

DESIGN CALCULATIONS

FOR

BURGER KING **Clearance Bar** Columbia County, FL

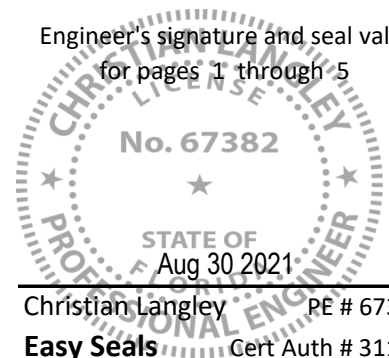
GENERAL NOTES:

1. Design is in accordance with the Florida Building Code 7th Edition (2020) for use within and outside the High Velocity Hurricane Zone (HVHZ).
2. Wind loads have been calculated per the requirements of ASCE 7-16 as shown herein, except where noted otherwise.
3. These engineering calculations pertain only to the structural integrity of those systems, components, and/or other construction explicitly specified herein and/or in accompanying engineering drawings. The existing host structure (if any) is assumed to be in good condition, capable of supporting the loaded system, subject to building department approval. No warranty, either expressed or implied, is contained herein.
4. System components shall be as noted herein. All references to named components and installation shall conform to manufacturer's or industry specifications as summarized herein.
5. Where site conditions deviate from those noted herein, revisions may be required or a separate site-specific engineering evaluation performed.
6. Aluminum components in contact with steel or embedded in concrete shall be protected as prescribed in the 2015 Aluminum Design Manual, Part 1-A. Steel components in contact with, but not encased in, concrete shall be coated, painted, or otherwise protected against corrosion.
7. Engineer seal affixed hereto validates structural design as shown only. Use of this specification by contractor, et. Al, indemnifies and saves harmless this engineer for all costs & damages including legal fees & anellate fees resulting from deviation from this design

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Engineer's signature and seal valid
for pages 1 through 5



Christian Langley PE # 67382
Easy Seals Cert Auth # 31124

ASCE 7-16 Design Wind Loads

FREESTANDING SOLID SIGNS AND WALLS (AT GRADE)

Building Specs

V = 120 mph *Basic wind speed*
 Exposure C

Risk Category 1 Structure
 ASD Load Combo Coeff: 0.6

Calculations

$\alpha = 9.5$ *3-sec gust speed power law exponent*
 $z_g = 900'$ *Nominal ht. of atmos. boundary layer*
 $G = 0.85$

Kd = 0.85 *Directionality factor*
 Kzt = 1.0 *Topographic factor*
 Ke = 1.0 *Ground elevation factor*
 Cf = 1.55 *Force Coefficient*
...Width / Height ratio ≥ 0.5

120 mph - Exp "C"

Monuments at grade

W/Ht Ratio ≤ 0.5

SIGN HEIGHT	DESIGN WIND PRESSURES	$K_h = K_z$	q_z
15 ft	± 21.0 psf	0.85	16.0
18 ft	± 21.8 psf	0.88	16.6
20 ft	± 22.3 psf	0.90	17.0
30 ft	± 24.3 psf	0.98	18.5
35 ft	± 25.1 psf	1.01	19.1
40 ft	± 25.8 psf	1.04	19.6
45 ft	± 26.5 psf	1.07	20.1
50 ft	± 27.1 psf	1.09	20.6
55 ft	± 27.6 psf	1.12	21.0
60 ft	± 28.2 psf	1.14	21.4
70 ft	± 29.1 psf	1.17	22.1
80 ft	± 29.9 psf	1.21	22.7
90 ft	± 30.7 psf	1.24	23.3
100 ft	± 31.3 psf	1.27	23.8
110 ft	± 32.0 psf	1.29	24.3
120 ft	± 32.6 psf	1.32	24.7
130 ft	± 33.1 psf	1.34	25.1
140 ft	± 33.7 psf	1.36	25.5
150 ft	± 34.1 psf	1.38	25.9
175 ft	± 35.3 psf	1.42	26.8
200 ft	± 36.3 psf	1.46	27.5
250 ft	± 38.0 psf	1.53	28.9

Footing Design for Freestanding Signs and Flagpoles

Structure Dimensions & Loading

Design wind pressure:	P =	21.0	psf	
Overturning Safety Factor:	Ω =	1.5		... FBC 1807.2.3
Sign area 1:	A1 =	10.5	sq ft	... tributary area 1 for each footer (e.g. sign)
Height of applied force above grade:	h1 =	4.5	ft	... height of area 1 centroid
Sign area 2:	A2 =	4.6	sq ft	... tributary area 2 for each footer (e.g. post)
Height of applied force above grade:	h2 =	8.8	ft	... height of area 2 centroid
Overturning Moment:		$M_n = P \cdot (A1 \cdot h1 + A2 \cdot h2)$		
		Mn =	1.9	kip-ft

Round	Footing Diameter:	B =	3	ft	
	Footing depth:	d =	3.5	ft	Soil cover: ds = 0 ft
	Superstructure weight:	Dr =	200	lb	
	Soil cover weight:	Ds =	0	lb	... = 100pcf * π * B^2 / 4 * ds
	Footing weight:	Df =	3711	lb	... = 150pcf * π * B^2 / 4 * d
	Total weight:	D =	3911	lb	... = Dr + Ds + Df

Soil Strength

...FBC Tables 1806.2, 1819.6

Soil class:	4. Sand, silty sand, silty gravel		
Lateral bearing strength:	Plat =	150	psf/ft
Vertical bearing strength:	Pbrg =	2000	psf

Check Lateral Soil Bearing Pressures

(Empirical Method) ...FBC Sect 1807.3.2.1

Unconstrained (No rigid floor or pavement at ground surface)

Allowable lateral soil bearing pressure at 1/3 depth:

$$S_1 = 2 \cdot \text{Plat} \cdot (d + ds) / 3$$

$$S_1 = 350 \text{ psf}$$

Total applied lateral load:	Ptot =	0.32	kips
Equiv ht of applied load:	heq =	5.81	ft
$A_s = 2.34 \cdot P_{tot} / (S_1 \cdot B)$			
$A_s =$		0.7	ft

$$d_{req} = A_s / 2 \cdot [1 + \sqrt{1 + 4.36 \cdot heq / A_s}]$$

$$d_{req} = 2.51 \text{ ft}$$

$d_{req} < d$ **OK**

Hollow Structural Pipe in Bending

Allowable Stress Design per 2016 AISC Spec for Structural Steel Buildings

Material Properties

Yield Stress, A53 Grd B Steel:	$F_y =$	35	ksi	Safety Factor =	1.67	Per Section B3.4
Modulus of Elasticity:	$E =$	29000	ksi			

End Supports: Cantilever

Member Properties

ANSI 4" Schedule 40 steel pipe

Nominal size:	4" diam	-	Sch 40		
Outside Diameter	$d =$	4.5	in	Moment of Inertia:	$I_x = 7.2 \text{ in}^4$
Wall Thickness	$t =$	0.237	in	Section Modulus:	$S = 3.21 \text{ in}^3$
				Deflection Limit:	$\text{Defl} = L / 80$

Design wind pressure:	$P =$	21.0	psf	
Sign area:	$A_1 =$	15.2	sq ft	... tributary area for each post (e.g. sign+post)
Eccentricity of applied force:	$e_1 =$	5.8	ft	... distance to area centroid (weighted avg h_1, h_2)

(1): Yielding Limit State

$M_n = F_y \cdot S$	Allowable Moment:	$M_{allow} = M_n / 1.67$
$M_n = 112.5 \text{ kip-in}$		$M_{allow} = 67.4 \text{ kip-in}$

Check Member Bending

Moment in member:	$M_{max} = P \cdot A_1 \cdot e_1$	
	$M_{max} = 22.2 \text{ kip-in}$	$M_{max} < M_{allow} \dots$ OK

Check Member Deflection:

Allowable Deflection:	$\Delta_{allow} =$	0.87	in	$L / 80$
Deflection in member:	$\Delta_{max} = P \cdot (A \cdot e^3) / (3 \cdot E \cdot I)$			
	$\Delta_{max} =$	0.17	in	$\Delta_{max} < \Delta_{allow} \dots$ OK

Cast-in-Place Concrete Anchor Bolts

ACI 318-14, Appendix "D"

Required Strength:

 Wind pressure: $W = 21.0$ psf
 Dead load: $D = 0$ lb
 ASCE 7-10, 2.3.2: $U = (1.2)D + (1.0)W$

 Tributary area: $A = 15.2$ sqft
 Load eccentricity: $e = 5.8$ ft
 $M_u = 1.85$ kip-ft $\dots = [(1.2)D + (1.0)W] * A * e$

Anchor & Concrete Specs:

Anchor bolt size:	1"	da = 1.0 in	Concrete:	$f'_c = 2500$ psi
Anchor material:	SAE Grade 2 / A307			$n_t = 8$ threads/in
Embedment:	$h_{ef} = 24$ in			$f_{uta} = 74$ ksi
Qty anchors in group:	$Q = 2$ anchors		Edge distance:	$ED = 12.25$ in
			Anchor group offset:	$a = 11.5$ in

Anchor Strength:

 Tension: $U \leq 0.75 \phi N_n$

 Steel: $\phi_s = 0.75$

 Conc, no suppl reinf: $\phi_c = 0.70$

Steel Strength:

$$A_{se} = \pi/4 * (d_a - 0.9743/n_t)^2$$

$$N_{sa} = A_{se} * f_{uta}$$

$$A_{se} = 0.61 \text{ in}^2$$

$$N_{sa} = 44.8 \text{ kips}$$

$$\phi_s * N_{sa} = 33.6 \text{ kips}$$

Concrete Breakout:

$$A_{nc} = [ED + s + 1.5 * h_{ef}] * [ED + 1.5 * h_{ef}]$$

$$A_{nc} = 9 * h_{ef}^2$$

$$A_{nc} = 2328 \text{ in}^2$$

$$A_{nc} = 5184 \text{ in}^2$$

$$N_b = k_c * \lambda * \sqrt{f'_c} * h_{ef}^{1.5}$$

Cracked Concrete: $\psi_c = 1.0$

$$N_b = 141.1 \text{ kips}$$

Cast-in anchors: $\psi_{cp} = 1.0$

$$\text{Limit} = 16 * \lambda * \sqrt{f'_c} * h_{ef}^{5/3} = 159.8 \text{ kips}$$

$$\psi_{ed} = 0.7 + 0.3 * ED / (1.5 * h_{ef}) \quad \psi_{ed} = 0.8$$

$$k_c = 24 \quad \dots \text{cast-in anchors}$$

No eccentricity between anchors: $\psi_{ec} = 1.0$

$$\lambda = 1.0 \quad \dots \text{normal weight concrete}$$

Concrete breakout strength:

$$N_{cb} = (A_{nc} / A_{co}) * \psi_c * \psi_{cp} * \psi_{ed} * \psi_{ec} * N_b$$

$$N_{cb} = 50.8 \text{ kips}$$

$$\phi_c * N_{cb} = 35.6 \text{ kips}$$

Concrete Pullout:

Hooked Bar / Stud:

 Hook length: $e_h = 2$ in

$$N_p = 0.9 * f'_c * e_h * d_a$$

$$N_p = 4.5 \text{ kips}$$

Cracked Concrete: $\psi_{c,p} = 1.0$

Concrete pullout strength:

$$N_{pn} = \psi_{c,p} * N_p$$

$$N_{pn} = 4.5 \text{ kips}$$

$$\phi_c * N_{pn} = 3.2 \text{ kips}$$

Concrete Blowout:

Hooked Bar / Stud:

 $N_{sb} = N/A$ (No headed stud)

Concrete blowout strength:

 $N_{sb} = N/A$

$$\phi_c * N_{sb} = N/A$$

Critical Anchor Strength:

$$\phi N_n = \min(\phi_s * N_{sa}, \phi_c * N_{cb}, \phi_c * N_{pn}, \phi_c * N_{sb})$$

$$\phi N_n = 3.2 \text{ kips}$$

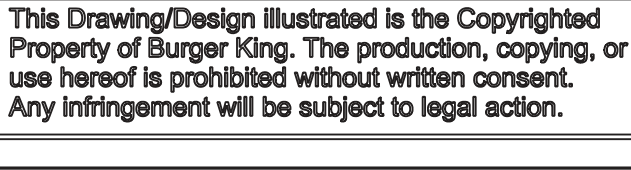
$$\phi M_n = Q * \phi N_n * a$$

$$\phi M_n = 6.0 \text{ kip-ft}$$

$$M_u \leq 0.75 \phi M_n$$

$$1.85 \text{ kip-ft} < 4.5 \text{ kip-ft}$$

OK



BURGER KING		COLUMBIA COUNTY, FL	
Custom Exterior Signage Systems			
File	Burger King Design Doc RFP #1	Design --	Date, 12/8/2011

Burger King requires that an " ☒ Approved" drawing be obtained from the client prior to any production release or production release revision.

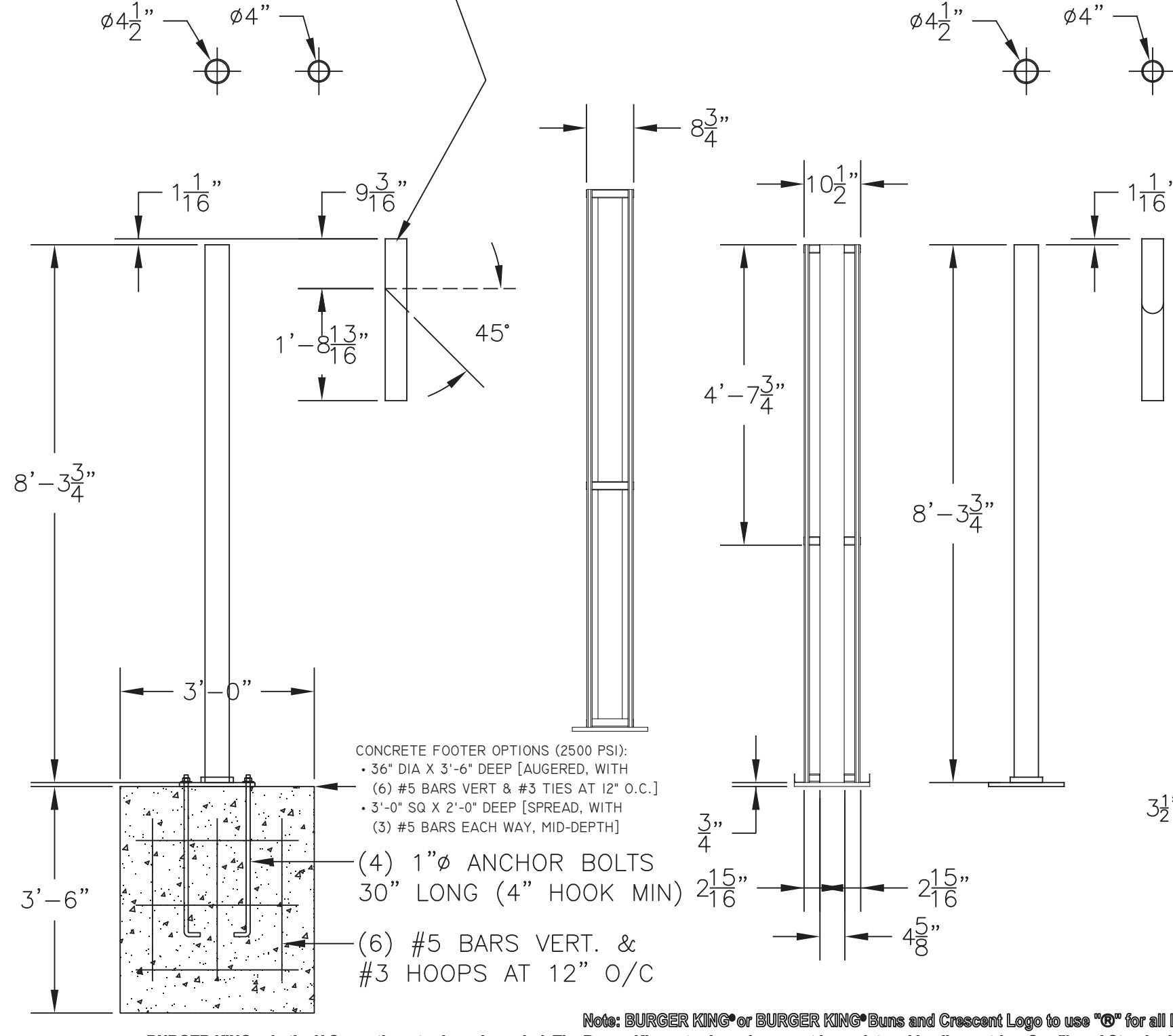
☐ Approved
 ☐ Revise & Resubmit

Name	Title	Date

Notes: as applicable. • Steel components shall be coated, painted, or otherwise protected against corrosion per FBC Sec 2203.2/2222.0. • Alum components in contact with steel or embedded in concrete shall be painted or protected as prescribed in ADM-13 (a), or plastic/neoprene spacers provided. • All exposed fasteners shall be S.S. or have a protective coating for corrosion protection. • All welding shall comply with AWS requirements. • Steel welds: E70xx electrodes. • Aluminum welds: 4043 filler alloy. • Alum extrusions: 6063-16 or stronger, U.N.C.



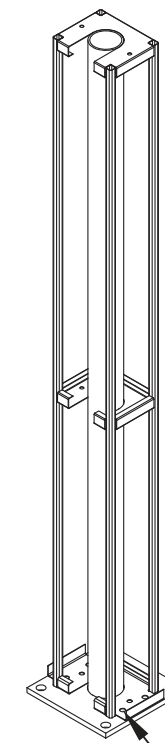
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MACHINE CUT DIAGONAL ONLY
FINISH CUT SURFACE SMOOTH

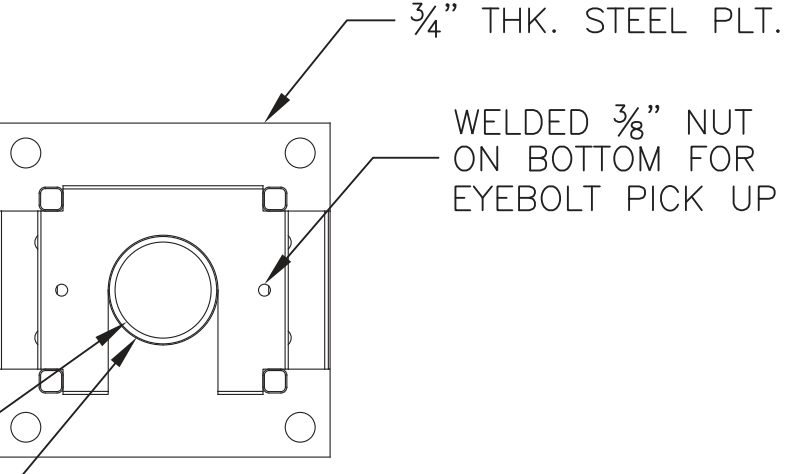
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REV | DATE | DESCRIPTION

Clearance Bar with
Swing-Away Bar Design
page 51 of 130TOP AND
MID
PLATEBOTTOM
PLATE

PLUG WELD TO BASE

 $3\frac{1}{2}$ "Øx.226 STD. PIPE
(NO-SUBSTITUTE)4"Øx.237 PIPE
(NO SUBSTITUTE)

SCALE: 3X



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Project Information

BURGER KING COLUMBIA COUNTY, FL
Custom Exterior Signage Systems
File Burger King Design Doc RFP #1 Design -- Date: 12/8/2011

Client Review Status

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☐ Approved☐ Revise & Resubmit

Name

Title

Date

DESIGN CALCULATIONS

FOR

BURGER KING **Menuboard** Columbia County, FL

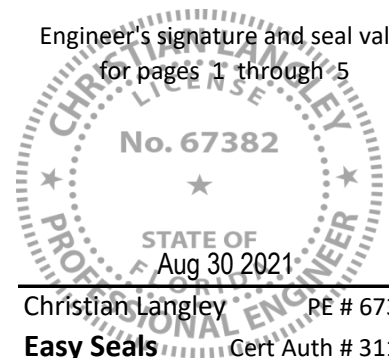
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for pages 1 through 5



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ASCE 7-16 Design Wind Loads

FREESTANDING SOLID SIGNS AND WALLS (AT GRADE)

Building Specs

V = 120 mph *Basic wind speed*
 Exposure C

Risk Category 1 Structure
 ASD Load Combo Coeff: 0.6

Calculations

$\alpha = 9.5$ *3-sec gust speed power law exponent*
 $z_g = 900'$ *Nominal ht. of atmos. boundary layer*
 $G = 0.85$

Kd = 0.85 *Directionality factor*
 Kzt = 1.0 *Topographic factor*
 Ke = 1.0 *Ground elevation factor*
 Cf = 1.55 *Force Coefficient*
...Width / Height ratio ≥ 0.5

120 mph - Exp "C"

Monuments at grade

W/Ht Ratio ≤ 0.5

SIGN HEIGHT	DESIGN WIND PRESSURES	$K_h = K_z$	q_z
15 ft	± 21.0 psf	0.85	16.0
18 ft	± 21.8 psf	0.88	16.6
20 ft	± 22.3 psf	0.90	17.0
30 ft	± 24.3 psf	0.98	18.5
35 ft	± 25.1 psf	1.01	19.1
40 ft	± 25.8 psf	1.04	19.6
45 ft	± 26.5 psf	1.07	20.1
50 ft	± 27.1 psf	1.09	20.6
55 ft	± 27.6 psf	1.12	21.0
60 ft	± 28.2 psf	1.14	21.4
70 ft	± 29.1 psf	1.17	22.1
80 ft	± 29.9 psf	1.21	22.7
90 ft	± 30.7 psf	1.24	23.3
100 ft	± 31.3 psf	1.27	23.8
110 ft	± 32.0 psf	1.29	24.3
120 ft	± 32.6 psf	1.32	24.7
130 ft	± 33.1 psf	1.34	25.1
140 ft	± 33.7 psf	1.36	25.5
150 ft	± 34.1 psf	1.38	25.9
175 ft	± 35.3 psf	1.42	26.8
200 ft	± 36.3 psf	1.46	27.5
250 ft	± 38.0 psf	1.53	28.9

Footing Design for Freestanding Signs and Flagpoles

Structure Dimensions & Loading

Design wind pressure:	P =	21.0	psf	
Overturning Safety Factor:	Ω =	1.5		... FBC 1807.2.3
Sign area 1:	A1 =	24.8	sq ft	... tributary area 1 for each footer (e.g. sign)
Height of applied force above grade:	h1 =	3.5	ft	... height of area 1 centroid
Sign area 2:	A2 =	4.9	sq ft	... tributary area 2 for each footer (e.g. post)
Height of applied force above grade:	h2 =	0.8	ft	... height of area 2 centroid
Overturning Moment:		$M_n = P \cdot (A1 \cdot h1 + A2 \cdot h2)$		
		Mn =	1.9	kip-ft

Round	Footing Diameter:	B =	3	ft	
	Footing depth:	d =	3.25	ft	Soil cover: ds = 0 ft
	Superstructure weight:	Dr =	200	lb	
	Soil cover weight:	Ds =	0	lb	... = $100\text{pcf} \cdot \pi \cdot B^2 / 4 \cdot ds$
	Footing weight:	Df =	3446	lb	... = $150\text{pcf} \cdot \pi \cdot B^2 / 4 \cdot d$
	Total weight:	D =	3646	lb	... = Dr + Ds + Df

Soil Strength

...FBC Tables 1806.2, 1819.6

Soil class:	4. Sand, silty sand, silty gravel		
Lateral bearing strength:	Plat =	150	psf/ft
Vertical bearing strength:	Pbrg =	2000	psf

Check Lateral Soil Bearing Pressures

(Empirical Method) ...FBC Sect 1807.3.2.1

Unconstrained (No rigid floor or pavement at ground surface)

Allowable lateral soil bearing pressure at 1/3 depth:

$$S_1 = 2 \cdot \text{Plat} \cdot (d + ds) / 3$$

$$S_1 = 325 \text{ psf}$$

Total applied lateral load: Ptot = 0.62 kips

Equiv ht of applied load: heq = 3.02 ft

$$A_s = 2.34 \cdot P_{\text{tot}} / (S_1 \cdot B)$$

$$A_s = 1.5 \text{ ft}$$

$$d_{\text{req}} = A_s / 2 \cdot [1 + \sqrt{1 + 4.36 \cdot \text{heq} / A_s}]$$

$$d_{\text{req}} = 3.09 \text{ ft}$$

$d_{\text{req}} < d$ **OK**

Hollow Structural Rectangular Tubing in Bending

Allowable Stress Design per 2016 AISC Spec for Structural Steel Buildings

Material Properties

 Yield Stress, A500 Grd B Steel:
 Modulus of Elasticity:

 $F_y = 46$ ksi
 $E = 29000$ ksi

 Safety Factor = **1.67** Per Section B3.4

Member Properties

 Flange: $b = 4$ in
 Flange Thickness: $t_f = 3/16" = 0.175"$
 Web: $d = 4$ in
 Web Thickness: $t_w = 3/16" = 0.175"$

 Moment of Inertia: $I_x = 6.5$ in⁴
 Section Modulus: $S = 3.3$ in³
 Deflection Limit: $Defl = L / 80$
 End Supports: **Cantilever**

 Design wind pressure: $P = 21.0$ psf
 Sign area: $A_1 = 29.7$ sq ft ... tributary area for each post (e.g. sign+post)
 Eccentricity of applied force: $e_1 = 3.0$ ft ... distance to area centroid (weighted avg h1,h2)
 Unbraced Length: $L_c = 3.0$ ft

Check for Limiting Width-Thickness Ratios

(Compact/Noncompact, per Table B4.1)

Flanges

 $b/t = 20.9 = (b-2*t_2)/t_1$
 $1.12*√(E/F_y) = 28.1$ Flange Compact Limit
 $1.40*√(E/F_y) = 35.2$ Flange NonCompact Limit

Flanges are compact

Webs

 $d/t = 20.9 = (d-2*t_1)/t_2$
 $2.42*√(E/F_y) = 60.8$ Web Compact Limit
 $5.70*√(E/F_y) = 143.1$ Web NonCompact Limit

Webs are compact

(1): Yielding Limit State

This criteria applies to all members, compact and noncompact

$$M_n = F_y * S$$

 $M_n = 150.4$ kip-in

$$M_{allow} = M_n / 1.67$$

 $M_{allow} = 90.0$ kip-in

Check Member Bending

 Allowable Moment: $M_n = 90.0$ kip-in Minimum of Mallow values above

 Moment in member: $M_{max} = P * A_1 * e_1$
 $M_{max} = 22.6$ kip-in

 $M_{max} < M_n \dots$ **OK**

Check Member Deflection:

 Allowable Deflection: $\Delta_{allow} = 0.45$ in $L / 80$

 Deflection in member: $\Delta_{max} = P * (A * e^3) / (3 * E * I)$
 $\Delta_{max} = 0.05$ in

 $\Delta_{max} < \Delta_{allow} \dots$ **OK**

Cast-in-Place Concrete Anchor Bolts

ACI 318-14, Appendix "D"

Required Strength:

Wind pressure: $W = 21.0$ psf
 Dead load: $D = 0$ lb
 ASCE 7-10, 2.3.2: $U = (1.2)D + (1.0)W$

Tributary area: $A = 29.7$ sqft
 Load eccentricity: $e = 3.0$ ft
 $M_u = 3.14$ kip-ft $\dots = [(1.2)D + (1.0)W] * A * e$

Anchor & Concrete Specs:

Anchor bolt size:	5/8"	da =	0.625	in	Concrete:	f'c =	2500	psi
Anchor material:	SAE Grade 2 / A307					nt =	11	threads/in
Embedment:	hef =	24	in		Edge distance:	ED =	14	in
Qty anchors in group:	Q =	2	anchors		Anchor group offset:	a =	8	in

Anchor Strength:

Tension: $U \leq 0.75 \phi N_n$

Steel: $\phi_s = 0.75$

Conc, no suppl reinf: $\phi_c = 0.70$

Steel Strength:

$$A_{se} = \pi/4 * (da - 0.9743/nt)^2$$

$$N_{sa} = A_{se} * f_{uta}$$

$$A_{se} = 0.23 \text{ in}^2$$

$$N_{sa} = 16.7 \text{ kips}$$

$$\phi_s * N_{sa} = 12.5 \text{ kips}$$

Concrete Breakout:

$$A_{nc} = [ED + s + 1.5 * hef] * [ED + 1.5 * hef]$$

$$A_{nc} = 9 * hef^2$$

$$A_{nc} = 2500 \text{ in}^2$$

$$A_{nc} = 5184 \text{ in}^2$$

$$N_b = k_c * \lambda * \sqrt{f'_c} * hef^{1.5}$$

Cracked Concrete: $\psi_c = 1.0$

$$N_b = 141.1 \text{ kips}$$

Cast-in anchors: $\psi_{cp} = 1.0$

$$\text{Limit} = 16 * \lambda * \sqrt{f'_c} * hef^{1.5} / (5/3) = 159.8 \text{ kips}$$

$$\psi_{ed} = 0.7 + 0.3 * ED / (1.5 * hef) \quad \psi_{ed} = 0.82$$

$$k_c = 24 \quad \dots \text{cast-in anchors}$$

No eccentricity between anchors: $\psi_{ec} = 1.0$

$$\lambda = 1.0 \quad \dots \text{normal weight concrete}$$

Concrete breakout strength:

$$N_{cb} = (A_{nc} / A_{co}) * \psi_c * \psi_{cp} * \psi_{ed} * \psi_{ec} * N_b$$

$$N_{cb} = 55.6 \text{ kips}$$

$$\phi_c * N_{cb} = 38.9 \text{ kips}$$

Concrete Pullout:

Hooked Bar / Stud:

Hook length: $eh = 6$ in

$$N_p = 0.9 * f'_c * eh * da$$

$$N_p = 8.4 \text{ kips}$$

Cracked Concrete: $\psi_{c,p} = 1.0$

Concrete pullout strength:

$$N_{pn} = \psi_{c,p} * N_p$$

$$N_{pn} = 8.4 \text{ kips}$$

$$\phi_c * N_{pn} = 5.9 \text{ kips}$$

Concrete Blowout:

Hooked Bar / Stud:

$N_{sb} = N/A$ (No headed stud)

Concrete blowout strength:

$N_{sb} = N/A$

$$\phi_c * N_{sb} = N/A$$

Critical Anchor Strength:

$$\phi N_n = \min(\phi_s * N_{sa}, \phi_c * N_{cb}, \phi_c * N_{pn}, \phi_c * N_{sb})$$

$$\phi N_n = 5.9 \text{ kips}$$

$$\phi M_n = Q * \phi N_n * a$$

$$\phi M_n = 7.9 \text{ kip-ft}$$

$$M_u \leq 0.75 \phi M_n$$

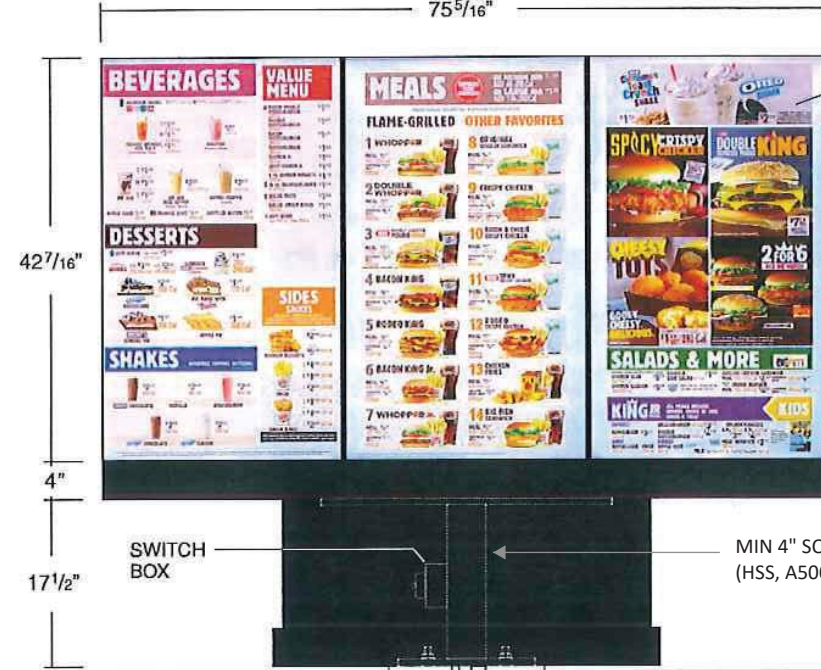
$$3.14 \text{ kip-ft} < 5.9 \text{ kip-ft}$$

OK



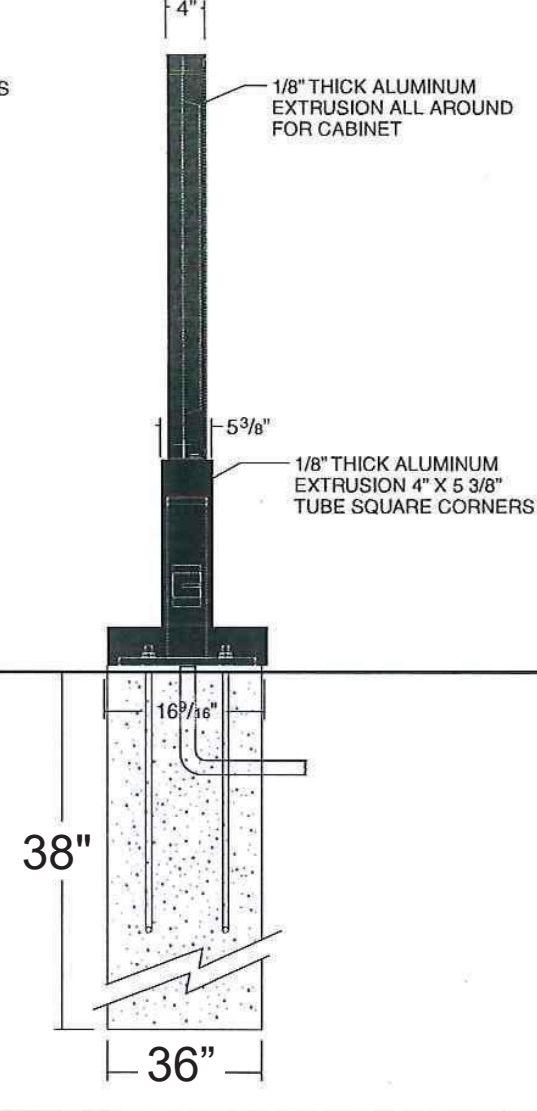
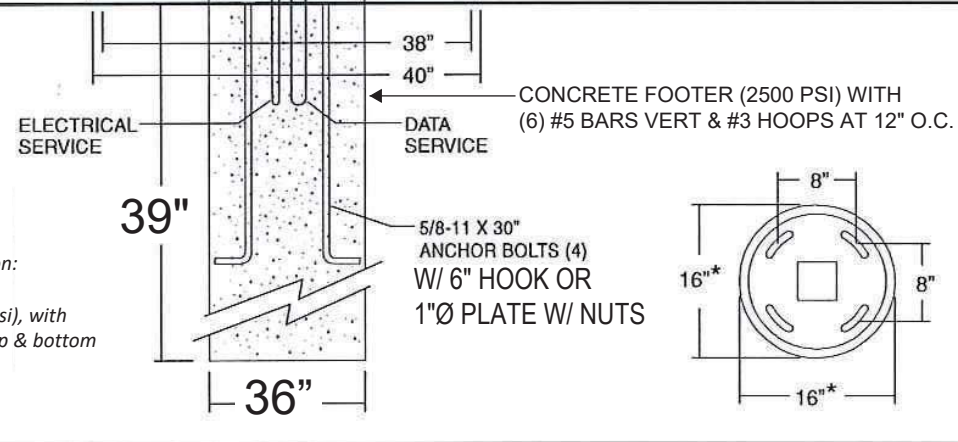
TAMPER RESISTANT
SECURITY MACHINE
SCREWS TO HOLD BACKS
TO CABINET

ROTATION 15° LEFT TO RIGHT



* Unit can be installed on existing foundation and anchor bolts, and if preferred can utilize the existing mounting steel base. (This would require the data cables to be routed outside of the existing mounting steel.)

Alt Shallow Footer Option:
3'-3" Sq x 2'-0" deep
Concrete Footer (2500 psi), with
(3) #5 bars each way, top & bottom



Drawing Type Art Creative

Customer Burger King COLUMBIA COUNTY, FL

Project Description 1X3 Digital Drive-Thru

Drawn By: DL

Proj. Man.:

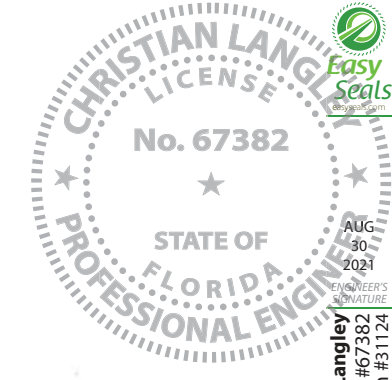
Date: 04/20/18

Proj. No.:

Note:



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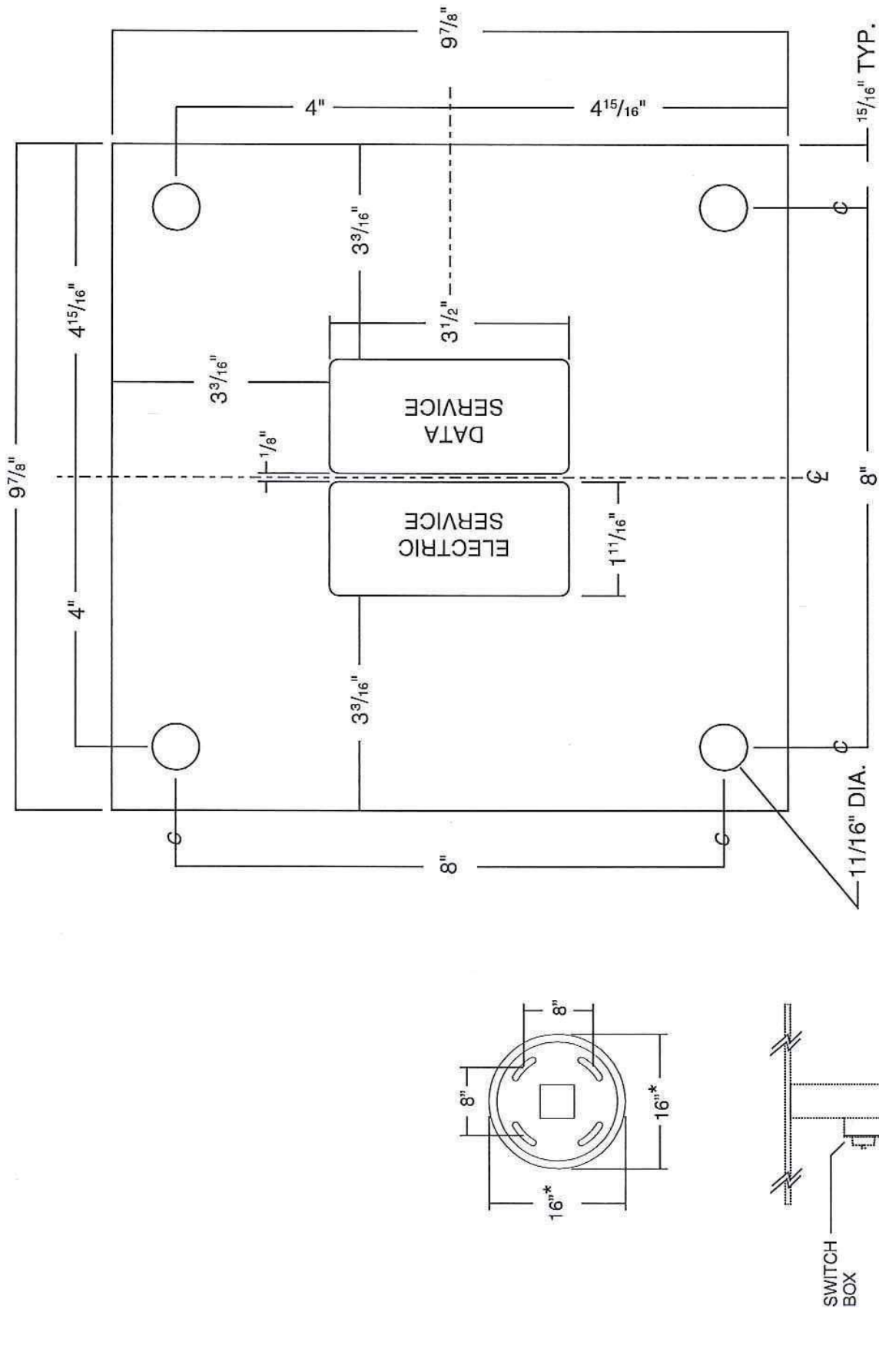
Christian Langley
Florida PE #67382
Cert of Auth #31124

1200 N Federal Hwy, #200
Boca Raton, FL 33432
1-888-371-3113

ASCE 7-16 • V=120 mph • Risk Category 1 Struct. • Sign Height = 15 ft max • Solid freestanding sign at grade: ± 21.0 psf
WIND LOADS: • Exposure 'C' • ASD Load Coeff = 0.6 • C_f=1.55 (w/h ratio ≥ 1/2) • C_f=0.85, G=0.85

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Digital Drive Thru & Pre Sell Anchor Bolt Template



(Anchor Bolt Size: 5/8" - 11 x 30")

This is a suggested plan. Local requirements may exceed this design. The contractor is responsible to verify this plan.

***NOTE: These are approximate foundation measurements. The soil bearing capacity at the erection site must be considered when designing the foundation. The sign manufacturer is not able to predetermine the specific needs of each location. Consult a local engineer for design specifications.**

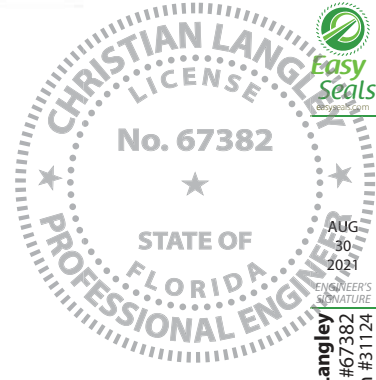
Drawing Type Installation
Customer Burger King COLUMBIA COUNTY, FL
Project Description DTPS Anchor Bolt Template

Drawn By:
Proj. Man.:
Date: 07/09/18
Page: 1



INSTR. SHEET (DTPS Anchor Bolt Template) 1/10/2018 Due To: 1/10/2018 DTPS Anchor Bolt Template

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DESIGN CALCULATIONS

FOR

BURGER KING **Order Canopy** Columbia County, FL

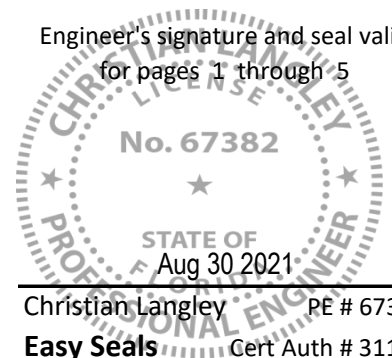
GENERAL NOTES:

1. Design is in accordance with the Florida Building Code 7th Edition (2020) for use within and outside the High Velocity Hurricane Zone (HVHZ).
2. Wind loads have been calculated per the requirements of ASCE 7-16 as shown herein, except where noted otherwise.
3. These engineering calculations pertain only to the structural integrity of those systems, components, and/or other construction explicitly specified herein and/or in accompanying engineering drawings. The existing host structure (if any) is assumed to be in good condition, capable of supporting the loaded system, subject to building department approval. No warranty, either expressed or implied, is contained herein.
4. System components shall be as noted herein. All references to named components and installation shall conform to manufacturer's or industry specifications as summarized herein.
5. Where site conditions deviate from those noted herein, revisions may be required or a separate site-specific engineering evaluation performed.
6. Aluminum components in contact with steel or embedded in concrete shall be protected as prescribed in the 2015 Aluminum Design Manual, Part 1-A. Steel components in contact with, but not encased in, concrete shall be coated, painted, or otherwise protected against corrosion.
7. Engineer seal affixed hereto validates structural design as shown only. Use of this specification by contractor, et. Al, indemnifies and saves harmless this engineer for all costs & damages including legal fees & appellate fees resulting from deviation from this design.

Index:

Pg 1	Cover
Pg 2	Wind Loads
Pg 3	Footing Design
Pg 4	Primary Support(s)
Pg 5	Concrete Bolts

Engineer's signature and seal valid
for pages 1 through 5



Christian Langley PE # 67382
Easy Seals Cert Auth # 31124

ASCE 7-16 Design Wind Loads

FREESTANDING SOLID SIGNS AND WALLS (AT GRADE)

Building Specs

V = 120 mph *Basic wind speed*
 Exposure C

Risk Category 1 Structure
 ASD Load Combo Coeff: 0.6

Calculations

$\alpha = 9.5$ *3-sec gust speed power law exponent*
 $z_g = 900'$ *Nominal ht. of atmos. boundary layer*
 $G = 0.85$

Kd = 0.85 *Directionality factor*
 Kzt = 1.0 *Topographic factor*
 Ke = 1.0 *Ground elevation factor*
 Cf = 1.55 *Force Coefficient*
...Width / Height ratio ≥ 0.5

120 mph - Exp "C"

Monuments at grade

W/Ht Ratio ≤ 0.5

SIGN HEIGHT	DESIGN WIND PRESSURES	$K_h = K_z$	q_z
15 ft	± 21.0 psf	0.85	16.0
18 ft	± 21.8 psf	0.88	16.6
20 ft	± 22.3 psf	0.90	17.0
30 ft	± 24.3 psf	0.98	18.5
35 ft	± 25.1 psf	1.01	19.1
40 ft	± 25.8 psf	1.04	19.6
45 ft	± 26.5 psf	1.07	20.1
50 ft	± 27.1 psf	1.09	20.6
55 ft	± 27.6 psf	1.12	21.0
60 ft	± 28.2 psf	1.14	21.4
70 ft	± 29.1 psf	1.17	22.1
80 ft	± 29.9 psf	1.21	22.7
90 ft	± 30.7 psf	1.24	23.3
100 ft	± 31.3 psf	1.27	23.8
110 ft	± 32.0 psf	1.29	24.3
120 ft	± 32.6 psf	1.32	24.7
130 ft	± 33.1 psf	1.34	25.1
140 ft	± 33.7 psf	1.36	25.5
150 ft	± 34.1 psf	1.38	25.9
175 ft	± 35.3 psf	1.42	26.8
200 ft	± 36.3 psf	1.46	27.5
250 ft	± 38.0 psf	1.53	28.9

Footing Design for Freestanding Signs and Flagpoles

Structure Dimensions & Loading

Design wind pressure:	P =	21.0	psf	
Overturning Safety Factor:	Ω =	1.5		... FBC 1807.2.3
Sign area 1:	A1 =	42.0	sq ft	... tributary area 1 for each footer (e.g. sign)
Height of applied force above grade:	h1 =	2.5	ft	... height of area 1 centroid
Sign area 2:	A2 =	24.8	sq ft	... tributary area 2 for each footer (e.g. post)
Height of applied force above grade:	h2 =	4.4	ft	... height of area 2 centroid
Overturning Moment:		$M_n = P \cdot (A1 \cdot h1 + A2 \cdot h2)$		
		Mn =	4.5	kip-ft

Round	Footing Diameter:	B =	3	ft	
	Footing depth:	d =	4.5	ft	Soil cover: ds = 0 ft
	Superstructure weight:	Dr =	200	lb	
	Soil cover weight:	Ds =	0	lb	... = $100pcf \cdot \pi \cdot B^2 / 4 \cdot ds$
	Footing weight:	Df =	4771	lb	... = $150pcf \cdot \pi \cdot B^2 / 4 \cdot d$
	Total weight:	D =	4971	lb	... = Dr + Ds + Df

Soil Strength

...FBC Tables 1806.2, 1819.6

Soil class:	4. Sand, silty sand, silty gravel		
Lateral bearing strength:	Plat =	150	psf/ft
Vertical bearing strength:	Pbrg =	2000	psf

Check Lateral Soil Bearing Pressures

(Empirical Method) ...FBC Sect 1807.3.2.1

Unconstrained (No rigid floor or pavement at ground surface)

Allowable lateral soil bearing pressure at 1/3 depth:

$$S1 = 2 \cdot Plat \cdot (d + ds) / 3$$

$$S1 = 450 \text{ psf}$$

Total applied lateral load: Ptot = 1.40 kips

Equiv ht of applied load: heq = 3.20 ft

$$As = 2.34 \cdot Ptot / (S1 \cdot B)$$

$$As = 2.4 \text{ ft}$$

$$dreq = As / 2 \cdot [1 + \sqrt{1 + 4.36 \cdot heq / As}]$$

$$dreq = 4.37 \text{ ft}$$

dreq < d **OK**

Hollow Structural Pipe in Bending

Allowable Stress Design per 2016 AISC Spec for Structural Steel Buildings

Material Properties

Yield Stress, A53 Grd B Steel:	$F_y =$	35	ksi	Safety Factor =	1.67	Per Section B3.4
Modulus of Elasticity:	$E =$	29000	ksi			

End Supports: Cantilever

Member Properties

ANSI 4" Schedule 40 steel pipe

Nominal size:	4" diam	-	Sch 40			
Outside Diameter	$d =$	4.5	in	Moment of Inertia:	$I_x =$	7.2 in ⁴
Wall Thickness	$t =$	0.237	in	Section Modulus:	$S =$	3.21 in ³
				Deflection Limit:	Defl =	L / 80

Design wind pressure:	$P =$	21.0	psf		
Sign area:	$A_1 =$	66.8	sq ft	...	tributary area for each post (e.g. sign+post)
Eccentricity of applied force:	$e_1 =$	3.2	ft	...	distance to area centroid (weighted avg h1,h2)

(1): Yielding Limit State

$M_n = F_y \cdot S$	Allowable Moment:	$M_{allow} = M_n / 1.67$
$M_n = 112.5$ kip-in		$M_{allow} = 67.4$ kip-in

Check Member Bending

Moment in member:	$M_{max} = P \cdot A_1 \cdot e_1$		
	$M_{max} = 53.8$ kip-in	$M_{max} < M_{allow} \dots$	OK

Check Member Deflection:

Allowable Deflection:	$\Delta_{allow} =$	0.48	in	L / 80	
Deflection in member:	$\Delta_{max} = P \cdot (A \cdot e^3) / (3 \cdot E \cdot I)$				
	$\Delta_{max} = 0.13$ in	$\Delta_{max} < \Delta_{allow} \dots$			OK

Cast-in-Place Concrete Anchor Bolts

ACI 318-14, Appendix "D"

Required Strength:

Wind pressure: $W = 21.0$ psf
 Dead load: $D = 0$ lb
 ASCE 7-10, 2.3.2: $U = (1.2)D + (1.0)W$

Tributary area: $A = 66.8$ sqft
 Load eccentricity: $e = 3.2$ ft
 $M_u = 7.48$ kip-ft $\dots = [(1.2)D + (1.0)W] * A * e$

Anchor & Concrete Specs:

Anchor bolt size: $3/4"$ $d_a = 0.75$ in
 Anchor material: SAE Grade 2 / A307
 Embedment: $h_{ef} = 40$ in
 Qty anchors in group: $Q = 2$ anchors
 Concrete: $f'_c = 2500$ psi
 $n_t = 10$ threads/in
 $f_{uta} = 74$ ksi
 Edge distance: $ED = 14.125$ in
 Anchor group offset: $a = 7.75$ in

Anchor Strength:

Tension: $U \leq 0.75 \phi N_n$

Steel: $\phi_s = 0.75$

Conc, no suppl reinf: $\phi_c = 0.70$

Steel Strength:

$A_{se} = \pi/4 * (d_a - 0.9743/n_t)^2$

$N_{sa} = A_{se} * f_{uta}$

$A_{se} = 0.33$ in²

$N_{sa} = 24.8$ kips

$\phi_s * N_{sa} = 18.6$ kips

Concrete Breakout:

$A_{nc} = [ED + s + 1.5 * h_{ef}] * [ED + 1.5 * h_{ef}]$

$A_{nc} = 9 * h_{ef}^2$

$A_{nc} = 5495$ in²

$A_{nc} = 14400$ in²

$N_b = k_c * \lambda * \sqrt{f'_c} * h_{ef}^{1.5}$

Cracked Concrete: $\psi_c = 1.0$

$N_b = 303.6$ kips

Cast-in anchors: $\psi_{cp} = 1.0$

$k_c = 24$... cast-in anchors

$\psi_{ed} = 0.7 + 0.3 * ED / (1.5 * h_{ef})$ $\psi_{ed} = 0.77$

$\lambda = 1.0$... normal weight concrete

No eccentricity between anchors: $\psi_{ec} = 1.0$

Concrete breakout strength:

$N_{cb} = (A_{nc} / A_{co}) * \psi_c * \psi_{cp} * \psi_{ed} * \psi_{ec} * N_b$

$N_{cb} = 89.3$ kips

$\phi_c * N_{cb} = 62.5$ kips

Concrete Pullout:

Headed Stud / Bolt:

Head diameter: $d_h = 1.5$ in

$N_p = 8 * A_{brg} * f'_c$

$A_{brg} = 1.8$ in²

$N_p = 35.3$ kips

Cracked Concrete: $\psi_{c,p} = 1.0$

Concrete pullout strength:

$N_{pn} = \psi_{c,p} * N_p$

$N_{pn} = 35.3$ kips

$\phi_c * N_{pn} = 24.7$ kips

Concrete Blowout:

Headed Stud / Bolt:

$N_{sb} = 160 * ED * A_{brg} * \lambda * \sqrt{f'_c}$

Concrete blowout strength:

$N_{sb} = 150.2$ kips

$\phi_c * N_{sb} = 105.2$ kips

Critical Anchor Strength:

$\phi N_n = \min(\phi_s * N_{sa}, \phi_c * N_{cb}, \phi_c * N_{pn}, \phi_c * N_{sb})$

$\phi N_n = 18.6$ kips

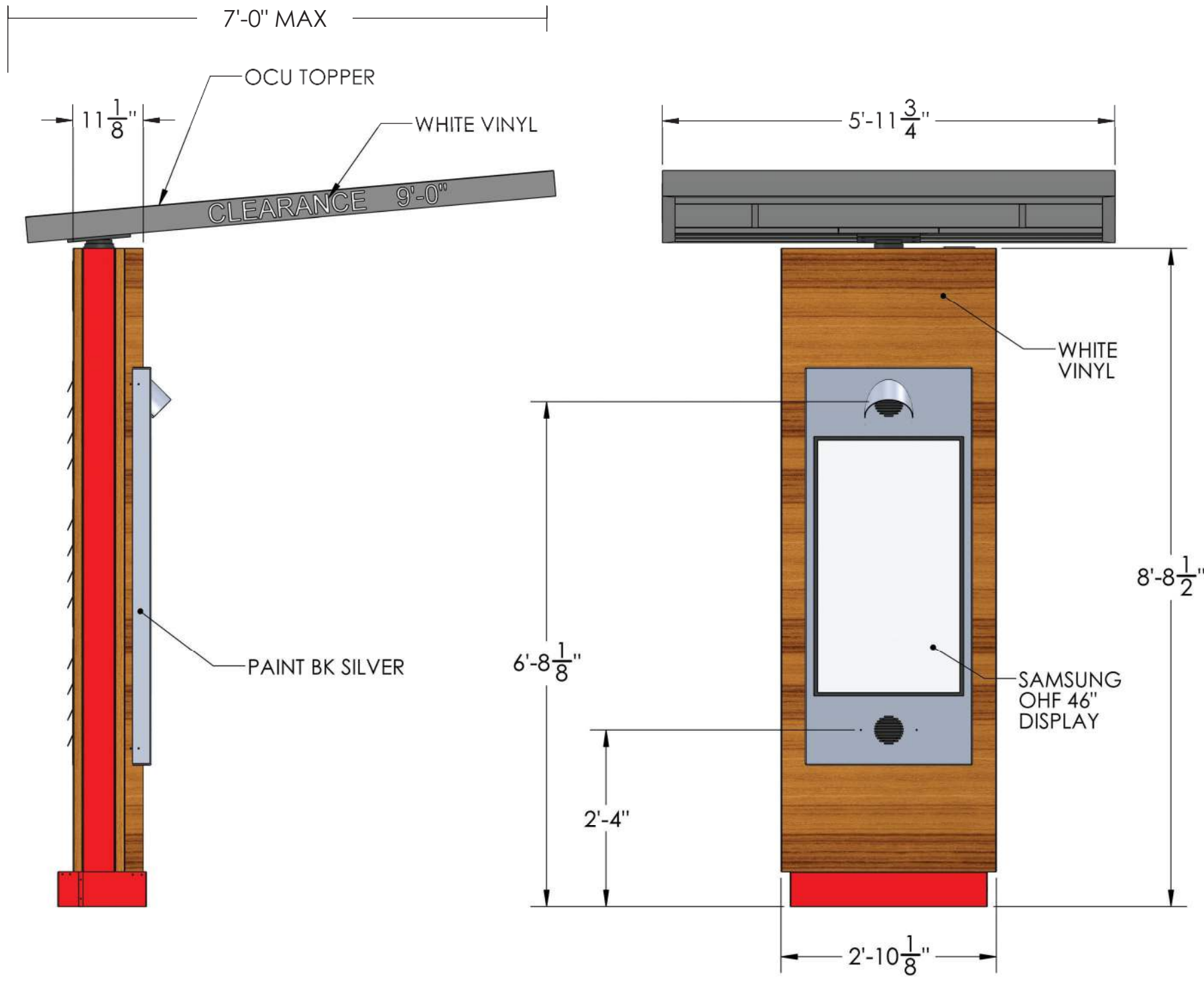
$\phi M_n = Q * \phi N_n * a$

$\phi M_n = 24.0$ kip-ft

$M_u \leq 0.75 \phi M_n$

7.48 kip-ft < 18.0 kip-ft

OK



ELECTRICAL NOTE-ACTUAL # OF CIRCUITS TO BE DETERMINED BY A LICENSED ELECTRICAL CONTRACTOR.

TOTAL AMPS: 0.3

OF CKTS: 1 @ 20 AMP (RECOMMENDED)

VOLTS: 120

ELECTRICAL CONNECTION AS FOLLOWS:

GREEN TO GREEN (GROUND), WHITE TO WHITE (NEUTRAL), BLACK TO BLACK (POWER)

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

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

ALL SIGNAGE WILL BE (U.L.) LISTED, (U.L.) 2161 COMPLIANT AND CARRY (U.L) LABELS



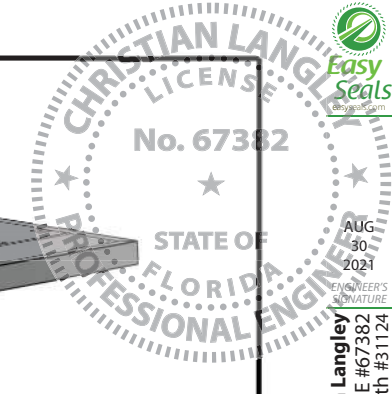
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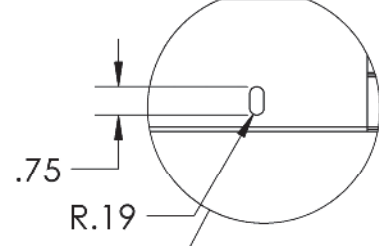
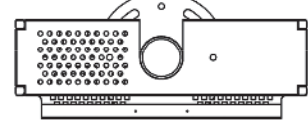
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DRAWN BY: STEVE BERTRAND		PAGE NUMBER: 1 OF 7



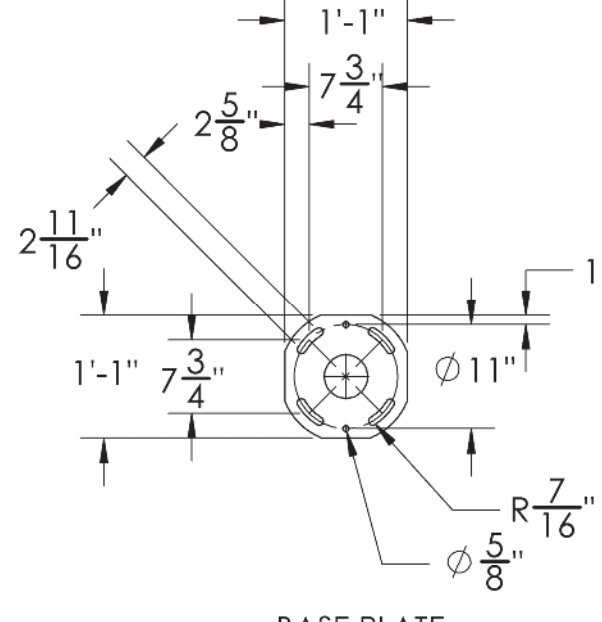
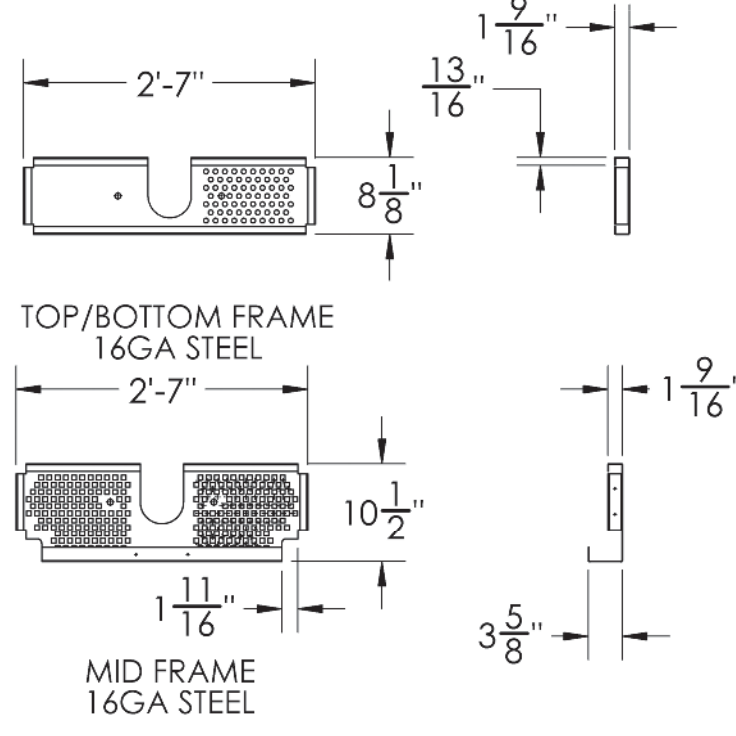
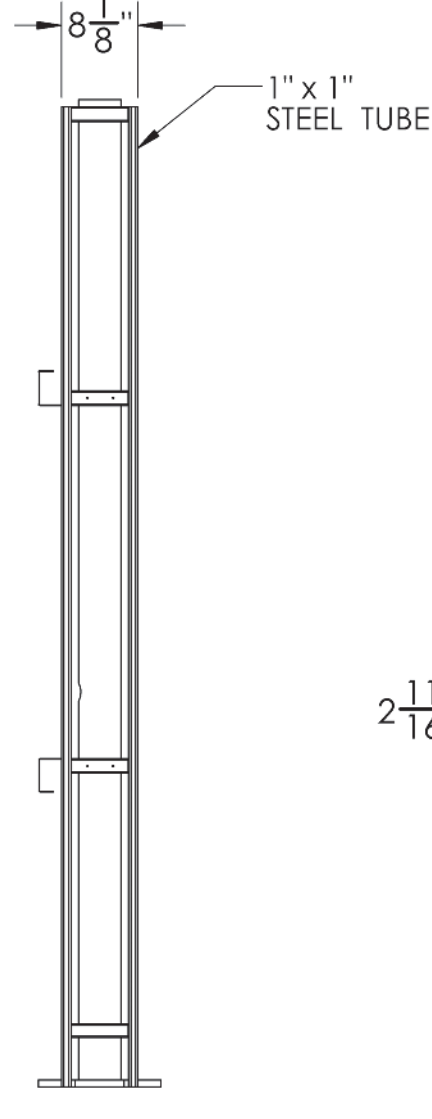
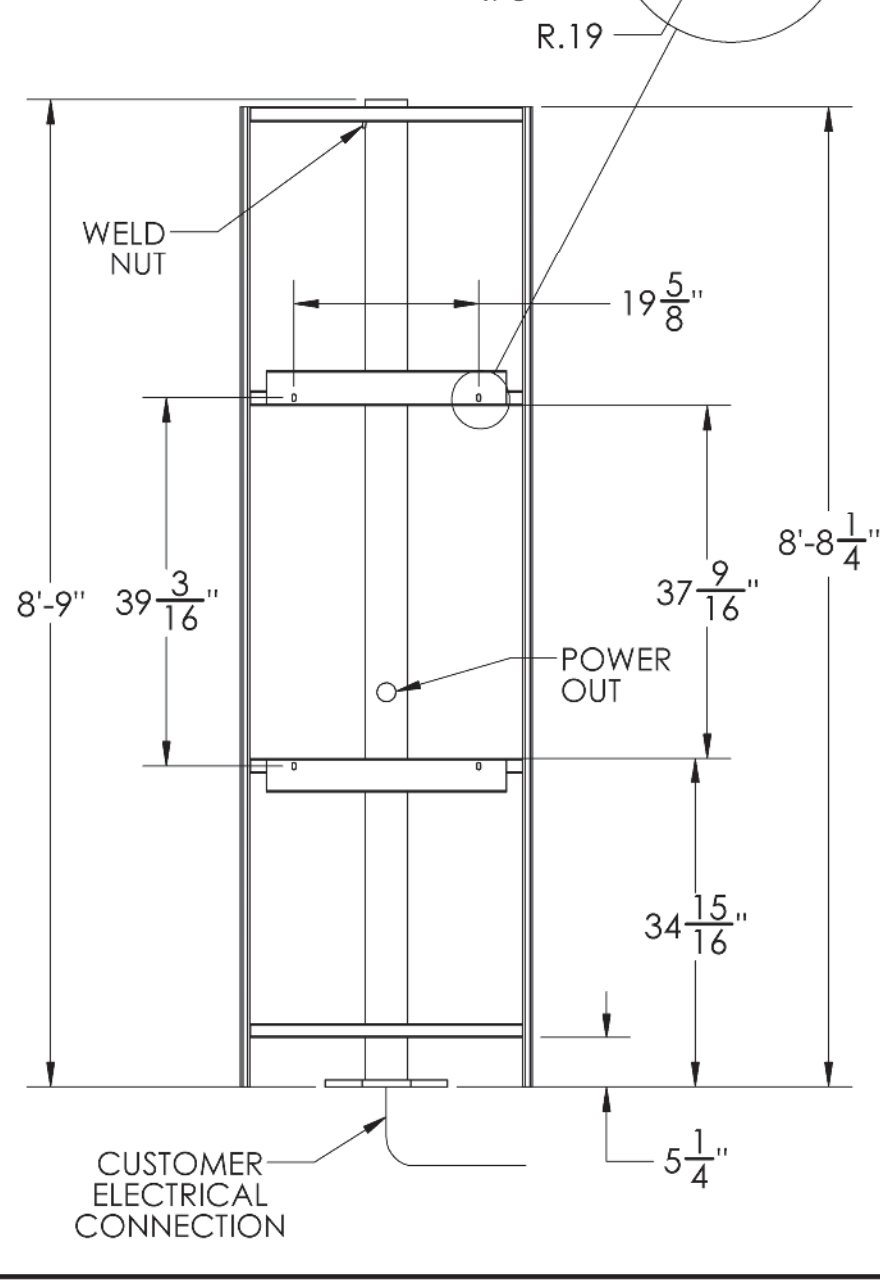
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Easy Seals

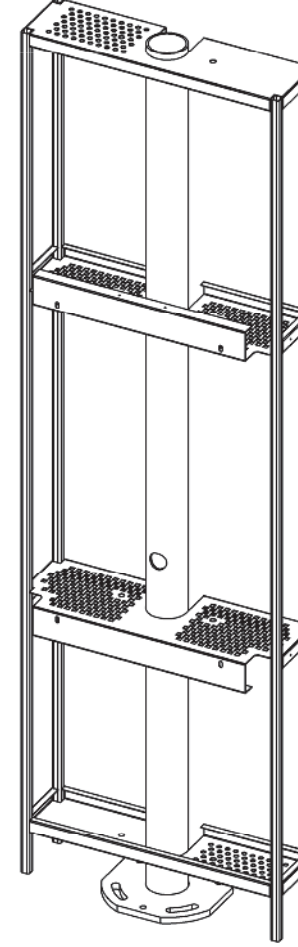


DETAIL C

SCALE 1 : 5



BASE PLATE
3/4" STEEL



MATERIALS:(TOTAL)

11	SQFT	SS0008	5' X 10' X 16GA STEEL SHEET
2	SQFT	SPL0013	.75 STEEL SHEET
9	LFT	SP0001	4" X .237 STEEL PIPE
35	LFT	ST0009	1 X 1 X 16GA STEEL TUBE



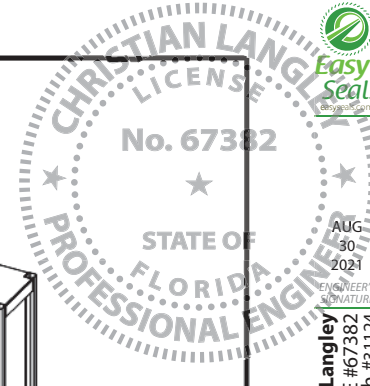
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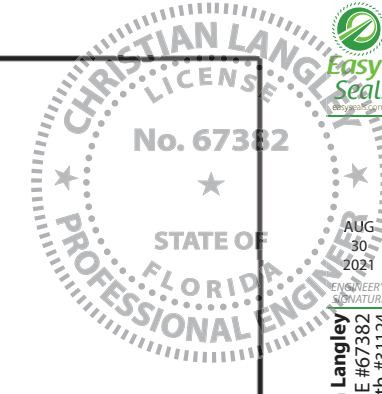
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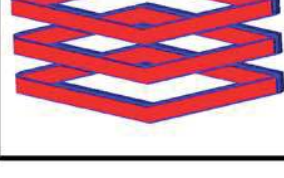
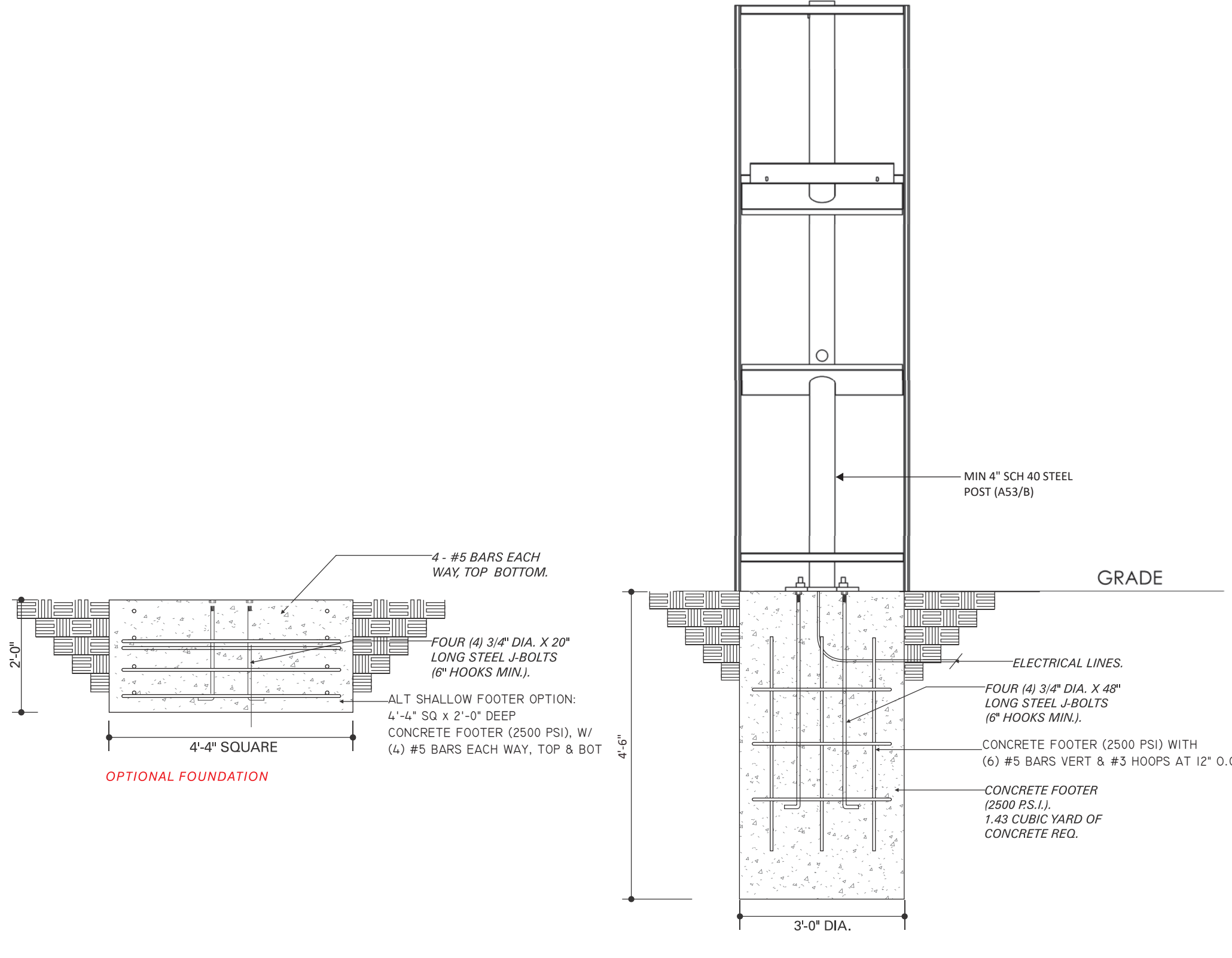
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ASCE 7-16 • V=120 mph
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 • Kzt=1.0, Kd=0.85, G=0.85
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 • Cf=1.55 (w/h ratio ≥ 1/2) ± **21.0 psf**



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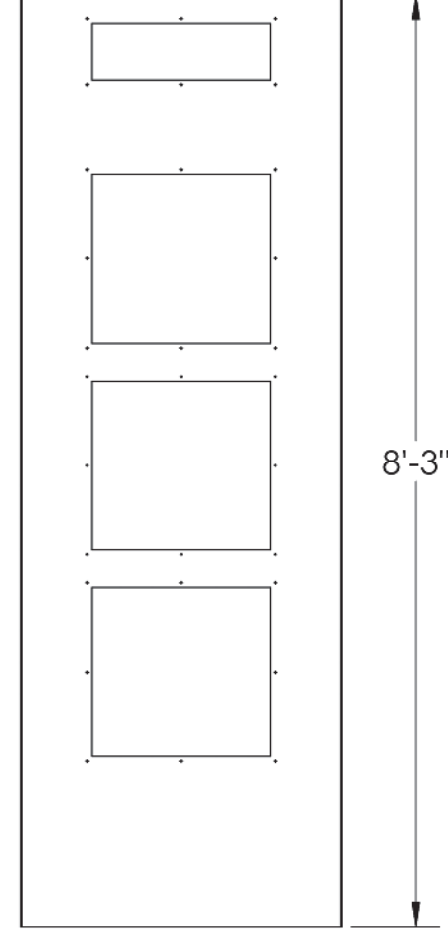
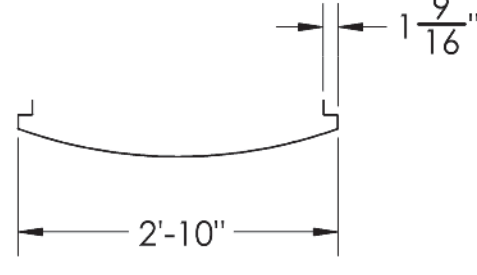
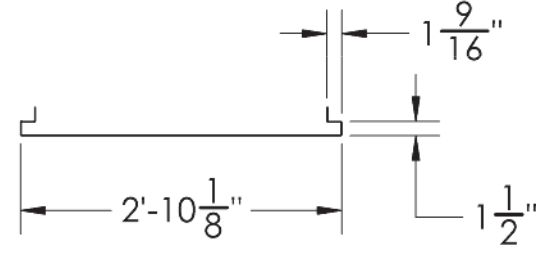


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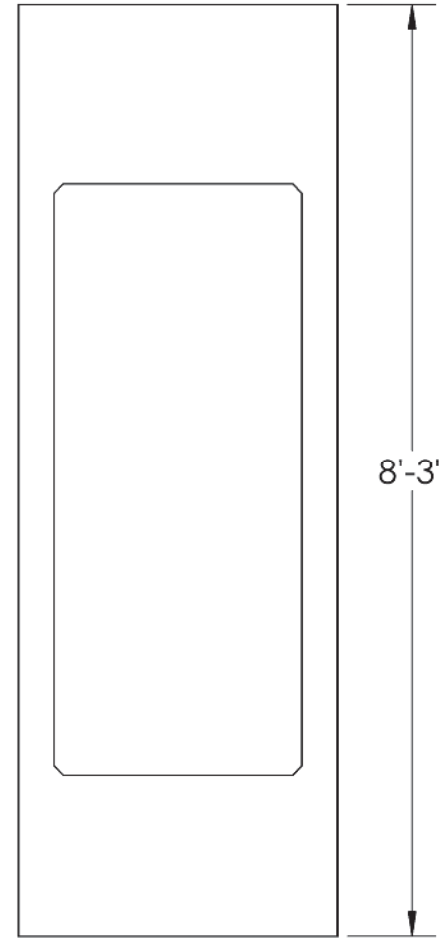
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DRAWN BY: STEVE BERTRAND		PAGE NUMBER: 3 OF 7

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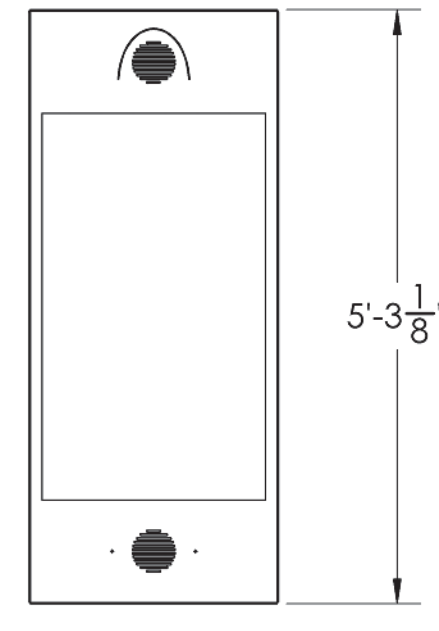
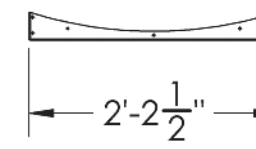


BACK PANEL
.063 ALUM
WOODGRAIN



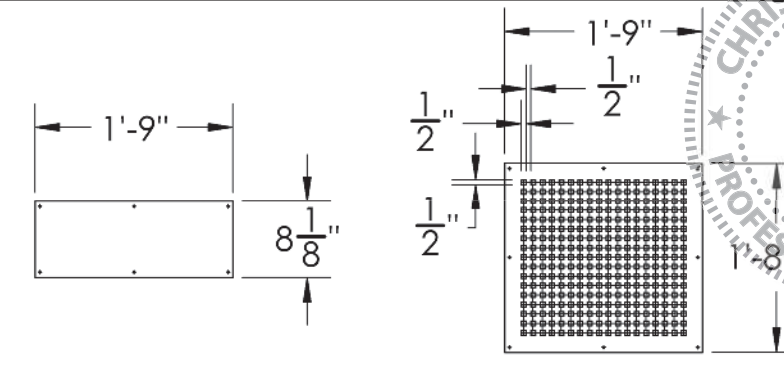
FRONT PANEL
.063 ALUM
WOODGRAIN

EYEBROW
.063 ALUM
PAINT BK SILVER



DISPLAY FRAME
.090 ALUM
PAINT BK SILVER

TOP ACCESS PANEL
.063 ALUM
WOODGRAIN



BACK ACCESS PANEL
.063 ALUM
WOODGRAIN



OPTIONAL
46IN EQUIVALENT
SNAP SCREEN

MATERIALS (TOTAL)			
51	SQFT	AS0021	5' X 10' X .063 ALUM SHEET
8	SQFT	AS0027	5' X 12' X .090 ALUM SHEET

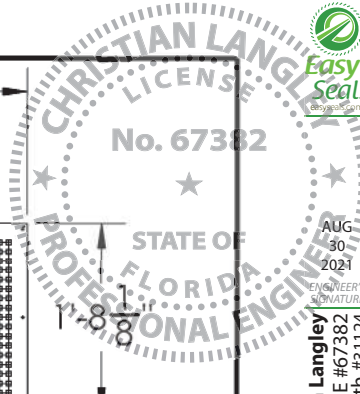


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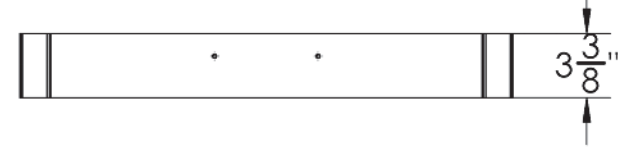
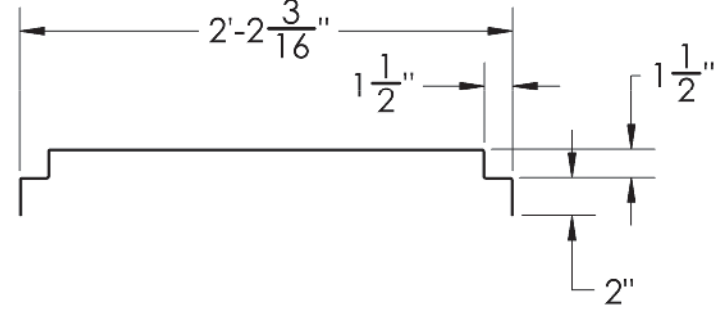
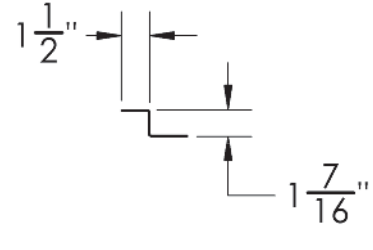
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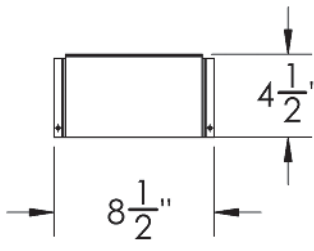


ASCE 7-16 • V=120 mph • Sign Height = 15 ft max • Risk Category 1 Struct. • Exposure 'C' • ASD Load Coeff = 0.6 • WIND LOADS: Solid freestanding sign at grade: • Cf=1.55 (w/h ratio ≥ 1/2) ± 21.0 psf

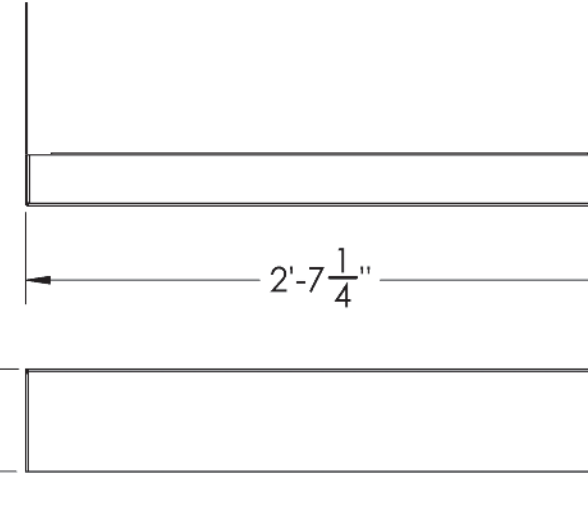
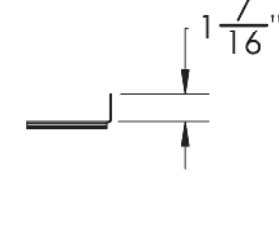
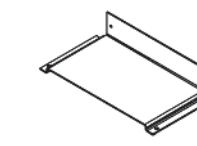
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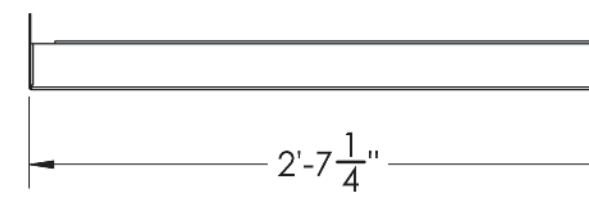
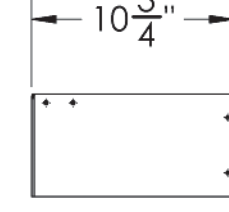
TOP COVER SUPPORT
.063 ALUM
QTY 2



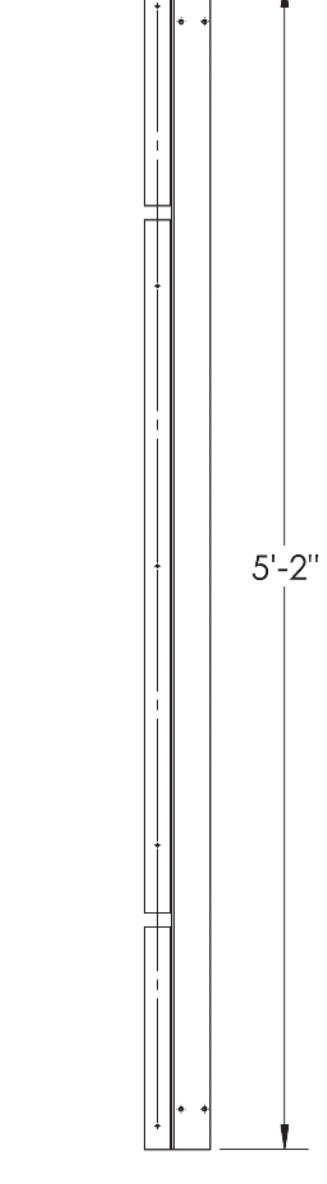
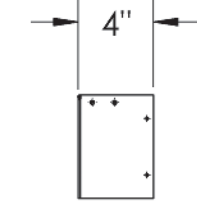
SPEAKER MOUNT
.063 ALUM
QTY 2



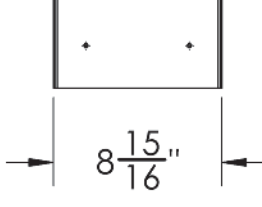
BOLT COVER FRONT
.063 ALUM
PAINT BK RED



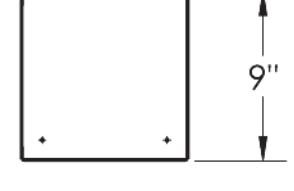
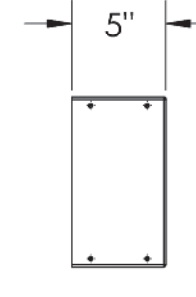
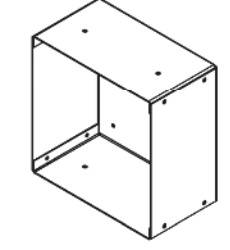
BOLT COVER BACK
.063 ALUM
PAINT BK RED



SIDE COVER SUPPORT
.063 ALUM
QTY 2
BEND ONE OPPOSITE



SPEAKER BOX
.063 ALUM
QTY 2



MATERIALS:(TOTAL)			
16	SQFT	AS0021	5' X 10' X .063 ALUM SHEET

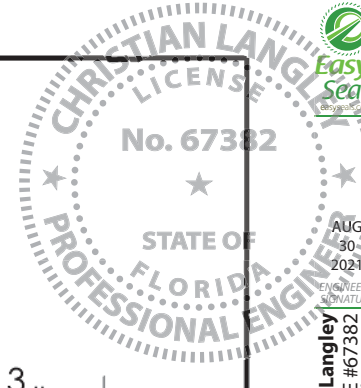


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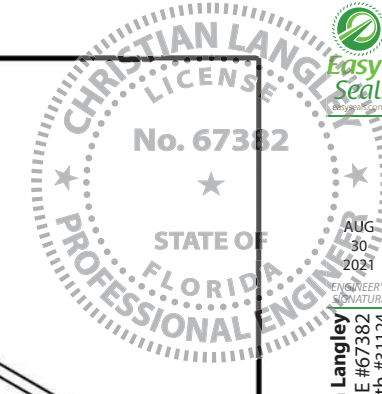
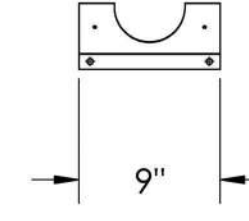
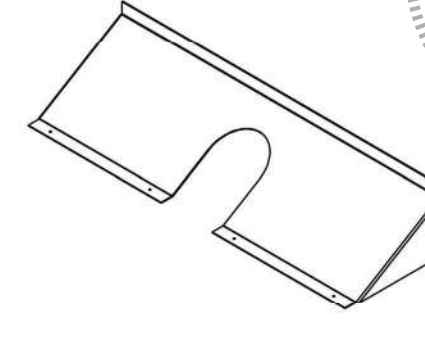
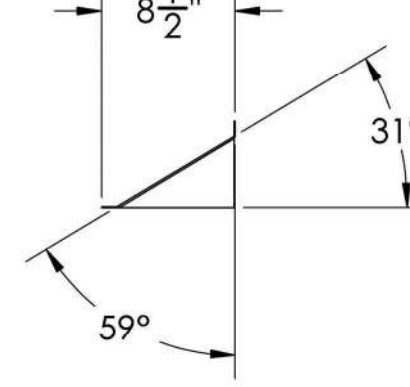
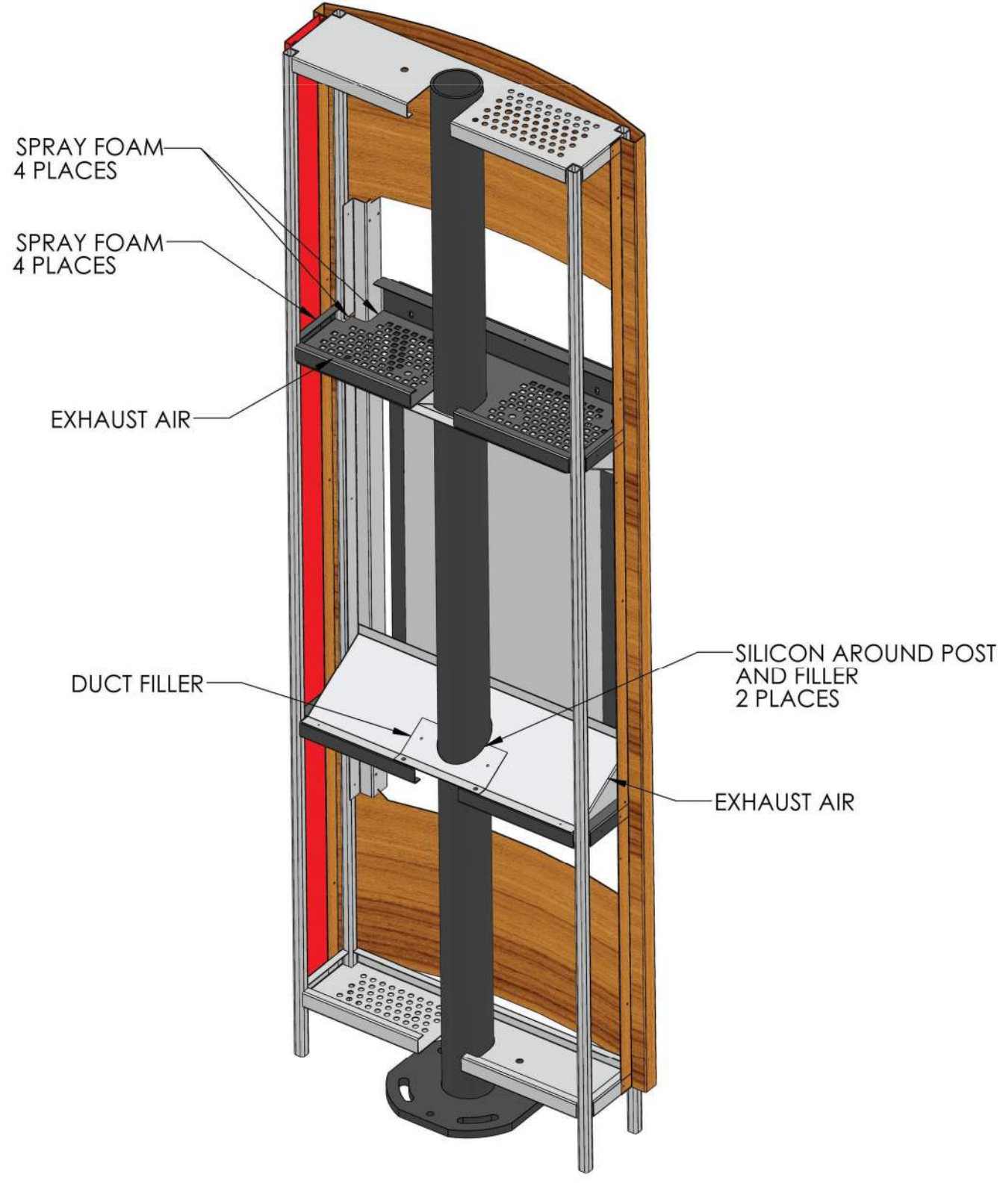
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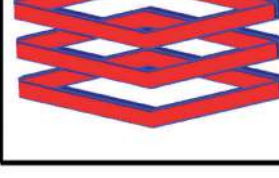


ASCE 7-16 • V=120 mph • Risk Category 1 Struct. • Sign Height = 15 ft max • Solid freestanding sign at grade: • Exposure 'C' • ASD Load Coeff = 0.6 • C_f=1.55 (w/h ratio ≥ 1/2) ± 21.0 psf • WIND LOADS: • C_f=1.55 (w/h ratio ≥ 1/2) ± 21.0 psf

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ASCE 7-16 • V=120 mph • Exposure 'C' • Risk Category 1 Struct. • Sign Height = 15 ft max • Solid freestanding sign at grade: ± 21.0 psf
 WIND LOADS: • ASD Load Coeff = 0.6 • Kzt=1.0, Kd=0.85, G=0.85 • Cf=1.55 (w/h ratio ≥ 1/2)



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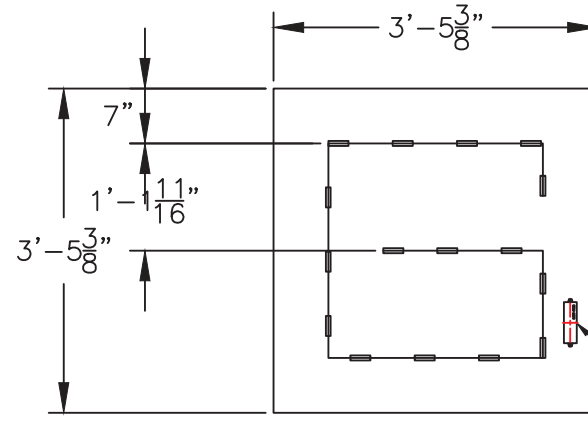
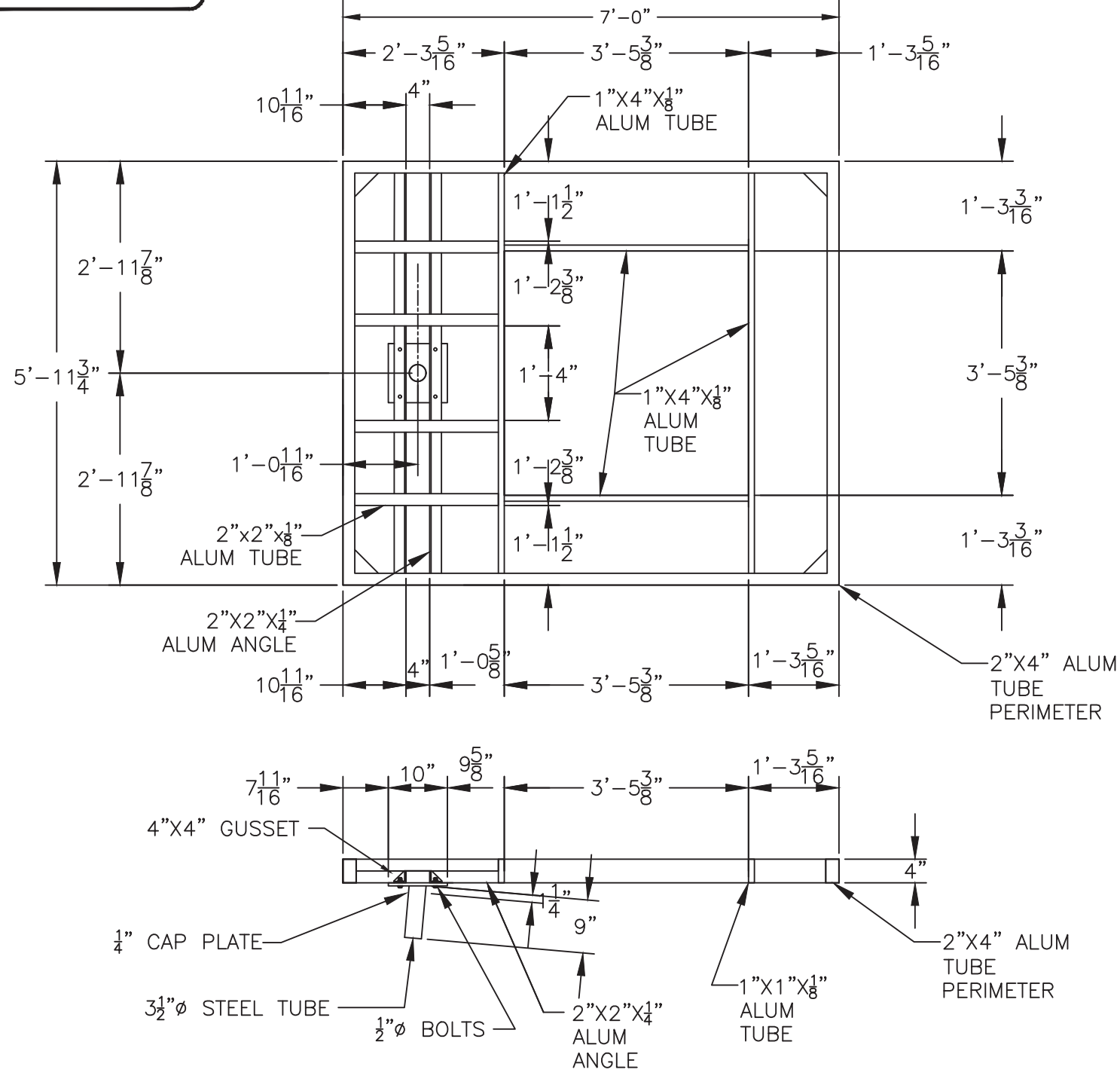


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S-10.2 Drive Thru OCU

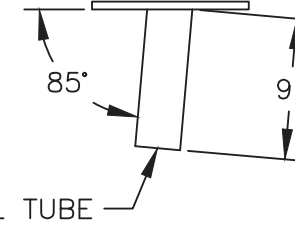
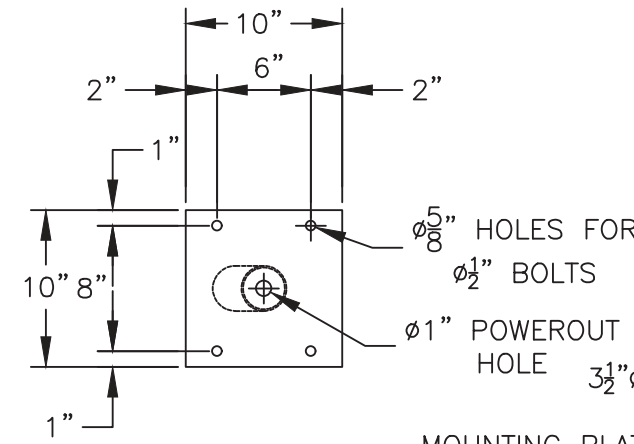
Swing Away/Manual Return

Canopy Arm

Revised 05/16/2018

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LIGHT BOX LED LAYOUT
WHITE 24V GE TETRA MAX: 11 FT
GEPS24-25 POWER SUPPLY: 1 QTY



FRAME MATERIAL LIST:			
26	LFT	ARECT0009	2"X4"X1/8" ALUM TUBE
3	LFT	SA0004	1"X1"X1/8" STEEL ANGLE
10	LFT	AA0017	2"X2"X1/4" ALUM ANGLE
84	SQFT	AS0017	.063 ALUM SHEET
1	SQFT	SPL0012	1/2" STEEL PLATE
2	SQFT	SPL0011	1/4" STEEL PLATE
2	LFT	SP0007	3 1/2" Ø STEEL PIPE
20	LFT	ARECT0004	1"X4"X1/8" ALUM TUBE

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Project Information

BURGER KING COLUMBIA COUNTY, FL
Custom Exterior Signage Systems
File Burger King Design Doc RFP #1 Design -- Date, 12/8/2011

Client Review Status

Burger King requires that an "Approved" drawing be obtained from the client prior to any production release or production release revision.

☐ Approved
☐ Revise & Resubmit

Name	Date

DESIGN CALCULATIONS

FOR

BURGER KING **FREESTANDING MONUMENT** 13721 US Hwy 441 – Lake City

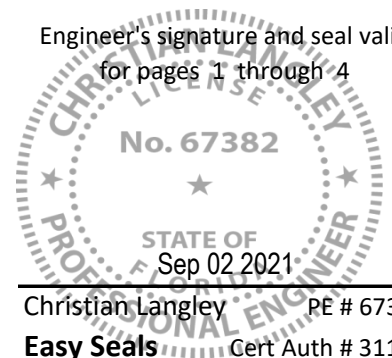
GENERAL NOTES:

1. Design is in accordance with the Florida Building Code 7th Edition (2020) for use within and outside the High Velocity Hurricane Zone (HVHZ).
2. Wind loads have been calculated per the requirements of ASCE 7-16 as shown herein, except where noted otherwise.
3. These engineering calculations pertain only to the structural integrity of those systems, components, and/or other construction explicitly specified herein and/or in accompanying engineering drawings. The existing host structure (if any) is assumed to be in good condition, capable of supporting the loaded system, subject to building department approval. No warranty, either expressed or implied, is contained herein.
4. System components shall be as noted herein. All references to named components and installation shall conform to manufacturer's or industry specifications as summarized herein.
5. Where site conditions deviate from those noted herein, revisions may be required or a separate site-specific engineering evaluation performed.
6. Aluminum components in contact with steel or embedded in concrete shall be protected as prescribed in the 2015 Aluminum Design Manual, Part 1-A. Steel components in contact with, but not encased in, concrete shall be coated, painted, or otherwise protected against corrosion.
7. Engineer seal affixed hereto validates structural design as shown only. Use of this specification by contractor, et. Al, indemnifies and saves harmless this engineer for all costs & damages including legal fees & appellate fees resulting from deviation from this design.

Index:

Pg 1	Cover
Pg 2	Wind Loads
Pg 3	Footing Design
Pg 4	Primary Support(s)

Engineer's signature and seal valid
for pages 1 through 4



Christian Langley PE # 67382
Easy Seals Cert Auth # 31124

ASCE 7-16 Design Wind Loads

FREESTANDING SOLID SIGNS (ELEVATED)

Building Specs

V = 120 mph *Basic wind speed (Vult)*
 Exposure C

Risk Category 1 Structure
 ASD Load Combo Coeff: 0.6

Calculations

$\alpha = 9.5$ *3-sec gust speed power law exponent*
 $z_g = 900'$ *Nominal ht. of atmos. boundary layer*
 $G = 0.85$

Kd = 0.85 *Directionality factor*
 Kzt = 1.0 *Topographic factor*
 Ke = 1.0 *Ground elevation factor*
 Cf = 1.85 *Force Coefficient*
...Width / Height ratio = 0.2 to 10

120 mph - Exp "C"

Elevated Signs

W/Ht Ratio = 0.2 to 2.0

SIGN HEIGHT	DESIGN WIND PRESSURES	$K_h = K_z$	q_z
15 ft	± 25.1 psf	0.85	16.0
18 ft	± 26.1 psf	0.88	16.6
20 ft	± 26.7 psf	0.90	17.0
30 ft	± 29.0 psf	0.98	18.5
35 ft	± 30.0 psf	1.01	19.1
40 ft	± 30.9 psf	1.04	19.6
45 ft	± 31.6 psf	1.07	20.1
50 ft	± 32.3 psf	1.09	20.6
55 ft	± 33.0 psf	1.12	21.0
60 ft	± 33.6 psf	1.14	21.4
70 ft	± 34.7 psf	1.17	22.1
80 ft	± 35.7 psf	1.21	22.7
90 ft	± 36.6 psf	1.24	23.3
100 ft	± 37.4 psf	1.27	23.8
110 ft	± 38.2 psf	1.29	24.3
120 ft	± 38.9 psf	1.32	24.7
130 ft	± 39.5 psf	1.34	25.1
140 ft	± 40.2 psf	1.36	25.5
150 ft	± 40.8 psf	1.38	25.9
175 ft	± 42.1 psf	1.42	26.8
200 ft	± 43.3 psf	1.46	27.5
250 ft	± 45.4 psf	1.53	28.9

Footing Design for Freestanding Signs

Structure Dimensions & Loading

Design wind pressure:	P =	29.0	psf	
Overturning Safety Factor:	Ω =	1.5		... FBC 1807.2.3
Sign area 1:	A1 =	200.0	sq ft	... tributary area 1 for each footer (e.g. sign)
Height of applied force above grade:	h1 =	10.0	ft	... height of area 1 centroid
Sign area 2:	A2 =	0.0	sq ft	... tributary area 2 for each footer (e.g. post)
Height of applied force above grade:	h2 =	0.0	ft	... height of area 2 centroid

Overturning Moment: $M_n = P \cdot (A1 \cdot h1 + A2 \cdot h2)$
Mn = 58.1 kip-ft

Round	Footing Diameter:	B =	3	ft	
	Footing depth:	d =	9.83	ft	Soil cover: ds = 0 ft
	Superstructure weight:	Dr =	200	lb	
	Soil cover weight:	Ds =	0	lb	... = 100pcf * π * B ² / 4 * ds
	Footing weight:	Df =	10423	lb	... = 150pcf * π * B ² / 4 * d
	Total weight:	D =	10623	lb	... = Dr + Ds + Df

Soil Strength

...FBC Tables 1806.2, 1819.6

Soil class:	4. Sand, silty sand, silty gravel
Lateral bearing strength:	Plat = 150 psf/ft
Vertical bearing strength:	Pbrg = 2000 psf

Check Lateral Soil Bearing Pressures

(Empirical Method) ...FBC Sect 1807.3.2.1

Unconstrained (No rigid floor or pavement at ground surface)

Allowable lateral soil bearing pressure at 1/3 depth:

$$S1 = 2 \cdot \text{Plat} \cdot (d + ds) / 3$$

S1 = 983 psf

Total applied lateral load:	Ptot =	5.81	kips
Equiv ht of applied load:	heq =	10.00	ft
	As =	2.34 * Ptot / (S1 * B)	
	As =	4.6	ft

$$d_{req} = As / 2 \cdot [1 + \sqrt{1 + 4.36 \cdot heq / As}]$$

dreq = 9.76 ft

dreq < d **OK**

Hollow Structural Pipe in Bending

Allowable Stress Design per 2016 AISC Spec for Structural Steel Buildings

Material Properties

Yield Stress, A53 Grd B Steel:

 $F_y = 35$ ksi

Safety Factor = 1.67

Per Section B3.4

Modulus of Elasticity:

 $E = 29000$ ksi

End Supports: Cantilever

Member Properties

ANSI 12" Schedule 40 steel pipe

Nominal size: 12" diam - Std

 Outside Diameter $d = 12.75$ in

 Moment of Inertia: $I_x = 279.3$ in⁴

 Wall Thickness $t = 0.375$ in

 Section Modulus: $S = 43.82$ in³

 Deflection Limit: $Defl = L / 60$

 Design wind pressure: $P = 29.0$ psf

 Sign area: $A_1 = 200.0$ sq ft

... tributary area for each post (e.g. sign+post)

 Eccentricity of applied force: $e_1 = 10.0$ ft

 ... distance to area centroid (weighted avg h_1, h_2)

(1): Yielding Limit State

 $M_n = F_y \cdot S$

 Allowable Moment: $M_{allow} = M_n / 1.67$
 $M_n = 1533.6$ kip-in

 $M_{allow} = 918.3$ kip-in

Check Member Bending

 Moment in member: $M_{max} = P \cdot A_1 \cdot e_1$
 $M_{max} = 696.9$ kip-in

 $M_{max} < M_{allow}$...

OK

Check Member Deflection:

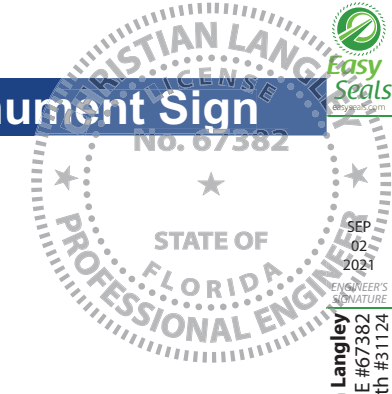
 Allowable Deflection: $\Delta_{allow} = 2.00$ in $L / 60$

 Deflection in member: $\Delta_{max} = P \cdot (A \cdot e^3) / (3 \cdot E \cdot I)$
 $\Delta_{max} = 0.41$ in

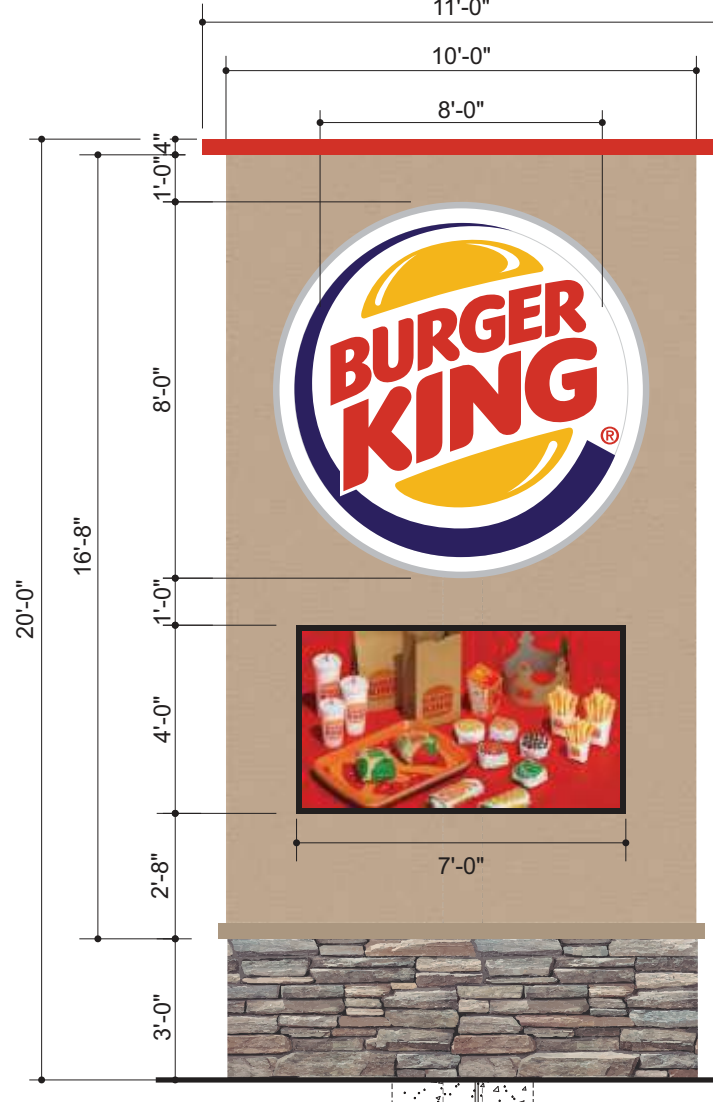
 $\Delta_{max} < \Delta_{allow}$...

OK

Monument Sign



Christian Langley
Florida PE #67382
Cert of Auth #31124
1200 N Federal Hwy, #200
Boca Raton, FL 33432
1-888-371-3113

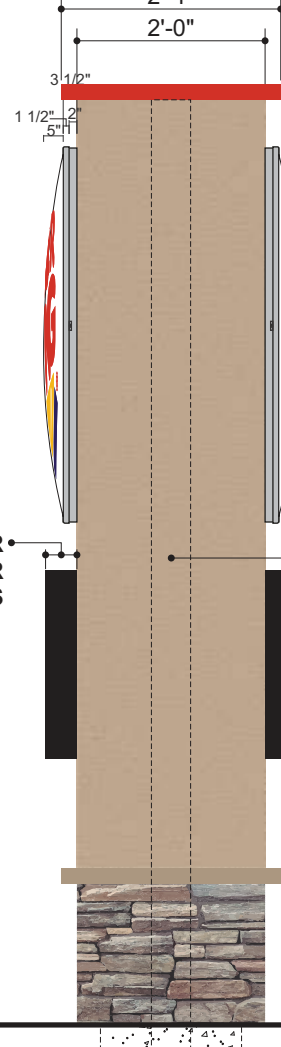


FRONT VIEW
SCALE: 1/4" = 1'-0"

TBD DEPTH PER
MANUFACTURER
SPECIFICATIONS

MIN 12" STD STEEL POST
(12.75" OD x 0.375", A53/B),
EMBED TO 6" FROM FOOTER BOT

GRADE



SIDE VIEW
SCALE: 1/4" = 1'-0"

SPECIFICATIONS:

ALL ALUMINUM CONSTRUCTION WITH INTERNAL BRACING AS NECESSARY.

8' BK LOGO SIGNS ARE STANDARD CAP OVER FACE DESIGN.
LED ILLUMINATED.

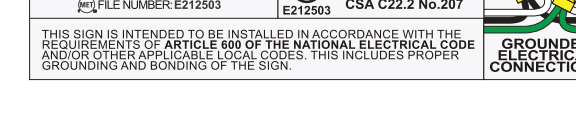
ELECTRONIC MESSAGE CENTER: SPECIFICATIONS TBD.

INTERNAL STEEL AND FOUNDATION SPECIFICATIONS PER ENGINEER.

MONUMENT WILL BE SENT UNPAINTED.
ALUMINUM TO BE SANDED AND PREPPED TO BE PAINTED IN FIELD.
BRICK AND PAINTING BY OTHERS.

120 VOLT, 20 AMP ELECTRICAL
CIRCUIT TO SIGN BY OTHERS

CONCRETE FOOTER OPTIONS (2500 PSI):
• 36" DIA x 9'-10" DEEP [AUGERED]
• 7'-9" SQ x 3'-0" DEEP [SPREAD, WITH
(8) #5 BARS EACH WAY, TOP+BOT]



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1-800-967-2553
www.allenindustries.com

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Client:
Burger King

Address:
13721 S. US HWY 441
Lake City, FL 32025

Date:
8/12/21

Page #:
2 of 2

File Name:
BK-F2774_Lake City, FL_100

Sales: **Design:** **PM:**
House **LB** **KR**

#	Date	Description	Initial
1	—	—	—
2	—	—	—
3	—	—	—
4	—	—	—
5	—	—	—
6	—	—	—

Client Review Status
Allen Industries, Inc. requires that an approved drawing be obtained from the client prior to any production release or production release revision.

Client Signature: **Approval Date:**

General: • Design is in accordance with the requirements of the **Fla Bldg Code 7th Ed (2020)** for use within & outside the High Velocity Hurricane Zone (HVHZ). • This engineering certifies only the structural integrity of those systems, components, and/or other construction explicitly specified herein. • Electrical notes, details, & specifications are provided by and are the sole responsibility of the electrical contractor. No electrical review has been performed and no certification of such is intended. • Structural design meets requirements of ACI 318-14, AISC 360-16, ADM1-15, & NDS-18, as applicable. • Steel components shall be coated, painted, or otherwise protected against corrosion per FBC Sec 2203.2/2222.6. • Alum components in contact with steel or embedded in concrete shall be painted or protected as prescribed in ADM1-15(1a), or plastic/neoprene spacers provided. • All exposed fasteners shall be S.S. or have a protective coating for corrosion protection. • All welding shall comply with AWS requirements. • Steel welds: E70xx electrodes. • Aluminum welds: 4043 filler alloy. • Alum extrusions: 6063-T6 or stronger, U.N.C.

ASCE 7-16 • V=120 mph
WIND LOADS: • Exposure 'C'
• Risk Category 1 Struct.
• Sign Height = 30 ft max
• Solid freestanding sign above grade: ± 29.0 psf
• CF=1.85 (w/h ratio = 0.2 to 10, any clearance ratio s/h)
• ASD Load Coeff = 0.6