

City of Puyallup
Building
ACCEPTED

JMontgomery
08/09/2023
7:11:01 AM

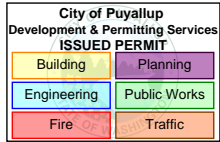


Structural Calculations

For

Red Dot - Mechanical Puyallup, WA

Project # 2220760.21



Project Principal
Project Manager

Andrew D McEachern PE SE
Larry A Higgins PE

Design Criteria

Design Codes and Standards

Codes and Standards: Structural design and construction shall be in accordance with the applicable sections of the following codes and standards as adopted and amended by the local building authority: International Building Code, 2018 Edition.

Structural Design Criteria:

Live Load Criteria:

Roof (Min Blanket Snow) 25 psf

Seismic Criteria:

Risk Category II
Seismic Importance Factor 1.0
 $S_s = 1.43$
 $S_{ds} = 1.03$
Site Class = D (original building)
Seismic Design Category = D
Response Modification Coeff. (Rp): 2.5 $A_p=1$
Seismic Response Coeff. (Fp): 0.49



Project Description

The project consists of adding a couple of large fans and one condenser to the roof of an existing concrete tilt warehouse currently occupied by Red Dot. Units require minor penetrations through plywood roof deck but are sitting in areas not specifically designed for heavy mechanical units. The original building was designed by AHBL and included a 2psf dead load into the building roof structure for minor mechanical units. Calculations show the new units fall into that category so only minor wood sleepers are necessary to support them between the existing roof joists.

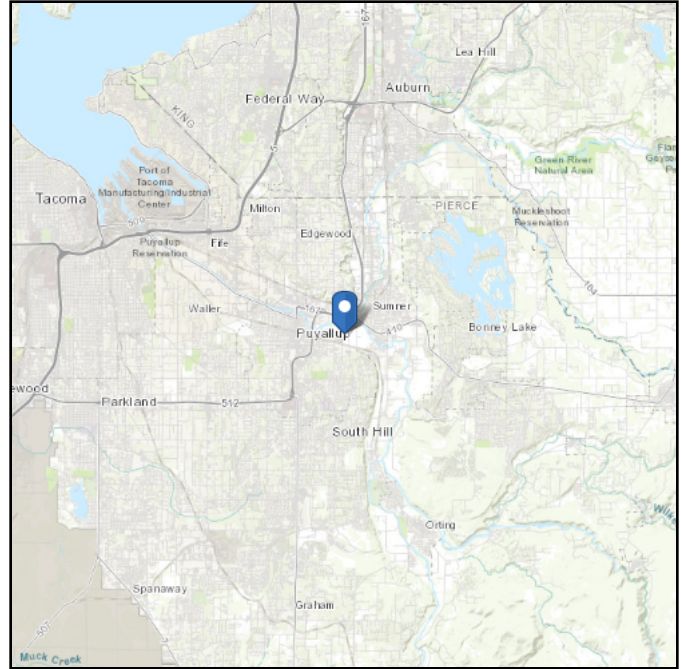
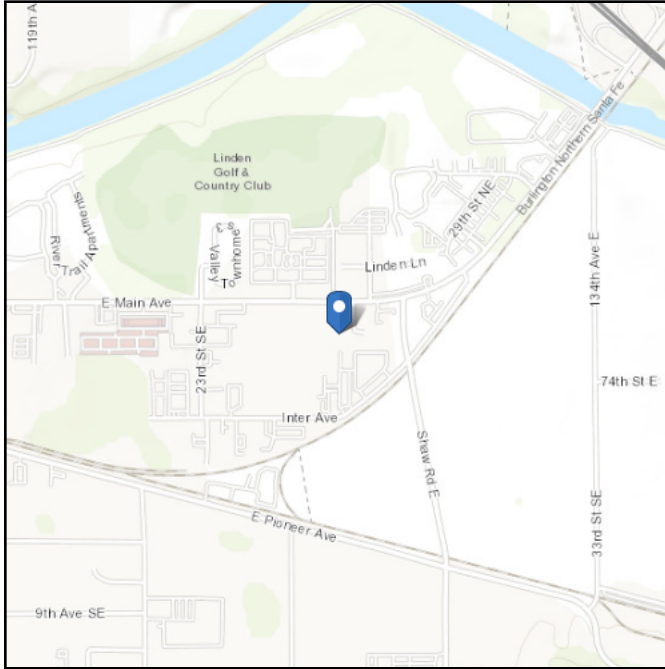


ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 47.1911
Longitude: -122.26
Elevation: 61.13679585729604 ft (NAVD 88)





Seismic

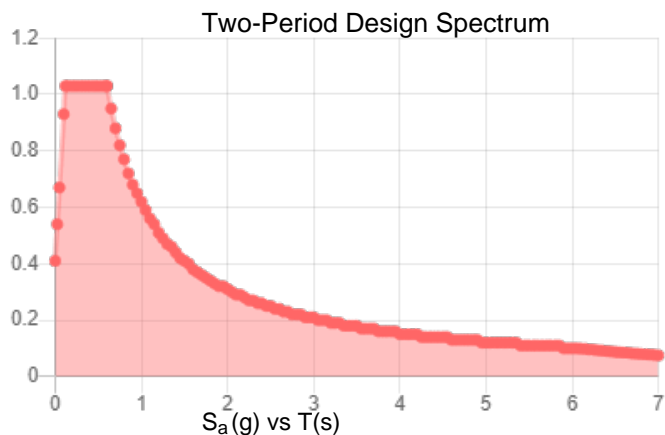
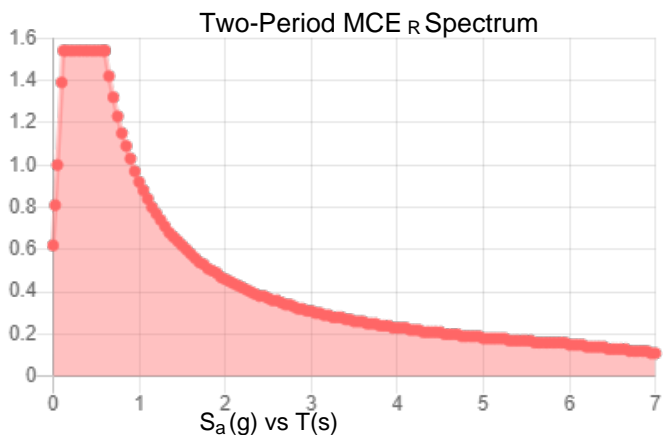
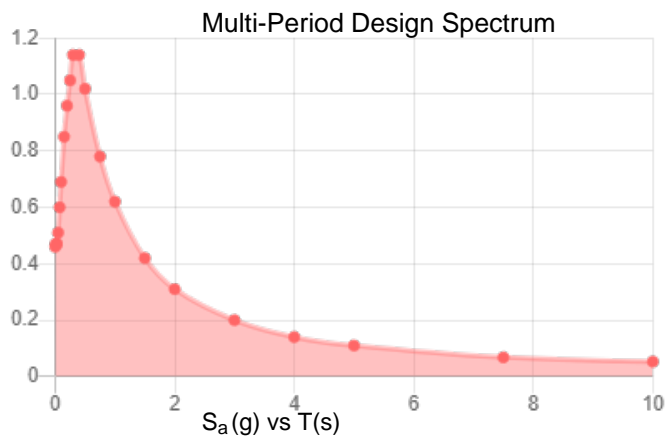
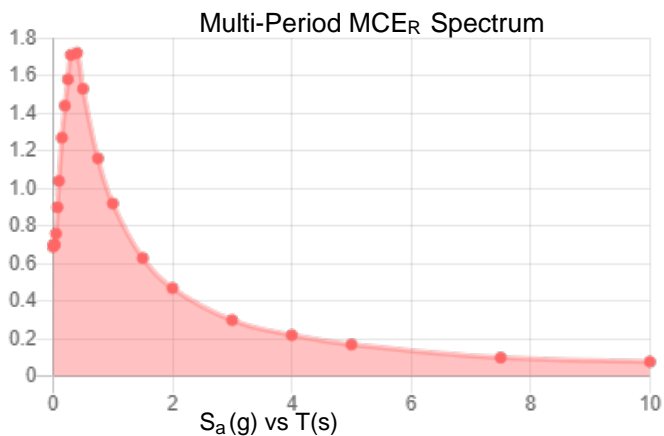
D - Stiff Soil

Site Soil Class:

Results:

PGA _M :	0.53	T _L :	6
S _{MS} :	1.54	S _s :	1.43
S _{M1} :	0.92	S ₁ :	0.44
S _{DS} :	1.03	V _{S30} :	260
S _{D1} :	0.62		

Seismic Design Category: D



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.



Data Accessed: Wed Aug 02 2023

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.



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Project _____ Project No. _____
 Subject _____ Phone _____
 With/To _____ Fax # _____
 Address _____ # Faxed Pages _____
 Date _____ By _____

Mechanical Unit Seismic ASCE 7-16 Chapter 13

Unit Length	$UL := 52 \cdot \text{in}$	Unit Weight	$Wt := 672 \cdot \text{lb/ft}$
Unit Width	$UW := 31 \cdot \text{in}$	$Cg := 32 \cdot \text{in}$	$Curb := 0 \cdot \text{in}$
Unit Height to Cg	$UH := Cg + Curb$	$UH = 2.67 \text{ ft}$	$P := 2 \cdot (UW + UH)$ $P = 10.5 \text{ ft}$
Seismic	$Sds := 1.03$	$Ap := 1$	$Rp := 2.5$ $lp := 1.0$
Unit Elevation	$z := 33.5 \cdot \text{ft}$	Building Roof Elevation	$h := 33.5 \cdot \text{ft}$
	$zh := \frac{z}{h}$ $\text{if}(zh \leq 1, zh, 1) = 1$		
Attachment Load	$Fp1 := Wt \cdot 0.4 \cdot Sds \cdot Ap \cdot lp \cdot \frac{(1 + 2 \cdot zh)}{Rp}$	$Fp1 = 332 \text{ lbf}$	
	$Fpmin := Wt \cdot .3 \cdot Sds \cdot lp$	$Fpmin = 208 \text{ lbf}$	
	$Fp := \text{if}(Fpmin > Fp1, Fpmin, Fp1)$		
	$Fp = 332 \text{ lbf}$	$L := \frac{Fp}{P}$	$L = 31.64 \text{ plf}$ Curb Attachment Load (ult)
		$Lasd := 0.7 \cdot L$	$Lasd = 22.15 \text{ plf}$ Curb Attachment Load (asd)
Overturning Width	$OTMw := Fp \cdot UH$	$OTMw = 885.96 \text{ (ft}\cdot\text{lb/ft)}$	
	$RMw := Wt \cdot \frac{UW}{2}$	$RMw = 868 \text{ (ft}\cdot\text{lb/ft)}$	
	$.9 \cdot D + E$	$Upw := \frac{(OTMw - .9 \cdot RMw)}{UW}$	$Upw = 40.55 \text{ lbf}$ uplift pretty small, typ connection okay by inspection
Overturning Length	$OTMI := Fp \cdot UH$	$OTMI = 885.96 \text{ (ft}\cdot\text{lb/ft)}$	
	$RMI := Wt \cdot \frac{UL}{2}$	$RMI = 1456 \text{ (ft}\cdot\text{lb/ft)}$	
	$.9 \cdot D + E$	$Upl := \frac{(OTMI - .9 \cdot RMI)}{UL}$	$Upl = -97.95 \text{ lbf}$
			No Uplift if Negative

Steel Beam

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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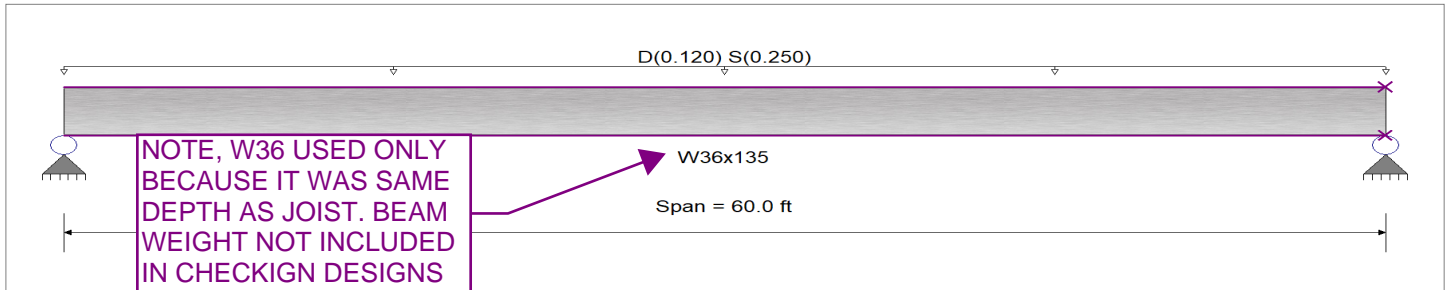
DESCRIPTION: 60' Joist Simulation max Loads

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 50.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0120, S = 0.0250 ksf, Tributary Width = 10.0 ft

MAX MOMENT FOR JOIST WITH DESIGN LOADS

DESIGN SUMMARY

Maximum Bending Stress Ratio =
 Section used for this span
 Ma : Applied
 Mn / Omega : Allowable
 Load Combination
 Span # where maximum occurs

0.131 : 1
W36x135
 166.500 k-ft
~~1,269.960 k-ft~~
 +D+S
 Span # 1

Maximum Shear Stress Ratio =
 Section used for this span
 Va : Applied
 Vn/Omega : Allowable
 Load Combination
 Location of maximum on span
 Span # where maximum occurs

Design OK
0.029 : 1
W36x135
 11.10 k
~~383.713 k~~
 +D+S
 0.000 ft
 Span # 1

Maximum Deflection

Max Downward Transient Deflection 0.324 in Ratio = 2,223 >=360 Span: 1 : S Only
 Max Upward Transient Deflection 0 in Ratio = 0 <360 n/a
 Max Downward Total Deflection 0.479 in Ratio = 1503 >=180 Span: 1 : +D+S
 Max Upward Total Deflection 0 in Ratio = 0 <180 n/a

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only														
Dsgn. L =	60.00 ft	1	0.043	0.009	54.00		54.00	2,120.83	1,269.96	1.00	1.00	3.60	640.80	383.71
+D+S														
Dsgn. L =	60.00 ft	1	0.131	0.029	166.50		166.50	2,120.83	1,269.96	1.00	1.00	11.10	640.80	383.71
+D+0.750S														
Dsgn. L =	60.00 ft	1	0.109	0.024	138.38		138.38	2,120.83	1,269.96	1.00	1.00	9.23	640.80	383.71
+0.60D														
Dsgn. L =	60.00 ft	1	0.026	0.006	32.40		32.40	2,120.83	1,269.96	1.00	1.00	2.16	640.80	383.71

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4792	30.171		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	11.100	11.100
Max Upward from Load Combinations	11.100	11.100
Max Upward from Load Cases	7.500	7.500
D Only	3.600	3.600
+D+S	11.100	11.100
+D+0.750S	9.225	9.225
+0.60D	2.160	2.160

PRMH20231156

AHBL Inc
2215 N. 30th Street; Suite 300
Tacoma, WA 98403
253-383-2422

Project Title: Red Dot HVAC
Engineer: Larry Higgins PE
Project ID: 2220760.21
Project Descr:

Printed: 2 AUG 2023, 11:25AM

Steel Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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DESCRIPTION: 60' Joist Simulation max Loads

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
S Only	7.500	7.500

Steel Beam

LIC#: KW-06014847, Build:20.23.05.25

AHBL, INC

(c) ENERCALC INC 1983-2023

DESCRIPTION: joist simulation with Fans

2PSF REMOVED AND 1/2 MECHANICAL UNIT LOAD ADDED AS IT'S SPLIT BETWEEN TWO JOISTS

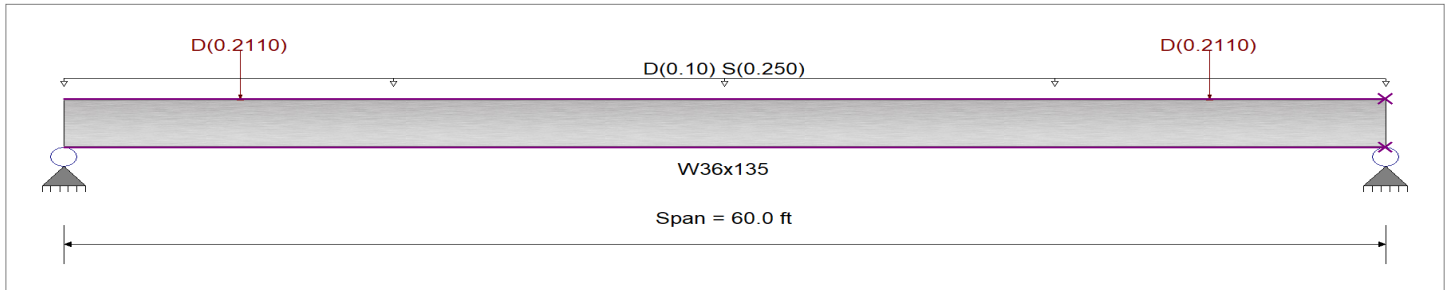
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.010, S = 0.0250 ksf, Tributary Width = 10.0 ft

Point Load : D = 0.2110 k @ 8.0 ft

Point Load : D = 0.2110 k @ 52.0 ft

Ma AND Va WITH UNIT LOADS ARE LESS THAN DESIGN LOADS. UNIT LOCATION OKAY

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.125 : 1	Maximum Shear Stress Ratio =	0.028 : 1
Section used for this span	W36x135	Section used for this span	W36x135
Ma : Applied	159.188 k-ft	Va : Applied	10.711 k
Mn / Omega : Allowable	1,269.960 k-ft	Vn/Omega : Allowable	383.713 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.324 in Ratio = 2,223 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in Ratio = 0 <360	n/a	
Max Downward Total Deflection	0.459 in Ratio = 1569 >=180	Span: 1 : +D+S	
Max Upward Total Deflection	0 in Ratio = 0 <180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega	
D Only														
Dsgn. L = 60.00 ft		1	0.037	0.008	46.69		46.69	2,120.83	1,269.96	1.00	1.00	3.21	640.80	383.71
+D+S														
Dsgn. L = 60.00 ft		1	0.125	0.028	159.19		159.19	2,120.83	1,269.96	1.00	1.00	10.71	640.80	383.71
+D+0.750S														
Dsgn. L = 60.00 ft		1	0.103	0.023	131.06		131.06	2,120.83	1,269.96	1.00	1.00	8.84	640.80	383.71
+0.60D														
Dsgn. L = 60.00 ft		1	0.022	0.005	28.01		28.01	2,120.83	1,269.96	1.00	1.00	1.93	640.80	383.71

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4590	30.171		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	10.711	10.711
Max Upward from Load Combinations	10.711	10.711

PRMH20231156

AHBL Inc
2215 N. 30th Street; Suite 300
Tacoma, WA 98403
253-383-2422

Project Title: Red Dot HVAC
Engineer: Larry Higgins PE
Project ID: 2220760.21
Project Descr:

Printed: 2 AUG 2023, 11:26AM

Steel Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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DESCRIPTION: joist simulation with Fans

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Cases	7.500	7.500
D Only	3.211	3.211
+D+S	10.711	10.711
+D+0.750S	8.836	8.836
+0.60D	1.927	1.927
S Only	7.500	7.500

Steel Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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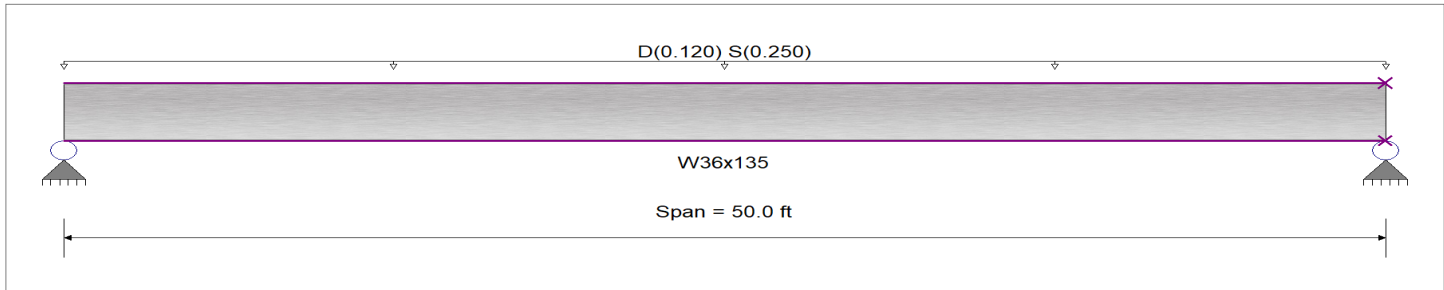
DESCRIPTION: 50' Joist Simulation max Loads

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 50.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0120, S = 0.0250 ksf, Tributary Width = 10.0 ft

ORIGINAL JOIST DESIGN LOADING

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.091 : 1	Maximum Shear Stress Ratio =	0.024 : 1
Section used for this span	W36x135	Section used for this span	W36x135
Ma : Applied	115.625 k-ft	Va : Applied	9.250 k
Mn / Omega : Allowable	1,269.960 k-ft	Vn/Omega : Allowable	383.713 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.156 in Ratio = 3,842 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in Ratio = 0 <360	n/a	
Max Downward Total Deflection	0.231 in Ratio = 2597 >=180	Span: 1 : +D+S	
Max Upward Total Deflection	0 in Ratio = 0 <180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only														
Dsgn. L =	50.00 ft	1	0.030	0.008	37.50		37.50	2,120.83	1,269.96	1.00	1.00	3.00	640.80	383.71
+D+S														
Dsgn. L =	50.00 ft	1	0.091	0.024	115.63		115.63	2,120.83	1,269.96	1.00	1.00	9.25	640.80	383.71
+D+0.750S														
Dsgn. L =	50.00 ft	1	0.076	0.020	96.09		96.09	2,120.83	1,269.96	1.00	1.00	7.69	640.80	383.71
+0.60D														
Dsgn. L =	50.00 ft	1	0.018	0.005	22.50		22.50	2,120.83	1,269.96	1.00	1.00	1.80	640.80	383.71

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2311	25.143		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.250	9.250
Max Upward from Load Combinations	9.250	9.250
Max Upward from Load Cases	6.250	6.250
D Only	3.000	3.000
+D+S	9.250	9.250
+D+0.750S	7.688	7.688
+0.60D	1.800	1.800

PRMH20231156

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2215 N. 30th Street; Suite 300
Tacoma, WA 98403
253-383-2422

Project Title: Red Dot HVAC
Engineer: Larry Higgins PE
Project ID: 2220760.21
Project Descr:

Printed: 2 AUG 2023, 11:25AM

Steel Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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DESCRIPTION: 50' Joist Simulation max Loads

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
S Only	6.250	6.250

Steel Beam

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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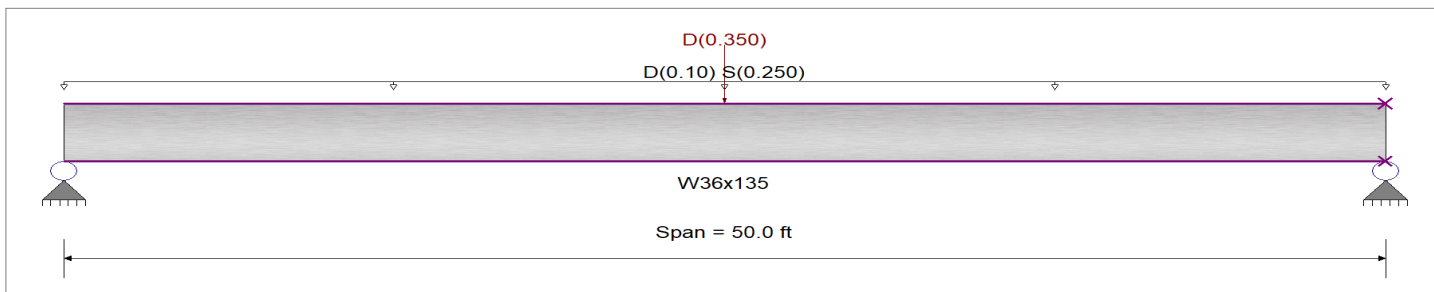
DESCRIPTION: Joist Simulation with Condenser Unit

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending
Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Uniform Load : D = 0.010, S = 0.0250 ksf, Tributary Width = 10.0

Point Load : D = 0.350 k @ 25.0 ft

JST MOMENTS WITH 2PSF REMOVED AND MECHANICAL UNIT ADDED. MOMENT AND SHEAR LESS THAN DESIGN, EXIST JOISTS OKAY WITH UNIT

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.090 : 1	Maximum Shear Stress Ratio =	0.023 : 1
Section used for this span	W36x135	Section used for this span	W36x135
Ma : Applied	113.750 k-ft	Va : Applied	8.925 k
Mn / Omega : Allowable	1,269.960 k-ft	Vn/Omega : Allowable	383.713 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.156 in Ratio = 3,842 >=360	Span: 1 : S Only	
Max Upward Transient Deflection	0 in Ratio = 0 <360	n/a	
Max Downward Total Deflection	0.226 in Ratio = 2660 >=180	Span: 1 : +D+S	
Max Upward Total Deflection	0 in Ratio = 0 <180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only	Dsgn. L = 50.00 ft	1	0.028	0.007	35.63		35.63	2,120.83	1,269.96	1.00	1.00	2.68	640.80	383.71
+D+S	Dsgn. L = 50.00 ft	1	0.090	0.023	113.75		113.75	2,120.83	1,269.96	1.00	1.00	8.93	640.80	383.71
+D+0.750S	Dsgn. L = 50.00 ft	1	0.074	0.019	94.22		94.22	2,120.83	1,269.96	1.00	1.00	7.36	640.80	383.71
+0.60D	Dsgn. L = 50.00 ft	1	0.017	0.004	21.38		21.38	2,120.83	1,269.96	1.00	1.00	1.61	640.80	383.71

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.2256	25.143		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	8.925	8.925
Max Upward from Load Combinations	8.925	8.925
Max Upward from Load Cases	6.250	6.250
D Only	2.675	2.675
+D+S	8.925	8.925

PRMH20231156

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Tacoma, WA 98403
253-383-2422

Project Title: Red Dot HVAC
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Project ID: 2220760.21
Project Descr:

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Steel Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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DESCRIPTION: Joist Simulation with Condenser Unit

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750S	7.363	7.363
+0.60D	1.605	1.605
S Only	6.250	6.250

Wood Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

(c) ENERCALC INC 1983-2023

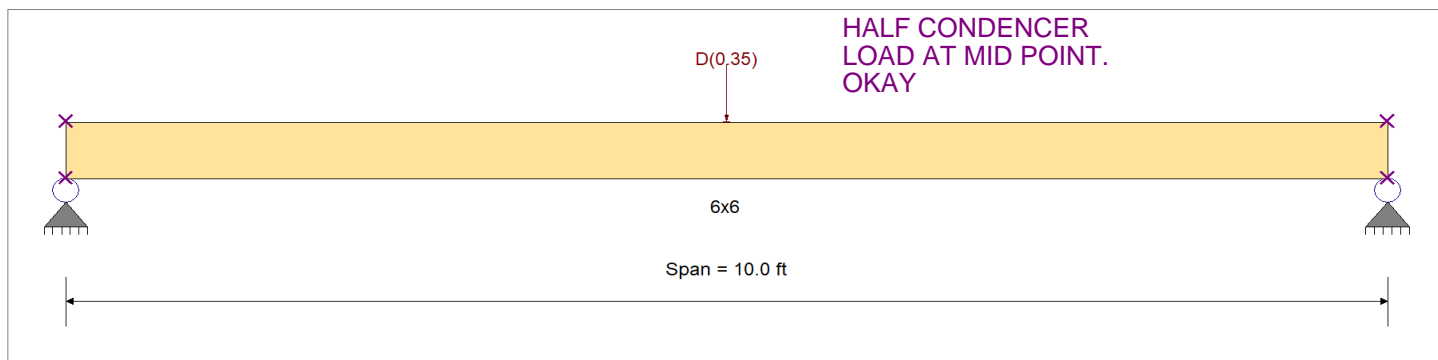
DESCRIPTION: Condenser Support Beam

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
 Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,000.0 psi	E : Modulus of Elasticity	
Load Combination : IBC 2021	Fb -	1,000.0 psi	Ebend- xx	1,300.0ksi
	Fc - Prll	1,000.0 psi	Eminbend - xx	1,300.0ksi
Wood Species : Douglas Fir-Larch (North)	Fc - Perp	1,000.0 psi		
Wood Grade : No. 1/No. 2	Fv	65.0 psi		
	Ft	65.0 psi	Density	34.0pcf
Beam Bracing : Completely Unbraced				



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added
 Point Load : D = 0.350 k @ 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.421 : 1	Maximum Shear Stress Ratio	=	0.148 : 1
Section used for this span		6x6	Section used for this span		6x6
fb: Actual	=	378.66psi	fv: Actual	=	8.68 psi
F'b	=	900.00psi	F'v	=	58.50 psi
Load Combination		D Only	Load Combination		D Only
Location of maximum on span	=	5.000ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Upward Transient Deflection	0 in	Ratio =	0 <360	n/a	
Max Downward Total Deflection	0.128 in	Ratio =	938 >=180	Span: 1 : D Only	
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values				
			M	V	CD	CM	C _t	CLx	C _F	C _{fu}	C _i	C _r	M	fb	F'b	V	fv	F'v		
D Only																				
Length = 10.0 ft	1		0.421	0.148	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.87	378.7	900.0	0.18	8.7	58.5		
+0.60D																				
Length = 10.0 ft	1		0.142	0.050	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.53	227.2	1,600.0	0.11	5.2	104.0		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.1278	5.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.175	0.175

PRMH20231156

AHBL Inc
2215 N. 30th Street; Suite 300
Tacoma, WA 98403
253-383-2422

Project Title: Red Dot HVAC
Engineer: Larry Higgins PE
Project ID: 2220760.21
Project Descr:

Printed: 2 AUG 2023, 1:13PM

Wood Beam

Project File: 2220760_RedDotHVAC.ec6

LIC# : KW-06014847, Build:20.23.05.25

AHBL, INC

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DESCRIPTION: Condenser Support Beam

Vertical Reactions

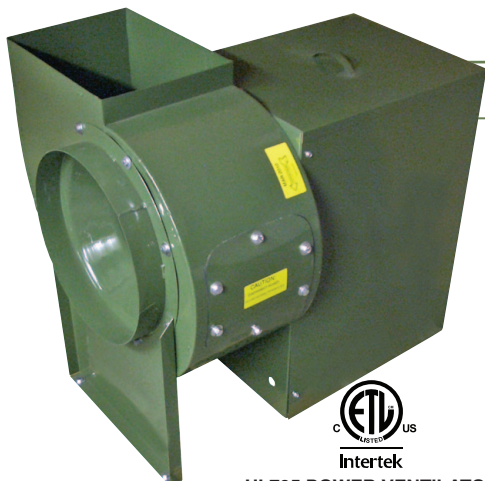
Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from Load Combinations	0.105	0.105
Max Upward from Load Cases	0.175	0.175
D Only	0.175	0.175
+0.60D	0.105	0.105

BI-RM SERIES

Belt Drive Utility Blowers



UL705 POWER VENTILATOR
FOR RESTAURANT
EXHAUST APPLIANCES

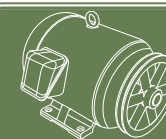
BI-RM/BI-RM-HS SERIES



MOTOR AND DRIVE COMPARTMENT WITH COVER REMOVED TO ILLUSTRATE 3 SIDE MOTOR ACCESS AND SLOPED MOTOR BASE FOR BELT TENSIONING.

FEATURES - BI-RM SERIES

- Complete range of sizes from 10" to 36".
- Full AMCA Class 1 Operation.
- Non-overloading backward inclined (BI) welded wheels.
- Aluminum wheel - (AMCA type B classification for spark resistant construction) - available as an option.
- Aluminum wheels only on BI-RM-30 to BI-RM-36.
- Discharge position can be field rotated to any of 8 discharge positions.
- Counter clock wise rotation is standard. Clock wise available.
- Outlet flanges on models BI-24 to BI-36.
- Temperature Ratings - without a heat slinger 250° F with a heat slinger, steel wheel 400° F, aluminum wheel 300° F.
- Motor access from 3 sides.
- Sloped motor base for ease of motor installation.
- Vented motor and drive compartment cover, with handles, for safety & weather protection.
- 16 gauge or heavier blower housing.
- Heavy duty pillow block ball bearings.
- UL 705 Supplement SC - Power Ventilator for Restaurant Exhaust Appliances Listed for removal of cooking vapours.
- Meets NFPA 96 guidelines.
- Upblast discharge directs exhaust away from roof.
- Integral handles for single person removal of motor and drive compartment cover.
- Continuously welded 16 gauge or heavier blower housing.
- Bolted clean out door.
- 2" drain for easy removal of cleaning solutions.
- Complete range of sizes from 10" to 36".
- Vinyl shaft seal.



AVAILABLE WITH MOTORS & DRIVES FACTORY INSTALLED. CONSULT OUR DELAIR FAN SELECTION SOFTWARE FOR DETAILS.

TYPICAL MAXIMUM CFM @ SP

MODEL	1" SP	2" SP	3" SP	4" SP	5" SP	Min HP	Max HP
BI-RM-10	2300	2050	1700	1500	1300	1/2	2
BI-RM-12*	3200	2950	2675	2350	1925	-	3
BI-RM-13	3900	3625	3400	2975	2450	1/2	5
BI-RM-15*	4775	4450	4075	3650	3000	-	5
BI-RM-16	5700	5350	4900	4300	3500	3/4	7 1/2
BI-RM-18	6175	5600	4925	3900	-	3/4	7 1/2
BI-RM-20	8400	7775	7050	6200	4650	1	7 1/2
BI-RM-22*	10000	9550	8700	7600	5550	-	10
BI-RM-24	11100	10100	8800	6600	-	1 1/2	15
BI-RM-27	15250	14050	12750	11150	8250	1 1/2	15
BI-RM-30-AW	18000	17000	16000	14000	11750	2	15
BI-RM-33-AW	22500	21000	19000	17000	14000	-	20
BI-RM-36-AW	27000	25000	23000	20000	16000	3	25

Power rating (BHP) does not include transmission losses. Performance certified is for installation type B: Free inlet, Ducted outlet. Performance ratings do not include the effect of appurtenances (accessories).

CFM values listed above are summarized for convenience.

FOR FAN CURVES & FULL PERFORMANCE DATA, CONSULT OUR DELAIR SOFTWARE. DOWNLOAD DELAIR @ WWW.CANARM.COM/DELAIR

*SPECIAL ORDER

BI-RM-HS SERIES

Belt Drive Utility Blowers with Heat Slinger for Smoke & Heat

The smoke and heat model of the BI & BI-RM series is suitable for use in clean, dry air with a maximum ambient temperature of 204°C (400°F).

They are designed to exhaust smoke in the event of a fire. It is in compliance with smoke control systems requirements of 500°F for 4 hours and 1000°F for 15 minutes.

FEATURES - BI-RM-HS SERIES

- Sizes from 10" to 24".
- Non-overloading backward inclined (BI) welded steel wheels only.
- Counter clockwise rotation is standard.
- Outlet flanges on model BI-24.
- Heat slinger with vinyl shaft seal.
- Upblast discharge directs exhaust away from roof.



Canarm certifies that the BI-RM Series shown herein are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Programme.

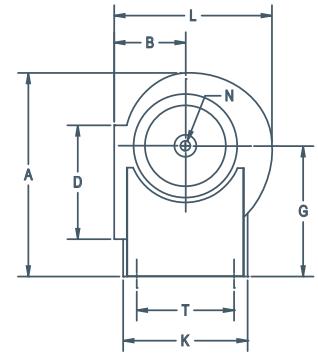
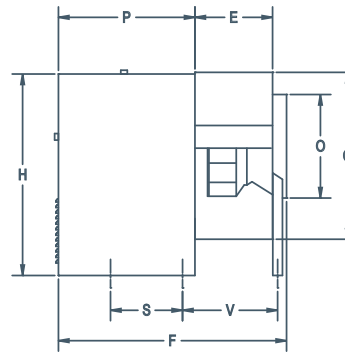
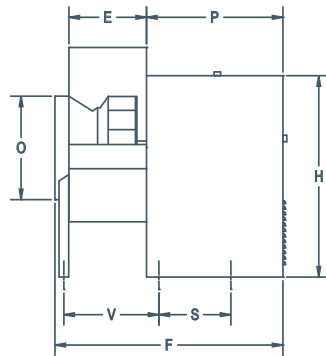
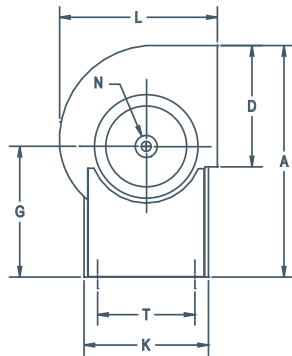


UL705 Supplement SC - Power Ventilator for Restaurant Exhaust Appliances certified, refer to our UL705 Supplement SC - Power Ventilator for Restaurant Exhaust Appliances Catalogue page C in *Roof Mount Ventilation* for all installation requirements

BI & BI-RM SERIES

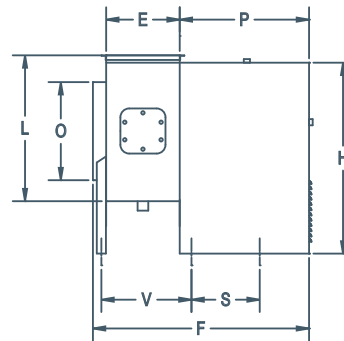
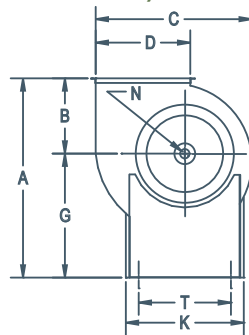
Belt Drive Utility Blowers

DIMENSIONS



MODELS BI-10 TO BI-27
(STANDARD TOP HORIZONTAL DISCHARGE)

MODELS BI-30 TO BI-36
(STANDARD BOTTOM HORIZONTAL DISCHARGE)



MODELS BI-RM(-HS)-10 TO BI-RM(-HS)-24
(UL 762 LISTED FOR REMOVAL OF COOKING VAPOURS)

MODEL	OUTLET																	SHAFT DIA.	INLET		WEIGHT (lbs) without motors
	A (STANDARD MODELS)	A (BI-RM MODELS)	B	C	D	E	F	G	H	K (CABINET WIDTH)	L	N	O	P	S	T	V				
BI-10	26 3/4"	23 5/8"	8 3/8"	19 3/16"	11 5/16"	8 1/4"	27 3/4" No Leg	15 5/6"	21 5/16"	13 1/4"	17 1/2"	3/4"	11"	17 1/4"	11 5/8"	11 1/4"	-	78			
BI-12	33 3/16"	30 3/16"	9 15/16"	27 7/16"	13 1/16"	9 7/8"	33 5/16"	20 3/16"	29 1/8"	16 3/4"	20 9/16"	1"	12 7/16"	21 3/16"	11 1/2"	14 3/4"	13 1/16"	112			
BI-13	34 1/2"	30 15/16"	10 3/4"	24 1/2"	14 3/8"	10 3/4"	34 1/4"	20 3/16"	29 1/8"	16 3/4"	22 7/16"	1"	14 3/8"	21 1/4"	11 1/2"	14 3/4"	14"	134			
BI-15	35 15/16"	31 15/16"	11 3/4"	27 1/4"	15 13/16"	12 3/4"	36 1/4"	20 3/16"	29 1/8"	16 3/4"	24 7/8"	1"	15 7/8"	21 3/16"	11 1/2"	14 3/4"	16"	140			
BI-16	39 7/16"	34 11/16"	12 11/16"	29 15/16"	17 1/2"	13 1/8"	36 5/8"	22"	30 15/16"	16 3/4"	26 15/16"	1 3/16"	17 3/8"	21 1/4"	11 1/2"	14 3/4"	16 1/2"	162			
BI-18	41 5/16"	35 7/8"	13 13/16"	33 3/16"	19 3/8"	14 1/2"	38 1/4"	22"	30 15/16"	16 3/4"	29 9/16"	1 3/16"	19 3/8"	21 1/2"	11 1/2"	14 3/4"	17 7/8"	172			
BI-20	49 3/16"	42 15/16"	14 15/16"	36 7/16"	21 3/16"	15 3/4"	46 3/8"	28"	40 15/16"	25 1/8"	32 3/16"	1 3/16"	21 1/4"	27 5/8"	14 9/16"	22 3/4"	19 3/4"	289			
BI-22	51 9/16"	44 3/8"	16 3/8"	40 7/16"	23 9/16"	17 3/4"	48 7/16"	28"	40 15/16"	25 1/8"	35 9/16"	1 3/16"	23 5/8"	27 5/8"	14 9/16"	22 3/4"	21 13/16"	322			
BI-24	58 3/16"	49 15/16"	17 15/16"	44 11/16"	26 1/8"	19 3/8"	51 5/16"	32 1/8"	46 11/16"	28 15/16"	39 1/8"	1 7/16"	26"	28 15/16"	18 5/16"	26 3/8"	23 3/8"	385			
BI-27	60 11/16"	51 1/2"	19 1/2"	49"	28 11/16"	21 1/4"	53 1/8"	32 1/8"	46 11/16"	28 15/16"	42 13/16"	1 7/16"	28 5/8"	28 7/8"	18 5/16"	26 3/8"	25 1/4"	411			
BI-30	65 15/16"	68 3/16"	24 7/8"	54 1/2"	31 7/8"	23 5/8"	58 5/8"	43 5/16"	65 5/16"	44 5/16"	50 15/16"	1 11/16"	31 3/4"	32"	17"	40"	29"	517			
BI-33	68 3/16"	68 5/8"	25 3/8"	58 15/16"	34 7/8"	25 15/16"	60 15/16"	43 5/16"	65 5/16"	44 5/16"	53 7/8"	1 11/16"	35"	32"	17"	40"	31 5/16"	607			
BI-36	70 7/8"	69"	25 1/2"	66 3/16"	38 9/16"	28 11/16"	63 11/16"	43 5/16"	65 5/16"	44 5/16"	56 15/16"	1 15/16"	38 3/4"	32"	17"	40"	34 1/16"	747			

ACCESSORIES

- V-Cap
- Bolted Clean Out Door
- Heat Slinger
- Vibration Isolators

- Shaft Seal
- Corrosion Resistant Coating
- Aluminum Wheel
- Back Draft Dampers

- Inlet & Outlet Screens
- 2" Drain Fitting

For more information on accessories, see page C14.

VRF Outdoor Unit

38VMA096RDS6-1 - Heat Recovery



Submittal Data

Job Data _____ Location _____
 Buyer _____ Buyer PO # _____ Carrier # _____
 Unit Number _____ Model Number _____
 Performance Data Certified By _____ Date _____



Heat Recovery Features

- Modules available from 6 to 28 tons
- Modules have inverter-driven scroll compressors
- Direct-drive, inverter-driven outdoor motor
- Up to 3280 ft (1000 m) actual total system piping (liquid line)
- 656 ft (200 m) actual piping length from outdoor unit to furthest fan coil
- Up to 3937 ft (1200 m) control wiring between the outdoor units and indoor units
- Operating temperature range Cooling (db): 5° to 125°F (-15° to 52°C)
Heating (wb): -13° to 64°F (-25° to 18°C)
- Protection: high pressure sensor and switch, low pressure sensor and switch, process controller board fuse, inverter overload protection
- 7-year compressor limited warranty
- 5-year parts limited warranty

Header Unit Model		38VMA096RDS6-1
PERFORMANCE		
Nominal Cooling Capacity	Btu/h	96,000
Nominal Heating Capacity	Btu/h	108,000
Maximum Total Connected Indoor Unit Capacity		50% to 150%
SIMULTANEOUS COOLING AND HEATING EFFICIENCY†		
SCHE, Ducted FCUs		27.70
SCHE, Ductless FCUs		30.00
COOLING EFFICIENCY†		
EER/IEER, Ducted FCUs	Btu/Wh	12.40/24.30
Power Consumption, Ducted FCUs	kW	7.10
EER/IEER, Ductless FCUs	Btu/Wh	13.20/23.70
Power Consumption, Ductless FCUs	kW	6.20
HEATING EFFICIENCY†		
COP at 47°F, Ducted FCUs		3.63
Power Consumption, Ducted FCUs	kW	8.00
COP at 47°F, Ductless FCUs		3.82
Power Consumption, Ductless FCUs	kW	7.20
Fan Type (Qty)		Propeller (2)
Airflow, Standard Range	CFM	7600
Sound Pressure	dBA	61.7
External Static Pressure*	in. wg	0.24

LEGEND

db	— Dry Bulb
COP	— Coefficient of Performance
EER	— Energy Efficiency Ratio
FCU	— Fan Coil Unit
IEER	— Integrated Energy Efficiency Ratio
wb	— Wet Bulb
SCHE	— Simultaneous Cooling and Heating Efficiency

ELECTRICAL		
Power Supply	V/Ph/Hz	460/3/60
Minimum Circuit Amps (MCA)	A	22
Recommended Fuse Size	A	30
COMPRESSORS		
Type (Number)		Inverter Hermetic Scroll (1)
FAN MOTOR		
Motor Type (Steps)		Inverter Direct Driven (13)
Motor Output	kW	2 x 0.21
PHYSICAL DATA		
Pipe Connection Size - Liquid (High Pressure)	in.	3/4 (Brazed)
Pipe Connection Size - Gas (Low Pressure)	in.	7/8 (Brazed)
Refrigerant		R-410A
Factory Charge††	lb	26.5
Unit Width	in.	52-3/4
Unit Height	in.	64-3/8
Unit Depth	in.	31-1/8
Net Weight	lb	672

†Rated per AHRI (Air-Conditioning, Heating and Refrigeration Institute) 1230 Standard.

Cooling: Indoor 80°F (27°C) db/67°F (20°C) wb; Outdoor 95°F (35°C) db

Heating: Indoor 70°F (21°C) db; Outdoor 47°F (8°C) db/43°F (6°C) wb

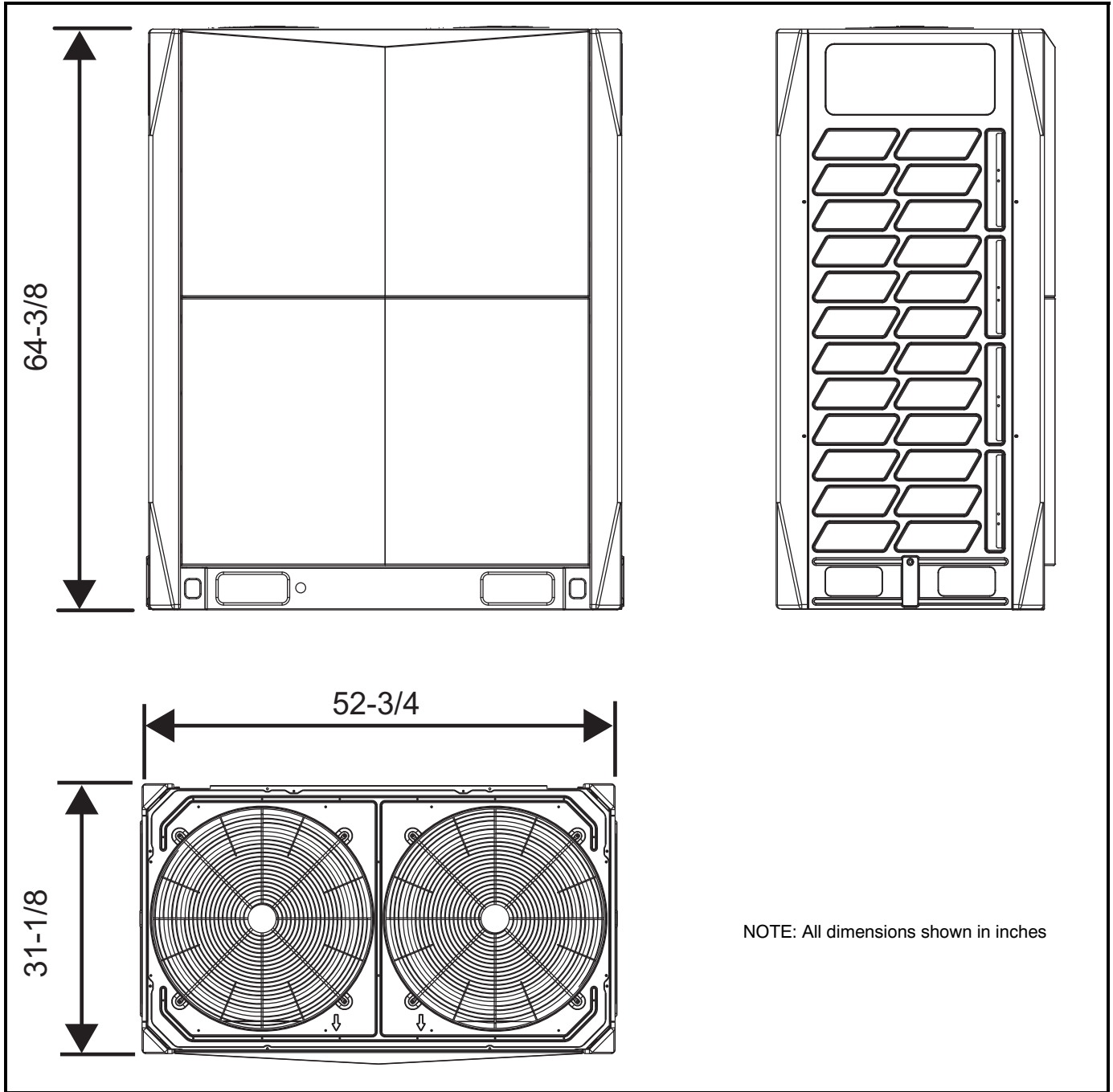
*Requires setting by menu functions.

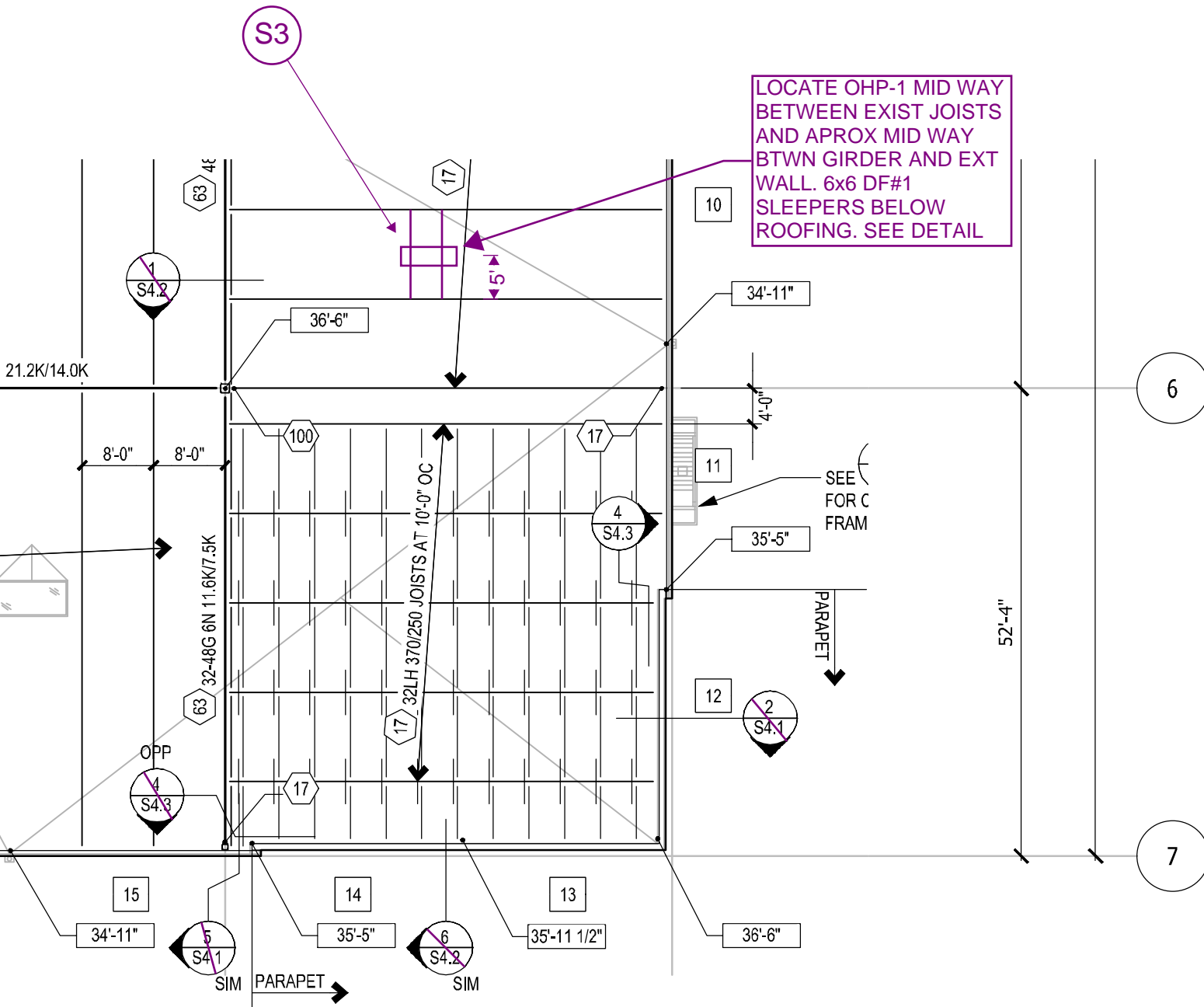
††Additional charge required.

NOTE: Unit cabinet and coil slab shall be capable of withstanding 500-hour salt spray test.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

DIMENSIONAL DRAWING OUTDOOR UNIT 38VMA096RDS6-1

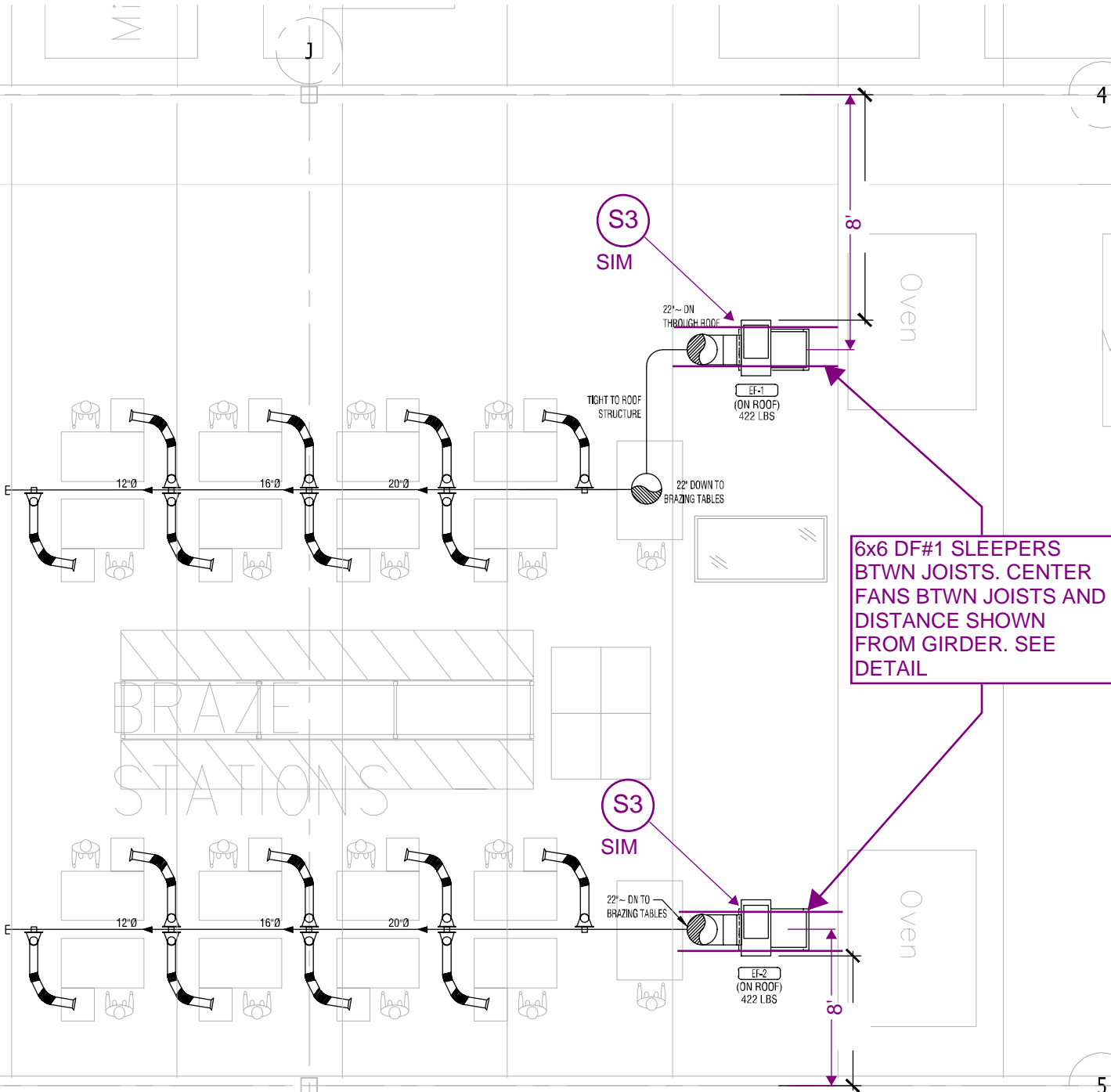




PARTIAL ROOF PLAN SOUTHEAST CORNER OF EXISTING BUILDING

AHBL INC.
 LARRY HIGGINS PE
 8-1-2023
 RED DOT MECHANICAL
 2220760.21

S1



PARTIAL ROOF PLAN FOR FAN (FF) UNITS. SEE MECHANICAL

AHBL INC.
LARRY HIGGINS PE
8-1-2023
RED DOT MECHANICAL
2220760.21

S2

CENTER UNIT BETWEEN ROOF JOISTS FOR EVEN DISTRIBUTION OF WEIGH TO JOISTS

FRONT VIEW

SIDE VIEW

UNIT SHOWN IS OHP-1. FANS FF-1 & FF-2 SIMILAR

1" X 3/8" THROUGH FOOT OF UNIT TO 1-5/8" UNISTRUT

NEOPRENE ISOLATION PAD, TYPICAL OF 4 POINTS OF CONNECTION

1" X 3/8" BOLT FROM UNI-STRUT TO ANGLE BRACKET

2" X 3/8" LAG BOLT FILL HOLE WITH SILICONE CAULK

SLEEPER BASE CONSTRUCTED OF P.T. 6X_ AND COVERED WITH 26 GA. GALVANIZED FLASHING SHEET WITH 2" LIP.

FLASHING

RIP CURB AS REQ'D TO PROVIDE LEVEL TOP

SEE ARCHITECTURAL DETAILS AND SPECIFICATIONS FOR ROOFING WORK

6x6 DF#1 BTWN JOISTS. ATTACH 6X12 TO 6X6 USING 1/4"x8" LAG BOLTS AT 8"OC, CTR SINK 6x AS REQ

exist joist, ctr unit btwn

FLASHING

6x12 at unit

6X6 btwn exist joists

SEE ARCHITECTURAL DETAILS AND SPECIFICATIONS FOR ROOFING WORK

ATTACH 6X TO ROOF DECK USING SIMPSON A34 CLIPS (8) PER 6X (4)EA SIDE. ONE PAIR AT EA END AND ONE PAIR EA END OF 6X12. ATTACH W/ SIMPSON SDS #9x1 1/2" SCREWS

1" X 3/8" THROUGH FOOT OF UNIT TO 1-5/8" UNISTRUT

NEOPRENE ISOLATION PAD, TYPICAL OF 4 POINTS OF CONNECTION

1" X 3/8" BOLT FROM UNI-STRUT TO ANGLE BRACKET

SLEEPER BASE CONSTRUCTED OF P.T. 6X_ AND COVERED WITH 26 GA. GALVANIZED FLASHING SHEET WITH 2" LIP.

RIP CURB AS REQ'D TO PROVIDE LEVEL TOP

3" min

3 M1.00

DETAIL - ROOFTOP HEAT PUMP CURB

SCALE: N.T.S.

MDC09