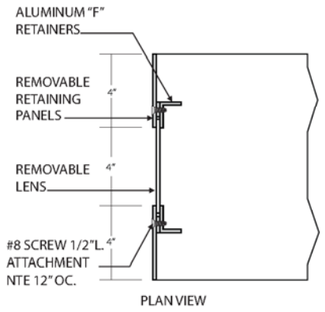
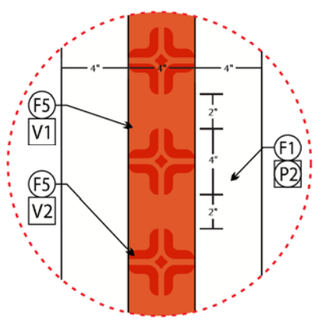
HCA Florida Lake City Hospital
Lake City, FL

Celebrating 52 Years of Quality Manufacturing and Service 52

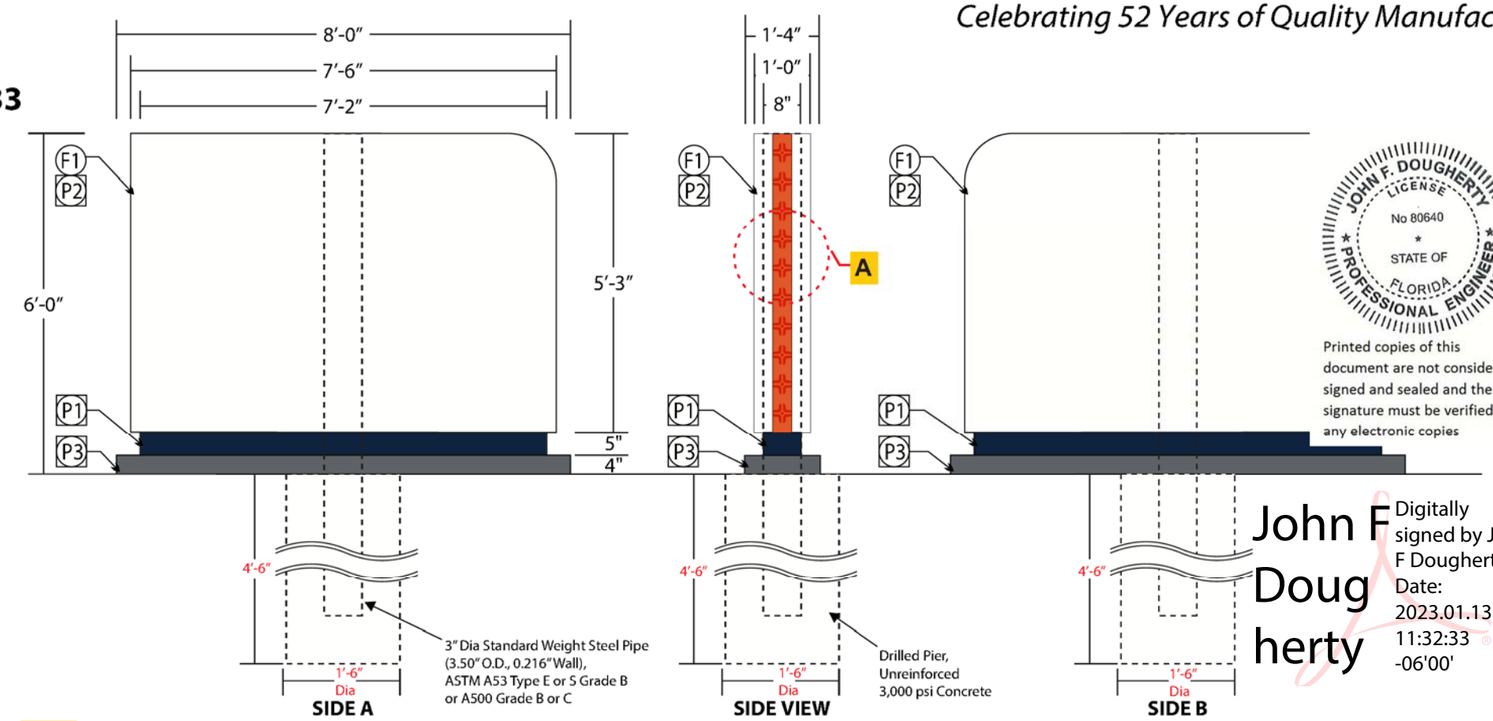
SIGN LOCATION - 32 & 33



PLAN VIEW



A Side Reveal / LENS Detail



New Illuminated Directionals

SCALE: 3/8" = 1'-0"

59 mods
1 p/s
3.4 mods/ft (3.5" mod spacing)

15 bars
5 columns
12" O.C

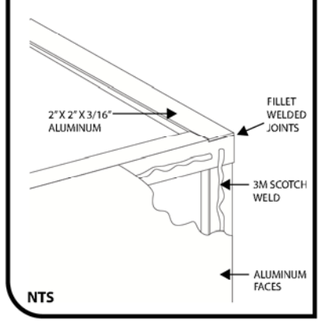
BILL OF MATERIALS

Ref #	Part Number	Description	Qty	Unit	w/unit	Unit/PS
1	OTSR-X2-BW65	PRIME24V REBEL Bright White 6500K	59	mods	0.6	136
2	ASU-100-24U	96W-24V Power Supply	1	pcs	N/A	N/A
3	L3G-LD10U15-24VBW65-230	L3G DS 100mm-150mm BW, 230mm	75	bars	3.36	26
4	ASU-100-24U	96W-24V Power Supply	3	pcs	N/A	N/A

E3 LED Layout

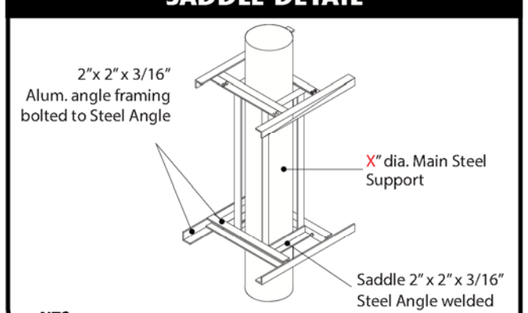
SCALE: 1/2" = 1'-0"

SIGN FRAME DETAIL



NTS

SADDLE DETAIL



NTS

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John F Dougherty
Digitally signed by John F Dougherty
Date: 2023.01.13 11:32:33 -06'00'

TOTAL SQFT =45.00 ⎅
PART # LCH-MN72I-32
ESTIMATE # 187494

MATERIALS FOR FREE STANDING SIGN

EXT. FILLER:	.090" ALUMINUM
FRAMING:	2" X 2" X 3/16" ALUM ANGLE
FACES:	.125 ALUMINUM
RETAINER:	1" ALUMINUM "F" RETAINER (SEE DETAIL A)
LIGHTING:	PRIME24V REBEL BRIGHT WHITE
BASE:	.125" ALUMINUM
SUPPORTS:	DIRECT-BURIED 3" DIAMETER STEEL PIPE
GRAPHICS:	VINYL GRAPHICS

COLORS FOR FREE STANDING SIGN

FILLER:	MATTHEWS WHITE WONDER MP-32071 - W/ UV RESISTANT CLEAR SATIN
FACE BKGND:	MATTHEWS WHITE WONDER MP-32071 - W/ UV RESISTANT CLEAR SATIN
BASE:	TO MATCH PANTONE 424C SLATE GRAY - W/ UV RESISTANT CLEAR SATIN
REVEAL:	TO MATCH PANTONE 289C NAVY BLUE - W/ UV RESISTANT CLEAR SATIN

FABRICATION NOTES

1) ROUTED ALUMINUM FACE BACKED W/ .177" ACRYLIC
2) CLEAR POLY.

VINYL COLOR

1) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / SECOND SURFACE
2) OPAQUE: DIGITALLY PRINTED ON 3M SCOTCHCAL 7725-20 MATTE WHITE COMPLETE WITH 3M MATTE OVERLAMINATE TO MATCH ORANGE 10% TO 15% DARKER THAN 3M 3630-124 BURNT ORANGE VINYL / FIRST SURFACE

PAINT COLOR

1) MATHEWS PAINT COLOR TO MATCH PANTONE 289 C / UV RESISTANT CLEAR SATIN TOP COAT.
2) MATTHEWS WHITE WONDER MP-32071 / UV RESISTANT CLEAR SATIN TOP COAT.
3) MATHEWS PAINT COLOR TO MATCH PANTONE 424 C / UV RESISTANT CLEAR SATIN TOP

ELECTRICAL NOTES

1) WEATHERPROOF DISCONNECT SWITCH
2) LEDs
3) SIGN IS WIRED AS IS ON SCHEMATIC FOR POWER SUPPLY
4) 10 FT MIN. WHIP / ELEC. PRIMARY
5) LED POWER SUPPLY

bitro Your Technology Partner

ELECTRICAL SPECIFICATIONS

LED MODULES= 133	110 VOLT INPUT		
BITRO TRANSFORMER	SECONDARY VOLTS	SECONDARY WATTS	AMP. INPUT
4 ASU-100-24U	24	96	1.0
TOTAL			4.0

(1) 20 AMP-120 VOLT CIRCUIT REQUIRED

GROUNDED ELECTRICAL CONNECTIONS

PER 2017 NATIONAL ELECTRIC CODE

ALL ELECTRICAL COMPONENTS WILL BE UL LISTED AND APPROVED AS PER 2017 NEC 600.3 AND MARKED AS PER NEC 600.4. THE INSTALLATION OF THE WIRING WILL BE DONE AS PER FBC 4505.4 AND DESIGNED TO UL 48. ALL SIGNS WILL BE GROUNDED AND BONDED AS PER NEC 600.7 AND 250.122. A DISCONNECT WILL BE PROVIDED AS PER NEC 600.6.

PRIMARY ELECTRICAL SOURCE WILL BE SUPPLIED BY CUSTOMER TO WITHIN 6 FEET OF SIGN LOCATION. THIS SIGN WILL BE BUILT AND INSTALLED IN COMPLIANCE WITH 2017 NEC ARTICLE 600, UL AND FBC.

THIS SIGN IS A UL LISTED ASSEMBLY PER NEC 600.3

THE LOCATION OF THE DISCONNECT SWITCH AFTER INSTALLATION SHALL COMPLY WITH ARTICLE 600.6(A) (1) OF THE NATIONAL ELECTRICAL CODE.

Design Loads

PER FL BLDG CODE, 7TH ED (2020)

BASIC WIND SPEED, V	136 MPH
RISK CATEGORY	IV
EXPOSURE CATEGORY	B
DESIGN WIND PRESSURE	28.0 PSF
FL CERTIFICATE OF AUTHORIZATION NO 31751	

THOMAS
SIGN & AWNING CO INC
4590 118TH Avenue North
Clearwater, Florida 33762
800-526-3325
www.thomassign.com

CLIENT
HCA Florida Lake City Hospital
Design Number:
97209
Installation Address:
3239 NW York DR
Lake City, FL
32055
Project Identity Number:
96070

Sales Associate:	Project Team:
MT	BM
Designer:	**Date:**
JB	09.07.22

Project Updates:
09.12.22 JB - Revisions
09.19.22 JB - Revisions

Underwriters Laboratories, Inc.
LISTING E89514
ELECTRIC SIGN
COMPLIES TO UL 48

THIS ARTICLE IS INTENDED TO BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ARTICLE 600 OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER APPLICABLE LOCAL CODES. THIS INCLUDES PROPER GROUNDING AND BONDING OF THE SIGN.

3M™ MCS™ Warranty

Approval:

☐ Approved
DATE:

☐ Approved as noted
DATE:

☐ Revise & Re-Submit
DATE:

Page	Sheet
1	1 of 1

Local: 727-573-7757
Fax: 727-573-0328

THOMAS
Sign & Awning Company, Inc.
4590 118th Avenue North
Clearwater, Florida 33762
Florida Certificate of Authorization No. 31751

Structural Calculations
Client: HCA Florida Lake City Hospital
Project Identity No.: 96070
Design No.: 97209

Installation Location: 3239 NW York Dr, Lake City, FL
Description: 6' OAH Monument Signs; Sign Locations 32 & 33

Engineering Calculations
Table of Contents

Structural Engineering Calculations — Pages 1 - 7
Prepared by: John F. Dougherty, P.E.
Florida P.E. No. 80640
Code: Florida Building Code, 7th Edition (2020) - Building

John F Dougherty

Digitally signed by John F Dougherty
Date: 2023.01.13 11:33:23 -06'00'

JOHN F. DOUGHERTY LICENSE No 80640 STATE OF FLORIDA PROFESSIONAL ENGINEER

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies

Columbia County Building Department
Plans Reviewed for Code Compliance
State of Florida

THOMAS
Sign & Awning Company, Inc.
4590 118th Avenue North
Clearwater, Florida 33762
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Structural Calculations
Client: HCA Florida Lake City Hospital
Project Identity No.: 96070
Design No.: 97209
Prepared by: John F. Dougherty
Florida P.E. License No. 80640

Installation Location: 3239 NW York Dr, Lake City, FL

Sign geometry:		
Sign Height, s	6.00	feet
Sign Width, B	7.50	feet
Sign Face Area, As	45.00	square feet
Height from grade to top of sign, h = s =	6.00	feet
Say sign weighs	5	psf
Then total weight =	225	lbs
Thickness of sign, t	1	feet
Lateral wind area, Alat = t s =	6.00	square feet

Florida Building Code 7th Edition (2020) Building (FBC 7th)

Table 1604.5; Risk Category	IV	
Fig. 1609.3; Ultimate Wind Speed, Vult	133	mph, interpolated
Use Vult	136	mph
1609.4.2; Surface Roughness	B	Suburban
1609.4.3; Exposure Category	B	

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Installation Location: 3239 NW York Dr, Lake City, FL
For free-standing solid signs, apply ASCE 7 provisions.
ASCE 7-16 Chapter 29 Wind Loads on Building Appurtenances and Other Structures...

Figure 29.3-1	Clearance ratio, s/h =	1.00	
	Aspect ratio, B/s =	1.25	<2; Case C doesn't apply
	Cf for Case A or B	1.44	
	Cfc1 for Case C, 0 to s	0.00	
	Cfc2 for Case C, s to 2s	0.00	
	Cfc3 for Case C, 2s to 3s	0.00	
	Cfc4 for Case C, 3s to 4s	0.00	
	Table 26.10-1; Kh =	0.57	
	Table 26.6-1, Directionality Factor, Kd	0.85	for free standing signs
	Section 26.8.2, Topographic factor, Kzt	1.00	
	Velocity pressure, $qz = qh = 0.00256\ Kz\ Kzt\ Kd\ Vasd^2 =$	22.9	psf
	Section 26.11 gust effect factor, G	0.85	
	Design wind pressure (Case A) = qz G Cf =	28.0	psf
	Eq. 29.3-1, F = qh G Cf As		
	Case A and Case B, F_{AB} =	1261	lb

Case C , $F1 = qh\ G\ Cfc1\ s^2$ =	0	lb applied s/2 =	3.00	feet from end of sign
Case C , $F2 = qh\ G\ Cfc2\ s^2$ =	0	lb applied 3s/2 =	9.00	feet from end of sign
Case C , $F3 = qh\ G\ Cfc3\ s^2$ =	0	lb applied 5s/2 =	15.00	feet from end of sign
Case C , $F4 = qh\ G\ Cfc4\ s^2$ =	0	lb applied 7s/2 =	21.00	feet from end of sign
Total force, ΣF_c =	0	lb		

Lateral load, Flat = say qh G Cf Alat = 168.19 lb (assumes Cf = 1.00)

To be shown on construction documents:

ULTIMATE DESIGN WIND SPEED, Vult (3-SECOND GUST):	136 mph
RISK CATEGORY:	IV
EXPOSURE CATEGORY:	B
DESIGN WIND PRESSURE:	28.0 psf

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Installation Location: 3239 NW York Dr, Lake City, FL
For One Support Pole:

Case B	ASCE 7, Fig. 29.3-1; F_{AB} applied 0.2B =	1.50	feet from center of sign
	Torsion = F_{AB} (0.2B) =	1,892	ft-lb
	F applied 0.05h =	0.30	feet above center
	Pole base moment, $Mx_B = F_{AB}(0.55)h$ =	4,163	ft-lb*
	$Vx_B = F_{AB}$ =	1261	lb
	Vy_B = Flat =	168.2	lb
	Pole base moment, $My_B = Vy_B$ (0.55h) =	555.0	ft-lb*
Case C	Total load, $Vx_C = F_{AB}$ =	0	lb
	Pole base moment, $Mx_C = Vx_C$ (0.55)h =	0	ft-lb*

Torsion, T = F1 (B/2-s/2) + F2 (B/2-3s/2) + F3 (B/2-5s/2) + F4 (B/2-7s/2)

T =	0	ft-lb
Vy_B = Flat =	168.2	lb
Pole base moment, $My_B = Vy_B$ (0.55h) =	555.0	ft-lb*

	Case B	Case C	Maximum	
Vx =	1,261	0	1,261	lb
Mx =	4,163	0	4,163	ft-lb at grade*
Torsion	1,892	0	1,892	ft-lb
My =	555.0	555.0	555	ft-lb at grade*
Vy =	168.2	168.2	168	lb
** Resultant $V=(Vx^2+Vy^2)^{1/2}$ =	1273	168	1,273	lb
** Resultant $M=(Mx^2+My^2)^{1/2}$ =	4199	555	4,199	ft-lb at grade*

* Moment is greater below grade; see drilled pier design
** Use resultant base shear and moment for drilled pier design

For load combination 1.0 DL + 0.6 Wind

Vx =	757	lb
Mx =	2,498	ft-lb at grade*
Torsion	1,135	ft-lb
My =	333	ft-lb at grade*
Vy =	101	lb
** Resultant $V=(Vx^2+Vy^2)^{1/2}$ =	764	lb
** Resultant $M=(Mx^2+My^2)^{1/2}$ =	2,520	ft-lb at grade*

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Installation Location: 3239 NW York Dr, Lake City, FL

For short, free-head pier in cohesionless soil

Lateral load applied to pile at grade, Pa =	764	lb	Torsion, T=	1135	ft-lb
Moment applied to pile at grade, Ma =	2,520	ft-lb			

Resolve Pa and Ma into a load applied at a height e above grade

e = M/P =	3.3	feet
Diameter of the pier, b =	18	inches = 1.5 feet

Note: Thomas Sign's standard truck-mounted augers are 18, 30 and 36 inches diameter X 14' max depth, 48" diameter x 6' max depth and the hand-held power auger has 6", 8" and 12" diameter bits.

Embedded length below grade, L =	4.5	feet
Assume angle of friction, ϕ =	30	degrees
Rankine coefficient of passive pressure, Kp = $\tan^2(45+\phi/2)$ =	3.00	
Unit weight of soil, γ =	110.0	pcf

Using Brom's method:

The load that will cause soil failure,

$Pt = \gamma b L^3 Kp/2/(e+L)$ = 2891.5 lb

Pt >= Pa; OK

Distance from grade down to the point of zero shear (max moment),

$f = \{2Pa/(3\ \gamma\ b\ Kp)\}^{1/2}$ = 1.01 feet

Mmax = Pa (e+f) - Pa f /3 =	3,036	ft-lb
Moment magnification = Mgrade/Mmax =	1.205	

Check stresses in the sign pole embedded in concrete pier.

Perimeter area of pier, Ap = $2\pi(b/2)(12L)$ =	3054	sq in		
Shear on soil-concrete interface = 12T/(b/2)/Ap =	0.50	psi x144 =	71	psf
average soil pressure = 110 pcf(L/2) =	247.5	psf		
say friction coeficient, fr =	0.3			
friction force =	74.25	psf		
Factor of Safety against turning = 74.3 / 71 =	1.04	> 1.00; OK		

The auger-drilled pier spreads support reactions from the main steel support onto the supporting soil, but does not directly carry structural shear or bending moments. Those forces remain in the main support, embedded in the pier. So the concrete does not need to be reinforced to carry the loads.

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Check: ASTM A53 Type E or S, Grade B
Pipe3STD

Fy = 35 ksi

W (lb/ft)	A	OD	ID	t_{nom}	t_{des}	D/t	I_x
7.58	2.07	3.5	3.07	0.216	0.201	17.4	2.85
Z_x	**S_x**	**r_x**	**I_y**	**Z_y**	**S_y**	**r_y**	**J**
2.19	1.63	1.17	2.85	2.19	1.63	1.17	5.69

From drilled pier design, Max Resultant Moment, M = 3,036 ft-lb
Resultant Lateral load on pole, Rb = 764 lb
Torsion, T = 1,135 ft-lb
Free length of cantilever, h = 6.00 feet
Center of load applied above grade, H = 0.55 h = 3.30 feet
Weight of sign = 225 lb

AISC Table B4.1, sect 15
D/t = 17.40
In compression; $\lambda r = 0.11\ E / Fy$ = 91.14 >D/t; non-slender element
In flexure; $\lambda p = 0.07\ E/Fy$ = 58.00
$\lambda r = 0.31\ E/Fy$ = 256.86 compact section

AISC Chapter E; Compression
AISC Section E1
Ωc = 1.67

AISC Section E2
Effective length factor, K = 2.10 for cantilever
Kl/r = K(12H)/rx = 71.08

AISC Section E3
$4.71\ (E/Fy)^{1/2}$ = 136 >= Kl/r

AISC Eq. E3-4; Fe = 56.7 ksi
AISC Eq. E3-2; Fcr = 27.0 ksi
AISC Eq. E3-1; Pn = Fcr Ag = 56 kips
Allowable compression strength, Pc = Pn/Ωc = 33 kips

Pole weight 7.58 lb/ft
H 3.30 feet
Weight of pole = 25.0 lb
Weight of sign = 225 lb
Required compression, Pr = 250.0 lb = 0.25 kips
0.25 <= 33; OK

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AISC Chapter F; Flexure	Ωb =	1.67	
AISC Section F8	0.45 E/Fy =	372.9	D/t < 0.45 E/Fy; Sect F8 Applies

Section F8.1; Yielding

Eq. F8-1; Mn = Mp = FyZ = 77 kip-in

Section F8.2; Local Buckling

For compact sections Section F8.2 does not apply
For non-compact sections; Eq. F8-2; Mn = 114 kip-in
For slender walled sections; Eq. F8-3; Mn = 897 kip-in

Mn = 77 kip-in
Allowable moment, Mc = Mn/Ωb = 46 kip-in
Required moment, Mr = 3,036 ft-lb = 36 inch-kip
36 <= 46; OK

AISC Chapter G; Shear	Ωv =	1.67	

Section G6; Lv is undefined since transverse shear is constant
Section G6; Eq. G6-2a; Fcr = N/A
Eq. G6-2b; Fcr = 312 ksi
Vn = Fcr Area / 2 = 323 kips
Allowable transverse shear, Vc = Vn/Ωv = 193 kips
Required transverse shear, Vr = 764 lb = 0.76 kips
inch-kip
0.76 <= 193; OK

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AISC Chapter H; Combined Forces
Section H3.1

Ωt =	1.67	
HSS torsional constant, $C = \pi(OD-t)^2 t/2$ =	3.44	

Fcr is largest of eq. H3-2a and eq. H3-2b but shall not exceed 0.6Fy

Eq. H3-2a; Fcr =	298	ksi
Eq. H3-2b; Fcr =	239.5	ksi
0.6 Fy =	21.0	ksi
Use Fcr =	21.0	ksi

eq H3-1; Tn = Fcr C =	72.2	in-kip
Allowable torsion, Tc = Tn/Ωt =	43.2	in-kip
Required torsion, Tr = 1,135.3 ft-lb =	13.62	inch-kip

13.62 <= 43; OK

AISC Section H3.2; eq. H3-6

$(Pr/Pc)+(Mr/Mc)+\{(Vr/Vc)+(Tr/Tc)\}^2 <= 1.00$

0.90 <= 1.00; OK

Deflection

Deflection due to load Rb, $\Delta = Rb\,(12H)^3/(3EIx)$ =	**0.19**	**inches**
$2(12H)/120$ =	**0.66**	**inches***
	OK	

* Uses span = 2H in accordance with building code for cantilevers