LANE SUPPLY, INC.

120 Fairview
Arlington, TX 76010
817-261-9116

DESIGN CALCULATIONS FOR :

QuikTrip Store #0183 (Gen 3) Gas Canopy
1001 SW Blue Prarkway
Lee's Summit, MO

Eight-Column Canopy :	58'-0" X 123'-6" Canopy
Lane Reference Number :	LSC- 78950
Date :	20-Nov-24

TABLE OF CONTENTS :

Engineer's Seal :

STATE OF MISSOURI
RICHARD
D. McCASKEY
E-2000164393
REGISTERED PROFESSIONAL ENGINEER

C.O.A. 2001015838

NOV 22 2024

Calculations By:	**Lane Supply, Inc.**	*LSC -* ~~78950~~
Customer:	QuikTrip Store #0183 (Gen 3) Gas Canopy	*By:* JO
Project:	58'-0" X 123'-6" Canopy	*Check:*

Code: **2018 International Building Code**

Roof Loads:

Dead Load =	3.00	psf	(SL-316 Deck)
Snow Load =	20.00	psf	
TOTAL =	23.00	psf	

Fascia Load:

Height =	42.00	in.
Dead Load =	20.00	plf

Wind Loads:

Risk Category =	II		
V, ULT Speed =	116	m.p.h. Exp	C
V, ASD Speed =	90	m.p.h. Exp	C
Height =	22	ft	
Kd =	0.85		
Kh =	0.92		
G =	0.85		
qz =	16.09	psf	

Lateral Load =	1.0	(H)•qz =	16.09	psf
Deck Uplift =	-1.7	(V)•G•qz =	-23.25	psf
Frame Uplift =	-1.1	(V)•G•qz =	-15.05	psf

Base Shear : V =	CS • W =	0.085	• W
	Site Class =	D	Default
	Risk Category =	II	
	Ss(0.2) =	0.100	
	S1(1.0) =	0.068	
	Fa =	1.60	
	Fv =	2.40	
SMS =	Fa•Ss =	0.16	(11.4-1)
SM1 =	Fv•S1 =	0.16	(11.4-2)
SDS =	2/3•SMS =	0.11	(11.4-3)
SD1 =	2/3•SM1 =	0.11	(11.4-4)
	R =	1.25	
	CS = (SDS/R) =	0.085	(12.8-2)

Seismic Design Category Based on SDS : A
Seismic Design Category Based on SD1 : B

Design Category : B

Section 7.1.2--Symbols & Notation

Ce =	1.2	Exposure Factor as determined from Table 7.3-1
Ct =	1.2	Thermal factor as determined from Table 7.3-2
D =	Snow Density in pcf as determined from Eq. 7.7-1	
hb =	Height of balanced snow load determined by dividing Pf by D, in feet.	
hd =	Height of snow drift, in feet	
hc =	Clear height from top of balanced snow to top of parapet, ft	
hr =	3.00	= Fascia height, ft
Is =	1.0	= Importance factor (see Table 1.5-2).
Pf =	Snow load on flat roofs, psf.	
Pg =	20	=ground snow, psf.
Pd =	Maximum intensity of drift surcharge load, psf.	
lu =	58.5	= Length of roof upwind of the drift, feet
w =	Width of snow drift, in feet	

Section 7.3--Flat-Roof Snow Loads, Pf

The snow load, Pf, on a roof with a slope equal to or less than 5° shall be calculated in psf using equation 7.3-1, but not less than th following mimimum values for low slope roofs: where Pg is 20 psf or less Pf = I(Pg), where Pg exceeds 20 psf, Pf = 20 (I).

Section 7.7 & Section 7.8

The geometrey of the surcharge load due to snow drifting shall be approximated by a triangle as shown in figure 7.7-2. Drift loads shall be superimposed on the balanced snow load. If hc/hb is less than 0.2, drift loads are not required to be applied.
The height of such drifts shall be taken as 0.75 x hd as determined from Fig 7.6-1, with lu equal to the length of the roof upwind of the projection or parapet wall. If the side of a roof projection is less than 15 ft long, a drift load is not required to be applied to that side. If the height, hd, is equal to or less than hc, the drift width shall equal 4hd and the drft height shall equal hd. If this height exceeds hc, the drift width, w, shall equal 4 hd^2/hc and the drift height shall equal hc. However, the drift width w shall not exceed 8hc. The maximum intensity of the drift surcharge load, pd, equals hd x D where the snow density, D, is defined by Eq 7.7-

Section 7.10--Rain-On-Snow Surcharge Load

For locations where Pg is 20 psf or less but not zero, all roofs with a slope less than W/50, shall have a 5 psf rain-on-snow surcharge load appled to establish the design snow loads. This additional load applies only to the slped roof (balanced) load case and need not be used in combination with drift, sliding, unbalanced, or partial loads.

Pf =	0.7 x Ce x Ct x Is x Pg	*Eq 7.3-1*
Pf =	20.0 psf	
hd =	0.75 x (0.43(lu)^1/3 x (Pg+10)^1/4-1.5)	*Ref. Fig. 7.6-1*
hd =	1.80 ft	
D =	0.13Pg + 14 < 30 psf	*Eq 7.7-1*
D =	16.60 psf	
hb =	1.20 ft	
hc =hr-hb =	1.80 ft	
hc/hb =	1.49 Consider Drift	
w =	7.26 ft	
Pd =	D x hd<D x hc	
Pd =	29.80 psf	

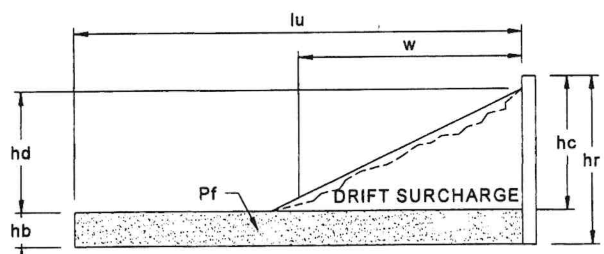


FIGURE 7.7-2
Configuration of Snow Drifts on Lower Roofs

DECK DESIGN: <==Controls Inside Purlins

```
| P1                                                                  P2 |
v                          o        23.00 psf        o                  v
==========================================================================
           ^A              B^                        ^C              D^
|<-- X1 ---> |<-------   L1   ------->| |<-------  L2  ------->| |<-------   L3   ------->| <--- X2 --->|
```

Wd=	3.00	psf	X1=	3.00	ft
Wl=	20.00	psf	L1=	8.50	ft
Deck : Ww=	-23.25	psf	L2=	6.00	ft
Frame : Ww=	-15.05	psf	L3=	8.50	ft
P1=	20.00	plf	X2=	3.00	ft
P2=	5.00	plf			

RAd=	50.40	plf
RAl=	155.59	plf
Frame : RAw=	-117.05	plf
Deck : RAw=	-180.90	plf
RA(d+l)=	205.99	plf
Frame : RA(d+w)=	-66.66	plf
Deck : RA(d+w)=	-130.50	plf
RBd=	13.10	plf
RBl=	145.00	plf
Frame : RBw=	-101.12	plf
Deck : RBw=	-156.28	plf
RB(d+l)=	158.10	plf
Frame : RB(d+w)=	-88.02	plf
Deck : RB(d+w)=	-143.17	plf
RCd=	18.40	plf
RCl=	145.00	plf
Frame : RCw=	-101.12	plf
Deck : RCw=	-156.28	plf
RC(d+l)=	163.40	plf
Frame : RC(d+w)=	-82.72	plf
Deck : RC(d+w)=	-137.88	plf
RDd=	30.10	plf
RDl=	155.59	plf
Frame : RDw=	-117.05	plf
Deck : RDw=	-180.90	plf
RD(d+l)=	185.69	plf
Frame : RD(d+w)=	-86.95	plf
Deck : RD(d+w)=	-150.80	plf

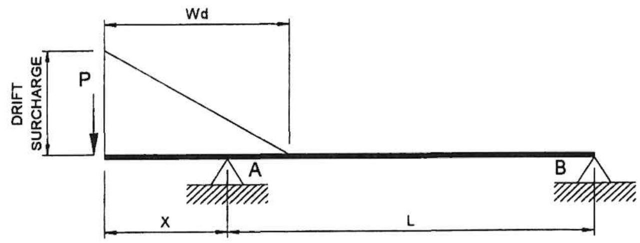
MAd=	73.50	ft-lbs/ft
MAl=	90.00	ft-lbs/ft
Deck : MAw=	-104.64	ft-lbs/ft
MA(d+l)=	163.50	ft-lbs/ft
Deck : MA(d+w)=	-31.14	ft-lbs/ft
MAB(d+l)=	172.59	ft-lbs/ft
Deck : MAB(d+w)=	-167.68	ft-lbs/ft
MBC(d+l)=	103.50	ft-lbs/ft
Deck : MBC(d+w)=	-91.14	ft-lbs/ft
MCD(d+l)=	193.71	ft-lbs/ft
Deck : MCD(d+w)=	-146.83	ft-lbs/ft
MDd=	28.50	ft-lbs/ft
MDl=	90.00	ft-lbs/ft
Deck : MDw=	-104.64	ft-lbs/ft
MD(d+l)=	118.50	ft-lbs/ft
Deck : MD(d+w)=	-76.14	ft-lbs/ft

USE 20 GAUGE GRADE C DECK

+S=.3961 in^3 -S=.3036 in^3 FY=40 ksl

Deck Design <==Controls Outside Purlin

wd=	3.00	psf
ws=	20.00	psf
Deck : ww=	-23.25	psf
Frame : ww=	-15.05	psf
P=	20.00	plf
(Drift Surcharge)Pm-ws=	29.80	psf
L=	8.50	ft
X=	3.00	ft
(Drift Length) Wd=	7.26	ft



RAd=	50.40	plf	RBd=	4.10	plf
RAs=	271.13	plf	RBs=	67.03	plf
Frame : RAw=	-117.05	plf	Frame : RBw=	-55.98	plf
Deck : RAw=	-180.90	plf	Deck : RBw=	-86.52	plf
RA(d+s)=	321.53	plf	RB(d+s)=	71.13	plf
Frame : RA(d+w)=	-66.66	plf	Frame : RB(d+w)=	-51.88	plf
Deck : RA(d+w)=	-130.50	plf	Deck : RB(d+w)=	-82.41	plf

MAd =	-73.50	ft-lbs/ft			
MAs =	-205.63	ft-lbs/ft			
Deck : MAw =	104.64	ft-lbs/ft			
MA(d+s)=	-279.13	ft-lbs/ft	MAB(d+s)=	109.90	ft-lbs/ft
Deck : MA(d+w)=	31.14	ft-lbs/ft	Deck : MAB(d+w)=	-167.66	ft-lbs/ft

USE 20 GAUGE GRADE C DECK

+S=.3961 in^3 -S=.3036 in^3 FY=40 ksl

DECK DESIGN: <==Does Not Control

Wd=	3.00	psf
ws=	20.00	psf
Deck : Ww=	-23.25	psf
Frame : Ww=	-15.05	psf
L=	6.00	ft

23.00 psf

^A B^

|<-------- L -------->|

			Rd=	9.00	plf
			Rs=	60.00	plf
			Frame : Rw=	-45.14	plf
			Deck : Rw=	-69.76	plf
M(d+s)=	103.50	ft-lbs/ft	R(d+s)=	69.00	plf
Deck : M(d+w)=	-91.14	ft-lbs/ft	Frame : R(d+w)=	-36.14	plf
			Deck : R(d+w)=	-60.76	plf

USE 20 GAUGE GRADE C DECK

+S=.3961 in^3 -S=.3036 in^3 FY=40 ksl

DECK DESIGN: <==Does Not Control

| P
v 23.00 psf
^A B^
|<-- X ---> |<------- L ------->|

Wd=	3.00	psf
Ws=	20.00	psf
Deck : Ww=	-23.25	psf
Frame : Ww=	-15.05	psf
P=	5.00	plf
L=	8.50	ft
X=	3.00	ft

Md(@ OH)=	28.50	ft-lbs/ft
Ms(@ OH)=	90.00	ft-lbs/ft
Deck : Mw(@ OH)=	-104.64	ft-lbs/ft
MA(d+ls=	118.50	ft-lbs/ft
Deck : MA(d+w)=	-76.14	ft-lbs/ft
MAB(d+s)=	193.71	ft-lbs/ft
Deck : MAB(d+w)=	-146.83	ft-lbs/ft

RAd=	30.10	plf
RAs=	155.59	plf
Frame : RAw=	-117.05	plf
Deck : RAw=	-180.90	plf
RA(d+s)=	185.69	plf
Frame : RA(d+w)=	-86.95	plf
Deck : RA(d+w)=	-150.80	plf
RBd=	9.40	plf
RBs=	85.00	plf
Frame : RBw=	-55.98	plf
Deck : RBw=	-86.52	plf
RB(d+s)=	94.40	plf
Frame : RB(d+w)=	-46.58	plf
Deck : RB(d+w)=	-77.12	plf

USE 20 GAUGE GRADE C DECK

+S=.3961 in^3 -S=.3036 in^3 FY=40 ksi

BEAM DESIGN: P-a

Wd=	69.40	plf
Wl=	271.13	plf
Ww=	-117.05	plf
L=	25.00	ft

340.53 plf

^ ^

|<----------- L -------->|

			Rd=	867	lbs	
			Rl=	3389	lbs	
Md=	5421.6	ft-lbs	Rw=	-1463	lbs	
Ml=	21182.3	ft-lbs	R(d+l)=	4257	lbs	
Mw=	-9144.7	ft-lbs	R(d+w)=	-596	lbs	
M(d+l)=	26604.0	ft-lbs	Lu=	8.00	ft	OK
M(d+w)=	-3723.1	ft-lbs	Lu=	1.33	ft	OK

USE: W12X19 Fy = 50 ksi

Deflections: (inches)	Midspan
DL=	0.162
DL+LL=	0.794

(+downward, -upward)

BEAM DESIGN: P-b

Wd=	29.10	plf
Wl=	145.00	plf
Ww=	-101.12	plf
L=	25.00	ft

174.10 plf

^ ^

|<----------- L -------->|

			Rd=	364	lbs	
			Rl=	1813	lbs	
Md=	2273.7	ft-lbs	Rw=	-1264	lbs	
Ml=	11328.1	ft-lbs	R(d+l)=	2176	lbs	
Mw=	-7900.1	ft-lbs	R(d+w)=	-900	lbs	
M(d+l)=	13601.8	ft-lbs	Lu=	8.00	ft	OK
M(d+w)=	-5626.4	ft-lbs	Lu=	1.33	ft	OK

USE: W12X16 Fy = 50 ksi

Deflections: (inches)	Midspan
DL=	0.086
DL+LL=	0.512

(+downward, -upward)

BEAM DESIGN: P-c

Wd=	34.40	plf
Wl=	145.00	plf
Ww=	-101.12	plf
L=	25.00	ft

179.40 plf

^ ^

|<----------- L -------->|

			Rd=	430	lbs	
			Rl=	1813	lbs	
Md=	2687.3	ft-lbs	Rw=	-1264	lbs	
Ml=	11328.1	ft-lbs	R(d+l)=	2242	lbs	
Mw=	-7900.1	ft-lbs	R(d+w)=	-834	lbs	
M(d+l)=	14015.4	ft-lbs	Lu=	8.00	ft	OK
M(d+w)=	-5212.8	ft-lbs	Lu=	1.33	ft	OK

USE: W12X16 Fy = 50 ksi

Deflections: (inches)	Midspan
DL=	0.101
DL+LL=	0.528

(+downward, -upward)

BEAM DESIGN: P-d

Wd=	46.10	plf
Wl=	155.59	plf
Ww=	-117.05	plf
L=	25.00	ft

201.69 plf

^ ^

|<----------- L -------->|

			Rd=	576	lbs	
			Rl=	1945	lbs	
Md=	3601.8	ft-lbs	Rw=	-1463	lbs	
Ml=	12155.3	ft-lbs	R(d+l)=	2521	lbs	
Mw=	-9144.7	ft-lbs	R(d+w)=	-887	lbs	
M(d+l)=	15757.1	ft-lbs	Lu=	8.00	ft	OK
M(d+w)=	-5542.9	ft-lbs	Lu=	1.33	ft	OK

USE: W12X16 Fy = 50 ksi

Deflections: (inches)	Midspan
DL=	0.136
DL+LL=	0.593

(+downward, -upward)

BEAM DESIGN: P-e

| P1 343.53 plf P2 |
v v
^A B^
|<--- X1 ---> |<------------ L -------->| <--- X2 --->|

Wd=	72.40	plf
Wl=	271.13	plf
Ww=	-117.05	plf
P1d=	155.59	lbs
P1l=	0.00	lbs
P1w=	0.00	lbs
P2d=	867.46	lbs
P2l=	3389.18	lbs
P2w=	-1463.15	lbs
L=	32.00	ft
X1=	13.58	ft
X2=	3.50	ft

RAd=	2463	lbs
RAl(MAX)=	8803	lbs
RAw=	-3618	lbs
RA(d+l)=	11266	lbs
RA(d+w)=	-1154	lbs
RBd=	2113	lbs
RBl(MAX)=	9099	lbs
RBw=	-3591	lbs
RB(d+l)=	11212	lbs
RB(d+w)=	-1477	lbs

MA(d)=	8792	ft-lbs				
MA(l)=	25013	ft-lbs				
MA(w)=	-10798	ft-lbs				
MA(d+l)=	33805	ft-lbs	lu =	1.33	ft	OK
MA(d+w)=	-2006	ft-lbs	lu =	6.79	ft	OK
MAB(d+l)=	37876	ft-lbs	lu =	8.00	ft	OK
MAB(d+w)=	-3535	ft-lbs	lu =	1.33	ft	OK
MB(d)=	3480	ft-lbs				
MB(l)=	13523	ft-lbs				
MB(w)=	-5838	ft-lbs				
MB(d+l)=	17002	ft-lbs	lu =	1.33	ft	OK
MB(d+w)=	-2358	ft-lbs	lu =	3.50	ft	OK

DEFLECTIONS	X1-OH	Span	X2-OH	
DL (in) =	-0.237	-0.078	0.015	*(-) is down*
DL+LL (in) =	-0.516	-0.550	0.118	*(+) is up*

SIGN CONVENTION: CANTILEVER; +M=COMPRESSION ON BOTTOM FLANGE
SPAN; +M=COMPRESSION ON TOP FLANGE

USE: W12X22 Fy = 50 ksi

BEAM DESIGN: P-f

Wd=	35.10	plf				
Wl=	145.00	plf				
Ww=	-101.12	plf				
P1d=	134.41	lbs				
P1l=	0.00	lbs		RAd=	1285	lbs
P1w=	0.00	lbs		RAl(MAX)=	4708	lbs
P2d=	363.79	lbs		RAw=	-3125	lbs
P2l=	1812.50	lbs		RA(d+l)=	5992	lbs
P2w=	-1264.01	lbs		RA(d+w)=	-1841	lbs
L=	32.00	ft				
X1=	13.58	ft		RBd=	937	lbs
X2=	3.50	ft		RBl(MAX)=	4866	lbs
				RBw=	-3102	lbs
				RB(d+l)=	5803	lbs
				RB(d+w)=	-2165	lbs

| P1   P2 |
v   180.10 plf   v
^A   B^
|<--- X1 ---> |<------------ L -------->| <--- X2 --->|

MA(d)=	5064	ft-lbs				
MA(l)=	13377	ft-lbs				
MA(w)=	-9329	ft-lbs				
MA(d+l)=	18441	ft-lbs	lu =	1.33	ft	**OK**
MA(d+w)=	-4265	ft-lbs	lu =	6.79	ft	**OK**
MAB(d+l)=	19812	ft-lbs	lu =	8.00	ft	**OK**
MAB(d+w)=	-4544	ft-lbs	lu =	1.33	ft	**OK**
MB(d)=	1488	ft-lbs				
MB(l)=	7232	ft-lbs				
MB(w)=	-5043	ft-lbs				
MB(d+l)=	8720	ft-lbs	lu =	1.33	ft	**OK**
MB(d+w)=	-3555	ft-lbs	lu =	3.50	ft	**OK**

DEFLECTIONS	X1-OH	Span	X2-OH	
DL (in) =	-0.173	-0.023	0.005	*(-) is down*
DL+LL (in) =	-0.322	-0.275	0.060	*(+) is up*

SIGN CONVENTION: CANTILEVER; +M=COMPRESSION ON BOTTOM FLANGE
SPAN; +M=COMPRESSION ON TOP FLANGE

USE: W12X22   Fy = 50 ksi

BEAM DESIGN: P-g

P1		P2
v	185.40 plf	v
	^A B^	
|<--- X1 ---> |<------------	L -------->|	<--- X2 --->|

Wd=	40.40	plf
Wl=	145.00	plf
Ww=	-101.12	plf
P1d=	134.41	lbs
P1l=	0.00	lbs
P1w=	0.00	lbs
P2d=	429.96	lbs
P2l=	1812.50	lbs
P2w=	-1264.01	lbs
L=	32.00	ft
X1=	13.58	ft
X2=	3.50	ft

RAd=	1448	lbs
RAl(MAX)=	4708	lbs
RAw=	-3125	lbs
RA(d+l)=	6156	lbs
RA(d+w)=	-1677	lbs
RBd=	1099	lbs
RBl(MAX)=	4866	lbs
RBw=	-3102	lbs
RB(d+l)=	5965	lbs
RB(d+w)=	-2003	lbs

MA(d)=	5553	ft-lbs				
MA(l)=	13377	ft-lbs				
MA(w)=	-9329	ft-lbs				
MA(d+l)=	18929	ft-lbs	lu =	1.33	ft	**OK**
MA(d+w)=	-3776	ft-lbs	lu =	6.79	ft	**OK**
MAB(d+l)=	20116	ft-lbs	lu =	8.00	ft	**OK**
MAB(d+w)=	-4241	ft-lbs	lu =	1.33	ft	**OK**
MB(d)=	1752	ft-lbs				
MB(l)=	7232	ft-lbs				
MB(w)=	-5043	ft-lbs				
MB(d+l)=	8984	ft-lbs	lu =	1.33	ft	**OK**
MB(d+w)=	-3291	ft-lbs	lu =	3.50	ft	**OK**

DEFLECTIONS	X1-OH	Span	X2-OH	
DL (in) =	-0.178	-0.032	0.007	*(-) is down*
DL+LL (in) =	-0.327	-0.284	0.062	*(+) is up*

SIGN CONVENTION: CANTILEVER; +M=COMPRESSION ON BOTTOM FLANGE
SPAN; +M=COMPRESSION ON TOP FLANGE

USE: W12X22 Fy = 50 ksi

BEAM DESIGN: P-h

| P1 P2 |
v 207.69 plf v
^A B^
|<--- X1 ---> |<------------ L -------->| <--- X2 --->|

Wd=	52.10	plf
Wl=	155.59	plf
Ww=	-117.05	plf
P1d=	155.59	lbs
P1l=	0.00	lbs
P1w=	0.00	lbs
P2d=	576.29	lbs
P2l=	1944.85	lbs
P2w=	-1463.15	lbs
L=	32.00	ft
X1=	13.58	ft
X2=	3.50	ft

RAd=	1840	lbs
RAl(MAX)=	5051	lbs
RAw=	-3618	lbs
RA(d+l)=	6892	lbs
RA(d+w)=	-1778	lbs
RBd=	1449	lbs
RBl(MAX)=	5221	lbs
RBw=	-3591	lbs
RB(d+l)=	6670	lbs
RB(d+w)=	-2142	lbs

MA(d)=	6920	ft-lbs				
MA(l)=	14354	ft-lbs				
MA(w)=	-10798	ft-lbs				
MA(d+l)=	21274	ft-lbs	lu =	1.33	ft	**OK**
MA(d+w)=	-3878	ft-lbs	lu =	6.79	ft	**OK**
MAB(d+l)=	22006	ft-lbs	lu =	8.00	ft	**OK**
MAB(d+w)=	-4624	ft-lbs	lu =	1.33	ft	**OK**
MB(d)=	2336	ft-lbs				
MB(l)=	7760	ft-lbs				
MB(w)=	-5838	ft-lbs				
MB(d+l)=	10096	ft-lbs	lu =	1.33	ft	**OK**
MB(d+w)=	-3502	ft-lbs	lu =	3.50	ft	**OK**

DEFLECTIONS	X1-OH	Span	X2-OH	
DL (in) =	-0.213	-0.045	0.009	*(-) is down*
DL+LL (in) =	-0.373	-0.316	0.068	*(+) is up*

SIGN CONVENTION: CANTILEVER; +M=COMPRESSION ON BOTTOM FLANGE
SPAN; +M=COMPRESSION ON TOP FLANGE

USE: W12X22 Fy = 50 ksi

HEADER BEAM DESIGN: H-a

```
|P1                |P2           |P3           |P4           |P5           |P6           |P7              P8|
V                  V             V             V             V             V             V                  V
==================================================================================================================
                ^A                                                                        B^
|<--- X1------>|                                                                                |<--- X9--->|
      X2---> |     |<----X3---->|<----X4---->|<----X5---->|<----X6---->|<----X7---->|     |<-X8
```

P1d=	2463 lbs	X1 =	6.00 ft		
P1l=	8803 lbs	X2 =	2.50 ft		
P1w=	-3618 lbs	X3 =	6.00 ft		
P2d=	1285 lbs	X4 =	8.50 ft		
P2l=	4708 lbs	X5 =	6.00 ft		
P2w=	-3125 lbs	X6 =	8.50 ft		
P3d=	1448 lbs	X7 =	6.00 ft		
P3l=	4708 lbs	X8 =	2.50 ft		
P3w=	-3125 lbs	X9 =	6.00 ft		
P4d=	1840 lbs				
P4l=	5051 lbs	Wd=	50.00 plf		
P4w=	-3618 lbs	Wl=	0.00 plf		
P5d=	1840 lbs	Ww=	0.00 plf		
P5l=	5051 lbs				
P5w=	-3618 lbs				
P6d=	1448 lbs	RA(d)=	8336 lbs		
P6l=	4708 lbs	RA(l)=	23269 lbs		
P6w=	-3125 lbs	RA(w)=	-13486 lbs		
P7d=	1285 lbs	RA(d+l)=	31606 lbs		
P7l=	4708 lbs	RA(d+w)=	-5150 lbs		
P7w=	-3125 lbs				
P8d=	2463 lbs	RB(d)=	8336 lbs		
P8l=	8803 lbs	RB(l)=	23269 lbs		
P8w=	-3618 lbs	RB(w)=	-13486 lbs		
		RB(d+l)=	31606 lbs		
		RB(d+w)=	-5150 lbs		

					Deflections (in)
MA(d+l) =	-68496.4 ft-lbs	Lu=	6.00 ft	X1 d =	-0.18
MA(d+w) =	6026.7 ft-lbs	Lu=	6.00 ft	X1 d+l =	-0.48
Mspan(d+l) =	125965.9 ft-lbs	Lu=	8.50 ft	Span d =	0.45
Mspan(d+w) =	-33275.2 ft-lbs	Lu=	8.50 ft	Span d+l =	1.34
MB(d+l) =	-68496.4 ft-lbs	Lu=	6.00 ft	X9 d =	-0.18
MB(d+w) =	6026.7 ft-lbs	Lu=	6.00 ft	X9 d+l =	-0.48

USE: W18X50 Fy = 50 ksi

HEADER BEAM DESIGN: H-b

```
|P1            |P2         |P3         |P4         |P5         |P6         |P7            P8|
V              V           V           V           V           V           V               V
================================================================================================
                 ^A                                                            B^
|<--- X1------>|                                                                  |<--- X9--->|
     X2---> |   |<----X3---->|<----X4---->|<----X5---->|<----X6---->|<----X7---->|  |<-X8
```

P1d=	2113	lbs	X1 =	6.00	ft
P1l=	9099	lbs	X2 =	2.50	ft
P1w=	-3591	lbs	X3 =	6.00	ft
P2d=	937	lbs	X4 =	8.50	ft
P2l=	4866	lbs	X5 =	6.00	ft
P2w=	-3102	lbs	X6 =	8.50	ft
P3d=	1099	lbs	X7 =	6.00	ft
P3l=	4866	lbs	X8 =	2.50	ft
P3w=	-3102	lbs	X9 =	6.00	ft
P4d=	1449	lbs			
P4l=	5221	lbs	Wd=	50.00	plf
P4w=	-3591	lbs	Wl=	0.00	plf
P5d=	1449	lbs	Ww=	0.00	plf
P5l=	5221	lbs			
P5w=	-3591	lbs			
P6d=	1099	lbs	RA(d)=	6898	lbs
P6l=	4866	lbs	RA(l)=	24052	lbs
P6w=	-3102	lbs	RA(w)=	-13385	lbs
P7d=	937	lbs	RA(d+l)=	30950	lbs
P7l=	4866	lbs	RA(d+w)=	-6487	lbs
P7w=	-3102	lbs			
P8d=	2113	lbs	RB(d)=	6898	lbs
P8l=	9099	lbs	RB(l)=	24052	lbs
P8w=	-3591	lbs	RB(w)=	-13385	lbs
			RB(d+l)=	30950	lbs
			RB(d+w)=	-6487	lbs

						Deflections (in)	
MA(d+l) =	-68172.4	ft-lbs	Lu=	6.00	ft	X1 d =	-0.14
MA(d+w) =	7964.9	ft-lbs	Lu=	6.00	ft	X1 d+l =	-0.45
Mspan(d+l) =	120432.3	ft-lbs	Lu=	8.50	ft	Span d =	0.35
Mspan(d+w) =	-41106.6	ft-lbs	Lu=	8.50	ft	Span d+l =	1.27
MB(d+l) =	-68172.4	ft-lbs	Lu=	6.00	ft	X9 d =	-0.14
MB(d+w) =	7964.9	ft-lbs	Lu=	6.00	ft	X9 d+l =	-0.45

USE: W18X50 Fy = 50 ksi

P DL =	8.34 kips		Clr. Ht.=	21.00	ft
P LL =	23.27 kips		Fascia Ht.=	3.50	ft
P WL =	-13.49 kips		Col. Trib=	33.06	ft
Base Shear =	0.71 kips		Wind Load=	16.09	psf
Total Base Shear =	5.20 kips		# of COL.=	2	
M WL =	w(Fascia Ht•2.5•Col Trib./# of col•L)+ w(Wrap•1/2 Clr. Ht^2)		Max All. Defl =	2.73	in
M Seis =	Base Shear x L		Max Defl Ratio =	L/ 100	
M Unbal =	Live Load x Col. Trib.x (Canopy Width/2)^2/2		Max Defl. =	1.63	in, OK
L =	Clr. Ht. + Fascia Ht/2				

Pr = 31.61 kips 1.6Pr<0.5Py First-Order Analysis Allowed (A-7-1)

Py =	736.00	kips
N =	0.02	•Yi (A-7-2)
B2 =	1.17	OK, A-8-6
M WL =	56.50	kip-ft
M Seis =	16.18	kip-ft
M DL(Nod) =	3.80	kip-ft
M LL(Nod) =	10.60	kip-ft
M Unbal DL=	0.00	kip-ft
M Unbal LL=	0.00	kip-ft
M Unbal WL=	0.00	kip-ft

Use:	TS12X12X3/8	
Fy =	46.00	ksi
K =	1.00	
L, Col =	22.75	ft
A =	16.00	in^2
I =	357.00	in^4
Cm =	1.00	
Pe1 =	436.41	kips
B1 =	1.13	(A-8-3)
P,All =	352.24	kips
M, All =	149.00	kip-ft

Load Combination	Pr, Kips	Mr, Kip-ft	Equation	Result
D+L	31.61	16.29	0.15	OK
D+W	8.34	68.21	0.47	OK
D+0.7E	8.34	17.11	0.13	OK
D+0.75W+0.75L	25.79	61.22	0.45	OK
D+0.525E+0.75L	25.79	22.90	0.19	OK

Top Connection :	Standard Cap Plate	Base Plate :	LBP 12 - 80

M(MAX)=	68206	FT-LBS
S3=	150	PCF

Pmax=	31.61	k
Area=	28.27	ft ^ 2
Bearing=	1117.82	psf

Depth Below Grade Before Effective Soil, d = 3.00 FT
Depth into Effective Soil, h = 6.50 FT

Note: 12/17 is a reduction factor

Effective Soils Resisting Moment = (d+2/3h)(1/2xFooting dimension x S3 x h^2)(12/17)

Effective Soils Resisting Moment = 98417.6

Footing= Round

USE: 6 FT.RND. X 9.5 FT. DEEP FOOTING(Total Depth)

As=12*M/(jd*24000)= 0.4 SQ.IN.

USE: 18 #8's (RND. CAGE) w/ #4 TIES @ 12" O.C. w/135 hooks

M(MAX)=	68206 FT-LBS		Pmax=	31.61	k
S3=	150 PCF		Area=	30.25	ft ^ 2
			Bearing=	1044.82	psf

Depth Below Grade Before Effective Soil, d = 3.00 FT
Depth into Effective Soil, h = 5.50 FT

Note: 12/17 is a reduction factor

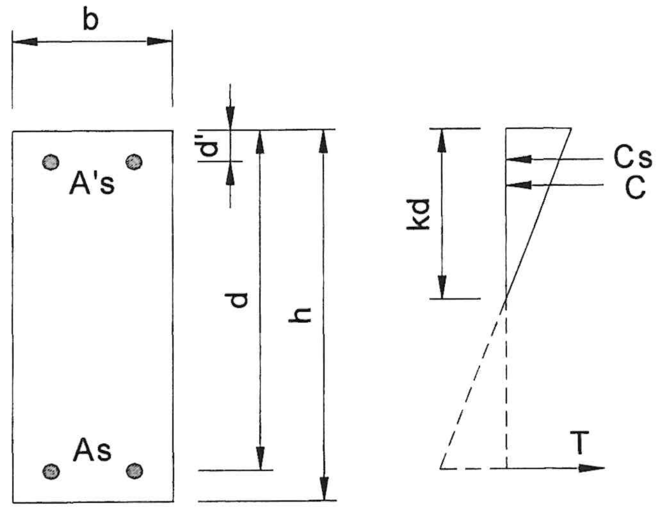
Effective Soils Resisting Moment = (d+2/3h)(1/2xFooting dimension x S3 x h^2)(12/17)
Effective Soils Resisting Moment = 83043.5

Footing= Square

USE: 5.5 FT.SQ. X 8.5 FT. DEEP FOOTING(Total Depth)

As=12*M/(jd*24000)= 0.5 SQ.IN.

USE: 24 #6's (SQ. CAGE) w/ #4 TIES w/ 135 hooks @ 9" O.C.



b =	24.63	in
d =	20.88	in
d' =	3.75	in
h =	24.63	in
Block Strength =	2.00	ksi
Masonry Type =	Concrete	
Mortar Type =	S	
As =	0.88	in^2
A's =	0.88	in^2
Fy =	60	ksi
Es =	29000	ksi
Em =	1400	ksi
f'm =	1.56	ksi
n =	20.71	
Fb =	0.52	ksi (2.3.3.2.2)
Fs =	24.00	ksi (Tension,2.3.2)
rho =	0.0017	
rho' =	0.0017	
rho(b) =	0.0033	
k =	0.228	
Y =	1.711	in
Compression Limit M =	51.5	ft-kip
Tension Limit M =	33.9	ft-kips

Max Moment = 33.9 ft-kips

L =	21.00	ft
Allowable Load =	153.59	plf
Allowable Load =	74.85	psf

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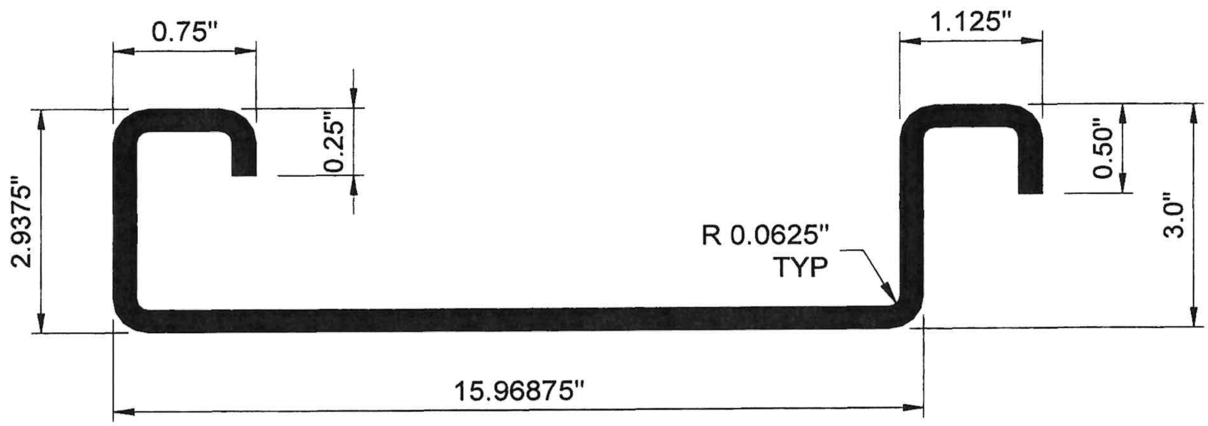
Arlington, Texas 76010
817-261-9116



SL-316 DECK PANEL

Section Properties

Gage	Wt, psf	Thickness, in	ASTM 653	+I, in^4	-I, in^4	+S, in^3	-S, in^3	+M, ft-lbs/ft	-M, ft-lbs/ft
20	2.20	0.0359	Grade 40	0.9346	0.4680	0.3961	0.3036	592.70	454.44
			Grade 50	0.9208	0.4522	0.3879	0.2880	725.86	538.92
18	2.93	0.0478	Grade 40	1.2486	0.6827	0.5329	0.4377	797.77	655.28
			Grade 50	1.2129	0.6518	0.5141	0.4296	962.09	803.92

Notes:

1 Designed per AISI Cold Formed Steel Manual, 2016 ed.
2 Complete calculations are available upon request.
3 ± M is allowable bending moment.

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LANE SUPPLY, INC.

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STANDARD BASE PLATE DESIGN

LBP # (D - M)	M (ft-k)	P_{BOLT} (k)	Bolt Dia. (in)	$t_{REQ'D}$ (in)	t_{ACTUAL} (in)	Weld Req'd (1/16 in)	Weld Actual (in)	Base Plate Mark
12 - 10	10	4.07	1 1/2	0.53	3/4	0.67	1/4	LBP 13
12 - 20	20	8.14	1 1/2	0.73	3/4	1.35	1/4	LBP 13
12 - 30	30	12.00	1 1/2	0.88	1	2.02	5/16	LBP 14
12 - 40	40	15.74	1 1/2	1.00	1 1/4	2.69	5/16	LBP 15
12 - 50	50	19.67	1 1/2	1.11	1 1/4	3.37	5/16	LBP 15
12 - 60	60	23.61	1 1/2	1.21	1 1/4	4.04	5/16	LBP 15
12 - 70	70	27.10	1 1/2	1.29	1 1/2	4.71	5/16	LBP 16
12 - 80	80	30.97	1 1/2	1.37	1 1/2	5.39	F.P.	LBP 16
12 - 90	90	34.84	1 1/2	1.44	1 1/2	6.06	F.P.	LBP 16

TS 12 X12 COLUMN:
- D= 12 in.
- e= 2 in.
- b,d= 12 in.

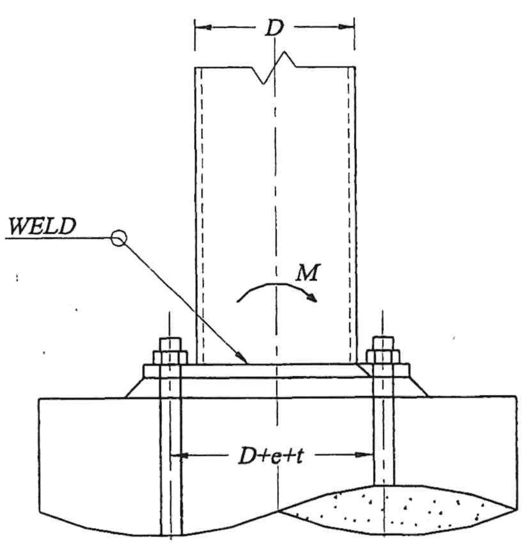
CONSTANTS:

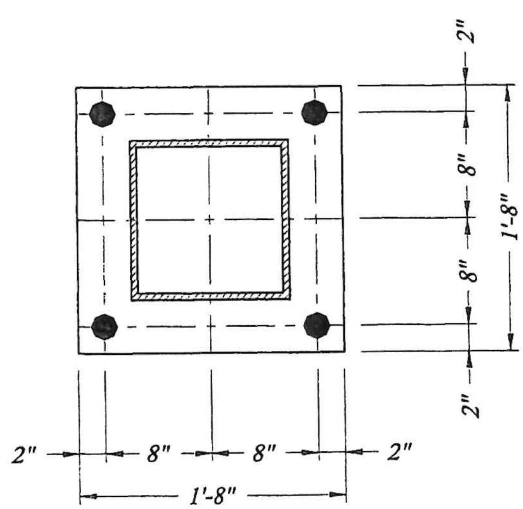
A36 Steel Plate	Fy = 36 ksi
E70xx Electrode	Fw = 0.928 k/in/16th
A307 Anchor Bolts	Ft = 20 ksi

EQUATIONS:

$$P_{BOLT} = \frac{M \times 12\ in/ft}{2\ bolts\ (D+e+t)} \qquad Weld = \frac{M \times 12\ in/ft}{S_{Weld} \times Fw} = \frac{M \times 12\ in/ft}{Fw\ (bd + d^2/3)}$$

$$t_{REQ'D} = \sqrt{\frac{6 \times P \times e \times 2\ bolts}{0.75 \times Fy \times (D+2t)}}$$





10 BOLTS END PLATE MOMENT CONNECTION :

(Ref: ASD 14th Ed.& Steel Design Guide Series 16)

Loading:

Mmax =	250.50	kip-ft
Vmax =	31.61	kips
Vmax/bolt =	3.95	kips

AISC TABLE 7-2 Allowable Tension Load (kips)		
Dia.(in)	A307	A325
5/8	6.9	13.8
3/4	9.9	19.9
7/8	13.5	27.1
1	17.7	35.3
1 1/4	27.6	55.2
1 3/8	33.4	66.8
1 1/2	39.8	79.5

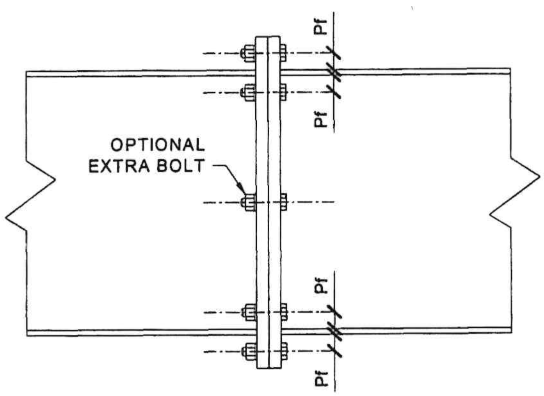
Beam Information

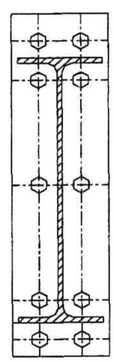
Size :	W18X50	
h =	18.000	in
tw =	0.355	in
bf =	7.500	in
tf =	0.570	in
g =	3.500	in
Plate, Fy =	36.000	ksi
Pf,o =	1.750	(db+1/2")
Pf,i =	1.750	(db+1/2")
h0 =	19.750	in
h1 =	15.680	in
db =	1.250	in
bp =	8.500	in
s =	2.73	in
Y =	148.470	in
All. Bolt Force =	55.20	kips
Mn =	3848.54	kip-in
tp, req'd =	1.155	

d0 = 19.465 in

d1 = 15.395 in

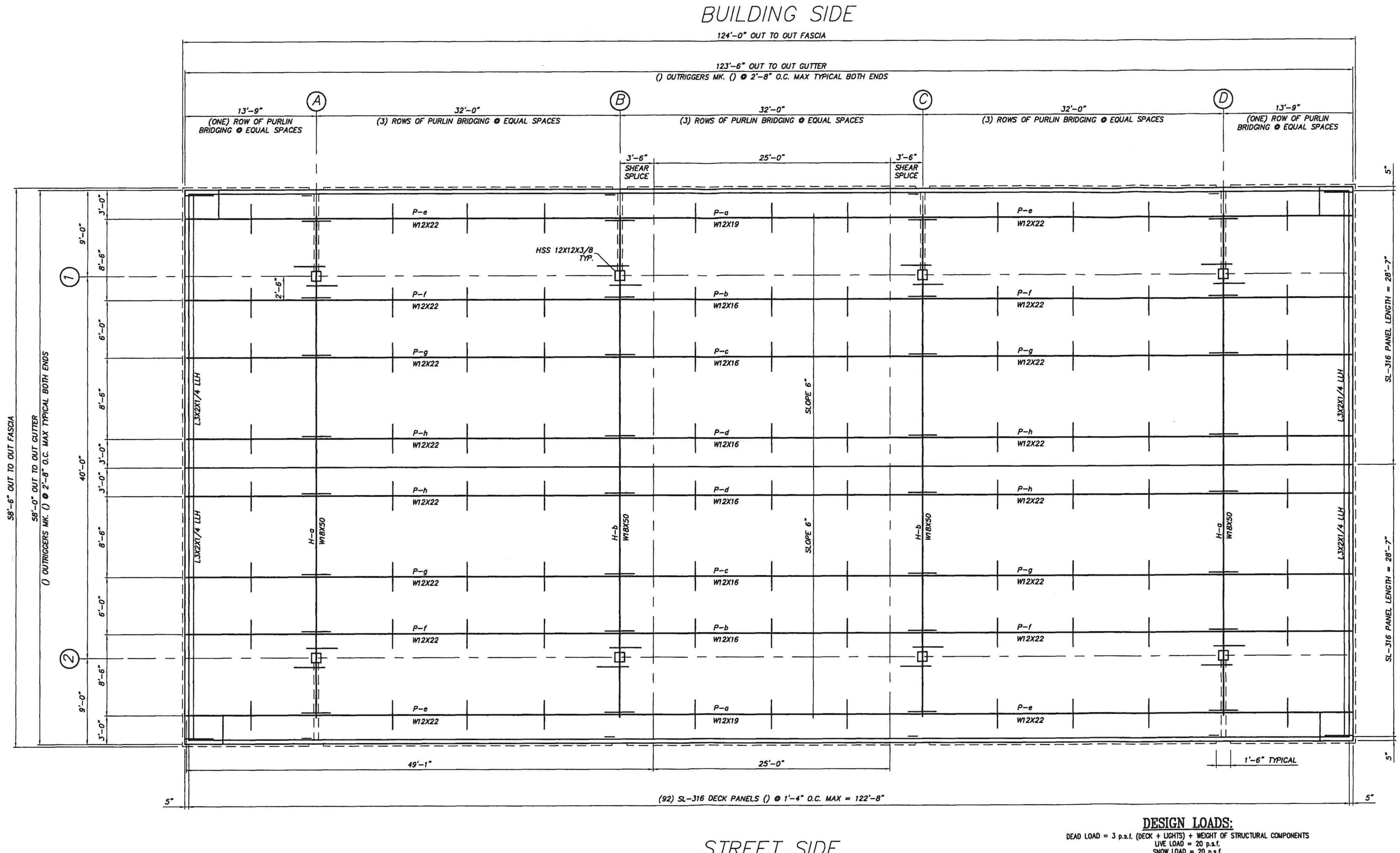
Flange Force, Ff=12Mmax/(d-tf) =	172.463	kips
Bolt Force=12•M/(2•SUM(d,n) =	43.116	kips
Flange Weld, Df=Ff/[0.928*{2(bf+tf)-tw}] =	11.773	/16th F.W.
Web Weld, Dw=0.6Fy*tw/(2*0.928) =	4.131	/16th F.W.





Pf = 1.750 in

Plate:	1 1/4" Connection Plate
Bolts:	10-1 1/4" Dia. A325 Bolts
Flange to Plate Weld:	Full Penetration Weld
Web to Plate Weld:	5/16" Fillet Weld



DOUBLE DECK CLIP OUTSIDE PURLINS AND PURLIN OVERHANGS TO THE FIRST HEADER

DESIGN LOADS:

DEAD LOAD = 3 p.s.f. (DECK + LIGHTS) + WEIGHT OF STRUCTURAL COMPONENTS
LIVE LOAD = 20 p.s.f.
SNOW LOAD = 20 p.s.f.
V, ULT = 116 m.p.h. EXP. C
V, ASD = 90 m.p.h. EXP. C
BLDG CODE = 2018 INTERNATIONAL BUILDING CODE
EQUIVALENT LATERAL FORCE PROCEDURE
LATERAL FORCE RESISTING SYSTEM = CANTILEVERED COLUMN SYSTEM-ORDINARY STEEL MOMENT FRAME
Pf = 20 p.s.f.
Ce = 1.2
Ct = 1.2
Is = 1.0
W = 7.26 ft
Pd = 29.80 p.s.f.
SITE CLASS = D (Default)
Ss (0.2) = 0.100
S1 (1.0) = 0.068
SDS = 0.11
SD1 = 0.11
Fa = 1.60
Fv = 2.40
R = 1.25
IMPORTANCE FACTOR = 1.0
RISK CATEGORY = II
SEISMIC DESIGN CATEGORY = B
CS = 0.085
CONSTRUCTION TYPE = IIB
OCCUPANCY CATEGORY = M
TOTAL SEISMIC BASE SHEAR BOTH DIRECTIONS = 5.20 KIPS