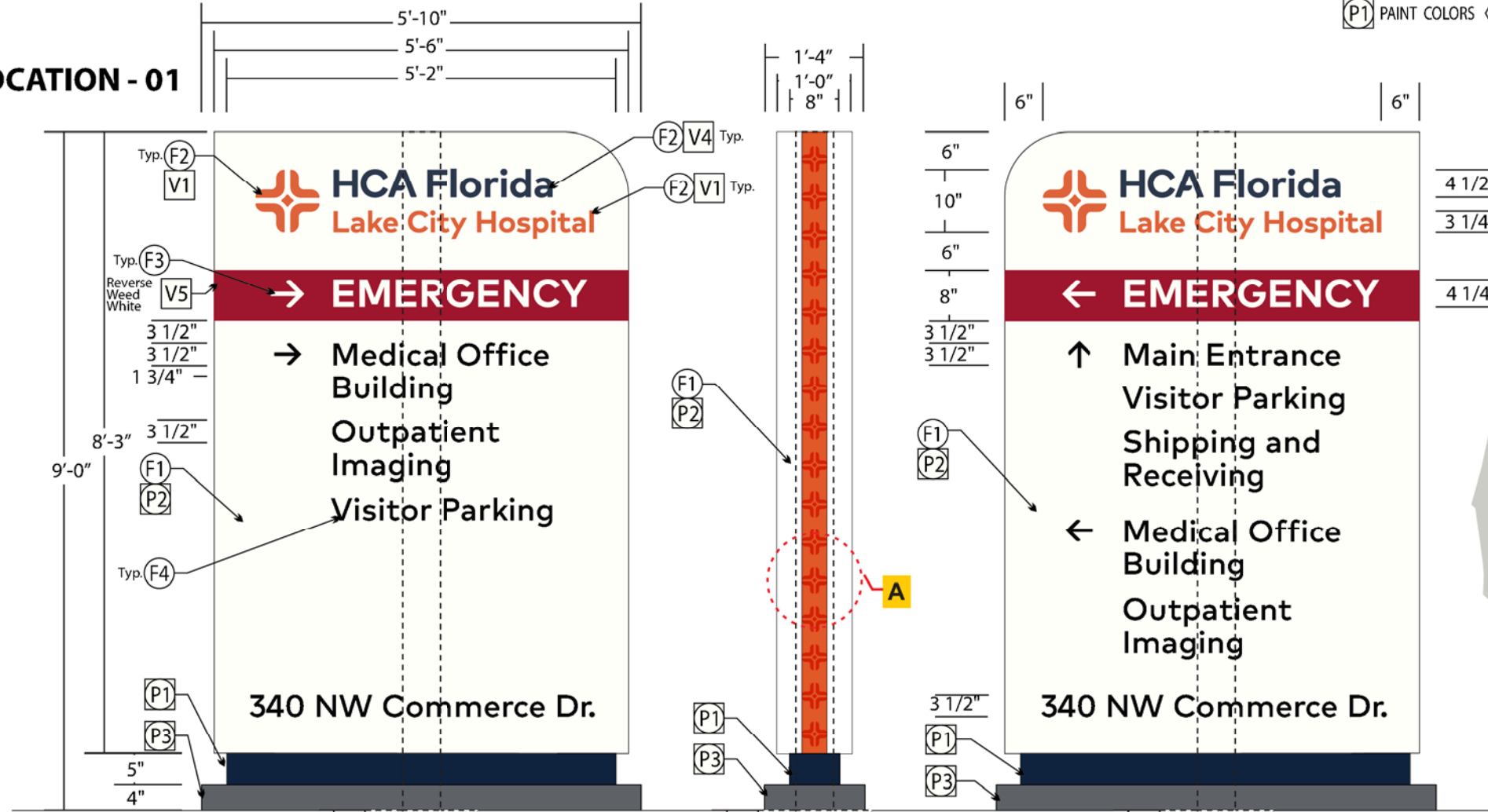


SIGN LOCATION - 01



TOTAL SQFT = 49.50 sq
PART # LCH-PYE-1081-01
ESTIMATE # 187459

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 4" DIAMETER STEEL PIPE
- GRAPHICS: VINYL GRAPHICS

COLORS FOR FREE STANDING SIGN

- FILLER: MATTHEWS WHITE WONDER MP-32071 - W/UV RESISTANT CLEAR SATIN FACE BGGND; 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) # 2447 MILKY WHITE ACRYLIC
- 3) # 7328 WHITE ACRYLIC
- 4) BITRO BLACK DULITE ACRYLIC
- 5) CLEAR POLY

VINYL COLOR

- 1) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / FIRST SURFACE
- 2) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / SECOND SURFACE
- 3) 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
- 4) TRANSLUCENT: 3M 3630-36 BLUE VINYL / FIRST SURFACE
- 5) TRANSLUCENT: 3M 3630-53 CARDINAL RED WITH 3M SCOTCHCAL 8519 11 LUSTER OVERLAMINATE / 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 COAT.

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



ELECTRICAL SPECIFICATIONS

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

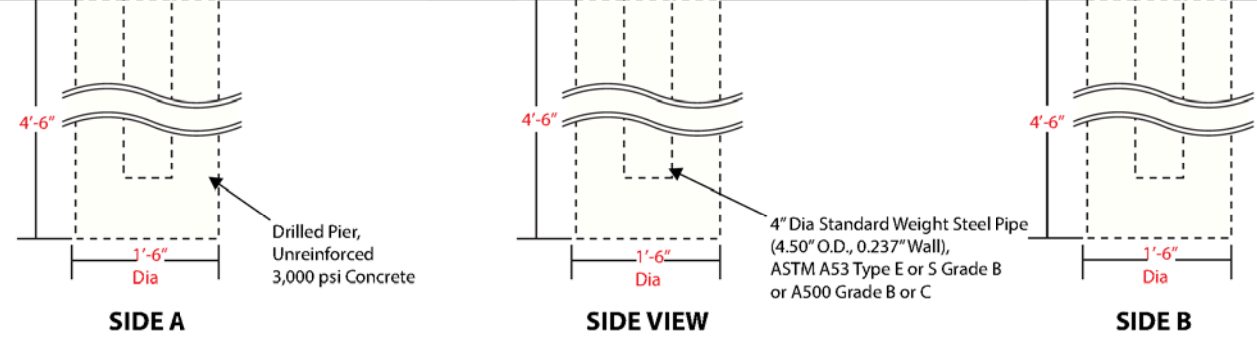
(1) 20 AMP-120 VOLT CIRCUIT REQUIRED



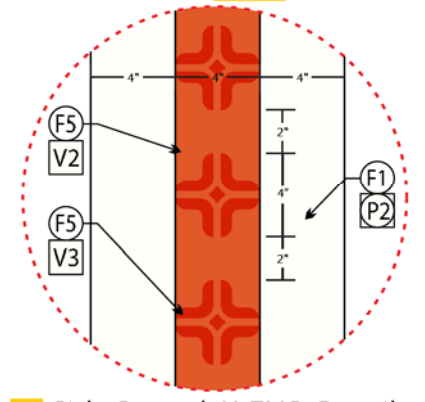
PER 2017 NATIONAL ELECTRIC CODE
ALL ELECTRICAL COMPONENTS WILL BE UL LISTED AND APPROVED AS PER 2017 NEC 680.3 AND MARKED AS PER NEC 680.4. THE INSTALLATION OF THE WIRING WILL BE DONE AS PER FBC 4504.4 AND DESIGNED TO UL 48. ALL SIGNS WILL BE GROUNDED AND BONDED AS PER NEC 680.7 AND 250.122. A DISCONNECT WILL BE PROVIDED AS PER NEC 680.6. 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 680, UL AND FBC. THIS SIGN IS A UL LISTED ASSEMBLY PER NEC 680.3

THE LOCATION OF THE DISCONNECT SWITCH AFTER INSTALLATION SHALL COMPLY WITH ARTICLE 680.6(A) (1) OF THE NATIONAL ELECTRICAL CODE.

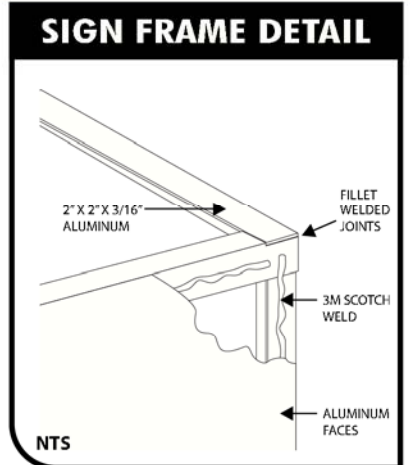
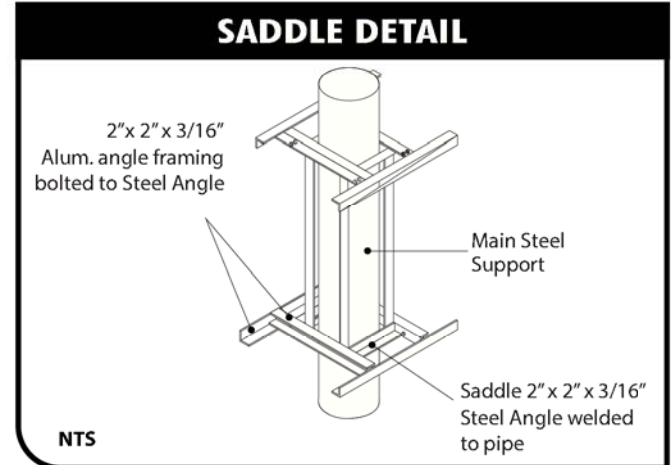
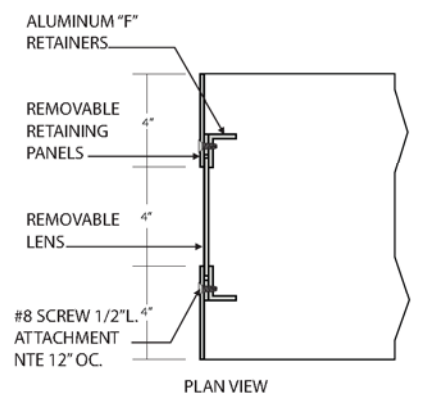
Design Loads	
PER FL BLDG CODE, 7TH ED (2020)	
BASIC WIND SPEED, V	136 MPH
RISK CATEGORY	IV
EXPOSURE CATEGORY	B
DESIGN WIND PRESSURE	29.8 PSF
FL CERTIFICATE OF AUTHORIZATION NO 31751	



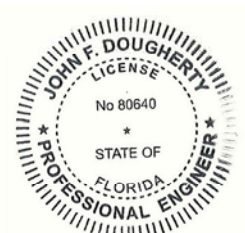
New Illuminated Directionals



A Side Reveal / LENS Detail



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



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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



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

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- Approved as noted
DATE:
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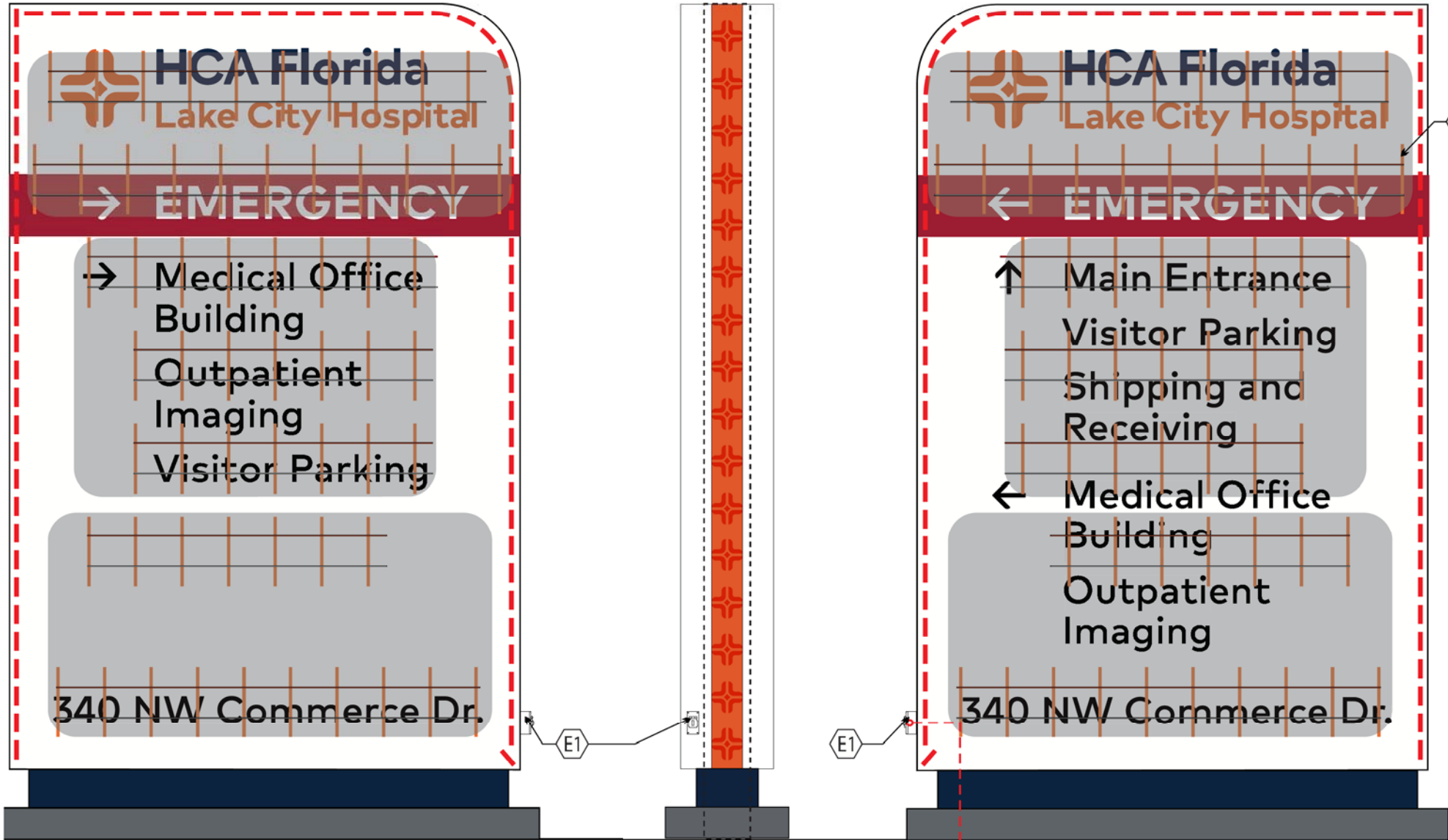
Page Sheet

1 1 of 2

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

SIGN LOCATION - 01

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



60 bars
7 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	73	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	60	bars	3.36	26
4	ASU-100-24U	96W-24V Power Supply	3	pcs	N/A	N/A

Design Loads

PER FL BLDG CODE, 7TH ED (2020)	136 MPH	IV	B	29.8 PSF
BASIC WIND SPEED, V		RISK CATEGORY	EXPOSURE CATEGORY	DESIGN WIND PRESSURE
FL CERTIFICATE OF AUTHORIZATION NO 31751				

TOTAL SQFT = 49.50 sq
PART # LCH-PYE-1081-01
ESTIMATE # 187459

MATERIALS FOR FREE STANDING SIGN

EXT. FILLER: .090" ALUMINUM
FRAMING: 2" x 2" x 3/16" ALUM ANGLE
FACES: .125 ALUMINUM
RETAINER: 1" ALUMINUM "T" RETAINER (SEE DETAIL A)
LIGHTING: PRIME24V REBEL BRIGHT WHITE
BASE: .125" ALUMINUM
SUPPORTS: DIRECT BURIED 4" 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/1/17" ACRYLIC
- 2) # 2447 MILKY WHITE ACRYLIC
- 3) # 7328 WHITE ACRYLIC
- 4) BITRO BLACK DULITE ACRYLIC
- 5) CLEAR POLY

VINYL COLOR

- 1) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / FIRST SURFACE
- 2) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / SECOND SURFACE
- 3) 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
- 4) TRANSLUCENT: 3M 3630-36 BLUE VINYL / FIRST SURFACE
- 5) TRANSLUCENT: 3M 3630-53 CARDINAL RED WITH 3M SCOTCHCAL 8519 11 LUSTER OVERLAMINATE / 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 COAT.

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



ELECTRICAL SPECIFICATIONS

LED MODULES= 133	110 VOLT INPUT		
BITRO TRANSFORMER	SECONDARY	AMP. INPUT	
	VOLTS	WATTS	
4 ASU-100-24U	24	96	1.0
TOTAL			4.0
(1) 20 AMP-120 VOLT CIRCUIT REQUIRED			



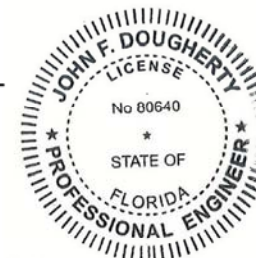
PER 2017 NATIONAL ELECTRIC CODE

ALL ELECTRICAL COMPONENTS WILL BE UL LISTED AND APPROVED AS PER 2017 NEC 680.3 AND MARKED AS PER NEC 680.4. THE INSTALLATION OF THE WIRING WILL BE DONE AS PER FBC 4504 AND DESIGNED TO UL 48. ALL SIGNS WILL BE GROUNDING AND BONDED AS PER NEC 680.7 AND 250.122. A DISCONNECT WILL BE PROVIDED AS PER NEC 680.6.

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 680, UL AND FBC.

THIS SIGN IS A UL LISTED ASSEMBLY PER NEC 680.3

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



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E5
power supply distribution
**** BOM is for BOTH faces**



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



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.



3MTM MCSTM Warranty

Approval:

- Approved
DATE:
- Approved as noted
DATE:
- Revise & Re-Submit
DATE:

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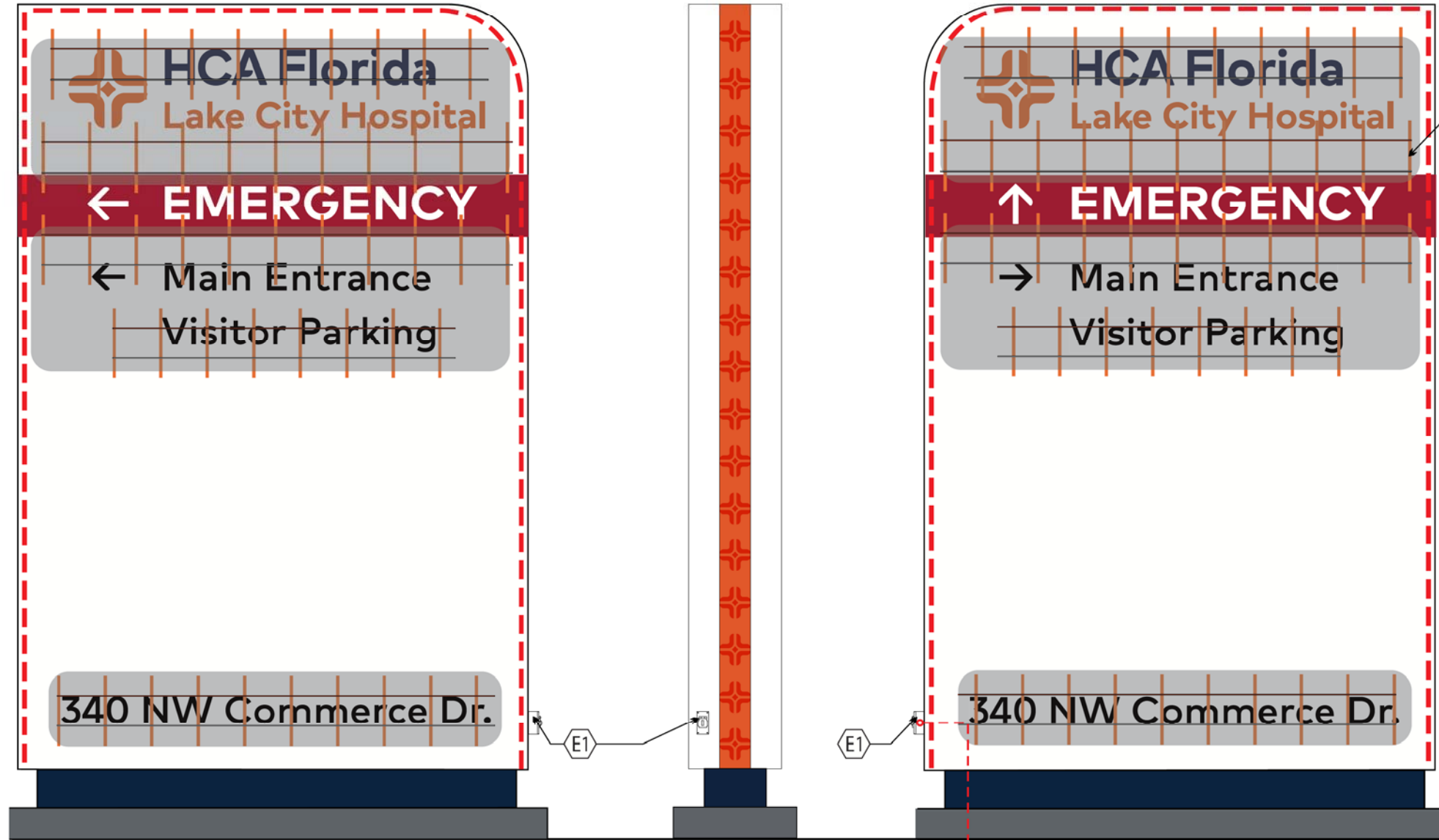
Page Sheet

2 2 of 2

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

SIGN LOCATION - 02

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



60 bars
7 columns
12" O.C

BILL OF MATERIALS

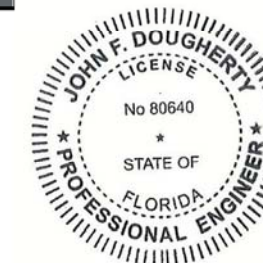
Ref #	Part Number	Description	Qty	Unit	w/unit	Unit/PS
1	OTSR-X2-BW65	PRIME24V REBEL Bright White 6500K	73	mods	0.6	136
2	ASU-100-24U	96W-24V Power Supply	1	pcs	N/A	N/A
3	L3G-LD10U15-24VBW65-230	L3G DS 100mm-150mm BW, 230mm	50	bars	3.36	26
4	ASU-100-24U	96W-24V Power Supply	3	pcs	N/A	N/A
5						

E3 LED Layout

Design Loads

PER FL BLDG CODE, 7TH ED (2020)	136 MPH	IV	B	29.8 PSF
BASIC WIND SPEED, V				
RISK CATEGORY				
EXPOSURE CATEGORY				
DESIGN WIND PRESSURE				
FL CERTIFICATE OF AUTHORIZATION NO 31751				

E5 power supply distribution
** BOM is for BOTH faces



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

TOTAL SQFT = 49.50 #
PART # LCH-PYE-1081-02
ESTIMATE # 187461

MATERIALS FOR FREE STANDING SIGN

EXT. FILLER: .090" ALUMINUM
FRAMING: 2" x 2" x 3/16" ALUM ANGLE
FACES: .125 ALUMINUM
RETAINER: 1" ALUMINUM "T" RETAINER (SEE DETAIL A)
LIGHTING: PRIME24V REBEL BRIGHT WHITE
BASE: .125" ALUMINUM
SUPPORTS: DIRECT BURIED 4" 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) # 2447 MILKY WHITE ACRYLIC
- 3) # 7328 WHITE ACRYLIC
- 4) BITRO BLACK DULITE ACRYLIC
- 5) CLEAR POLY

VINYL COLOR

- 1) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / FIRST SURFACE
- 2) TRANSLUCENT: 3M 3630-124 BURNT ORANGE VINYL / SECOND SURFACE
- 3) 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
- 4) TRANSLUCENT: 3M 3630-36 BLUE VINYL / FIRST SURFACE
- 5) TRANSLUCENT: 3M 3630-53 CARDINAL RED WITH 3M SCOTCHCAL 8519 11 LISTER OVERLAMINATE / 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 COAT.

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



ELECTRICAL SPECIFICATIONS

LED MODULES= 123	110 VOLT INPUT		
BITRO TRANSFORMER	SECONDARY	AMP. INPUT	
	VOLTS	WATTS	
4 ASU-100-24U	24	96	1.0
TOTAL			4.0
(1) 20 AMP-120 VOLT CIRCUIT REQUIRED			



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 4504 AND DESIGNED TO UL 4E. 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.



THOMAS

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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:

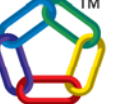
JB 09.07.22

Project Updates:
09.12.22 JB - Revisions
09.19.22 JB - Revisions



LISTING E89514
ELECTRIC SIGN
COMPLIES TO UL 48

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3M™ MCS™ Warranty

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Page Sheet

2 2 of 2

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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: 9' OAH Monument Signs; Sign Locations 01 & 02

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



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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

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	9.00	feet
Sign Width, B	5.50	feet
Sign Face Area, As	49.50	square feet
Height from grade to top of sign, h = s =	9.00	feet

Say sign weighs	5	psf
Then total weight =	248	lbs

Thickness of sign, t	1	feet
Lateral wind area, $A_{lat} = t s =$	9.00	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

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

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

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, $B/s =$	0.61	<2; Case C doesn't apply
	Cf for Case A or B	1.53	
	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; $K_h =$	0.57	
	Table 26.6-1, Directionality Factor, K_d	0.85	for free standing signs
	Section 26.8.2, Topographic factor, K_{zt}	1.00	
	Velocity pressure, $q_z = q_h = 0.00256 K_z K_{zt} K_d V_{asd}^2 =$	22.9	psf
	Section 26.11 gust effect factor, G	0.85	
	Design wind pressure (Case A) = $q_z G C_f =$	29.8	psf
	Eq. 29.3-1, $F = q_h G C_f A_s$		
	Case A and Case B, $F_{AB} =$	1475	lb
	Case C, $F_1 = q_h G C_{fc1} s^2 =$	0	lb applied $s/2 =$ 4.50 feet from end of sign
	Case C, $F_2 = q_h G C_{fc2} s^2 =$	0	lb applied $3s/2 =$ 13.50 feet from end of sign
	Case C, $F_3 = q_h G C_{fc3} s^2 =$	0	lb applied $5s/2 =$ 22.50 feet from end of sign
	Case C, $F_4 = q_h G C_{fc4} s^2 =$	0	lb applied $7s/2 =$ 31.50 feet from end of sign
	Total force, $\Sigma F_c =$	0	lb
	Lateral load, $F_{lat} = \text{say } q_h G C_f A_{lat} =$	268.12	lb (assumes $C_f = 1.00$)

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:	29.8	psf

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

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

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 = 1.10 feet from center of sign
 Torsion = $F_{AB} (0.2B)$ = 1,622 ft-lb
 F applied 0.05h = 0.45 feet above center
 Pole base moment, $M_{x_B} = F_{AB}(0.55)h$ = 7,300 ft-lb*
 $V_{x_B} = F_{AB}$ = 1475 lb
 $V_{y_B} = \text{Flat}$ = 268.1 lb
 Pole base moment, $M_{y_B} = V_{y_B} (0.55h)$ = 1327.2 ft-lb*

Case C Total load, $V_{x_C} = F_{AB}$ = 0 lb
 Pole base moment, $M_{x_C} = V_{x_C} (0.55)h$ = 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
 $V_{y_B} = \text{Flat}$ = 268.1 lb
 Pole base moment, $M_{y_B} = V_{y_B} (0.55h)$ = 1327.2 ft-lb*

	Case B	Case C	Maximum	
$V_x =$	1,475	0	1,475	lb
$M_x =$	7,300	0	7,300	ft-lb at grade*
Torsion	1,622	0	1,622	ft-lb
$M_y =$	1,327.2	1,327.2	1,327	ft-lb at grade*
$V_y =$	268.1	268.1	268	lb
** Resultant $V = (V_x^2 + V_y^2)^{1/2} =$	1499	268	1,499	lb
** Resultant $M = (M_x^2 + M_y^2)^{1/2} =$	7419	1327	7,419	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

$V_x = 885$ lb
 $M_x = 4,380$ ft-lb at grade*
 Torsion 973 ft-lb
 $M_y = 796$ ft-lb at grade*
 $V_y = 161$ lb
 ** Resultant $V = (V_x^2 + V_y^2)^{1/2} = 899$ lb
 ** Resultant $M = (M_x^2 + M_y^2)^{1/2} = 4,452$ ft-lb at grade*

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

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

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

For short, free-head pier in cohesionless soil

$$\text{Lateral load applied to pile at grade, } P_a = 899 \text{ lb}$$

$$\text{Moment applied to pile at grade, } M_a = 4,452 \text{ ft-lb}$$

$$\text{Torsion, } T = 973 \text{ ft-lb}$$

Resolve P_a and M_a into a load applied at a height e above grade

$$e = M/P = 5.0 \text{ feet}$$

$$\text{Diameter of the pier, } b = 18 \text{ inches} = 1.5 \text{ feet}$$

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.

$$\text{Embedded length below grade, } L = 4.5 \text{ feet}$$

$$\text{Assume angle of friction, } \phi = 30 \text{ degrees}$$

$$\text{Rankine coefficient of passive pressure, } K_p =$$

$$\tan^2(45 + \phi/2) = 3.00$$

$$\text{Unit weight of soil, } \gamma = 110.0 \text{ pcf}$$

Using Brom's method:

The load that will cause soil failure,

$$P_t = \gamma b L^3 K_p / 2 / (e + L) = 2386.6 \text{ lb}$$

$$P_t \geq P_a; \text{ OK}$$

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

$$f = \{2P_a / (3 \gamma b K_p)\}^{1/2} = 1.10 \text{ feet}$$

$$M_{\text{max}} = P_a (e + f) - P_a f / 3 = 5,111 \text{ ft-lb}$$

$$\text{Moment magnification} = M_{\text{grade}} / M_{\text{max}} = 1.148$$

Check stresses in the sign pole embedded in concrete pier.

$$\text{Perimeter area of pier, } A_p = 2\pi(b/2)(12L) = 3054 \text{ sq in}$$

$$\text{Shear on soil-concrete interface} = 12T / (b/2) / A_p = 0.42 \text{ psi} \times 144 = 61 \text{ psf}$$

$$\text{average soil pressure} = 110 \text{ pcf}(L/2) = 247.5 \text{ psf}$$

$$\text{say friction coefficient, } f_r = 0.3$$

$$\text{friction force} = 74.25 \text{ psf}$$

$$\text{Factor of Safety against turning} = 74.3 / 61 = 1.21 > 1.00; \text{ OK}$$

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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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

Check: **ASTM A53 Type E or S, Grade B** $F_y = 35$ ksi
Pipe4STD

W (lb/ft)	A	OD	ID	t_{nom}	t_{des}	D/t	I_x
10.8	2.96	4.5	4.03	0.237	0.221	20.4	6.82
Z_x	S_x	r_x	I_y	Z_y	S_y	r_y	J
4.05	3.03	1.51	6.82	4.05	3.03	1.51	13.6

From drilled pier design, Max Resultant Moment, $M = 5,111$ ft-lb
 Resultant Lateral load on pole, $R_b = 899$ lb
 Torsion, $T = 973$ ft-lb
 Free length of cantilever, $h = 9.00$ feet
 Center of load applied above grade, $H = 0.55 h = 4.95$ feet
 Weight of sign = 248 lb

AISC Table B4.1, sect 15 $D/t = 20.40$
 In compression; $\lambda_r = 0.11 E / F_y = 91.14 > D/t$; non-slender element
 In flexure; $\lambda_p = 0.07 E / F_y = 58.00$
 $\lambda_r = 0.31 E / F_y = 256.86$ compact section

AISC Chapter E; Compression
 AISC Section E1 $\Omega_c = 1.67$

AISC Section E2 Effective length factor, $K = 2.10$ for cantilever
 $Kl/r = K(12H)/r_x = 82.61$

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

AISC Eq. E3-4; $F_e = 41.9$ ksi
 AISC Eq. E3-2; $F_{cr} = 24.7$ ksi
 AISC Eq. E3-1; $P_n = F_{cr} A_g = 73$ kips
 Allowable compression strength, $P_c = P_n / \Omega_c = 44$ kips

Pole weight 10.8 lb/ft
 $H = 4.95$ feet
 Weight of pole = 53.5 lb
 Weight of sign = 248 lb
 Required compression, $P_r = 301.0$ lb = 0.30 kips
 $0.30 \leq 44$; OK

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Structural Calculations

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Project Identity No.: 96070

Design No.: 97209

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

AISC Chapter F; Flexure

$$\Omega_b = 1.67$$

AISC Section F8

$$0.45 E/F_y = 372.9 \quad D/t < 0.45 E/F_y; \text{ Sect F8 Applies}$$

Section F8.1; Yielding

$$\text{Eq. F8-1; } M_n = M_p = F_y Z = 142 \text{ kip-in}$$

Section F8.2; Local Buckling

For compact sections Section F8.2 does not apply

$$\text{For non compact sections; Eq. F8-2; } M_n = 197 \text{ kip-in}$$

$$\text{For slender walled sections; Eq. F8-3; } M_n = 1,421 \text{ kip-in}$$

$$M_n = 142 \text{ kip-in}$$

$$\text{Allowable moment, } M_c = M_n / \Omega_b = 85 \text{ kip-in}$$

$$\text{Required moment, } M_r = 5,111 \text{ ft-lb} = 61 \text{ inch-kip}$$

$$61 \leq 85; \text{ OK}$$

AISC Chapter G; Shear

$$\Omega_v = 1.67$$

Section G6; L_v is undefined since transverse shear is constant

Section G6; Eq. G6-2a; $F_{cr} = \text{N/A}$

$$\text{Eq. G6-2b; } F_{cr} = 245 \text{ ksi}$$

$$V_n = F_{cr} \text{ Area} / 2 = 363 \text{ kips}$$

$$\text{Allowable transverse shear, } V_c = V_n / \Omega_v = 218 \text{ kips}$$

$$\text{Required transverse shear, } V_r = 899 \text{ lb} = 0.90 \text{ kips}$$

inch-kip

$$0.90 \leq 218; \text{ OK}$$

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Florida P.E. License No. 80640

AISC Chapter H; Combined Forces

Section H3.1

$$\Omega t = 1.67$$

$$\text{HSS torsional constant, } C = \pi(OD-t)^2 t / 2 = 6.36$$

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

$$\text{Eq. H3-2a; } F_{cr} = 227 \text{ ksi}$$

$$\text{Eq. H3-2b; } F_{cr} = 189.4 \text{ ksi}$$

$$0.6 F_y = \underline{21.0 \text{ ksi}}$$

$$\text{Use } F_{cr} = 21.0 \text{ ksi}$$

$$\text{eq H3-1; } T_n = F_{cr} C = 133.5 \text{ in-kip}$$

$$\text{Allowable torsion, } T_c = T_n / \Omega t = 79.9 \text{ in-kip}$$

$$\text{Required torsion, } T_r = 973.3 \text{ ft-lb} = 11.68 \text{ inch-kip}$$

$$11.68 \leq 80; \text{ OK}$$

AISC Section H3.2; eq. H3-6

$$(P_r/P_c) + (M_r/M_c) + \{(V_r/V_c) + (T_r/T_c)\}^2 \leq 1.00$$

$$0.75 \leq 1.00; \text{ OK}$$

Deflection

$$\text{Deflection due to load } R_b, \Delta = R_b (12H)^3 / (3EI_x) =$$
$$2(12H)/120 =$$

$$0.32 \text{ inches}$$

$$0.99 \text{ inches}^*$$

OK

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

SIGN LOCATION - 03

TOTAL SQFT = 10.40#
PART # LCH-PUE72-03
ESTIMATE # 187462
MATERIAL FOR FREE STANDING SIGN
FACES: .125" ALUMINUM
FRAME: 3" x 3" x .125" ALUM. TUBE
FILLER/TOP CAP: .090" ALUMINUM
SUPPORTS: DIRECT-BURIED SOB ALUM. TUBES:
ALLOY 6063-T52; 3X3X0.188" OR THICKER
ALLOY 6061-T6; 3X3X0.095" OR THICKER

COLOR FOR FREE-STANDING SIGN
FACES: NOTED
FILLER: TO MATCH PANTONE 7579 C ORANGE
SUPPORTS: TO MATCH PANTONE 289 C BLUE
VINYL COLOR
1) REFLECTIVE: DIGITALLY PRINTED GRAPHICS ON
3M 680-CR-10 WHITE TO MATCH:
- PANTONE 7579 C ORANGE
- PANTONE 289 C BLUE
- PANTONE 7427 C RED
- BLACK
2) OPAQUE: 3M SCOTCHCAL 7725-22 MATTE BLACK VINYL.

PAINT COLOR
1) PAINT TO MATCH PANTONE 289 C BURNT ORANGE / UV RESISTANT SATIN TOPCOAT
2) PAINT TO MATCH PANTONE 7579 C NAVY BLUE / UV RESISTANT SATIN TOPCOAT
3) MATTHEWS WHITE WONDER MP-32071 / UV RESISTANT SATIN TOPCOAT

Design Loads

PER FL BLDG CODE, 7TH ED (2020)	
BASIC WIND SPEED, V	136 MPH
RISK CATEGORY	IV
EXPOSURE CATEGORY	B
DESIGN WIND PRESSURE	33.3 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

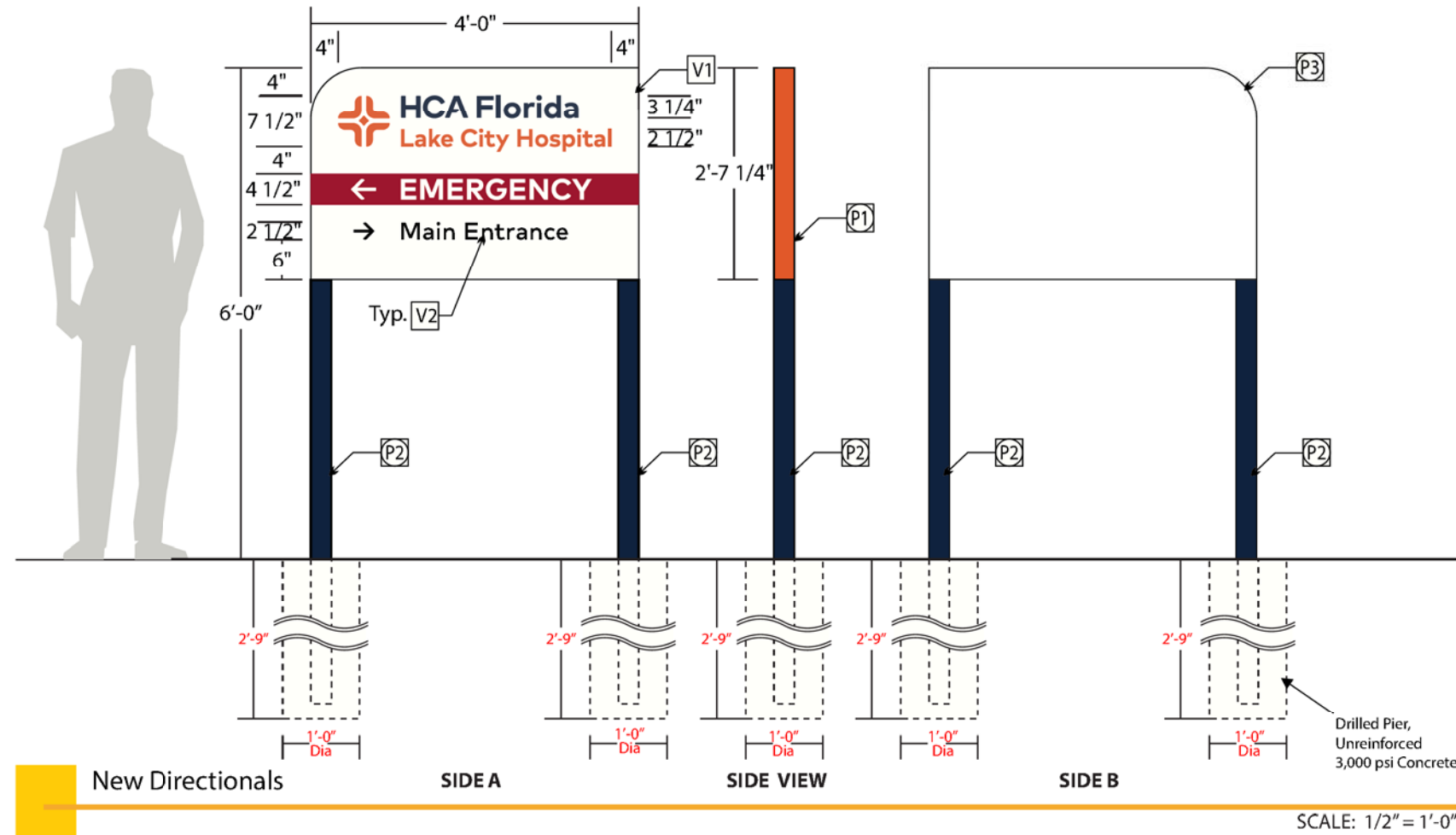
Installation Address:
3239 NW York DR
Lake City, FL
32055

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



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3M™ MCS™ Warranty

Approval:

- Approved
DATE: _____
- Approved as noted
DATE: _____
- Revise & Re-Submit
DATE: _____

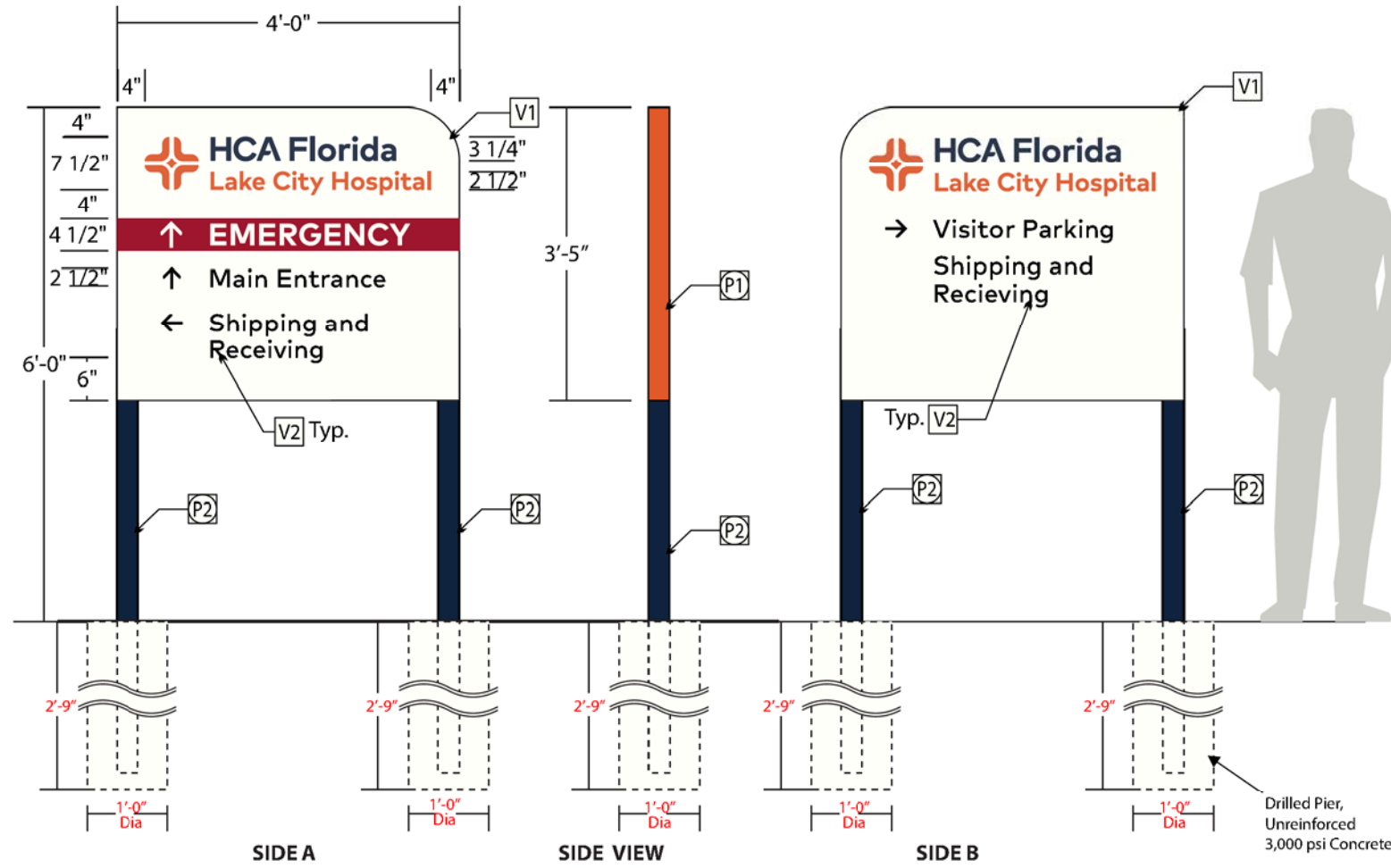
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Page Sheet

1 1 of 1

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

SIGN LOCATION - 18



New Directionals

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

TOTAL SQFT = 13.70 #
PART # LCH-PU72-18
ESTIMATE # 187466

MATERIAL FOR FREE STANDING SIGN	
FACES:	.125" ALUMINUM
FRAME:	3" x 3" x .125" ALUM. TUBE
FILLER/TOP CAP:	.090" ALUMINUM
SUPPORTS:	DIRECT-BURIED SOB ALUM. TUBES: ALLOY 6063-T52; 3X3X0.188" OR THICKER ALLOY 6061-T6; 3X3X0.095" OR THICKER

COLOR FOR FREE-STANDING SIGN	
FACES:	NOTED
FILLER:	TO MATCH PANTONE 7579 C ORANGE
SUPPORTS:	TO MATCH PANTONE 289 C BLUE

VINYL COLOR	
1) REFLECTIVE: DIGITALLY PRINTED GRAPHICS ON 3M 680-CR-10 WHITE TO MATCH:	
- PANTONE 7579 C ORANGE	
- PANTONE 289 C BLUE	
- PANTONE 7427 C RED	
- BLACK	
2) OPAQUE: 3M SCOTCHCAL 7725-22 MATTE BLACK VINYL	

PAINT COLOR	
1) PAINT TO MATCH PANTONE 289 C BURNT ORANGE / UV RESISTANT SATIN TOPCOAT	
2) PAINT TO MATCH PANTONE 7579 C NAVY BLUE / UV RESISTANT SATIN TOPCOAT	

Design Loads	
PER FL BLDG CODE, 7TH ED (2020)	
BASIC WIND SPEED, V	136 MPH
RISK CATEGORY	IV
EXPOSURE CATEGORY	B
DESIGN WIND PRESSURE	33.3 PSF
FL CERTIFICATE OF AUTHORIZATION NO 31751	



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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



3M™ MCS™ Warranty

Approval:

Approved

DATE:

Approved as noted

DATE:

Revise & Re-Submit

DATE:

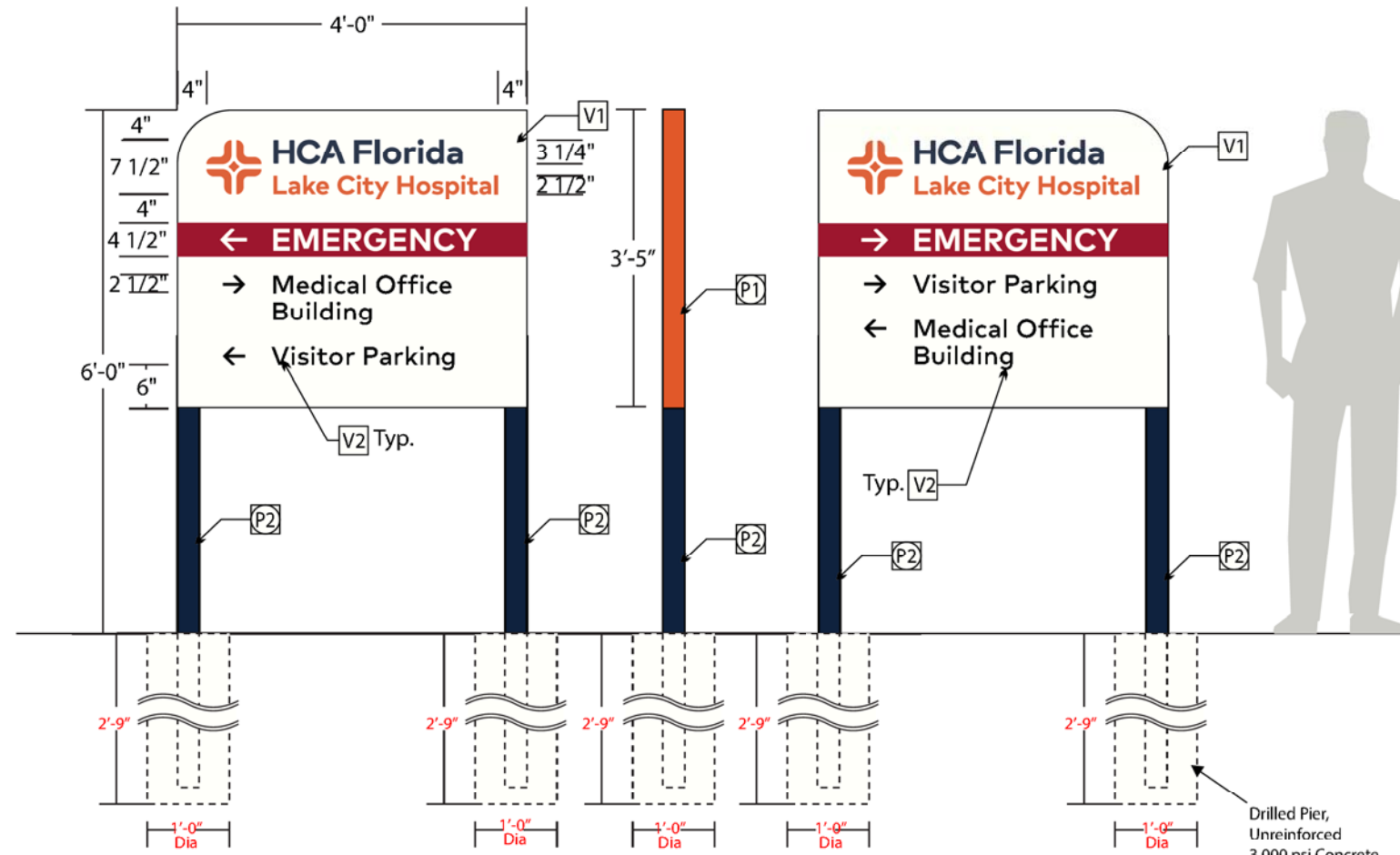
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Page Sheet

1 1 of 1

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

SIGN LOCATION - 23



New Directionals

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

TOTAL SQFT = 13.70 #
PART # LCH-PU72-18
ESTIMATE # 187466

MATERIAL FOR FREE STANDING SIGN
FACES: .125" ALUMINUM
FRAME: 3" x 3" x .125" ALUM. TUBE
FILLER/TOP CAP: .090" ALUMINUM
SUPPORTS: DIRECT-BURIED SOB ALUM. TUBES:
ALLOY 6063-T52; 3X3X0.188" OR THICKER
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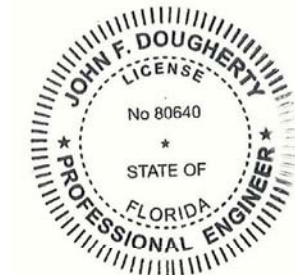
COLOR FOR FREE-STANDING SIGN
FACES: NOTED
FILLER: TO MATCH PANTONE 7579 C ORANGE
SUPPORTS: TO MATCH PANTONE 289 C BLUE
VINYL COLOR

1) REFLECTIVE: DIGITALLY PRINTED GRAPHICS ON
3M 680-CR-10 WHITE TO MATCH:
- PANTONE 7579 C ORANGE
- PANTONE 289 C BLUE
- PANTONE 7427 C RED
- BLACK
2) OPAQUE: 3M SCOTCHCAL 7725-22 MATTE BLACK VINYL
PAINT COLOR

1) PAINT TO MATCH PANTONE 289 C BURNT ORANGE
/ UV RESISTANT SATIN TOPCOAT
2) PAINT TO MATCH PANTONE 7579 C NAVY BLUE
/ UV RESISTANT SATIN TOPCOAT

Design Loads

PER FL BLDG CODE, 7TH ED (2020)	
BASIC WIND SPEED, V	136 MPH
RISK CATEGORY	IV
EXPOSURE CATEGORY	B
DESIGN WIND PRESSURE	33.3 PSF
FL CERTIFICATE OF AUTHORIZATION NO 31751	



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CLIENT

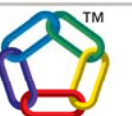
HCA Florida
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Local: 727-573-7757
Fax: 727-573-0328

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: Directional Signs; Sign Locations 03, 18 & 23

Engineering Calculations

Table of Contents

Structural Engineering Calculations

Prepared by: John F. Dougherty, P.E.

Florida P.E. No. 80640

Code: Florida Building Code, 7th Edition (2020) - Building

Pages 1 - 7



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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 18	Sign 23	Sign 3
Sign Height, s	3.42	3.42	2.60 feet
Sign Width, B	4.00	4.00	4.00 feet
Sign Face Area, As	13.7	13.7	10.4 square feet
Height from grade to top of sign, h	6.00	6.00	6.00 feet

Say sign weighs 5 psf
Then total weight = 68 lbs

Thickness of sign, t 0.25 feet
Lateral wind area, $Alat = t s =$ 0.85 square feet

Pole Cover
Cover width, $Bc =$ 0.50 feet (total width of all poles covered)
Cover length, $lc = h-s =$ 2.58 feet
Area of cover, $Ac =$ 1.3 sq ft

Thickness of cover, $tc =$ 0.25 feet
Lateral area of cover, $Alatc =$ 0.646 sq ft

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

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
 Prepared by: John F. Dougherty
 Florida P.E. License No. 80640

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, $s/h =$	0.569		
	Aspect ratio, $B/s =$	1.17	<2; Case C doesn't apply	
	Cf for Case A or B	1.71		
	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; $K_h =$	0.57		
	Table 26.6-1, Directionality Factor, $K_d =$	0.85		
	Section 26.8.2, Topographic factor, $K_{zt} =$	1.00		
	Velocity pressure, $q_z = q_h = 0.00256 K_z K_{zt} K_d V_{asd}^2 =$	22.9	psf	
	Section 26.11 gust effect factor, $G =$	0.85		
	Design wind pressure (Case A) $= q_z G C_f =$	33.3	psf	
	Eq. 29.3-1, $F = q_h G C_f A_s$			area of pole cover <u>1.3</u> sq ft
	Case A and Case B, $F_{AB} =$	455	lb	$F_{cvr} =$ <u>43</u> lb
	Case B, F applied $0.2B =$	0.80	feet from center of sign	
	Torsion $=$	364	ft-lb	
ASCE 7 Fig. 29.3-1; Base mom, $M_{x_{AB}} = F_{AB}(h-s/2) =$	1,952	ft-lb	due to wind on sign face	
$M_{xcvr} =$ wind pressure x Area cover x $L_c/2 =$	56	ft-lb	due to wind on pole cover	
Base moment, $M_{x_{AB}} =$	2,008	ft-lb		
Case C, $F_1 = q_h G C_{fc1} s^2 =$	0	lb	applied $s/2 =$	1.71 feet from end of sign
Case C, $F_2 = q_h G C_{fc2} s^2 =$	0	lb	applied $3s/2 =$	5.13 feet from end of sign
Case C, $F_3 = q_h G C_{fc3} s^2 =$	0	lb	applied $5s/2 =$	8.54 feet from end of sign
Case C, $F_4 = q_h G C_{fc4} s^2 =$	0	lb	applied $7s/2 =$	11.96 feet from end of sign
Total force, $F_C =$	0	lb	Torsion $=$	0 ft-lb **
Base moment, $M_{x_c} = F_C(h-s/2) =$	0	ft-lb		** About centerline of sign
From Case B above, $M_{xcvr} =$	56	ft-lb		
$M_{x_c} =$	56	ft-lb		
Lateral load, $F_{lat} =$ say $q_h G C_f A_{lat} =$	28.43	lb	on sign cabinet	wind pressure 33.3 psf
Base Mom, $M_y = F_{lat}(h-s/2) =$	122	ft-lb		pole cover lateral area <u>0.646</u> sq ft
				lateral load on pole cover <u>21</u> lb
				$L_c/2$ <u>1.292</u> ft
				$M_y =$ <u>28</u> ft-lb
total lateral load	50	lb		Total $M_y =$ 150 ft-lb

THOMAS

Sign & Awning Company, Inc.

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Clearwater, Florida 33762

Florida Certificate of Authorization No. 31751

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

To be shown on construction documents:

ULTIMATE DESIGN WIND SPEED, Vult (3-SECOND GUST):	136.0 mph
RISK CATEGORY:	IV
EXPOSURE CATEGORY:	B
DESIGN WIND PRESSURE:	33.3 psf

Sign Supported on Two Poles

ASCE 7 Fig 29.3-1

Case B: One pole carries $.5B + 0.2B)/B = 70\%$ of total load on sign plus half of load on pole cover

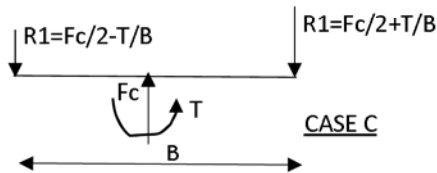
$$V_x = 455(0.70) + 43/2 = 340 \text{ lb}$$

Case C:

$$V_x = F_c/2 + \text{Torsion}/B = 21 \text{ lb}$$

plus half of pole cover load $\underline{21 \text{ lb}}$

$$43 \text{ lb}$$



	Case B	Case C	Maximum	
V_x	340	43	340	lb
$M_x =$	1,394	120	1,394	ft-lb at grade*
$T =$	0	0	0	ft-lb
$M_y =$	150	150	150	ft-lb at grade*
$V_y = \text{Flat} =$	50	50	50	lb

Load combination: 1.0 Dead + 0.6 Wind

$$0.6 \text{ Max } V_x = 204 \text{ lb}$$

$$0.6 \text{ Max } M_x = 837 \text{ ft-lb at grade}^*$$

$$0.6 \text{ Max } V_y = 30 \text{ lb}$$

$$0.6 \text{ Max } M_y = 90 \text{ ft-lb at grade}^*$$

Resultant base moment,

$$M_{res} = ((0.6 \text{ Max } M_x)^2 + (0.6 \text{ Max } M_y)^2)^{1/2} = 841 \text{ ft-lb at grade}^*$$

Resultant lateral load,

$$V_{res} = ((0.6 \text{ Max } V_x)^2 + (0.6 \text{ Max } V_y)^2)^{1/2} = 206 \text{ lb}$$

$$\text{Axial load} = 68.33333 \text{ lb sign shared by 2 poles}$$

$$34 \text{ lb sign weight/pole} + \text{weight of pole}$$

* Moment is greater below grade; see drilled pier design

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

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

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

For short, free-head pier in cohesionless soil

$$\text{Lateral load applied to pile at grade, } Pa = 206 \text{ lb}$$

$$\text{Torsion, } T = 0 \text{ ft-lb}$$

$$\text{Moment applied to pile at grade, } Ma = 841 \text{ ft-lb}$$

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

$$e = M/P = 4.1 \text{ feet}$$

$$\text{Diameter of the pier, } b = 12 \text{ inches} = 1 \text{ feet}$$

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.

$$\text{Embedded length below grade, } L = 2.75 \text{ feet}$$

$$\text{Assume angle of friction, } \phi = 30 \text{ degrees}$$

Rankine coefficient of passive pressure, $Kp =$

$$\tan^2(45 + \phi/2) = 3.00$$

$$\text{Unit weight of soil, } \gamma = 110.0 \text{ pcf}$$

Using Brom's method:

The load that will cause soil failure,

$$Pt = \gamma b L^3 Kp / 2 / (e + L) = 502.3 \text{ lb}$$

$Pt \geq Pa$; OK

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

$$f = \{2Pa / (3 \gamma b Kp)\}^{1/2} = 0.65 \text{ feet}$$

$$M_{max} = Pa (e + f) - Pa f / 3 = 930 \text{ ft-lb}$$

$$\text{Moment magnification} = M_{grade} / M_{max} = 1.105$$

Check stresses in the sign pole embedded in concrete pier.

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.

THOMAS

Sign & Awning Company, Inc.
 4590 118th Avenue North
 Clearwater, Florida 33762

Structural Calculations

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

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

Select square aluminum tube for support pylon

Shear, V_x = 204 lb, due to wind *
 Max moment, M_x = 925 ft-lb, due to wind * **
 Shear, V_y = 30 lb, due to wind *
 Max moment, M_y = 99 ft-lb, due to wind * **

* load combination reduction on wind load included
 ** max moment occurs below grade

From page 1, estimated weight of sign = 68.3 lb
 Amount of sign weight carried by this pylon = 50%
 Sign weight tributary to pylon = 34.2 lb

Check 3x3x0.188

Width (in)	Depth (in)	Thickness (in)	Weight (lb/ft)	Area (sq in)	I_x (in ⁴)	S_x (in ³)	r_x (in)
3.00	3.00	0.188	2.49	2.11	2.799	1.866	1.152
				Stocked By Ryerson	Stocked By T&C Metals (2016 Catalog)		
I_y (in ⁴)	S_y (in ³)	r_y (in)	J (in ⁴)	Alloy - Temper	Alloy - Temper		
2.799	1.866	1.152	5.599	0	0	0	

Design for alloy: 6061-T6

"Aluminum Design Manual," 2010, The Aluminum Association, aka "ADM"
 Table A.3.3, k_t = 1.0 for "all others"

Part I, Table A.3.4, extrusions, $F_{tu} = 38$ ksi
 $F_{ty} = 35$ ksi
 $F_{cy} = 35$ ksi
 $F_{su} = 24$
 Modulus of Elasticity, $E = 10100$ ksi

Table A3.1, poisson's ratio, $\nu = 0.33$
 Shear modulus, $G = (3/8)E = 3,788$ ksi
 Coef of thermal expansion, $\alpha = 1.30E-05$ / degree F
 Density, $\gamma = 0.100$ lb/cu inch
 Shear yield strength, $F_{sy} = 0.6 F_{ty} = 21$ ksi

Table B.4.2; Buckling Constants

Compression in Columns & Beam Flanges	$B_c = 39.37$	$D_c = 0.246$	$C_c = 65.67$
Axial Compression in Flat Elements	$B_p = 45.00$	$D_p = 0.300$	$C_p = 61.42$
Axial Compression in Curved Elements	$B_t = 43.19$	$D_t = 1.558$	$C_t = \text{See note}$
Bending Compression in Flat elements	$B_{br} = 66.82$	$D_{br} = 0.666$	$C_{br} = 66.92$
Bending Compression in Curved Elements	$B_{tb} = 64.78$	$D_{tb} = 4.458$	$C_{tb} = 55.44$
Shear in Flat Elements	$B_s = 27.24$	$D_s = 0.141$	$C_s = 78.95$

Note: C_t shall be determined using a plot of curves of limit state stress based on elastic and inelastic buckling or by trial and error solution

ADM Chapter E Compression

E.1 $\Omega_c = 1.65$
 E.2 Cantilever length, $s = 3$ feet
 $K = 2.1$ for cantilever
 $Kl/r = K(12)s/r = 66$
 E.3 $S_2 = C_c = 65.67$
 $kl/r < S_2$; E.3-2; $F_c = 19.750$
 E.3-1; $P_n = F_c A_g = 41.672$ kips
 $P_n/\Omega_c = 25.256$ kips

Length of pipe 3 feet
 weight $\frac{2.49}{7}$ lb/ft
 7 lb

sign weight $\frac{34}{42}$ lb
 $P = 42$ lb =

0.041637 kips
 $\frac{1.200}{0.050}$ Dead Load Factor
 $P_u = 0.050$ kips

$P_n/\Omega_c \geq P_u$; OK

ADM Chapter F Flexure

F.1 $\Omega_b = 1.95$ for tensile rupture
 $\Omega_b = 1.65$ for other flexural limit states
 F.1.1 for cantilever, $C_b = 1.3$

F.8 Closed Shapes in Flexure Other Than Pipes & Round Tubes

Section F.8.1.2 tensile yielding; $F_b = 1.30 F_t = 45.5$ ksi; $\Omega_b = 1.65$ $F_b/\Omega_b = 27.6$ ksi
 tensile rupture, $F_b = 1.42 F_t / k_t = 53.96$ ksi; $\Omega_b = 1.95$ $F_b/\Omega_b = 27.7$ ksi
 Use $F_b/\Omega_b = 27.6$ ksi

	<u>Mx</u>		<u>My</u>
	925 ft-lb		99 ft-lb
	11 inch-kip		1 inch-kip
ASD Load combination factor on wind load:	<u>0.6</u>		<u>0.6</u>
	18.5 inch-kip		2.0 inch-kip
LRFD factor on wind load:	<u>1.0</u>		<u>1.0</u>
	Mu = 18.49349 inch-kip		1.986594 inch-kip
	Fbx = Mx/Sx = 9.9 ksi;		Fby = My/Sy = 1.1 ksi
	Fb/Ω_b >= Fb; OK		Fb/Ω_b >= Fb; OK

Combined Stress Ratio = 0.40 <= 1.00; OK

Deflection

Allowable deflection, $D = 2L/120 = 2 (12S)/120 = 0.60$ inches

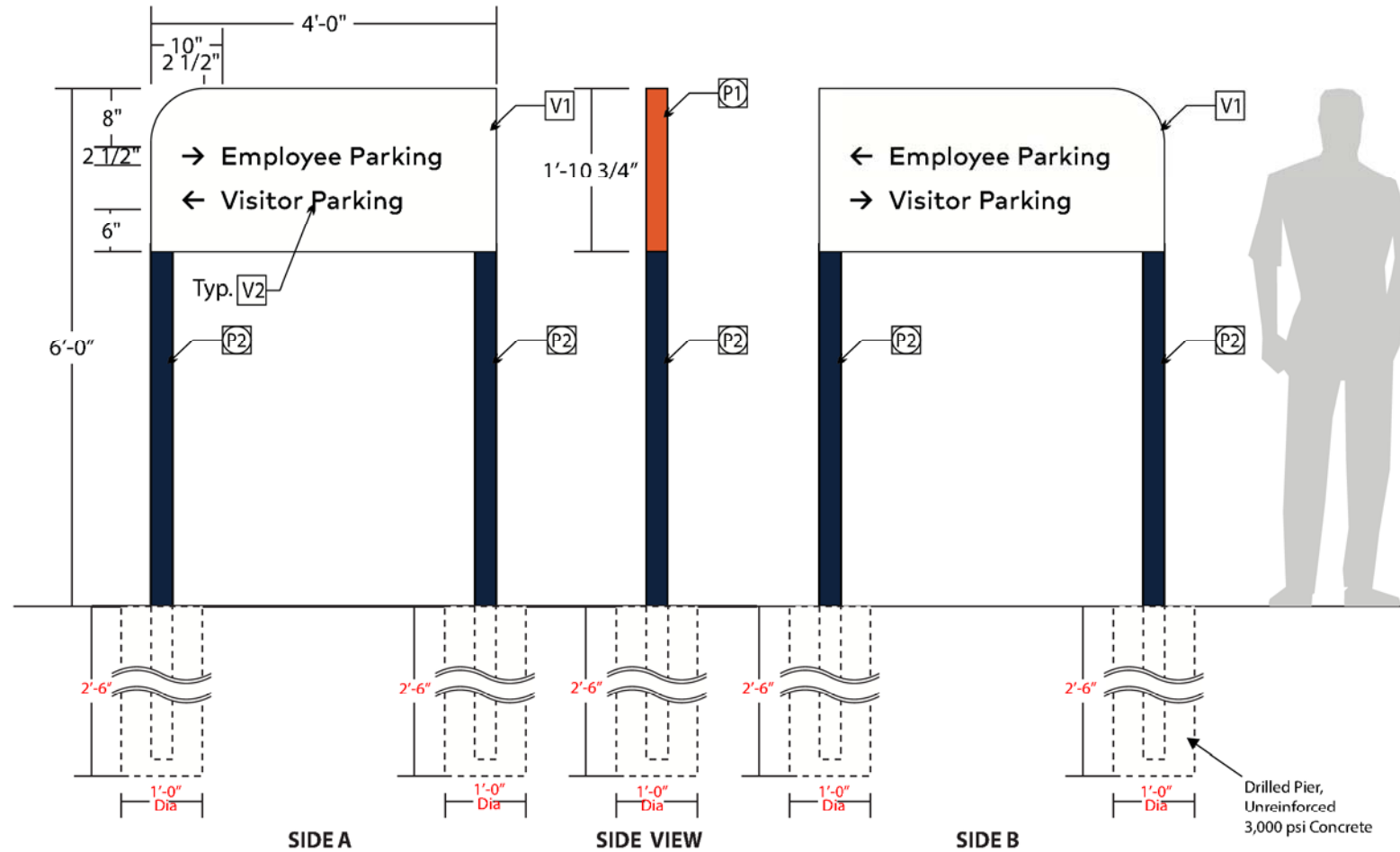
Length is taken as twice cantilever length per FL Bldg Code, 5th ed, 1604.3 i

$V_x = 204$ lb = 0.20 kip
 $d = V_x L^3 / (3EI) = 0.11$ inches

d <= D; OK

		Alloy	SR	DR
3"x3"x	0.095	6063-T52	1.57	0.337
3"x3"x	0.125	6063-T52	1.23	0.264
3"x3"x	0.188	6063-T52	0.87	0.187
3"x3"x 3x3x0.095	0.095	6061-T6	0.40	0.187
3"x3"x	0.188	6061-T6	0.40	0.187
3"x3"x	0.188	6061-T6	0.40	0.187

SIGN LOCATION - 17



New Directionals

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

TOTAL SQFT = 7.6 sq ft

PART # LCH-PU72-17

ESTIMATE # 187465

MATERIAL FOR FREE STANDING SIGN

FACES: .125" ALUMINUM
 FRAME: 3" x 3" x .125" ALUM TUBE
 FILLER/TOP CAP: .090" ALUMINUM
 SUPPORTS: DIRECT-BURIED SOB ALUM TUBES:
 ALLOY 6063-T52; 3X3X0.125" OR THICKER
 ALLOY 6061-T6; 3X3X0.095" OR THICKER

COLOR FOR FREE-STANDING SIGN

FACES: NOTED
 FILLER: TO MATCH PANTONE 7579 C ORANGE
 SUPPORTS: TO MATCH PANTONE 289 C BLUE

VINYL COLOR

- 1) REFLECTIVE: DIGITALLY PRINTED GRAPHICS ON 3M 680-CR-10 WHITE TO MATCH:
 - BLACK
 2) OPAQUE: 3M SCOTCHCAL 7725-22 MATTE BLACK VINYL
- PAINT COLOR**
- 1) PAINT TO MATCH PANTONE 289 C BURNT ORANGE / UV RESISTANT SATIN TOPCOAT
 2) PAINT TO MATCH PANTONE 7579 C NAVY BLUE / UV RESISTANT SATIN TOPCOAT

Design Loads

PER FL BLDG CODE, 7TH ED (2020)

BASIC WIND SPEED, V	136 MPH
RISK CATEGORY	IV
EXPOSURE CATEGORY	B
DESIGN WIND PRESSURE	34.9 PSF
FL CERTIFICATE OF AUTHORIZATION NO 31751	



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THOMAS

SIGN & AWNING CO INC
 4590 118TH Avenue North
 Clearwater, Florida 33762
800-526-3325

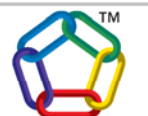
www.thomassign.com

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



3M™ MCS™ Warranty

Approval:

Approved
 DATE: _____

Approved as noted
 DATE: _____

Revise & Re-Submit
 DATE: _____

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Page Sheet

1 1 of 1

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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: Directional Signs; Sign Locations 08 & 17

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



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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

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

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

Sign geometry:	Sign 17	Sign 08
Sign Height, s	1.90	1.38 feet
Sign Width, B	4.00	4.00 feet
Sign Face Area, As	7.6	5.5 square feet
Height from grade to top of sign, h	6.00	6.00 feet

Say sign weighs 5 psf
Then total weight = 38 lbs

Thickness of sign, t 0.25 feet
Lateral wind area, $Alat = t s =$ 0.47 square feet

Pole Cover
Cover width, $Bc =$ 0.50 feet (total width of all poles covered)
Cover length, $lc = h-s =$ 4.10 feet
Area of cover, $Ac =$ 2.1 sq ft

Thickness of cover, $tc =$ 0.25 feet
Lateral area of cover, $Alatc =$ 1.026 sq ft

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

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
 Prepared by: John F. Dougherty
 Florida P.E. License No. 80640

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, $s/h = 0.316$
 Aspect ratio, $B/s = 2.11$
 Cf for Case A or B 1.79
 Cfc1 for Case C, 0 to s 2.25
 Cfc2 for Case C, s to 2s 1.50
 Cfc3 for Case C, 2s to 3s 0.00
 Cfc4 for Case C, 3s to 4s 0.00

Table 26.10-1; $K_h = 0.57$
 Table 26.6-1, Directionality Factor, $K_d = 0.85$
 Section 26.8.2, Topographic factor, $K_{zt} = 1.00$

Velocity pressure,
 $q_z = q_h = 0.00256 K_z K_{zt} K_d V_{asd}^2 = 22.9 \text{ psf}$

Section 26.11 gust effect factor, $G = 0.85$
 Design wind pressure (Case A) $= q_z G C_f = 34.9 \text{ psf}$
 Eq. 29.3-1, $F = q_h G C_f A_s$ area of pole cover $\frac{34.9 \text{ psf}}{2.1} = 16.6 \text{ sq ft}$
 Case A and Case B, $F_{AB} = 265 \text{ lb}$ $F_{cvr} = \frac{265 \text{ lb}}{72} = 3.7 \text{ lb}$

Case B, F applied $0.2B = 0.80$ feet from center of sign
 Torsion = 212 ft-lb

ASCE 7 Fig. 29.3-1; Base mom, $M_{x_{AB}} = F_{AB}(h-s/2) = 1,339 \text{ ft-lb}$ due to wind on sign face
 $M_{xcvr} = \text{wind pressure} \times \text{Area cover} \times L_c/2 = 147 \text{ ft-lb}$ due to wind on pole cover
 Base moment, $M_{x_{AB}} = 1,486 \text{ ft-lb}$

Case C, $F_1 = q_h G C_{fc1} s^2 = 158 \text{ lb}$ applied $s/2 = 0.95$ feet from end of sign
 Case C, $F_2 = q_h G C_{fc2} s^2 = 105 \text{ lb}$ applied $3s/2 = 2.84$ feet from end of sign
 Case C, $F_3 = q_h G C_{fc3} s^2 = 0 \text{ lb}$ applied $5s/2 = 4.74$ feet from end of sign
 Case C, $F_4 = q_h G C_{fc4} s^2 = 0 \text{ lb}$ applied $7s/2 = 6.64$ feet from end of sign
 Total force, $F_C = 263 \text{ lb}$ Torsion = 77 ft-lb^{**}

Base moment, $M_{x_c} = F_C(h-s/2) = 1,328 \text{ ft-lb}$ ** About centerline of sign
 From Case B above, $M_{xcvr} = 147 \text{ ft-lb}$
 $M_{x_c} = 1,475 \text{ ft-lb}$

Lateral load, Flat = say $q_h G C_f A_{lat} = 16.56 \text{ lb}$ on sign cabinet
 Base Mom, $M_y = F_{lat}(h-s/2) = 84 \text{ ft-lb}$

wind pressure 34.9 psf
 pole cover lateral area $\frac{16.56 \text{ lb}}{34.9 \text{ psf}} = 0.47 \text{ sq ft}$
 lateral load on pole cover 36 lb
 $L_c/2 = 2.052 \text{ ft}$
 $M_y = 74 \text{ ft-lb}$

total lateral load 52 lb Total $M_y = 157 \text{ ft-lb}$

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Structural Calculations

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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

To be shown on construction documents:

ULTIMATE DESIGN WIND SPEED, Vult (3-SECOND GUST):	136.0 mph
RISK CATEGORY:	IV
EXPOSURE CATEGORY:	B
DESIGN WIND PRESSURE:	34.9 psf

Sign Supported on Two Poles

ASCE 7 Fig 29.3-1

Case B: One pole carries $.5B+0.2B)/B = 70%$ of total load on sign
plus half of load on pole cover

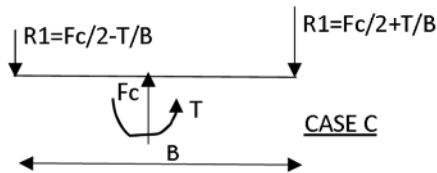
$$V_x = 265(0.70) + 72/2 = 221 \text{ lb}$$

Case C:

$$V_x = F_c/2 + \text{Torsion}/B = 187 \text{ lb}$$

plus half of pole cover load 36 lb

$$222 \text{ lb}$$



	Case B	Case C	Maximum	
V_x	221	222	222	lb
$M_x =$	1,011	1,016	1,016	ft-lb at grade*
$T =$	0	0	0	ft-lb
$M_y =$	157	157	157	ft-lb at grade*
$V_y = \text{Flat} =$	52	52	52	lb

Load combination: 1.0 Dead + 0.6 Wind

$$0.6 \text{ Max } V_x = 133 \text{ lb}$$

$$0.6 \text{ Max } M_x = 610 \text{ ft-lb at grade}^*$$

$$0.6 \text{ Max } V_y = 31 \text{ lb}$$

$$0.6 \text{ Max } M_y = 94 \text{ ft-lb at grade}^*$$

Resultant base moment,

$$M_{res} = ((0.6 \text{ Max } M_x)^2 + (0.6 \text{ Max } M_y)^2)^{1/2} = 617 \text{ ft-lb at grade}^*$$

Resultant lateral load,

$$V_{res} = ((0.6 \text{ Max } V_x)^2 + (0.6 \text{ Max } V_y)^2)^{1/2} = 137 \text{ lb}$$

$$\text{Axial load} = 37.91667 \text{ lb sign shared by 2 poles}$$

$$19 \text{ lb sign weight/pole} + \text{weight of pole}$$

* Moment is greater below grade; see drilled pier design

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Structural Calculations

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Design No.: 97209

Prepared by: John F. Dougherty

Florida P.E. License No. 80640

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

For short, free-head pier in cohesionless soil

Lateral load applied to pile at grade, $P_a = 137$ lb

Torsion, $T = 0$ ft-lb

Moment applied to pile at grade, $M_a = 617$ ft-lb

Resolve P_a and M_a into a load applied at a height e above grade

$e = M/P = 4.5$ feet

Diameter of the pier, $b = 12$ inches = 1 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, $L = 2.50$ feet

Assume angle of friction, $\phi = 30$ degrees

Rankine coefficient of passive pressure, $K_p =$

$\tan^2(45+\phi/2) = 3.00$

Unit weight of soil, $\gamma = 110.0$ pcf

Using Brom's method:

The load that will cause soil failure,

$P_t = \gamma b L^3 K_p / 2 / (e+L) = 368.3$ lb

$P_t \geq P_a$; OK

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

$f = \{2P_a / (3 \gamma b K_p)\}^{1/2} = 0.53$ feet

$M_{max} = P_a (e+f) - P_a f / 3 = 665$ ft-lb

Moment magnification = $M_{grade} / M_{max} = 1.078$

Check stresses in the sign pole embedded in concrete pier.

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.

THOMAS

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 4590 118th Avenue North
 Clearwater, Florida 33762

Structural Calculations

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

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

Select square aluminum tube for support pylon

Shear, V_x = 133 lb, due to wind *
 Max moment, M_x = 657 ft-lb, due to wind * **
 Shear, V_y = 31 lb, due to wind *
 Max moment, M_y = 102 ft-lb, due to wind * **

* load combination reduction on wind load included
 ** max moment occurs below grade

From page 1, estimated weight of sign = 37.9 lb
 Amount of sign weight carried by this pylon = 50%
 Sign weight tributary to pylon = 19.0 lb

Check 3x3x0.095

Width (in)	Depth (in)	Thickness (in)	Weight (lb/ft)	Area (sq in)	I_x (in ⁴)	S_x (in ³)	r_x (in)
3.00	3.00	0.095	1.3	1.1	1.554	1.036	1.189
				Stocked By Ryerson	Stocked By T&C Metals (2016 Catalog)		
I_y (in ⁴)	S_y (in ³)	r_y (in)	J (in ⁴)	Alloy - Temper	Alloy - Temper		
1.554	1.036	1.189	3.109	0 6063-T52 0			

Design for alloy: 6061-T6

"Aluminum Design Manual," 2010, The Aluminum Association, aka "ADM"
 Table A.3.3, k_t = 1.0 for "all others"

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 $F_{ty} = 35$ ksi
 $F_{cy} = 35$ ksi
 $F_{su} = 24$
 Modulus of Elasticity, $E = 10100$ ksi

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 Coef of thermal expansion, $\alpha = 1.30E-05$ / degree F
 Density, $\gamma = 0.100$ lb/cu inch
 Shear yield strength, $F_{sy} = 0.6 F_{ty} = 21$ ksi

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Bending Compression in Flat elements	$B_{br} = 66.82$	$D_{br} = 0.666$	$C_{br} = 66.92$
Bending Compression in Curved Elements	$B_{tb} = 64.78$	$D_{tb} = 4.458$	$C_{tb} = 55.44$
Shear in Flat Elements	$B_s = 27.24$	$D_s = 0.141$	$C_s = 78.95$

Note: C_t shall be determined using a plot of curves of limit state stress based on elastic and inelastic buckling or by trial and error solution

ADM Chapter E Compression

E.1 $\Omega_c = 1.65$
 E.2 Cantilever length, $s = 3$ feet
 $K = 2.1$ for cantilever
 $Kl/r = K(12)s/r = 64$
 E.3 $S_2 = C_c = 65.67$
 $kl/r < S_2$; E.3-2; $F_c = 20.175$
 E.3-1; $P_n = F_c A_g = 22.192$ kips
 $P_n/\Omega_c = 13.450$ kips

Length of pipe 3 feet
 weight $\frac{1.3 \text{ lb/ft}}{4 \text{ lb}}$

sign weight $\frac{19 \text{ lb}}{23 \text{ lb}} =$

0.022858 kips
 $P_u = \frac{1.200 \text{ Dead Load Factor}}{0.027 \text{ kips}}$

$P_n/\Omega_c \geq P_u$; OK

ADM Chapter F Flexure

F.1 $\Omega_b = 1.95$ for tensile rupture
 $\Omega_b = 1.65$ for other flexural limit states
 F.1.1 for cantilever, $C_b = 1.3$
 F.8 Closed Shapes in Flexure Other Than Pipes & Round Tubes

Section F.8.1.2 tensile yielding; $F_b = 1.30 F_{ty} = 45.5$ ksi; $\Omega_b = 1.65$ $F_b/\Omega_b = 27.6$ ksi
 tensile rupture, $F_b = 1.42 F_{tu} / k_t = 53.96$ ksi; $\Omega_b = 1.95$ $F_b/\Omega_b = 27.7$ ksi
 Use $F_b / \Omega_b = 27.6$ ksi

	M_x		M_y
	657 ft-lb		102 ft-lb
	8 inch-kip		1 inch-kip
ASD Load combination factor on wind load:	0.6		0.6
	13.1 inch-kip		2.0 inch-kip
LRFD factor on wind load:	1.0		1.0
	Mu = 13.14427 inch-kip		2.034112 inch-kip
$F_{bx} = M_x/S_x = 12.7$ ksi;		$F_{by} = M_y/S_y = 2.0$ ksi	
$F_b/\Omega_b \geq F_b$; OK		$F_b/\Omega_b \geq F_b$; OK	

Combined Stress Ratio = 0.53 <= 1.00; OK

Deflection

Allowable deflection, $D = 2L/120 = 2 (12S)/120 = 0.60$ inches

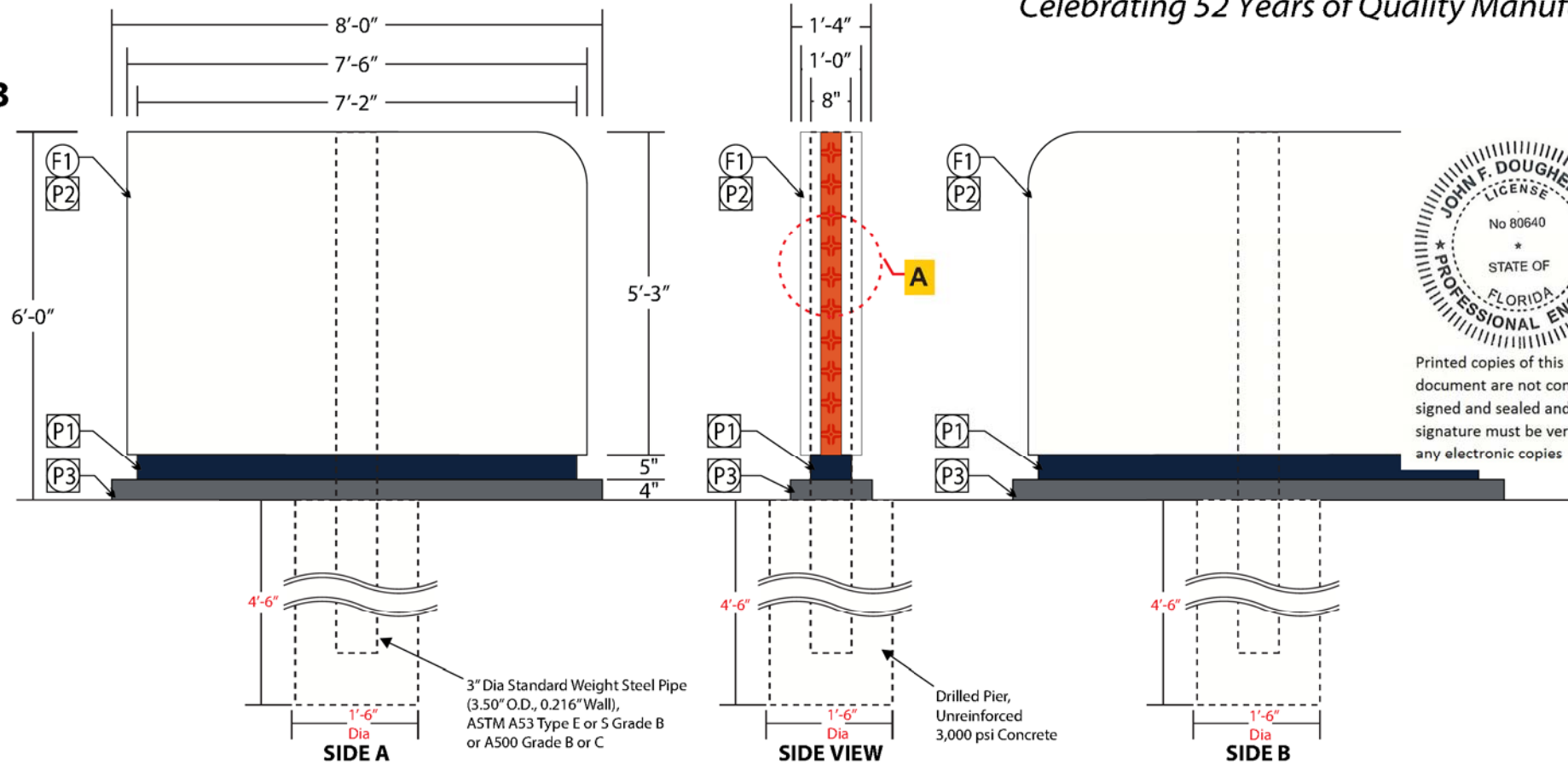
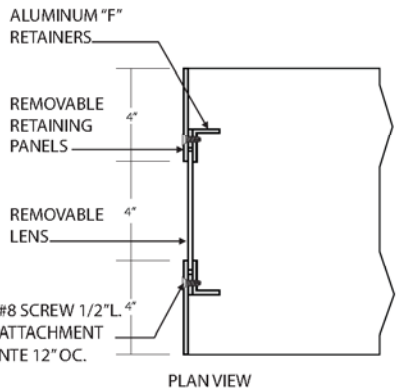
Length is taken as twice cantilever length per FL Bldg Code, 5th ed, 1604.3 i

$V_x = 133$ lb = 0.13 kip
 $d = V_x L^3 / (3EI) = 0.13$ inches

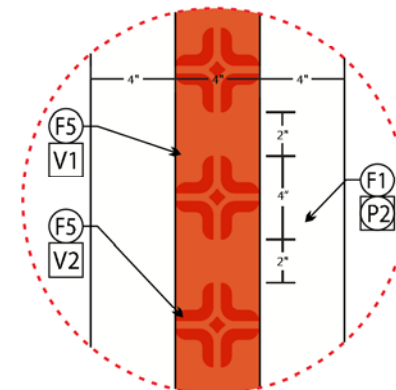
d <= D; OK

		Alloy	SR	DR
3"x3"x	0.095	6063-T52	1.17	0.220
3"x3"x	0.125	6063-T52	0.91	0.173
3"x3"x	0.095	6061-T6	0.53	0.220
3"x3"x	0.095	6061-T6	0.53	0.220

SIGN LOCATION - 32 & 33



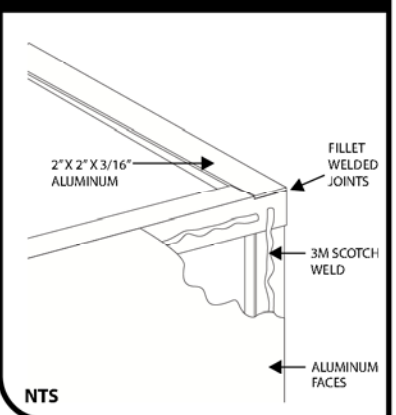
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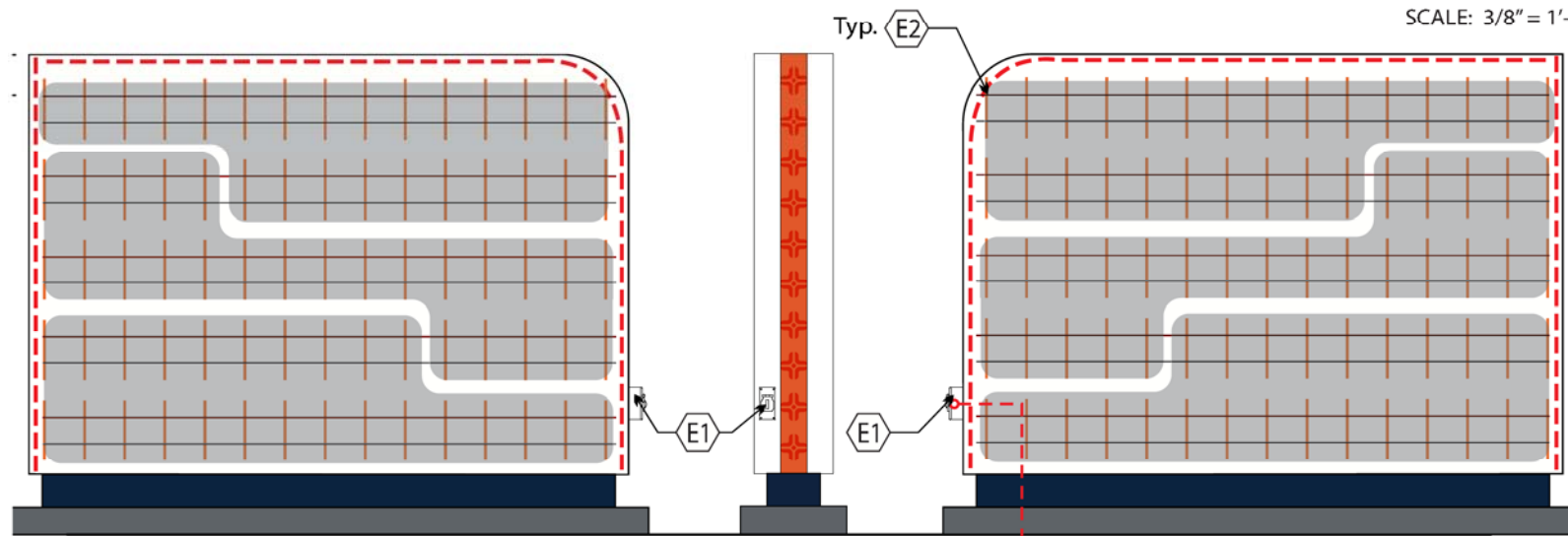
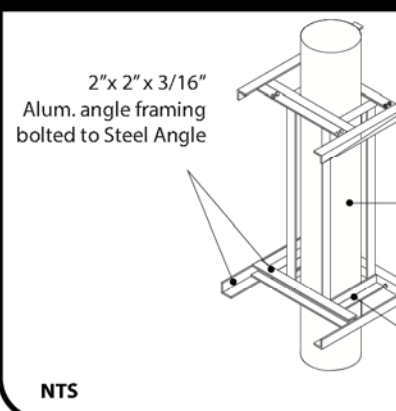
A Side Reveal / LENS Detail

New Illuminated Directionals

SIGN FRAME DETAIL



SADDLE DETAIL



E3 LED Layout

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

E5

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

TOTAL SQFT = 45.00 sq
PART # LCH-MN721-32
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/1/77" 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) MATHEWS WHITE WONDER MP-32071 / UV RESISTANT CLEAR SATIN TOP COAT.
3) MATHEWS PAINT COLOR TO MATCH PANTONE 424 C / UV RESISTANT CLEAR SATIN TOP COAT.

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=	110 VOLT INPUT		
BITRO TRANSFORMER	SECONDARY	VOLTS	AMP. INPUT
	4 ASU-100-24U	24	96
TOTAL			4.0

(1) 20 AMP-120 VOLT CIRCUIT REQUIRED

GROUNDING 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 4E. 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: MT
Project Team: BM
Designer: JB
Date: 09.07.22

Project Updates:
09.12.22 JB - Revisions
09.19.22 JB - Revisions

UL 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:

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Page 1 **Sheet** 1 of 1

Local: 727-573-7757
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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

Prepared by: John F. Dougherty, P.E.

Florida P.E. No. 80640

Code: Florida Building Code, 7th Edition (2020) - Building

Pages 1 - 7



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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, $A_{lat} = t s =$	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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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; $K_h =$	0.57	
	Table 26.6-1, Directionality Factor, K_d	0.85	for free standing signs
	Section 26.8.2, Topographic factor, K_{zt}	1.00	
	Velocity pressure, $q_z = q_h = 0.00256 K_z K_{zt} K_d V_{asd}^2 =$	22.9	psf
	Section 26.11 gust effect factor, G	0.85	
	Design wind pressure (Case A) $= q_z G C_f =$	28.0	psf
	Eq. 29.3-1, $F = q_h G C_f A_s$		
	Case A and Case B, $F_{AB} =$	1261	lb
	Case C, $F_1 = q_h G C_{fc1} s^2 =$	0	lb applied $s/2 =$ 3.00 feet from end of sign
	Case C, $F_2 = q_h G C_{fc2} s^2 =$	0	lb applied $3s/2 =$ 9.00 feet from end of sign
	Case C, $F_3 = q_h G C_{fc3} s^2 =$	0	lb applied $5s/2 =$ 15.00 feet from end of sign
	Case C, $F_4 = q_h G C_{fc4} s^2 =$	0	lb applied $7s/2 =$ 21.00 feet from end of sign
	Total force, $\Sigma F_c =$	0	lb
	Lateral load, $F_{lat} = \text{say } q_h G C_f A_{lat} =$	168.19	lb (assumes $C_f = 1.00$)

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, $M_{x_B} = F_{AB}(0.55)h$ = 4,163 ft-lb*
 $V_{x_B} = F_{AB}$ = 1261 lb
 $V_{y_B} = \text{Flat}$ = 168.2 lb
 Pole base moment, $M_{y_B} = V_{y_B} (0.55h)$ = 555.0 ft-lb*

Case C Total load, $V_{x_C} = F_{AB}$ = 0 lb
 Pole base moment, $M_{x_C} = V_{x_C} (0.55)h$ = 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
 $V_{y_B} = \text{Flat}$ = 168.2 lb
 Pole base moment, $M_{y_B} = V_{y_B} (0.55h)$ = 555.0 ft-lb*

	Case B	Case C	Maximum	
$V_x =$	1,261	0	1,261	lb
$M_x =$	4,163	0	4,163	ft-lb at grade*
Torsion	1,892	0	1,892	ft-lb
$M_y =$	555.0	555.0	555	ft-lb at grade*
$V_y =$	168.2	168.2	168	lb
** Resultant $V = (V_x^2 + V_y^2)^{1/2} =$	1273	168	1,273	lb
** Resultant $M = (M_x^2 + M_y^2)^{1/2} =$	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

$V_x = 757$ lb
 $M_x = 2,498$ ft-lb at grade*
 Torsion 1,135 ft-lb
 $M_y = 333$ ft-lb at grade*
 $V_y = 101$ lb
 ** Resultant $V = (V_x^2 + V_y^2)^{1/2} = 764$ lb
 ** Resultant $M = (M_x^2 + M_y^2)^{1/2} = 2,520$ ft-lb at grade*

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Design No.: 97209

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Florida P.E. License No. 80640

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

For short, free-head pier in cohesionless soil

$$\text{Lateral load applied to pile at grade, } P_a = 764 \text{ lb}$$

$$\text{Moment applied to pile at grade, } M_a = 2,520 \text{ ft-lb}$$

Resolve P_a and M_a into a load applied at a height e above grade

$$e = M/P = 3.3 \text{ feet}$$

$$\text{Torsion, } T = 1135 \text{ ft-lb}$$

$$\text{Diameter of the pier, } b = 18 \text{ inches} = 1.5 \text{ feet}$$

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.

$$\text{Embedded length below grade, } L = 4.5 \text{ feet}$$

$$\text{Assume angle of friction, } \phi = 30 \text{ degrees}$$

$$\text{Rankine coefficient of passive pressure, } K_p =$$

$$\tan^2(45 + \phi/2) = 3.00$$

$$\text{Unit weight of soil, } \gamma = 110.0 \text{ pcf}$$

Using Brom's method:

The load that will cause soil failure,

$$P_t = \gamma b L^3 K_p / 2 / (e + L) = 2891.5 \text{ lb}$$

$$P_t \geq P_a; \text{ OK}$$

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

$$f = \{2P_a / (3 \gamma b K_p)\}^{1/2} = 1.01 \text{ feet}$$

$$M_{\text{max}} = P_a (e + f) - P_a f / 3 = 3,036 \text{ ft-lb}$$

$$\text{Moment magnification} = M_{\text{grade}} / M_{\text{max}} = 1.205$$

Check stresses in the sign pole embedded in concrete pier.

$$\text{Perimeter area of pier, } A_p = 2\pi(b/2)(12L) = 3054 \text{ sq in}$$

$$\text{Shear on soil-concrete interface} = 12T / (b/2) / A_p = 0.50 \text{ psi} \times 144 = 71 \text{ psf}$$

$$\text{average soil pressure} = 110 \text{ pcf} / (L/2) = 247.5 \text{ psf}$$

$$\text{say friction coefficient, } f_r = 0.3$$

$$\text{friction force} = 74.25 \text{ psf}$$

$$\text{Factor of Safety against turning} = 74.3 / 71 = 1.04 > 1.00; \text{ OK}$$

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** $F_y = 35$ ksi
Pipe3STD

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, $R_b = 764$ 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; $\lambda_r = 0.11 E / F_y = 91.14 > D/t$; non-slender element
 In flexure; $\lambda_p = 0.07 E / F_y = 58.00$
 $\lambda_r = 0.31 E / F_y = 256.86$ compact section

AISC Chapter E; Compression
 AISC Section E1 $\Omega_c = 1.67$

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

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

AISC Eq. E3-4; $F_e = 56.7$ ksi
 AISC Eq. E3-2; $F_{cr} = 27.0$ ksi
 AISC Eq. E3-1; $P_n = F_{cr} A_g = 56$ kips
 Allowable compression strength, $P_c = P_n / \Omega_c = 33$ kips

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

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AISC Chapter F; Flexure

$$\Omega_b = 1.67$$

AISC Section F8

$$0.45 E/F_y = 372.9 \quad D/t < 0.45 E/F_y; \text{ Sect F8 Applies}$$

Section F8.1; Yielding

$$\text{Eq. F8-1; } M_n = M_p = F_y Z = 77 \text{ kip-in}$$

Section F8.2; Local Buckling

For compact sections Section F8.2 does not apply

$$\text{For non compact sections; Eq. F8-2; } M_n = 114 \text{ kip-in}$$

$$\text{For slender walled sections; Eq. F8-3; } M_n = 897 \text{ kip-in}$$

$$M_n = 77 \text{ kip-in}$$

$$\text{Allowable moment, } M_c = M_n / \Omega_b = 46 \text{ kip-in}$$

$$\text{Required moment, } M_r = 3,036 \text{ ft-lb} = 36 \text{ inch-kip}$$

$$36 \leq 46; \text{ OK}$$

AISC Chapter G; Shear

$$\Omega_v = 1.67$$

Section G6; L_v is undefined since transverse shear is constant

Section G6; Eq. G6-2a; $F_{cr} = \text{N/A}$

$$\text{Eq. G6-2b; } F_{cr} = 312 \text{ ksi}$$

$$V_n = F_{cr} \text{ Area} / 2 = 323 \text{ kips}$$

$$\text{Allowable transverse shear, } V_c = V_n / \Omega_v = 193 \text{ kips}$$

$$\text{Required transverse shear, } V_r = 764 \text{ lb} = 0.76 \text{ kips}$$

inch-kip

$$0.76 \leq 193; \text{ OK}$$

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AISC Chapter H; Combined Forces

Section H3.1

$$\Omega t = 1.67$$

$$\text{HSS torsional constant, } C = \pi(OD-t)^2 t / 2 = 3.44$$

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

$$\text{Eq. H3-2a; } F_{cr} = 298 \text{ ksi}$$

$$\text{Eq. H3-2b; } F_{cr} = 239.5 \text{ ksi}$$

$$0.6 F_y = 21.0 \text{ ksi}$$

$$\text{Use } F_{cr} = 21.0 \text{ ksi}$$

$$\text{eq H3-1; } T_n = F_{cr} C = 72.2 \text{ in-kip}$$

$$\text{Allowable torsion, } T_c = T_n / \Omega t = 43.2 \text{ in-kip}$$

$$\text{Required torsion, } T_r = 1,135.3 \text{ ft-lb} = 13.62 \text{ inch-kip}$$

$$13.62 \leq 43; \text{ OK}$$

AISC Section H3.2; eq. H3-6

$$(P_r/P_c) + (M_r/M_c) + \{(V_r/V_c) + (T_r/T_c)\}^2 \leq 1.00$$

$$0.90 \leq 1.00; \text{ OK}$$

Deflection

$$\text{Deflection due to load } R_b, \Delta = R_b (12H)^3 / (3EI_x) =$$
$$2(12H) / 120 =$$

$$0.19 \text{ inches}$$

$$0.66 \text{ inches}^*$$

OK

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