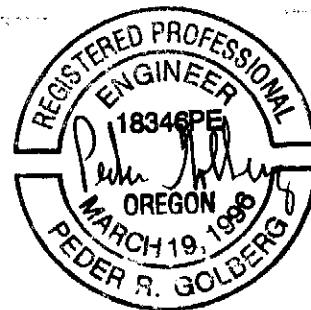
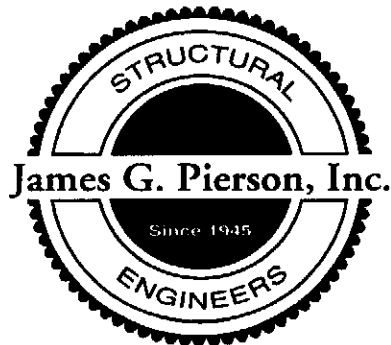


Structural Calculations Car Deck Rail

Muller-Dhillon Residence
3425 SW Heather Lane
Portland, Oregon 97201

for

William J. Hawkins III
Architect FAIA
1425 Southwest 20th Ave..
Portland, Oregon 97201



EXP. REG: JUNE 30, 21

James G. Pierson, Inc.
Consulting Structural Engineers
320 S.W. STARK SUITE 535 PORTLAND, OR. 97204
(503) 226-1286 FAX 226-3130

May 1, 2006

Car Deck Guardrail

6000# @ 13" ASCE 7-02 Sectn 4.4.2.C
= 108,000 in. lbs moment

See encl. use 4x4x1/4" vertical posts @ 4' o/c
Horizontal rail - 4x4x1/4" also

See encl. attached

Resist w/ couple - 13" or T/C = 6000#

Flt. weld 3"x 9/16" x 3/16" 8,350# - use ~~3/16"~~ 1/4" weld

#4 bar in tension = .20 in² = 6300# Guide 40 bar
9450# Guide 60 bar
use #4 bar @ 16" o/c

See SD-08 attached for sketch

James G. Pierson, Inc.

Project
Mueller

Job no.

Consulting Structural Engineers

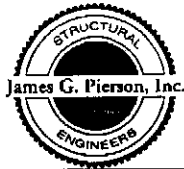
Location
Car Deck

Date
5/1/06

320 S.W. Stark, Suite 535 Portland, Oregon 97204
Tel: (503) 226-1286 Fax: (503) 226-3130

Client
Harkin

Sheet no.
SD-08-1



Peder Golberg, P.E./S.E.
 James G. Pierson, Inc.
 320 SW Stark #535
 Portland, Oregon 97204
 503-226-1286 fax 503-226-3130

Title :
 Dsgnr: □Ši9i Ā#@R9_©%u .@ü Date: 10:44AM, 1 MAY 06
 Description :

Scope :

Job #

Rev: 580008
 User: KW-0601615, Ver 5.8.0, 1-Dec-2003
 (c)1983-2003 ENERCALC Engineering Software

Steel Column

Description Guardrail posts

General Information

Code Ref: AISC 9th ASD, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Steel Section	TS4X4X1/4	Fy	36.00 ksi	X-X Sidesway :	Restrained
		Duration Factor	1.330	Y-Y Sidesway :	Restrained
Column Height	3.000 ft	Elastic Modulus	29,000.00 ksi		
End Fixity	Fix-Free	X-X Unbraced	0.000 ft	Kxx	1.000
Live & Short Term Loads Combined		Y-Y Unbraced	0.000 ft	Kyy	1.000

Loads

Axial Load...					
Dead Load	0.20 k	Ecc. for X-X Axis Moments	0.000 in		
Live Load	k	Ecc. for Y-Y Axis Moments	0.000 in		
Short Term Load	k				
Point lateral Loads...		<u>DL</u>	<u>LL</u>	<u>ST</u>	<u>Height</u>
Along Y-Y (strong axis moments)				6.000 k	1.500 ft
Along X-X (y moments)				k	ft

Summary

Column Design OK

Section : TS4X4X1/4, Height = 3.00ft, Axial Loads: DL = 0.20, LL = 0.00, ST = 0.00k, Ecc. = 0.000in
 Unbraced Lengths: X-X = 0.00ft, Y-Y = 0.00ft

Combined Stress Ratios	<u>Dead</u>	<u>Live</u>	<u>DL + LL</u>	<u>DL + ST + (LL if Chosen)</u>
AISC Formula H1 - 1				
AISC Formula H1 - 2				
AISC Formula H1 - 3	0.0026		0.0026	0.8335

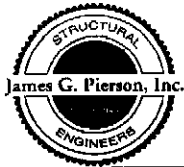
XX Axis : Fa calc'd per Eq. E2-1, $K^*L/r < C_c$
 YY Axis : Fa calc'd per Eq. E2-1, $K^*L/r < C_c$

Stresses

Allowable & Actual Stresses	<u>Dead</u>	<u>Live</u>	<u>DL + LL</u>	<u>DL + Short</u>
Fa : Allowable	21.60 ksi	0.00 ksi	21.60 ksi	28.73 ksi
fa : Actual	0.06 ksi	0.00 ksi	0.06 ksi	0.06 ksi
Fb:xx : Allow [F1-6]	23.76 ksi	0.00 ksi	23.76 ksi	31.60 ksi
Fb:xx : Allow [F1-7] & [F1-8]	23.76 ksi	0.00 ksi	23.76 ksi	31.60 ksi
fb : xx Actual	0.00 ksi	0.00 ksi	0.00 ksi	26.28 ksi
Fb:yy : Allow [F1-6]	23.76 ksi	0.00 ksi	23.76 ksi	31.60 ksi
Fb:yy : Allow [F1-7] & [F1-8]	23.76 ksi	0.00 ksi	23.76 ksi	31.60 ksi
fb : yy Actual	0.00 ksi	0.00 ksi	0.00 ksi	0.00 ksi

Analysis Values

F'ex : DL+LL	0 psi	Cm:x DL+LL	0.60	Cb:x DL+LL	1.00
F'ey : DL+LL	0 psi	Cm:y DL+LL	0.60	Cb:y DL+LL	1.00
F'ex : DL+LL+ST	132999,999 psi	Cm:x DL+LL+ST	1.00	Cb:x DL+LL+ST	1.00
F'ey : DL+LL+ST	132999,999 psi	Cm:y DL+LL+ST	0.60	Cb:y DL+LL+ST	1.00
Max X-X Axis Deflection	-0.122 in at	3.000 ft	Max Y-Y Axis Deflection	0.000 in at	0.000 ft



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Title :
 Dsgnr: □Ši9i Ä#@R9_©%u. @ü Date: 10:44AM, 1 MAY 06
 Description :

Scope :

Job #

Rev: 580008
 User: KW-0601615, Ver 5.8.0, 1-Dec-2003
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Steel Column

Page 2
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Description Guardrail posts

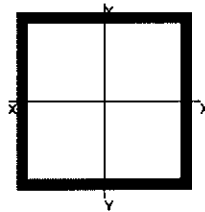
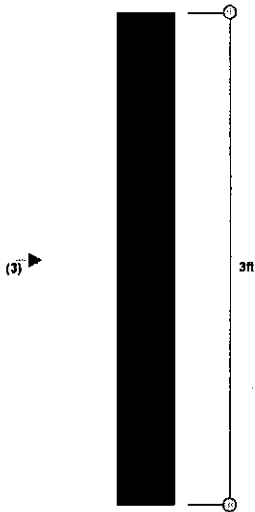
Section Properties TS4X4X1/4

Depth	4.000 in	Weight	12.19 #/ft	Values for LRFD Design....	
Thickness	0.250 in	Ixx	8.220 in4	J	13.500 in4
Width	4.000 in	Iyy	8.220 in4		0.00
		Sxx	4.110 in3	Zx	4.970 in3
Area	3.59 in2	Syy	4.110 in3	Zy	4.970 in3
Rt	2.000 in	Rxx	1.510 in		0.000
		Ryy	1.510 in		

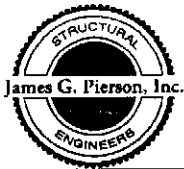
Section Type = TS-Square

Sketch & Diagram

Axial DL = 0.2k
 Axial LL = 0k
 Axial ST = 0k



(3): X-X Axis Point Load: DL=0, LL=0a, ST=6k @ 1.5ft



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Title : Job #
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Rev: 580006
 User: KW-0601615, Ver 5.8.0, 1-Dec-2003
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Steel Beam Design

Page 1
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Description Guardrail beam

General Information

Code Ref: AISC 9th ASD, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Steel Section : TS4X4X1/4

Center Span	4.00 ft	Pinned-Pinned	Fy	36.00 ksi
Left Cant.	0.00 ft	Bm Wt. Added to Loads	Load Duration Factor	1.00
Right Cant	0.00 ft	LL & ST Act Together	Elastic Modulus	29,000.0 ksi
Lu : Unbraced Length	0.00 ft	Minor Axis Bending !		

Point Loads

Note! Short Term Loads Are WIND Loads.

	# 1	# 2	# 3	# 4	# 5	# 6	# 7	
Dead Load								k
Live Load								k
Short Term	6.000							k
Location	2.000							ft

Summary

Beam OK
 Short Term Load Case Governs Stress

Using: TS4X4X1/4 section, Span = 4.00ft, Fy = 36.0ksi
 End Fixity = Pinned-Pinned, Lu = 0.00ft, LDF = 1.000

	Actual	Allowable		
Moment	6.024 k-ft	8.138 k-ft	Max. Deflection	-0.058 in
fb : Bending Stress	17.589 ksi	23.760 ksi	Length/DL Defl	162910.3 : 1
fb / Fb	0.740 : 1		Length/(DL+LL Defl)	823.5 : 1
Shear	3.024 k	14.400 k		
fv : Shear Stress	1.512 ksi	14.400 ksi		
fv / Fv	0.105 : 1			

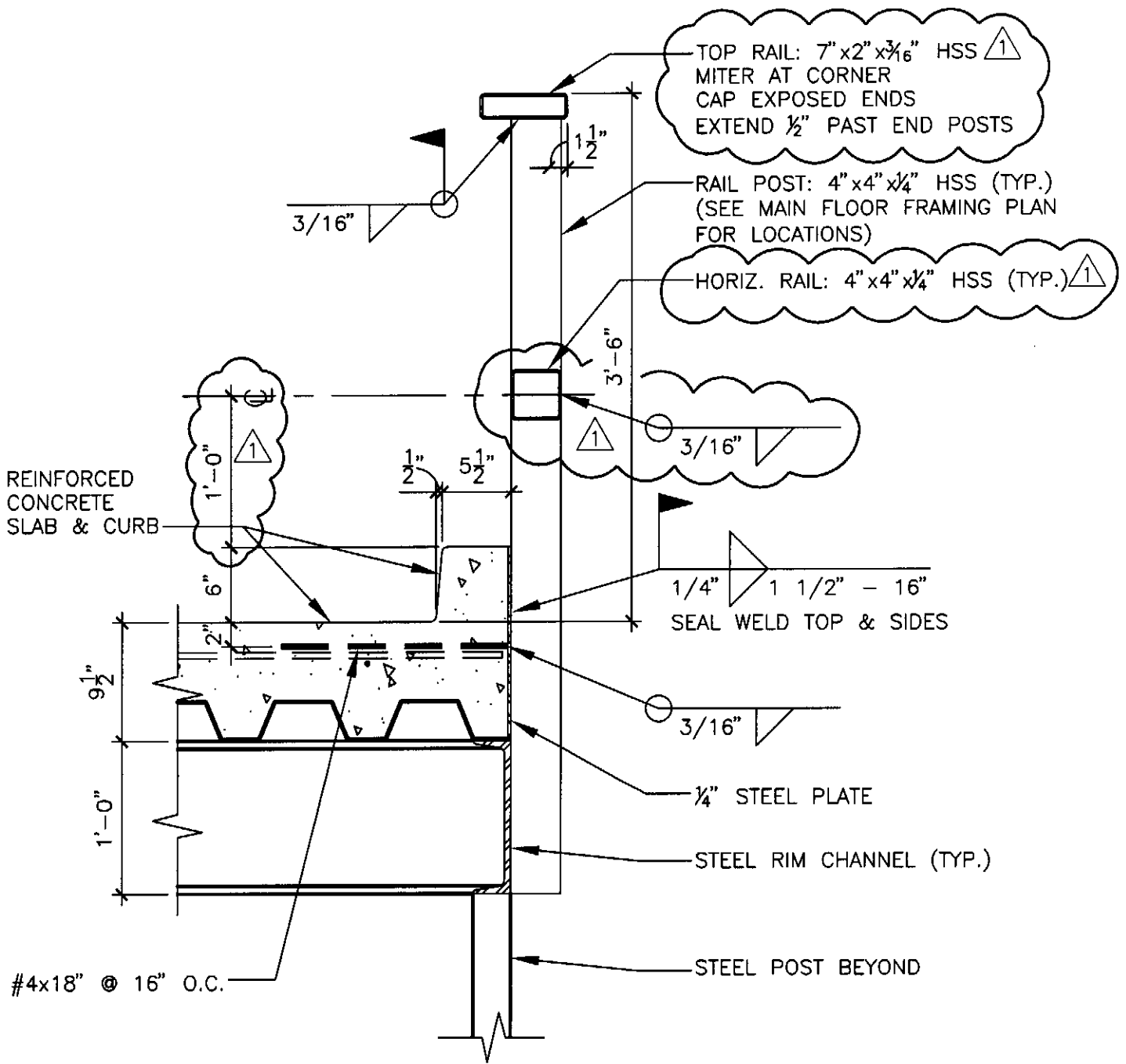
Force & Stress Summary

	Maximum	<-- These columns are Dead + Live Load placed as noted -->					
		DL Only	LL @ Center	LL+ST @ Center	LL @ Cants	LL+ST @ Cants	
Max. M +	6.02 k-ft	0.02		6.02			k-ft
Max. M -							k-ft
Max. M @ Left							k-ft
Max. M @ Right							k-ft
Shear @ Left	3.02 k	0.02		3.02			k
Shear @ Right	3.02 k	0.02		3.02			k
Center Defl.	-0.058 in	-0.000	0.000	-0.058	0.000	0.000 in	
Left Cant Defl	0.000 in	0.000	0.000	0.000	0.000	0.000 in	
Right Cant Defl	0.000 in	0.000	0.000	0.000	0.000	0.000 in	
...Query Defl @	0.000 ft	0.000	0.000	0.000	0.000	0.000 in	
Reaction @ Left	3.02	0.02		3.02			k
Reaction @ Rt	3.02	0.02		3.02			k

Fa calc'd per Eq. E2-1, K*L/r < Cc

Section Properties TS4X4X1/4

Depth	4.000 in	Weight	12.19 #/ft
Thickness	0.250 in	Ixx	8.220 in4
Width	4.000 in	Iyy	8.220 in4
		Sxx	4.110 in3
Area	3.59 in2	Syy	4.110 in3
Rt	2.000 in	R-xx	1.510 in
Values for LRFD Design....		R-yy	1.510 in
J	13.500 in4	Zx	4.970 in3
		Zy	4.970 in3



1

RAIL POST AT CAR DECK

SCALE: 1" = 1'-0"

ALSO SEE NOTES ON DETAIL CD2/S-3

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Muller-Dhillon
Residence Addition

SD-08