

# Concrete Column

ENERCALC, INC. 1983-2011, Build: 6.11.12.15, Ver: 6.11.12.15

Licenses:

## Lic. #:

Description: 11164 - Concrete Column Design for CA

## General Information

$f_c$  : Concrete 28 day strength = 5.0 ksi  
 $E$  = 3,122.0 ksi  
 Density = 150.0 pcf  
 $\beta$  = 0.80  
 $f_y$  - Main Rebar = 60.0 ksi  
 $E$  - Main Rebar = 29,000.0 ksi  
 Allow. Reinforcing Limits *ASTM A615 Bars Used*  
 Min. Reinf. = 1.0 %  
 Max. Reinf. = 8.0 %

Load Combination 2006 IBC & ASCE 7-05

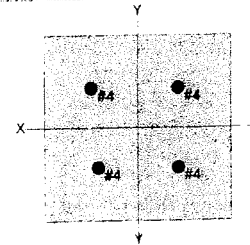
Calculations per ACI 318-08, IBC 2009, CBC 2010, ASCE 7-05

Overall Column Height = 8.135 ft  
 End Fixity Top & Bottom Pinned  
 ACI Code Year ACI 318-05  
 Brace condition for deflection (buckling) along columns :  
 X-X (width) axis : Unbraced Length for X-X Axis buckling = 8.135 ft,  $K = 1.0$   
 Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 8.135 ft,  $K = 1.0$

## Column Cross Section

Column Dimensions 7.0in Square Column, Column Edge to Rebar Edge  
Cover = 0.750in

Column Reinforcing : 4 - #4 bars @ corners,



## Applied Loads

Column self weight included : 415.22 lbs \* Dead Load Factor  
 AXIAL LOADS ...  
 Axial Load at 8.135 ft above base,  $D = 1.0$ ,  $L = 1.250$  k

Entered loads are factored per load combinations specified by user.

## DESIGN SUMMARY

Load Combination +1.20D+0.50Lr+1.60L+1.60H  
 Location of max. above base 8.080 ft  
**Maximum Stress Ratio 0.030001 : 1**  
 $\text{Ratio} = (P_u^2 + M_u^2)^{.5} / (\Phi P_n^2 + \Phi M_n^2)^{.5}$   
 $P_u = 3.698$  k  $\Phi * P_n = 122.97$  k  
 $M_{u-x} = 0.0$  k-ft  $\Phi * M_{n-x} = 0.0$  k-ft  
 $M_{u-y} = 0.2496$  k-ft  $\Phi * M_{n-y} = 0.0$  k-ft  
 $M_u$  Angle = 90.0 deg  
 $M_u$  at Angle = 0.2496 k-ft  $\Phi M_n$  at Angle = 8.344 k-ft

## Maximum SERVICE Load Reactions . . .

Top along Y-Y	k	Bottom along Y-Y	k
Top along X-X	k	Bottom along X-X	k

## Maximum SERVICE Load Deflections . . .

Along Y-Y	0.0 in at	0.0 ft above base
for load combination :		
Along X-X	0.0 in at	0.0 ft above base
for load combination :		

$P_n$  &  $M_n$  values located at  $P_u$ - $M_u$  vector intersection with capacity curve

## Column Capacities . . .

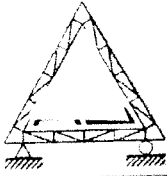
$P_{nmax}$ : Nominal Max. Compressive Axial Capacity	252.85 k
$P_{nmin}$ : Nominal Min. Tension Axial Capacity	-48.0 k
$\Phi P_n$ , max : Usable Compressive Axial Capacity	131.48 k
$\Phi P_n$ , min : Usable Tension Axial Capacity	-31.20 k

General Section Information .  $\phi = 0.650$   $\beta = 0.80$   $\theta = 0.80$

$\rho$ : % Reinforcing	1.633 %	Rebar % Ok
Reinforcing Area	0.80 in <sup>2</sup>	
Concrete Area	49.0 in <sup>2</sup>	

## Governing Load Combination Results

Governing Factored Load Combination	Dist. from base ft.	Axial Load k			Bending Analysis k-ft						Utilization	
		$P_u$	$\Phi * P_n$	$\delta_x$	$\delta_x * M_{ux}$	$\delta_y$	$\delta_y * M_{uy}$	Alpha (deg)	$\delta M_u$	$\Phi M_n$	Ratio	
+1.40D	8.08	1.98	122.97	1.000		1.000	0.13	90.000	0.13	8.34	0.016	
+1.20D+0.50Lr+1.60L+1.60H	8.08	3.70	122.97	1.000		1.000	0.25	90.000	0.25	8.34	0.030	
+1.20D+1.60L+0.50S+1.60H	8.08	3.70	122.97	1.000		1.000	0.25	90.000	0.25	8.34	0.030	
+1.20D+1.60Lr+0.50L	8.08	2.32	122.97	1.000		1.000	0.16	90.000	0.16	8.34	0.019	
+1.20D+0.50L+1.60S	8.08	2.32	122.97	1.000		1.000	0.16	90.000	0.16	8.34	0.019	



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### Governing Load Combination Results

Governing Factored Load Combination	Dist. from base - ft	Axial Load - k			Bending Analysis - k-ft				Utilization Ratio		
		P <sub>u</sub>	φ * P <sub>n</sub>	δ * Δ	δ * Δ * M <sub>ux</sub>	δ * Δ * M <sub>uy</sub>	Alpha (deg)	δ * M <sub>u</sub>		φ * M <sub>n</sub>	
+1.20D+0.50Lr+0.50L+1.60W	8.08	2.32	122.97	1.000		1.000	0.16	90.000	0.16	8.34	0.019
+1.20D+0.50L+0.50S+1.60W	8.08	2.32	122.97	1.000		1.000	0.16	90.000	0.16	8.34	0.019
+1.20D+0.50L+0.20S+E	8.08	2.32	122.97	1.000		1.000	0.16	90.000	0.16	8.34	0.019

Note: Only non-zero reactions are listed.

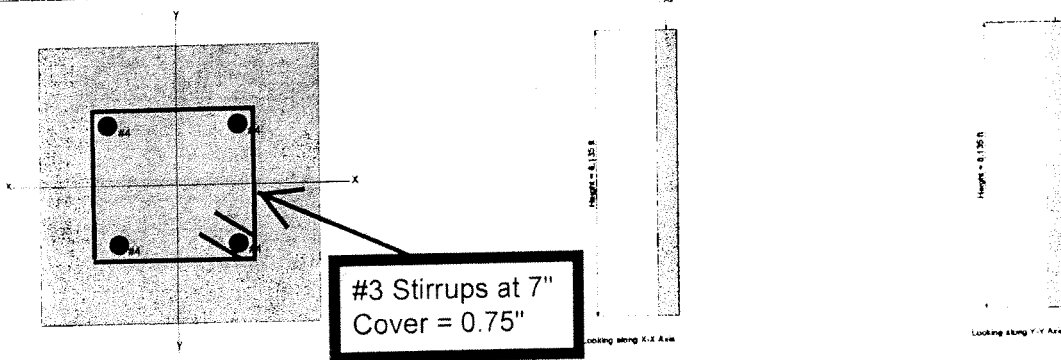
### Maximum Reactions - Unfactored

Load Combination	Reaction along X-X Axis		Reaction along Y-Y Axis		Axial Reaction @ Base
	@ Base	@ Top	@ Base	@ Top	
D Only					1.415 k
L Only					1.250 k
D+L					2.665 k

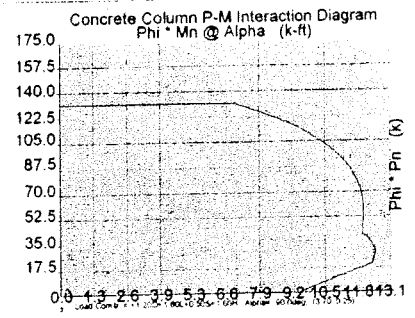
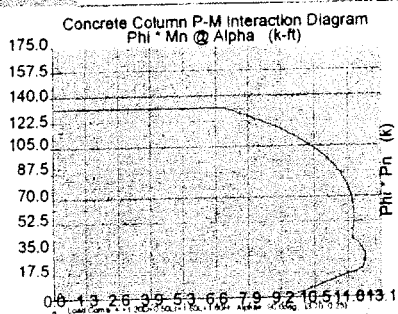
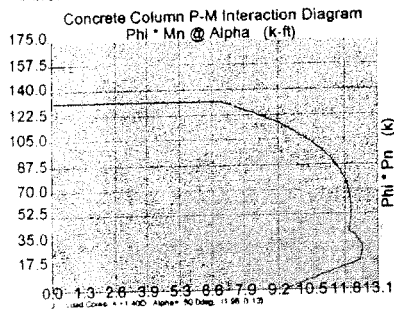
### Maximum Deflections for Load Combinations - Unfactored Loads

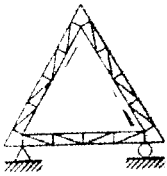
Load Combination	Max. X-X Deflection		Max. Y-Y Deflection	
	Distance	Value	Distance	Value
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
D+L	0.0000 in	0.000 ft	0.000 in	0.000 ft

### Sketches



### Interaction Diagrams





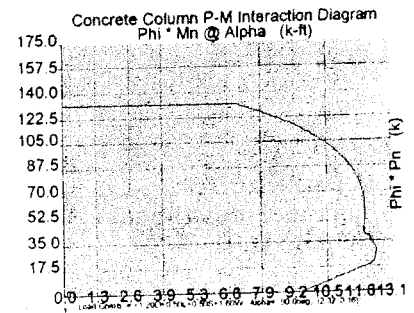
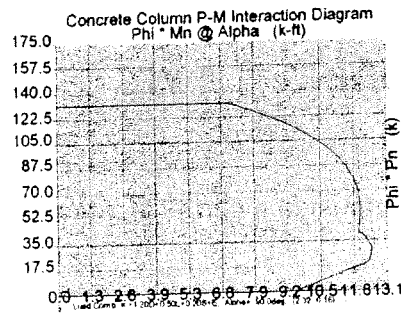
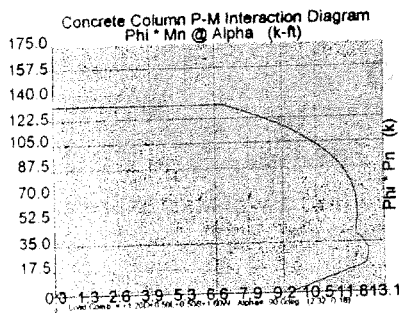
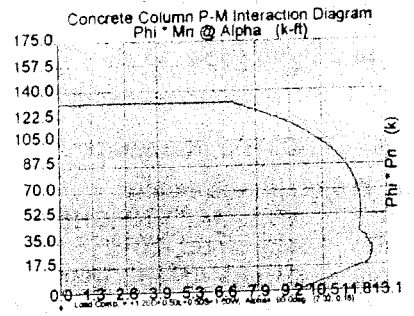
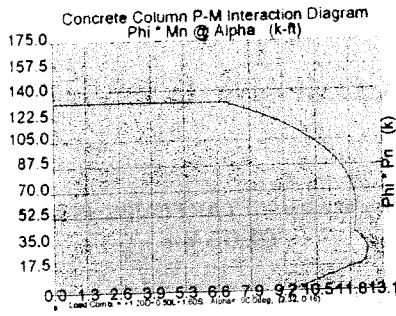
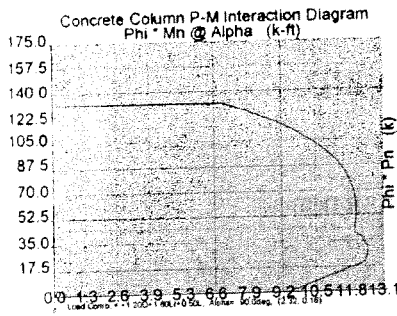
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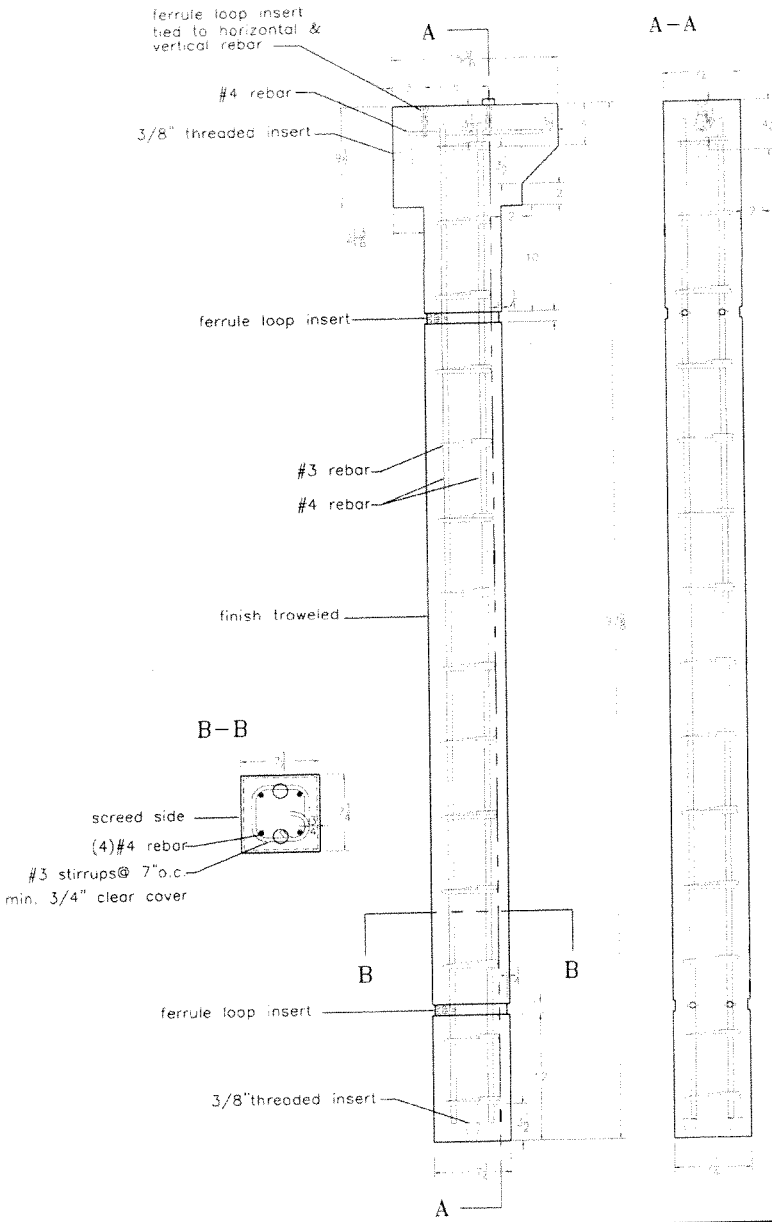
# APPROVAL DRAWING

JOB NAME: ts  
 CUSTOMER: SALES  
 SERVICE REP.: ORDER #: 5690

DETAIL NAME: 1/A8.8 Double Columm  
 DRAWN BY: DT REVISION #: 01  
 REVISION DATES: 11/15/11, 01-05-12

In order to facilitate release of castings from molds it is necessary to apply draft to certain edges/sides of castings. Casting tolerance is 1/8 inch. For questions regarding draft or tolerance contact your product consultant.

## Double Column Side 1



CASTINGS: 110  
 Color: Y27 Mesa Buff  
 Bldg 500 1c: 32  
 Bldg 800 1c: 34  
 Bldgs 200-300 1b: 44

5000 psi concrete

Load Information as Provided:  
 Design Live Load: 1250#  
 Design Dead Load: 1000#  
 These columns will not be resisting any lateral or seismic loads.

Scale: 3/4" = 1'-0"

### CURRENT APPROXIMATE TOOLING LEAD TIMES :

AN ACCURATE LEAD-TIME WILL BE GIVEN ONCE DRAWINGS ARE APPROVED

CDI retains ownership of all molds and patterns. Due to space constraints, molds can not be stored indefinitely. Please inform your product consultant if you plan to use this product for future projects.

NAME (Printed) :	SIGNATURE :	DATE: 5 of 7
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