SULLAWAY ENGINEERING
11545 W. BERNARDO COURT, SUITE 201
SAN DIEGO, CA 92127
PROJECTMANAGER@SULLAWAYENG.COM
PHONE: 1-858-312-5150 FAX: 1-858-777-3534

PROJECT: DETROIT WING COMPANY, SIGN TYPE: N01 & N02, 3365 WASHTENAW RD., ANN ARBOR, MI
PROJECT #: 35316
CLIENT: ALLEN INDUSTRIES, INC.
DATE: 6/6/2022
ENGINEER: BF
LAST REVISED:

1/- ELEVATION - MAX OAH FROM GRADE - 26'-0"

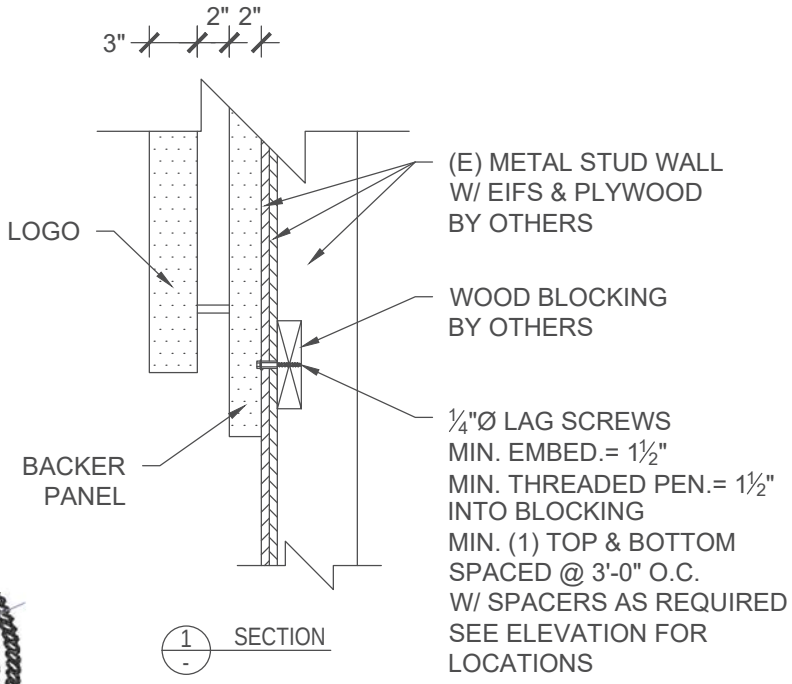
GENERAL NOTES

1. DESIGN CODE: IBC 2015 & 2015 MICHIGAN BC
2. DESIGN LOADS: ASCE 7-10
3. WIND VELOCITY 115 MPH EXPOSURE C
4. LAG SCREWS PER NDS SPECIFICATIONS
5. PROVIDE PROTECTION AGAINST DISSIMILAR METALS
6. ALL DIMENSIONS TO BE VERIFIED PRIOR TO FABRICATION
7. ALL EXISTING ELEMENTS AND DIMENSIONS TO BE VERIFIED IN FIELD

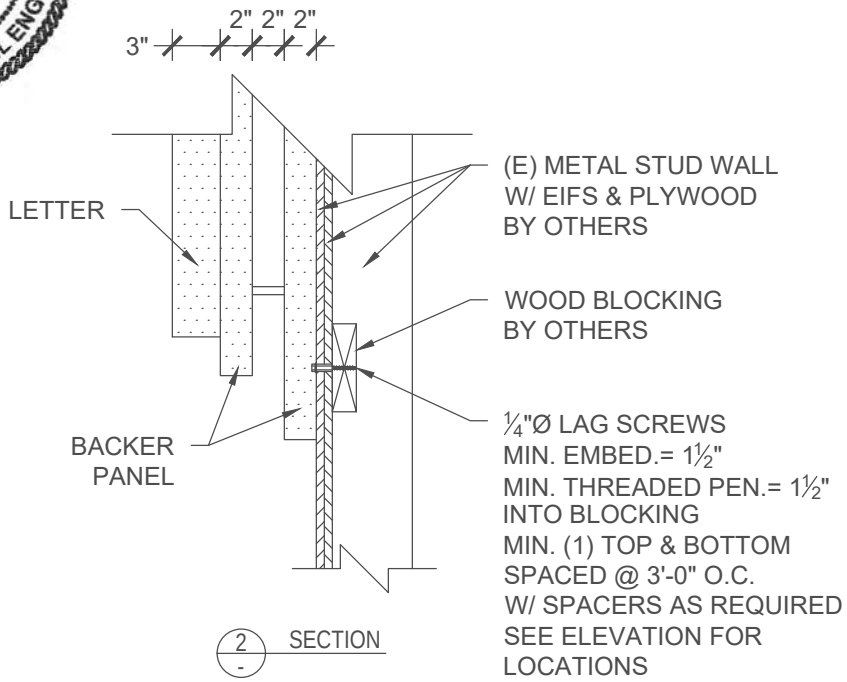
SULLAWAY ENGINEERING
11545 W. BERNARDO COURT, SUITE 201
SAN DIEGO, CA 92127
PROJECTMANAGER@SULLAWAYENG.COM
PHONE: 1-858-312-5150 FAX: 1-858-777-3534

PROJECT: DETROIT WING COMPANY, SIGN TYPE: N01 & N02, 3365 WASHTENAW RD., ANN ARBOR, MI
PROJECT #: 35316
CLIENT: ALLEN INDUSTRIES, INC.

DATE: 6/6/2022
ENGINEER: BF
LAST REVISED:



1 - SECTION



2 - SECTION

SULLAWAY ENGINEERING

PROJECT: DETROIT WING COMPANY DATE: 6/6/2022
PROJ. NO.: 35316 ENGINEER: BF
CLIENT: ALLEN INDUSTRIES, INC.

V5.5 units; pounds, feet unless noted otherwise

Applied Wind Loads; from ASCE 7-10

$p_{net}=\lambda\ K_{zt}\ p_{net30}$ (ASCE 30.5-1)

λ=	1.35	(ASCE Fig. 30.5-1)			
K_{zt}=	1.0	(unless unusual landscape)			
V=	115	mph	Exposure=	c	
Area=	49.9	ft^2			
max. height=	26.0	ft			
p_{net30}=	**21.3**	psf		p_{net}= 28.76	psf
p_{net30}=	**-26.9**	psf		p_{net}= -36.32	psf

Loads on 0.25" Dia. Lag Screws - Signage to Wall (LRFD):

Pnet=	See Above=	36.32	psf
Tributary Area=	A_{Trib}=(3'-0")*(4'-7")=	13.750	ft^2
Wind Load=	WL=Pnet*ATrib=	499	lbs
Dead Load=	DL=1.2*10psf*ATrib=	165	lbs
Governing arm=	(3")/2+(2")+(2")+(2")=	7.5	in
MDL=	DL*arm=	1238	lbs-in
Spacing=	=	36	in
Additional tension due DL=	TDL=MDL/spacing/1 screw=	34	lbs
#screws=	=	2	screws
dia.=	=	0.250	in
Tension per screw=	Tu=WL/#screws+TDL=	284	lbs
Shear per screw=	Vu=DL/#screws=	83	lbs

SULLAWAY ENGINEERING

PROJECT: DETROIT WING COMPANY
DATE: 6/6/2022
PROJ. NO.: 35316
ENGINEER: BF
CLIENT: ALLEN INDUSTRIES, INC.

LAG SCREWS (LRFD) - SOLID WOOD TO SOLID ALUMINUM - WITHDRAWAL AND SINGLE SHEAR LATERAL

DESIGN INPUT

FACTORED FASTENER LOADING			MAIN MEMBER		SIDE MEMBER		
W_u	284 lb	Withdrawal Load	DOUGLAS FIR-LARCH		ALUMINUM		
Z_u	83 lb	Lateral Load	G	0.5	F_u	42 ksi	Ultimate Strength
FASTENER DIMENSIONS			t_m	1.5 in	t_s	0.063 in	Thickness
L_m	1.5 in	Length into Main MBR	θ	90 deg			
D	0.250 in	Nominal Diameter					
w	0 in	Washer					Main Member End Grain (x)
g	0 in	Gap					

p_{min}	1 in	Minimum dowel penetration for lateral loading [NDS 11.1.3.7]
p	1.5 in	Actual dowel penetration based on selected dowel length

STANDARD HEX LAG SCREWS [NDS Appendix Table L2]

D_r 0.173 in
F_{yb} 70000 psi [NDS Table I1]

D	0.25	0.313	0.375	0.438	0.5	0.625	0.75	0.875	1	1.125	1.25
D_r	0.173	0.227	0.265	0.328	0.371	0.471	0.579	0.683	0.78	0.887	1.012

DOWEL BEARING CALCULATIONS

$F_{e,II}$	5600 psi			Dowel bearing strength, perpendicular to grain [NDS Table 11.3.2 Footnote 2]
$F_{e,perp}$	4465.46 psi			Dowel bearing strength, parallel to grain [NDS Table 11.3.2 Footnote 2]
F_{em}	4465.46 psi	F_e	63000 psi	Dowel bearing strength - Hankinson formula [NDS 11.3-11] & Steel [NDS Comm. I2]
L_m	1.5 in	L_s	0.063 in	Dowel bearing length
q_m	772.525 lbs/in	q_s	10899 lbs/in	Dowel bearing resistance [AWC Techincal Report 12] - D_r Assumption
M_m	60.4067 in-lbs	M_s	60.4067 in-lbs	Dowel moment resistance based [AWC Technical Report 12] - D_r Assumption

YIELD MODE DOWEL EQUATIONS [AWC Technical Report 12 Table 1-1]

I_m	415.708 lb	P	1158.79						R_d	2.788	K_D	2.23	θ	90
I_s	246.327 lb	P	686.637						R_d	2.788	K_D	2.23	$K_θ$	1.25
II	169.096 lb	P	471.355	A	3E-04	B	0.782	C -445.36	R_d	2.788	K_D	2.23		
III_m	188.139 lb	P	524.439	A	4E-04	B	0.75	C -494.95	R_d	2.788	K_D	2.23		
III_s	108.822 lb	P	303.341	A	7E-04	B	0.032	C -71.221	R_d	2.788	K_D	2.23		
IV	149.776 lb	P	417.502	A	7E-04	B	0	C -120.81	R_d	2.788	K_D	2.23		

Z	108.822 lb	Ref Value	
Z'	235.055 lb	Adj Value	
RATIO	0.35	**PASS**	

Adjustment Factors [NDS Table 10.3.1]

C_M	C_t	C_g	$C_Δ$	C_d	C_{eg}	C_{st}	C_{di}	C_{tn}	K_F	ϕ	λ
1	1	1	1		1		1	1	3.32	0.65	1

WITHDRAWAL LOADING [NDS 11.2.1]

W	225 lb/in	Reference Value [NDS 11.2-1]	
W'	486 lb/in	Adj Value	
$p_{t,req}$	0.58455 in	Required thread penetration for withdrawal	
$p_{t,req}$	0.625 in	-->Rounded up to nearest 1/8"	
$p_{t,ovr}$	1.5	Override for additional thread penetration	
$p_{t,sel}$	1.500 in		

Adjustment Factors [NDS Table 10.3.1]

C_M	C_t	C_{eg}	K_F	ϕ	λ
1	1	1	3.32	0.65	1

COMBINED LATERAL AND WITHDRAWAL LOADING [NDS 11.4.1]

α	1.28817 rad	=	73.81 deg	
Z_u'	295.83 lb			
$Z_α'$	626.595 lb			Based on $p_{t,sel}$
RATIO	0.47	**PASS**		