OLLMANN ERNEST MARTIN ARCHITECTS
509 South State Street
Belvidere, Illinois 61008
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February 19, 2016

Mr. Randall R. Dahmen, P.E.
Engineering Consultant, WI Division of Industry Services

Transaction ID No. 2662586
Site ID No. 803873
RE: Culvers of Waukesha
840 W. Sunset Dr.
Waukesha, WI 53189
Review Comments: 02/11/2016

Mr. Dahmen:

We have responded to your review comments as follows; item numbers correspond to the numbered items in the review.

Item 1 SPS 361.31(2): *See attached stamped/signed structural calculation.*

Item 2 SPS 361.31(2): *See attached stamped/signed HVAC Load Analysis.*

Item 3 SPS 361.31(2)(e): *See attached stamped/signed structural calculation.*

Item 4 SPS 361.31(2)(e): *See attached stamped/signed structural calculation.*

Item 5 SPS 361.31(2) & IBC 1608: *See attached stamped/signed structural calculation. There is a little step between the existing and the new addition; however, the tapered insulation makes up for this step. We have revised the spacing of the joists for the addition. See attached sheet S102 to show the 2x12s are at 12" o.c.*

Item 6 IBC 715.4.10: *As indicated in Specification section 083400 Overhead Coiling Fire Doors, the coiling door is a 1.5 hour rated door with self resetting test operation. Per 2.01:F: the door has an automatic closing operation at 165 degree thermal (fusible) link positioned at each side of wall, with manual over ride release.*

Item 7 IBC 703.6: *Per Specification section 083400 Overhead Coiling Fire Doors:2.01:K: the fire shutter is to be provided with a permanently affixed UL label indicating class of door.*

Item 8 IBC 716.4: *Note has been added to keynote #4 on attached sheet M101.*

Item 9 IFGC 401/SPS 365.0400: *Note has been added to General Note #13 on attached sheet M101.*

Item 10 IECC 403.2.2/IECC 503.2.7/IMC 603.9: *Note has been added to Specification section 233113 Ductwork:3:A on page 3.*

Item 11 IBC 1101.2/ANSI A117.1-308.2 & 3: *Note has been added at Stat locations on attached sheet M101.*

Additional Documents:

Structural Calculations, HVAC Load Analysis, Spec Section 233113, S102 and M101.

Please feel free to contact me with any questions or comments.

Sincerely,

Todd William Ost, AIA
Ollmann Ernest Martin Architects
Cc: File

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JOB TITLE Waukesha Culvers

JOB NO. 2015-093 SHEET NO.
CALCULATED BY DATE 2/4/16
CHECKED BY DATE .

CS12 Ver 2013.07.01 www.struware.com

STRUCTURAL CALCULATIONS

FOR

Waukesha Culvers

Waukesha, Wisconsin

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Code Search

Code: Wisconsin Bldg Code

Occupancy:

Occupancy Group = A Assembly

Occupancy Category & Importance Factors:

Occupancy Category = II

Wind factor =	1.00
Snow factor =	1.00
Seismic factor =	1.00

Type of Construction:

Fire Rating:

Roof =	0.0 hr
Floor =	0.0 hr

Building Geometry:

Roof angle (θ)	0.25 / 12	1.2 deg
Building length (L)	26.0 ft	
Least width (B)	25.0 ft	
Mean Roof Ht (h)	12.0 ft	
Parapet ht above grd	16.0 ft	
Minimum parapet ht	4.0 ft	

Live Loads:

Roof

0 to 200 sf:	20 psf
200 to 600 sf:	24 - 0.02Area, but not less than 12 psf
over 600 sf:	12 psf

Floor:

Typical Floor	50 psf
Partitions	15 psf
Corridors above first floor	80 psf
Lobbies & first floor corridors	100 psf
Balconies (exterior) - same as occupa	50 psf

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Wind Loads : ASCE 7 - 05

Basic Wind Speed	90 mph
Importance Factor	1.00
Occupancy Category	II
Exposure Category	B
Enclosure Classif.	Enclosed Building
Internal pressure	+/-0.18
Directionality (Kd)	0.85
Kh case 1	0.701
Kh case 2	0.575
Type of roof	Monoslope

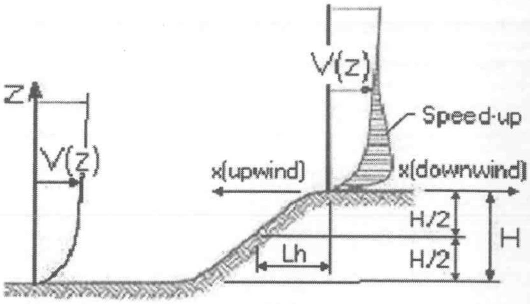
Topographic Factor (Kzt)

Topography	Flat
Hill Height (H)	80.0 ft
Half Hill Length (Lh)	100.0 ft
Actual H/Lh =	0.80
Use H/Lh =	0.50
Modified Lh =	160.0 ft
From top of crest: x =	50.0 ft
Bldg up/down wind?	downwind

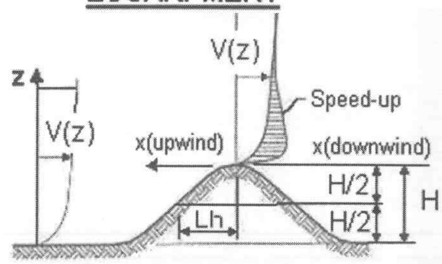
H/Lh= 0.50	K_1 =	0.000
x/Lh = 0.31	K_2 =	0.792
z/Lh = 0.09	K_3 =	1.000

At Mean Roof Ht:

$Kzt = (1+K_1K_2K_3)^2 =$ 1.00



ESCARPMENT



2D RIDGE or 3D AXISYMMETRICAL HILL

Gust Effect Factor

h =	12.0 ft
B =	25.0 ft
/z (0.6h) =	30.0 ft

Flexible structure if natural frequency < 1 Hz (T > 1 second).
However, if building h/B < 4 then probably rigid structure (rule of thumb).
h/B = 0.48 Rigid structure

G = 0.85 Using rigid structure default

Rigid Structure

ē =	0.33
ℓ =	320 ft
z_{min} =	30 ft
c =	0.30
g_Q, g_v =	3.4
L_z =	310.0 ft
Q =	0.93
I_z =	0.30
G =	0.88 use G = 0.85

Flexible or Dynamically Sensitive Structure

Natural Frequency (η_1) =	0.0 Hz				
Damping ratio (β) =	0				
/b =	0.45				
/α =	0.25				
Vz =	58.0				
N_1 =	0.00				
R_n =	0.000				
R_h =	28.282	η =	0.000	h =	12.0 ft
R_B =	28.282	η =	0.000		
R_L =	28.282	η =	0.000		
g_R =	0.000				
R =	0.000				
G =	0.000				

Enclosure Classification

Test for Enclosed Building: A building that does not qualify as open or partially enclosed.

Test for Open Building: All walls are at least 80% open.
$A_o \geq 0.8A_g$

Test for Partially Enclosed Building:

	Input			Test	
Ao	0.0	sf	Ao ≥ 1.1Aoi	YES	
Ag	0.0	sf	Ao > 4' or 0.01Ag	NO	
Aoi	0.0	sf	Aoi / Agi ≤ 0.20	NO	Building is NOT
Agi	0.0	sf			Partially Enclosed

Conditions to qualify as Partially Enclosed Building. Must satisfy all of the following:
- Ao ≥ 1.1Aoi
- Ao > smaller of 4' or 0.01 Ag
- Aoi / Agi ≤ 0.20

Where:
Ao = the total area of openings in a wall that receives positive external pressure.
Ag = the gross area of that wall in which Ao is identified.
Aoi = the sum of the areas of openings in the building envelope (walls and roof) not including Ao.
Agi = the sum of the gross surface areas of the building envelope (walls and roof) not including Ag.

Reduction Factor for large volume partially enclosed buildings (Ri) :

If the partially enclosed building contains a single room that is unpartitioned , the internal pressure coefficient may be multiplied by the reduction factor Ri.

Total area of all wall & roof openings (Aog):		0 sf
Unpartitioned internal volume (Vi) :		0 cf
	Ri =	1.00

Altitude adjustment to constant 0.00256 (caution - see code) :

Altitude = 0 feet
Constant = 0.00256

Average Air Density = 0.0765 lbm/ft^3

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Agi	0.0	sf			Partially Enclosed

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- $A_o >$ smaller of 4' or 0.01 Ag
- $A_{oi} / A_{gi} \leq 0.20$

Where:
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Wind Loads - MWFRS all h (Enclosed/partially enclosed only)

Kh (case 2) =	0.57	h =	12.0 ft	GCpi =	+/-0.18
Base pressure (q_h) =	**10.1 psf**	ridge ht =	12.3 ft	G =	0.85
Roof Angle (θ) =	1.2 deg	L =	26.0 ft	qi = qh	
Roof tributary area - (h/2)*L:	156 sf	B =	25.0 ft		
(h/2)*B:	150 sf				

Nominal Wind Surface Pressures (psf)

	Wind Normal to Ridge				**Wind Parallel to Ridge**				
	B/L = 0.96		h/L = 0.48		L/B = 1.04			h/L = 0.46	
Surface	Cp	q_hGC_p	w/+q_iGC_{pi}	w/-q_hGC_{pi}	Dist.*	Cp	q_hGC_p	w/ +q_iGC_{pi}	w/ -q_hGC_{pi}
Windward Wall (WW)	0.80	6.9	see table below			0.80	6.9	see table below	
Leeward Wall (LW)	-0.50	-4.3	-6.1	-2.5		-0.49	-4.2	-6.1	-2.4
Side Wall (SW)	-0.70	-6.0	-7.9	-4.2		-0.70	-6.0	-7.9	-4.2
Leeward Roof (LR)		**				Included in windward roof			
Windward Roof: 0 to h/2*	-0.90	-7.7	-9.6	-5.9	0 to h/2*	-0.90	-7.7	-9.6	-5.9
h/2 to h*	-0.90	-7.7	-9.6	-5.9	h/2 to h*	-0.90	-7.7	-9.6	-5.9
h to 2h*	-0.50	-4.31	-6.13	-2.48	h to 2h*	-0.50	-4.3	-6.1	-2.5
> 2h*	-0.30	-2.58	-4.41	-0.76	> 2h*	-0.30	-2.6	-4.4	-0.8

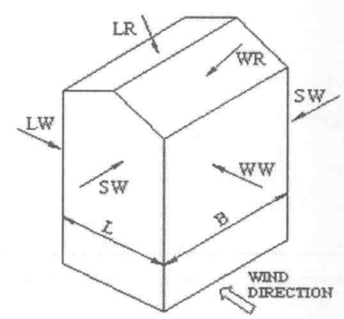
**Roof angle < 10 degrees. Therefore, leeward roof is included in windward roof pressure zones.

*Horizontal distance from windward edge

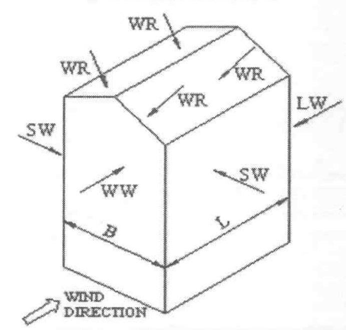
For monoslope roofs, entire roof surface is either windward or leeward surface.

Windward Wall Pressures at "z" (psf)

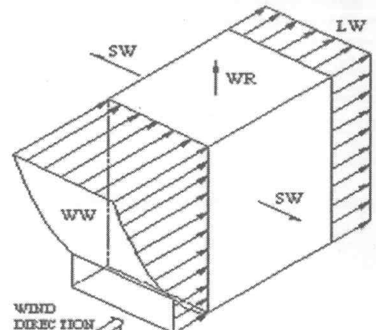
				Windward Wall			Combined WW + LW	
	z	Kz	Kzt	q_zGC_p	w/+q_iGC_{pi}	w/-q_hGC_{pi}	Normal to Ridge	Parallel to Ridge
h=	0 to 15'	0.57	1.00	6.9	5.1	8.7	11.2	11.1



WIND NORMAL TO RIDGE



WIND PARALLEL TO RIDGE



TYPICAL WIND LOADING

NOTE:
See figure in ASCE7 for the application of full and partial loading of the above wind pressures. There are 4 different loading cases.

Parapet

z	Kz	Kzt	qp (psf)
16.0 ft	0.59	1.00	10.3

Windward parapet: 15.5 psf (GCpn = +1.5)
Leeward parapet: -10.3 psf (GCpn = -1.0)

Windward roof overhangs (add to windward roof pressure) : 6.9 psf (upward)

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Wind Loads - MWFRS h≤60' (Low-rise Buildings) Enclosed/partially enclosed only

Kz = Kh (case 1) = 0.70
Base pressure (qh) = **12.3 psf**
GCpi = +/-0.18

Edge Strip (a) = 3.0 ft
End Zone (2a) = 6.0 ft
Zone 2 length = 12.5 ft

Wind Pressure Coefficients

	Transverse Direction			Longitudinal Direction		
	Perpendicular θ = 1.2 deg			Parallel θ = 0.0		
Surface	GCpf	w/-GCpi	w/+GCpi	GCpf	w/-Gcpi	w/+GCpi
1	0.40	0.58	0.22	0.40	0.58	0.22
2	-0.69	-0.51	-0.87	-0.69	-0.51	-0.87
3	-0.37	-0.19	-0.55	-0.37	-0.19	-0.55
4	-0.29	-0.11	-0.47	-0.29	-0.11	-0.47
5	-0.45	-0.27	-0.63	-0.45	-0.27	-0.63
6	-0.45	-0.27	-0.63	-0.45	-0.27	-0.63
1E	0.61	0.79	0.43	0.61	0.79	0.43
2E	-1.07	-0.89	-1.25	-1.07	-0.89	-1.25
3E	-0.53	-0.35	-0.71	-0.53	-0.35	-0.71
4E	-0.43	-0.25	-0.61	-0.43	-0.25	-0.61

Nominal Wind Surface Pressures (psf)

1		7.2	2.7		7.2	2.7
2		-6.3	-10.7		-6.3	-10.7
3		-2.3	-6.8		-2.3	-6.8
4		-1.4	-5.8		-1.4	-5.8
5		-3.3	-7.8		-3.3	-7.8
6		-3.3	-7.8		-3.3	-7.8
1E		9.8	5.3		9.8	5.3
2E		-11.0	-15.4		-11.0	-15.4
3E		-4.3	-8.8		-4.3	-8.8
4E		-3.1	-7.5		-3.1	-7.5

Parapet

Windward parapet = 18.5 psf (GCpn = +1.5)
Leeward parapet = -12.3 psf (GCpn = -1.0)

Windward roof overhangs = 8.4 psf (upward) add to windward roof pressure

Horizontal MWFRS Simple Diaphragm Pressures (psf)

Transverse direction (normal to L)

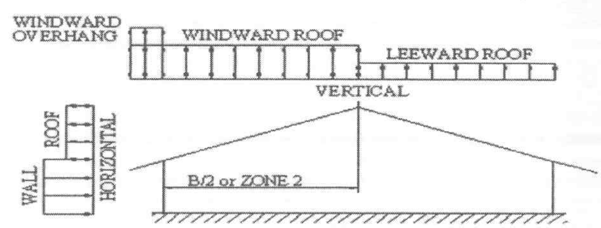
Interior Zone: Wall 8.5 psf
Roof -4.0 psf **
End Zone: Wall 12.8 psf
Roof -6.7 psf **

Longitudinal direction (parallel to L)

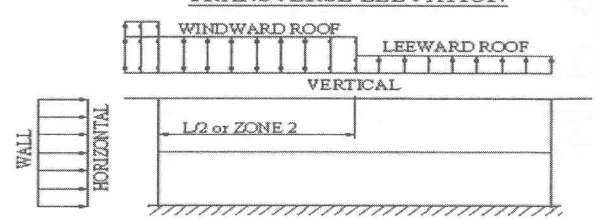
Interior Zone: Wall 8.5 psf
End Zone: Wall 12.8 psf

** NOTE: Total horiz force shall not be less than that determined by neglecting roof forces (except for MWFRS moment frames).

The code requires the MWFRS as a minimum be designed for a 10 psf force applied to the vertical projection of the structure.



TRANSVERSE ELEVATION



LONGITUDINAL ELEVATION

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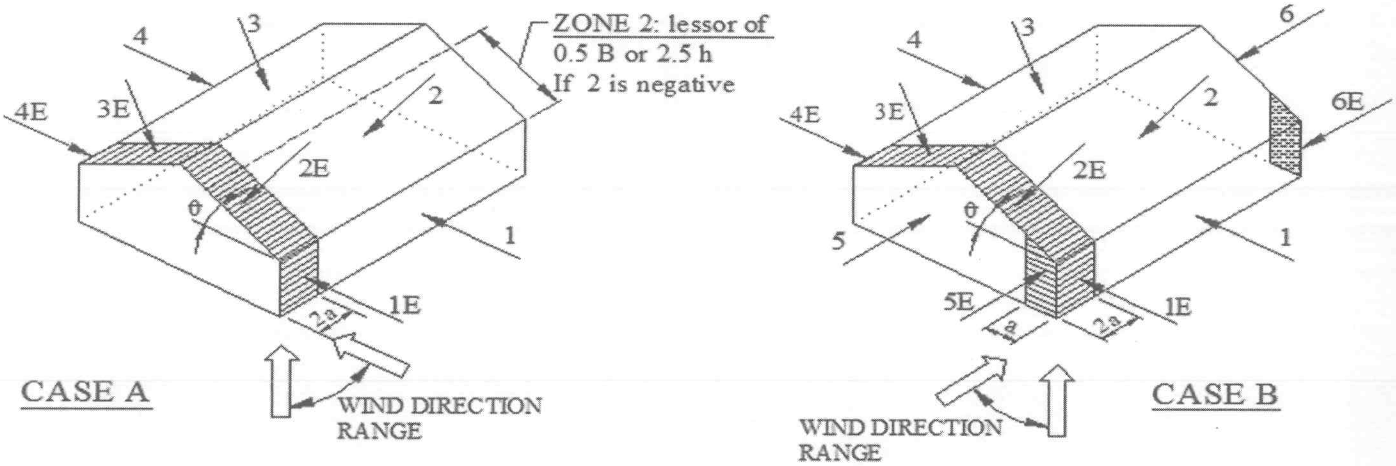
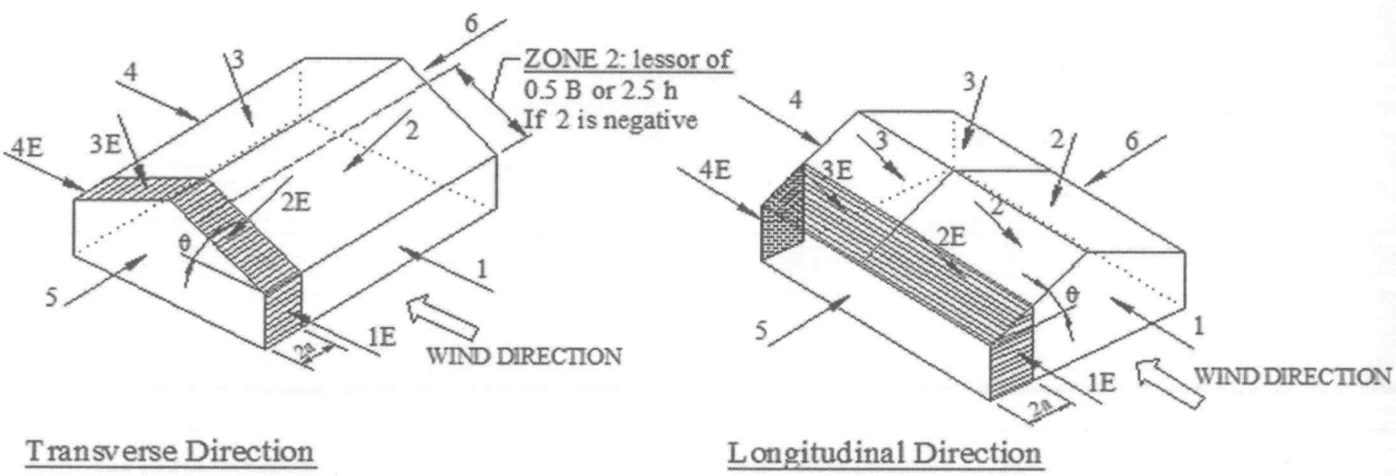
Location of MWFRS Wind Pressure Zones



NOTE: Torsional loads are 25% of zones 1 - 6. See code for loading diagram.

~~ASCE 7 -99 and ASCE 7-10 (& later)~~



NOTE: Torsional loads are 25% of zones 1 - 4. See code for loading diagram.

ASCE 7 -02 and ASCE 7-05

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Nominal Wind Pressures

Wind Loads - Components & Cladding : h <= 60'

Kh (case 1) =	0.70	h =	12.0 ft
Base pressure (qh) =	**12.3 psf**	a =	3.0 ft
Minimum parapet ht =	4.0 ft	GCpi =	+/-0.18
Roof Angle (θ) =	1.2 deg		
Type of roof =	Monoslope		

Roof

	GCp +/- GCpi			Surface Pressure (psf)			User input	
Area	10 sf	50 sf	100 sf	10 sf	50 sf	100 sf	75 sf	500 sf
Negative Zone 1	-1.18	-1.11	-1.08	-14.6	-13.7	-13.3	-13.5	-13.3
Negative Zone 2	-1.98	-1.49	-1.28	-24.4	-18.4	-15.8	-16.9	-15.8
Negative Zone 3	-1.98	-1.49	-1.28	-24.4	-18.4	-15.8	-16.9	-15.8
Positive Zone 1	0.48	0.41	0.38	10.0	10.0	10.0	10.0	10.0
Positive Zones 2 & 3	1.08	0.97	0.92	13.3	12.0	11.4	11.6	10.0
Overhang Zone 1&2	-1.70	-1.63	-1.60	-21.0	-20.1	-19.8	-19.9	-13.6
Overhang Zone 3	-1.70	-1.63	-1.60	-21.0	-20.1	-19.8	-19.9	-13.6

Negative zone 3 = zone 2, since parapet >= 3ft.
Overhang pressures in the table above assume an internal pressure coefficient (Gcpi) of 0.0

Parapet

qp = 12.3 psf

CASE A = pressure towards building (pos)
CASE B = pressure away from bldg (neg)

	Surface Pressure (psf)			User input
Solid Parapet Pressure	10 sf	100 sf	500 sf	40 sf
CASE A : Interior zone:	33.3	22.7	21.4	27.0
Corner zone:	33.3	22.7	21.4	27.0
CASE B : Interior zone:	-23.3	-19.4	-16.7	-21.0
Corner zone:	-26.7	-20.8	-16.7	-23.1

Walls

	GCp +/- GCpi			Surface Pressure (psf)			User input	
Area	10 sf	100 sf	500 sf	10 sf	100 sf	500 sf	50 sf	200 sf
Negative Zone 4	-1.17	-1.01	-0.90	-14.4	-12.5	-11.1	-13.1	-11.9
Negative Zone 5	-1.44	-1.12	-0.90	-17.8	-13.9	-11.1	-15.0	-12.7
Positive Zone 4 & 5	1.08	0.92	0.81	13.3	11.4	10.0	12.0	10.8

Note: GCp reduced by 10% due to roof angle <= 10 deg.

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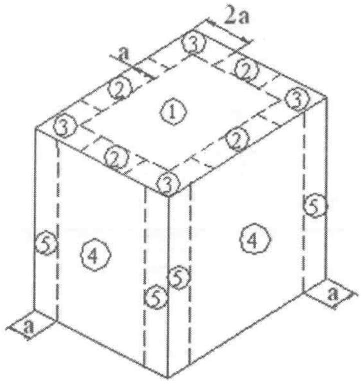
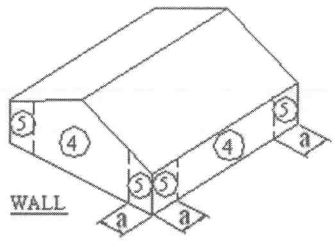
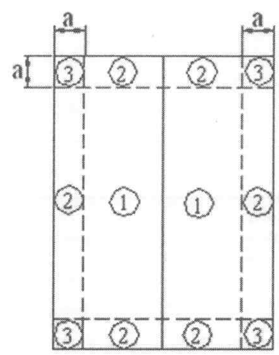
Location of C&C Wind Pressure Zones



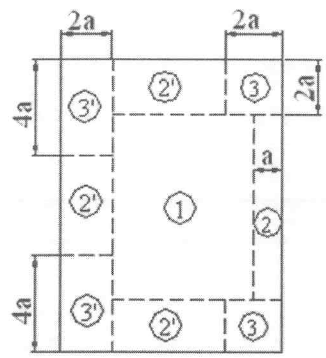
Roofs w/ θ ≤ 10°
and all walls
h > 60'



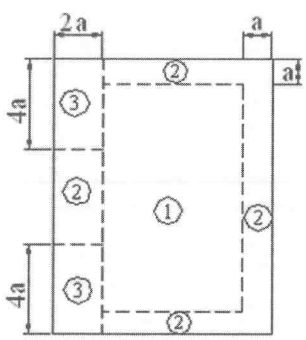
Walls h ≤ 60'
& alt design h<90'



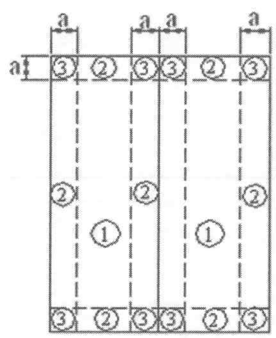
Gable, Sawtooth and
Multispan Gable θ ≤ 7 degrees &
Monoslope ≤ 3 degrees
h ≤ 60' & alt design h<90'



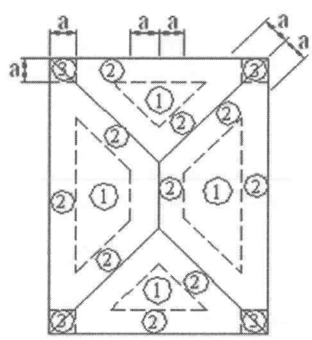
Monoslope roofs
3° < θ ≤ 10°
h ≤ 60' & alt design h<90'



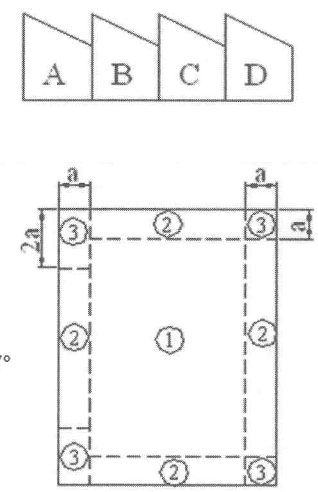
Monoslope roofs
10° < θ ≤ 30°
h ≤ 60' & alt design h<90'



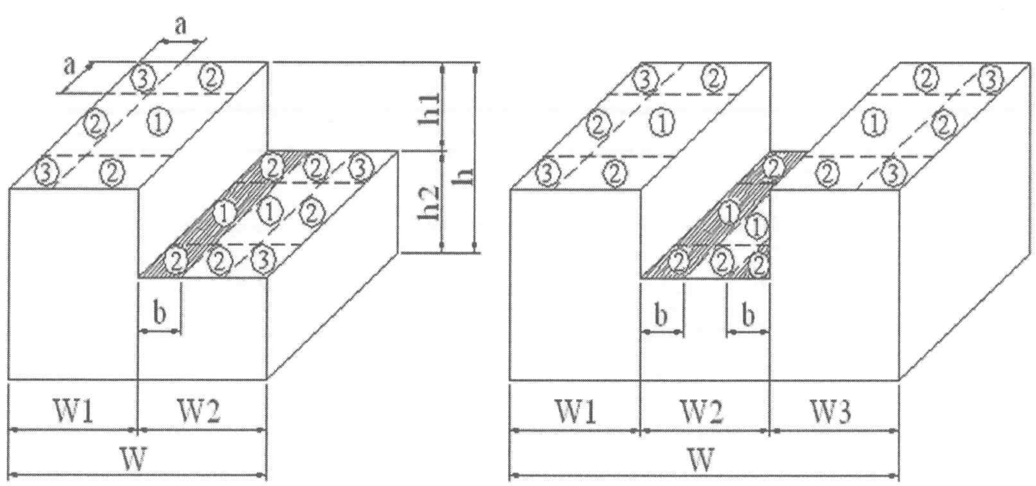
Multispan Gable &
Gable 7° < θ ≤ 45°



Hip 7° < θ ≤ 27°



Sawtooth 10° < θ ≤ 45°
h ≤ 60' & alt design h<90'



Stepped roofs θ ≤ 3°
h ≤ 60' & alt design h<90'

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Snow Loads : ASCE 7-05

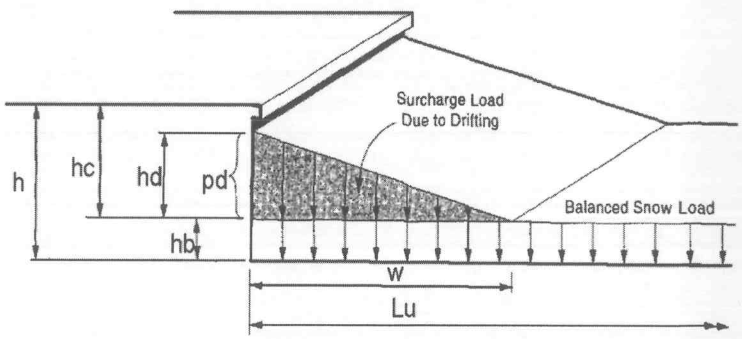
Nominal Snow Forces

Roof slope		=	1.2 deg
Horiz. eave to ridge dist (W)		=	25.0 ft
Roof length parallel to ridge (L)		=	26.0 ft
Type of Roof			Monoslope
Ground Snow Load	Pg	=	30.0 psf
Occupancy Category		=	II
Importance Factor	I	=	1.0
Thermal Factor	Ct	=	1.00
Exposure Factor	Ce	=	1.0
Pf = 0.7*Ce*Ct*I*Pg		=	21.0 psf
Unobstructed Slippery Surface			yes
Sloped-roof Factor	Cs	=	1.00
Balanced Snow Load	**Ps**	**=**	**21.0 psf**
Rain on Snow Surcharge Angle			0.50 deg
Code Maximum Rain Surcharge			5.0 psf
Rain on Snow Surcharge		=	0.0 psf
Ps plus rain surcharge		=	21.0 psf
Minimum Snow Load	Pfmin	=	20.0 psf
Uniform Roof Design Snow Load		=	**21.0 psf**

NOTE: Alternate spans of continuous beams and other areas shall be loaded with half the design roof snow load so as to produce the greatest possible effect - see code.

Windward Snow Drifts 1 - Against walls, parapets, etc more than 15' long

Upwind fetch	lu	=	26.0 ft
Projection height	h	=	4.0 ft
Snow density	g	=	17.9 pcf
Balanced snow height	hb	=	1.17 ft
	hd	=	1.28 ft
	hc	=	2.83 ft
hc/hb >0.2 = 2.4	**Therefore, design for drift**		
Drift height (hd)		=	1.28 ft
Drift width	w	=	5.11 ft
Surcharge load:	pd = γ*hd	=	**22.9 psf**
Balanced Snow load:		=	21.0 psf
			43.9 psf



Windward Snow Drifts 2 - Against walls, parapets, etc > 15'

Upwind fetch	lu	=	116.0 ft
Projection height	h	=	4.0 ft
Snow density	g	=	17.9 pcf
Balanced snow height	hb	=	1.17 ft
	hd	=	2.83 ft
	hc	=	2.83 ft
hc/hb >0.2 = 2.4	**Therefore, design for drift**		
Drift height (hc)		=	2.83 ft
Drift width	w	=	11.34 ft
Surcharge load:	pd = γ*hd	=	**50.6 psf**

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Seismic Loads: IBC 2009 — Strength Level Forces

Occupancy Category : II
Importance Factor (I) : 1.00
Site Class : D

Ss (0.2 sec) = 11.20 %g
S1 (1.0 sec) = 4.50 %g

Fa =	1.600	Sms =	0.179	S_{DS} =	0.119	Design Category =	A
Fv =	2.400	Sm1 =	0.108	S_{D1} =	0.072	Design Category =	B

Seismic Design Category = **B**
Number of Stories: 1
Structure Type: All other building systems
Horizontal Struct Irregularities: No plan Irregularity
Vertical Structural Irregularities: No vertical Irregularity
Flexible Diaphragms: Yes
Building System: **Bearing Wall Systems**
Seismic resisting system: **Light frame (wood) walls with structural wood shear panels**
System Structural Height Limit: **Height not limited**
Actual Structural Height (hn) = 12.3 ft

DESIGN COEFFICIENTS AND FACTORS

Response Modification Coefficient (R) = 6.5
Over-Strength Factor (Ωo) = 2.5
Deflection Amplification Factor (Cd) = 4
S_{DS} = 0.119
S_{D1} = 0.072

Seismic Load Effect (E) = ρQ_E +/- $0.2S_{DS}D$ = ρQ_E +/- 0.024D
Special Seismic Load Effect (Em) = $\Omega o\ Q_E$ +/- $0.2S_{DS}D$ = 2.5 Q_E +/- 0.024D

ρ = redundancy coefficient
Q_E = horizontal seismic force
D = dead load

PERMITTED ANALYTICAL PROCEDURES

Simplified Analysis - Use Equivalent Lateral Force Analysis

Equivalent Lateral-Force Analysis - Permitted

Building period coef. (C_T) = 0.020 — Cu = 1.70
Approx fundamental period (Ta) = $C_T h_n$^ = 0.131 sec x= 0.75 — Tmax = CuTa = 0.223
User calculated fundamental period (T) = 0 sec — Use T = 0.131
Long Period Transition Period (TL) = ASCE7 map = 12
Seismic response coef. (Cs) = $S_{DS}I/R$ = 0.018
need not exceed Cs = Sd1 I /RT = 0.084
but not less than Cs = 0.010
USE Cs = 0.018
Design Base Shear V = 0.018W

Model & Seismic Response Analysis - Permitted (see code for procedure)

ALLOWABLE STORY DRIFT

Structure Type: All other structures

Allowable story drift = 0.020hsx where hsx is the story height below level x

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CODE SUMMARY

Code: Wisconsin Bldg Code

Live Loads:

Roof	0 to 200 sf:	20 psf
	200 to 600 sf:	24 - 0.02Area, but not less than 12 psf
	over 600 sf:	12 psf

Typical Floor	50 psf
Partitions	15 psf
Corridors above first floor	80 psf
Lobbies & first floor corridors	100 psf
Balconies (exterior) - same as occupa	50 psf

Dead Loads:

Floor	100.0 psf
Roof	20.0 psf

Wind Design Data:

Basic Wind Speed	90 mph
Importance Factor	1.00
Occupancy Category	II
Mean Roof Ht (h)	12.0 ft
Exposure Category	B
Enclosure Classif.	Enclosed Building
Internal pressure Coef.	+/-0.18
Directionality (Kd)	0.85

Roof Snow Loads:

Design Uniform Roof Snow load	=	21.0 psf
Flat Roof Snow Load	Pf =	21.0 psf
Balanced Snow Load	Ps =	21.0 psf
Ground Snow Load	Pg =	30.0 psf
Importance Factor	I =	1.00
Snow Exposure Factor	Ce =	1.00
Thermal Factor	Ct =	1.00
Sloped-roof Factor	Cs =	1.00

Earthquake Design Data:

Occupancy Category	=	II
Importance Factor	I =	1.00
Mapped spectral response acceleratic	Ss =	11.20 %g
	S1 =	4.50 %g
Site Class	=	D
Spectral Response Coef.	Sds =	0.119
	Sd1 =	0.072
Seismic Design Category	=	B
Basic Structural System	=	Bearing Wall Systems
Seismic Resisting System	=	Light frame (wood) walls with structural wood shear panels
Design Base Shear	V =	0.018W
Seismic Response Coef.	Cs =	0.018
Response Modification Factor	R =	6.5
Analysis Procedure	=	Equivalent Lateral-Force Analysis

CODE SUMMARY- continued

Component and cladding wind pressures

Roof

	Surface Pressure (psf)		
Area	10 sf	50 sf	100 sf
Negative Zone 1	-14.6	-13.7	-13.3
Negative Zone 2	-24.4	-18.4	-15.8
Negative Zone 3	-24.4	-18.4	-15.8
Positive Zone 1	10.0	10.0	10.0
Positive Zones 2 & 3	13.3	12.0	11.4
Overhang Zone 1&2	-21.0	-20.1	-19.8
Overhang Zone 3	-21.0	-20.1	-19.8

Parapet

		Solid Parapet Pressure (psf)		
	Area	10 sf	100 sf	500 sf
CASE A:	Interior zone	33.3	22.7	21.4
	Corner zone	33.3	22.7	21.4
CASE B:	Interior zone	-23.3	-19.4	-16.7
	Corner zone	-26.7	-20.8	-16.7

Wall

	Surface Pressure (psf)		
Area	10 sf	100 sf	500 sf
Negative Zone 4	-14.4	-12.5	-11.1
Negative Zone 5	-17.8	-13.9	-11.1
Positive Zone 4 & 5	13.3	11.4	10.0

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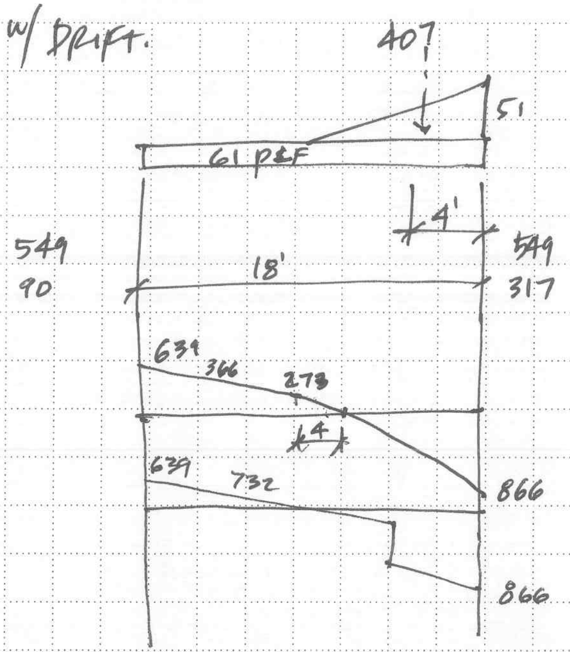
JOISTS W/ DRIFT.



$DRIFT = \frac{12}{2}(51) = 306 \ \#/FT.$

$306(1.33) = 407\#$ EA. JOIST.

UNIFORM: 25 PSF DEAD, 21 PSF LIVE } 46 PSF

$46(1.33) = 61$ PLF PER JOIST

$x = \frac{x}{639} = \frac{14'}{732} \quad x = 12.2'$

$M = 3.9^{kFT.}$ APPROX.

$S_{980} = 43.5$

$M = 3.3^{kFT.}$

$S_{980} = 36.7$ NG.

JOISTS @ 12" O.C.

$S = \frac{36.7}{1.33} = 27.6.$

$V_d = \frac{866}{1.33} - \frac{46(11.25)}{12} = 608\ \#$

$f_v = \frac{608(3)}{2(16.875)} = 54 \quad ok$

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Job WAUKESHA Job No.
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ROOF FRAMING.

RAFTERS SPAN = 18'

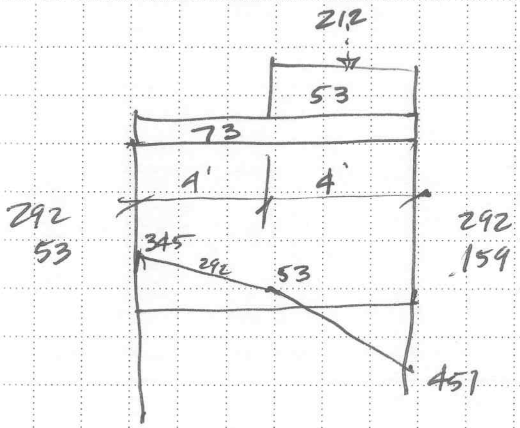
LOADS = DEAD 25 psf
LIVE 30 psf

55 psf TOTAL

No 2 SPF 2x12's @ ~~16" o.c.~~ 19'-2" ALLOWABLE
12" o.c. DUE TO DRIFT.

RTU - 7'x4' 800 #'s - 30 psf AVE
JOISTS @ 16" o.c.

USE 40 psf 40(1.33) = 53 plf
55(1.33) = 73 plf



$\frac{X}{451} = \frac{4}{504}$ X = 3.58'

M = 0.807 kft

S_{980} = 8.9 2x12 ok

HEADER

SPAN = 21'
LOAD = 340 plf + 495 = 835 plf

V = 8768
M = 46.0 kft. S_{2600} = 193

try (3) 16" LVL's

$$\Delta = \frac{5(0.835)(21)^4 1728}{384(1800)(1785)} = 1.14" = \frac{l}{221}$$

USE (4) 16" LVL's

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HEADER ALONG EXIST

SPAN = 21'
LOAD = 345 plf

V = 3623
M = 19.0

$S_{2600} = 79.8$

try (2) 16" LVLs

$$\Delta = \frac{5(.345)(21)^4\ 1728}{384(1800)(1190)} = 0.7" = \frac{l}{357} \quad ok.$$

TYP FOOTINGS

LOAD = 9(55) + 16(20) = 815 plf

16" WIDE FTG OK w/ 1500 psf SOIL.

866 + 320 = 1186

$\frac{1186}{1500} = 0.8'$ → 16" FTG OK

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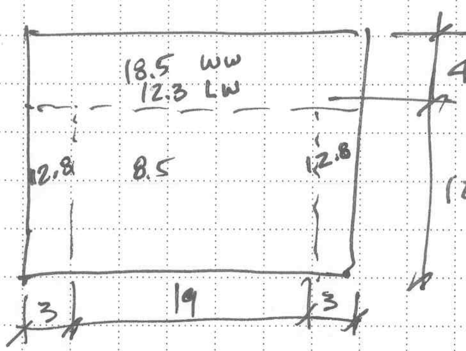
WIND.



WALL

$(2)(3')(12.8)\left(\frac{12}{2}\right) + 19'\left(\frac{12}{2}\right)(8.5) = 1430$

PARAPET

$25'(4')(18.5\ psf) + 25'(4')(12.3\ psf) = 3080$

TOTAL = 4510

$\frac{4510}{2} = 2255$ # EA. WALL

ROOF DECK

$\frac{2255}{25} = 90.2$ PLF

$\frac{90.2}{0.92\ SPF}(2\ ASD) = 196$ PLF

UNBLOCKED DIAPHRAM – 19/32 ROOF SHEATHING w/ 2" NOMINAL FRAMING
10d NAILS @ 6" O.C. @ ALL PANEL EDGES & BOUNDARIES

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WALL SHEATHING

MAX LOAD = 2255

WORST CASE – $\frac{2255}{12}$ = 188 plf

$\frac{188}{0.92 \text{ SPF}}$ (2 ASD) = 409 plf TARGET.

15/32 SHEATHING w/ 10d NAILS @ 6" o.c. @ EDGES

USE 5/8" ϕ ANCHOR BOLTS @ 48" o.c. typical

2015-093 Culvers
HVAC Load Analysis

for

Culver's Of Waukesha, WI

Elite Software

CHVAC COMMERCIAL HVAC LOADS

WISCONSIN PROFESSIONAL ENGINEER
LOWELL J. LARSON
E-29108
BYRON, IL.

2.18.16

Prepared By:

Ollmann Ernest Martin Architects

February 2016

Air Handler #1 - RTU-3 - Summary Loads

Rm No	Description Room Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	Prep 4pm June	63 1 819	166 7 0.11	4,635 207 3.29	200 0 0	Direct 7 1	Direct 7 21
2	Storage 4pm June	553 0 7,189	13,027 541 0.98	8,779 392 0.71	2,852 0 0	Direct 58 77	Direct 58 40
3	Office 4pm June	153 1 1,989	404 17 0.11	4,361 195 1.27	155 0 0	Direct 16 2	Direct 16 20
	Room Peak Totals: Total Rooms: 3 Unique Rooms: 3	769 2 9,997	13,598 565 0.73	17,774 794 1.03	3,207 0 0	 80 80	 80 80

Air Handler #1 - RTU-3 - Total Load Summary

Air Handler Description: RTU-3 Constant Volume - Sum of Peaks
Sensible Heat Ratio: 0.85 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time: 4pm in June.
Outdoor Conditions: Clg: 89° DB, 75° WB, 110.00 grains, Htg: -5° DB
Indoor Conditions: Clg: 75° DB, 50% RH, Htg: 72° DB

Summer: Ventilation controls outside air, ----- Winter: Ventilation controls outside air.

Room Space sensible loss:	5,537 Btuh		
Infiltration sensible loss:	8,061 Btuh	100 CFM	
Outside Air sensible loss:	6,449 Btuh	80 CFM	
Supply Duct sensible loss:	0 Btuh		
Return Duct sensible loss:	0 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			20,047 Btuh
Heating Supply Air: 13,598 / (.969 X 1.08 X 23) =		565 CFM	
Winter Vent Outside Air (14.2% of supply) =		80 CFM	
Room space sensible gain:	16,277 Btuh		
Infiltration sensible gain:	1,497 Btuh		
Draw-thru fan sensible gain:	0 Btuh		
Supply duct sensible gain:	0 Btuh		
Reserve sensible gain:	0 Btuh		
Total sensible gain on supply side of coil:			17,774 Btuh
Cooling Supply Air: 17,774 / (.969 X 1.1 X 21) =		794 CFM	
Summer Vent Outside Air (10.1% of supply) =		80 CFM	
Return duct sensible gain:	0 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	1,194 Btuh	80 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			1,194 Btuh
Total sensible gain on air handling system:			18,969 Btuh
Room space latent gain:	355 Btuh		
Infiltration latent gain:	2,852 Btuh		
Outside air latent gain:	2,417 Btuh		
Total latent gain on air handling system:			5,625 Btuh
Total system sensible and latent gain:			24,593 Btuh

Check Figures

Total Air Handler Supply Air (based on a 21° TD):	794 CFM
Total Air Handler Vent. Air (10.08% of Supply):	80 CFM
Total Conditioned Air Space:	769 Sq.ft
Supply Air Per Unit Area:	1.0323 CFM/Sq.ft
Area Per Cooling Capacity:	375.2 Sq.ft/Ton
Cooling Capacity Per Area:	0.0027 Tons/Sq.ft
Heating Capacity Per Area:	26.07 Btuh/Sq.ft
Total Heating Required With Outside Air:	20,047 Btuh
Total Cooling Required With Outside Air:	2.05 Tons

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

SECTION 233113 - DUCTWORK

1. GENERAL

A. It must be understood that the heating, ventilating and air conditioning drawings and details are diagrammatic and are intended to show the intent of the specifications. The contractor shall make full allowance in his proposal to cover such contingencies as actual length and routing, proper equipment locations and connections, etc. He shall take all necessary measurements and accept responsibility for their accuracy. Coordinate with the General Contractor for exact location of walls, beams, shafts, etc. Do not scale drawings. Coordinate with equipment suppliers for connections made to equipment furnished by others.

B. Make Engineer/Architect aware of any discrepancies between drawings and/or existing conditions. The Engineer/Architect reserves the right to eliminate discrepancies through minor changes in work at no change in contract cost.

2. MATERIALS

A. Sheet Metal: Furnish, install, fit and secure in place all supply, return, exhaust and vent air ducts, risers, branches, etc., as shown and detailed on plans, built of galvanized iron as hereinafter specified.

1. Sheet metal work shall be constructed according to practices recommended in the "HVAC Duct Construction Standards, 1st edition 1985" as published by SMACNA, and hereinafter specified. All duct dimensions noted on the drawings are finished inside dimensions. Sheet metal used shall not be lighter than the following:

Rectangular Ducts	Galvanized Sheet Metal Gage	Aluminum Alloy
Up thru 12"	26	.020
13" - 30"	24	.025
31" - 54"	22	.032
55" - 84"	20	.040

Round Ducts	Galvanized Sheet Metal Gage
Up thru 13"	26
14" - 22"	24

2. Install ducts, risers, etc., as indicated on the drawings, making necessary changes in cross section, offsets, etc., whether or not same is specifically indicated. If ducts cannot be run as shown on the drawings, install ducts between required point, subject to the approval of the Engineer/Architect without additional cost to the Owner.

3. At all outlets and inlets in rooms, flange ducts for attachment of grilles. Install grilles according to manufacturer's recommendations.

4. Sheet metal work throughout shall be assembled and erected in such a manner that no vibration will occur and no noise be transmitted by the moving air.

5. All duct turns shall have either an inside radius equal to the duct width or be a miter turn with turning vanes.

6. All supply take-offs shall be bellmouth or conical type. Square/rectangular take-off fittings shall have 45 degree leading edge for 4" maximum depth. No air turns allowed.

7. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant gaskets and tapes, except as noted.

B. Ductwork Pressure - Velocity Classification: Low Pressure, +2" W.G., 2500 FPM maximum, Class "B" seal. All grease ducts shall have welded liquid tight seal.

C. All duct turns shall have either an inside radius equal to the duct width or a miter turn with turning vanes. Vanes shall be double wall air foil type.

D. Round take-off fittings shall be bellmouth or conical. Rectangular or square take-off fittings shall have a 45 degree lead edge with 4" minimum depth.

E. Volume Dampers: Furnish and install in branches of supply air and exhaust ducts. Substantial volume dampers to be fitted with quadrant locking devices for adjusting the air delivery. Damper blades shall not exceed 6" width.

F. Access Panels: Install access panels with latches and gaskets in ducts at automatic dampers, coils, fire dampers, and other duct mounted equipment. Panels in insulated ducts must be internally insulated.

G. Backdraft Dampers: Provide backdraft dampers at discharge grille of louvers unless motor operated dampers are specified with these units. Entire perimeter of blade shall be lined with neoprene or vinyl seals to prevent clatter. Damper blades shall be tight closing.

H. Flexible Duct:

1. Provide factory fabricated insulated low pressure flexible duct with zinc-coated spring steel helix, 1" thick fiberglass insulation sheathed in a seamless vapor barrier (RFK) jacket. Maximum length 8'.

2. Composite assembly, including insulation and vapor barrier, meeting Class 1 requirements of flame spread rating of 25 or less and smoke developed rating of 50 or less as set forth in NFPA Bulletin 90-A, and bearing the UL label as an air duct.

3. Flexible ductwork shall meet ductwork pressure classification.

I. Insulation:

1. Materials:

Materials shall conform to NFPA bulletin 90-A as determined by U.L. method NFPA 225 - ASTM E84, complying with applicable codes with a flame spread rating of 25 or less and a smoke developed rating of 50 or less.

2. External Ductwork Insulation:

a. Concealed ductwork (horizontal): Wrap ductwork with flexible type fiberglass insulation, operating temperature range 40 to 250 degrees F., K=0.25, 1-1/2 PCF density, vapor permeability less than 0.02 perms, installed R of 4.5. Johns Manville Microlite EQ Type 100 duct wrap insulation.

b. Concealed ductwork (vertical): Rigid fiberglass duct liner, operating temperature to 250 degrees F., installed R of 6.3. Johns Manville Permacote Linacoustic R-300.

c. Application Schedule:

Application Schedule:	Thickness
Exhaust air ducts	1-1/2"
Fresh air ducts	1-1/2"

Supply air ducts 1-1/2"

J. Kitchen Hood Exhaust Ductwork

1. Welded Steel

a. Duct to be constructed with 16 gauge welded black iron.

b. All external joints, seams and duct connections to the hood shall be welded liquid tight conforming to NFPA 90.

c. Insulation: 3M "Fire Barrier Duct Wrap 615+".

K. Air Outlets and Inlets:

1. Furnish grilles, registers, diffusers and louvers in the sizes, type and capacity as shown on the drawings by the selected manufacturer or approved equal.

2. Grilles, registers, diffusers shall be suitable and compatible with ceiling construction in which they are installed. Check architectural schedules for ceiling construction. Coordinate locations with ceiling system and lighting fixtures.

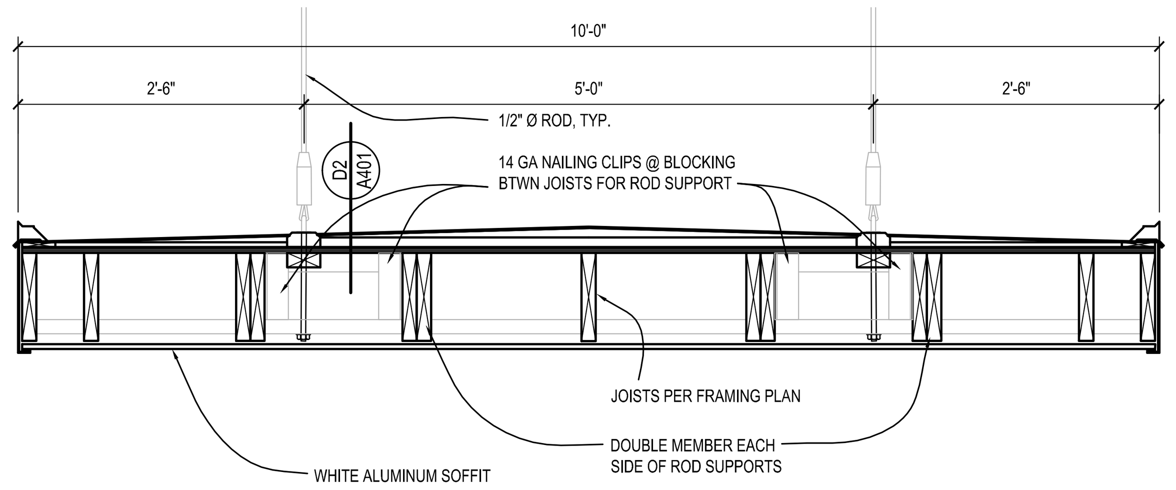
3. EXECUTION

WI item:
2-19-2016

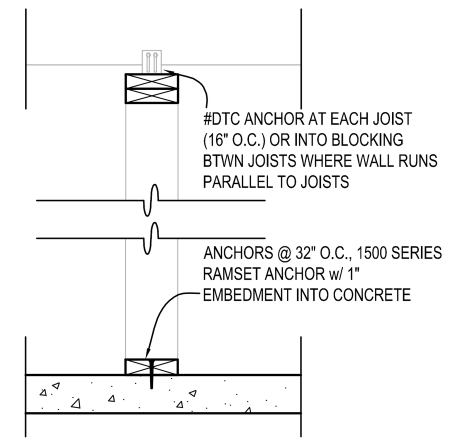
A. Ducts shall be constructed, supported and installed in accordance with the latest standards of SMACNA. Install all turning vanes, access doors, extractors, and accessories as indicated or specified herein. Ductwork shall be sealed at all joints, transverse and longitudinal seams and connections in ductwork using listed products as referenced in the code. The referenced ductwork includes all supply, exhaust and return ducts.

B. Provide all necessary personnel, equipment, and services and perform all tests necessary to demonstrate the integrity of the completed installation to the approval of the Owner and Engineer/Architect. The air and hydronic systems shall be tested, adjusted and balanced in accordance with the latest edition of the Associated Air Balance Council (AABC) Procedural Standards, NEBB or equivalent.

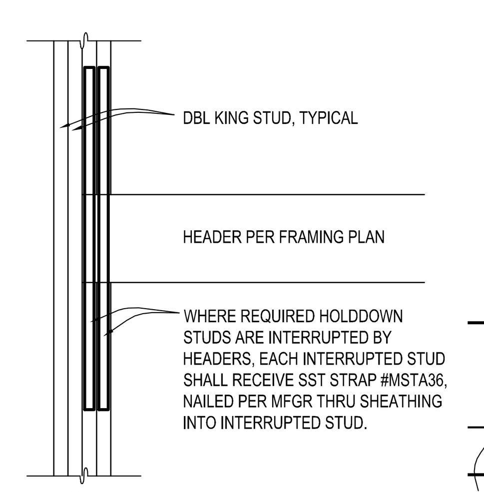
END OF SECTION 233113



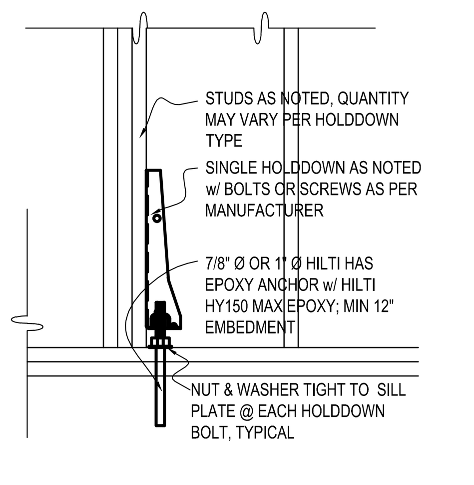
A2 CANOPY SECTION
SCALE : 3/4" = 1'-0"



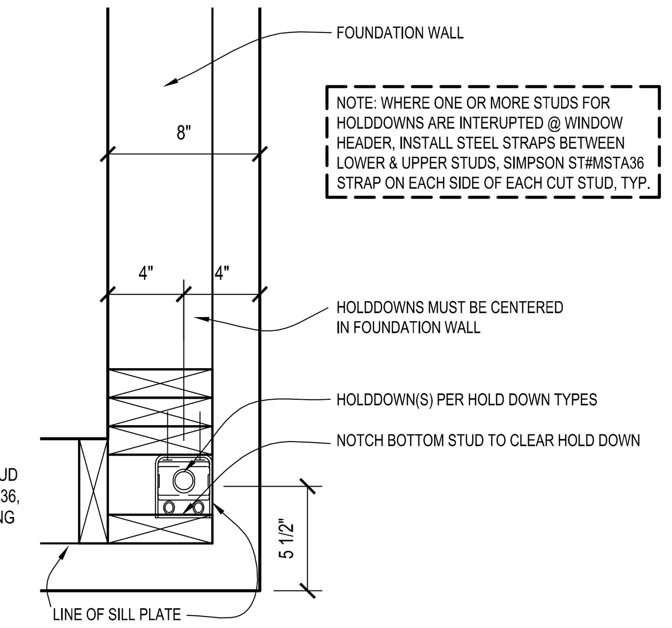
B1 INT. WALL ANCHOR
SCALE : 3/4" = 1'-0"



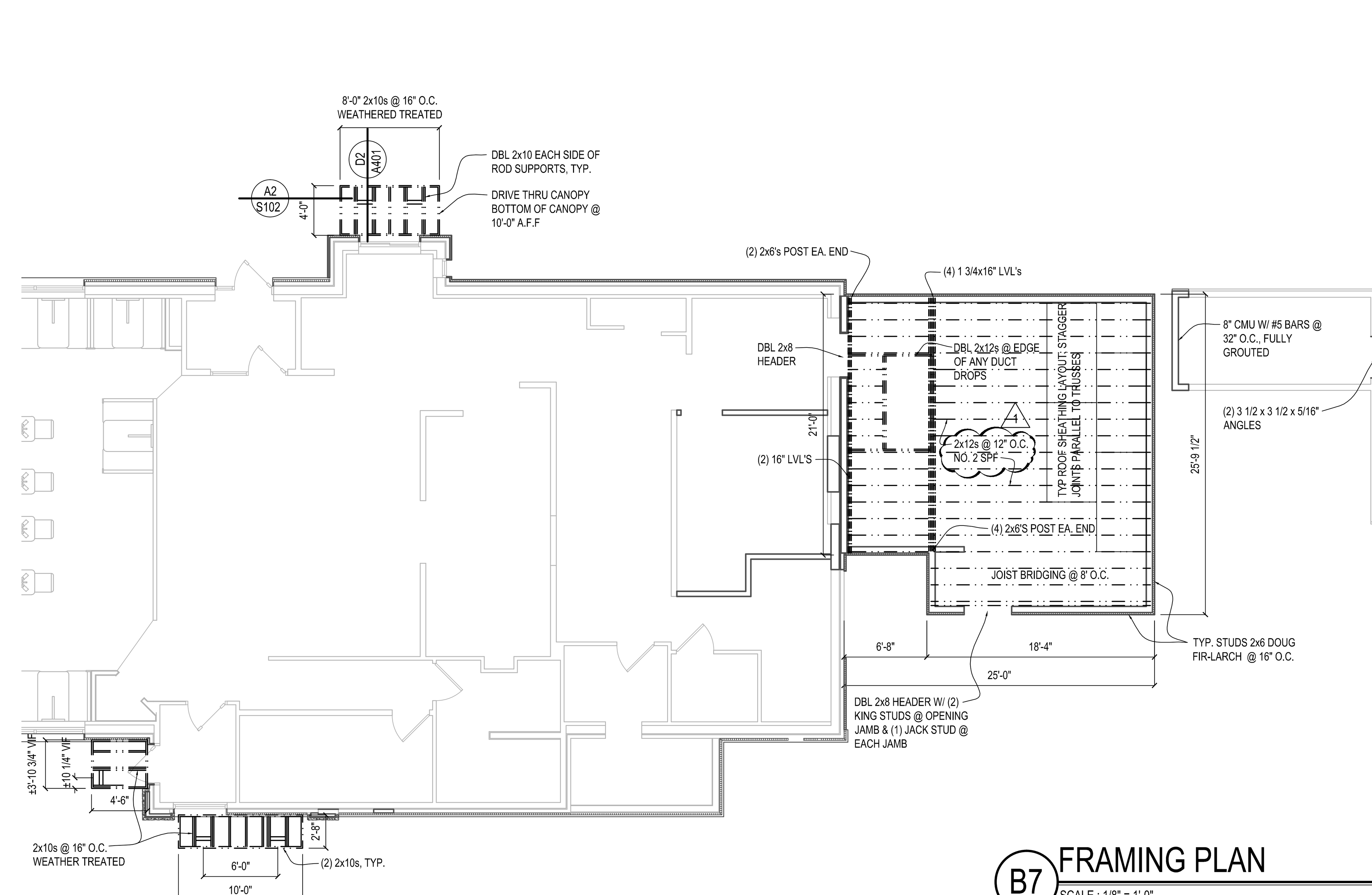
B3 STRAP DETAIL
SCALE : 3/4" = 1'-0"



C3 HOLDDOWN
SCALE : 3/4" = 1'-0"



B4 CORNER HOLDDOWN
SCALE : 1 1/2" = 1'-0"



B7 FRAMING PLAN
SCALE : 1/8" = 1'-0"

GENERAL SHEATHING REQUIREMENTS

1. INSTALL SHEATHING CONTINUOUS OVER ENTIRE WALL.
2. REFER TO BUILDING PLANS, SECTIONS, AND ELEVATIONS FOR DIMENSIONS.
3. SEE FLOOR PLAN FOR EXACT LOCATIONS OF WINDOW AND DOOR OPENINGS.
4. COORDINATE WITH WALL SECTIONS SHOWN ON SHEET A401
5. ALL SHEATHING SHALL BE INSTALLED W/ 1/8" GAP @ ALL PANEL EDGES.

GENERAL STRUCTURAL NOTES

CARPENTRY -- SEE FRAMING PLAN THIS SHEET

1. FLASH ALL HEADS OF WINDOWS AND DOORS.
2. ALL STRUCTURAL LUMBER SHALL BE AS SPECIFIED IN PROJECT MANUAL AND BELOW UNLESS OTHERWISE NOTED HEREIN.

- LAMINATED VENEER LUMBER SHALL HAVE MINIMUM Fb = 2600 PSI & E=1800 KSI
- STUDS: #2 DOUG FIR-LARCH U.N.O.
- HEADERS, JOISTS, ROUGH FRAMES, FRAMING SILLS, etc.: #2 SPF OR #2 HEM FIR
- NAILERS @ MEMBRANE ROOFING: #2 SPF OR #2 HEM FIR
- WOOD FURRING & GROUNDS: #2 WHITE PINE
- PLYWOOD: CONFORMING TO PS 1; APA PRP-108, INCLUDING GRADE STAMPING
  ROOF SHEATHING: C-D GRADE w/ EXTERIOR GLUE (CDX)
  SHEATHING OVER STUDS: EXTERIOR TYPE, C-C GRADE
  INTERIOR WALL SHEATHING: EXTERIOR TYPE, B-C GRADE.
- OSB: CONFORMING TO DOC PS 2, EXPOSURE 1 GRADE

WALL SHEATHING NOTES:

- EXTERIOR SHEATHING SHALL BE 15/32" O.S.B. SHEATHING WITH 10d NAILS @ 6" O.C. @ EDGES & 12" O.C. IN PANEL FIELD
- JOINTS IN SHEATHING SHALL HAVE 2X BLOCKING BETWEEN STUDS

ROOF SHEATHING NOTES:

NEW ROOF SHEATHING SHALL BE 19/32" APA RATED OSB OR CDX PLYWD. INSTALL 10d NAILS AT:

- 6" O.C. AT ROOF PERIMETER & AT EXISTING
- 6" O.C. AT OTHER PANEL EDGES,
- 12" O.C. IN PANEL FIELD.

SEE GENERAL STRUCT. NOTES & DESIGN LOADS ON SHEET S101

CULVER'S RESTAURANT RE-IMAGE
840 W Sunset Drive
Waukesha, WI 53189
County of WAUKESHA

Culver Franchising System, Inc.
1240 Water Street
Prairie du Sac, WI 53578
608-643-7980

OWNER:
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OLLMANN ERNEST MARTIN ARCHITECTS
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FRAMING PLAN & DETAILS

Date: 2-5-2016
Revision: 2/19/2016 WI comments

2015-093

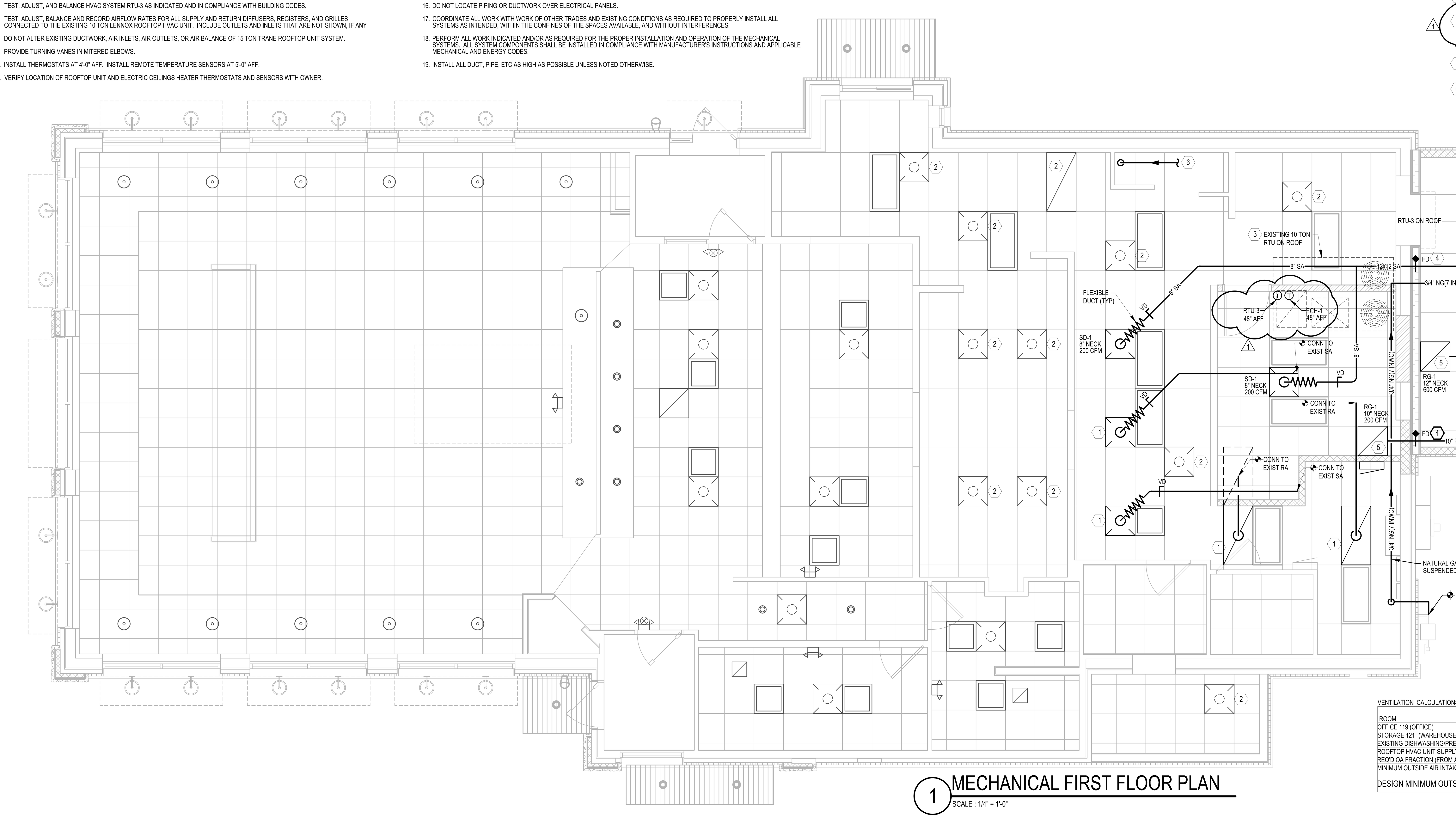
S102

GENERAL NOTES:

1. INDICATED DUCT SIZES FOR LINED DUCT ARE INSIDE DIMENSION, CLEAR OF DUCT LINER.
2. PROVIDE DUCT LINER FOR ALL VERTICAL RECTANGULAR SUPPLY AND RETURN DUCT DROPS FROM RTU. PROVID DUCT LINER WITH MINIMUM 1" THICKNESS AND MINIMUM INSTALLED R-VALUE 4.0. INSTALL AS INDICATED, IN COMPLIANCE WITH NAIMA AND SMACNA GUIDES, AND IN COMPLIANCE WITH BUILDING CODES.
3. EXISTING HVAC SYSTEMS AS SHOWN MAY BE INCOMPLETE OR INCORRECT; FIELD VERIFY EXISTING HVAC CONFIGURATIONS AND MODIFY WORK SCOPE AS REQUIRED.
4. TEST, ADJUST, AND BALANCE HVAC SYSTEM RTU-3 AS INDICATED AND IN COMPLIANCE WITH BUILDING CODES.
5. TEST, ADJUST, BALANCE AND RECORD AIRFLOW RATES FOR ALL SUPPLY AND RETURN DIFFUSERS, REGISTERS, AND GRILLES CONNECTED TO THE EXISTING 10 TON LENNOX ROOFTOP HVAC UNIT. INCLUDE OUTLETS AND INLETS THAT ARE NOT SHOWN, IF ANY
6. DO NOT ALTER EXISTING DUCTWORK, AIR INLETS, AIR OUTLETS, OR AIR BALANCE OF 15 TON TRANE ROOFTOP UNIT SYSTEM.
9. PROVIDE TURNING VANES IN MITERED ELBOWS.
10. INSTALL THERMOSTATS AT 4'-0" AFF. INSTALL REMOTE TEMPERATURE SENSORS AT 5'-0" AFF.
11. VERIFY LOCATION OF ROOFTOP UNIT AND ELECTRIC CEILINGS HEATER THERMOSTATS AND SENSORS WITH OWNER.
12. SET THERMOSTATS AT 70 DEG F FOR HEATING AND 75 DEG F FOR COOLING.
13. PROVIDE BLACK STEEL GAS PIPING SYSTEM COMPLYING WITH APPLICABLE FUEL GAS CODE AND LOCAL CODES. PAINT OUTDOOR NATURAL GAS PIPING YELLOW. GAS PIPING INSTALLATION SHALL COMPLY WITH NFPA 54-2009, NATIONAL FUEL GAS CODE. (1)
14. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF EQUIPMENT AND ITEMS INSTALLED IN CEILINGS.
15. INSTALL RTU-1 CONDENSATE TRAP FURNISHED BY RTU MANUFACTURER. ARRANGE TRAP TO DISCHARGE CONDENSATE ON ROOF.
16. DO NOT LOCATE PIPING OR DUCTWORK OVER ELECTRICAL PANELS.
17. COORDINATE ALL WORK WITH WORK OF OTHER TRADES AND EXISTING CONDITIONS AS REQUIRED TO PROPERLY INSTALL ALL SYSTEMS AS INTENDED, WITHIN THE CONFINES OF THE SPACES AVAILABLE, AND WITHOUT INTERFERENCES.
18. PERFORM ALL WORK INDICATED AND/OR AS REQUIRED FOR THE PROPER INSTALLATION AND OPERATION OF THE MECHANICAL SYSTEMS. ALL SYSTEM COMPONENTS SHALL BE INSTALLED IN COMPLIANCE WITH MANUFACTURER'S INSTRUCTIONS AND APPLICABLE MECHANICAL AND ENERGY CODES.
19. INSTALL ALL DUCT, PIPE, ETC AS HIGH AS POSSIBLE UNLESS NOTED OTHERWISE.

KEYED NOTES

1. RELOCATED EXISTING DIFFUSER. CONNECT TO SAME SYSTEM WITH SAME DUCT SIZE, MATERIAL, AND INSULATION AS BEFORE RELOCATION. TEST, ADJUST, AND BALANCE TO SAME AIRFLOW RATE AS BEFORE START OF WORK.
2. EXISTING DIFFUSER, REGISTER, OR GRILLE. TEST, ADJUST, AND BALANCE TO SAME AIRFLOW RATE AS BEFORE START OF WORK.
3. EXISTING ROOFTOP UNIT ON ROOF. TEST, ADJUST, AND BALANCE SUPPLY, RETURN, RELIEF, AND OUTSIDE AIR INTAKE MAXIMUM AND MINIMUM AIRFLOW RATES TO SAME AS BEFORE START OF WORK.
4. (1) 1-1/2 HR DYNAMIC FIRE DAMPER AS REQUIRED BY CODE FOR 2 HOUR FIRE RESISTANCE RATED WALL. INSTALL IN COMPLIANCE WITH DAMPER MANUFACTURER'S INSTRUCTIONS, UL LISTING, AND APPLICABLE CODES. PROVIDE INSULATED DUCT ACCESS DOORS LARGE ENOUGH TO PERMIT INSPECTION AND MAINTENANCE. ACCESS POINTS SHALL BE PERMANENTLY IDENTIFIED ON THE EXTERIOR BY A LABEL HAVING LETTERS A MINIMUM OF 0.5 INCH HEIGHT READING "FIRE DAMPER."
5. PROVIDE 24"x24" PLENUM BOX; 6" TALL FOR UNITS WITH TOP DUCT CONNECTIONS, 20 INCH TALL FOR UNITS WITH SIDE DUCT CONNECTIONS.
6. COPPER EVAPORATOR COIL DRAIN PIPING FROM COOLING COIL DRAIN PANS TO WALL MOUNTED CONDENSATE PUMP CCCP-1. PROVIDE 3/4" PVC PIPING FROM PUMP DISCHARGE, ABOVE SUSPENDED CIELINGS, TO OPEN SIGHT TERMINATION ABOVE FLOOD RIM OF MOP SINK IN MOP ROOM 112. PROVIDE HEAT TRACE AND 1" ELASTOMERIC INSULATION ON PIPING WITHIN FREEZER AND COOLER (COORDINATE WITH ELECTRICAL CONTRACTOR).



1 MECHANICAL FIRST FLOOR PLAN

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

VENTILATION CALCULATIONS - BASED ON WISCONSIN SPS 264.0403:

ROOM	FLOOR AREA	OCCUPANTS PER 1,000 SF	CODE QTY OCCUPANTS	MIN CODE OA REQUIRED	DESIGN SUPPLY AIRFLOW	MINIMUM CODE OA FRACTION REQ'D
OFFICE 119 (OFFICE)	153.5 SF	7	154x7/1000=1.1	8.25 CFM	200 CFM	8.25 / 200 = 0.04
STORAGE 121 (WAREHOUSE)	251.0 SF	NR	NR	NR	NR	NR
EXISTING DISHWASHING/PREP	(VENTILATION PROVIDE BY EXISTING HVAC SYSTEM)					

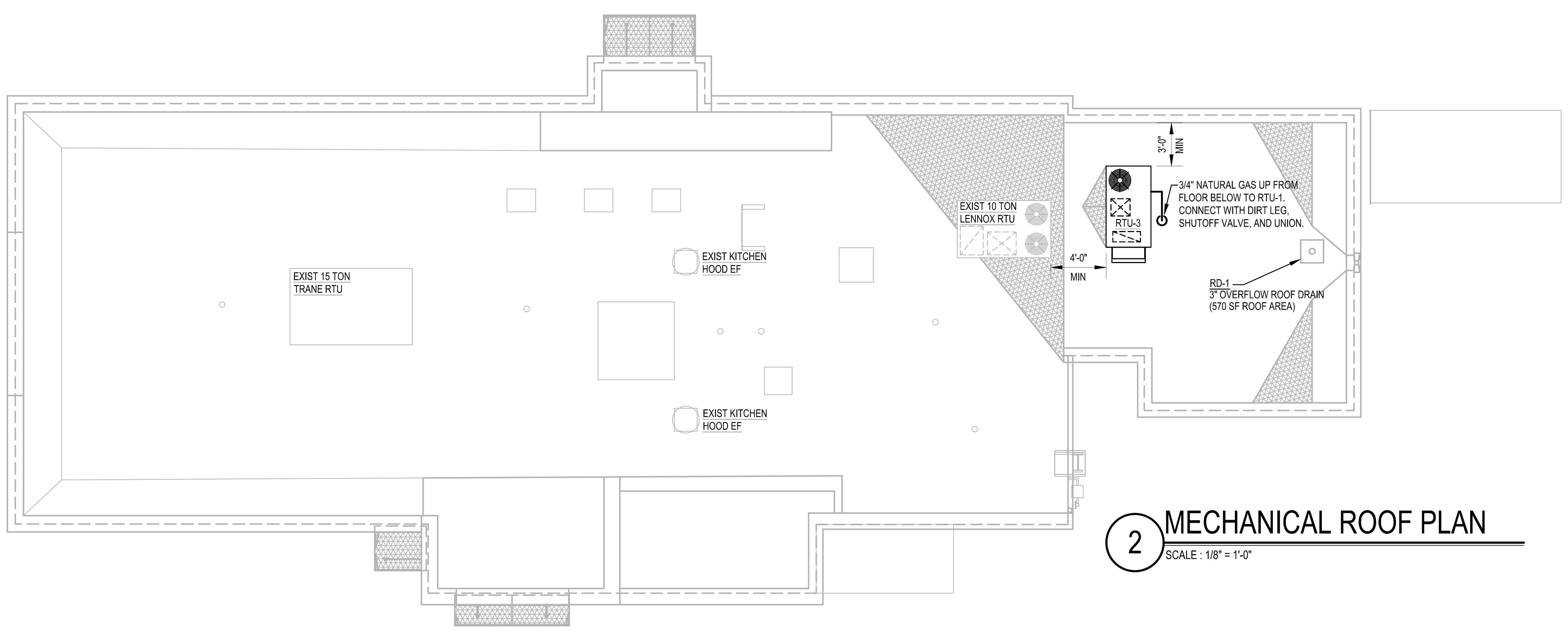
ROOFTOP HVAC UNIT SUPPLY AIRFLOW: 800 CFM
REQ'D OA FRACTION (FROM ABOVE) 0.04
MINIMUM OUTSIDE AIR INTAKE REQUIRED: 800 x 0.04 = 32 CFM OUTDOOR AIR

DESIGN MINIMUM OUTSIDE AIR INTAKE = 80 CFM OUTDOOR AIR

DIFFUSER, REGISTER, AND GRILLE SCHEDULE

TAG	SERVICE	TYPE	MATERIAL	THROW	FACE	NECK	MOUNTING	MANUFACTURER/MODEL	Notes
SD-1	SUPPLY	SQUARE CONCENTRIC CONE	STEEL	4-WAY	24X24	SEE PLAN	LAY-IN	CARNES SFTB24	1, 2
RG-1	RETURN	GRID CORE ("EGGCRATE")	ALUMINUM	N/A	24X24	SEE PLAN	LAY-IN	CARNES RAPAH	2

DIFFUSER NOTES:
1. PROVIDE W/ ADJUSTABLE OPPOSED BLADE DAMPER
2. PROVIDE WITH WHITE FINISH UNLESS NOTED OTHERWISE.



2 MECHANICAL ROOF PLAN

SCALE : 1/8" = 1'-0"

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County of WAUKESHA

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OWNER:
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MECANICAL PLANS

Date: 2-5-2016 Revision: (1) 2-19-2016

2015-093

M101