

REVISIONS			
#	DESCRIPTION	BY	DATE

atlas
SIGN INDUSTRIES

Headquarters
1077 West Blue Heron Blvd., West Palm Beach, FL 33404

Northeast Division
707 Commerce Dr. Concord, NC 28025

Western Division
1586 High Meadows Way Cedar Hills, TX 75104

1-800-772-7932 atlasbtw.com

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TITLE	
HARBOR FREIGHT PYLON SIGN	
ADDRESS	
46 SHRIJI LANE ERWIN, NC	
DRAWING NO	
ENG-185366-S02	
REV.#	1 OF 8
DATE	

	NAME	DATE
DRAWN BY	BH	08/23/2024
PROJECT MGR.	J. KLUTTZ	

ENGINEERING

ENGINEER INFORMATION
NAME: Thomas F. Lubanovic, P.E.
ADDRESS: 1077 West Blue Heron Blvd. West Palm Beach, Florida 33404
E-MAIL: THOMAS.L@ATLASBTW.COM
LICENSE: NC PE #54526 & FL PE #56659

Code Provisions for Sign Installation:
 Int'l Building Code, 2021 w/ NC Modifications
 Wind load per ASCE7-22; IBC sections 1609.1.1; 1620; Exposure C; Risk Category II
 Standard design for $V_{ULT} = 125$ mph

I certify that the menu attachments and foundation meet or exceed the requirements of the 2021 IBC for wind speed, $V_{ULT} = 125$ mph.

DESIGN WIND SPEED AT THE SITE IS
 $V_{ULT} = 113$ MPH
 (Fig. 1609.3(1) - County Map)

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NOTE:
SEE SHEETS (4) & (5) FOR FOUNDATION DETAILS

20 AMP DISCONNECT SWITCH
 INSIDE UL RATED WEATHERPROOF
 BELL BOX WITH LOCKABLE
 COVER.

G.C. PROVIDED PRIMARY FEED
 TO 20 AMP DISCONNECT PRIOR
 TO ENTERING SIGN.



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TITLE
**HARBOR FREIGHT
PYLON SIGN**

ADDRESS
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ERWIN, NC**

DRAWING NO
ENG-185366-S02

REV.#
2 OF 8

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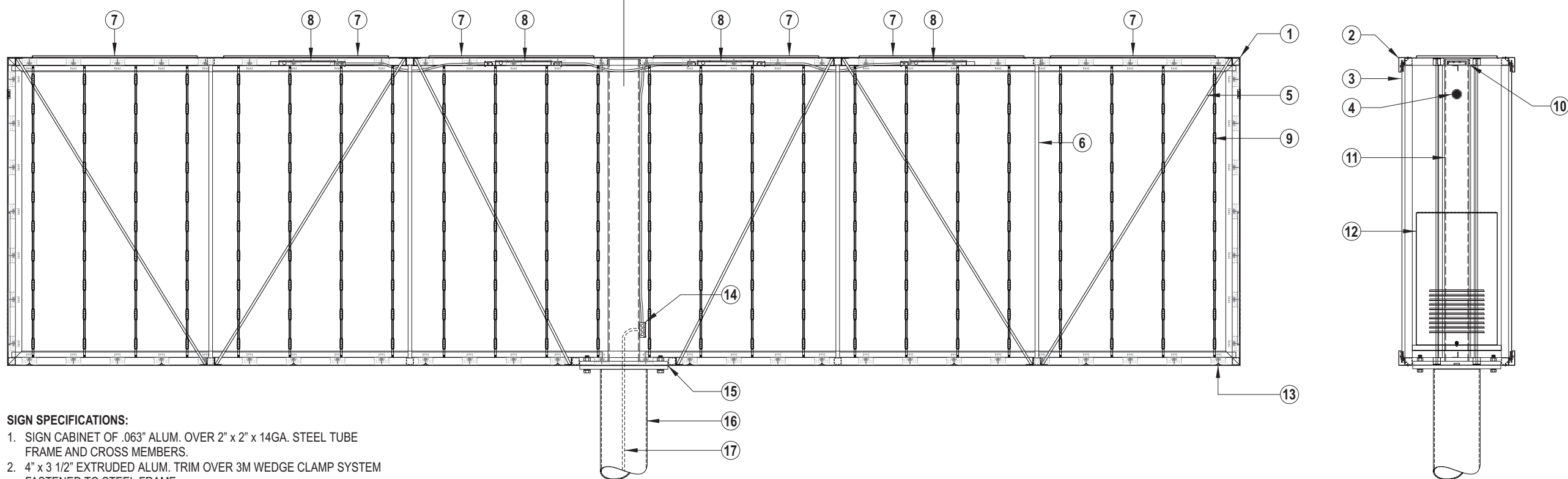
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SIGN SPECIFICATIONS:

- SIGN CABINET OF .063" ALUM. OVER 2" x 2" x 14GA. STEEL TUBE FRAME AND CROSS MEMBERS.
- 4" x 3 1/2" EXTRUDED ALUM. TRIM OVER 3M WEDGE CLAMP SYSTEM FASTENED TO STEEL FRAME.
- 3M PANAGRAPHS III FLEXIBLE POLY- PROPYLENE FACE WITH APPLIED VINYL GRAPHICS STRETCHED AND SECURED WITH WEDGE CLAMP SYSTEM.
- HEYCO LP2.5 LOUVERD VENTS MOUNTED TO SIDE OF CABINET. (1) PER SIDE AT TOP AS REQUIRED FOR VENTILATION.
- 1/2" DIA. STEEL SAG RODS WELDED TO CABINET FRAME CROSS MEMBERS FOR ADDITIONAL SUPPORT.
- 1" x 1" x 1/8" STEEL TUBE VERTICAL SUPPORTS WELDED TO CABINET FRAME CROSS MEMBERS.
- REMOVABLE PANELS FOR ACCESS TO POWER SUPPLIES AND LED'S.
- GEPS24-300U / 2.7 AMP CLASS 2 LED POWER SUPPLIES MOUNTED INSIDE UL ENCLOSURES. SEE ELECTRICAL DATA BOX FOR QUANTITY AND TOTAL AMPS.
- 24V CLASS 2 WITH LED MODULES MOUNTED TO VERTICAL RAILS ATTACHED TO ALUM. ANGLE HORIZONTAL STRINGERS FASTENED TO CABINET FRAME CROSS MEMBERS.
- 2" x 2" x 14GA. STEEL SADDLE WELDED TO STEEL TUBE SIGN FRAME AND TO STEEL SUPPORT INSIDE CABINET. SEE SHEET (3) FOR DETAILS.
- 8" SCH 40s x .322" (8 5/8"Ø ACTUAL) STEEL SUPPORT COLUMN WELDED TO STEEL TUBE CROSS MEMBERS AT TOP OF CABINET AND TO STEEL (INNER) MATCH PLATE AT BOTTOM.
- BRAKE FORMED ALUM. HINGED AND LOCKABLE VENTED ACCESS DOORS. (1) EACH SIDE OF CABINET FOR ENTRY INTO CABINET INTERIOR.
- 1/4" DIA. DRAIN HOLES WITH LIGHT SHIELDS ALONG BOTTOM OF CABINET AS REQUIRED.
- UL JUNCTION BOX MOUNTED TO STEEL SUPPORT INSIDE CABINET FOR BRANCH WIRE CONNECTIONS FROM INCOMING PRIMARY FEED AND POWER SUPPLIES.
- 1" x 24" x 24" STEEL MATCH PLATES. (1) WELDED TO STEEL TUBE CABINET FRAME AND TO INNER SUPPORT COLUMN. LOWER MATCH PLATE WILL BE WELDED TO INTERMEDIATE COLUMN AND BOLTED TO INNER MATCH PLATE. SEE SHEET (3) FOR DETAILS.
- 12"Ø x .375" STD. STEEL INTERMEDIATE SUPPORT PIPE WELDED TO BOTTOM (OUTER) MATCH PLATE AND SLEEVED INTO LOWER SUPPORT COLUMN. SEE SHEET (3) FOR DETAILS.
- 14"Ø x .375" SCH. 30s STEEL LOWER SUPPORT PIPE EMBEDDED INTO CONCRETE FOOTER. SEE FOOTER DETAILS ON SHEET 3.
- #12AWG BRANCH WIRING INSIDE MAIN AND INTERMEDIATE SUPPORT COLUMNS FROM 20 AMP DISCONNECT INSIDE WEATHERPROOF BELL BOX AT BASE OF LOWER SUPPORT PIPE TO SIGN. SEE SIGN ELEVATION ON SHEET (1) APPROXIMATE DISCONNECT LOCATION.

ELECTRICAL DATA	
Volts	120V Primary / 24V Secondary
Total Amps	3.24 Total Amps
Circuits	(1) 20 Amp Dedicated
Visible Disconnects	(1) 20 Amp / 120VAC
Power Supplies	(4) 24V / 300W @ 2.7 Amps Ea.

- ELECTRICAL NOTES**
- All materials and fasteners meet 3004.4
 - All electrical components listed and approved in accordance with UL48 and NEC NFPA 70.
 - Sign grounded according to NEC 600.7.
 - Signs manufactured and listed NEC 600.3 and marked per NEC 600.4.
 - All branch circuits per NEC 600.5(B).1 or (B).2.
 - All Signs controlled by photocell or time clock per NEC 600.
 - One visible 20 amp disconnect per sign per circuit per NEC 600.6(A).1
 - All Class 2 rated LED modules and LED power supplies will be in compliance with a nationally recognized test laboratory and NEC 600.33 (A) thru (D).

LISTED

**Complies with
UL48
Sign Certification
E212706**

DESIGN WIND SPEED AT THE SITE IS
 $V_{ULT} = 113$ MPH
(Fig. 1609.3(1) - County Map)

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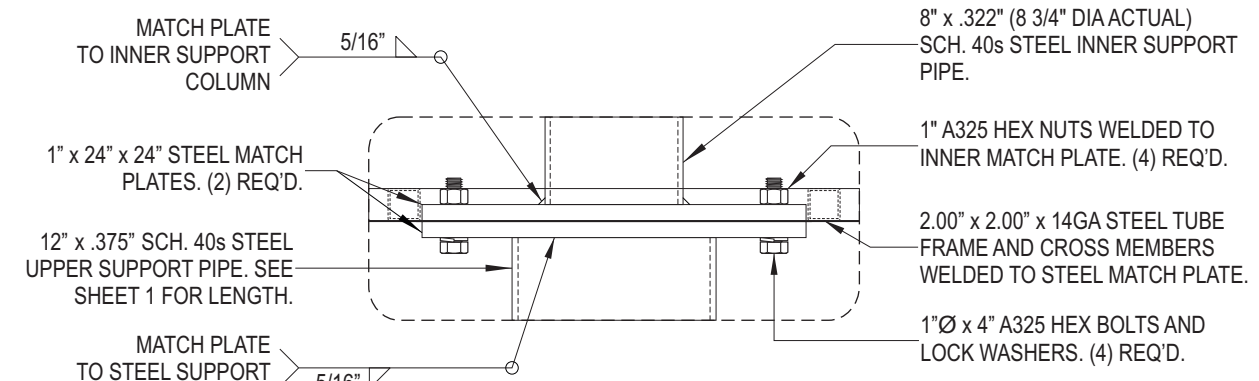
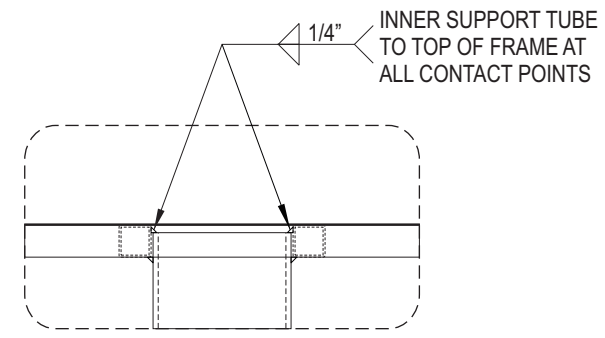
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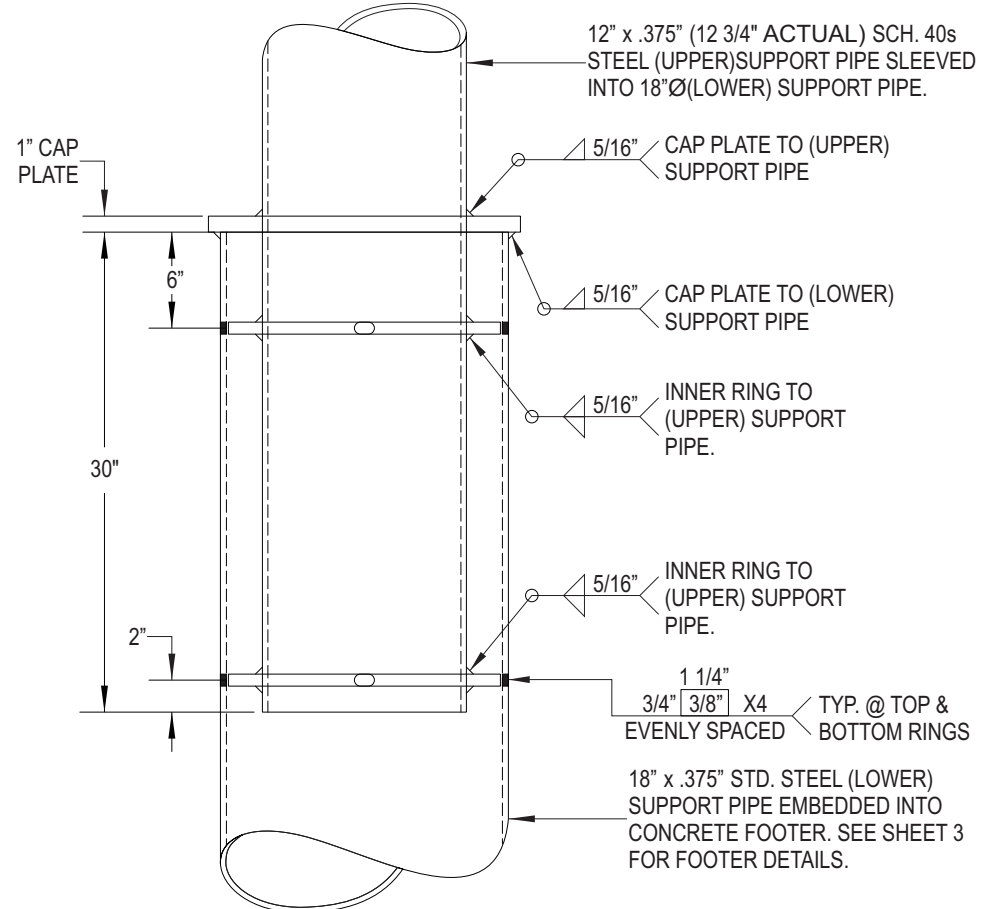
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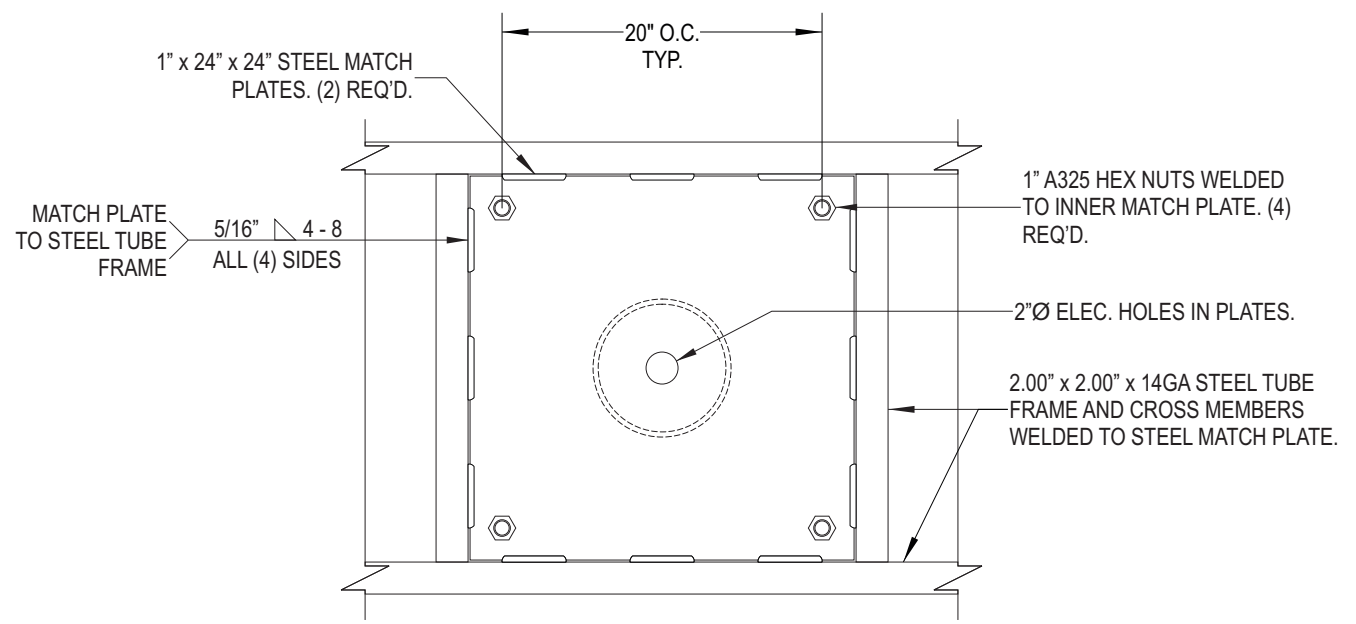
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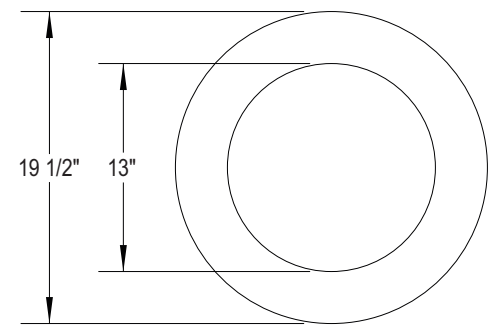
MAIN I.D. CABINET & MATCH PLATE ATTACHMENT DETAILS



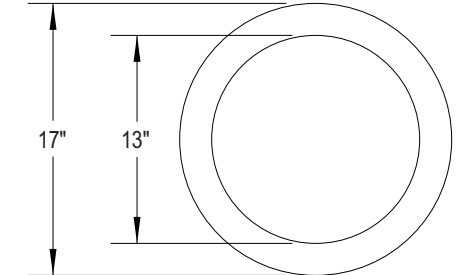
SPLICE DETAIL



MAIN I.D. CABINET & MATCH PLATE ATTACHMENT DETAILS



1" THICK STEEL CAP PLATE (1) REQUIRED



3/4" THICK STEEL INNER RING (2) REQUIRED

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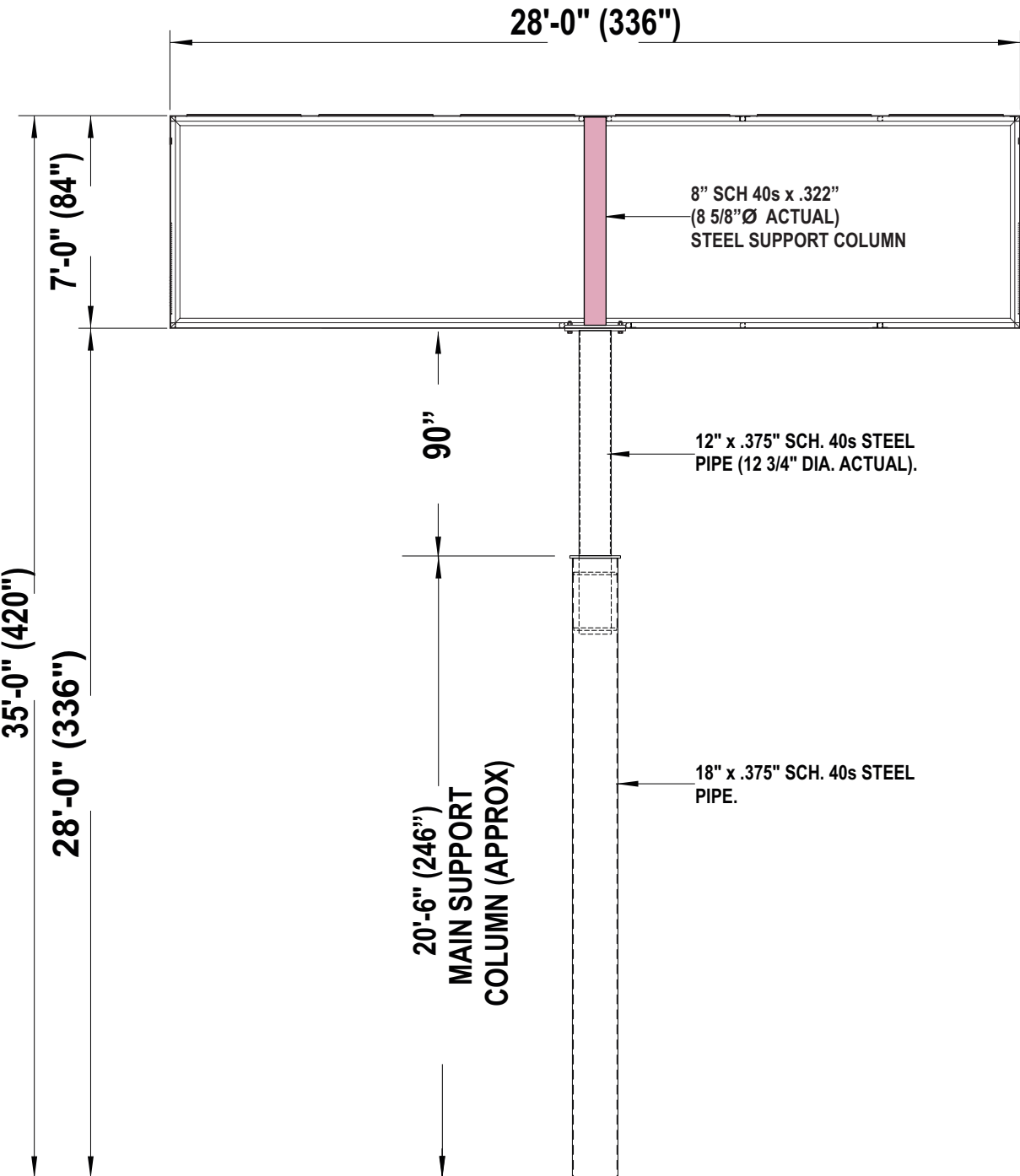
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HARBOR FREIGHT TOOLS - ERWIN, NORTH CAROLINA (185366) 9/5/2024
S01 Sign on pylon structure 11:45 AM
PYLON SIGN ON A COLUMN

Wind Load per IBC 2021; ASCE 7-22
 EXPOSURE C; RISK CATEGORY II

$V_{ULT} = 125$ (IBC Fig. 1609.3(1) (IBC Fig. 1609.3(1) – ATC Interpolation)
 $V_{ASD} = 97 = V_{ULT} \times (0.6)^{1/2}$ (IBC Table 1609.3.1)

ASCE Chapter 30, Part 1, components and cladding
 $q_z = 0.00256 K_z K_{zt} K_d K_e (V_{ASD})^2$ (Eq. 26.10-1)

(Table 26.10-1) (Fig 26.8-1) (Table 26.6-1) (Table 26.9-1)
 $\therefore K_z = 0.85$ $K_{zt} = 1$ $K_d = 0.85$ $K_e = 1$
 $q_z = 0.00256 * K_z * K_{zt} * K_d * K_e * (V_{ASD})^2$ (Eq. 26.10-1)
 $= 0.00256 * (0.85) * (1) * (0.85) * (1) * (97)^2 = 17.34$ psf; --> 0.01734 ksf

1. ANALYSIS OF NEW STEEL SUPPORT - AT THE MATCH PLATE

SUPPORT -	1	8" DIAMETER SCH 40 STEEL TUBE	$S_x = 16.81$	in^3
			$F_y = 35$	ksi
			$F_b = 23.1$	ksi

RECTANGULAR CABINET: $B = 28.00$ ft $s = 7.00$ ft $A = 196.00$ SF
 $h_o = 28.00$ ft $B/s = 4.00$ $S/h_o = 0.25$
 $C_f = 1.8$ (Fig 29.3-1) $h_z = 0.00$ ft $h_{cp} = 3.50$
 $G = 0.85$ ASCE Chapter 29; Sec. 29.4.1; (Sec. 26.9.1)

$F_{cir cab} = q_z \cdot G \cdot C_f \cdot A_{sign}$ (Eq. 29.3.1) = $(0.017) \times (0.85) \times (1.8) \times (196) = 5.20$ kips
 $S_{new-cab} = F_{wind} \times h_z / F_b = (5.2) \times (3.5) \times (12) / (23.1) = 9.45$ in^3 (Total)

PROVIDED --> $S_x = 16.81$ $in^3 > 9.45$ IN^3 (OKAY)

MATCH PLATES & BOLTS
24" x 24" x 1" STEEL MATCH PLATES LOCATED AT BOTTOM OF UPPER CABINET SECTION AND TOP OF LOWER CABINET SECTION.

$B = 24$ INCHES X $W = 24$ INCHES X 1 IN THICK
 2 BOLTS per side @ 10.5 in o.c.
 $M = Force * M.A. = 5.200$ Kips x 3.500 ft X $12 = 218.40$ IN-KIP
 $P = Load/Bolt = M / (SPACING * N) = (218.397) / (2 \times 10.5) = 10.40$ kips (PER BOLT)

Bending in match plate: $F_y = 36$ ksi $F_b = 0.75 * F_y = 27$ ksi
 $M_{pl} = (M/d) \times [(d-OD) / 2]$ $d = 10.5$ IN & OD = 6.1875 IN $B = 24$
 $= (218.397/10.5) \times [(10.5 - (6.1875/2))] = 154.05$ in-kips
 $T_{required} = [6M_{pl} / 0.75F_y b]^{1/2} = [(6 \times 154.048) / (27 \times 24)]^{1/2} = 1.194$ in

USE Two 1" A36 steel plates (OKAY)

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ANALYSIS OF NEW STEEL SUPPORT - AT THE SPLICE

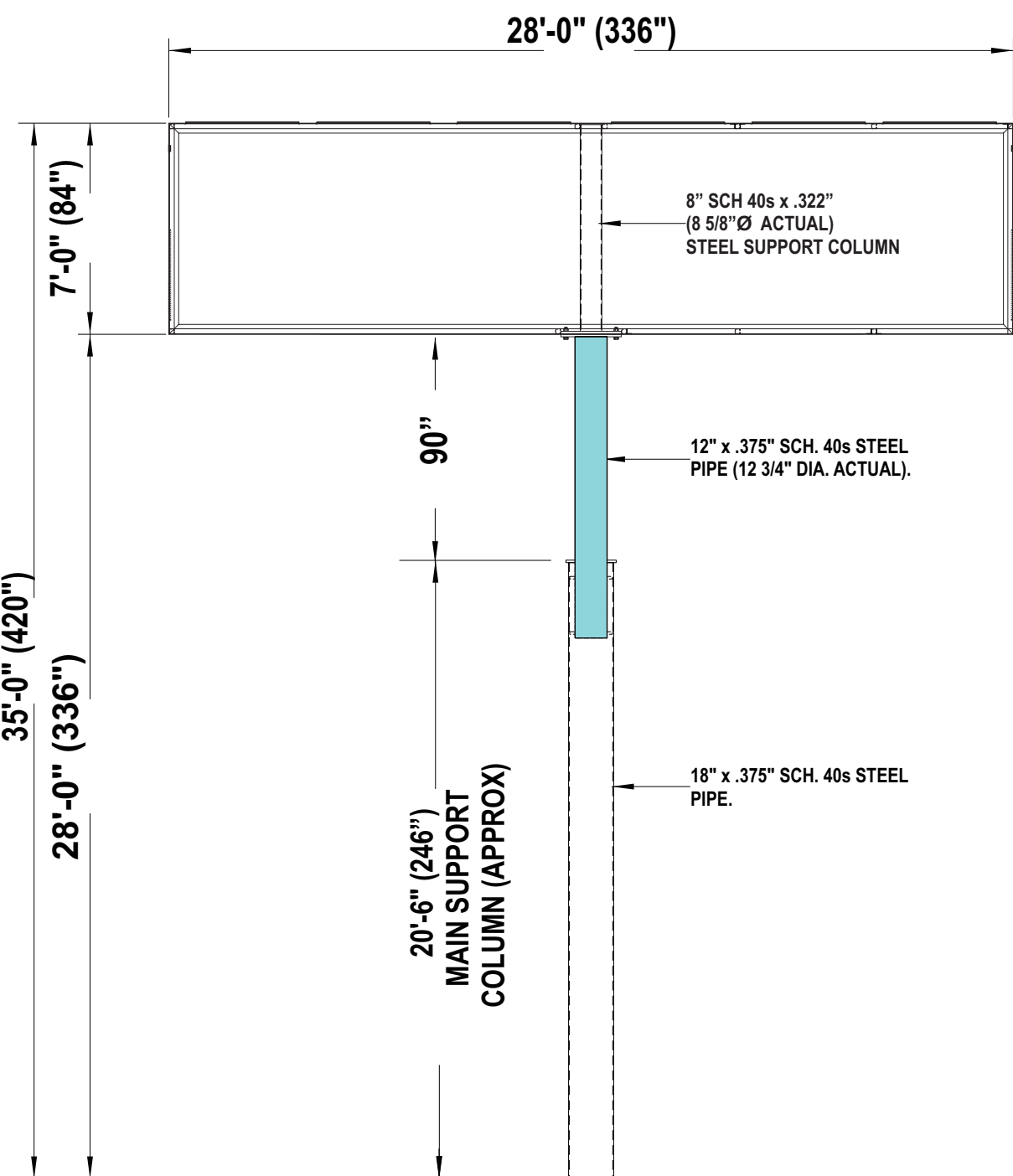
SUPPORT - 1 12" DIAMETER HSS A500-B STEEL TUBE $S_x = 43.80 \text{ in}^3$
 $F_y = 35 \text{ ksi}$ $F_b = 23.1 \text{ ksi}$

RECTANGULAR CABINET: $B = 28.00 \text{ ft}$ $s = 7.00 \text{ ft}$ $A = 196.00 \text{ SF}$
 $h_o = 40.00 \text{ ft}$ $B/s = 4.00$ $S/h_o = 0.18$
 $C_f = 1.8$ (Fig 29.3-1) $h_z = 11.00 \text{ ft}$ $h_{cp} = 11.00$
 $G = 0.85$ ASCE Chapter 29; Sec. 29.4.1; (Sec. 26.9.1)
 $F_{cir cab} = q_z \cdot G \cdot C_f \cdot A_{sign}$ (Eq. 29.3.1) = $(0.017) \times (0.85) \times (1.8) \times (196) = 5.20 \text{ kips}$
 $S_{new cab} = F_{wind} \times h_z / F_b = (5.2) \times (11) \times (12) / (23.1) = 29.714 \text{ in}^3$ (Total)

UPPER LOWER PIPE: $B = 1.00 \text{ ft}$ $s = 7.50 \text{ ft}$ $A = 7.50 \text{ SF}$
 $h_o = 40.0 \text{ ft}$ $B/s = 0.13$ $S/h_o = 0.19$
 $C_f = 0.9$ (Fig 29.3-1) $h_z = 3.75 \text{ ft}$ $h_{cp} = 3.75$
 $G = 0.85$ ASCE Chapter 29; Sec. 29.4.1; (Sec. 26.9.1)
 $F_{2 exp pipe} = q_z \cdot G \cdot C_f \cdot A_{sign}$ (Eq. 29.3.1) = $(0.017) \times (0.85) \times (0.9) \times (7.5) = 0.111 \text{ kips}$
 $S_{lower} = F_{wind} \times h_z / F_b = (0.111) \times (3.75) \times (12) / (23.1) = 0.22 \text{ in}^3$ (Total)

$F_{total} = F_{rect cab} + F_{pipe} = (5.2) + (0.111) = 5.310 \text{ kips}$
 $S_{total} = S_{rect cab} + S_{new pipe} = (29.714) + (0.215) = 29.93 \text{ in}^3$

PROVIDED --> $S_x = 43.80 \text{ in}^3 > 29.93 \text{ in}^3$ (OKAY)



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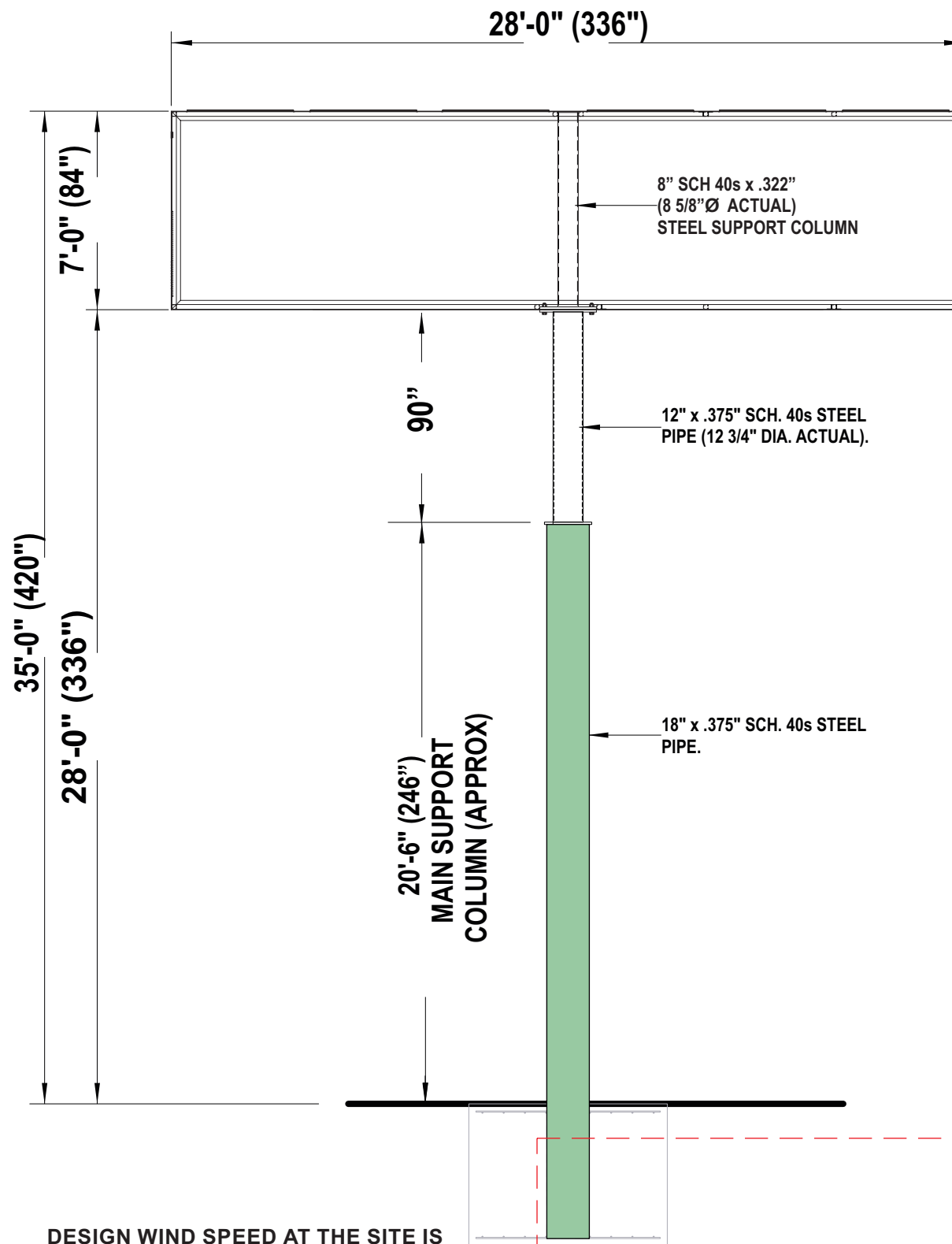
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3. ANALYSIS OF NEW STEEL SUPPORT - AT THE SIGN BASE

SUPPORT -	1	18" DIAMETER (T=0.562")SCH 40STEEL TUBE	$S_x = 130.20$	in^3
		$F_y = 35$	ksi	$F_b = 23.1$
			ksi	ksi

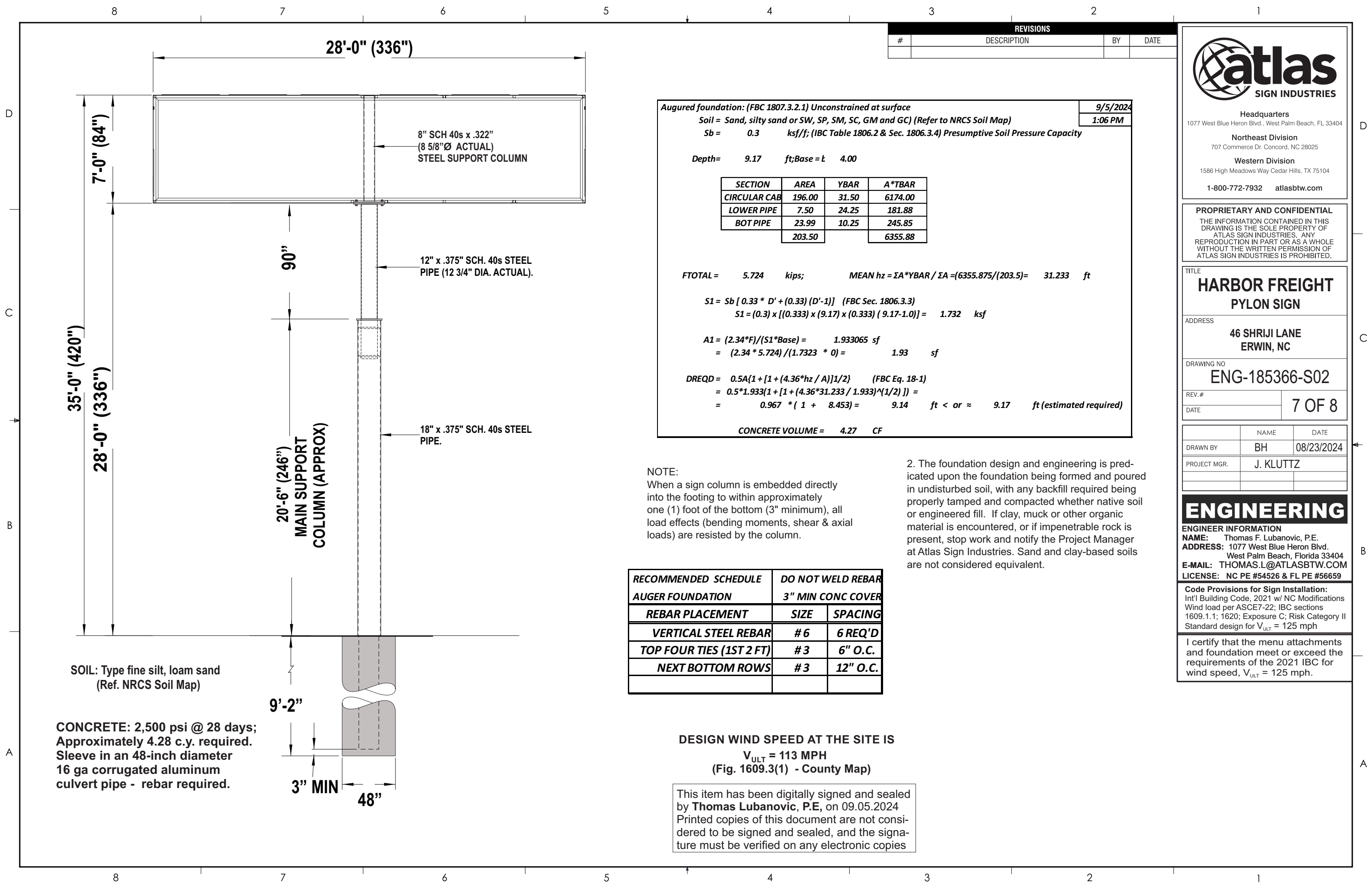
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 $h_o = 35.00$ ft $B/s = 4.00$ $S/h_o = 0.20$
 $C_f = 1.8$ (Fig 29.3-1), $h_z = 11.00$ ft $h_{cp} = 31.50$
 $G = 0.85$ ASCE Chapter 29; Sec. 29.4.1; (Sec. 26.9.1)
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 $S_{new-cab} = F_{wind} \times h_z / F_b = (5.2) \times (31.5) \times (12) / (23.1) = 85.090$ in^3 (Total)

UPPER LOWER PIPE: $B = 1.00$ ft $s = 7.50$ ft $A = 7.50$ SF
 $h_o = 35.0$ ft $B/s = 0.13$ $S/h_o = 0.21$
 $C_f = 0.9$ (Fig 29.3-1), $h_z = 2.83$ ft $h_{cp} = 24.25$
 $G = 0.85$ ASCE Chapter 29; Sec. 29.4.1; (Sec. 26.9.1)
 $F_{2 exp pipe} = q_z \cdot G \cdot C_f \cdot A_{sign}$ (Eq. 29.3.1) = $(0) \times (0.85) \times (0.9) \times (7.5) = 0.111$ kips
 $S_{lower} = F_{wind} \times h_z / F_b = (0.111) \times (24.25) \times (12) / (23.1) = 1.39$ in^3 (Total)

UPPER LOWER PIPE: $B = 1.17$ ft $s = 20.50$ ft $A = 23.99$ SF
 $h_o = 35.0$ ft $B/s = 0.06$ $S/h_o = 0.59$
 $C_f = 0.9$ (Fig 29.3-1), $h_z = 2.83$ ft $h_{cp} = 10.25$
 $G = 0.85$ ASCE Chapter 29; Sec. 29.4.1; (Sec. 26.9.1)
 $F_{2 exp pipe} = q_z \cdot G \cdot C_f \cdot A_{sign}$ (Eq. 29.3.1) = $(0) \times (0.85) \times (0.9) \times (23.985) = 0.414$ kips
 $S_{lower} = F_{wind} \times h_z / F_b = (0.414) \times (10.25) \times (12) / (23.1) = 2.20$ in^3 (Total)

$F_{total} =$	$F_{rect cab} + F_{pipe} + F_{lower pipe} =$	
	$(5.2) + (0.111) + (0.414) =$	5.724 kips
$S_{total} =$	$S_{rect cab} + S_{pipe} + S_{lower pipe} =$	
	$(85.09) + (1.393) + (2.202) =$	88.68 in^3

PROVIDED --> $S_x = 130.20$ $in^3 > 88.68$ in^3 (OKAY)



REVISIONS			
#	DESCRIPTION	BY	DATE



Headquarters
1077 West Blue Heron Blvd., West Palm Beach, FL 33404

Northeast Division
707 Commerce Dr. Concord, NC 28025

Western Division
1586 High Meadows Way Cedar Hills, TX 75104

1-800-772-7932 atlasbtw.com

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TITLE
HARBOR FREIGHT PYLON SIGN

ADDRESS
46 SHRIJI LANE ERWIN, NC

DRAWING NO
ENG-185366-S02

REV.#
7 OF 8

DATE

NAME	DATE
DRAWN BY: BH	08/23/2024
PROJECT MGR. J. KLUTTZ	

ENGINEERING

ENGINEER INFORMATION
NAME: Thomas F. Lubanovic, P.E.
ADDRESS: 1077 West Blue Heron Blvd. West Palm Beach, Florida 33404
E-MAIL: THOMAS.L@ATLASBTW.COM
LICENSE: NC PE #54526 & FL PE #56659

Code Provisions for Sign Installation:
Int'l Building Code, 2021 w/ NC Modifications
Wind load per ASCE7-22; IBC sections 1609.1.1; 1620; Exposure C; Risk Category II
Standard design for V_{ULT} = 125 mph

I certify that the menu attachments and foundation meet or exceed the requirements of the 2021 IBC for wind speed, V_{ULT} = 125 mph.

Augured foundation: (FBC 1807.3.2.1) Unconstrained at surface

Soil = Sand, silty sand or SW, SP, SM, SC, GM and GC) (Refer to NRCS Soil Map)

S_b = 0.3 ksf/ft; (IBC Table 1806.2 & Sec. 1806.3.4) Presumptive Soil Pressure Capacity

Depth = 9.17 ft; Base = t 4.00

SECTION	AREA	YBAR	A*YBAR
CIRCULAR CAB	196.00	31.50	6174.00
LOWER PIPE	7.50	24.25	181.88
BOT PIPE	23.99	10.25	245.85
	203.50		6355.88

FTOTAL = 5.724 kips; MEAN hz = ΣA*YBAR / ΣA = (6355.875 / (203.5)) = 31.233 ft

S1 = S_b [0.33 * D' + (0.33) (D'-1)] (FBC Sec. 1806.3.3)
S1 = (0.3) x [(0.333) x (9.17) x (0.333) (9.17-1.0)] = 1.732 ksf

A1 = (2.34*F)/(S1*Base) = 1.933065 sf
= (2.34 * 5.724) / (1.7323 * 0) = 1.93 sf

DREQD = 0.5A(1 + [1 + (4.36*hz / A)]^{1/2}) (FBC Eq. 18-1)
= 0.5*1.933(1 + [1 + (4.36*31.233 / 1.933)^{1/2}]) =
= 0.967 * (1 + 8.453) = 9.14 ft < or = 9.17 ft (estimated required)

CONCRETE VOLUME = 4.27 CF

NOTE:
When a sign column is embedded directly into the footing to within approximately one (1) foot of the bottom (3" minimum), all load effects (bending moments, shear & axial loads) are resisted by the column.

2. The foundation design and engineering is predicated upon the foundation being formed and poured in undisturbed soil, with any backfill required being properly tamped and compacted whether native soil or engineered fill. If clay, muck or other organic material is encountered, or if impenetrable rock is present, stop work and notify the Project Manager at Atlas Sign Industries. Sand and clay-based soils are not considered equivalent.

RECOMMENDED SCHEDULE AUGER FOUNDATION	DO NOT WELD REBAR 3" MIN CONC COVER	
REBAR PLACEMENT	SIZE	SPACING
VERTICAL STEEL REBAR	# 6	6 REQ'D
TOP FOUR TIES (1ST 2 FT)	# 3	6" O.C.
NEXT BOTTOM ROWS	# 3	12" O.C.

DESIGN WIND SPEED AT THE SITE IS
V_{ULT} = 113 MPH
(Fig. 1609.3(1) - County Map)

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SOIL: Type fine silt, loam sand (Ref. NRCS Soil Map)

CONCRETE: 2,500 psi @ 28 days; Approximately 4.28 c.y. required. Sleeve in an 48-inch diameter 16 ga corrugated aluminum culvert pipe - rebar required.

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TITLE
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PYLON SIGN**

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Int'l Building Code, 2021 w/ NC Modifications
Wind load per ASCE7-22; IBC sections 1609.1.1; 1620; Exposure C; Risk Category II
Standard design for $V_{ULT} = 125$ mph

I certify that the menu attachments and foundation meet or exceed the requirements of the 2021 IBC for wind speed, $V_{ULT} = 125$ mph.

SPREAD FOUNDATION: (IBC 1807.3.2.1) Unconstrained at surface

Soil = *Fine sand (Ref. NRCS Soil Map)*

$S_b = 2.00$ ksff; ALLOWABLE VERTICAL (IBC Table 1806.2 & Sec. 1806.3.4)

$S_b = 0.300$ ksff; ALLOWABLE LATERAL (IBC Table 1806.2 & Sec. 1806.3.4)

$F_{TOTAL} = 5.724$ kips; MEAN $h_z = 31.233$ FT

Depth = 5.00 $B_{strong} = 14.00$ ft $B_{weak} = 8.00$ ft

UNIFORM LOAD FROM 3.00 DEPTH OF CONCRETE BASED ON 150 PCF = $(3) \times 150 / 1000 = 0.450$ KSF

COMPRESSIVE VERTICAL LOAD AT THE TOE AND HEEL FROM THE OVERTURNING MOMENT

MOMENT ARM TO BASE = $(31.233) + (5) = 34.233$ FT

#REF! 195.951 K-F

BASE SECTION MODULUS = $B \times D^2 / 6 = (8) \times (14)^2 / 6 = 261.33$ FT³

PRESSURE (OVERTURNING) AT THE TOE AND HEEL = $M / S = (195.951) / (261.333) = 0.750$ KSF

PRESSURE (OVERTURNING) AT THE TOE = $(0.45) + (0.75) = 1.200 < 2.00$ KSF THEREFORE, OKAY!

PRESSURE (OVERTURNING) AT THE HEEL = $(0.45) - (0.75) = -0.300$ OKAY

COMPRESSIVE LATERAL LOAD AT THE TOE FROM THE APPLIED HORIZONTAL LOAD

AREA OF FRONT FACE AT THE TOE = $(14) \times (5) = 70$ FT²

PRESSURE (LATERAL) AT THE TOE AREA = $P / A = (5.724) / (70) = 0.082$ KSF

PRESSURE (LATERAL) AT THE TOE = 0.082 < 0.3 KSF THEREFORE, OKAY!

REBAR SCHEDULE	DO NOT WELD REBAR	
SPREAD FOUNDATION	3" MIN CONC COVER	
REBAR PLACEMENT	SIZE	SPACING
LONG BOTTOM STEEL	# 5	12"
LONG TOP STEEL	# 5	12"
BOTTOM CROSS STEEL	# 5	12"
TOP CROSS STEEL	# 5	12"

DESIGN WIND SPEED AT THE SITE IS
 $V_{ULT} = 113$ MPH
(Fig. 1609.3(1) - County Map)

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