Princeton Properties 4 Buildings #2
HVAC Load Analysis

for

Princeton Properties
Back Bay Blvd
Portland, Maine

Elite Software

CHVAC COMMERCIAL HVAC LOADS

Prepared By:
David Clay
Mechanical Services
400 Presumpscot St.
Potland, Maine 04103
207-774-1531
Monday, April 29, 2013

General Project Data Input

General Project Information

Project file name:	C:\Elite\Chvacw32\Projects\Princeton Properties 2.CHV
Project title:	Princeton Properties 4 Buildings #2
Designed by:	David Clay
Project date:	04/29/13
Project comment:	To create a template from an existing project, open the project and select 'File
Project location:	PORTLAND, MAINE, USA
Client name:	Princeton Properties
Client address:	Back Bay Blvd
Client city:	Portland, Maine
Company name:	Mechanical Services
Company representative:	David Clay
Company address:	400 Presumpscot St.
Company city:	Potland, Maine 04103
Company phone:	207-774-1531
Company fax:	207-774-3837
Company e-mail address:	dclay@mechanicalservices.com
Company website:	mechanicalservices.com

Barometric pressure:	29.875	in.Hg.
Altitude:	43	feet
Latitude:	44	Degrees
Mean daily temperature range:	25	Degrees
Starting & ending time for HVAC load calculations:	8am - 6pm	
Floor heat loss coefficient:	0.5	Btuh per foot of slab
Number of unique zones in this project:	1	

Building Default Values

Calculations performed:	Heating loads only	
Lighting requirements:	1.50	Watts per square foot
Equipment requirements:	1.00	Watts per square foot
People sensible load multiplier:	230	Btuh per person
People latent load multiplier:	190	Btuh per person
Zone sensible safety factor:	10	%
Zone latent safety factor:	10	%
Zone heating safety factor:	10	%
People diversity factor:	80	%
Lighting profile number:	0	
Equipment profile number:	0	
People profile number:	0	
Building default ceiling height:	8.0	feet
Building default wall height:	8.0	feet

Internal Operating Load Profiles (C = 100)

	hr 1	hr 2	hr 3	hr 4	hr 5	hr 6	hr 7	hr 8	hr 9	hr 10	hr 11	hr 12	hr 13	hr 14	hr 15	hr 16	hr 17	hr 18	hr 19	hr 20	hr 21	hr 22	hr 23	hr 24
1	C	C	C	C	C	C	C	C	C	C	70	70	70	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

General Project Data Input (cont'd)

Building-Level Design Conditions

Design Month	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Diff	In/Outdoor Correction
August	87	72	50%	75	29.28	-8
July	87	72	50%	75	29.28	-8
Winter	-3			72		

Master Roofs

Roof No.	ASHRAE Roof#	Roof U-Fac	Dark Color	Susp. Ceil
1	13	0.052	Yes	No

Master Walls

Wall No.	ASHRAE Group	Wall U-Fac	Wall Color
1	G	0.091	M
2	G	0.200	M

Master Partitions

Partition No.	Partition U-Factor	Cool T-D	Heat T-D
1	0.200	0	10
2	0.200	10	10

Master Glass

Glass No.	Summer U-Factor	Winter U-Factor	Glass Shd.Coef.	Interior Shading	Interior Shd.Coef	Room Const	Glass Width	Glass Height
1	0.560	0.490	0.800	4	0.000	L	1.000	1.000

Building Envelope Report

Envelope Report Using Summer U-Factors

Material Types		Gross Area	Glass Area	Net Area	-U- Factor	Area x U-Factor	Average U-Factor
Roof	1	5,476.0	0.0	5,476.0	0.052	284.752	0.052
Tot.Roof		5,476.0	0.0	5,476.0	N/A	284.752	0.052
Wall	1	7,776.0	1,340.0	6,436.0	0.091	585.676	0.091
Wall	2	168.0	0.0	168.0	0.200	33.600	0.200
Tot.Wall		7,944.0	1,340.0	6,604.0	N/A	619.276	0.094
Glass	1	1,340.0	N/A	1,340.0	0.560	750.400	0.560
Tot.Glass		1,340.0	N/A	1,340.0	N/A	750.400	0.560
Totals				13,420.0		1,654.428	0.123

Wall Direction	Wall Area	Glass Area	Wall Net Area	Wall Avg U-Factor	Glass Avg U-Factor	Glass Avg Shd.Coef
N	7,944.0	1,340.0	6,604.0	0.094	0.560	0.800
NE	0.0	0.0	0.0	0.000	0.000	0.000
E	0.0	0.0	0.0	0.000	0.000	0.000
SE	0.0	0.0	0.0	0.000	0.000	0.000
S	0.0	0.0	0.0	0.000	0.000	0.000
SW	0.0	0.0	0.0	0.000	0.000	0.000
W	0.0	0.0	0.0	0.000	0.000	0.000
NW	0.0	0.0	0.0	0.000	0.000	0.000
Totals	7,944.0	1,340.0	6,604.0	0.094	0.560	0.800

Building Summary Loads

Building peaks in July at 6pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	5,476	23,492	10.98	0	0	0	0.00
Wall	6,604	51,090	23.89	0	0	0	0.00
Glass	1,340	54,170	25.33	0	0	0	0.00
Floor Slab	0	0	0.00	0	0	0	0.00
Skin Loads		128,752	60.20	0	0	0	0.00
Lighting	8,214	0	0.00	0	0	0	0.00
Equipment	5,476	0	0.00	0	0	0	0.00
People	44	0	0.00	0	0	0	0.00
Partition	5,476	12,047	5.63	0	0	0	0.00
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	0	0	0.00	0	0	0	0.00
Heat. Vent.	0	0	0.00	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	821	73,073	34.17	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	0	0	0.00
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	0	0	0.00
Supply Duct	0	0	0.00	0	0	0	0.00
Return Duct	0	0	0.00	0	0	0	0.00
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		213,872	100.00	0	0	0	0.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	73,073	34.17	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	140,799	65.83	0	0	0	0.00
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	0	0.00	0	0	0	0.00
Building Totals	213,872	100.00	0	0	0	0.00

Check Figures

Total Building Supply Air (based on a 23° TD):	8,623	CFM
Total Building Vent. Air (0.00% of Supply):	0	CFM
Total Conditioned Air Space:	5,476	Sq.ft
Supply Air Per Unit Area:	1.5748	CFM/Sq.ft
Area Per Cooling Capacity:	0.0000	Sq.ft/Ton
Cooling Capacity Per Area:	0.0000	Tons/Sq.ft
Total Heating Required With Outside Air:	213,872	Btuh
Total Cooling Required With Outside Air:	0.00	Tons

Air Handler #1 - Building 1-4 Boiler - Summary Loads

Zn No	Description / 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
		5,476	213,872	0	0	None	None
1	Buildings 1-4	55	8,623	0	0	0	0
	6pm July	98,568	1.57	0.00	0	0	0
Runout duct size: 0in. dia, Diffusers: 1, CFM/runout: 0, Velocity: 0.0 ft/min, Pressure drop: 0.000 in.wg./100ft							
	Zone Peak Totals:	5,476	213,872	0	0		
	Total Zones: 1	55	8,623	0	0	0	0
	Unique Zones: 1	98,568	1.57	0.00	0	0	0
Main trunk duct size: 39in. h x 38in. w, Velocity: 896.3 ft/min, Pressure drop: 0.028 in.wg./100ft							

Air Handler #1 - Building 1-4 Boiler - Total Load Summary

Air Handler Description: Building 1-4 Boiler Constant Volume - Sum of Peaks
Sensible Heat Ratio: 0.00 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time: 6pm in July.
Outdoor Conditions: 82° DB, 71° WB, 95.52 grains

Because of the diversity in zone, plenum and ventilation loads, the zone sensible peak time in (None) at 6pm is different from the total system peak time, hence the air system CFM was computed using a zone sensible load of 0.

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

Zone Space sensible loss:	140,799 Btuh		
Infiltration sensible loss:	73,073 Btuh	821 CFM	
Outside Air sensible loss:	0 Btuh	0 CFM	
Supply Duct sensible loss:	0 Btuh		
Return Duct sensible loss:	0 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			213,872 Btuh
Heating Supply Air: 213,872 / (.998 X 1.08 X 23) =		8,623 CFM	
Winter Vent Outside Air (0.0% of supply) =		0 CFM	
Zone space sensible gain:	0 Btuh		
Infiltration sensible gain:	0 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:			0 Btuh
Cooling Supply Air: 0 / (.998 X 1.1 X 0) =		0 CFM	
Summer Vent Outside Air (0.0% of supply) =		0 CFM	
Return duct sensible gain:	0 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	0 Btuh	0 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			0 Btuh
Total sensible gain on air handling system:			0 Btuh
Zone space latent gain:	0 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	0 Btuh		
Total latent gain on air handling system:			0 Btuh
Total system sensible and latent gain:			0 Btuh

Check Figures

Total Air Handler Supply Air (based on a 23° TD):	8,623 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	5,476 Sq.ft
Supply Air Per Unit Area:	1.5748 CFM/Sq.ft
Area Per Cooling Capacity:	0.0000 Sq.ft/Ton
Cooling Capacity Per Area:	0.0000 Tons/Sq.ft
Total Heating Required With Outside Air:	213,872 Btuh
Total Cooling Required With Outside Air:	0.00 Tons

Zone Detailed Loads (At Zone Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Zone 1-Buildings 1-4 peaks (sensible) in July at 6pm, Air Handler 1 (Building 1-4 Boiler), Group 1, 74.0 x 74.0								
Roof-1-13-No.Clg-D	5,476	1.00	29.0	0.052	0		3.900	21,356
Wall-1-N-G-M	6,436	0.83	14.1	0.091	0		6.825	43,926
Wall-3-N-G-M	168	0.83	14.1	0.200	0		15.000	2,520
Partition-2-1	5476		0/10	0.200	0		2.000	10,952
Gls-N-1-0-Tran	1,340.0	1.000	5	0.560	0		36.750	49,245
0%S-0-L-UNS-Solar	1,340.0	0.800	37	0.550	0			
Cool. Infil.AC/hr	0				0	0		
Heat. Infil.AC/hr	821						80.874	66,430
Sub-total					0	0		194,429
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					0	0		213,872