {2}			126 (4)	0.75	1.40
1.51	62 {2}			186 (4)	0.75	1.69
2.02	78 {2}			246 (4)	0.75	1.93
2.52	92 {2}			314 (4)	0.76	0.27
3.02	103 {2}			361 (4)	0.78	0.31
3.53	111 {2}			406 (4)	0.79	0.34
4.03	118 {2}			449 (4)	0.80	0.37
4.54	121 {2}			490 (4)	0.82	0.40
5.04	123 {2}	475*		527 (4)	0.83	0.43
5.54	121 {2}			490 (4)	0.82	0.40
6.05	118 {2}			449 (4)	0.80	0.37

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6.55	111 {2}	406 (4)	0.79	0.34
7.06	103 {2}	361 (4)	0.78	0.31
7.56	92 {2}	314 (4)	0.76	0.27
8.06	78 {2}	246 (4)	0.75	1.93
8.57	62 {2}	186 (4)	0.75	1.69
9.07	44 {2}	126 (4)	0.75	1.40
9.58	23 {2}	64 (4)	0.75	1.01
10.08	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(3): Development length controlled by both strand and rebar.
(4): Development lengths overlap. Strength may be reduced.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	3.5	0.0	25.1	15.6	0.000	0.000	0.065 (A1)
1.01	9.60	3.2	0.0	20.7	16.1	0.000	0.000	0.065 (A1)
1.51	9.60	2.8	0.0	17.3	16.8	0.000	0.000	0.065 (A1)
2.02	9.60	2.4	0.0	15.0	17.5	0.000	0.000	0.028 (C1)
2.52	9.60	2.0	0.0	11.6	17.6	0.000	0.000	0.028 (C1)
3.02	9.60	1.6	0.0	9.0	17.6	0.000	0.000	0.028 (C1)
3.53	9.60	1.2	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
4.03	9.60	0.8	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
4.54	9.60	0.4	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
5.04	9.60	0.0	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
5.54	9.60	-0.4	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
6.05	9.60	-0.8	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
6.55	9.60	-1.2	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
7.06	9.60	-1.6	0.0	9.0	17.6	0.000	0.000	0.028 (C1)
7.56	9.60	-2.0	0.0	11.6	17.6	0.000	0.000	0.028 (C1)
8.06	9.60	-2.4	0.0	15.0	17.5	0.000	0.000	0.028 (C1)
8.57	9.60	-2.8	0.0	17.3	16.8	0.000	0.000	0.065 (A1)
9.07	9.60	-3.2	0.0	20.7	16.1	0.000	0.000	0.065 (A1)
9.41	9.60	-3.5	0.0	25.1	15.6	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.09

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Creep Before Erection	-0.07	
Erection: PS+BM DL @ 30 days		-0.15
Change Due to Non-Comp.DL	-0.01	
30 days : PS+BM DL+Non-Comp.DL		-0.16
Change Due to Comp.DL+SustLL	0.01	
60 days : PS+All DL+Sust.LL		-0.15
Long Term Creep	0.01	
Final : PS+All DL+Sust.LL		-0.14
: PS+All DL+LL		-0.14

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 17.08 ft	Right Cant. = 0.00 ft
Beam Length = 17.08 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	221.363 in^2	Stc(Tpg)=	539.57 in^3	Stc(P/C)=	-2163.84 in^3
Ic =	1727.51 in^4	Sbc =	196.35 in^3	Ybc =	8.798 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand =	28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult =	1.000
# Str. lev. = 2	# of Strand = 2.00	LdMult =	1.000
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile:

Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	17.08	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	17.08	0.000
Composite Dead Load	0.383	0.383	0.00	17.08	0.000
Live Load	0.180	0.180	0.00	17.08	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	17.08	0.000
Composite Dead Load	0.046	0.046	0.00	17.08	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	206	1890	186	1911	0.00
5.00	206	1888	91	2007	0.00
5.71	206	1888	112	1986	0.00
6.42	206	1888	128	1970	0.00
7.12	206	1889	140	1958	0.00
7.83	206	1889	147	1951	0.00
8.54	206	1889	149	1949	0.00
9.25	206	1889	147	1951	0.00
9.96	206	1889	140	1958	0.00
10.66	206	1888	128	1970	0.00
11.37	206	1888	112	1986	0.00
12.08	206	1888	91	2007	0.00
15.00	206	1890	186	1911	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
1.71	162.0	151.7	108.8	109.4	52.59	32.46
3.42	162.0	151.9	134.4	135.4	26.58	16.41
5.12	162.0	152.0	135.9	137.3	24.71	15.26
6.83	162.0	152.1	136.9	138.4	23.60	14.57
8.54	162.0	152.1	137.2	138.8	23.22	14.34
10.25	162.0	152.1	136.9	138.4	23.60	14.57
11.96	162.0	152.0	135.9	137.3	24.71	15.26
13.66	162.0	151.9	134.4	135.4	26.58	16.41
15.37	162.0	151.7	108.8	109.4	52.59	32.46
17.08	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.71	7	-7	68	28	-30
3.42	13	-13	120	50	-45
5.12	17	-17	158	66	-46
6.83	20	-19	180	76	-46
8.54	21	-20	188	79	-46
10.25	20	-19	180	76	-46
11.96	17	-17	158	66	-46
13.66	13	-13	120	50	-45
15.37	7	-7	68	28	-30
17.08	0	0	-0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.85	138	613	54	59	497	77	52	424
1.71	269	1233	102	119	1012	145	107	875
2.56	352	1487	145	141	1174	206	123	980
3.42	397	1454	182	132	1062	258	110	818
4.27	435	1426	213	124	967	302	98	681
5.12	466	1403	239	118	889	339	89	568
5.98	491	1385	259	113	828	367	81	481
6.83	508	1373	273	109	785	387	76	419
7.69	518	1365	281	107	759	399	73	381
8.54	522	1363	284	106	750	403	72	369
9.39	518	1365	281	107	759	399	73	381
10.25	508	1373	273	109	785	387	76	419
11.10	491	1385	259	113	828	367	81	481
11.96	466	1403	239	118	889	339	89	568
12.81	435	1426	213	124	967	302	98	681
13.66	397	1454	182	132	1062	258	110	818
14.52	352	1487	145	141	1174	206	123	980
15.37	269	1233	102	119	1012	145	107	875
16.23	138	613	54	59	497	77	52	424
17.08	0	0	-0	0	0	-0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu: by Fact'd Loads	Required Mu: by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn: by Strain-compat.	Provided phi*Mn: by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.85	67 {2}			112 (1)	0.75	1.32
1.71	127 {2}			219 (1)	0.75	1.82
2.56	179 {2}			330 (1)	0.76	0.29
3.42	225 {2}			408 (1)	0.79	0.35
4.27	264 {2}			480 (1)	0.81	0.40
5.12	295 {2}			543 (1)	0.84	0.44
5.98	320 {2}			597 (1)	0.86	0.47
6.83	338 {2}			637 (1)	0.88	0.48
7.69	348 {2}		654		0.90	0.49
8.54	352 {2}	539	654		0.90	0.49
9.39	348 {2}		654		0.90	0.49
10.25	338 {2}			637 (1)	0.88	0.48

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11.10	320 {2}	597 (1)	0.86	0.47
11.96	295 {2}	543 (1)	0.84	0.44
12.81	264 {2}	480 (1)	0.81	0.40
13.66	225 {2}	408 (1)	0.79	0.35
14.52	179 {2}	330 (1)	0.76	0.29
15.37	127 {2}	219 (1)	0.75	1.82
16.23	67 {2}	112 (1)	0.75	1.32
17.08	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	6.3	0.0	26.0	15.6	0.000	0.000	0.065 (A4)
0.85	9.60	6.2	0.0	23.3	15.9	0.000	0.000	0.065 (A4)
1.71	9.60	5.5	0.0	18.1	17.1	0.000	0.000	0.028 (C1)
2.56	9.60	4.8	0.0	13.8	17.7	0.000	0.000	0.028 (C1)
3.42	9.60	4.1	0.0	10.2	17.7	0.000	0.000	0.028 (C4)
4.27	9.60	3.4	0.0	8.0	17.7	0.000	0.000	0.028 (C4)
5.12	9.60	2.7	0.0	7.1	17.8	0.000	0.000	0.028 (C4)
5.98	9.60	2.1	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
6.83	9.60	1.4	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
7.69	9.60	0.7	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
8.54	9.60	0.0	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
9.39	9.60	-0.7	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
10.25	9.60	-1.4	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
11.10	9.60	-2.1	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
11.96	9.60	-2.7	0.0	7.1	17.8	0.000	0.000	0.028 (C4)
12.81	9.60	-3.4	0.0	8.0	17.7	0.000	0.000	0.028 (C4)
13.66	9.60	-4.1	0.0	10.2	17.7	0.000	0.000	0.028 (C4)
14.52	9.60	-4.8	0.0	13.8	17.7	0.000	0.000	0.028 (C1)
15.37	9.60	-5.5	0.0	18.1	17.1	0.000	0.000	0.028 (C1)
16.23	9.60	-6.2	0.0	23.3	15.9	0.000	0.000	0.065 (A4)
16.41	9.60	-6.3	0.0	26.0	15.6	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.20
Creep Before Erection	-0.14	
Erection: PS+BM DL @ 30 days		-0.34
Change Due to Non-Comp.DL	-0.08	
30 days : PS+BM DL+Non-Comp.DL		-0.42
Change Due to Comp.DL+SustLL	0.10	
60 days : PS+All DL+Sust.LL		-0.32
Long Term Creep	0.14	
Final : PS+All DL+Sust.LL		-0.18
: PS+All DL+LL		-0.14

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 18.42 ft	Right Cant. = 0.00 ft
Beam Length = 18.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	221.363 in^2	Stc(Tpg)=	539.57 in^3	Stc(P/C)=	-2163.84 in^3
Ic =	1727.51 in^4	Sbc =	196.35 in^3	Ybc =	8.798 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	18.42	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	18.42	0.000
Composite Dead Load	0.383	0.383	0.00	18.42	0.000
Live Load	0.180	0.180	0.00	18.42	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	18.42	0.000
Composite Dead Load	0.046	0.046	0.00	18.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	206	1890	186	1911	0.00
5.00	206	1888	91	2007	0.00
5.84	206	1888	121	1978	0.00
6.68	206	1889	143	1954	0.00
7.53	206	1889	160	1938	0.00
8.37	206	1890	169	1928	0.00
9.21	206	1890	173	1925	0.00
10.05	206	1890	169	1928	0.00
10.89	206	1889	160	1938	0.00
11.74	206	1889	143	1954	0.00
12.58	206	1888	121	1978	0.00
13.42	206	1888	91	2007	0.00
16.34	206	1890	186	1911	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
1.84	162.0	151.7	117.6	118.3	43.69	26.97
3.68	162.0	151.9	135.2	136.4	25.61	15.81
5.53	162.0	152.1	137.0	138.6	23.44	14.47
7.37	162.0	152.2	138.1	139.9	22.14	13.67
9.21	162.0	152.2	138.4	140.3	21.71	13.40
11.05	162.0	152.2	138.1	139.9	22.14	13.67
12.89	162.0	152.1	137.0	138.6	23.44	14.47
14.74	162.0	151.9	135.2	136.4	25.61	15.81
16.58	162.0	151.7	117.6	118.3	43.69	26.97
18.42	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.84	9	-8	79	33	-35
3.68	15	-15	140	59	-45
5.53	20	-20	183	77	-46
7.37	23	-22	210	88	-47
9.21	24	-23	218	92	-47
11.05	23	-22	210	88	-47
12.89	20	-20	183	77	-46
14.74	15	-15	140	59	-45
16.58	9	-8	79	33	-35
18.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.92	154	657	63	62	522	89	55	437
1.84	300	1322	119	127	1066	169	112	906
2.76	381	1466	169	135	1102	239	115	876
3.68	433	1427	211	124	971	300	99	688
4.61	478	1395	248	115	861	352	85	528
5.53	514	1368	278	108	770	394	75	398
6.45	542	1348	301	102	699	427	66	296
7.37	562	1333	317	98	649	450	60	223
8.29	574	1324	327	96	619	464	56	180
9.21	578	1321	330	95	609	469	55	165
10.13	574	1324	327	96	619	464	56	180
11.05	562	1333	317	98	649	450	60	223
11.97	542	1348	301	102	699	427	66	296
12.89	514	1368	278	108	770	394	75	398
13.81	478	1395	248	115	861	352	85	528
14.74	433	1427	211	124	971	300	99	688
15.66	381	1466	169	135	1102	239	115	876
16.58	300	1322	119	127	1066	169	112	906
17.50	154	657	63	62	522	89	55	437
18.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu: by Fact'd Loads	Required Mu: by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn: by Strain-compat.	Provided phi*Mn: by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.92	78 {2}			122 (1)	0.75	1.37
1.84	147 {2}			238 (1)	0.75	1.90
2.76	209 {2}			352 (1)	0.77	0.31
3.68	262 {2}			434 (1)	0.80	0.36
4.61	307 {2}			508 (1)	0.82	0.41
5.53	344 {2}			572 (1)	0.85	0.45
6.45	372 {2}			623 (1)	0.88	0.48
7.37	393 {2}		654		0.90	0.49
8.29	405 {2}		654		0.90	0.49
9.21	409 {2}	543	654		0.90	0.49
10.13	405 {2}		654		0.90	0.49
11.05	393 {2}		654		0.90	0.49

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11.97	372 {2}	623 (1)	0.88	0.48
12.89	344 {2}	572 (1)	0.85	0.45
13.81	307 {2}	508 (1)	0.82	0.41
14.74	262 {2}	434 (1)	0.80	0.36
15.66	209 {2}	352 (1)	0.77	0.31
16.58	147 {2}	238 (1)	0.75	1.90
17.50	78 {2}	122 (1)	0.75	1.37
18.42	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	6.9	0.0	26.1	15.6	0.000	0.000	0.065 (A4)
0.92	9.60	6.7	0.0	22.7	16.0	0.000	0.000	0.065 (A4)
1.84	9.60	5.9	0.0	17.8	17.3	0.000	0.000	0.028 (C1)
2.76	9.60	5.2	0.0	13.0	17.7	0.000	0.000	0.028 (C4)
3.68	9.60	4.4	0.0	9.7	17.7	0.000	0.000	0.028 (C4)
4.61	9.60	3.7	0.0	7.7	17.8	0.000	0.000	0.028 (C4)
5.53	9.60	3.0	0.0	7.1	17.8	0.000	0.000	0.028 (C4)
6.45	9.60	2.2	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
7.37	9.60	1.5	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
8.29	9.60	0.7	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
9.21	9.60	0.0	0.0	7.1	17.9	0.000	0.000	0.028 (C1)
10.13	9.60	-0.7	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
11.05	9.60	-1.5	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
11.97	9.60	-2.2	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
12.89	9.60	-3.0	0.0	7.1	17.8	0.000	0.000	0.028 (C4)
13.82	9.60	-3.7	0.0	7.7	17.8	0.000	0.000	0.028 (C4)
14.74	9.60	-4.4	0.0	9.7	17.7	0.000	0.000	0.028 (C4)
15.66	9.60	-5.2	0.0	13.0	17.7	0.000	0.000	0.028 (C4)
16.58	9.60	-5.9	0.0	17.8	17.3	0.000	0.000	0.028 (C1)
17.50	9.60	-6.7	0.0	22.7	16.0	0.000	0.000	0.065 (A4)
17.75	9.60	-6.9	0.0	26.1	15.6	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.21
Creep Before Erection	-0.15	
Erection: PS+BM DL @ 30 days		-0.37
Change Due to Non-Comp.DL	-0.11	
30 days : PS+BM DL+Non-Comp.DL		-0.47
Change Due to Comp.DL+SustLL	0.14	
60 days : PS+All DL+Sust.LL		-0.34
Long Term Creep	0.19	
Final : PS+All DL+Sust.LL		-0.14
: PS+All DL+LL		-0.09

NOTE: Negative values indicate camber.

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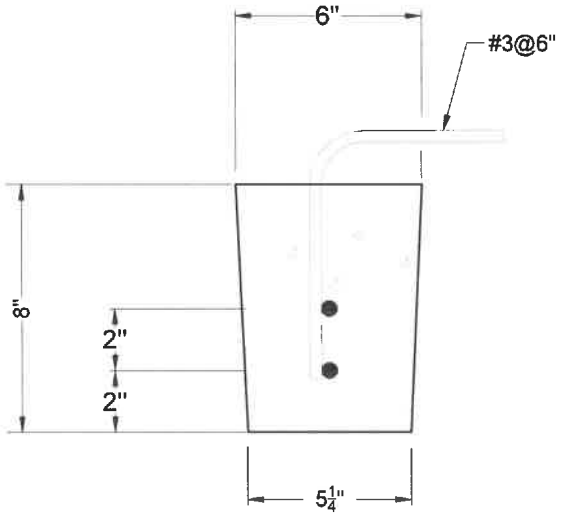

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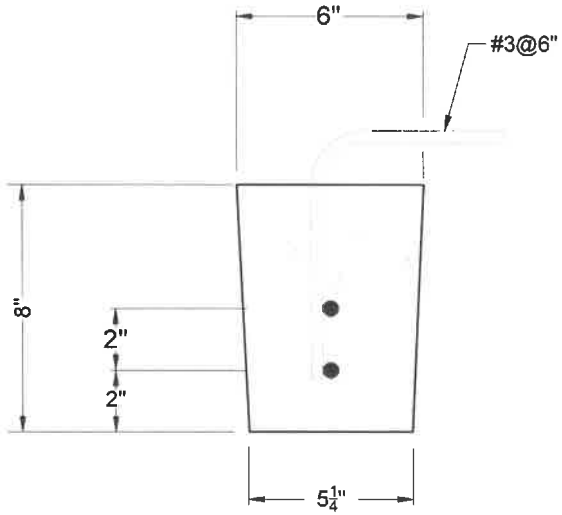


MIDSPAN

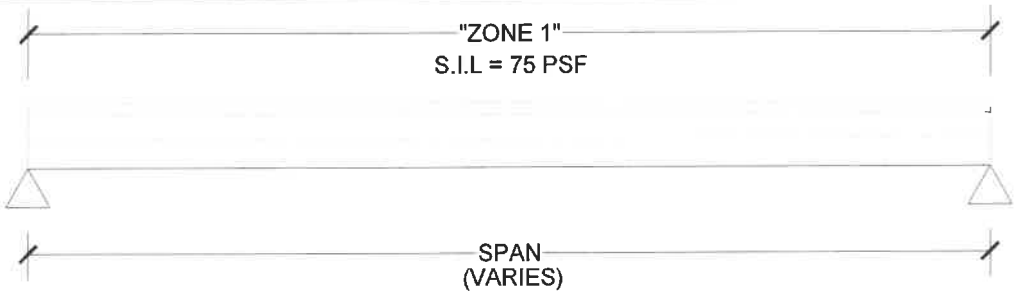
MK: J1(A), J2, J5, AND J7	2-½" LOWLAX 270 KSI STRANDS NO HOLDDOWNS NO MILD STEEL PULL 0.60 PRECAST LENGTH = VARIES FROM 10.08FT TO 18.42 FT	JOIST DESIGN GROUP 1

PRECAST JOIST
DESIGN GROUP 2

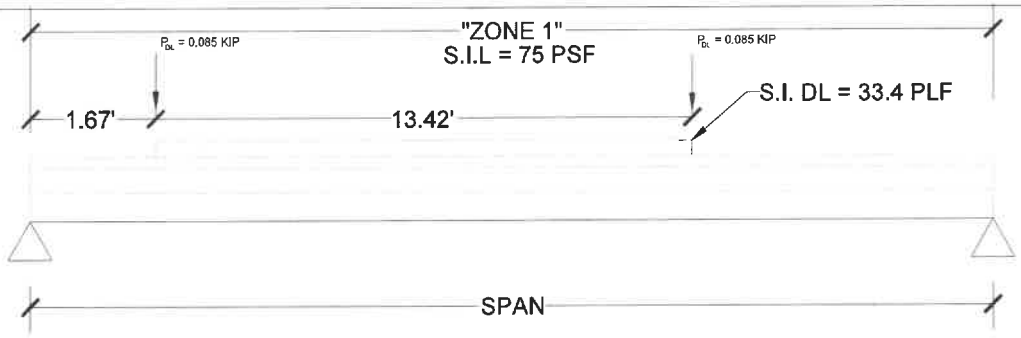
S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	34 plf; 85#		8x4 Conc Curb (33.4 plf); Add 85 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
2ND FLOOR	J1(B)	8	6	23.33	4.00	4.00	23.667	24.083	54.00	4.00	2	1	3500	9.1



J1(A),J1(B), J2, J4, THRU J16



J3

JOIST DESIGN - MODELED LOADS

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 24.10 ft	Right Cant. = 0.00 ft
Beam Length = 24.10 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	221.363 in^2	Stc(Tpg)=	539.57 in^3	Stc(P/C)=	-2163.84 in^3
Ic =	1727.51 in^4	Sbc =	196.35 in^3	Ybc =	8.798 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	4.00
No. of Strand :	1.00	1.00

Draping Information (General Case)

Pt No.: 1
at X 12.00
Lev 1 2.00
2 3.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Harp Point No. 1----------	12.00	2.75	1.34	0.3060
Right End of Beam----------	24.10	4.00	0.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Flexure : fy = 60.00 ksi	fs = 30.00 ksi		
Emild = 29000 ksi	LdMult = 1.000		

Layer	No. of Bars in Layer	Bar Size	Area of Steel(in^2)	Dist. from Bottom of Section (in)	Distance From Left End Beginning (ft)	Ending (ft)

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1	1	5	0.310	2.00	4.50	19.50

NOTE: Mild steel transformed for section props and used in design moment.

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	24.10	0.000
Composite Dead Load	0.383	0.383	0.00	24.10	0.000
Live Load	0.180	0.180	0.00	24.10	0.000
Non-comp. Dead Load	-0.046	-0.046	0.00	24.10	0.000
Composite Dead Load	0.046	0.046	0.00	24.10	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	173	1922	153	1943	0.00
5.00	139	1909	25	2027	0.00
6.41	142	1817	109	1849	0.00
7.82	120	1840	151	1809	0.00
9.23	98	1862	174	1786	0.00
10.64	76	1883	179	1780	0.00
12.00	55	1903	167	1792	0.00
12.05	59	1899	171	1788	0.00
13.46	168	1797	271	1694	0.00
14.87	277	1692	353	1617	0.00
16.28	387	1587	418	1556	0.00
17.69	498	1480	465	1512	0.00
19.10	584	1480	470	1598	0.00
22.02	808	1283	788	1304	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
2.41	162.0	151.8	134.8	135.9	26.09	16.10
4.82	162.0	152.1	139.0	141.1	20.95	12.93
7.23	162.0	152.6	141.5	144.1	17.93	11.07
9.64	162.0	152.7	142.3	145.3	16.67	10.29

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12.05	162.0	152.6	142.5	145.7	16.31	10.07
14.46	162.0	153.1	142.8	145.7	16.27	10.04
16.87	162.0	153.4	142.3	144.8	17.25	10.65
19.28	162.0	153.2	140.5	142.4	19.61	12.11
21.69	162.0	153.1	137.0	138.0	24.05	14.84
24.10	162.0	153.1	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	12.00	24.10
Lev 1	2.00	2.00	2.00
2	4.00	3.50	6.00

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.41	15	-14	135	56	-47
4.82	26	-26	239	100	-51
7.23	34	-34	314	132	-55
9.64	39	-38	359	151	-57
12.05	41	-40	374	157	-59
14.46	39	-38	359	151	-48
16.87	34	-34	314	132	-37
19.28	26	-26	239	100	-26
21.69	15	-14	135	56	-14
24.10	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.21	223	846	107	65	614	153	52	470
2.41	390	1467	204	92	1028	289	67	755
3.62	475	1409	288	53	786	409	18	400
4.82	550	1341	360	24	568	511	-19	88
6.03	623	1231	414	19	358	587	-28	-187
7.23	666	1193	463	-8	217	657	-61	-390
8.43	695	1171	501	-36	113	711	-93	-544
9.64	711	1160	529	-60	44	751	-121	-649
10.85	713	1160	545	-82	9	774	-145	-705
12.05	706	1167	551	-97	5	782	-161	-716
13.26	788	1088	545	-8	-62	774	-69	-779
14.46	856	1020	529	85	-96	751	27	-793
15.67	911	963	501	180	-95	711	126	-758
16.87	951	917	463	276	-59	657	228	-673
18.08	976	893	414	371	16	588	329	-537
19.28	973	928	361	446	153	512	407	-337
20.49	963	924	288	542	302	409	511	-92
21.69	940	922	204	642	483	289	622	204
22.90	579	492	107	422	260	153	411	112
24.10	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.21	133 {2}			164 (1)	0.75	1.59
2.41	252 {2}			331 (1)	0.76	0.29
3.62	357 {2}			442 (1)	0.80	0.37
4.82	448 {2}			571 (3)	0.83	0.45
6.03	525 {2}			768 (3)	0.87	0.58
7.23	588 {2}		825		0.90	0.60
8.43	637 {2}		827		0.90	0.60
9.64	672 {2}		829		0.90	0.60
10.85	693 {2}		831		0.90	0.60
12.05	700 {2}	594	832		0.90	0.60
13.26	693 {2}		823		0.90	0.60
14.46	672 {2}		813		0.90	0.60
15.67	637 {2}		804		0.90	0.60
16.87	588 {2}		795		0.90	0.60
18.08	525 {2}			723 (3)	0.87	0.57
19.28	448 {2}			524 (3)	0.83	0.45
20.49	357 {2}			407 (1)	0.80	0.37
21.69	252 {2}			301 (1)	0.76	0.29
22.90	133 {2}			147 (1)	0.75	1.59
24.10	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	9.2	0.0	26.5	15.6	0.000	0.000	0.065 (A4)
1.21	9.60	8.7	0.0	21.1	16.3	0.000	0.000	0.065 (A4)
2.41	9.60	7.7	0.0	15.8	17.2	0.000	0.000	0.028 (C4)
3.62	9.60	6.8	0.0	10.9	17.0	0.000	0.000	0.028 (C4)
4.82	9.60	5.8	0.0	8.3	16.8	0.000	0.000	0.028 (C4)
6.03	9.60	4.8	0.0	7.1	16.6	0.000	0.000	0.028 (C4)
7.23	9.60	3.9	0.0	7.1	16.3	0.000	0.000	0.028 (C4)
8.44	9.60	2.9	0.0	7.1	16.0	0.000	0.000	0.028 (C4)
9.64	9.60	1.9	0.0	7.1	15.8	0.000	0.000	0.028 (C1)
10.85	9.60	1.0	0.0	7.1	15.5	0.000	0.000	0.028 (C1)
12.05	9.60	0.0	0.0	7.1	14.8	0.000	0.000	0.028 (C1)
13.26	9.60	-1.0	0.0	7.1	17.0	0.000	0.000	0.028 (C1)
14.46	9.60	-1.9	0.0	7.1	18.5	0.000	0.000	0.028 (C1)
15.67	9.60	-2.9	0.0	7.1	19.9	0.000	0.000	0.028 (C4)
16.87	9.60	-3.9	0.0	7.1	21.3	0.000	0.000	0.028 (C4)
18.08	9.60	-4.8	0.0	7.1	22.7	0.000	0.000	0.028 (C4)
19.28	9.60	-5.8	0.0	7.3	24.1	0.010	0.000	0.028 (C4)
20.49	9.60	-6.8	0.0	9.0	25.3	0.000	0.000	0.028 (C4)
21.69	9.60	-7.7	0.0	12.4	26.5	0.000	0.000	0.028 (C4)
22.90	9.60	-8.7	0.0	16.5	22.3	0.000	0.000	0.065 (A4)
23.43	9.60	-9.2	0.0	21.6	19.0	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).

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NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.16
Creep Before Erection	-0.10
Erection: PS+BM DL @ 30 days	-0.26
Change Due to Non-Comp.DL	-0.30
30 days : PS+BM DL+Non-Comp.DL	-0.56
Change Due to Comp.DL+SustLL	0.38
60 days : PS+All DL+Sust.LL	-0.18
Long Term Creep	0.60
Final : PS+All DL+Sust.LL	0.41
: PS+All DL+LL	0.64

NOTE: Negative values indicate camber.
NOTE: Beam has cracked under positive moment; deflections are based on a bilinear moment-deflection relationship using extended Icr.

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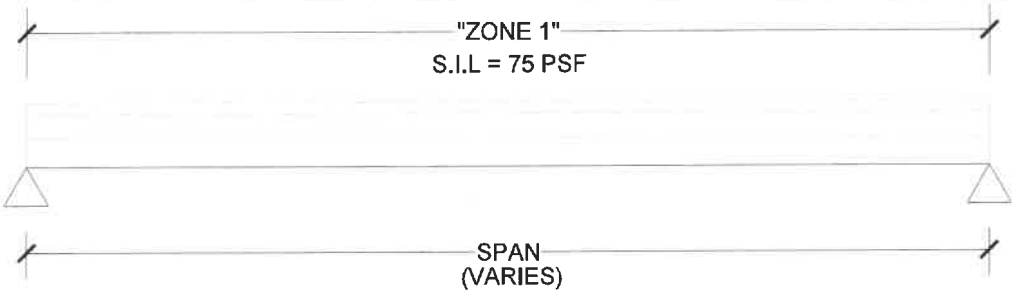
PRECAST JOIST
DESIGN GROUP 3

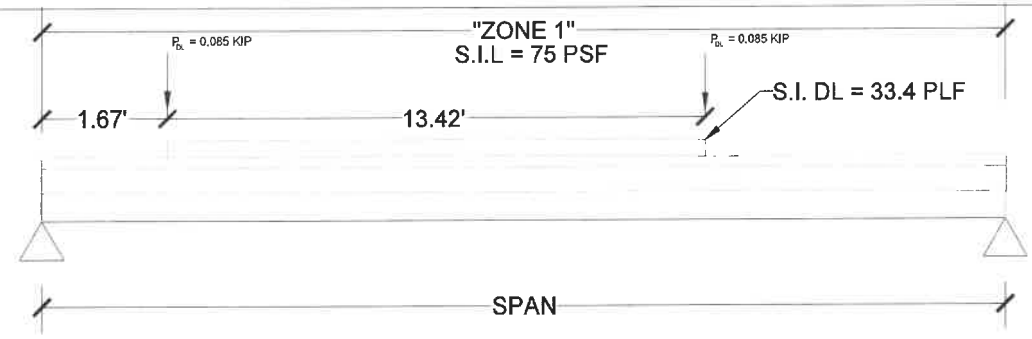
S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	34 plf; 85#		8x4 Conc Curb (33.4 plf); Add 85 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
2ND FLOOR	J3	8	1	24.33	4.00	4.00	24.667	25.083	58.00	4.00	3	2	3500	10.5
2ND FLOOR	J4	8	5	24.33	4.00	4.00	24.667	25.083	66.00	4.00	3	1	3500	11.5



J1(A),J1(B), J2, J4, THRU J16



J3

JOIST DESIGN - MODELED LOADS

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 24.75 ft	Right Cant. = 0.00 ft
Beam Length = 24.75 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 58.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)		Height = 8.000 in
Area = 45.000 in^2	St = 61.27 in^3	Yt = 3.911 in
I = 239.64 in^4	Sb = 58.61 in^3	Yb = 4.089 in
Vol/Surf = 1.650 in		
Composite : (Based on above section dimensions)		Height = 12.000 in
Ac = 234.427 in^2	Stc(Tpg)= 562.34 in^3	Stc(P/C)= -2037.10 in^3
Ic = 1762.74 in^4	Sbc = 198.84 in^3	Ybc = 8.865 in

Miscellaneous : (Governing code is ACI 318-14)		
Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION		Strain Curve: PCI Handbk)
Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000
# Str. lev. = 2	# of Strand = 3.00	LdMult = 1.000
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO	

Strand Level :	1	2
Left end patt. :	2.00	4.00
Right end patt.:	2.00	4.00
No. of Strand :	2.00	1.00

Draping Information (General Case)

Pt No.: 1
at X 12.54
Lev 1 2.00
2 3.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.33	0.76	0.4590
Harp Point No. 1----------	12.54	2.50	1.59	0.4590
Right End of Beam----------	24.75	3.33	0.76	0.4590

Mild Steel

Shear :	fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi
Flexure :	fy = 60.00 ksi	fs = 30.00 ksi	
Emild	= 29000 ksi	LdMult = 1.000	

Distance From Left End

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Layer	No. of Bars in Layer	Bar Size	Area of Steel(in^2)	Dist. from Bottom of Section (in)	Beginning (ft)	Ending (ft)
1	1	5	0.310	1.75	5.00	20.00

NOTE: Mild steel transformed for section props and used in design moment.

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	24.75	0.000
Composite Dead Load	0.411	0.411	0.00	24.75	0.000
Live Load	0.193	0.193	0.00	24.75	0.000
Non-comp. Dead Load	-0.046	-0.046	0.00	24.75	0.000
Composite Dead Load	0.046	0.046	0.00	24.75	0.000
Composite Dead Load	0.033	0.033	2.00	16.75	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

Concentrated Loads (non-factored)

Load Type	Magnitude of Load (k)	Distance From Left End (ft)	Eccent. (in)
Composite Dead Load	0.09	2.00	0.000
Composite Dead Load	0.09	16.75	0.000

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	524	2573	504	2594	0.00
5.00	305	2785	190	2905	0.00
6.47	253	2682	228	2706	0.00
7.95	150	2765	194	2721	0.00
9.43	42	2866	136	2773	0.00
10.90	-65	2966	58	2843	0.00
12.38	-171	3063	-38	2930	0.00
12.54	-183	3074	-50	2941	0.00
13.85	-86	2985	37	2862	0.00
15.32	24	2883	117	2790	0.00
16.80	134	2780	178	2736	0.00
18.27	245	2675	220	2699	0.00
19.75	305	2757	191	2876	0.00
22.67	520	2578	500	2598	0.00

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NOTE: Required f'ci = 4902 psi at X = 12.54 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.902 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	150.0	0.0	0.0	162.00	100.00
2.47	162.0	149.9	129.2	130.5	31.52	19.46
4.95	162.0	149.7	133.2	135.5	26.47	16.34
7.43	162.0	149.9	136.6	139.5	22.45	13.86
9.90	162.0	149.5	137.8	141.2	20.79	12.83
12.38	162.0	148.9	137.4	141.0	20.96	12.94
14.85	162.0	149.4	137.6	141.1	20.94	12.92
17.33	162.0	149.8	136.4	139.4	22.63	13.97
19.80	162.0	149.8	133.1	135.4	26.61	16.42
22.27	162.0	149.9	129.0	130.3	31.70	19.57
24.75	162.0	150.0	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	12.54	24.75
Lev 1	2.00	2.00	2.00
2	6.00	3.50	6.00

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.47	16	-15	163	64	-55
4.95	28	-27	288	113	-67
7.43	36	-36	378	149	-80
9.90	41	-41	431	170	-92
12.38	43	-42	449	177	-102
14.85	41	-41	430	170	-93
17.33	36	-36	375	149	-81
19.80	28	-27	284	113	-68
22.27	16	-15	159	64	-55
24.75	0	0	-0	0	-0

FINAL STRESSES (psi)

X(ft) From	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
Left End	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.24	433	1139	125	260	845	174	246	686
2.47	681	1985	236	352	1426	329	325	1126
3.71	712	1997	334	247	1208	465	208	785
4.95	726	2020	419	143	1032	583	93	504
6.19	756	1942	479	91	826	668	35	229
7.43	749	1945	533	10	712	743	-52	53
8.66	715	1994	577	-85	659	804	-155	-51
9.90	666	2051	608	-178	644	848	-253	-103
11.14	603	2113	627	-267	664	874	-347	-103
12.38	527	2182	632	-352	719	882	-435	-52
13.61	583	2131	626	-287	684	873	-367	-82
14.85	648	2066	606	-195	664	846	-271	-81

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16.09	699	2007	574	-100	680	802	-170	-29
17.33	735	1955	529	-2	735	739	-65	78
18.56	751	1927	472	91	839	660	36	246
19.80	723	2006	410	145	1047	574	94	523
21.04	705	2000	327	243	1235	458	203	812
22.27	676	1986	230	349	1448	323	322	1149
23.51	431	1139	121	259	856	170	245	698
24.75	0	0	-0	0	0	-0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu		Provided phi*Mn			
X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)*	0.00	0.00
1.24	157 {2}			234 (1)	0.75	1.85
2.47	298 {2}			477 (1)	0.76	0.40
3.71	421 {2}			646 (1)	0.80	0.51
4.95	528 {2}			796 (1)	0.83	0.60
6.19	619 {2}			1036 (3)	0.87	0.74
7.43	692 {2}		1151		0.90	0.78
8.66	750 {2}		1160		0.90	0.78
9.90	791 {2}		1169		0.90	0.78
11.14	815 {2}		1178		0.90	0.78
12.38	823 {2}	866	1187		0.90	0.78
13.61	814 {2}		1180		0.90	0.78
14.85	789 {2}		1171		0.90	0.78
16.09	748 {2}		1162		0.90	0.78
17.33	689 {2}		1152		0.90	0.78
18.56	614 {2}			1062 (3)	0.87	0.75
19.80	522 {2}			817 (3)	0.83	0.61
21.04	415 {2}			647 (1)	0.80	0.51
22.27	293 {2}			478 (1)	0.76	0.40
23.51	154 {2}			234 (1)	0.75	1.85
24.75	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

						-- Required Reinforcing --		
X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	10.5	0.0	30.3	17.6	0.000	0.000	0.065 (A4)
1.24	9.60	10.0	0.0	24.8	19.8	0.000	0.000	0.065 (A4)
2.47	9.60	8.9	0.0	18.7	22.0	0.000	0.000	0.042 (C4)
3.71	9.60	7.8	0.0	13.0	20.9	0.000	0.000	0.042 (C4)
4.95	9.60	6.6	0.0	10.0	19.7	0.000	0.000	0.042 (C4)
6.19	9.60	5.5	0.0	8.1	18.4	0.000	0.000	0.042 (C4)
7.42	9.60	4.4	0.0	7.1	17.1	0.000	0.000	0.042 (C4)
8.66	9.60	3.3	0.0	7.1	15.7	0.000	0.000	0.042 (C4)
9.90	9.60	2.2	0.0	7.1	14.3	0.000	0.000	0.042 (C1)
11.14	9.60	1.1	0.0	7.1	12.9	0.000	0.000	0.042 (C1)
12.38	9.60	-0.0	0.0	7.1	10.8	0.000	0.000	0.042 (C1)

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13.61	9.60	-1.1	0.0	7.1	12.6	0.000	0.000	0.042 (C1)
14.85	9.60	-2.2	0.0	7.1	14.0	0.000	0.000	0.042 (C1)
16.09	9.60	-3.4	0.0	7.1	15.5	0.000	0.000	0.042 (C4)
17.32	9.60	-4.5	0.0	7.1	16.9	0.000	0.000	0.042 (C4)
18.56	9.60	-5.6	0.0	8.2	18.2	0.000	0.000	0.042 (C4)
19.80	9.60	-6.7	0.0	10.1	19.5	0.000	0.000	0.042 (C4)
21.04	9.60	-7.7	0.0	13.1	20.8	0.000	0.000	0.042 (C4)
22.27	9.60	-8.8	0.0	18.8	22.0	0.000	0.000	0.042 (C4)
23.51	9.60	-9.9	0.0	24.8	19.7	0.000	0.000	0.065 (A4)
24.08	9.60	-10.3	0.0	30.2	17.6	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.902 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4245 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.52
Creep Before Erection	-0.35
Erection: PS+BM DL @ 30 days	-0.87
Change Due to Non-Comp.DL	-0.33
30 days : PS+BM DL+Non-Comp.DL	-1.20
Change Due to Comp.DL+SustLL	0.47
60 days : PS+All DL+Sust.LL	-0.73
Long Term Creep	0.62
Final : PS+All DL+Sust.LL	-0.10
: PS+All DL+LL	0.08

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 25.08 ft	Right Cant. = 0.00 ft
Beam Length = 25.08 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	260.555 in^2	Stc(Tpg)=	605.07 in^3	Stc(P/C)=	-1866.86 in^3
Ic =	1827.85 in^4	Sbc =	203.57 in^3	Ybc =	8.979 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure = 0.900		Strand Developmt = 0.750	
Factors : Compression-controlled Flexure = 0.650		Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 3.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	4.00
Right end patt.:	2.00	4.00
No. of Strand :	2.00	1.00

Draping Information (General Case)

Pt No.: 1
at X 12.54
Lev 1 2.00
2 3.50

Harping Profile: (General Case)

Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.33	0.76	0.4590
Harp Point No. 1----------	12.54	2.50	1.59	0.4590
Right End of Beam----------	25.08	3.33	0.76	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Flexure : fy = 60.00 ksi	fs = 30.00 ksi		
Emild = 29000 ksi	LdMult = 1.000		

Distance From Left End

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Layer	No. of Bars in Layer	Bar Size	Area of Steel(in^2)	Dist. from Bottom of Section (in)	Beginning (ft)	Ending (ft)
1	1	5	0.310	1.75	5.00	20.00

NOTE: Mild steel transformed for section props and used in design moment.

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	25.08	0.000
Composite Dead Load	0.468	0.468	0.00	25.08	0.000
Live Load	0.220	0.220	0.00	25.08	0.000
Non-comp. Dead Load	-0.046	-0.046	0.00	25.08	0.000
Composite Dead Load	0.046	0.046	0.00	25.08	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	524	2573	504	2594	0.00
5.00	305	2784	190	2904	0.00
6.51	252	2679	231	2699	0.00
8.02	145	2769	197	2718	0.00
9.52	35	2872	138	2770	0.00
11.03	-74	2974	59	2840	0.00
12.54	-183	3073	-39	2929	0.00
14.05	-74	2974	59	2840	0.00
15.56	35	2872	138	2770	0.00
17.06	145	2769	197	2718	0.00
18.57	249	2689	228	2710	0.00
20.08	305	2784	190	2904	0.00
23.00	524	2573	504	2594	0.00

NOTE: Required f'ci = 4882 psi at X = 12.54 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.882 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	150.0	0.0	0.0	162.00	100.00
2.51	162.0	149.9	129.5	131.0	31.03	19.16

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5.02	162.0	149.7	133.9	136.5	25.51	15.75
7.52	162.0	149.9	137.4	140.8	21.19	13.08
10.03	162.0	149.4	138.6	142.5	19.48	12.02
12.54	162.0	148.8	138.2	142.4	19.60	12.10
15.05	162.0	149.4	138.6	142.5	19.48	12.02
17.56	162.0	149.9	137.4	140.8	21.19	13.08
20.06	162.0	149.7	133.8	136.5	25.51	15.75
22.57	162.0	149.9	129.5	131.0	31.03	19.16
25.08	162.0	150.0	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=		0.00	12.54	25.08
Lev	1	2.00	2.00	2.00
	2	6.00	3.50	6.00

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.51	16	-16	175	75	-55
5.02	28	-28	310	133	-68
7.52	37	-36	407	174	-81
10.03	42	-42	466	199	-93
12.54	44	-43	485	208	-104
15.05	42	-42	466	199	-93
17.56	37	-36	407	174	-81
20.06	28	-28	310	133	-68
22.57	16	-16	175	75	-55
25.08	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
Left End	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.25	440	1155	124	256	843	178	238	662
2.51	686	1985	236	338	1394	336	302	1052
3.76	720	1999	334	226	1161	477	175	679
5.02	736	2022	419	116	972	598	51	369
6.27	768	1939	479	62	753	684	-11	72
7.52	759	1951	533	-27	635	762	-108	-117
8.78	724	2001	578	-127	576	825	-217	-236
10.03	675	2057	610	-223	554	871	-321	-299
11.29	611	2120	629	-315	570	898	-418	-306
12.54	533	2191	635	-402	625	907	-509	-256
13.79	611	2120	629	-315	570	898	-418	-306
15.05	675	2057	610	-223	554	871	-321	-299
16.30	724	2001	578	-127	576	825	-217	-236
17.56	759	1951	533	-27	635	762	-108	-117
18.81	766	1946	480	58	757	685	-14	75
20.06	735	2024	419	116	973	598	50	370
21.32	720	1999	334	226	1161	477	175	679
22.57	686	1985	236	338	1394	336	302	1052
23.83	440	1155	124	256	843	178	238	662
25.08	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

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ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.25	174 {2}			241 (1)	0.75	1.76
2.51	329 {2}			487 (1)	0.76	0.36
3.76	467 {2}			658 (1)	0.80	0.46
5.02	586 {2}			810 (3)	0.84	0.53
6.27	686 {2}			1057 (3)	0.87	0.65
7.52	769 {2}		1157		0.90	0.69
8.78	833 {2}		1166		0.90	0.69
10.03	878 {2}		1175		0.90	0.69
11.29	906 {2}		1185		0.90	0.69
12.54	915 {2}	893	1194		0.90	0.69
13.79	906 {2}		1185		0.90	0.69
15.05	878 {2}		1175		0.90	0.69
16.30	833 {2}		1166		0.90	0.69
17.56	769 {2}		1157		0.90	0.69
18.81	686 {2}			1049 (3)	0.87	0.65
20.06	586 {2}			809 (1)	0.84	0.53
21.32	467 {2}			658 (1)	0.80	0.46
22.57	329 {2}			487 (1)	0.76	0.36
23.83	174 {2}			241 (1)	0.75	1.76
25.08	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	11.5	0.0	31.0	17.6	0.000	0.000	0.065 (A4)
1.25	9.60	10.9	0.0	25.2	19.8	0.000	0.000	0.065 (A4)
2.51	9.60	9.7	0.0	19.0	22.0	0.000	0.000	0.042 (C4)
3.76	9.60	8.5	0.0	13.2	20.9	0.000	0.000	0.042 (C4)
5.02	9.60	7.3	0.0	10.2	19.6	0.000	0.000	0.042 (C4)
6.27	9.60	6.1	0.0	8.2	18.4	0.000	0.000	0.042 (C4)
7.52	9.60	4.9	0.0	7.1	17.0	0.000	0.000	0.042 (C4)
8.78	9.60	3.6	0.0	7.1	15.6	0.000	0.000	0.042 (C4)
10.03	9.60	2.4	0.0	7.1	14.2	0.000	0.000	0.042 (C1)
11.29	9.60	1.2	0.0	7.1	12.7	0.000	0.000	0.042 (C1)
12.54	9.60	0.0	0.0	7.1	11.3	0.000	0.000	0.042 (C1)
13.79	9.60	-1.2	0.0	7.1	12.7	0.000	0.000	0.042 (C1)
15.05	9.60	-2.4	0.0	7.1	14.2	0.000	0.000	0.042 (C1)
16.30	9.60	-3.6	0.0	7.1	15.6	0.000	0.000	0.042 (C4)
17.56	9.60	-4.9	0.0	7.1	17.0	0.000	0.000	0.042 (C4)
18.81	9.60	-6.1	0.0	8.2	18.4	0.000	0.000	0.042 (C4)
20.06	9.60	-7.3	0.0	10.2	19.6	0.000	0.000	0.042 (C4)
21.32	9.60	-8.5	0.0	13.2	20.9	0.000	0.000	0.042 (C4)
22.57	9.60	-9.7	0.0	19.0	22.0	0.000	0.000	0.042 (C4)
23.83	9.60	-10.9	0.0	25.2	19.8	0.000	0.000	0.065 (A4)
24.41	9.60	-11.5	0.0	31.0	17.6	0.000	0.000	0.065 (A4)

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(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.882 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4236 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.52
Creep Before Erection	-0.35
Erection: PS+BM DL @ 30 days	-0.87
Change Due to Non-Comp.DL	-0.35
30 days : PS+BM DL+Non-Comp.DL	-1.22
Change Due to Comp.DL+SustLL	0.50
60 days : PS+All DL+Sust.LL	-0.72
Long Term Creep	0.68
Final : PS+All DL+Sust.LL	-0.04
: PS+All DL+LL	0.17

NOTE: Negative values indicate camber.

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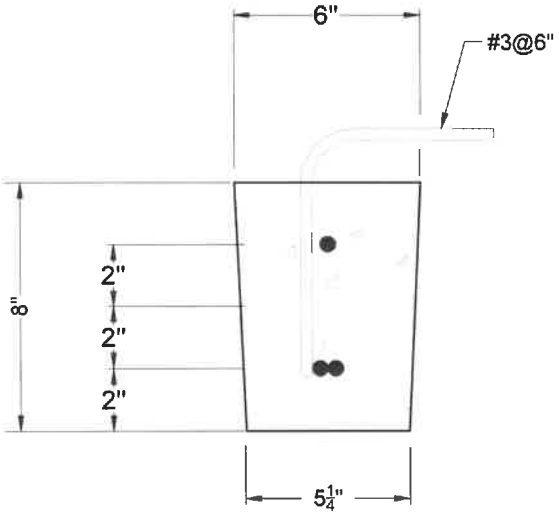
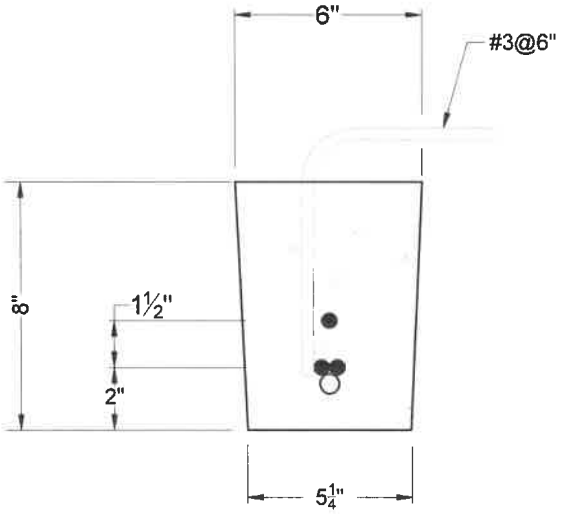


END



MIDSPAN

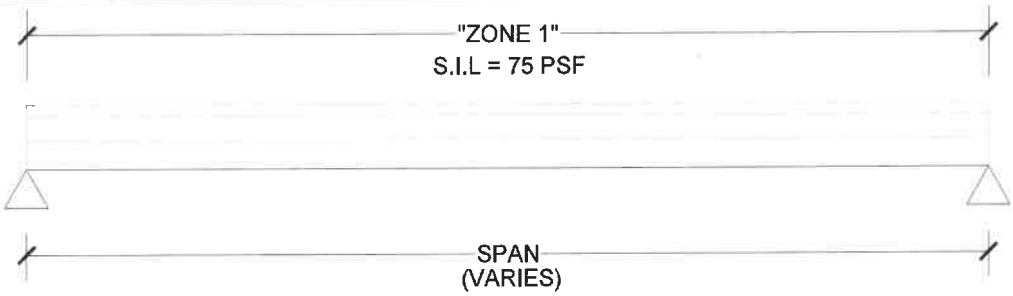
MK: J3 & J4	3-½" LOWLAX 270 KSI STRANDS ADD 1-#5 x 15FT @ 1.5" 1 PT HOLDDOWN TO 3½" PULL 0.60 PRECAST LENGTH = 25.08FT	JOIST DESIGN GROUP 3

PRECAST JOIST
DESIGN GROUP 4

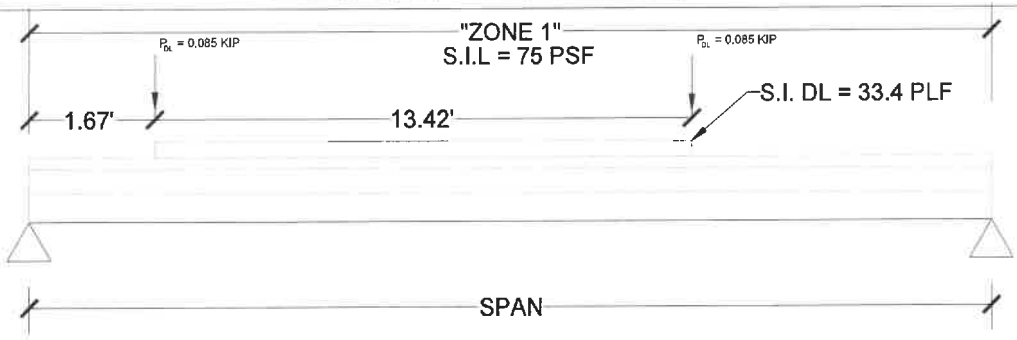
S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	34 plf; 85#		8x4 Conc Curb (33.4 plf); Add 85 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
2ND FLOOR	J11	12	2	20.83	4.00	4.00	21.167	21.583	57.00	4.00	4	1	3500	8.7
2ND FLOOR	J12	12	2	5.50	4.00	4.00	5.833	6.250	57.00	4.00	4	1	3500	2.0
2ND FLOOR	J14	12	1	26.67	1.00	4.00	26.875	27.125	31.00	4.00	4	1	3500	6.6
2ND FLOOR	J15	12	1	26.67	4.00	4.00	27.000	27.417	31.00	4.00	4	1	3500	6.6
2ND FLOOR	J16	12	6	26.67	4.00	4.00	27.000	27.417	54.00	4.00	4	1	3500	10.7



J1(A),J1(B), J2, J4, THRU J16



J3

JOIST DESIGN - MODELED LOADS

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 21.58 ft	Right Cant. = 0.00 ft
Beam Length = 21.58 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 57.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	253.661 in^2	Stc(Tpg)=	1007.16 in^3	Stc(P/C)=	44166.33 in^3
Ic =	4122.65 in^4	Sbc =	346.25 in^3	Ybc =	11.907 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure = 0.900		Strand Developmt = 0.750	
Factors : Compression-controlled Flexure = 0.650		Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	21.58	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	21.58	0.000
Composite Dead Load	0.404	0.404	0.00	21.58	0.000
Live Load	0.190	0.190	0.00	21.58	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	21.58	0.000
Composite Dead Load	0.069	0.069	0.00	21.58	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	333	1764	320	1778	0.00
5.00	333	1763	257	1843	0.00
6.16	333	1764	294	1805	0.00
7.32	333	1764	322	1775	0.00
8.47	333	1765	343	1754	0.00
9.63	333	1765	355	1742	0.00
10.79	333	1765	360	1738	0.00
11.95	333	1765	355	1742	0.00
13.11	333	1765	343	1754	0.00
14.26	333	1764	322	1775	0.00
15.42	333	1764	294	1805	0.00
16.58	333	1763	257	1843	0.00
19.50	333	1764	320	1778	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.16	162.0	152.1	132.5	133.0	29.02	17.91
4.32	162.0	152.3	134.4	135.3	26.67	16.46
6.47	162.0	152.4	135.8	137.0	24.98	15.42
8.63	162.0	152.5	136.7	138.0	23.97	14.80
10.79	162.0	152.5	137.0	138.4	23.64	14.59
12.95	162.0	152.5	136.7	138.0	23.97	14.80
15.11	162.0	152.4	135.8	137.0	24.98	15.42
17.26	162.0	152.3	134.4	135.3	26.67	16.46
19.42	162.0	152.1	132.5	133.0	29.02	17.91
21.58	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
2.16	18	-17	119	48	-84
4.32	31	-31	211	85	-86
6.47	41	-40	278	111	-87
8.63	47	-46	317	127	-88
10.79	49	-48	330	133	-88
12.95	47	-46	317	127	-88
15.11	41	-40	278	111	-87
17.26	31	-31	211	85	-86
19.42	18	-17	119	48	-84
21.58	0	0	-0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.08	218	726	51	153	614	71	154	544
2.16	419	1405	96	296	1193	135	298	1061
3.24	475	1361	137	300	1061	191	303	873
4.32	523	1323	171	304	946	240	308	711
5.39	564	1291	201	307	850	282	312	574
6.47	597	1265	225	310	770	315	315	462
7.55	623	1245	244	312	709	342	318	375
8.63	642	1230	257	313	665	360	319	312
9.71	653	1221	265	314	638	372	320	275
10.79	657	1218	268	315	630	375	321	263
11.87	653	1221	265	314	638	372	320	275
12.95	642	1230	257	313	665	360	319	312
14.03	623	1245	244	312	709	342	318	375
15.11	597	1265	225	310	770	315	315	462
16.19	564	1291	201	307	850	282	312	574
17.26	523	1323	171	304	946	240	308	711
18.34	475	1361	137	300	1061	191	303	873
19.42	419	1405	96	296	1193	135	298	1061
20.50	218	726	51	153	614	71	154	544
21.58	0	0	-0	-0	0	-0	-0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.08	116 {2}			261 (1)	0.75	2.01
2.16	220 {2}			543 (1)	0.75	0.37
3.24	311 {2}			732 (1)	0.78	0.47
4.32	390 {2}			903 (1)	0.81	0.56
5.39	457 {2}			1048 (1)	0.84	0.63
6.47	512 {2}			1162 (1)	0.87	0.68
7.55	555 {2}		1222		0.90	0.69
8.63	586 {2}		1222		0.90	0.69
9.71	604 {2}		1222		0.90	0.69
10.79	610 {2}	901*	1222		0.90	0.69
11.87	604 {2}		1222		0.90	0.69
12.95	586 {2}		1222		0.90	0.69

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14.03	555 {2}	1222		0.90	0.69
15.11	512 {2}		1162 (1)	0.87	0.68
16.19	457 {2}		1048 (1)	0.84	0.63
17.26	390 {2}		903 (1)	0.81	0.56
18.34	311 {2}		732 (1)	0.78	0.47
19.42	220 {2}		543 (1)	0.75	0.37
20.50	116 {2}		261 (1)	0.75	2.01
21.58	0		0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	8.7	0.0	39.3	22.1	0.000	0.000	0.065	(A) *
1.08	12.80	8.5	0.0	35.4	22.9	0.000	0.000	0.065	(A1)
2.16	12.80	7.5	0.0	27.2	26.1	0.000	0.000	0.037	(C1)
3.24	12.80	6.6	0.0	18.2	26.2	0.000	0.000	0.037	(C1)
4.32	12.80	5.7	0.0	13.5	26.2	0.000	0.000	0.037	(C) *
5.39	12.80	4.7	0.0	10.6	26.3	0.000	0.000	0.037	(C) *
6.47	12.80	3.8	0.0	9.5	26.3	0.000	0.000	0.037	(C) *
7.55	12.80	2.8	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
8.63	12.80	1.9	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
9.71	12.80	0.9	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
10.79	12.80	0.0	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
11.87	12.80	-0.9	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
12.95	12.80	-1.9	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
14.03	12.80	-2.8	0.0	9.5	26.4	0.000	0.000	0.037	(C1)
15.11	12.80	-3.8	0.0	9.5	26.3	0.000	0.000	0.037	(C) *
16.18	12.80	-4.7	0.0	10.6	26.3	0.000	0.000	0.037	(C) *
17.26	12.80	-5.7	0.0	13.5	26.2	0.000	0.000	0.037	(C) *
18.34	12.80	-6.6	0.0	18.2	26.2	0.000	0.000	0.037	(C1)
19.42	12.80	-7.5	0.0	27.2	26.1	0.000	0.000	0.037	(C1)
20.50	12.80	-8.5	0.0	35.4	22.9	0.000	0.000	0.065	(A1)
20.75	12.80	-8.7	0.0	39.3	22.1	0.000	0.000	0.065	(A) *

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

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Position:		Midspan (in)
Release : PS+BM DL		-0.16
Creep Before Erection	-0.11	
Erection: PS+BM DL @ 30 days		-0.27
Change Due to Non-Comp.DL	-0.09	
30 days : PS+BM DL+Non-Comp.DL		-0.35
Change Due to Comp.DL+SustLL	0.12	
60 days : PS+All DL+Sust.LL		-0.24
Long Term Creep	0.17	
Final : PS+All DL+Sust.LL		-0.07
: PS+All DL+LL		-0.02

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 6.25 ft	Right Cant. = 0.00 ft
Beam Length = 6.25 ft	Lift @ Left = 1.00 ft	Lift @ Right= 1.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 57.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)		Height = 12.000 in
Area = 67.500 in^2	St = 137.86 in^3	Yt = 5.867 in
I = 808.80 in^4	Sb = 131.87 in^3	Yb = 6.133 in
Vol/Surf = 1.914 in		
Composite : (Based on above section dimensions)		Height = 16.000 in
Ac = 253.661 in^2	Stc(Tpg)= 1007.16 in^3	Stc(P/C)= 44166.33 in^3
Ic = 4122.65 in^4	Sbc = 346.25 in^3	Ybc = 11.907 in

Miscellaneous : (Governing code is ACI 318-14)		
Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO	

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	6.25	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi fyh = 60.00 ksi fyl = 60.00 ksi
Emild = 29000 ksi LdMult = 1.000

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	6.25	0.000
Composite Dead Load	0.404	0.404	0.00	6.25	0.000
Live Load	0.190	0.190	0.00	6.25	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	6.25	0.000
Composite Dead Load	0.069	0.069	0.00	6.25	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 1.00 ft from LEFT end and 1.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
1.42	228	1207	230	1205	0.00
1.85	296	1567	302	1561	0.00
2.08	333	1765	341	1757	0.00
2.28	333	1765	342	1756	0.00
2.70	333	1765	344	1754	0.00
3.13	333	1765	344	1753	0.00
3.55	333	1765	344	1754	0.00
3.97	333	1765	342	1756	0.00
4.17	333	1765	341	1757	0.00
4.40	296	1567	302	1561	0.00
4.82	228	1207	230	1205	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
0.63	162.0	151.9	39.1	39.2	122.83	75.82
1.25	162.0	151.9	78.3	78.3	83.65	51.64
1.88	162.0	151.9	117.4	117.5	44.48	27.46
2.50	162.0	152.0	130.5	130.6	31.37	19.37
3.13	162.0	152.0	130.5	130.7	31.34	19.35
3.75	162.0	152.0	130.5	130.6	31.37	19.37
4.38	162.0	151.9	117.4	117.5	44.48	27.46
5.00	162.0	151.9	78.3	78.3	83.65	51.64
5.63	162.0	151.9	39.1	39.2	122.83	75.82
6.25	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0

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0.63	1	-1	10	4	-7
1.25	3	-3	18	7	-30
1.88	3	-3	23	9	-67
2.50	4	-4	27	11	-83
3.13	4	-4	28	11	-83
3.75	4	-4	27	11	-83
4.38	3	-3	23	9	-67
5.00	3	-3	18	7	-30
5.63	1	-1	10	4	-7
6.25	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.31	49	221	4	43	212	6	43	206
0.63	97	443	8	86	426	11	86	414
0.94	144	666	11	129	641	16	130	625
1.25	191	889	14	173	858	20	173	838
1.56	237	1113	17	216	1076	24	216	1053
1.88	283	1338	19	259	1296	26	259	1270
2.19	314	1487	20	287	1442	29	288	1414
2.50	315	1486	22	288	1439	30	288	1409
2.81	316	1485	22	288	1436	31	288	1406
3.13	316	1485	22	288	1436	31	288	1405
3.44	316	1485	22	288	1436	31	288	1406
3.75	315	1486	22	288	1439	30	288	1409
4.06	314	1487	20	287	1442	29	288	1414
4.38	283	1338	19	259	1296	26	259	1270
4.69	237	1113	17	216	1076	24	216	1053
5.00	191	889	14	173	858	20	173	838
5.31	144	666	11	129	641	16	130	625
5.63	97	443	8	86	426	11	86	414
5.94	49	221	4	43	212	6	43	206
6.25	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.31	10 {2}			73 (4)	0.75	1.09
0.63	18 {2}			145 (4)	0.75	1.51
0.94	26 {2}			215 (4)	0.75	1.83
1.25	33 {2}			285 (4)	0.75	2.10
1.56	38 {2}			353 (4)	0.75	2.33
1.88	43 {2}			421 (4)	0.75	2.53
2.19	47 {2}			518 (4)	0.75	0.35
2.50	49 {2}			568 (4)	0.75	0.38
2.81	51 {2}			615 (4)	0.75	0.42
3.13	51 {2}	647*		661 (4)	0.75	0.45
3.44	51 {2}			615 (4)	0.75	0.42
3.75	49 {2}			568 (4)	0.75	0.38
4.06	47 {2}			518 (4)	0.75	0.35
4.38	43 {2}			421 (4)	0.75	2.53

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4.69	38 {2}	353 (4)	0.75	2.33
5.00	33 {2}	285 (4)	0.75	2.10
5.31	26 {2}	215 (4)	0.75	1.83
5.63	18 {2}	145 (4)	0.75	1.51
5.94	10 {2}	73 (4)	0.75	1.09
6.25	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(3): Development length controlled by both strand and rebar.
(4): Development lengths overlap. Strength may be reduced.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	2.0	0.0	34.8	22.1	0.000	0.000	0.065 (A1)
0.94	12.80	1.9	0.0	32.4	22.4	0.000	0.000	0.065 (A1)
1.25	12.80	1.6	0.0	27.1	23.4	0.000	0.000	0.065 (A1)
1.56	12.80	1.4	0.0	23.1	24.3	0.000	0.000	0.065 (A1)
1.88	12.80	1.1	0.0	19.4	25.3	0.000	0.000	0.037 (C1)
2.19	12.80	0.8	0.0	15.4	25.9	0.000	0.000	0.037 (C1)
2.50	12.80	0.5	0.0	11.0	25.9	0.000	0.000	0.037 (C1)
2.81	12.80	0.3	0.0	9.5	25.9	0.000	0.000	0.037 (C1)
3.13	12.80	0.0	0.0	9.5	25.9	0.000	0.000	0.037 (C1)
3.44	12.80	-0.3	0.0	9.5	25.9	0.000	0.000	0.037 (C1)
3.75	12.80	-0.5	0.0	11.0	25.9	0.000	0.000	0.037 (C1)
4.06	12.80	-0.8	0.0	15.4	25.9	0.000	0.000	0.037 (C1)
4.38	12.80	-1.1	0.0	19.4	25.3	0.000	0.000	0.037 (C1)
4.69	12.80	-1.4	0.0	23.1	24.3	0.000	0.000	0.065 (A1)
5.00	12.80	-1.6	0.0	27.1	23.4	0.000	0.000	0.065 (A1)
5.31	12.80	-1.9	0.0	32.4	22.4	0.000	0.000	0.065 (A1)
5.42	12.80	-2.0	0.0	34.8	22.1	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.02
Creep Before Erection	-0.01
Erection: PS+BM DL @ 30 days	-0.03
Change Due to Non-Comp.DL	-0.00
30 days : PS+BM DL+Non-Comp.DL	-0.03

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Change Due to Comp.DL+SustLL	0.00	
60 days : PS+All DL+Sust.LL		-0.03
Long Term Creep	0.00	
Final : PS+All DL+Sust.LL		-0.03
: PS+All DL+LL		-0.03

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 27.13 ft	Right Cant. = 0.00 ft
Beam Length = 27.13 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.08 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 31.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	168.746 in^2	Stc(Tpg)=	670.34 in^3	Stc(P/C)=	3008.57 in^3
Ic =	3450.07 in^4	Sbc =	317.88 in^3	Ybc =	10.853 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	27.13	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	27.13	0.000
Composite Dead Load	0.220	0.220	0.00	27.13	0.000
Live Load	0.103	0.103	0.00	27.13	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	27.13	0.000
Composite Dead Load	0.069	0.069	0.00	27.13	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	333	1764	320	1778	0.00
5.00	333	1763	257	1843	0.00
6.71	333	1764	338	1760	0.00
8.43	334	1766	401	1696	0.00
10.14	334	1767	446	1649	0.00
11.85	334	1767	473	1622	0.00
13.56	334	1767	482	1613	0.00
15.28	334	1767	473	1622	0.00
16.99	334	1767	446	1649	0.00
18.70	334	1766	401	1696	0.00
20.42	333	1764	338	1760	0.00
22.13	333	1763	257	1843	0.00
25.05	333	1764	320	1778	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.71	162.0	152.3	132.5	133.0	29.04	17.92
5.43	162.0	152.5	134.5	135.3	26.70	16.48
8.14	162.0	152.7	135.9	137.0	25.03	15.45
10.85	162.0	152.9	136.8	138.0	24.03	14.83
13.56	162.0	152.9	137.1	138.3	23.70	14.63
16.28	162.0	152.9	136.8	138.0	24.03	14.83
18.99	162.0	152.7	135.9	137.0	25.03	15.45
21.70	162.0	152.5	134.5	135.3	26.70	16.48
24.42	162.0	152.3	132.5	133.0	29.04	17.92
27.13	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
2.71	28	-27	115	41	-84
5.43	50	-49	204	73	-86
8.14	65	-64	268	96	-87
10.85	75	-73	306	109	-88
13.56	78	-76	319	114	-88
16.28	75	-73	306	109	-88
18.99	65	-64	268	96	-87
21.70	50	-49	204	73	-86
24.42	28	-27	115	41	-84
27.13	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.36	296	886	74	211	805	100	218	740
2.71	494	1327	140	333	1174	190	347	1050
4.07	580	1251	198	353	1034	269	373	859
5.43	656	1186	249	370	913	337	396	693
6.78	719	1130	291	384	810	395	415	553
8.14	771	1084	326	396	727	443	430	438
9.50	812	1049	354	405	661	480	442	349
10.85	841	1024	373	412	615	506	451	285
12.21	858	1009	385	416	587	522	456	247
13.56	864	1004	389	417	577	527	458	234
14.92	858	1009	385	416	587	522	456	247
16.28	841	1024	373	412	615	506	451	285
17.63	812	1049	354	405	661	480	442	349
18.99	771	1084	326	396	727	443	430	438
20.35	719	1130	291	384	810	395	415	553
21.70	656	1186	249	370	913	337	396	693
23.06	580	1251	198	353	1034	269	373	859
24.42	494	1327	140	333	1174	190	347	1050
25.77	296	886	74	211	805	100	218	740
27.13	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.36	108 {2}			318 (1)	0.75	2.96
2.71	204 {2}			635 (1)	0.77	0.78
4.07	289 {2}			852 (1)	0.81	1.00
5.43	363 {2}			1033 (1)	0.85	1.17
6.78	425 {2}			1162 (1)	0.88	1.26
8.14	476 {2}		1193		0.90	1.27
9.50	516 {2}		1193		0.90	1.27
10.85	544 {2}		1193		0.90	1.27
12.21	561 {2}		1193		0.90	1.27
13.56	567 {2}	827*	1193		0.90	1.27
14.92	561 {2}		1193		0.90	1.27
16.28	544 {2}		1193		0.90	1.27

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17.63	516 {2}	1193		0.90	1.27
18.99	476 {2}	1193		0.90	1.27
20.35	425 {2}		1162 (1)	0.88	1.26
21.70	363 {2}		1033 (1)	0.85	1.17
23.06	289 {2}		852 (1)	0.81	1.00
24.42	204 {2}		635 (1)	0.77	0.78
25.77	108 {2}		318 (1)	0.75	2.96
27.13	0		0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Betal for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.71	12.80	6.6	0.0	39.3	22.5	0.000	0.000	0.065 (A1)
1.36	12.80	6.3	0.0	30.4	25.3	0.000	0.000	0.065 (A1)
2.71	12.80	5.6	0.0	20.8	28.5	0.000	0.000	0.037 (C1)
4.07	12.80	4.9	0.0	14.2	28.6	0.000	0.000	0.037 (C1)
5.43	12.80	4.2	0.0	10.8	28.7	0.000	0.000	0.037 (C) *
6.78	12.80	3.5	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
8.14	12.80	2.8	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
9.50	12.80	2.1	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
10.85	12.80	1.4	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
12.21	12.80	0.7	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
13.56	12.80	0.0	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
14.92	12.80	-0.7	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
16.28	12.80	-1.4	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
17.63	12.80	-2.1	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
18.99	12.80	-2.8	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
20.35	12.80	-3.5	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
21.70	12.80	-4.2	0.0	10.8	28.7	0.000	0.000	0.037 (C) *
23.06	12.80	-4.9	0.0	14.2	28.6	0.000	0.000	0.037 (C1)
24.42	12.80	-5.6	0.0	20.8	28.5	0.000	0.000	0.037 (C1)
25.77	12.80	-6.3	0.0	30.4	25.3	0.000	0.000	0.065 (A1)
26.30	12.80	-6.5	0.0	36.6	23.1	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

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Position:		Midspan (in)
Release : PS+BM DL		-0.14
Creep Before Erection	-0.08	
Erection: PS+BM DL @ 30 days		-0.23
Change Due to Non-Comp.DL	-0.22	
30 days : PS+BM DL+Non-Comp.DL		-0.45
Change Due to Comp.DL+SustLL	0.21	
60 days : PS+All DL+Sust.LL		-0.23
Long Term Creep	0.31	
Final : PS+All DL+Sust.LL		0.07
: PS+All DL+LL		0.15

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 27.42 ft	Right Cant. = 0.00 ft
Beam Length = 27.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 31.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	168.746 in^2	Stc(Tpg)=	670.34 in^3	Stc(P/C)=	3008.57 in^3
Ic =	3450.07 in^4	Sbc =	317.88 in^3	Ybc =	10.853 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	27.42	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	27.42	0.000
Composite Dead Load	0.220	0.220	0.00	27.42	0.000
Live Load	0.103	0.103	0.00	27.42	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	27.42	0.000
Composite Dead Load	0.069	0.069	0.00	27.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	333	1764	320	1778	0.00
5.00	333	1763	257	1843	0.00
6.74	333	1764	340	1757	0.00
8.48	334	1766	406	1690	0.00
10.23	334	1767	452	1643	0.00
11.97	334	1767	480	1614	0.00
13.71	334	1768	490	1605	0.00
15.45	334	1767	480	1614	0.00
17.19	334	1767	452	1643	0.00
18.94	334	1766	406	1690	0.00
20.68	333	1764	340	1757	0.00
22.42	333	1763	257	1843	0.00
25.34	333	1764	320	1778	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.74	162.0	152.3	132.6	133.0	28.97	17.88
5.48	162.0	152.6	134.6	135.4	26.59	16.41
8.23	162.0	152.8	136.1	137.1	24.88	15.36
10.97	162.0	152.9	136.9	138.1	23.86	14.73
13.71	162.0	152.9	137.2	138.5	23.52	14.52
16.45	162.0	152.9	136.9	138.1	23.86	14.73
19.19	162.0	152.8	136.1	137.1	24.88	15.36
21.94	162.0	152.6	134.6	135.4	26.59	16.41
24.68	162.0	152.3	132.6	133.0	28.97	17.88
27.42	162.0	151.9	-0.0	-0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
2.74	29	-28	117	42	-84
5.48	51	-50	209	74	-86
8.23	67	-65	274	98	-87
10.97	76	-75	313	112	-88
13.71	79	-78	326	116	-88
16.45	76	-75	313	112	-88
19.19	67	-65	274	98	-87
21.94	51	-50	209	74	-86
24.68	29	-28	117	42	-84
27.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.37	300	895	75	213	812	102	221	745
2.74	498	1323	143	334	1167	194	349	1040
4.11	587	1246	202	354	1024	275	375	845
5.48	664	1179	254	372	900	345	398	676
6.86	729	1122	298	386	795	404	417	532
8.23	782	1075	333	399	710	452	433	415
9.60	823	1039	361	408	643	490	446	324
10.97	853	1013	381	415	596	517	455	259
12.34	870	998	393	419	567	533	460	220
13.71	876	993	397	420	557	538	462	207
15.08	870	998	393	419	567	533	460	220
16.45	853	1013	381	415	596	517	455	259
17.82	823	1039	361	408	643	490	446	324
19.19	782	1075	333	399	710	452	433	415
20.56	729	1122	298	386	795	404	417	532
21.94	664	1179	254	372	900	345	398	676
23.31	587	1246	202	354	1024	275	375	845
24.68	498	1323	143	334	1167	194	349	1040
26.05	300	895	75	213	812	102	221	745
27.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu		Provided phi*Mn			
	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.37	110 {2}			321 (1)	0.75	2.97
2.74	208 {2}			640 (1)	0.77	0.79
4.11	295 {2}			859 (1)	0.81	1.01
5.48	370 {2}			1040 (1)	0.85	1.17
6.86	434 {2}			1168 (1)	0.89	1.26
8.23	486 {2}		1193		0.90	1.27
9.60	527 {2}		1193		0.90	1.27
10.97	556 {2}		1193		0.90	1.27
12.34	573 {2}		1193		0.90	1.27
13.71	579 {2}	827*	1193		0.90	1.27
15.08	573 {2}		1193		0.90	1.27
16.45	556 {2}		1193		0.90	1.27

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17.82	527 {2}	1193		0.90	1.27
19.19	486 {2}	1193		0.90	1.27
20.56	434 {2}		1168 (1)	0.89	1.26
21.94	370 {2}		1040 (1)	0.85	1.17
23.31	295 {2}		859 (1)	0.81	1.01
24.68	208 {2}		640 (1)	0.77	0.79
26.05	110 {2}		321 (1)	0.75	2.97
27.42	0		0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	6.6	0.0	36.6	23.1	0.000	0.000	0.065 (A1)
1.37	12.80	6.3	0.0	30.3	25.4	0.000	0.000	0.065 (A1)
2.74	12.80	5.6	0.0	20.6	28.5	0.000	0.000	0.037 (C1)
4.11	12.80	4.9	0.0	14.1	28.6	0.000	0.000	0.037 (C1)
5.48	12.80	4.2	0.0	10.7	28.7	0.000	0.000	0.037 (C) *
6.86	12.80	3.5	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
8.23	12.80	2.8	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
9.60	12.80	2.1	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
10.97	12.80	1.4	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
12.34	12.80	0.7	0.0	9.5	29.0	0.000	0.000	0.037 (C1)
13.71	12.80	0.0	0.0	9.5	29.0	0.000	0.000	0.037 (C1)
15.08	12.80	-0.7	0.0	9.5	29.0	0.000	0.000	0.037 (C1)
16.45	12.80	-1.4	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
17.82	12.80	-2.1	0.0	9.5	28.9	0.000	0.000	0.037 (C1)
19.19	12.80	-2.8	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
20.57	12.80	-3.5	0.0	9.5	28.8	0.000	0.000	0.037 (C1)
21.94	12.80	-4.2	0.0	10.7	28.7	0.000	0.000	0.037 (C) *
23.31	12.80	-4.9	0.0	14.1	28.6	0.000	0.000	0.037 (C1)
24.68	12.80	-5.6	0.0	20.6	28.5	0.000	0.000	0.037 (C1)
26.05	12.80	-6.3	0.0	30.3	25.4	0.000	0.000	0.065 (A1)
26.59	12.80	-6.6	0.0	36.6	23.1	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

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Position:		Midspan (in)
Release : PS+BM DL		-0.14
Creep Before Erection	-0.08	
Erection: PS+BM DL @ 30 days		-0.22
Change Due to Non-Comp.DL	-0.23	
30 days : PS+BM DL+Non-Comp.DL		-0.45
Change Due to Comp.DL+SustLL	0.22	
60 days : PS+All DL+Sust.LL		-0.23
Long Term Creep	0.32	
Final : PS+All DL+Sust.LL		0.09
: PS+All DL+LL		0.17

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 27.42 ft	Right Cant. = 0.00 ft
Beam Length = 27.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)		Height = 12.000 in
Area = 67.500 in^2	St = 137.86 in^3	Yt = 5.867 in
I = 808.80 in^4	Sb = 131.87 in^3	Yb = 6.133 in
Vol/Surf = 1.914 in		
Composite : (Based on above section dimensions)		Height = 16.000 in
Ac = 243.863 in^2	Stc(Tpg)= 973.06 in^3	Stc(P/C)= 22907.42 in^3
Ic = 4064.93 in^4	Sbc = 343.83 in^3	Ybc = 11.823 in

Miscellaneous : (Governing code is ACI 318-14)		
Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO	

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam	0.00	4.75	1.38	0.4590
Right End of Beam	27.42	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	27.42	0.000
Composite Dead Load	0.383	0.383	0.00	27.42	0.000
Live Load	0.180	0.180	0.00	27.42	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	27.42	0.000
Composite Dead Load	0.069	0.069	0.00	27.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	333	1764	320	1778	0.00
5.00	333	1763	257	1843	0.00
6.74	333	1764	340	1757	0.00
8.48	334	1766	406	1690	0.00
10.23	334	1767	452	1643	0.00
11.97	334	1767	480	1614	0.00
13.71	334	1768	490	1605	0.00
15.45	334	1767	480	1614	0.00
17.19	334	1767	452	1643	0.00
18.94	334	1766	406	1690	0.00
20.68	333	1764	340	1757	0.00
22.42	333	1763	257	1843	0.00
25.34	333	1764	320	1778	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.74	162.0	152.3	133.9	134.6	27.36	16.89
5.48	162.0	152.6	136.9	138.3	23.72	14.64
8.23	162.0	152.8	139.1	140.9	21.12	13.04
10.97	162.0	152.9	140.4	142.4	19.56	12.07
13.71	162.0	152.9	140.8	143.0	19.04	11.75
16.45	162.0	152.9	140.4	142.4	19.56	12.07
19.19	162.0	152.8	139.1	140.9	21.12	13.04
21.94	162.0	152.6	136.9	138.3	23.72	14.64
24.68	162.0	152.3	133.9	134.6	27.36	16.89
27.42	162.0	151.9	-0.0	-0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
2.74	29	-28	184	73	-85
5.48	51	-50	326	130	-88
8.23	67	-65	428	171	-89
10.97	76	-75	489	195	-90
13.71	79	-78	510	203	-91
16.45	76	-75	489	195	-90
19.19	67	-65	428	171	-89
21.94	51	-50	326	130	-88
24.68	29	-28	184	73	-85
27.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.37	301	902	81	198	733	114	201	625
2.74	501	1338	154	306	1017	215	311	813
4.11	591	1267	218	314	812	305	321	524
5.48	669	1205	274	322	634	383	330	272
6.86	734	1153	321	328	484	449	338	60
8.23	788	1110	359	333	361	502	344	-114
9.60	830	1077	389	337	265	544	349	-250
10.97	860	1053	411	340	196	574	353	-346
12.34	878	1039	423	341	155	592	355	-404
13.71	884	1034	428	342	142	598	356	-424
15.08	878	1039	423	341	155	592	355	-404
16.45	860	1053	411	340	196	574	353	-346
17.82	830	1077	389	337	265	544	349	-250
19.19	788	1110	359	333	361	502	344	-114
20.56	734	1153	321	328	484	449	338	60
21.94	669	1205	274	322	634	383	330	272
23.31	591	1267	218	314	812	305	321	524
24.68	501	1338	154	306	1017	215	311	813
26.05	301	902	81	198	733	114	201	625
27.42	0	0	0	0	-0	0	0	-0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.37	178 {2}			339 (1)	0.75	2.34
2.74	338 {2}			664 (1)	0.77	0.46
4.11	479 {2}			887 (1)	0.81	0.59
5.48	601 {2}			1071 (1)	0.85	0.68
6.86	704 {2}			1199 (1)	0.89	0.73
8.23	788 {2}		1220		0.90	0.73
9.60	854 {2}		1220		0.90	0.73
10.97	901 {2}		1220		0.90	0.73
12.34	929 {2}		1220		0.90	0.73
13.71	938 {2}	912	1220		0.90	0.73
15.08	929 {2}		1220		0.90	0.73
16.45	901 {2}		1220		0.90	0.73

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17.82	854 {2}	1220		0.90	0.73
19.19	788 {2}	1220		0.90	0.73
20.56	704 {2}		1199 (1)	0.89	0.73
21.94	601 {2}		1071 (1)	0.85	0.68
23.31	479 {2}		887 (1)	0.81	0.59
24.68	338 {2}		664 (1)	0.77	0.46
26.05	178 {2}		339 (1)	0.75	2.34
27.42	0		0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	10.7	0.0	39.5	22.2	0.000	0.000	0.065 (A) *
1.37	12.80	10.3	0.0	32.7	24.0	0.000	0.000	0.065 (A) *
2.74	12.80	9.1	0.0	22.2	26.4	0.000	0.000	0.037 (C) *
4.11	12.80	8.0	0.0	15.1	26.5	0.000	0.000	0.037 (C) *
5.48	12.80	6.8	0.0	11.4	26.6	0.000	0.000	0.037 (C) *
6.86	12.80	5.7	0.0	9.5	26.7	0.000	0.000	0.037 (C) *
8.23	12.80	4.6	0.0	9.5	26.8	0.000	0.000	0.037 (C) *
9.60	12.80	3.4	0.0	9.5	26.9	0.000	0.000	0.037 (C1)
10.97	12.80	2.3	0.0	9.5	26.9	0.000	0.000	0.037 (C1)
12.34	12.80	1.1	0.0	9.5	26.9	0.000	0.000	0.037 (C1)
13.71	12.80	0.0	0.0	9.5	27.0	0.000	0.000	0.037 (C1)
15.08	12.80	-1.1	0.0	9.5	26.9	0.000	0.000	0.037 (C1)
16.45	12.80	-2.3	0.0	9.5	26.9	0.000	0.000	0.037 (C1)
17.82	12.80	-3.4	0.0	9.5	26.9	0.000	0.000	0.037 (C1)
19.19	12.80	-4.6	0.0	9.5	26.8	0.000	0.000	0.037 (C) *
20.57	12.80	-5.7	0.0	9.5	26.7	0.000	0.000	0.037 (C) *
21.94	12.80	-6.8	0.0	11.4	26.6	0.000	0.000	0.037 (C) *
23.31	12.80	-8.0	0.0	15.1	26.5	0.000	0.000	0.037 (C) *
24.68	12.80	-9.1	0.0	22.2	26.4	0.000	0.000	0.037 (C) *
26.05	12.80	-10.3	0.0	32.7	24.0	0.000	0.000	0.065 (A) *
26.59	12.80	-10.7	0.0	39.5	22.2	0.000	0.000	0.065 (A) *

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.14
Creep Before Erection	-0.08	
Erection: PS+BM DL @ 30 days		-0.22
Change Due to Non-Comp.DL	-0.23	
30 days : PS+BM DL+Non-Comp.DL		-0.45
Change Due to Comp.DL+SustLL	0.30	
60 days : PS+All DL+Sust.LL		-0.15
Long Term Creep	0.44	
Final : PS+All DL+Sust.LL		0.29
: PS+All DL+LL		0.41

NOTE: Negative values indicate camber.

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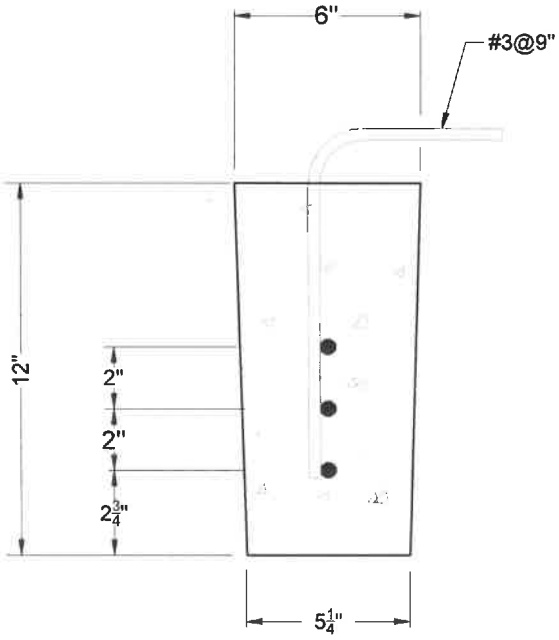

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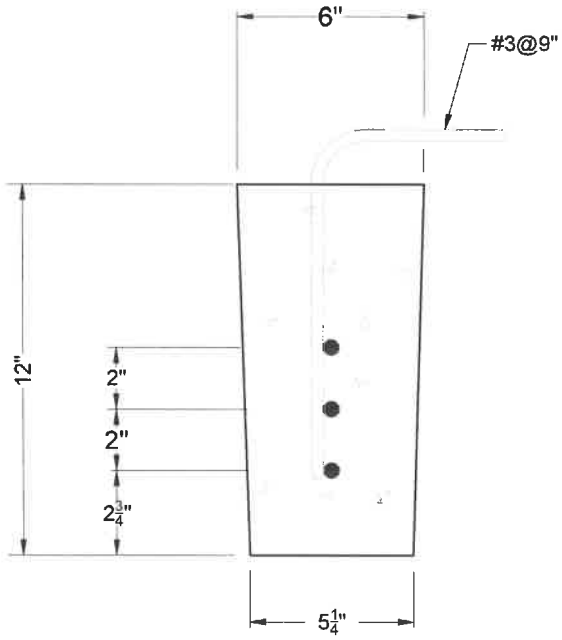


MIDSPAN

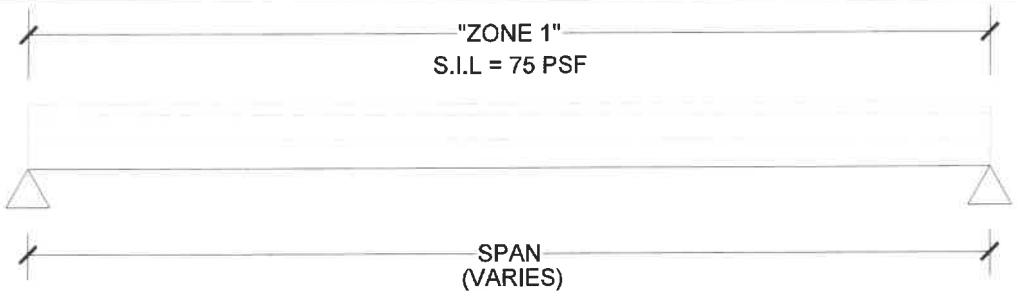
MK: J11, J12, J14 THRU J16	3-½" LOWLAX 270 KSI STRANDS NO HOLDDOWNS NO MILD STEEL PULL 0.60 PRECAST LENGTH = VARIES FROM 6.25FT TO 27.42FT	JOIST DESIGN GROUP 4

PRECAST JOIST
DESIGN GROUP 5

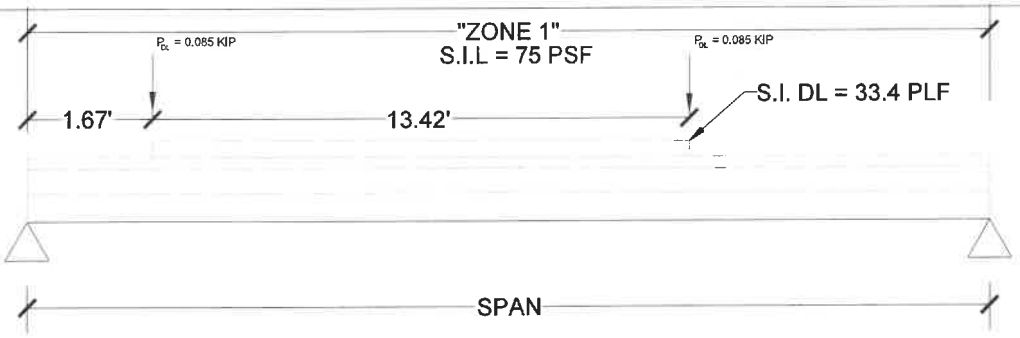
S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	34 plf; 85#		8x4 Conc Curb (33.4 plf); Add 85 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
2ND FLOOR	J10	12	4	33.67	4.00	4.00	34.000	34.417	54.00	4.00	5	1	3500	13.6
2ND FLOOR	J13	12	5	33.67	4.00	4.00	34.000	34.417	54.00	4.00	5	1	3500	13.6



J1(A),J1(B), J2, J4, THRU J16



J3

JOIST DESIGN - MODELED LOADS

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 34.42 ft	Right Cant. = 0.00 ft
Beam Length = 34.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	243.863 in^2	Stc(Tpg)=	973.06 in^3	Stc(P/C)=	22907.42 in^3
Ic =	4064.93 in^4	Sbc =	343.83 in^3	Ybc =	11.823 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 4	# of Strand = 4.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	17.21
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	17.21	3.69	2.45	0.6120
Right End of Beam----------	34.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	34.42	0.000
Composite Dead Load	0.383	0.383	0.00	34.42	0.000
Live Load	0.180	0.180	0.00	34.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	34.42	0.000
Composite Dead Load	0.069	0.069	0.00	34.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	947	1817	934	1831	0.00
5.00	710	2055	633	2135	0.00
7.44	513	2256	600	2164	0.00
9.88	316	2454	532	2229	0.00
12.33	121	2650	428	2329	0.00
14.77	-73	2841	288	2463	0.00
17.21	-265	3027	114	2630	0.00
19.65	-73	2841	288	2463	0.00
22.09	121	2650	428	2329	0.00
24.54	316	2454	532	2229	0.00
26.98	513	2256	600	2164	0.00
29.42	710	2055	633	2135	0.00
32.34	947	1817	934	1831	0.00

NOTE: Required f'ci = 4383 psi at X = 17.21 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.383 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.5	0.0	0.0	162.00	100.00
3.44	162.0	151.5	132.3	133.5	28.54	17.62
6.88	162.0	151.3	136.1	138.2	23.81	14.70
10.33	162.0	151.1	138.5	141.4	20.56	12.69
13.77	162.0	150.5	139.4	142.9	19.08	11.78
17.21	162.0	149.7	138.4	142.3	19.67	12.14
20.65	162.0	150.5	139.4	142.9	19.08	11.78
24.09	162.0	151.1	138.5	141.4	20.56	12.69

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27.54	162.0	151.3	136.1	138.2	23.81	14.70
30.98	162.0	151.5	132.3	133.5	28.54	17.62
34.42	162.0	151.5	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=		0.00	17.21	34.42
Lev	1	2.75	2.75	2.75
	2	4.75	3.50	4.75
	3	6.75	4.00	6.75
	4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
3.44	45	-44	289	115	-65
6.88	80	-78	514	205	-102
10.33	105	-103	675	269	-140
13.77	120	-118	771	307	-178
17.21	125	-123	803	320	-213
20.65	120	-118	771	307	-178
24.09	105	-103	675	269	-140
27.54	80	-78	514	205	-102
30.98	45	-44	289	115	-65
34.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.72	868	1093	128	706	826	179	712	656
3.44	1059	1348	243	751	841	339	762	521
5.16	1083	1360	344	647	643	481	662	190
6.88	1084	1390	431	537	490	603	554	-74
8.60	1063	1438	506	422	384	707	440	-274
10.33	1021	1502	566	303	320	792	320	-412
12.05	958	1579	613	180	300	858	196	-490
13.77	876	1669	647	56	319	905	69	-508
15.49	775	1770	667	-70	378	933	-60	-471
17.21	658	1879	674	-196	473	942	-189	-378
18.93	775	1770	667	-70	378	933	-60	-471
20.65	876	1669	647	56	319	905	69	-508
22.37	958	1579	613	180	300	858	196	-490
24.09	1021	1502	566	303	320	792	320	-412
25.81	1063	1438	506	422	384	707	440	-274
27.54	1084	1390	431	537	490	603	554	-74
29.26	1083	1360	344	647	643	481	662	190
30.98	1059	1348	243	751	841	339	762	521
32.70	868	1093	128	706	826	179	712	656
34.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.72	281 {2}			510 (1)	0.75	2.96
3.44	532 {2}			978 (1)	0.79	0.71
5.16	754 {2}			1315 (1)	0.84	0.88
6.88	946 {2}			1559 (1)	0.89	0.97
8.60	1109 {2}		1615		0.90	0.97
10.33	1242 {2}		1646		0.90	0.97
12.05	1345 {2}		1677		0.90	0.98
13.77	1419 {2}		1707		0.90	0.98
15.49	1464 {2}		1738		0.90	0.98
17.21	1479 {2}	1401	1769		0.90	0.98
18.93	1464 {2}		1738		0.90	0.98
20.65	1419 {2}		1707		0.90	0.98
22.37	1345 {2}		1677		0.90	0.98
24.09	1242 {2}		1646		0.90	0.97
25.81	1109 {2}		1615		0.90	0.97
27.54	946 {2}			1559 (1)	0.89	0.97
29.26	754 {2}			1315 (1)	0.84	0.88
30.98	532 {2}			978 (1)	0.79	0.71
32.70	281 {2}			510 (1)	0.75	2.96
34.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	13.6	0.0	38.8	27.8	0.000	0.000	0.065 (A)	*
1.72	12.80	12.9	0.0	30.8	35.5	0.000	0.000	0.049 (C)	*
3.44	12.80	11.5	0.0	19.4	36.7	0.000	0.000	0.049 (C)	*
5.16	12.80	10.0	0.0	14.0	34.5	0.000	0.000	0.049 (C)	*
6.88	12.80	8.6	0.0	11.1	32.1	0.005	0.000	0.049 (C)	*
8.60	12.80	7.2	0.0	9.5	29.6	0.001	0.000	0.049 (C)	*
10.33	12.80	5.7	0.0	9.5	27.1	0.000	0.000	0.049 (C)	*
12.05	12.80	4.3	0.0	9.5	24.4	0.000	0.000	0.049 (C)	*
13.77	12.80	2.9	0.0	9.5	21.7	0.000	0.000	0.049 (C1)	
15.49	12.80	1.4	0.0	9.5	19.0	0.000	0.000	0.049 (C1)	
17.21	12.80	0.0	0.0	9.5	16.2	0.000	0.000	0.049 (C1)	
18.93	12.80	-1.4	0.0	9.5	19.0	0.000	0.000	0.049 (C1)	
20.65	12.80	-2.9	0.0	9.5	21.7	0.000	0.000	0.049 (C1)	
22.37	12.80	-4.3	0.0	9.5	24.4	0.000	0.000	0.049 (C)	*
24.09	12.80	-5.7	0.0	9.5	27.1	0.000	0.000	0.049 (C)	*
25.81	12.80	-7.2	0.0	9.5	29.6	0.001	0.000	0.049 (C)	*
27.54	12.80	-8.6	0.0	11.1	32.1	0.005	0.000	0.049 (C)	*
29.26	12.80	-10.0	0.0	14.0	34.5	0.000	0.000	0.049 (C)	*
30.98	12.80	-11.5	0.0	19.4	36.7	0.000	0.000	0.049 (C)	*
32.70	12.80	-12.9	0.0	30.8	35.5	0.000	0.000	0.049 (C)	*
33.59	12.80	-13.6	0.0	38.8	27.8	0.000	0.000	0.065 (A)	*

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).

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NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.383 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4013 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.22
Erection: PS+BM DL @ 30 days	-0.59
Change Due to Non-Comp.DL	-0.57
30 days : PS+BM DL+Non-Comp.DL	-1.16
Change Due to Comp.DL+SustLL	0.73
60 days : PS+All DL+Sust.LL	-0.43
Long Term Creep	0.98
Final : PS+All DL+Sust.LL	0.55
: PS+All DL+LL	0.84

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 34.42 ft	Right Cant. = 0.00 ft
Beam Length = 34.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	243.863 in^2	Stc(Tpg)=	973.06 in^3	Stc(P/C)=	22907.42 in^3
Ic =	4064.93 in^4	Sbc =	343.83 in^3	Ybc =	11.823 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 4	# of Strand = 4.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	17.21
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	17.21	3.69	2.45	0.6120
Right End of Beam----------	34.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	34.42	0.000
Composite Dead Load	0.383	0.383	0.00	34.42	0.000
Live Load	0.180	0.180	0.00	34.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	34.42	0.000
Composite Dead Load	0.069	0.069	0.00	34.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	947	1817	934	1831	0.00
5.00	710	2055	633	2135	0.00
7.44	513	2256	600	2164	0.00
9.88	316	2454	532	2229	0.00
12.33	121	2650	428	2329	0.00
14.77	-73	2841	288	2463	0.00
17.21	-265	3027	114	2630	0.00
19.65	-73	2841	288	2463	0.00
22.09	121	2650	428	2329	0.00
24.54	316	2454	532	2229	0.00
26.98	513	2256	600	2164	0.00
29.42	710	2055	633	2135	0.00
32.34	947	1817	934	1831	0.00

NOTE: Required f'ci = 4383 psi at X = 17.21 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.383 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.5	0.0	0.0	162.00	100.00
3.44	162.0	151.5	132.3	133.5	28.54	17.62
6.88	162.0	151.3	136.1	138.2	23.81	14.70
10.33	162.0	151.1	138.5	141.4	20.56	12.69
13.77	162.0	150.5	139.4	142.9	19.08	11.78
17.21	162.0	149.7	138.4	142.3	19.67	12.14
20.65	162.0	150.5	139.4	142.9	19.08	11.78
24.09	162.0	151.1	138.5	141.4	20.56	12.69

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27.54	162.0	151.3	136.1	138.2	23.81	14.70
30.98	162.0	151.5	132.3	133.5	28.54	17.62
34.42	162.0	151.5	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=		0.00	17.21	34.42
Lev	1	2.75	2.75	2.75
	2	4.75	3.50	4.75
	3	6.75	4.00	6.75
	4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
3.44	45	-44	289	115	-65
6.88	80	-78	514	205	-102
10.33	105	-103	675	269	-140
13.77	120	-118	771	307	-178
17.21	125	-123	803	320	-213
20.65	120	-118	771	307	-178
24.09	105	-103	675	269	-140
27.54	80	-78	514	205	-102
30.98	45	-44	289	115	-65
34.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.72	868	1093	128	706	826	179	712	656
3.44	1059	1348	243	751	841	339	762	521
5.16	1083	1360	344	647	643	481	662	190
6.88	1084	1390	431	537	490	603	554	-74
8.60	1063	1438	506	422	384	707	440	-274
10.33	1021	1502	566	303	320	792	320	-412
12.05	958	1579	613	180	300	858	196	-490
13.77	876	1669	647	56	319	905	69	-508
15.49	775	1770	667	-70	378	933	-60	-471
17.21	658	1879	674	-196	473	942	-189	-378
18.93	775	1770	667	-70	378	933	-60	-471
20.65	876	1669	647	56	319	905	69	-508
22.37	958	1579	613	180	300	858	196	-490
24.09	1021	1502	566	303	320	792	320	-412
25.81	1063	1438	506	422	384	707	440	-274
27.54	1084	1390	431	537	490	603	554	-74
29.26	1083	1360	344	647	643	481	662	190
30.98	1059	1348	243	751	841	339	762	521
32.70	868	1093	128	706	826	179	712	656
34.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.72	281 {2}			510 (1)	0.75	2.96
3.44	532 {2}			978 (1)	0.79	0.71
5.16	754 {2}			1315 (1)	0.84	0.88
6.88	946 {2}			1559 (1)	0.89	0.97
8.60	1109 {2}		1615		0.90	0.97
10.33	1242 {2}		1646		0.90	0.97
12.05	1345 {2}		1677		0.90	0.98
13.77	1419 {2}		1707		0.90	0.98
15.49	1464 {2}		1738		0.90	0.98
17.21	1479 {2}	1401	1769		0.90	0.98
18.93	1464 {2}		1738		0.90	0.98
20.65	1419 {2}		1707		0.90	0.98
22.37	1345 {2}		1677		0.90	0.98
24.09	1242 {2}		1646		0.90	0.97
25.81	1109 {2}		1615		0.90	0.97
27.54	946 {2}			1559 (1)	0.89	0.97
29.26	754 {2}			1315 (1)	0.84	0.88
30.98	532 {2}			978 (1)	0.79	0.71
32.70	281 {2}			510 (1)	0.75	2.96
34.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	13.6	0.0	38.8	27.8	0.000	0.000	0.065 (A)	*
1.72	12.80	12.9	0.0	30.8	35.5	0.000	0.000	0.049 (C)	*
3.44	12.80	11.5	0.0	19.4	36.7	0.000	0.000	0.049 (C)	*
5.16	12.80	10.0	0.0	14.0	34.5	0.000	0.000	0.049 (C)	*
6.88	12.80	8.6	0.0	11.1	32.1	0.005	0.000	0.049 (C)	*
8.60	12.80	7.2	0.0	9.5	29.6	0.001	0.000	0.049 (C)	*
10.33	12.80	5.7	0.0	9.5	27.1	0.000	0.000	0.049 (C)	*
12.05	12.80	4.3	0.0	9.5	24.4	0.000	0.000	0.049 (C)	*
13.77	12.80	2.9	0.0	9.5	21.7	0.000	0.000	0.049 (C1)	
15.49	12.80	1.4	0.0	9.5	19.0	0.000	0.000	0.049 (C1)	
17.21	12.80	0.0	0.0	9.5	16.2	0.000	0.000	0.049 (C1)	
18.93	12.80	-1.4	0.0	9.5	19.0	0.000	0.000	0.049 (C1)	
20.65	12.80	-2.9	0.0	9.5	21.7	0.000	0.000	0.049 (C1)	
22.37	12.80	-4.3	0.0	9.5	24.4	0.000	0.000	0.049 (C)	*
24.09	12.80	-5.7	0.0	9.5	27.1	0.000	0.000	0.049 (C)	*
25.81	12.80	-7.2	0.0	9.5	29.6	0.001	0.000	0.049 (C)	*
27.54	12.80	-8.6	0.0	11.1	32.1	0.005	0.000	0.049 (C)	*
29.26	12.80	-10.0	0.0	14.0	34.5	0.000	0.000	0.049 (C)	*
30.98	12.80	-11.5	0.0	19.4	36.7	0.000	0.000	0.049 (C)	*
32.70	12.80	-12.9	0.0	30.8	35.5	0.000	0.000	0.049 (C)	*
33.59	12.80	-13.6	0.0	38.8	27.8	0.000	0.000	0.065 (A)	*

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).

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NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.383 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4013 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.22
Erection: PS+BM DL @ 30 days	-0.59
Change Due to Non-Comp.DL	-0.57
30 days : PS+BM DL+Non-Comp.DL	-1.16
Change Due to Comp.DL+SustLL	0.73
60 days : PS+All DL+Sust.LL	-0.43
Long Term Creep	0.98
Final : PS+All DL+Sust.LL	0.55
: PS+All DL+LL	0.84

NOTE: Negative values indicate camber.

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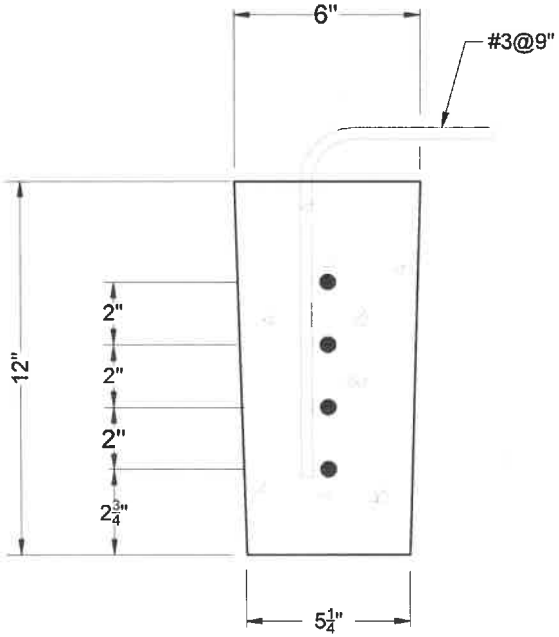

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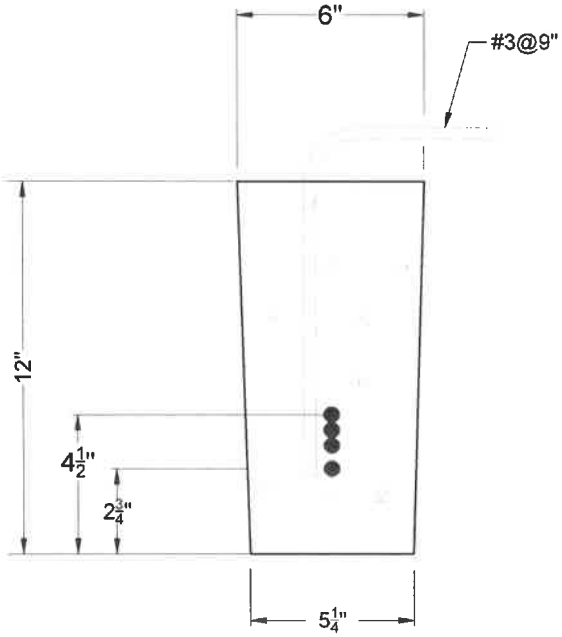

MIDSPAN

MK: J10 & J13	4-½" LOWLAX 270 KSI STRANDS 1PT HOLDDOWN TO 4.5" NO MILD STEEL PULL 0.60 PRECAST LENGTH = 34.42FT	JOIST DESIGN GROUP 5

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 22.00 ft	Right Cant. = 0.00 ft
Beam Length = 22.00 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	221.363 in^2	Stc(Tpg)=	539.57 in^3	Stc(P/C)=	-2163.84 in^3
Ic =	1727.51 in^4	Sbc =	196.35 in^3	Ybc =	8.798 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	

Losses: PCI Comm. Report (RATIONAL) Strand Transformed -> NO

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	4.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	22.00	4.00	0.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Flexure : fy = 60.00 ksi	fs = 30.00 ksi		
Emild = 29000 ksi	LdMult = 1.000		

Layer	No. of Bars in Layer	Bar Size	Area of Steel(in^2)	Dist. from Bottom of Section (in)	Distance From Left End Beginning (ft)	Ending (ft)
1	1	5	0.310	2.00	4.50	19.50

NOTE: Mild steel transformed for section props and used in design moment.

Distributed Loads (non-factored)

Magnitude of Load Distance From Left

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Load Type	Beginning (k/ft)	Ending (k/ft)	Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	22.00	0.000
Composite Dead Load	0.165	0.165	0.00	22.00	0.000
Live Load	0.165	0.165	0.00	22.00	0.000
Non-comp. Dead Load	-0.046	-0.046	0.00	22.00	0.000
Composite Dead Load	0.046	0.046	0.00	22.00	0.000
Composite Dead Load	0.275	0.275	0.00	22.00	0.000
Composite Dead Load	0.113	0.113	0.00	2.00	0.000
Composite Dead Load	0.113	0.113	20.00	22.00	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	278	1819	258	1839	0.00
5.00	390	1664	276	1782	0.00
6.20	455	1520	400	1575	0.00
7.40	497	1481	488	1490	0.00
8.60	538	1442	562	1418	0.00
9.80	580	1402	623	1359	0.00
11.00	621	1362	671	1312	0.00
12.20	663	1322	706	1278	0.00
13.40	704	1281	728	1257	0.00
14.60	746	1240	737	1249	0.00
15.80	787	1200	733	1254	0.00
17.00	828	1159	715	1272	0.00
19.92	901	1188	881	1209	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
2.20	162.0	152.1	135.2	136.1	25.94	16.02
4.40	162.0	152.6	139.5	141.0	21.04	12.99
6.60	162.0	153.3	142.0	143.9	18.14	11.20
8.80	162.0	153.5	142.9	145.0	16.99	10.49
11.00	162.0	153.6	143.2	145.4	16.64	10.27
13.20	162.0	153.7	143.0	145.0	17.02	10.50
15.40	162.0	153.6	142.2	143.9	18.07	11.15
17.60	162.0	153.6	140.4	141.6	20.35	12.56
19.80	162.0	153.2	136.8	137.5	24.45	15.09
22.00	162.0	153.1	0.0	0.0	162.00	100.00

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*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.20	12	-12	130	43	-41
4.40	22	-21	229	77	-38
6.60	29	-28	299	101	-35
8.80	33	-32	341	115	-31
11.00	34	-33	356	120	-26
13.20	33	-32	341	115	-22
15.40	29	-28	299	101	-17
17.60	22	-21	229	77	-13
19.80	12	-12	130	43	-8
22.00	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot	
0.00	0	0	0	0	0	0	0	0	
1.10	220	761	105	85	516	139	75	406	
2.20	452	1408	196	195	953	262	177	743	
3.30	574	1313	276	211	673	369	185	376	
4.40	685	1224	346	230	425	462	198	51	
5.50	797	1084	398	275	177	532	240	-249	
6.60	891	974	441	313	-21	589	277	-491	
7.70	966	905	477	340	-172	638	301	-682	
8.80	1030	846	503	370	-290	673	330	-829	
9.90	1083	796	519	402	-375	1066	-173	(-932)	CR
delta fps = 11.7 ksi		Icr =	433 in^4	See ACI 24.3.5 requirements					
11.00	1124	755	524	437	-428	1094	-165	(-990)	CR
delta fps = 12.3 ksi		Icr =	432 in^4	See ACI 24.3.5 requirements					
12.10	1154	724	519	473	-447	1085	-120	(-1004)	CR
delta fps = 12.0 ksi		Icr =	431 in^4	See ACI 24.3.5 requirements					
13.20	1172	704	503	512	-432	1038	-37	(-974)	CR
delta fps = 10.9 ksi		Icr =	430 in^4	See ACI 24.3.5 requirements					
14.30	1178	693	477	552	-384	638	516	-898	
15.40	1173	693	441	595	-303	589	562	-778	
16.50	1155	702	394	639	-188	526	610	-613	
17.60	1123	719	337	682	-43	450	658	-406	
18.70	1069	781	273	712	157	364	691	-139	
19.80	1001	856	196	745	401	262	729	187	
20.90	546	432	105	410	188	139	402	75	
22.00	0	0	0	0	0	0	0	0	

NOTE: Class C: precast tensile stress exceeds 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.10	120 {2}			149 (1)	0.75	1.52
2.20	225 {2}			305 (1)	0.75	0.27
3.30	317 {2}			403 (1)	0.79	0.35

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4.40	397 {2}			490 (1)	0.82	0.41
5.50	465 {2}			661 (3)	0.86	0.52
6.60	521 {2}			773 (1)	0.89	0.59
7.70	564 {2}		788		0.90	0.60
8.80	594 {2}		784		0.90	0.60
9.90	613 {2}		780		0.90	0.60
11.00	619 {2}	465	777		0.90	0.60
12.10	613 {2}		773		0.90	0.60
13.20	594 {2}		769		0.90	0.60
14.30	564 {2}		765		0.90	0.60
15.40	521 {2}			744 (1)	0.89	0.59
16.50	465 {2}			688 (1)	0.86	0.57
17.60	397 {2}			615 (1)	0.84	0.52
18.70	317 {2}			450 (3)	0.80	0.40
19.80	225 {2}			277 (1)	0.75	0.27
20.90	120 {2}			133 (1)	0.75	1.52
22.00	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	8.9	0.0	26.2	15.7	0.000	0.000	0.065 (A4)
1.10	9.60	8.5	0.0	21.3	16.5	0.000	0.000	0.065 (A4)
2.20	9.60	7.5	0.0	16.2	18.6	0.000	0.000	0.028 (C4)
3.30	9.60	6.5	0.0	10.9	19.3	0.000	0.000	0.028 (C4)
4.40	9.60	5.6	0.0	8.2	20.0	0.000	0.000	0.028 (C4)
5.50	9.60	4.7	0.0	7.1	20.6	0.000	0.000	0.028 (C4)
6.60	9.60	3.7	0.0	7.1	21.3	0.000	0.000	0.028 (C4)
7.70	9.60	2.8	0.0	7.1	21.9	0.000	0.000	0.028 (C4)
8.80	9.60	1.9	0.0	7.1	22.5	0.000	0.000	0.028 (C1)
9.90	9.60	0.9	0.0	7.1	23.1	0.000	0.000	0.028 (C1)
11.00	9.60	0.0	0.0	7.1	23.7	0.000	0.000	0.028 (C1)
12.10	9.60	-0.9	0.0	7.1	24.6	0.000	0.000	0.028 (C1)
13.20	9.60	-1.9	0.0	7.1	25.2	0.000	0.000	0.028 (C1)
14.30	9.60	-2.8	0.0	7.1	25.8	0.000	0.000	0.028 (C4)
15.40	9.60	-3.7	0.0	7.1	26.3	0.000	0.000	0.028 (C4)
16.50	9.60	-4.7	0.0	7.1	26.8	0.000	0.000	0.028 (C4)
17.60	9.60	-5.6	0.0	7.1	27.2	0.007	0.000	0.028 (C4)
18.70	9.60	-6.5	0.0	8.9	27.6	0.000	0.000	0.028 (C4)
19.80	9.60	-7.5	0.0	12.5	27.9	0.000	0.000	0.028 (C4)
20.90	9.60	-8.5	0.0	16.6	21.9	0.000	0.000	0.065 (A4)
21.33	9.60	-8.9	0.0	21.3	19.1	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209

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Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	0.04
Creep Before Erection	0.05
Erection: PS+BM DL @ 30 days	0.09
Change Due to Non-Comp.DL	-0.21
30 days : PS+BM DL+Non-Comp.DL	-0.12
Change Due to Comp.DL+SustLL	0.30
60 days : PS+All DL+Sust.LL	0.18
Long Term Creep	0.53
Final : PS+All DL+Sust.LL	0.71
: PS+All DL+LL	0.95

NOTE: Negative values indicate camber.
NOTE: Beam has cracked under positive moment; deflections are based on a bilinear moment-deflection relationship using extended Icr.

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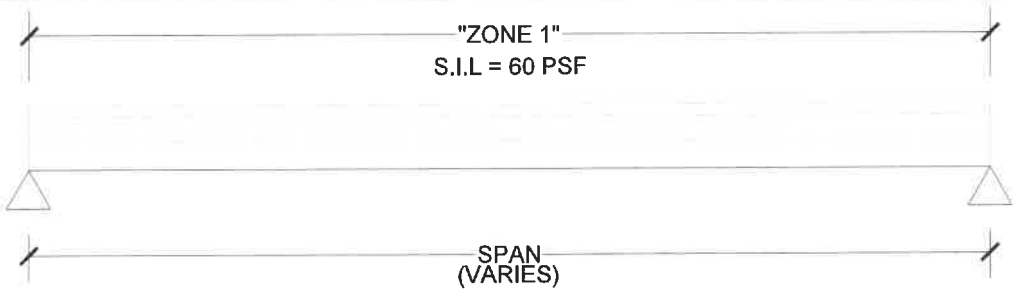
ROOF LEVEL PRECAST JOIST DESIGN

PRECAST JOIST
DESIGN GROUP 1

S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	33plf; 85#		8x4 Conc Curb (plf); Add 150 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
ROOF LEVEL	J20	8	4	18.00	4.00	4.00	18.333	18.750	66.00	4.00	1	3	3500	7.4
ROOF LEVEL	J21	8	5	14.00	4.00	4.00	14.333	14.750	66.00	4.00	1	3	3500	5.7
ROOF LEVEL	J22	8	3	9.33	4.00	4.00	9.667	10.083	66.00	4.00	1	3	3500	3.5
ROOF LEVEL	J23	8	5	16.33	4.00	4.00	16.667	17.083	66.00	4.00	1	3	3500	6.7



J20 THRU J34

JOIST DESIGN LOAD MODEL

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 18.75 ft	Right Cant. = 0.00 ft
Beam Length = 18.75 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	260.555 in^2	Stc(Tpg)=	605.07 in^3	Stc(P/C)=	-1866.86 in^3
Ic =	1827.85 in^4	Sbc =	203.57 in^3	Ybc =	8.979 in

Miscellaneous : (Governing code is ACI 318-14)			
Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	
Load Cases: 1) U = 1.40 DL			
2) U = 1.20 DL + 1.60 LL			

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand =	28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult =	1.000
# Str. lev. = 2	# of Strand = 2.00	LdMult =	1.000
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	4.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.00	0.09	0.3060
Right End of Beam----------	18.75	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	18.75	0.000
Composite Dead Load	0.440	0.440	0.00	18.75	0.000
Live Load	0.165	0.165	0.00	18.75	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	18.75	0.000
Composite Dead Load	0.046	0.046	0.00	18.75	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	888	1201	868	1222	0.00
5.00	768	1323	653	1443	0.00
5.88	732	1360	649	1447	0.00
6.75	696	1397	638	1458	0.00
7.63	661	1434	620	1477	0.00
8.50	625	1470	594	1502	0.00
9.38	589	1507	562	1535	0.00
10.25	553	1543	523	1575	0.00
11.13	517	1579	476	1622	0.00
12.00	481	1615	423	1676	0.00
12.88	445	1651	362	1738	0.00
13.75	409	1686	295	1806	0.00
16.67	291	1806	271	1827	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	153.1	0.0	0.0	162.00	100.00
1.88	162.0	153.1	122.2	122.7	39.28	24.25
3.75	162.0	153.2	137.8	138.8	23.19	14.32
5.63	162.0	153.2	139.6	140.8	21.15	13.06
7.50	162.0	153.2	140.6	142.1	19.92	12.29
9.38	162.0	153.1	140.8	142.4	19.59	12.10
11.25	162.0	153.0	140.4	141.9	20.09	12.40
13.13	162.0	152.7	139.0	140.4	21.61	13.34
15.00	162.0	152.4	136.8	137.8	24.16	14.92
16.88	162.0	152.0	120.6	121.2	40.80	25.19
18.75	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.88	9	-9	92	31	-6
3.75	16	-16	164	56	-12
5.63	21	-20	215	73	-17
7.50	24	-23	246	84	-21
9.38	25	-24	256	87	-26
11.25	24	-23	246	84	-30
13.13	21	-20	215	73	-34
15.00	16	-16	164	56	-37
16.88	9	-9	92	31	-33
18.75	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.94	450	380	66	348	219	88	341	140
1.88	861	800	125	669	495	167	655	346
2.81	972	885	176	701	454	236	681	242
3.75	997	875	221	655	334	296	631	69
4.69	1011	873	259	612	239	347	582	-72
5.63	1017	878	291	569	168	389	536	-179
6.56	1013	891	315	528	121	422	492	-255
7.50	1000	910	332	488	99	445	450	-298
8.44	978	936	342	450	99	459	410	-309
9.38	947	969	346	414	124	463	373	-288
10.31	907	1008	342	379	172	459	339	-235
11.25	859	1054	332	347	243	445	307	-151
12.19	802	1106	315	317	337	422	279	-36
13.13	736	1164	291	289	454	389	253	110
14.06	663	1227	259	263	593	347	231	286
15.00	581	1295	221	240	754	296	213	493
15.94	491	1368	176	219	937	236	198	729
16.88	370	1291	125	178	987	167	162	840
17.81	174	657	66	73	496	88	64	419
18.75	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu		Provided phi*Mn			
X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.94	85 {2}			112 (1)	0.75	1.27
1.88	161 {2}			221 (1)	0.75	1.76
2.81	228 {2}			327 (1)	0.77	0.26
3.75	286 {2}			405 (1)	0.80	0.30
4.69	335 {2}			476 (1)	0.83	0.34
5.63	376 {2}			537 (1)	0.85	0.37
6.56	407 {2}			586 (1)	0.88	0.39
7.50	429 {2}		612		0.90	0.40
8.44	443 {2}		616		0.90	0.40
9.38	447 {2}	480	619		0.90	0.40
10.31	443 {2}		623		0.90	0.40
11.25	429 {2}		627		0.90	0.40

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12.19	407 {2}	608 (1)	0.88	0.39
13.13	376 {2}	563 (1)	0.85	0.37
14.06	335 {2}	505 (1)	0.83	0.34
15.00	286 {2}	435 (1)	0.80	0.30
15.94	228 {2}	355 (1)	0.77	0.26
16.88	161 {2}	244 (1)	0.75	1.76
17.81	85 {2}	125 (1)	0.75	1.27
18.75	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	7.4	0.0	21.9	19.1	0.000	0.000	0.065 (A4)
0.94	9.60	7.2	0.0	18.4	20.8	0.000	0.000	0.065 (A4)
1.88	9.60	6.4	0.0	13.9	26.5	0.000	0.000	0.028 (C4)
2.81	9.60	5.6	0.0	10.3	27.4	0.000	0.000	0.028 (C4)
3.75	9.60	4.8	0.0	8.0	27.0	0.000	0.000	0.028 (C4)
4.69	9.60	4.0	0.0	7.1	26.5	0.000	0.000	0.028 (C4)
5.63	9.60	3.2	0.0	7.1	26.0	0.000	0.000	0.028 (C4)
6.56	9.60	2.4	0.0	7.1	25.5	0.000	0.000	0.028 (C1)
7.50	9.60	1.6	0.0	7.1	25.0	0.000	0.000	0.028 (C1)
8.44	9.60	0.8	0.0	7.1	24.4	0.000	0.000	0.028 (C1)
9.38	9.60	0.0	0.0	7.1	23.9	0.000	0.000	0.028 (C1)
10.31	9.60	-0.8	0.0	7.1	22.9	0.000	0.000	0.028 (C1)
11.25	9.60	-1.6	0.0	7.1	22.3	0.000	0.000	0.028 (C1)
12.19	9.60	-2.4	0.0	7.1	21.7	0.000	0.000	0.028 (C1)
13.13	9.60	-3.2	0.0	7.1	21.1	0.000	0.000	0.028 (C4)
14.06	9.60	-4.0	0.0	7.4	20.4	0.000	0.000	0.028 (C4)
15.00	9.60	-4.8	0.0	9.4	19.8	0.000	0.000	0.028 (C4)
15.94	9.60	-5.6	0.0	12.7	19.2	0.000	0.000	0.028 (C4)
16.88	9.60	-6.4	0.0	17.9	18.2	0.000	0.000	0.028 (C1)
17.81	9.60	-7.2	0.0	23.2	16.2	0.000	0.000	0.065 (A4)
18.08	9.60	-7.4	0.0	26.9	15.7	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.05
Creep Before Erection	-0.02	
Erection: PS+BM DL @ 30 days		-0.07
Change Due to Non-Comp.DL	-0.11	
30 days : PS+BM DL+Non-Comp.DL		-0.19
Change Due to Comp.DL+SustLL	0.16	
60 days : PS+All DL+Sust.LL		-0.03
Long Term Creep	0.27	
Final : PS+All DL+Sust.LL		0.24
: PS+All DL+LL		0.29

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 14.75 ft	Right Cant. = 0.00 ft
Beam Length = 14.75 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	260.555 in^2	Stc(Tpg)=	605.07 in^3	Stc(P/C)=	-1866.86 in^3
Ic =	1827.85 in^4	Sbc =	203.57 in^3	Ybc =	8.979 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	14.75	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	14.75	0.000
Composite Dead Load	0.440	0.440	0.00	14.75	0.000
Live Load	0.165	0.165	0.00	14.75	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	14.75	0.000
Composite Dead Load	0.046	0.046	0.00	14.75	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	206	1890	186	1911	0.00
5.00	206	1888	91	2007	0.00
5.47	206	1888	101	1998	0.00
5.95	206	1888	108	1991	0.00
6.43	206	1888	113	1985	0.00
6.90	206	1888	116	1982	0.00
7.38	206	1888	117	1981	0.00
7.85	206	1888	116	1982	0.00
8.32	206	1888	113	1985	0.00
8.80	206	1888	108	1991	0.00
9.27	206	1888	101	1998	0.00
9.75	206	1888	91	2007	0.00
12.67	206	1890	186	1911	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
1.48	162.0	151.6	93.8	94.2	67.81	41.86
2.95	162.0	151.7	133.5	134.2	27.83	17.18
4.43	162.0	151.9	134.8	135.7	26.35	16.26
5.90	162.0	151.9	135.5	136.5	25.46	15.72
7.38	162.0	151.9	135.8	136.8	25.17	15.53
8.85	162.0	151.9	135.5	136.5	25.46	15.72
10.32	162.0	151.9	134.8	135.7	26.35	16.26
11.80	162.0	151.7	133.5	134.2	27.83	17.18
13.27	162.0	151.6	93.8	94.2	67.81	41.86
14.75	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.48	6	-5	57	19	-22
2.95	10	-10	102	34	-45
4.43	13	-13	133	45	-45
5.90	15	-14	152	52	-45
7.38	15	-15	159	54	-46
8.85	15	-14	152	52	-45
10.32	13	-13	133	45	-45
11.80	10	-10	102	34	-45
13.27	6	-5	57	19	-22
14.75	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.74	111	536	41	49	437	54	43	389
1.48	218	1077	77	99	889	103	89	798
2.21	308	1523	109	140	1257	146	126	1128
2.95	342	1500	137	130	1165	183	113	1004
3.69	370	1480	161	123	1087	215	102	899
4.43	393	1463	180	116	1024	241	93	813
5.16	411	1450	195	111	975	261	86	746
5.90	424	1441	205	107	939	275	81	698
6.64	432	1436	212	105	918	284	78	669
7.38	435	1434	214	105	911	287	77	660
8.11	432	1436	212	105	918	284	78	669
8.85	424	1441	205	107	939	275	81	698
9.59	411	1450	195	111	975	261	86	746
10.32	393	1463	180	116	1024	241	93	813
11.06	370	1480	161	123	1087	215	102	899
11.80	342	1500	137	130	1165	183	113	1004
12.54	308	1523	109	140	1257	146	126	1128
13.27	218	1077	77	99	889	103	89	798
14.01	111	536	41	49	437	54	43	389
14.75	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.74	53 {2}			96 (4)	0.75	1.11
1.48	100 {2}			189 (4)	0.75	1.54
2.21	141 {2}			293 (4)	0.75	0.21
2.95	177 {2}			363 (4)	0.77	0.26
3.69	208 {2}			429 (4)	0.80	0.29
4.43	233 {2}			490 (4)	0.82	0.33
5.16	252 {2}			545 (4)	0.84	0.36
5.90	266 {2}			592 (4)	0.86	0.38
6.64	274 {2}			630 (4)	0.88	0.39
7.38	277 {2}	555*		655 (4)	0.90	0.40
8.11	274 {2}			630 (4)	0.88	0.39
8.85	266 {2}			592 (4)	0.86	0.38

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9.59	252 {2}	545 (4)	0.84	0.36
10.32	233 {2}	490 (4)	0.82	0.33
11.06	208 {2}	429 (4)	0.80	0.29
11.80	177 {2}	363 (4)	0.77	0.26
12.54	141 {2}	293 (4)	0.75	0.21
13.27	100 {2}	189 (4)	0.75	1.54
14.01	53 {2}	96 (4)	0.75	1.11
14.75	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(3): Development length controlled by both strand and rebar.
(4): Development lengths overlap. Strength may be reduced.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	5.7	0.0	26.7	15.6	0.000	0.000	0.065 (A1)
0.74	9.60	5.6	0.0	25.4	15.7	0.000	0.000	0.065 (A1)
1.48	9.60	5.0	0.0	19.3	16.7	0.000	0.000	0.065 (A1)
2.21	9.60	4.4	0.0	15.9	17.6	0.000	0.000	0.028 (C1)
2.95	9.60	3.8	0.0	11.7	17.6	0.000	0.000	0.028 (C1)
3.69	9.60	3.1	0.0	9.1	17.7	0.000	0.000	0.028 (C1)
4.43	9.60	2.5	0.0	7.2	17.7	0.000	0.000	0.028 (C1)
5.16	9.60	1.9	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
5.90	9.60	1.3	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
6.64	9.60	0.6	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
7.38	9.60	0.0	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
8.11	9.60	-0.6	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
8.85	9.60	-1.3	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
9.59	9.60	-1.9	0.0	7.1	17.7	0.000	0.000	0.028 (C1)
10.32	9.60	-2.5	0.0	7.2	17.7	0.000	0.000	0.028 (C1)
11.06	9.60	-3.1	0.0	9.1	17.7	0.000	0.000	0.028 (C1)
11.80	9.60	-3.8	0.0	11.7	17.6	0.000	0.000	0.028 (C1)
12.54	9.60	-4.4	0.0	15.9	17.6	0.000	0.000	0.028 (C1)
13.28	9.60	-5.0	0.0	19.3	16.7	0.000	0.000	0.065 (A1)
14.01	9.60	-5.6	0.0	25.4	15.7	0.000	0.000	0.065 (A1)
14.09	9.60	-5.7	0.0	26.7	15.6	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.17
Creep Before Erection	-0.12	
Erection: PS+BM DL @ 30 days		-0.29
Change Due to Non-Comp.DL	-0.04	
30 days : PS+BM DL+Non-Comp.DL		-0.33
Change Due to Comp.DL+SustLL	0.06	
60 days : PS+All DL+Sust.LL		-0.27
Long Term Creep	0.08	
Final : PS+All DL+Sust.LL		-0.20
: PS+All DL+LL		-0.18

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. =	0.00 ft	Simple Span =	9.67 ft	Right Cant. =	0.00 ft
Beam Length =	9.67 ft	Lift @ Left =	1.00 ft	Lift @ Right=	1.00 ft
Design Bearing Lengths:		@ Left =	0.33 ft	@ Right=	0.33 ft
No. of stems=	1	Tpg. thick =	4.000 in	Leg Top =	6.000 in
Flange width=	66.000 in	Flange thick=	0.000 in	Leg Bottom =	5.250 in
Web width =	5.625 in	Stem height =	8.000 in	Section Type=	SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				

Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	260.555 in^2	Stc(Tpg)=	605.07 in^3	Stc(P/C)=	-1866.86 in^3
Ic =	1827.85 in^4	Sbc =	203.57 in^3	Ybc =	8.979 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci =	3.500 ksi	Rel. humid. =	60.00 %	Stress Block=	RECTANGULAR
Beam f'c =	6.000 ksi	Beam weight =	150.00 pcf	NORMAL WT.	
Topping f'c =	4.000 ksi	Topping wt. =	150.00 pcf	NORMAL WT.	
Cu =	2.350	eds =	300 E-06	eshu =	650 E-06
Eci modifier=	1.000	Ec modifier =	1.000	Camber Mult.=	1.000
Shear Options :		Depth used =	COMPOSITE	f'c used =	BEAM
Allow. Concrete Stress:		At Release =	0.600f'ci	At Final =	12.0sqrt f'c
phi :	Tension-controlled Flexure	=	0.900	Strand Developmt =	0.750
Factors :	Compression-controlled Flexure	=	0.650	Shear & Torsion =	0.750

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull =	0.600Xfpu	Strand diam.=	0.5000 in	Estrand =	28500 ksi
Strand fpu =	270.00 ksi	Area ea.str.=	0.1530 in^2	LtMult =	1.000
# Str. lev. =	2	# of Strand =	2.00	LdMult =	1.000
Losses: PCI Comm. Report (RATIONAL)		Strand Transformed ->	NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	9.67	3.00	1.09	0.3060

Mild Steel

Shear :	fyv = 60.00 ksi	fyh =	60.00 ksi	fyl =	60.00 ksi
Emild =	29000 ksi	LdMult =	1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	9.67	0.000
Composite Dead Load	0.440	0.440	0.00	9.67	0.000
Live Load	0.165	0.165	0.00	9.67	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	9.67	0.000
Composite Dead Load	0.046	0.046	0.00	9.67	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 1.00 ft from LEFT end and 1.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
1.77	175	1604	195	1583	0.00
2.08	206	1891	234	1862	0.00
2.53	206	1891	245	1851	0.00
3.30	206	1892	258	1837	0.00
4.07	206	1892	267	1829	0.00
4.84	206	1892	269	1826	0.00
5.60	206	1892	267	1829	0.00
6.37	206	1892	258	1837	0.00
7.14	206	1891	245	1851	0.00
7.59	206	1891	234	1862	0.00
7.90	175	1604	195	1583	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
0.97	162.0	151.5	60.9	61.1	100.92	62.30
1.93	162.0	151.6	121.9	122.2	39.84	24.59
2.90	162.0	151.6	131.7	132.1	29.89	18.45
3.87	162.0	151.6	132.1	132.5	29.51	18.21
4.84	162.0	151.6	132.2	132.6	29.38	18.14
5.80	162.0	151.6	132.1	132.5	29.51	18.21
6.77	162.0	151.6	131.7	132.1	29.89	18.45
7.74	162.0	151.6	121.9	122.2	39.84	24.59
8.70	162.0	151.5	60.9	61.1	100.92	62.30
9.67	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0

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0.97	2	-2	25	8	-9
1.93	4	-4	44	15	-38
2.90	6	-5	57	19	-44
3.87	6	-6	65	22	-44
4.84	7	-6	68	23	-44
5.80	6	-6	65	22	-44
6.77	6	-5	57	19	-44
7.74	4	-4	44	15	-38
8.70	2	-2	25	8	-9
9.67	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.48	62	359	17	35	316	23	33	296
0.97	122	720	33	71	639	44	66	600
1.45	179	1084	47	107	969	63	101	914
1.93	235	1450	59	144	1306	79	136	1237
2.42	260	1557	69	153	1389	92	144	1308
2.90	270	1550	77	150	1362	104	141	1271
3.38	277	1545	84	148	1340	112	138	1242
3.87	283	1541	88	147	1325	118	135	1222
4.35	286	1539	91	146	1316	122	134	1209
4.84	287	1538	92	145	1313	123	134	1205
5.32	286	1539	91	146	1316	122	134	1209
5.80	283	1541	88	147	1325	118	135	1222
6.29	277	1545	84	148	1340	112	138	1242
6.77	270	1550	77	150	1362	104	141	1271
7.25	260	1557	69	153	1389	92	144	1308
7.74	235	1450	59	144	1306	79	136	1237
8.22	179	1084	47	107	969	63	101	914
8.70	122	720	33	71	639	44	66	600
9.19	62	359	17	35	316	23	33	296
9.67	0	0	0	-0	-0	0	-0	-0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.48	23 {2}			61 (4)	0.75	0.89
0.97	43 {2}			121 (4)	0.75	1.25
1.45	61 {2}			180 (4)	0.75	1.51
1.93	76 {2}			238 (4)	0.75	1.72
2.42	89 {2}			301 (4)	0.75	0.22
2.90	100 {2}			340 (4)	0.75	0.25
3.38	108 {2}			377 (4)	0.75	0.27
3.87	114 {2}			410 (4)	0.75	0.30
4.35	118 {2}			440 (4)	0.75	0.32
4.84	119 {2}	485*		467 (4)	0.75	0.34
5.32	118 {2}			440 (4)	0.75	0.32
5.80	114 {2}			410 (4)	0.75	0.30
6.29	108 {2}			377 (4)	0.75	0.27
6.77	100 {2}			340 (4)	0.75	0.25

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7.25	89 {2}	301 (4)	0.75	0.22
7.74	76 {2}	238 (4)	0.75	1.72
8.22	61 {2}	180 (4)	0.75	1.51
8.70	43 {2}	121 (4)	0.75	1.25
9.19	23 {2}	61 (4)	0.75	0.89
9.67	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(3): Development length controlled by both strand and rebar.
(4): Development lengths overlap. Strength may be reduced.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	3.5	0.0	25.9	15.6	0.000	0.000	0.065 (A1)
0.97	9.60	3.3	0.0	21.6	16.0	0.000	0.000	0.065 (A1)
1.45	9.60	2.9	0.0	18.0	16.7	0.000	0.000	0.065 (A1)
1.93	9.60	2.5	0.0	15.6	17.4	0.000	0.000	0.028 (C1)
2.42	9.60	2.1	0.0	12.4	17.6	0.000	0.000	0.028 (C1)
2.90	9.60	1.6	0.0	9.6	17.6	0.000	0.000	0.028 (C1)
3.38	9.60	1.2	0.0	7.4	17.6	0.000	0.000	0.028 (C1)
3.87	9.60	0.8	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
4.35	9.60	0.4	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
4.84	9.60	0.0	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
5.32	9.60	-0.4	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
5.80	9.60	-0.8	0.0	7.1	17.6	0.000	0.000	0.028 (C1)
6.29	9.60	-1.2	0.0	7.4	17.6	0.000	0.000	0.028 (C1)
6.77	9.60	-1.6	0.0	9.6	17.6	0.000	0.000	0.028 (C1)
7.25	9.60	-2.1	0.0	12.4	17.6	0.000	0.000	0.028 (C1)
7.74	9.60	-2.5	0.0	15.6	17.4	0.000	0.000	0.028 (C1)
8.22	9.60	-2.9	0.0	18.0	16.7	0.000	0.000	0.065 (A1)
8.70	9.60	-3.3	0.0	21.6	16.0	0.000	0.000	0.065 (A1)
9.01	9.60	-3.5	0.0	25.9	15.6	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.08
Creep Before Erection	-0.06
Erection: PS+BM DL @ 30 days	-0.14

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Change Due to Non-Comp.DL	-0.01	
30 days : PS+BM DL+Non-Comp.DL		-0.15
Change Due to Comp.DL+SustLL	0.01	
60 days : PS+All DL+Sust.LL		-0.14
Long Term Creep	0.01	
Final : PS+All DL+Sust.LL		-0.13
: PS+All DL+LL		-0.13

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 17.08 ft	Right Cant. = 0.00 ft
Beam Length = 17.08 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 8.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	8.000 in
Area =	45.000 in^2	St =	61.27 in^3	Yt =	3.911 in
I =	239.64 in^4	Sb =	58.61 in^3	Yb =	4.089 in
Vol/Surf =	1.650 in				
Composite : (Based on above section dimensions)				Height =	12.000 in
Ac =	260.555 in^2	Stc(Tpg)=	605.07 in^3	Stc(P/C)=	-1866.86 in^3
Ic =	1827.85 in^4	Sbc =	203.57 in^3	Ybc =	8.979 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure = 0.900		Strand Developmt = 0.750	
Factors : Compression-controlled Flexure = 0.650		Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 2	# of Strand = 2.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2
Left end patt. :	2.00	2.00
Right end patt.:	2.00	2.00
No. of Strand :	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	3.00	1.09	0.3060
Right End of Beam----------	17.08	3.00	1.09	0.3060

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.047	0.047	0.00	17.08	0.000
Composite Dead Load	0.440	0.440	0.00	17.08	0.000
Live Load	0.165	0.165	0.00	17.08	0.000

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Non-comp. Dead Load	-0.046	-0.046	0.00	17.08	0.000
Composite Dead Load	0.046	0.046	0.00	17.08	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A)DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	206	1890	186	1911	0.00
5.00	206	1888	91	2007	0.00
5.71	206	1888	112	1986	0.00
6.42	206	1888	128	1970	0.00
7.12	206	1889	140	1958	0.00
7.83	206	1889	147	1951	0.00
8.54	206	1889	149	1949	0.00
9.25	206	1889	147	1951	0.00
9.96	206	1889	140	1958	0.00
10.66	206	1888	128	1970	0.00
11.37	206	1888	112	1986	0.00
12.08	206	1888	91	2007	0.00
15.00	206	1890	186	1911	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.4	0.0	0.0	162.00	100.00
1.71	162.0	151.7	109.1	109.6	52.40	32.34
3.42	162.0	151.9	134.9	135.8	26.21	16.18
5.12	162.0	152.0	136.6	137.8	24.23	14.96
6.83	162.0	152.1	137.6	139.0	23.04	14.22
8.54	162.0	152.1	137.9	139.4	22.65	13.98
10.25	162.0	152.1	137.6	139.0	23.04	14.22
11.96	162.0	152.0	136.6	137.8	24.23	14.96
13.66	162.0	151.9	134.9	135.8	26.21	16.18
15.37	162.0	151.7	109.1	109.6	52.40	32.34
17.08	162.0	151.4	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
1.71	7	-7	77	26	-30
3.42	13	-13	136	46	-45
5.12	17	-17	179	61	-46
6.83	20	-19	204	69	-46
8.54	21	-20	213	72	-46
10.25	20	-19	204	69	-46
11.96	17	-17	179	61	-46
13.66	13	-13	136	46	-45
15.37	7	-7	77	26	-30
17.08	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.85	138	615	55	54	481	73	47	417
1.71	269	1236	103	110	984	138	97	862
2.56	353	1492	146	127	1134	196	109	962
3.42	398	1460	184	115	1011	246	91	796
4.27	436	1433	215	104	907	288	77	654
5.12	467	1411	241	96	822	323	65	539
5.98	491	1394	261	89	756	350	55	449
6.83	509	1382	276	84	709	369	49	385
7.69	519	1374	284	81	680	381	45	347
8.54	523	1372	287	80	671	384	43	334
9.39	519	1374	284	81	680	381	45	347
10.25	509	1382	276	84	709	369	49	385
11.10	491	1394	261	89	756	350	55	449
11.96	467	1411	241	96	822	323	65	539
12.81	436	1433	215	104	907	288	77	654
13.66	398	1460	184	115	1011	246	91	796
14.52	353	1492	146	127	1134	196	109	962
15.37	269	1236	103	110	984	138	97	862
16.23	138	615	55	54	481	73	47	417
17.08	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu: by Fact'd Loads	Required Mu: by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn: by Strain-compat.	Provided phi*Mn: by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.85	71 {2}			113 (1)	0.75	1.20
1.71	134 {2}			221 (1)	0.75	1.66
2.56	189 {2}			332 (1)	0.76	0.24
3.42	238 {2}			410 (1)	0.79	0.28
4.27	278 {2}			482 (1)	0.81	0.32
5.12	312 {2}			546 (1)	0.84	0.36
5.98	338 {2}			600 (1)	0.86	0.38
6.83	356 {2}			640 (1)	0.89	0.40
7.69	367 {2}		657		0.90	0.40
8.54	371 {2}	561	657		0.90	0.40
9.39	367 {2}		657		0.90	0.40
10.25	356 {2}			640 (1)	0.89	0.40

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11.10	338 {2}	600 (1)	0.86	0.38
11.96	312 {2}	546 (1)	0.84	0.36
12.81	278 {2}	482 (1)	0.81	0.32
13.66	238 {2}	410 (1)	0.79	0.28
14.52	189 {2}	332 (1)	0.76	0.24
15.37	134 {2}	221 (1)	0.75	1.66
16.23	71 {2}	113 (1)	0.75	1.20
17.08	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	From End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.67	9.60	6.7	0.0	26.9	15.6	0.000	0.000	0.065 (A4)
0.85	9.60	6.5	0.0	24.1	15.9	0.000	0.000	0.065 (A4)
1.71	9.60	5.8	0.0	18.7	17.1	0.000	0.000	0.028 (C1)
2.56	9.60	5.1	0.0	14.2	17.7	0.000	0.000	0.028 (C1)
3.42	9.60	4.3	0.0	10.5	17.7	0.000	0.000	0.028 (C4)
4.27	9.60	3.6	0.0	8.3	17.7	0.000	0.000	0.028 (C4)
5.12	9.60	2.9	0.0	7.1	17.8	0.000	0.000	0.028 (C4)
5.98	9.60	2.2	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
6.83	9.60	1.4	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
7.69	9.60	0.7	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
8.54	9.60	0.0	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
9.39	9.60	-0.7	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
10.25	9.60	-1.4	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
11.10	9.60	-2.2	0.0	7.1	17.8	0.000	0.000	0.028 (C1)
11.96	9.60	-2.9	0.0	7.1	17.8	0.000	0.000	0.028 (C4)
12.81	9.60	-3.6	0.0	8.3	17.7	0.000	0.000	0.028 (C4)
13.66	9.60	-4.3	0.0	10.5	17.7	0.000	0.000	0.028 (C4)
14.52	9.60	-5.1	0.0	14.2	17.7	0.000	0.000	0.028 (C1)
15.37	9.60	-5.8	0.0	18.7	17.1	0.000	0.000	0.028 (C1)
16.23	9.60	-6.5	0.0	24.1	15.9	0.000	0.000	0.065 (A4)
16.41	9.60	-6.7	0.0	26.9	15.6	0.000	0.000	0.065 (A4)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
(4): Avmin not required, phi*Vc > Vu > phi*Vc/2 (ACI 9.6.3.1 Integral).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.990 eshu = 512 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.20
Creep Before Erection	-0.14	
Erection: PS+BM DL @ 30 days		-0.34
Change Due to Non-Comp.DL	-0.08	
30 days : PS+BM DL+Non-Comp.DL		-0.42
Change Due to Comp.DL+SustLL	0.11	
60 days : PS+All DL+Sust.LL		-0.31
Long Term Creep	0.15	
Final : PS+All DL+Sust.LL		-0.17
: PS+All DL+LL		-0.13

NOTE: Negative values indicate camber.

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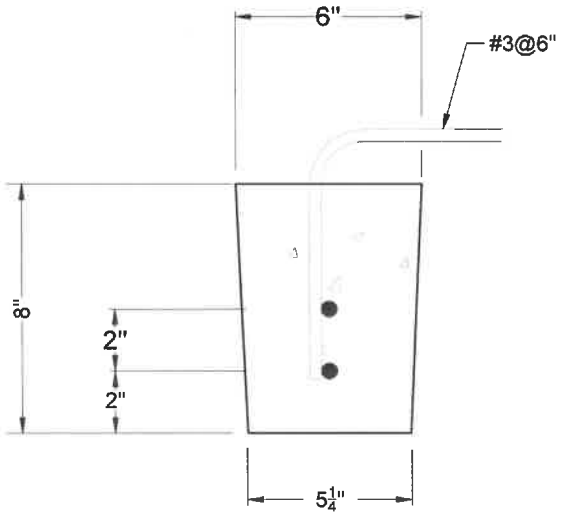

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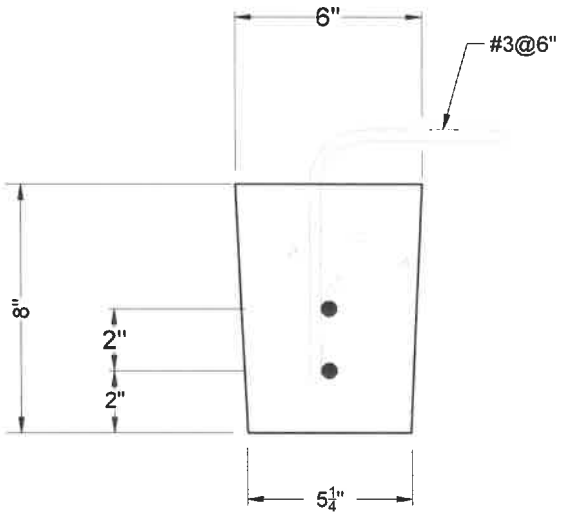


MIDSPAN

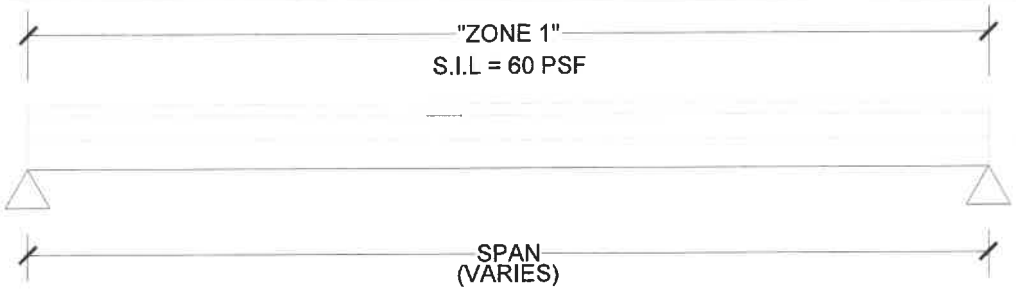
MK: J20 THRU J23	2-½" LOWLAX 270 KSI STRANDS NO HOLDDOWNS NO MILD STEEL PULL 0.60 PRECAST LENGTH = VARIES FROM 10.08 FT TO 18.75FT	JOIST DESIGN GROUP 1

PRECAST JOIST
DESIGN GROUP 4

S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	33plf; 85#		8x4 Conc Curb (plf); Add 150 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
ROOF LEVEL	J26	12	1	20.83	4.00	4.00	21.167	21.583	46.13	4.00	4	3	3500	6.4
ROOF LEVEL	J27	12	1	20.83	4.00	4.00	21.167	21.583	39.00	4.00	4	3	3500	5.5
ROOF LEVEL	J28	12	3	5.50	4.00	4.00	5.833	6.250	60.00	4.00	4	3	3500	1.8



J20 THRU J34

JOIST DESIGN LOAD MODEL

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 21.58 ft	Right Cant. = 0.00 ft
Beam Length = 21.58 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 46.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	217.735 in^2	Stc(Tpg)=	876.68 in^3	Stc(P/C)=	8869.36 in^3
Ic =	3891.34 in^4	Sbc =	336.58 in^3	Ybc =	11.561 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand =	28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult =	1.000
# Str. lev. = 3	# of Strand = 3.00	LdMult =	1.000

Losses: PCI Comm. Report (RATIONAL) Strand Transformed -> NO

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile:

Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	21.58	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi fyh = 60.00 ksi fyl = 60.00 ksi
Emild = 29000 ksi LdMult = 1.000

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	21.58	0.000
Composite Dead Load	0.308	0.308	0.00	21.58	0.000
Live Load	0.115	0.115	0.00	21.58	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	21.58	0.000
Composite Dead Load	0.069	0.069	0.00	21.58	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	333	1764	320	1778	0.00
5.00	333	1763	257	1843	0.00
6.16	333	1764	294	1805	0.00
7.32	333	1764	322	1775	0.00
8.47	333	1765	343	1754	0.00
9.63	333	1765	355	1742	0.00
10.79	333	1765	360	1738	0.00
11.95	333	1765	355	1742	0.00
13.11	333	1765	343	1754	0.00
14.26	333	1764	322	1775	0.00
15.42	333	1764	294	1805	0.00
16.58	333	1763	257	1843	0.00
19.50	333	1764	320	1778	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.16	162.0	152.1	132.0	132.3	29.68	18.32
4.32	162.0	152.3	133.6	134.2	27.85	17.19
6.47	162.0	152.4	134.7	135.5	26.53	16.38
8.63	162.0	152.5	135.4	136.3	25.75	15.89
10.79	162.0	152.5	135.7	136.5	25.48	15.73
12.95	162.0	152.5	135.4	136.3	25.75	15.89
15.11	162.0	152.4	134.7	135.5	26.53	16.38
17.26	162.0	152.3	133.6	134.2	27.85	17.19
19.42	162.0	152.1	132.0	132.3	29.68	18.32
21.58	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
2.16	18	-17	95	29	-84
4.32	31	-31	169	51	-85
6.47	41	-40	221	67	-86
8.63	47	-46	253	77	-87
10.79	49	-48	263	80	-87
12.95	47	-46	253	77	-87
15.11	41	-40	221	67	-86
17.26	31	-31	169	51	-85
19.42	18	-17	95	29	-84
21.58	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.08	218	723	47	157	644	61	159	600
2.16	418	1399	88	303	1249	115	307	1167
3.24	473	1353	125	310	1141	163	316	1024
4.32	521	1313	157	316	1047	205	323	900
5.39	562	1280	184	322	967	240	330	796
6.47	595	1252	206	326	902	269	335	710
7.55	621	1231	223	330	851	291	340	643
8.63	639	1216	235	332	815	307	343	596
9.71	650	1206	243	334	794	317	344	567
10.79	654	1203	245	334	786	320	345	558
11.87	650	1206	243	334	794	317	344	567
12.95	639	1216	235	332	815	307	343	596
14.03	621	1231	223	330	851	291	340	643
15.11	595	1252	206	326	902	269	335	710
16.19	562	1280	184	322	967	240	330	796
17.26	521	1313	157	316	1047	205	323	900
18.34	473	1353	125	310	1141	163	316	1024
19.42	418	1399	88	303	1249	115	307	1167
20.50	218	723	47	157	644	61	159	600
21.58	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.08	85 {2}			256 (1)	0.75	2.21
2.16	160 {2}			535 (1)	0.75	0.45
3.24	227 {2}			723 (1)	0.78	0.58
4.32	285 {2}			893 (1)	0.81	0.70
5.39	334 {2}			1038 (1)	0.84	0.78
6.47	374 {2}			1151 (1)	0.87	0.84
7.55	406 {2}		1214		0.90	0.86
8.63	428 {2}		1214		0.90	0.86
9.71	441 {2}		1214		0.90	0.86
10.79	446 {2}	869*	1214		0.90	0.86
11.87	441 {2}		1214		0.90	0.86
12.95	428 {2}		1214		0.90	0.86

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14.03	406 {2}	1214		0.90	0.86
15.11	374 {2}		1151 (1)	0.87	0.84
16.19	334 {2}		1038 (1)	0.84	0.78
17.26	285 {2}		893 (1)	0.81	0.70
18.34	227 {2}		723 (1)	0.78	0.58
19.42	160 {2}		535 (1)	0.75	0.45
20.50	85 {2}		256 (1)	0.75	2.21
21.58	0		0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left	End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	6.4	0.0	38.2	22.4	0.000	0.000	0.065 (A1)
1.08	12.80	6.2	0.0	34.4	23.3	0.000	0.000	0.065 (A1)
2.16	12.80	5.5	0.0	26.5	26.8	0.000	0.000	0.037 (C1)
3.24	12.80	4.8	0.0	17.7	26.9	0.000	0.000	0.037 (C1)
4.32	12.80	4.1	0.0	13.2	27.0	0.000	0.000	0.037 (C1)
5.39	12.80	3.4	0.0	10.4	27.0	0.000	0.000	0.037 (C1)
6.47	12.80	2.8	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
7.55	12.80	2.1	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
8.63	12.80	1.4	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
9.71	12.80	0.7	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
10.79	12.80	0.0	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
11.87	12.80	-0.7	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
12.95	12.80	-1.4	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
14.03	12.80	-2.1	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
15.11	12.80	-2.8	0.0	9.5	27.1	0.000	0.000	0.037 (C1)
16.18	12.80	-3.4	0.0	10.4	27.0	0.000	0.000	0.037 (C1)
17.26	12.80	-4.1	0.0	13.2	27.0	0.000	0.000	0.037 (C1)
18.34	12.80	-4.8	0.0	17.7	26.9	0.000	0.000	0.037 (C1)
19.42	12.80	-5.5	0.0	26.5	26.8	0.000	0.000	0.037 (C1)
20.50	12.80	-6.2	0.0	34.4	23.3	0.000	0.000	0.065 (A1)
20.75	12.80	-6.4	0.0	38.2	22.4	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.16
Creep Before Erection	-0.11	
Erection: PS+BM DL @ 30 days		-0.27
Change Due to Non-Comp.DL	-0.09	
30 days : PS+BM DL+Non-Comp.DL		-0.35
Change Due to Comp.DL+SustLL	0.10	
60 days : PS+All DL+Sust.LL		-0.26
Long Term Creep	0.14	
Final : PS+All DL+Sust.LL		-0.12
: PS+All DL+LL		-0.09

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 21.58 ft	Right Cant. = 0.00 ft
Beam Length = 21.58 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 39.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	194.873 in^2	Stc(Tpg)=	784.99 in^3	Stc(P/C)=	5116.87 in^3
Ic =	3708.94 in^4	Sbc =	328.95 in^3	Ybc =	11.275 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	21.58	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	21.58	0.000
Composite Dead Load	0.260	0.260	0.00	21.58	0.000
Live Load	0.098	0.098	0.00	21.58	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	21.58	0.000
Composite Dead Load	0.069	0.069	0.00	21.58	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	333	1764	320	1778	0.00
5.00	333	1763	257	1843	0.00
6.16	333	1764	294	1805	0.00
7.32	333	1764	322	1775	0.00
8.47	333	1765	343	1754	0.00
9.63	333	1765	355	1742	0.00
10.79	333	1765	360	1738	0.00
11.95	333	1765	355	1742	0.00
13.11	333	1765	343	1754	0.00
14.26	333	1764	322	1775	0.00
15.42	333	1764	294	1805	0.00
16.58	333	1763	257	1843	0.00
19.50	333	1764	320	1778	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.16	162.0	152.1	131.8	132.0	29.96	18.49
4.32	162.0	152.3	133.2	133.7	28.34	17.49
6.47	162.0	152.4	134.2	134.8	27.18	16.78
8.63	162.0	152.5	134.8	135.5	26.49	16.35
10.79	162.0	152.5	135.0	135.7	26.26	16.21
12.95	162.0	152.5	134.8	135.5	26.49	16.35
15.11	162.0	152.4	134.2	134.8	27.18	16.78
17.26	162.0	152.3	133.2	133.7	28.34	17.49
19.42	162.0	152.1	131.8	132.0	29.96	18.49
21.58	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment

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0.00	0	0	0	0	-0
2.16	18	-17	83	25	-84
4.32	31	-31	147	44	-85
6.47	41	-40	193	58	-86
8.63	47	-46	221	66	-86
10.79	49	-48	230	68	-86
12.95	47	-46	221	66	-86
15.11	41	-40	193	58	-86
17.26	31	-31	147	44	-85
19.42	18	-17	83	25	-84
21.58	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.08	217	722	45	159	658	59	162	620
2.16	417	1396	86	308	1277	112	313	1205
3.24	473	1349	122	317	1180	158	325	1078
4.32	520	1309	153	325	1095	199	335	968
5.39	561	1274	179	332	1024	233	343	875
6.47	594	1246	201	338	966	261	350	798
7.55	619	1224	218	342	921	282	356	739
8.63	638	1208	229	345	888	298	360	697
9.71	649	1199	237	347	869	307	362	671
10.79	653	1196	239	348	863	310	363	663
11.87	649	1199	237	347	869	307	362	671
12.95	638	1208	229	345	888	298	360	697
14.03	619	1224	218	342	921	282	356	739
15.11	594	1246	201	338	966	261	350	798
16.19	561	1274	179	332	1024	233	343	875
17.26	520	1309	153	325	1095	199	335	968
18.34	473	1349	122	317	1180	158	325	1078
19.42	417	1396	86	308	1277	112	313	1205
20.50	217	722	45	159	658	59	162	620
21.58	0	0	0	0	-0	0	0	-0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.08	73 {2}			253 (1)	0.75	2.38
2.16	139 {2}			530 (1)	0.75	0.52
3.24	197 {2}			718 (1)	0.78	0.69
4.32	247 {2}			886 (1)	0.81	0.82
5.39	290 {2}			1031 (1)	0.84	0.92
6.47	325 {2}			1143 (1)	0.87	0.99
7.55	352 {2}		1206		0.90	1.01
8.63	371 {2}		1206		0.90	1.01
9.71	383 {2}		1206		0.90	1.01
10.79	386 {2}	847*	1206		0.90	1.01
11.87	383 {2}		1206		0.90	1.01
12.95	371 {2}		1206		0.90	1.01

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14.03	352 {2}	1206		0.90	1.01
15.11	325 {2}		1143 (1)	0.87	0.99
16.19	290 {2}		1031 (1)	0.84	0.92
17.26	247 {2}		886 (1)	0.81	0.82
18.34	197 {2}		718 (1)	0.78	0.69
19.42	139 {2}		530 (1)	0.75	0.52
20.50	73 {2}		253 (1)	0.75	2.38
21.58	0		0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	5.5	0.0	37.4	22.7	0.000	0.000	0.065 (A1)
1.08	12.80	5.4	0.0	33.6	23.6	0.000	0.000	0.065 (A1)
2.16	12.80	4.8	0.0	25.9	27.4	0.000	0.000	0.037 (C1)
3.24	12.80	4.2	0.0	17.3	27.5	0.000	0.000	0.037 (C1)
4.32	12.80	3.6	0.0	12.9	27.6	0.000	0.000	0.037 (C1)
5.39	12.80	3.0	0.0	10.2	27.6	0.000	0.000	0.037 (C1)
6.47	12.80	2.4	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
7.55	12.80	1.8	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
8.63	12.80	1.2	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
9.71	12.80	0.6	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
10.79	12.80	0.0	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
11.87	12.80	-0.6	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
12.95	12.80	-1.2	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
14.03	12.80	-1.8	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
15.11	12.80	-2.4	0.0	9.5	27.7	0.000	0.000	0.037 (C1)
16.18	12.80	-3.0	0.0	10.2	27.6	0.000	0.000	0.037 (C1)
17.26	12.80	-3.6	0.0	12.9	27.6	0.000	0.000	0.037 (C1)
18.34	12.80	-4.2	0.0	17.3	27.5	0.000	0.000	0.037 (C1)
19.42	12.80	-4.8	0.0	25.9	27.4	0.000	0.000	0.037 (C1)
20.50	12.80	-5.4	0.0	33.6	23.6	0.000	0.000	0.065 (A1)
20.75	12.80	-5.5	0.0	37.4	22.7	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position: Midspan

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		(in)
Release : PS+BM DL		-0.16
Creep Before Erection	-0.11	
Erection: PS+BM DL @ 30 days		-0.27
Change Due to Non-Comp.DL	-0.09	
30 days : PS+BM DL+Non-Comp.DL		-0.35
Change Due to Comp.DL+SustLL	0.09	
60 days : PS+All DL+Sust.LL		-0.26
Long Term Creep	0.12	
Final : PS+All DL+Sust.LL		-0.14
: PS+All DL+LL		-0.11

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 6.25 ft	Right Cant. = 0.00 ft
Beam Length = 6.25 ft	Lift @ Left = 1.00 ft	Lift @ Right= 1.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 60.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	263.459 in^2	Stc(Tpg)=	1040.23 in^3	Stc(P/C)=	269618.75 in^3
Ic =	4177.05 in^4	Sbc =	348.54 in^3	Ybc =	11.985 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 3	# of Strand = 3.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3
Left end patt. :	2.75	2.00	2.00
Right end patt.:	2.75	2.00	2.00
No. of Strand :	1.00	1.00	1.00

Harping Profile: Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	4.75	1.38	0.4590
Right End of Beam----------	6.25	4.75	1.38	0.4590

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	6.25	0.000
Composite Dead Load	0.400	0.400	0.00	6.25	0.000
Live Load	0.150	0.150	0.00	6.25	0.000

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Non-comp. Dead Load	-0.069	-0.069	0.00	6.25	0.000
Composite Dead Load	0.069	0.069	0.00	6.25	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 1.00 ft from LEFT end and 1.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
1.42	228	1207	230	1205	0.00
1.85	296	1567	302	1561	0.00
2.08	333	1765	341	1757	0.00
2.28	333	1765	342	1756	0.00
2.70	333	1765	344	1754	0.00
3.13	333	1765	344	1753	0.00
3.55	333	1765	344	1754	0.00
3.97	333	1765	342	1756	0.00
4.17	333	1765	341	1757	0.00
4.40	296	1567	302	1561	0.00
4.82	228	1207	230	1205	0.00

NOTE: Required f'ci = 3500 psi based on assigned minimum.

STRAND STRESSES (Based on f'ci=3.500 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
0.63	162.0	151.9	39.1	39.2	122.84	75.82
1.25	162.0	151.9	78.3	78.3	83.67	51.65
1.88	162.0	151.9	117.4	117.5	44.51	27.47
2.50	162.0	152.0	130.5	130.6	31.40	19.39
3.13	162.0	152.0	130.5	130.6	31.38	19.37
3.75	162.0	152.0	130.5	130.6	31.40	19.39
4.38	162.0	151.9	117.4	117.5	44.51	27.47
5.00	162.0	151.9	78.3	78.3	83.67	51.65
5.63	162.0	151.9	39.1	39.2	122.84	75.82
6.25	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0

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0.63	1	-1	10	3	-7
1.25	3	-3	18	6	-30
1.88	3	-3	23	7	-67
2.50	4	-4	26	8	-83
3.13	4	-4	27	9	-83
3.75	4	-4	26	8	-83
4.38	3	-3	23	7	-67
5.00	3	-3	18	6	-30
5.63	1	-1	10	3	-7
6.25	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
0.31	49	221	4	43	212	5	43	208
0.63	97	443	8	86	426	10	86	417
0.94	144	666	11	129	641	15	129	629
1.25	191	889	14	172	858	18	172	843
1.56	237	1113	16	215	1077	21	215	1059
1.88	283	1338	18	258	1297	24	258	1277
2.19	314	1487	20	287	1443	26	287	1421
2.50	315	1486	21	287	1440	27	287	1416
2.81	316	1485	21	287	1437	28	287	1414
3.13	316	1485	22	287	1437	28	287	1413
3.44	316	1485	21	287	1437	28	287	1414
3.75	315	1486	21	287	1440	27	287	1416
4.06	314	1487	20	287	1443	26	287	1421
4.38	283	1338	18	258	1297	24	258	1277
4.69	237	1113	16	215	1077	21	215	1059
5.00	191	889	14	172	858	18	172	843
5.31	144	666	11	129	641	15	129	629
5.63	97	443	8	86	426	10	86	417
5.94	49	221	4	43	212	5	43	208
6.25	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

X(ft) From Left End	Required Mu by Fact'd Loads	Required Mu by 1.2*Mcr (ACI 9.6.2.1)	Provided phi*Mn by Strain-compat.	Provided phi*Mn by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
0.31	9 {2}			73 (4)	0.75	1.06
0.63	17 {2}			145 (4)	0.75	1.48
0.94	24 {2}			215 (4)	0.75	1.79
1.25	30 {2}			285 (4)	0.75	2.05
1.56	35 {2}			354 (4)	0.75	2.27
1.88	40 {2}			422 (4)	0.75	2.47
2.19	43 {2}			518 (4)	0.75	0.33
2.50	45 {2}			568 (4)	0.75	0.36
2.81	47 {2}			616 (4)	0.75	0.39
3.13	47 {2}	651*		661 (4)	0.75	0.42
3.44	47 {2}			616 (4)	0.75	0.39
3.75	45 {2}			568 (4)	0.75	0.36
4.06	43 {2}			518 (4)	0.75	0.33
4.38	40 {2}			422 (4)	0.75	2.47

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4.69	35 {2}	354 (4)	0.75	2.27
5.00	30 {2}	285 (4)	0.75	2.05
5.31	24 {2}	215 (4)	0.75	1.79
5.63	17 {2}	145 (4)	0.75	1.48
5.94	9 {2}	73 (4)	0.75	1.06
6.25	0	0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(3): Development length controlled by both strand and rebar.
(4): Development lengths overlap. Strength may be reduced.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	1.8	0.0	35.0	22.0	0.000	0.000	0.065 (A1)
0.94	12.80	1.8	0.0	32.6	22.3	0.000	0.000	0.065 (A1)
1.25	12.80	1.5	0.0	27.3	23.3	0.000	0.000	0.065 (A1)
1.56	12.80	1.3	0.0	23.2	24.2	0.000	0.000	0.065 (A1)
1.88	12.80	1.0	0.0	19.5	25.1	0.000	0.000	0.037 (C1)
2.19	12.80	0.8	0.0	15.5	25.8	0.000	0.000	0.037 (C1)
2.50	12.80	0.5	0.0	11.0	25.8	0.000	0.000	0.037 (C1)
2.81	12.80	0.3	0.0	9.5	25.8	0.000	0.000	0.037 (C1)
3.13	12.80	0.0	0.0	9.5	25.8	0.000	0.000	0.037 (C1)
3.44	12.80	-0.3	0.0	9.5	25.8	0.000	0.000	0.037 (C1)
3.75	12.80	-0.5	0.0	11.0	25.8	0.000	0.000	0.037 (C1)
4.06	12.80	-0.8	0.0	15.5	25.8	0.000	0.000	0.037 (C1)
4.38	12.80	-1.0	0.0	19.5	25.1	0.000	0.000	0.037 (C1)
4.69	12.80	-1.3	0.0	23.2	24.2	0.000	0.000	0.065 (A1)
5.00	12.80	-1.5	0.0	27.3	23.3	0.000	0.000	0.065 (A1)
5.31	12.80	-1.8	0.0	32.6	22.3	0.000	0.000	0.065 (A1)
5.42	12.80	-1.8	0.0	35.0	22.0	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 3.500 ksi, f'c = 6.000 ksi and ACI-209
Eci = 3587 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.02
Creep Before Erection	-0.01
Erection: PS+BM DL @ 30 days	-0.03
Change Due to Non-Comp.DL	-0.00
30 days : PS+BM DL+Non-Comp.DL	-0.03

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Change Due to Comp.DL+SustLL	0.00
60 days : PS+All DL+Sust.LL	-0.03
Long Term Creep	0.00
Final : PS+All DL+Sust.LL	-0.03
: PS+All DL+LL	-0.03

NOTE: Negative values indicate camber.

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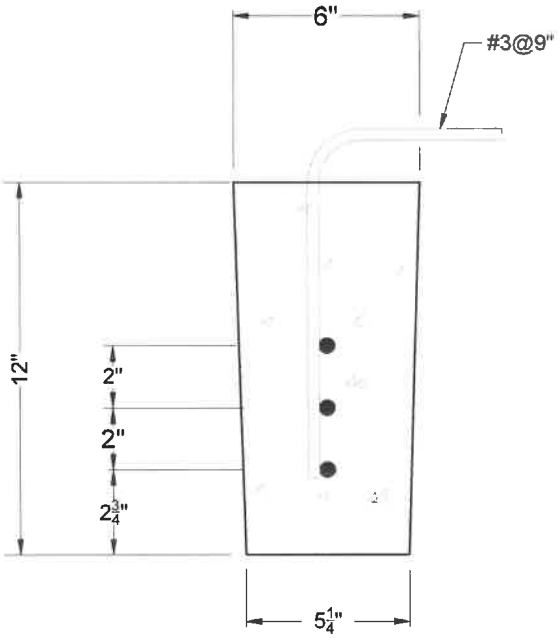

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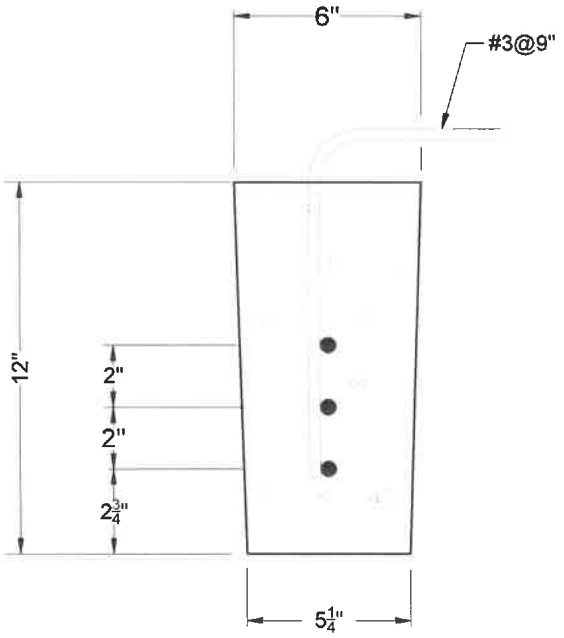


MIDSPAN

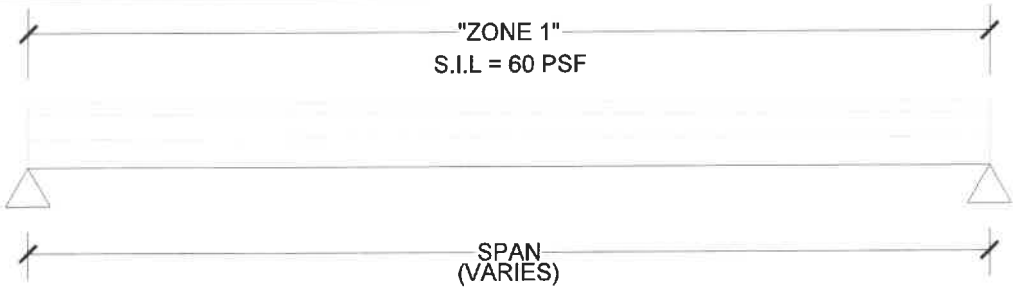
MK: J26, J27, J28	3-½" LOWLAX 270 KSI STRANDS NO HOLDDOWNS NO MILD STEEL PULL 0.60 PRECAST LENGTH = VARIES FROM 6.25FT TO 21.58FT	JOIST DESIGN GROUP 4

PRECAST JOIST
DESIGN GROUP 5

S.I.L. LOADING DATA							
LOADING DESIGNATION	DESCRIPTION	S.I.L. DL (PSF)	S.I.L. LL (PSF)	TOTAL SIL (PSF)	ADD'L POINT OR UNIFORM LOAD S.I.L. DL	ADD'L POINT OR UNIFORM LOAD S.I.L. LL	COMMENTS
Column1	Column2	Column3	Column4	Column5	Column6		
1	2nd Floor (Floor)	35	40	75			
2	2nd Floor (J3)	35	40	75	33plf; 85#		8x4 Conc Curb (plf); Add 150 lb Concent Load at curb returns
3	Roof Level	30	30	60			

JOIST DATA

LEVEL	JOIST ID	JOIST DEPTH (IN)	QTY	CLEAR SPAN (FT)	BEARING LENGTH LEFT (IN)	BEARING LENGTH RIGHT (IN)	CL BRG TO CL BRG (FT)	PRECAST LENGTH (FT)	TRIBUTARY WIDTH (IN)	SLAB THICKNESS (IN)	DESIGN ID	LOADING DESIGNATION	CONCRETE RELEASE STRENGTH (PSI)	Vu
ROOF LEVEL	J25	12	3	33.67	4.00	4.00	34.000	34.417	66.00	4.00	5	3	3500	14.4
ROOF LEVEL	J29	12	1	27.50	4.00	4.00	27.833	28.250	54.00	4.00	5	3	3500	9.7
ROOF LEVEL	J30	12	1	33.67	4.00	4.00	34.000	34.417	49.00	4.00	5	3	3500	11.0
ROOF LEVEL	J31	12	1	33.67	4.00	4.00	34.000	34.417	66.00	4.00	5	3	3500	14.4
ROOF LEVEL	J32	12	2	26.67	4.00	4.00	27.000	27.417	37.00	4.00	5	3	3500	6.8
ROOF LEVEL	J33	12	2	26.67	4.00	4.00	27.000	27.417	37.00	4.00	5	3	3500	6.8
ROOF LEVEL	J34	12	5	26.67	4.00	4.00	27.000	27.417	67.00	4.00	5	3	3500	11.5



J20 THRU J34

JOIST DESIGN LOAD MODEL

DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 34.42 ft	Right Cant. = 0.00 ft
Beam Length = 34.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	283.055 in^2	Stc(Tpg)=	1103.54 in^3	Stc(P/C)=	-34483.11 in^3
Ic =	4277.27 in^4	Sbc =	352.79 in^3	Ybc =	12.124 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand =	28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult =	1.000
# Str. lev. = 4	# of Strand = 4.00	LdMult =	1.000

Losses: PCI Comm. Report (RATIONAL) Strand Transformed -> NO

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	17.21
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	17.21	3.69	2.45	0.6120
Right End of Beam----------	34.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	34.42	0.000
Composite Dead Load	0.440	0.440	0.00	34.42	0.000
Live Load	0.165	0.165	0.00	34.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	34.42	0.000
Composite Dead Load	0.069	0.069	0.00	34.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	947	1817	934	1831	0.00
5.00	710	2055	633	2135	0.00
7.44	513	2256	600	2164	0.00
9.88	316	2454	532	2229	0.00
12.33	121	2650	428	2329	0.00
14.77	-73	2841	288	2463	0.00
17.21	-265	3027	114	2630	0.00
19.65	-73	2841	288	2463	0.00
22.09	121	2650	428	2329	0.00
24.54	316	2454	532	2229	0.00
26.98	513	2256	600	2164	0.00
29.42	710	2055	633	2135	0.00
32.34	947	1817	934	1831	0.00

NOTE: Required f'ci = 4383 psi at X = 17.21 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.383 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.5	0.0	0.0	162.00	100.00
3.44	162.0	151.5	133.0	134.0	28.00	17.28
6.88	162.0	151.3	137.3	139.2	22.83	14.09
10.33	162.0	151.1	140.1	142.8	19.23	11.87
13.77	162.0	150.5	140.7	143.9	18.07	11.15
17.21	162.0	149.7	139.9	143.4	18.56	11.46
20.65	162.0	150.5	140.7	143.9	18.07	11.15
24.09	162.0	151.1	140.1	142.8	19.23	11.87

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27.54	162.0	151.3	137.3	139.2	22.83	14.09
30.98	162.0	151.5	133.0	134.0	28.00	17.28
34.42	162.0	151.5	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	17.21	34.42
Lev 1	2.75	2.75	2.75
2	4.75	3.50	4.75
3	6.75	4.00	6.75
4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
3.44	45	-44	326	106	-65
6.88	80	-78	579	188	-103
10.33	105	-103	760	246	-142
13.77	120	-118	868	281	-179
17.21	125	-123	905	293	-215
20.65	120	-118	868	281	-179
24.09	105	-103	760	246	-142
27.54	80	-78	579	188	-103
30.98	45	-44	326	106	-65
34.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.72	870	1097	127	696	786	168	698	635
3.44	1062	1356	241	733	767	319	735	481
5.16	1087	1372	341	620	539	452	623	136
6.88	1088	1408	428	502	362	567	504	-142
8.60	1067	1460	502	380	235	665	380	-353
10.33	1024	1528	562	254	156	744	252	-498
12.05	959	1606	609	126	119	806	121	-586
13.77	876	1694	642	-3	125	851	-11	-613
15.49	774	1796	663	-132	178	877	-144	-579
17.21	656	1910	669	-260	275	886	-275	-484
18.93	774	1796	663	-132	178	877	-144	-579
20.65	876	1694	642	-3	125	851	-11	-613
22.37	959	1606	609	126	119	806	121	-586
24.09	1024	1528	562	254	156	744	252	-498
25.81	1067	1460	502	380	235	665	380	-353
27.54	1088	1408	428	502	362	567	504	-142
29.26	1087	1372	341	620	539	452	623	136
30.98	1062	1356	241	733	767	319	735	481
32.70	870	1097	127	696	786	168	698	635
34.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.72	296 {2}			519 (1)	0.75	2.71
3.44	561 {2}			987 (1)	0.79	0.58
5.16	794 {2}			1326 (1)	0.84	0.72
6.88	997 {2}			1572 (1)	0.89	0.80
8.60	1168 {2}		1627		0.90	0.80
10.33	1308 {2}		1657		0.90	0.80
12.05	1417 {2}		1688		0.90	0.80
13.77	1495 {2}		1719		0.90	0.80
15.49	1542 {2}		1749		0.90	0.80
17.21	1557 {2}	1451	1780		0.90	0.80
18.93	1542 {2}		1749		0.90	0.80
20.65	1495 {2}		1719		0.90	0.80
22.37	1417 {2}		1688		0.90	0.80
24.09	1308 {2}		1657		0.90	0.80
25.81	1168 {2}		1627		0.90	0.80
27.54	997 {2}			1572 (1)	0.89	0.80
29.26	794 {2}			1326 (1)	0.84	0.72
30.98	561 {2}			987 (1)	0.79	0.58
32.70	296 {2}			519 (1)	0.75	2.71
34.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	14.4	0.0	39.8	27.7	0.000	0.000	0.065 (A)	*
1.72	12.80	13.6	0.0	31.6	35.4	0.000	0.000	0.049 (C)	*
3.44	12.80	12.1	0.0	19.8	36.5	0.000	0.000	0.049 (C)	*
5.16	12.80	10.6	0.0	14.3	34.2	0.000	0.000	0.049 (C)	*
6.88	12.80	9.0	0.0	11.4	31.7	0.011	0.000	0.049 (C)	*
8.60	12.80	7.5	0.0	9.5	29.2	0.009	0.000	0.049 (C)	*
10.33	12.80	6.0	0.0	9.5	26.5	0.000	0.000	0.049 (C)	*
12.05	12.80	4.5	0.0	9.5	23.7	0.000	0.000	0.049 (C)	*
13.77	12.80	3.0	0.0	9.5	20.9	0.000	0.000	0.049 (C1)	
15.49	12.80	1.5	0.0	9.5	18.0	0.000	0.000	0.049 (C1)	
17.21	12.80	0.0	0.0	9.5	15.2	0.000	0.000	0.049 (C1)	
18.93	12.80	-1.5	0.0	9.5	18.0	0.000	0.000	0.049 (C1)	
20.65	12.80	-3.0	0.0	9.5	20.9	0.000	0.000	0.049 (C1)	
22.37	12.80	-4.5	0.0	9.5	23.7	0.000	0.000	0.049 (C)	*
24.09	12.80	-6.0	0.0	9.5	26.5	0.000	0.000	0.049 (C)	*
25.81	12.80	-7.5	0.0	9.5	29.2	0.009	0.000	0.049 (C)	*
27.54	12.80	-9.0	0.0	11.4	31.7	0.011	0.000	0.049 (C)	*
29.26	12.80	-10.6	0.0	14.3	34.2	0.000	0.000	0.049 (C)	*
30.98	12.80	-12.1	0.0	19.8	36.5	0.000	0.000	0.049 (C)	*
32.70	12.80	-13.6	0.0	31.6	35.4	0.000	0.000	0.049 (C)	*
33.59	12.80	-14.4	0.0	39.8	27.7	0.000	0.000	0.065 (A)	*

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).

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NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.383 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4013 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.22
Erection: PS+BM DL @ 30 days	-0.59
Change Due to Non-Comp.DL	-0.57
30 days : PS+BM DL+Non-Comp.DL	-1.16
Change Due to Comp.DL+SustLL	0.79
60 days : PS+All DL+Sust.LL	-0.38
Long Term Creep	1.07
Final : PS+All DL+Sust.LL	0.69
: PS+All DL+LL	0.95

NOTE: Negative values indicate camber.
NOTE: Beam has cracked under positive moment; deflections are based on a bilinear moment-deflection relationship using extended Icr.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 28.25 ft	Right Cant. = 0.00 ft
Beam Length = 28.25 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 54.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	243.863 in^2	Stc(Tpg)=	973.06 in^3	Stc(P/C)=	22907.42 in^3
Ic =	4064.93 in^4	Sbc =	343.83 in^3	Ybc =	11.823 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure = 0.900		Strand Developmt = 0.750	
Factors : Compression-controlled Flexure = 0.650		Shear & Torsion = 0.750	

Load Cases:
1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 4	# of Strand = 4.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	14.13
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	14.13	3.69	2.45	0.6120
Right End of Beam----------	28.25	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	28.25	0.000
Composite Dead Load	0.360	0.360	0.00	28.25	0.000
Live Load	0.135	0.135	0.00	28.25	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	28.25	0.000
Composite Dead Load	0.069	0.069	0.00	28.25	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	912	1859	899	1873	0.00
5.00	623	2149	546	2229	0.00
6.82	443	2330	458	2314	0.00
8.65	264	2509	351	2418	0.00
10.48	86	2685	224	2541	0.00
12.30	-90	2857	78	2681	0.00
14.13	-265	3025	-87	2839	0.00
15.95	-91	2858	77	2682	0.00
17.77	86	2685	223	2541	0.00
19.60	264	2509	350	2419	0.00
21.42	443	2331	458	2315	0.00
23.25	623	2149	546	2229	0.00
26.17	912	1859	899	1873	0.00

NOTE: Required f'ci = 4731 psi at X = 14.13 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.731 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.83	162.0	151.7	130.7	131.2	30.76	18.99
5.65	162.0	151.4	132.6	133.7	28.32	17.48
8.48	162.0	151.0	133.5	135.0	26.97	16.65
11.30	162.0	150.3	133.3	135.1	26.91	16.61
14.13	162.0	149.3	131.7	133.7	28.29	17.46
16.95	162.0	150.3	133.3	135.1	26.91	16.61
19.77	162.0	151.0	133.5	135.0	26.98	16.65

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22.60	162.0	151.4	132.6	133.7	28.32	17.48
25.42	162.0	151.7	130.7	131.2	30.76	18.99
28.25	162.0	151.9	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=		0.00	14.13	28.25
Lev	1	2.75	2.75	2.75
	2	4.75	3.50	4.75
	3	6.75	4.00	6.75
	4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.83	30	-30	185	58	-64
5.65	54	-53	329	103	-99
8.48	71	-69	431	136	-134
11.30	81	-79	493	155	-168
14.13	84	-83	514	162	-200
16.95	81	-79	493	155	-168
19.77	71	-69	431	136	-134
22.60	54	-53	329	103	-99
25.42	30	-30	185	58	-64
28.25	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
Left End	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.41	685	919	82	575	754	108	578	668
2.83	943	1438	155	735	1125	204	741	963
4.24	920	1482	220	626	1039	289	633	811
5.65	882	1537	276	513	982	363	521	697
7.06	829	1603	323	397	953	425	406	621
8.48	763	1679	362	279	950	476	287	580
9.89	684	1763	392	159	973	516	167	575
11.30	592	1853	414	38	1021	544	45	603
12.71	489	1950	427	-82	1091	561	-77	663
14.13	375	2051	431	-202	1184	567	-198	754
15.54	488	1951	427	-83	1092	561	-78	664
16.95	591	1854	414	37	1021	544	44	603
18.36	683	1763	392	158	974	516	166	575
19.77	763	1679	362	278	951	476	287	581
21.19	829	1604	323	396	953	425	405	621
22.60	882	1538	276	513	983	363	521	698
24.01	920	1482	220	626	1040	289	633	811
25.42	943	1438	155	735	1126	204	741	964
26.84	685	919	82	575	754	108	578	669
28.25	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.41	167 {2}			398 (1)	0.75	2.63
2.83	316 {2}			809 (1)	0.77	0.60
4.24	447 {2}			1118 (1)	0.81	0.77
5.65	561 {2}			1385 (1)	0.85	0.90
7.06	658 {2}			1585 (1)	0.89	0.97
8.48	736 {2}		1646		0.90	0.97
9.89	798 {2}		1676		0.90	0.97
11.30	842 {2}		1707		0.90	0.98
12.71	868 {2}		1738		0.90	0.98
14.13	877 {2}	1346*	1769		0.90	0.98
15.54	868 {2}		1738		0.90	0.98
16.95	842 {2}		1707		0.90	0.98
18.36	798 {2}		1677		0.90	0.98
19.77	736 {2}		1646		0.90	0.97
21.19	658 {2}			1585 (1)	0.89	0.97
22.60	561 {2}			1385 (1)	0.85	0.90
24.01	447 {2}			1118 (1)	0.81	0.77
25.42	316 {2}			809 (1)	0.77	0.60
26.84	167 {2}			398 (1)	0.75	2.63
28.25	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	9.7	0.0	38.7	27.7	0.000	0.000	0.065 (A1)
1.41	12.80	9.3	0.0	32.3	32.7	0.000	0.000	0.065 (A1)
2.83	12.80	8.3	0.0	22.6	36.6	0.000	0.000	0.049 (C1)
4.24	12.80	7.2	0.0	16.0	34.2	0.000	0.000	0.049 (C) *
5.65	12.80	6.2	0.0	12.6	31.8	0.000	0.000	0.049 (C) *
7.06	12.80	5.2	0.0	10.3	29.4	0.000	0.000	0.049 (C) *
8.48	12.80	4.1	0.0	9.5	26.8	0.000	0.000	0.049 (C) *
9.89	12.80	3.1	0.0	9.5	24.3	0.000	0.000	0.049 (C1)
11.30	12.80	2.1	0.0	9.5	21.7	0.000	0.000	0.049 (C1)
12.71	12.80	1.0	0.0	9.5	19.1	0.000	0.000	0.049 (C1)
14.13	12.80	0.0	0.0	9.5	16.5	0.000	0.000	0.049 (C1)
15.54	12.80	-1.0	0.0	9.5	19.1	0.000	0.000	0.049 (C1)
16.95	12.80	-2.1	0.0	9.5	21.7	0.000	0.000	0.049 (C1)
18.36	12.80	-3.1	0.0	9.5	24.2	0.000	0.000	0.049 (C1)
19.77	12.80	-4.1	0.0	9.5	26.8	0.000	0.000	0.049 (C) *
21.19	12.80	-5.2	0.0	10.3	29.3	0.000	0.000	0.049 (C) *
22.60	12.80	-6.2	0.0	12.6	31.8	0.000	0.000	0.049 (C) *
24.01	12.80	-7.2	0.0	16.0	34.2	0.000	0.000	0.049 (C) *
25.43	12.80	-8.3	0.0	22.6	36.6	0.000	0.000	0.049 (C1)
26.84	12.80	-9.3	0.0	32.3	32.7	0.000	0.000	0.065 (A1)
27.42	12.80	-9.7	0.0	38.7	27.7	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)

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(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.731 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4170 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.39
Creep Before Erection	-0.25
Erection: PS+BM DL @ 30 days	-0.64
Change Due to Non-Comp.DL	-0.26
30 days : PS+BM DL+Non-Comp.DL	-0.90
Change Due to Comp.DL+SustLL	0.32
60 days : PS+All DL+Sust.LL	-0.58
Long Term Creep	0.39
Final : PS+All DL+Sust.LL	-0.19
: PS+All DL+LL	-0.10

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 34.42 ft	Right Cant. = 0.00 ft
Beam Length = 34.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 49.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	227.533 in^2	Stc(Tpg)=	913.80 in^3	Stc(P/C)=	11866.60 in^3
Ic =	3960.17 in^4	Sbc =	339.45 in^3	Ybc =	11.666 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand =	28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult =	1.000
# Str. lev. = 4	# of Strand = 4.00	LdMult =	1.000

Losses: PCI Comm. Report (RATIONAL) Strand Transformed -> NO

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	17.21
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	17.21	3.69	2.45	0.6120
Right End of Beam----------	34.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	34.42	0.000
Composite Dead Load	0.327	0.327	0.00	34.42	0.000
Live Load	0.123	0.123	0.00	34.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	34.42	0.000
Composite Dead Load	0.069	0.069	0.00	34.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	947	1817	934	1831	0.00
5.00	710	2055	633	2135	0.00
7.44	513	2256	600	2164	0.00
9.88	316	2454	532	2229	0.00
12.33	121	2650	428	2329	0.00
14.77	-73	2841	288	2463	0.00
17.21	-265	3027	114	2630	0.00
19.65	-73	2841	288	2463	0.00
22.09	121	2650	428	2329	0.00
24.54	316	2454	532	2229	0.00
26.98	513	2256	600	2164	0.00
29.42	710	2055	633	2135	0.00
32.34	947	1817	934	1831	0.00

NOTE: Required f'ci = 4383 psi at X = 17.21 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.383 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.5	0.0	0.0	162.00	100.00
3.44	162.0	151.5	131.7	132.5	29.55	18.24
6.88	162.0	151.3	134.9	136.3	25.70	15.86
10.33	162.0	151.1	136.8	138.8	23.16	14.30
13.77	162.0	150.5	137.4	139.8	22.20	13.70
17.21	162.0	149.7	136.3	138.9	23.07	14.24
20.65	162.0	150.5	137.4	139.8	22.20	13.70
24.09	162.0	151.1	136.8	138.8	23.16	14.30

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27.54	162.0	151.3	134.9	136.3	25.70	15.86
30.98	162.0	151.5	131.7	132.5	29.55	18.24
34.42	162.0	151.5	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	17.21	34.42
Lev 1	2.75	2.75	2.75
2	4.75	3.50	4.75
3	6.75	4.00	6.75
4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
3.44	45	-44	253	79	-65
6.88	80	-78	450	140	-101
10.33	105	-103	591	184	-138
13.77	120	-118	676	210	-174
17.21	125	-123	704	219	-208
20.65	120	-118	676	210	-174
24.09	105	-103	591	184	-138
27.54	80	-78	450	140	-101
30.98	45	-44	253	79	-65
34.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.72	866	1089	119	708	872	157	714	754
3.44	1055	1339	226	756	928	297	767	706
5.16	1078	1347	321	655	764	420	670	451
6.88	1079	1373	402	548	641	527	565	250
8.60	1059	1415	472	436	558	618	455	102
10.33	1017	1474	528	320	514	692	339	6
12.05	956	1547	572	201	506	750	220	-40
13.77	876	1632	604	79	535	791	96	-39
15.49	777	1729	623	-44	597	816	-28	9
17.21	662	1834	629	-168	691	824	-154	102
18.93	777	1729	623	-44	597	816	-28	9
20.65	876	1632	604	79	535	791	96	-39
22.37	956	1547	572	201	506	750	220	-40
24.09	1017	1474	528	320	514	692	339	6
25.81	1059	1415	472	436	558	618	455	102
27.54	1079	1373	402	548	641	527	565	250
29.26	1078	1347	321	655	764	420	670	451
30.98	1055	1339	226	756	928	297	767	706
32.70	866	1089	119	708	872	157	714	754
34.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.72	227 {2}			496 (1)	0.75	3.06
3.44	431 {2}			960 (1)	0.79	0.77
5.16	610 {2}			1298 (1)	0.84	0.96
6.88	766 {2}			1546 (1)	0.89	1.07
8.60	898 {2}		1609		0.90	1.07
10.33	1005 {2}		1639		0.90	1.07
12.05	1089 {2}		1670		0.90	1.07
13.77	1149 {2}		1701		0.90	1.07
15.49	1185 {2}		1732		0.90	1.07
17.21	1197 {2}	1365	1762		0.90	1.07
18.93	1185 {2}		1732		0.90	1.07
20.65	1149 {2}		1701		0.90	1.07
22.37	1089 {2}		1670		0.90	1.07
24.09	1005 {2}		1639		0.90	1.07
25.81	898 {2}		1609		0.90	1.07
27.54	766 {2}			1546 (1)	0.89	1.07
29.26	610 {2}			1298 (1)	0.84	0.96
30.98	431 {2}			960 (1)	0.79	0.77
32.70	227 {2}			496 (1)	0.75	3.06
34.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	11.0	0.0	38.3	27.8	0.000	0.000	0.065 (A)	*
1.72	12.80	10.4	0.0	30.4	35.6	0.000	0.000	0.065 (A1)	
3.44	12.80	9.3	0.0	19.1	36.9	0.000	0.000	0.049 (C)	*
5.16	12.80	8.1	0.0	13.7	34.7	0.000	0.000	0.049 (C)	*
6.88	12.80	7.0	0.0	10.9	32.4	0.000	0.000	0.049 (C)	*
8.60	12.80	5.8	0.0	9.5	30.0	0.000	0.000	0.049 (C)	*
10.33	12.80	4.6	0.0	9.5	27.5	0.000	0.000	0.049 (C)	*
12.05	12.80	3.5	0.0	9.5	25.0	0.000	0.000	0.049 (C1)	
13.77	12.80	2.3	0.0	9.5	22.4	0.000	0.000	0.049 (C1)	
15.49	12.80	1.2	0.0	9.5	19.8	0.000	0.000	0.049 (C1)	
17.21	12.80	0.0	0.0	9.5	17.2	0.000	0.000	0.049 (C1)	
18.93	12.80	-1.2	0.0	9.5	19.8	0.000	0.000	0.049 (C1)	
20.65	12.80	-2.3	0.0	9.5	22.4	0.000	0.000	0.049 (C1)	
22.37	12.80	-3.5	0.0	9.5	25.0	0.000	0.000	0.049 (C1)	
24.09	12.80	-4.6	0.0	9.5	27.5	0.000	0.000	0.049 (C)	*
25.81	12.80	-5.8	0.0	9.5	30.0	0.000	0.000	0.049 (C)	*
27.54	12.80	-7.0	0.0	10.9	32.4	0.000	0.000	0.049 (C)	*
29.26	12.80	-8.1	0.0	13.7	34.7	0.000	0.000	0.049 (C)	*
30.98	12.80	-9.3	0.0	19.1	36.9	0.000	0.000	0.049 (C)	*
32.70	12.80	-10.4	0.0	30.4	35.6	0.000	0.000	0.065 (A1)	
33.59	12.80	-11.0	0.0	38.3	27.8	0.000	0.000	0.065 (A)	*

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).

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NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.383 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4013 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.22
Erection: PS+BM DL @ 30 days	-0.59
Change Due to Non-Comp.DL	-0.57
30 days : PS+BM DL+Non-Comp.DL	-1.16
Change Due to Comp.DL+SustLL	0.66
60 days : PS+All DL+Sust.LL	-0.50
Long Term Creep	0.87
Final : PS+All DL+Sust.LL	0.37
: PS+All DL+LL	0.57

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 34.42 ft	Right Cant. = 0.00 ft
Beam Length = 34.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 66.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	283.055 in^2	Stc(Tpg)=	1103.54 in^3	Stc(P/C)=	-34483.11 in^3
Ic =	4277.27 in^4	Sbc =	352.79 in^3	Ybc =	12.124 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 4	# of Strand = 4.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	17.21
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	17.21	3.69	2.45	0.6120
Right End of Beam----------	34.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	34.42	0.000
Composite Dead Load	0.440	0.440	0.00	34.42	0.000
Live Load	0.165	0.165	0.00	34.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	34.42	0.000
Composite Dead Load	0.069	0.069	0.00	34.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	947	1817	934	1831	0.00
5.00	710	2055	633	2135	0.00
7.44	513	2256	600	2164	0.00
9.88	316	2454	532	2229	0.00
12.33	121	2650	428	2329	0.00
14.77	-73	2841	288	2463	0.00
17.21	-265	3027	114	2630	0.00
19.65	-73	2841	288	2463	0.00
22.09	121	2650	428	2329	0.00
24.54	316	2454	532	2229	0.00
26.98	513	2256	600	2164	0.00
29.42	710	2055	633	2135	0.00
32.34	947	1817	934	1831	0.00

NOTE: Required f'ci = 4383 psi at X = 17.21 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.383 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.5	0.0	0.0	162.00	100.00
3.44	162.0	151.5	133.0	134.0	28.00	17.28
6.88	162.0	151.3	137.3	139.2	22.83	14.09
10.33	162.0	151.1	140.1	142.8	19.23	11.87
13.77	162.0	150.5	140.7	143.9	18.07	11.15
17.21	162.0	149.7	139.9	143.4	18.56	11.46
20.65	162.0	150.5	140.7	143.9	18.07	11.15
24.09	162.0	151.1	140.1	142.8	19.23	11.87

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27.54	162.0	151.3	137.3	139.2	22.83	14.09
30.98	162.0	151.5	133.0	134.0	28.00	17.28
34.42	162.0	151.5	0.0	0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	17.21	34.42
Lev 1	2.75	2.75	2.75
2	4.75	3.50	4.75
3	6.75	4.00	6.75
4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
3.44	45	-44	326	106	-65
6.88	80	-78	579	188	-103
10.33	105	-103	760	246	-142
13.77	120	-118	868	281	-179
17.21	125	-123	905	293	-215
20.65	120	-118	868	281	-179
24.09	105	-103	760	246	-142
27.54	80	-78	579	188	-103
30.98	45	-44	326	106	-65
34.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM Top	FP + BM Bot	FP + DL + Sustained LL Tpg	FP + DL + Sustained LL Top	FP + DL + Sustained LL Bot	FP + DL + All LL Tpg	FP + DL + All LL Top	FP + DL + All LL Bot
0.00	0	0	0	0	0	0	0	0
1.72	870	1097	127	696	786	168	698	635
3.44	1062	1356	241	733	767	319	735	481
5.16	1087	1372	341	620	539	452	623	136
6.88	1088	1408	428	502	362	567	504	-142
8.60	1067	1460	502	380	235	665	380	-353
10.33	1024	1528	562	254	156	744	252	-498
12.05	959	1606	609	126	119	806	121	-586
13.77	876	1694	642	-3	125	851	-11	-613
15.49	774	1796	663	-132	178	877	-144	-579
17.21	656	1910	669	-260	275	886	-275	-484
18.93	774	1796	663	-132	178	877	-144	-579
20.65	876	1694	642	-3	125	851	-11	-613
22.37	959	1606	609	126	119	806	121	-586
24.09	1024	1528	562	254	156	744	252	-498
25.81	1067	1460	502	380	235	665	380	-353
27.54	1088	1408	428	502	362	567	504	-142
29.26	1087	1372	341	620	539	452	623	136
30.98	1062	1356	241	733	767	319	735	481
32.70	870	1097	127	696	786	168	698	635
34.42	0	0	0	0	0	0	0	0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

	Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.72	296 {2}			519 (1)	0.75	2.71
3.44	561 {2}			987 (1)	0.79	0.58
5.16	794 {2}			1326 (1)	0.84	0.72
6.88	997 {2}			1572 (1)	0.89	0.80
8.60	1168 {2}		1627		0.90	0.80
10.33	1308 {2}		1657		0.90	0.80
12.05	1417 {2}		1688		0.90	0.80
13.77	1495 {2}		1719		0.90	0.80
15.49	1542 {2}		1749		0.90	0.80
17.21	1557 {2}	1451	1780		0.90	0.80
18.93	1542 {2}		1749		0.90	0.80
20.65	1495 {2}		1719		0.90	0.80
22.37	1417 {2}		1688		0.90	0.80
24.09	1308 {2}		1657		0.90	0.80
25.81	1168 {2}		1627		0.90	0.80
27.54	997 {2}			1572 (1)	0.89	0.80
29.26	794 {2}			1326 (1)	0.84	0.72
30.98	561 {2}			987 (1)	0.79	0.58
32.70	296 {2}			519 (1)	0.75	2.71
34.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	14.4	0.0	39.8	27.7	0.000	0.000	0.065 (A)	*
1.72	12.80	13.6	0.0	31.6	35.4	0.000	0.000	0.049 (C)	*
3.44	12.80	12.1	0.0	19.8	36.5	0.000	0.000	0.049 (C)	*
5.16	12.80	10.6	0.0	14.3	34.2	0.000	0.000	0.049 (C)	*
6.88	12.80	9.0	0.0	11.4	31.7	0.011	0.000	0.049 (C)	*
8.60	12.80	7.5	0.0	9.5	29.2	0.009	0.000	0.049 (C)	*
10.33	12.80	6.0	0.0	9.5	26.5	0.000	0.000	0.049 (C)	*
12.05	12.80	4.5	0.0	9.5	23.7	0.000	0.000	0.049 (C)	*
13.77	12.80	3.0	0.0	9.5	20.9	0.000	0.000	0.049 (C1)	
15.49	12.80	1.5	0.0	9.5	18.0	0.000	0.000	0.049 (C1)	
17.21	12.80	0.0	0.0	9.5	15.2	0.000	0.000	0.049 (C1)	
18.93	12.80	-1.5	0.0	9.5	18.0	0.000	0.000	0.049 (C1)	
20.65	12.80	-3.0	0.0	9.5	20.9	0.000	0.000	0.049 (C1)	
22.37	12.80	-4.5	0.0	9.5	23.7	0.000	0.000	0.049 (C)	*
24.09	12.80	-6.0	0.0	9.5	26.5	0.000	0.000	0.049 (C)	*
25.81	12.80	-7.5	0.0	9.5	29.2	0.009	0.000	0.049 (C)	*
27.54	12.80	-9.0	0.0	11.4	31.7	0.011	0.000	0.049 (C)	*
29.26	12.80	-10.6	0.0	14.3	34.2	0.000	0.000	0.049 (C)	*
30.98	12.80	-12.1	0.0	19.8	36.5	0.000	0.000	0.049 (C)	*
32.70	12.80	-13.6	0.0	31.6	35.4	0.000	0.000	0.049 (C)	*
33.59	12.80	-14.4	0.0	39.8	27.7	0.000	0.000	0.065 (A)	*

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).

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NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.383 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4013 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.22
Erection: PS+BM DL @ 30 days	-0.59
Change Due to Non-Comp.DL	-0.57
30 days : PS+BM DL+Non-Comp.DL	-1.16
Change Due to Comp.DL+SustLL	0.79
60 days : PS+All DL+Sust.LL	-0.38
Long Term Creep	1.07
Final : PS+All DL+Sust.LL	0.69
: PS+All DL+LL	0.95

NOTE: Negative values indicate camber.
NOTE: Beam has cracked under positive moment; deflections are based on a bilinear moment-deflection relationship using extended Icr.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 27.42 ft	Right Cant. = 0.00 ft
Beam Length = 27.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 37.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	188.341 in^2	Stc(Tpg)=	757.37 in^3	Stc(P/C)=	4454.83 in^3
Ic =	3650.05 in^4	Sbc =	326.46 in^3	Ybc =	11.181 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi	
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000	
# Str. lev. = 4	# of Strand = 4.00	LdMult = 1.000	
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO		

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.: 1
at X 13.71

Lev	1	2.75
	2	3.50
	3	4.00
	4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	13.71	3.69	2.45	0.6120
Right End of Beam----------	27.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	27.42	0.000
Composite Dead Load	0.247	0.247	0.00	27.42	0.000
Live Load	0.093	0.093	0.00	27.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	27.42	0.000
Composite Dead Load	0.069	0.069	0.00	27.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	906	1866	893	1879	0.00
5.00	608	2165	531	2245	0.00
6.74	431	2343	438	2335	0.00
8.48	255	2518	327	2443	0.00
10.23	80	2691	199	2567	0.00
11.97	-93	2860	53	2707	0.00
13.71	-265	3025	-110	2862	0.00
15.45	-93	2860	53	2707	0.00
17.19	80	2691	199	2567	0.00
18.94	255	2518	327	2443	0.00
20.68	431	2343	438	2335	0.00
22.42	608	2165	531	2245	0.00
25.34	906	1866	893	1879	0.00

NOTE: Required f'ci = 4770 psi at X = 13.71 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.770 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.74	162.0	151.8	129.7	130.0	31.96	19.73
5.48	162.0	151.5	130.7	131.4	30.59	18.88
8.23	162.0	151.0	130.9	131.9	30.11	18.59
10.97	162.0	150.3	130.2	131.3	30.66	18.92
13.71	162.0	149.2	128.3	129.6	32.36	19.98
16.45	162.0	150.3	130.2	131.3	30.66	18.92
19.19	162.0	151.0	130.9	131.9	30.11	18.59

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21.94	162.0	151.5	130.7	131.4	30.59	18.88
24.68	162.0	151.8	129.7	130.0	31.96	19.73
27.42	162.0	151.6	-0.0	-0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=		0.00	13.71	27.42
Lev	1	2.75	2.75	2.75
	2	4.75	3.50	4.75
	3	6.75	4.00	6.75
	4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.74	29	-28	128	38	-63
5.48	51	-50	228	67	-97
8.23	67	-65	299	88	-131
10.97	76	-75	342	101	-163
13.71	79	-78	356	105	-194
16.45	76	-75	342	101	-163
19.19	67	-65	299	88	-131
21.94	51	-50	228	67	-97
24.68	29	-28	128	38	-63
27.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.37	658	890	73	566	795	94	572	736
2.74	925	1438	138	750	1258	179	761	1147
4.11	895	1481	196	648	1225	254	662	1068
5.48	852	1533	246	542	1212	318	560	1017
6.86	796	1596	288	433	1219	373	453	992
8.23	728	1667	323	321	1245	418	343	992
9.60	648	1745	350	207	1289	453	230	1016
10.97	557	1831	369	92	1350	477	115	1063
12.34	456	1923	380	-23	1426	492	-1	1132
13.71	345	2019	384	-139	1517	497	-118	1223
15.08	456	1923	380	-23	1426	492	-1	1132
16.45	557	1831	369	92	1350	477	115	1063
17.82	648	1745	350	207	1289	453	230	1016
19.19	728	1667	323	321	1245	418	343	992
20.56	796	1596	288	433	1219	373	453	992
21.94	852	1533	246	542	1212	318	560	1017
23.31	895	1481	196	648	1225	254	662	1068
24.68	925	1438	138	750	1258	179	761	1147
26.05	658	890	73	566	795	94	572	736
27.42	0	0	0	0	-0	0	0	-0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.37	113 {2}			369 (1)	0.75	3.03
2.74	215 {2}			765 (1)	0.77	0.83
4.11	305 {2}			1063 (1)	0.81	1.09
5.48	382 {2}			1325 (1)	0.84	1.28
6.86	448 {2}			1530 (1)	0.88	1.40
8.23	502 {2}		1617		0.90	1.42
9.60	543 {2}		1647		0.90	1.42
10.97	573 {2}		1678		0.90	1.42
12.34	591 {2}		1709		0.90	1.42
13.71	597 {2}	1251*	1739		0.90	1.42
15.08	591 {2}		1709		0.90	1.42
16.45	573 {2}		1678		0.90	1.42
17.82	543 {2}		1647		0.90	1.42
19.19	502 {2}		1617		0.90	1.42
20.56	448 {2}			1530 (1)	0.88	1.40
21.94	382 {2}			1325 (1)	0.84	1.28
23.31	305 {2}			1063 (1)	0.81	1.09
24.68	215 {2}			765 (1)	0.77	0.83
26.05	113 {2}			369 (1)	0.75	3.03
27.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	6.8	0.0	36.8	27.9	0.000	0.000	0.065 (A1)
1.37	12.80	6.5	0.0	31.0	32.8	0.000	0.000	0.065 (A1)
2.74	12.80	5.8	0.0	22.1	37.5	0.000	0.000	0.049 (C1)
4.11	12.80	5.1	0.0	15.6	35.4	0.000	0.000	0.049 (C1)
5.48	12.80	4.4	0.0	12.2	33.3	0.000	0.000	0.049 (C1)
6.86	12.80	3.6	0.0	10.0	31.1	0.000	0.000	0.049 (C1)
8.23	12.80	2.9	0.0	9.5	28.9	0.000	0.000	0.049 (C1)
9.60	12.80	2.2	0.0	9.5	26.7	0.000	0.000	0.049 (C1)
10.97	12.80	1.5	0.0	9.5	24.4	0.000	0.000	0.049 (C1)
12.34	12.80	0.7	0.0	9.5	22.2	0.000	0.000	0.049 (C1)
13.71	12.80	0.0	0.0	9.5	18.0	0.000	0.000	0.049 (C1)
15.08	12.80	-0.7	0.0	9.5	22.2	0.000	0.000	0.049 (C1)
16.45	12.80	-1.5	0.0	9.5	24.4	0.000	0.000	0.049 (C1)
17.82	12.80	-2.2	0.0	9.5	26.7	0.000	0.000	0.049 (C1)
19.19	12.80	-2.9	0.0	9.5	28.9	0.000	0.000	0.049 (C1)
20.57	12.80	-3.6	0.0	10.0	31.1	0.000	0.000	0.049 (C1)
21.94	12.80	-4.4	0.0	12.2	33.3	0.000	0.000	0.049 (C1)
23.31	12.80	-5.1	0.0	15.6	35.4	0.000	0.000	0.049 (C1)
24.68	12.80	-5.8	0.0	22.1	37.5	0.000	0.000	0.049 (C1)
26.05	12.80	-6.5	0.0	31.0	32.8	0.000	0.000	0.065 (A1)
26.59	12.80	-6.8	0.0	36.8	27.9	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)

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(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.770 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4187 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.25
Erection: PS+BM DL @ 30 days	-0.63
Change Due to Non-Comp.DL	-0.23
30 days : PS+BM DL+Non-Comp.DL	-0.86
Change Due to Comp.DL+SustLL	0.23
60 days : PS+All DL+Sust.LL	-0.63
Long Term Creep	0.26
Final : PS+All DL+Sust.LL	-0.37
: PS+All DL+LL	-0.31

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 27.42 ft	Right Cant. = 0.00 ft
Beam Length = 27.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 37.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)				Height =	12.000 in
Area =	67.500 in^2	St =	137.86 in^3	Yt =	5.867 in
I =	808.80 in^4	Sb =	131.87 in^3	Yb =	6.133 in
Vol/Surf =	1.914 in				
Composite : (Based on above section dimensions)				Height =	16.000 in
Ac =	188.341 in^2	Stc(Tpg)=	757.37 in^3	Stc(P/C)=	4454.83 in^3
Ic =	3650.05 in^4	Sbc =	326.46 in^3	Ybc =	11.181 in

Miscellaneous : (Governing code is ACI 318-14)

Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR	
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.	
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.	
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06	
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000	
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM	
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c	
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750	
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750	

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION Strain Curve: PCI Handbk)

Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand =	28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult =	1.000
# Str. lev. = 4	# of Strand = 4.00	LdMult =	1.000

Losses: PCI Comm. Report (RATIONAL) Strand Transformed -> NO

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.: 1
at X 13.71

Lev	1	2.75
	2	3.50
	3	4.00
	4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	13.71	3.69	2.45	0.6120
Right End of Beam----------	27.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Magnitude of Load Ending (k/ft)	Distance From Left Beginning (ft)	Distance From Left Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	27.42	0.000
Composite Dead Load	0.247	0.247	0.00	27.42	0.000
Live Load	0.093	0.093	0.00	27.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	27.42	0.000
Composite Dead Load	0.069	0.069	0.00	27.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Initial P/S Bot.	Init.P/S + BM Top	Init.P/S + BM Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	906	1866	893	1879	0.00
5.00	608	2165	531	2245	0.00
6.74	431	2343	438	2335	0.00
8.48	255	2518	327	2443	0.00
10.23	80	2691	199	2567	0.00
11.97	-93	2860	53	2707	0.00
13.71	-265	3025	-110	2862	0.00
15.45	-93	2860	53	2707	0.00
17.19	80	2691	199	2567	0.00
18.94	255	2518	327	2443	0.00
20.68	431	2343	438	2335	0.00
22.42	608	2165	531	2245	0.00
25.34	906	1866	893	1879	0.00

NOTE: Required f'ci = 4770 psi at X = 13.71 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.770 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.74	162.0	151.8	129.7	130.0	31.96	19.73
5.48	162.0	151.5	130.7	131.4	30.59	18.88
8.23	162.0	151.0	130.9	131.9	30.11	18.59
10.97	162.0	150.3	130.2	131.3	30.66	18.92
13.71	162.0	149.2	128.3	129.6	32.36	19.98
16.45	162.0	150.3	130.2	131.3	30.66	18.92
19.19	162.0	151.0	130.9	131.9	30.11	18.59

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21.94	162.0	151.5	130.7	131.4	30.59	18.88
24.68	162.0	151.8	129.7	130.0	31.96	19.73
27.42	162.0	151.6	-0.0	-0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	13.71	27.42
Lev 1	2.75	2.75	2.75
2	4.75	3.50	4.75
3	6.75	4.00	6.75
4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.74	29	-28	128	38	-63
5.48	51	-50	228	67	-97
8.23	67	-65	299	88	-131
10.97	76	-75	342	101	-163
13.71	79	-78	356	105	-194
16.45	76	-75	342	101	-163
19.19	67	-65	299	88	-131
21.94	51	-50	228	67	-97
24.68	29	-28	128	38	-63
27.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
Left End	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.37	658	890	73	566	795	94	572	736
2.74	925	1438	138	750	1258	179	761	1147
4.11	895	1481	196	648	1225	254	662	1068
5.48	852	1533	246	542	1212	318	560	1017
6.86	796	1596	288	433	1219	373	453	992
8.23	728	1667	323	321	1245	418	343	992
9.60	648	1745	350	207	1289	453	230	1016
10.97	557	1831	369	92	1350	477	115	1063
12.34	456	1923	380	-23	1426	492	-1	1132
13.71	345	2019	384	-139	1517	497	-118	1223
15.08	456	1923	380	-23	1426	492	-1	1132
16.45	557	1831	369	92	1350	477	115	1063
17.82	648	1745	350	207	1289	453	230	1016
19.19	728	1667	323	321	1245	418	343	992
20.56	796	1596	288	433	1219	373	453	992
21.94	852	1533	246	542	1212	318	560	1017
23.31	895	1481	196	648	1225	254	662	1068
24.68	925	1438	138	750	1258	179	761	1147
26.05	658	890	73	566	795	94	572	736
27.42	0	0	0	0	-0	0	0	-0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

Required Mu Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.37	113 {2}			369 (1)	0.75	3.03
2.74	215 {2}			765 (1)	0.77	0.83
4.11	305 {2}			1063 (1)	0.81	1.09
5.48	382 {2}			1325 (1)	0.84	1.28
6.86	448 {2}			1530 (1)	0.88	1.40
8.23	502 {2}		1617		0.90	1.42
9.60	543 {2}		1647		0.90	1.42
10.97	573 {2}		1678		0.90	1.42
12.34	591 {2}		1709		0.90	1.42
13.71	597 {2}	1251*	1739		0.90	1.42
15.08	591 {2}		1709		0.90	1.42
16.45	573 {2}		1678		0.90	1.42
17.82	543 {2}		1647		0.90	1.42
19.19	502 {2}		1617		0.90	1.42
20.56	448 {2}			1530 (1)	0.88	1.40
21.94	382 {2}			1325 (1)	0.84	1.28
23.31	305 {2}			1063 (1)	0.81	1.09
24.68	215 {2}			765 (1)	0.77	0.83
26.05	113 {2}			369 (1)	0.75	3.03
27.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
*NOTE: phi*Mn > 2*Mu, ACI 9.6.2.2 requirements can be ignored.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft
0.83	12.80	6.8	0.0	36.8	27.9	0.000	0.000	0.065 (A1)
1.37	12.80	6.5	0.0	31.0	32.8	0.000	0.000	0.065 (A1)
2.74	12.80	5.8	0.0	22.1	37.5	0.000	0.000	0.049 (C1)
4.11	12.80	5.1	0.0	15.6	35.4	0.000	0.000	0.049 (C1)
5.48	12.80	4.4	0.0	12.2	33.3	0.000	0.000	0.049 (C1)
6.86	12.80	3.6	0.0	10.0	31.1	0.000	0.000	0.049 (C1)
8.23	12.80	2.9	0.0	9.5	28.9	0.000	0.000	0.049 (C1)
9.60	12.80	2.2	0.0	9.5	26.7	0.000	0.000	0.049 (C1)
10.97	12.80	1.5	0.0	9.5	24.4	0.000	0.000	0.049 (C1)
12.34	12.80	0.7	0.0	9.5	22.2	0.000	0.000	0.049 (C1)
13.71	12.80	0.0	0.0	9.5	18.0	0.000	0.000	0.049 (C1)
15.08	12.80	-0.7	0.0	9.5	22.2	0.000	0.000	0.049 (C1)
16.45	12.80	-1.5	0.0	9.5	24.4	0.000	0.000	0.049 (C1)
17.82	12.80	-2.2	0.0	9.5	26.7	0.000	0.000	0.049 (C1)
19.19	12.80	-2.9	0.0	9.5	28.9	0.000	0.000	0.049 (C1)
20.57	12.80	-3.6	0.0	10.0	31.1	0.000	0.000	0.049 (C1)
21.94	12.80	-4.4	0.0	12.2	33.3	0.000	0.000	0.049 (C1)
23.31	12.80	-5.1	0.0	15.6	35.4	0.000	0.000	0.049 (C1)
24.68	12.80	-5.8	0.0	22.1	37.5	0.000	0.000	0.049 (C1)
26.05	12.80	-6.5	0.0	31.0	32.8	0.000	0.000	0.065 (A1)
26.59	12.80	-6.8	0.0	36.8	27.9	0.000	0.000	0.065 (A1)

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)

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(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).
NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.770 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4187 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.25
Erection: PS+BM DL @ 30 days	-0.63
Change Due to Non-Comp.DL	-0.23
30 days : PS+BM DL+Non-Comp.DL	-0.86
Change Due to Comp.DL+SustLL	0.23
60 days : PS+All DL+Sust.LL	-0.63
Long Term Creep	0.26
Final : PS+All DL+Sust.LL	-0.37
: PS+All DL+LL	-0.31

NOTE: Negative values indicate camber.

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DESIGN DATA

Left Cant. = 0.00 ft	Simple Span = 27.42 ft	Right Cant. = 0.00 ft
Beam Length = 27.42 ft	Lift @ Left = 5.00 ft	Lift @ Right= 5.00 ft
Design Bearing Lengths:	@ Left = 0.33 ft	@ Right= 0.33 ft
No. of stems= 1	Tpg. thick = 4.000 in	Leg Top = 6.000 in
Flange width= 67.000 in	Flange thick= 0.000 in	Leg Bottom = 5.250 in
Web width = 5.625 in	Stem height = 12.000 in	Section Type=SINGLE TEE

Non-Composite : (Based on above section dimensions)		Height = 12.000 in
Area = 67.500 in^2	St = 137.86 in^3	Yt = 5.867 in
I = 808.80 in^4	Sb = 131.87 in^3	Yb = 6.133 in
Vol/Surf = 1.914 in		
Composite : (Based on above section dimensions)		Height = 16.000 in
Ac = 286.321 in^2	Stc(Tpg)= 1113.74 in^3	Stc(P/C)= -29517.62 in^3
Ic = 4292.99 in^4	Sbc = 353.47 in^3	Ybc = 12.145 in

Miscellaneous : (Governing code is ACI 318-14)		
Beam f'ci = 3.500 ksi	Rel. humid. = 60.00 %	Stress Block=RECTANGULAR
Beam f'c = 6.000 ksi	Beam weight = 150.00 pcf	NORMAL WT.
Topping f'c = 4.000 ksi	Topping wt. = 150.00 pcf	NORMAL WT.
Cu = 2.350	eds = 300 E-06	eshu = 650 E-06
Eci modifier= 1.000	Ec modifier = 1.000	Camber Mult.= 1.000
Shear Options :	Depth used = COMPOSITE	f'c used = BEAM
Allow. Concrete Stress:	At Release =0.600f'ci	At Final =12.0sqrt f'c
phi : Tension-controlled Flexure	= 0.900	Strand Developmt = 0.750
Factors : Compression-controlled Flexure	= 0.650	Shear & Torsion = 0.750

Load Cases: 1) U = 1.40 DL
2) U = 1.20 DL + 1.60 LL

Prestressing Strands (Strand Type: LOW RELAXATION		Strain Curve: PCI Handbk)
Eff. Pull = 0.600Xfpu	Strand diam.= 0.5000 in	Estrand = 28500 ksi
Strand fpu =270.00 ksi	Area ea.str.= 0.1530 in^2	LtMult = 1.000
# Str. lev. = 4	# of Strand = 4.00	LdMult = 1.000
Losses: PCI Comm. Report (RATIONAL)	Strand Transformed -> NO	

Strand Level :	1	2	3	4
Left end patt. :	2.75	2.00	2.00	2.00
Right end patt.:	2.75	2.00	2.00	2.00
No. of Strand :	1.00	1.00	1.00	1.00

Draping Information (General Case)

Pt No.:	1
at X	13.71
Lev 1	2.75
2	3.50
3	4.00
4	4.50

Harping Profile: (General Case) Description	X(ft) From Left End	Hstr (in)	Eccent. (in)	Area of P/S (in^2)
Left End of Beam----------	0.00	5.75	0.38	0.6120
Harp Point No. 1----------	13.71	3.69	2.45	0.6120
Right End of Beam----------	27.42	5.75	0.38	0.6120

Mild Steel

Shear : fyv = 60.00 ksi	fyh = 60.00 ksi	fyl = 60.00 ksi	
Emild = 29000 ksi	LdMult = 1.000		

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Distributed Loads (non-factored)

Load Type	Magnitude of Load Beginning (k/ft)	Ending (k/ft)	Distance From Left Beginning (ft)	Ending (ft)	Eccent. (in)
P/C Self Weight	0.070	0.070	0.00	27.42	0.000
Composite Dead Load	0.447	0.447	0.00	27.42	0.000
Live Load	0.168	0.168	0.00	27.42	0.000
Non-comp. Dead Load	-0.069	-0.069	0.00	27.42	0.000
Composite Dead Load	0.069	0.069	0.00	27.42	0.000

At Release Only: Suction = 0.000 k/ft Core Material = 0.000 k/ft

NOTE: 0.00% of all distributed and concentrated live loads are sustained.
NOTE: Shear calculations are based on loads being applied to top of member.

Bearing Plates

Nu = 0.20*Pu Height= 0.00 in Bearing Pad Thickness = 0.250 in
Eff. Brg. Surface: Width = 0.00 in Length = 0.000 in
Plate Rebar: Angle = 10.00 deg fy = 60.00 ksi
Confinement for non-debonded prestressing strand assumed -> NO

********** OUTPUT **********

INITIAL STRESSES (psi, at release)

A) DL beam + core material (if any) + suction (if any)
Beam is supported at 5.00 ft from LEFT end and 5.00 ft from RIGHT end

X(ft) From Left End	Initial P/S Top	Bot.	Init.P/S + BM Top	Bot.	Aux. steel area (ACI 24.5.3.2.1)
2.08	906	1866	893	1879	0.00
5.00	608	2165	531	2245	0.00
6.74	431	2343	438	2335	0.00
8.48	255	2518	327	2443	0.00
10.23	80	2691	199	2567	0.00
11.97	-93	2860	53	2707	0.00
13.71	-265	3025	-110	2862	0.00
15.45	-93	2860	53	2707	0.00
17.19	80	2691	199	2567	0.00
18.94	255	2518	327	2443	0.00
20.68	431	2343	438	2335	0.00
22.42	608	2165	531	2245	0.00
25.34	906	1866	893	1879	0.00

NOTE: Required f'ci = 4770 psi at X = 13.71 ft, based on fconc/0.600.

STRAND STRESSES (Based on f'ci=4.770 ksi, f'c=6.000 ksi, by PCI Committee)

X(ft) from Left End	at Tensioning ksi	at Release ksi	DL and Sust. LL ksi	Final* ksi	P/S Loss ksi	P/S Loss %
0.00	162.0	151.9	0.0	0.0	162.00	100.00
2.74	162.0	151.8	131.1	131.8	30.21	18.65
5.48	162.0	151.5	133.4	134.7	27.33	16.87
8.23	162.0	151.0	134.6	136.3	25.65	15.84
10.97	162.0	150.3	134.6	136.6	25.36	15.65
13.71	162.0	149.2	133.1	135.4	26.63	16.44
16.45	162.0	150.3	134.6	136.6	25.36	15.65
19.19	162.0	151.0	134.6	136.3	25.65	15.84

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21.94	162.0	151.5	133.4	134.7	27.33	16.87
24.68	162.0	151.8	131.1	131.8	30.21	18.65
27.42	162.0	151.6	-0.0	-0.0	162.00	100.00

*NOTE: Final strand stresses include elastic regain for Live Load.

Height to C.G. of Strand Levels

at X=	0.00	13.71	27.42
Lev 1	2.75	2.75	2.75
2	4.75	3.50	4.75
3	6.75	4.00	6.75
4	8.75	4.50	8.75

SERVICE LOAD MOMENTS (k-in)

X(ft) From Left End	Beam Moment	Non-Comp. DL Moment	Composite DL Moment	Live Load Moment	Prestress Moment
0.00	0	0	0	0	-0
2.74	29	-28	209	68	-64
5.48	51	-50	372	121	-100
8.23	67	-65	489	159	-135
10.97	76	-75	559	182	-170
13.71	79	-78	582	189	-203
16.45	76	-75	559	182	-170
19.19	67	-65	489	159	-135
21.94	51	-50	372	121	-100
24.68	29	-28	209	68	-64
27.42	0	0	0	0	-0

FINAL STRESSES (psi)

X(ft) From Left End	FP + BM		FP + DL + Sustained LL			FP + DL + All LL		
	Top	Bot	Tpg	Top	Bot	Tpg	Top	Bot
0.00	0	0	0	0	0	0	0	0
1.37	663	899	81	552	698	107	553	600
2.74	933	1457	154	722	1077	204	724	892
4.11	905	1510	218	607	971	288	608	711
5.48	862	1573	273	488	897	362	489	572
6.86	805	1646	320	367	854	424	367	475
8.23	735	1728	358	244	841	475	242	419
9.60	652	1817	388	121	856	515	117	402
10.97	558	1913	410	-3	899	543	-9	422
12.34	452	2013	422	-126	967	560	-134	479
13.71	337	2116	427	-247	1060	566	-258	570
15.08	452	2013	422	-126	967	560	-134	479
16.45	558	1913	410	-3	899	543	-9	422
17.82	652	1817	388	121	856	515	117	402
19.19	735	1728	358	244	841	475	242	419
20.56	805	1646	320	367	854	424	367	475
21.94	862	1573	273	488	897	362	489	572
23.31	905	1510	218	607	971	288	608	711
24.68	933	1457	154	722	1077	204	724	892
26.05	663	899	81	552	698	107	553	600
27.42	0	0	0	-0	-0	0	-0	-0

NOTE: Allowable precast tensile stress = 12.0*sqrt(f'c) = -930 psi

ULTIMATE MOMENT: (k-in)

Required Mu	Provided phi*Mn

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X(ft) From Left End	by Fact'd Loads	by 1.2*Mcr (ACI 9.6.2.1)	by Strain-compat.	by Other Limits (see notes)	Flex. phi Factor (ACI Tab 21.2.1)	N.A. c(in)
0.00	0			0 (3)	0.00	0.00
1.37	191 {2}			395 (1)	0.75	2.36
2.74	361 {2}			802 (1)	0.77	0.48
4.11	512 {2}			1107 (1)	0.81	0.62
5.48	642 {2}			1374 (1)	0.85	0.72
6.86	752 {2}			1581 (1)	0.88	0.78
8.23	843 {2}		1658		0.90	0.79
9.60	913 {2}		1689		0.90	0.79
10.97	963 {2}		1719		0.90	0.79
12.34	993 {2}		1750		0.90	0.79
13.71	1003 {2}	1396	1781		0.90	0.79
15.08	993 {2}		1750		0.90	0.79
16.45	963 {2}		1719		0.90	0.79
17.82	913 {2}		1689		0.90	0.79
19.19	843 {2}		1658		0.90	0.79
20.56	752 {2}			1581 (1)	0.88	0.78
21.94	642 {2}			1374 (1)	0.85	0.72
23.31	512 {2}			1107 (1)	0.81	0.62
24.68	361 {2}			802 (1)	0.77	0.48
26.05	191 {2}			395 (1)	0.75	2.36
27.42	0			0 (3)	0.00	0.00

{n}: Load Case {n} controls.
(1): Development length controlled by strand.
(3): Development length controlled by both strand and rebar.
Beta1 for depth of Whitney block: 0.75

VERTICAL SHEAR REINFORCING

X(ft) From Left End	d in.	Vu kips	Tu k-in	Vci kips	Vcw kips	-- Required Reinforcing -- for Avci in^2/ft	for Avcw in^2/ft	for Avmin in^2/ft	
0.83	12.80	11.5	0.0	39.8	27.6	0.000	0.000	0.065 (A)	*
1.37	12.80	11.0	0.0	33.5	32.2	0.000	0.000	0.065 (A1)	
2.74	12.80	9.8	0.0	23.8	36.4	0.000	0.000	0.049 (C)	*
4.11	12.80	8.5	0.0	16.9	34.0	0.000	0.000	0.049 (C)	*
5.48	12.80	7.3	0.0	13.2	31.5	0.000	0.000	0.049 (C)	*
6.86	12.80	6.1	0.0	10.7	28.9	0.000	0.000	0.049 (C)	*
8.23	12.80	4.9	0.0	9.5	26.3	0.000	0.000	0.049 (C)	*
9.60	12.80	3.7	0.0	9.5	23.6	0.000	0.000	0.049 (C)	*
10.97	12.80	2.4	0.0	9.5	20.9	0.000	0.000	0.049 (C1)	
12.34	12.80	1.2	0.0	9.5	18.2	0.000	0.000	0.049 (C1)	
13.71	12.80	0.0	0.0	9.5	13.5	0.000	0.000	0.049 (C1)	
15.08	12.80	-1.2	0.0	9.5	18.2	0.000	0.000	0.049 (C1)	
16.45	12.80	-2.4	0.0	9.5	20.9	0.000	0.000	0.049 (C1)	
17.82	12.80	-3.7	0.0	9.5	23.6	0.000	0.000	0.049 (C)	*
19.19	12.80	-4.9	0.0	9.5	26.3	0.000	0.000	0.049 (C)	*
20.57	12.80	-6.1	0.0	10.7	28.9	0.000	0.000	0.049 (C)	*
21.94	12.80	-7.3	0.0	13.2	31.5	0.000	0.000	0.049 (C)	*
23.31	12.80	-8.5	0.0	16.9	34.0	0.000	0.000	0.049 (C)	*
24.68	12.80	-9.8	0.0	23.8	36.4	0.000	0.000	0.049 (C)	*
26.05	12.80	-11.0	0.0	33.5	32.2	0.000	0.000	0.065 (A1)	
26.59	12.80	-11.5	0.0	39.8	27.6	0.000	0.000	0.065 (A)	*

(A): Minimum based on ACI Tab 9.6.3.3a. (prestress < 40% tensile strength)
(C): Minimum based on ACI Tab 9.6.3.3e. (prestress > 40% tensile strength)
(1): Avmin not required, Vu < phi*Vc/2 (ACI 9.6.3.1).

Beam V3.4.0
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NOTE: Reqd. reinf. is based on a total web width = 5.625 in.
*NOTE: Spacing must not exceed the lesser of 24(in) or 3/4*h= 9.00(in).
NOTE: No significant torsion was found (ACI 9.5.4.1).
NOTE: Design assumes web reinforcing is carried as close to compression and tension surfaces as possible per ACI 25.7.1.1.
NOTE: Shear calculations based on loads applied to top of member.
NOTE: Per ACI 318 Sect. 1.10.1, shear mesh for double tees may be omitted in center 80% of span subject to use restrictions. See PCISFRAD Project #2 summarized in PCI Journal, Nov-Dec 1986, p.74.

PREDICTED DEFLECTIONS

Based on : Rational approach and PCI Committee Recommendations for losses.
f'ci = 4.770 ksi, f'c = 6.000 ksi and ACI-209
Eci = 4187 ksi, Ec = 4696 ksi, Camber Mult.= 1.000
Modified : Cu = 1.906 eshu = 496 E-06

Position:	Midspan (in)
Release : PS+BM DL	-0.38
Creep Before Erection	-0.25
Erection: PS+BM DL @ 30 days	-0.63
Change Due to Non-Comp.DL	-0.23
30 days : PS+BM DL+Non-Comp.DL	-0.86
Change Due to Comp.DL+SustLL	0.32
60 days : PS+All DL+Sust.LL	-0.54
Long Term Creep	0.40
Final : PS+All DL+Sust.LL	-0.14
: PS+All DL+LL	-0.04

NOTE: Negative values indicate camber.

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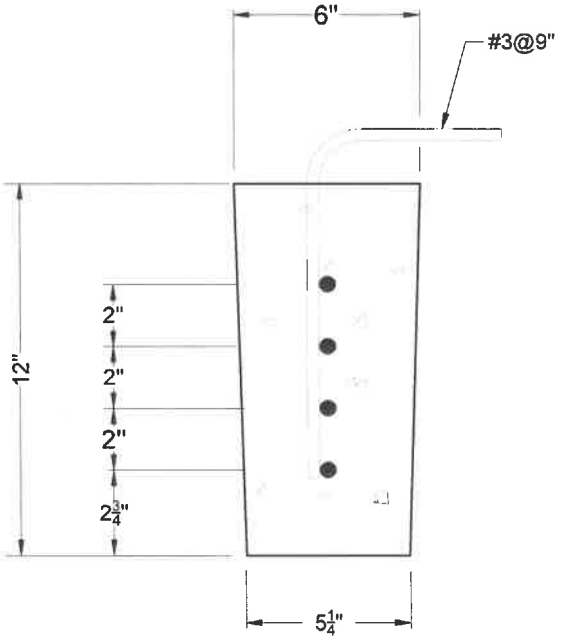
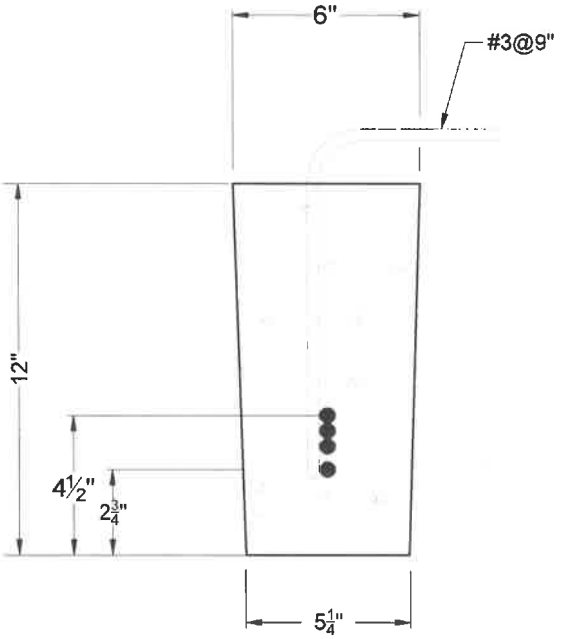


END



MIDSPAN

MK: J 25, J29 THRU J34	4-½" LOWLAX 270 KSI STRANDS 1PT HOLDDOWN TO 4.5" NO MILD STEEL PULL 0.60 PRECAST LENGTH = VARIES FROM 27.42 FT TO 34.42FT	JOIST DESIGN GROUP 5