



THE NELSON GROUP
ENGINEERING & DEVELOPING, INC.
1136 EAST HARMONY AVE. Y SUITE 205
MESA, ARIZONA 85204
[480] 497-0003 Y FAX: [480] 497-0038

Job Name: Aristone - Column Design
Job No.: 2008-119 **Sheet No.:** 1
By: C.A.N. **Date:** 05.27.08

CLIENT:

ARISTONE DESIGNS, Inc.

1615 East Weber Drive

Tempe, Arizona

PROJECT DESCRIPTION AND ADDRESS:

Structural Design of

PRECAST CONCRETE COLUMNS

Great State of Arizona

GENERAL INFORMATION:

BUILDING CODES:

2006 I.B.C

2003 I.B.C.

NOTES:

FOR ADDITIONAL INFORMATION - SEE BASIS OF DESIGN.

2006-BASIS



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Job Name: Aristone - Column Design
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Job Name: Aristone - Column Design
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BASIS FOR DESIGN:

BUILDING CODE:

- 2006 EDITION OF THE INTERNATIONAL BUILDING CODE.
- 2003 EDITION OF THE INTERNATIONAL BUILDING CODE..

LOADS:

- MAXIMUM VERTICAL POINT LOAD ALLOWED, TO BE DETERMINED DURING CALCULATIONS.

FOUNDATIONS:

- TO BE DESIGNED BY THE STRUCTURAL ENGINEER OF RECORD FOR SPECIFIC PROJECTS.

CONCRETE:

- MINIMUM 28 DAY STRENGTH = 3,000 P.S.I. EXCEPT AS FOLLOWS:

COLUMNS -----4,000 p.s.i..

REINFORCING:

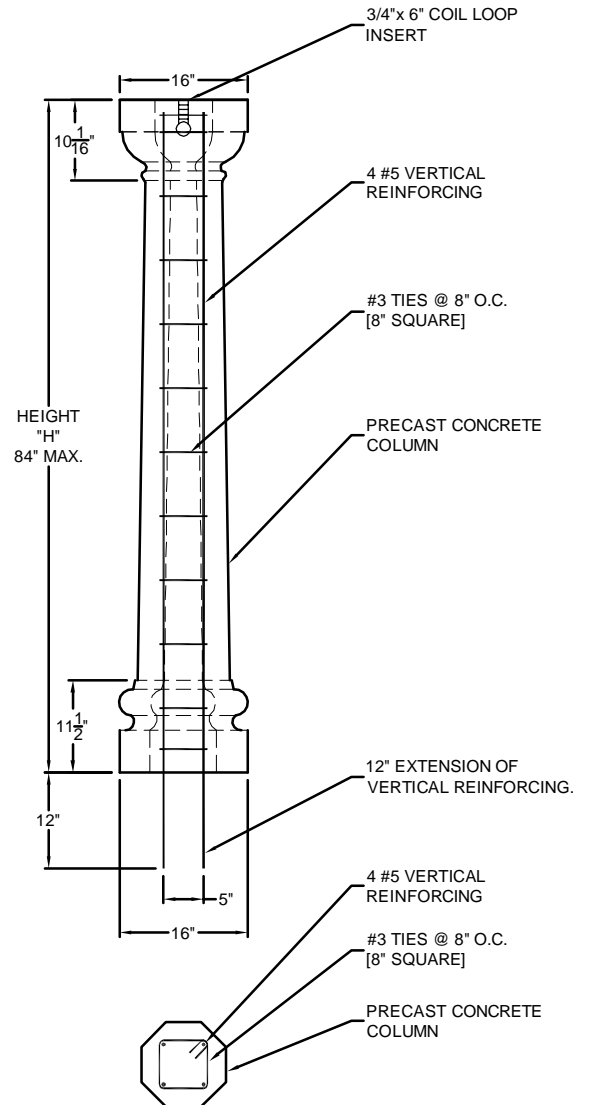
- BARS #4 AND SMALLER: ----- $F_Y = 40,000$ P.S.I..
- BARS #5 AND LARGER: ----- $F_Y = 60,000$ P.S.I..

INSERTS:

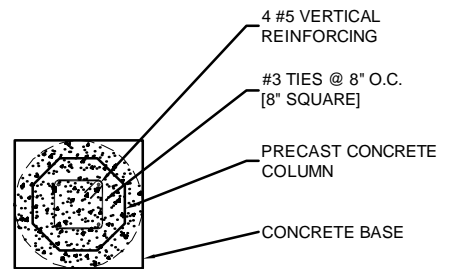
- COIL LOOP INSERTS SHALL BE MANUFACTURED BY 'DAYTON RICHMOND' OR EQUIVALENT WITH CURRENT 'ICC' EVALUATION REPORT.

COT-84 - ALLOWABLE LOADS			
HEIGHT		ALLOWABLE LOADS	
DESIGN	ACTUAL [H]	VERTICAL	MOMENT
7'-0"	84"	10 kips	2.0ft-kips

- GENERAL STRUCTURAL NOTES**
- BUILDING CODES:
2006 EDITION OF INTERNATIONAL BUILDING CODE.
2003 EDITION OF INTERNATIONAL BUILDING CODE.
 - CONCRETE STRENGTH = 4,000 PSI.
 - REINFORCING STRENGTH: $F_y = 40,000$ PSI
 - ALL CONCRETE SHALL BE VIBRATED DURING PLACEMENT.
 - REINFORCING SHALL BE RESTRAINED DURING PLACEMENT OF CONCRETE.
 - REINFORCING AND CONCRETE PLACEMENT SHALL CONFORM TO "ACI 318" SPECIFICATION AND REQUIREMENTS.
 - CONNECTION AT TOP AND BOTTOM SHALL BE SPECIFIED ON CONSTRUCTION DOCUMENTS.
 - ALL COLUMNS SHALL BE BRACED AGAINST SIDESWAY.
 - COIL LOOP INSERTS SHALL BE MANUFACTURED BY DAYTON RICHMOND OR EQUIVALENT.



MID-HEIGHT SECTION



**COLUMN SECTION
COT-84**



EXPIRES 03.31.11



PRECAST CONCRETE COLUMN LOAD TABLE

SCALE: NONE

THE NELSON GROUP ENGINEERING & DEVELOPING, INC. 1136 East Harmony Ave., Suite 205 Mesa, Arizona 85204 Ph: [480] 497-0003 Fax: [480] 497-0038	ARISTONE® DESIGNS, Inc. 1615 East Weber Drive Tempe, Arizona	DATE: 05.27.08	DRWN BY: C.A.N.	4 OF
		JOB NO. 08-119	REV'D BY: C.A.N.	6

COLUMN 'COT-84'

GRAVITY LOADS:

• **DESIGN VALUES:**

L_{MAX} 84" USE 7'-0"

F'_C 4,000 PSI

F_Y 40,000 PSI

DIA. [DESIGN] 10" [Actual Dia. = 10.5"]

CONC. COVER 1.50" [Actual Cover = 1.5"]

LOAD ECCENTRICITY ... 6"

CONNECTIONS AT TOP AND BOTTOM OF COLUMN SHALL BE DETAILED BY ENGINEER OF RECORD.

• **DESIGN LOADS:**

$P_1 = 10,000 \#$

LOAD ARE ENTERED INTO THE DESIGN PROGRAM AS LIVE LOADS SO THAT THE HIGHER LOAD FACTOR OF 1.7 WOULD BE APPLIED TO LOADS. THIS PRODUCES A MORE CONSERVATIVE DESIGN.

• **ALLOWABLE MOMENTS:** [DETERMINED FROM DESIGN PROGRAM RESULTS]

$P_1 = 10,000 \#$ $M_1 = 2.0$ ft-kips

REFER TO ATTACHED CALCULATIONS RESULTS FROM "ENERCALC" DESIGN PROGRAM FOR ADDITIONAL INFORMATION.

THE NELSON GROUP E. & D., Inc.
Structural Engineers
1136 East Harmony Ave., Ste 205
Mesa, Arizona 85204
P.: 480-497-0003 F.: 480-497-0038

Title : ARISTONE - COLUMN DESIGN **Job #** 08-119
Dsgnr: C.A.N. **Date:**
Description : ARISTONE DESIGNS, Inc.
 1615 East Weber Drive
Scope : 2006 IBC: Structural Design of Reinforced Concrete Columns

Rev: 580003
 User: KW-0603042, Ver 5.8.0, 1-Nov-2006
 (c)1983-2006 ENERCALC Engineering Software

Circular Concrete Column

08-119.ecw:Calculations

Description COT-84 [10.0k & 2.0 k-f] **PG 6 OF 6**

General Information

Code Ref: ACI 318-02, 1997 UBC, 2003 IBC, 2003 NFPA 5000

Diameter	10.000 in	f'c	4,000.0psi	Total Height	7.000 ft
Number of Bars	4	Fy	40,000.0 psi	Unbraced Length	7.000 ft
Bar Size	5	Seismic Zone	4	Eff. Length Factor	1.000
Total Rebar Area	1.240 in ²	LL & ST Loads Act Separate		Column is BRACED	
Rebar Percent	1.579 %	Spiral Ties Used			
Bar Cover	1.500 in				

Loads

Note: Load factoring supports 2003 IBC and 2003 NFPA 5000 by virtue of their references to ACI 318-02 for concrete design.
 Factoring of entered loads to ultimate loads within this program is according to ACI 318-02 C.2

	<u>Dead Load</u>	<u>Live Load</u>	<u>Short Term</u>	<u>Eccentricity</u>
Axial Loads	k	10.000 k	k	6.000 in
Applied Moments...				
@ Top	k-ft	2.000 k-ft	k-ft	
@ Bottom	k-ft	k-ft	k-ft	

Summary

Column is OK

Column Diameter= 10.00in, with 4 #5 Bars

	<u>ACI C-1</u>	<u>ACI C-2</u>	<u>ACI C-3</u>
Applied Pu : Max Factored	17.00 k	0.00 k	0.00 k
Allowable Pn * Phi @ Design Ecc.	23.12 k	185.89 k	185.89 k
M-critical	11.90 k-ft	0.00 k-ft	0.00 k-ft
Combined Eccentricity	8.4000 in	0.0000 in	0.0000 in
Magnification Factor	1.00	1.00	1.00
Design Eccentricity	8.4000 in	0.0000 in	0.0000 in
Magnified Design Moment	11.90 k-ft	0.00 k-ft	0.00 k-ft
Po * 0.85	265.56 k	265.56 k	265.56 k
P : Balanced	109.46 k	109.46 k	109.46 k
Ecc : Balanced	3.5975 in	3.5975 in	3.5975 in

Slenderness per ACI 318-02 Section 10.12 & 10.13

Actual k Lu / r	33.600	Elastic Modulus	3,605.0 ksi	Beta	0.850
		<u>ACI Eq. C-1</u>	<u>ACI Eq. C-2</u>	<u>ACI Eq. C-3</u>	
Neutral Axis Distance		2.8750 in	13.2650 in	13.2650 in	
Phi		0.7654	0.7000	0.7000	
Max Limit kl/r		34.0000	34.0000	34.0000	
Beta = M:sustained/M:max		0.0000	0.0000	0.0000	
Cm		1.0000	1.0000	1.0000	
EI / 1000		0.00	0.00	0.00	
Pc : pi ² E I / (k Lu) ²		0.00	0.00	0.00	
alpha: MaxPu / (.75 Pc)		0.0000	0.0000	0.0000	
Delta		1.0000	0.0000	0.0000	
Ecc: Ecc Loads + Moments		8.4000	0.0000	0.0000 in	
Design Ecc = Ecc * Delta		0.0000	0.0000	0.0000 in	

ACI Factors (per ACI 318-02, applied internally to entered loads)

ACI C-1 & C-2 DL	1.400	ACI C-2 Group Factor	0.750	Add'l "1.4" Factor for Seismic	1.400
ACI C-1 & C-2 LL	1.700	ACI C-3 Dead Load Factor	0.900	Add'l "0.9" Factor for Seismic	0.900
ACI C-1 & C-2 ST	1.700	ACI C-3 Short Term Factor	1.300		
....seismic = ST * :	1.100				

Spiral Tie Requirements per 97 ACI 10.9.3

Spiral Tie Bar Size #	3	Min. Spiral Reinforcement Ratio	0.047
Gross Area of Column	78.54 in ²	Max Spiral Tie Spacing	1.342 in
Core Area Within Spirals	38.48 in ²		