

State Attorney Office  
HVAC Load Analysis

for

Leon County

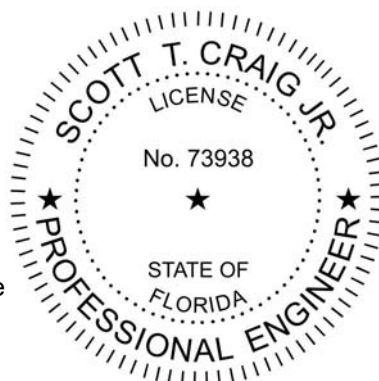
Tallahassee, FL



**CHVAC** COMMERCIAL  
HVAC LOADS

This item has been electronically signed and sealed by **Scott T. Craig, Jr., P.E.** on **10/08/2018** using a Digital Signature.

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Thursday, October 4, 2018

**Chvac - Full Commercial HVAC Loads Calculation Program**H2 Engineering Inc.  
Tallahassee, FL 32303-6123

Elite Software Development, Inc.

State Attorney Office  
Page 2**Building Summary Loads**

Building peaks in August at 10am.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	5,530	13,139	26.69	0	1,773	1,773	1.14
Wall	0	0	0.00	0	0	0	0.00
Glass	1,285	36,082	73.31	0	76,315	76,315	49.17
Floor Slab	0	0	0.00	0	0	0	0.00
<b>Skin Loads</b>		<b>49,221</b>	<b>100.00</b>	<b>0</b>	<b>78,089</b>	<b>78,089</b>	<b>50.31</b>
Lighting	3,641	0	0.00	0	13,664	13,664	8.80
Equipment	5,350	0	0.00	0	20,080	20,080	12.94
People	45	0	0.00	9,900	12,375	22,275	14.35
Partition	0	0	0.00	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.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	9,129	9,129	5.88
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	11,967	11,967	7.71
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
<b>Building Totals</b>		<b>49,221</b>	<b>100.00</b>	<b>9,900</b>	<b>145,304</b>	<b>155,204</b>	<b>100.00</b>

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	0	0.00	0	0	0	0.00
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	49,221	100.00	9,900	136,175	146,075	94.12
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	0	0.00	0	9,129	9,129	5.88
<b>Building Totals</b>	<b>49,221</b>	<b>100.00</b>	<b>9,900</b>	<b>145,304</b>	<b>155,204</b>	<b>100.00</b>

**Check Figures**

Total Building Supply Air (based on a 20° TD):

6,618 CFM

Total Building Vent. Air (0.00% of Supply):

0 CFM

Total Conditioned Air Space:

5,530 Sq.ft

Supply Air Per Unit Area:

1.1967 CFM/Sq.ft

Area Per Cooling Capacity:

427.6 Sq.ft/Ton

Cooling Capacity Per Area:

0.0023 Tons/Sq.ft

Heating Capacity Per Area:

8.90 Btuh/Sq.ft

Total Heating Required With Outside Air:

49,221 Btuh

Total Cooling Required With Outside Air:

12.93 Tons



### Air Handler #1 - AHU-13 - Summary Loads

Zn No	Description Zone 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	CHIEF ATTY. 443M 10am August	220 1 1,760	5,830 270 1.23	12,712 618 2.81	220 0 0	None 0 0	None 0 0
2	CHIEF ATTY. 443H 10am August	200 1 1,600	5,530 257 1.28	12,118 589 2.94	220 0 0	None 0 0	None 0 0
3	OPEN OFFICE 443L 10am August	320 2 2,560	6,236 289 0.90	14,201 690 2.16	440 0 0	None 0 0	None 0 0
4	OPEN OFFICE 443J 10am August	140 2 1,120	5,303 246 1.76	12,601 612 4.37	440 0 0	None 0 0	None 0 0
5	BREAK 443K 10am August	195 4 1,560	5,629 261 1.34	14,477 704 3.61	880 0 0	None 0 0	None 0 0
6	OFFICE 443G 6pm August	120 1 900	285 13 0.11	1,320 64 0.53	220 0 0	None 0 0	None 0 0
7	OFFICE 443O 6pm August	110 1 825	261 12 0.11	1,279 62 0.57	220 0 0	None 0 0	None 0 0
8	OFFICE 443P 6pm August	110 1 825	261 12 0.11	1,279 62 0.57	220 0 0	None 0 0	None 0 0
9	OFFICE 443N 6pm August	120 1 900	285 13 0.11	1,320 64 0.53	220 0 0	None 0 0	None 0 0
10	OFFICE 443E 6pm August	125 1 1,000	297 14 0.11	1,340 120 0.96	220 0 0	None 0 0	None 0 0
11	OFFICE 443C 6pm August	125 1 1,000	297 14 0.11	1,340 120 0.96	220 0 0	None 0 0	None 0 0
12	IT 443T 6pm August	105 1 840	249 12 0.11	1,259 61 0.58	220 0 0	None 0 0	None 0 0
13	IT 443R 6pm August	105 1 840	249 12 0.11	1,259 61 0.58	220 0 0	None 0 0	None 0 0
14	STG 443S 6pm August	25 0 188	59 3 0.11	100 40 1.60	0 0 0	None 0 0	None 0 0



### Air Handler #1 - AHU-13 - Summary Loads (cont'd)

Zn No	Description Zone 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
15	INVEST. 443D 6pm August	125 1 1,000	297 14 0.11	1,340 120 0.96	220 0 0	None 0 0	None 0 0
16	CONFERENCE 443B 6pm August	255 10 2,040	606 28 0.11	4,449 216 0.85	2,200 0 0	None 0 0	None 0 0
17	FIRE 443U 6pm August	40 0 300	95 4 0.11	161 60 1.50	0 0 0	None 0 0	None 0 0
18	LOBBY 443 6pm August	380 3 3,040	903 42 0.11	4,039 196 0.52	660 0 0	None 0 0	None 0 0
19	OPEN OFFICE 443Q 6pm August	565 2 4,520	1,342 62 0.11	3,943 192 0.34	440 0 0	None 0 0	None 0 0
20	COPY 443A 6pm August	120 0 960	285 13 0.11	2,358 115 0.96	0 0 0	None 0 0	None 0 0
21	OPEN OFFICE 443V 6pm August	400 3 3,200	950 44 0.11	4,119 200 0.50	660 0 0	None 0 0	None 0 0
22	IT STORAGE 443W 6pm August	110 0 880	261 12 0.11	441 100 0.91	0 0 0	None 0 0	None 0 0
23	VACANT 442A 6pm August	315 0 2,520	748 35 0.11	440 240 0.76	0 0 0	None 0 0	None 0 0
24	PROB. OFF. 441A 6pm August	120 1 960	285 13 0.11	1,320 64 0.53	220 0 0	None 0 0	None 0 0
25	PROB. OFF. 441 6pm August	170 1 1,360	404 19 0.11	1,520 74 0.43	220 0 0	None 0 0	None 0 0
26	HALL 443I 6pm August	220 0 1,760	523 24 0.11	883 43 0.20	0 0 0	None 0 0	None 0 0
27	VACANT 442B 6pm August	110 0 880	261 12 0.11	156 40 0.36	0 0 0	None 0 0	None 0 0
28	VACANT 442C 6pm August	110 1 880	261 12 0.11	994 48 0.44	220 0 0	None 0 0	None 0 0



### Air Handler #1 - AHU-13 - Summary Loads (cont'd)

Zn No	Description Zone 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
29	NIS Conference 10am August	225 4 1,800	4,410 205 0.91	10,663 518 2.30	880 0 0	None 0 0	None 0 0
30	NIS Office 10am August	245 1 1,960	6,816 316 1.29	15,021 730 2.98	220 0 0	None 0 0	None 0 0
	Zone Peak Totals:	5,530	49,221	128,451	9,900		
	Total Zones: 30	45	2,283	6,824	0	0	0
	Unique Zones: 30	43,978	0.41	1.23	0	0	0

**Chvac - Full Commercial HVAC Loads Calculation Program**H2 Engineering Inc.  
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Page 6**Air Handler #1 - AHU-13 - Total Load Summary**

Air Handler Description: AHU-13 Variable Air Volume  
 Supply Air Fan: Draw-Thru with program estimated horsepower of 3.60 HP  
 Fan Input: 65% motor and fan efficiency with 2.25 in. water across the fan  
 Sensible Heat Ratio: 0.94 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time: 10am in August.  
 Outdoor Conditions: Clg: 84° DB, 75° WB, 119.53 grains, Htg: 25° DB  
 Indoor Conditions: Clg: 75° DB, 51% RH, Htg: 70° DB

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

Zone Space sensible loss:	49,221 Btuh	
Infiltration sensible loss:	0 Btuh	0 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:		49,221 Btuh

Heating Supply Air: $49,221 / (.998 \times 1.08 \times 20) =$	2,283 CFM
Winter Vent Outside Air (0.0% of supply) =	0 CFM

Zone space sensible gain:	124,208 Btuh	
Infiltration sensible gain:	0 Btuh	
Draw-thru fan sensible gain:	9,129 Btuh	
Supply duct sensible gain:	0 Btuh	
Reheat sensible gain:	11,967 Btuh	
Total sensible gain on supply side of coil:		145,304 Btuh

Cooling Supply Air: $145,304 / (.998 \times 1.1 \times 20) =$	6,618 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:		145,304 Btuh

Zone space latent gain:	9,900 Btuh	
Infiltration latent gain:	0 Btuh	
Outside air latent gain:	0 Btuh	
Total latent gain on air handling system:		9,900 Btuh
Total system sensible and latent gain:		155,204 Btuh

**Check Figures**

Total Air Handler Supply Air (based on a 20° TD):	6,618 CFM
Total Air Handler Vent. Air (0.00% of Supply):	0 CFM
Total Conditioned Air Space:	5,530 Sq.ft
Supply Air Per Unit Area:	1.1967 CFM/Sq.ft
Area Per Cooling Capacity:	427.6 Sq.ft/Ton
Cooling Capacity Per Area:	0.0023 Tons/Sq.ft
Heating Capacity Per Area:	8.90 Btuh/Sq.ft
Total Heating Required With Outside Air:	49,221 Btuh
Total Cooling Required With Outside Air:	12.93 Tons

**Chvac - Full Commercial HVAC Loads Calculation Program**H2 Engineering Inc.  
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Page 7**Air System #1 (AHU-13) Psychrometric Analysis**

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition		63.870		55.000	
Draw-Thru Fan			9,129	1.257	416
Misc Load on Supply Side			0	0.000	0
Supply Air Duct			0	0.000	0
Zone Loads	9,900	2.204	124,208	17.096	5,657
Reheat			11,967	1.647	545
Zone Condition	9,900	66.074	145,304	75.000	6,618
Return Air Duct			0	0.000	
Return Air Plenum			0	0.000	
Misc Load on Return Side			0	0.000	
Vent Air 0 CFM	0	0.000	0	0.000	
Blow-Thru Fan			0	0.000	
Entering Coil Condition	9,900	66.074	145,304	75.000	6,618

**General Psychrometric Equations Used In Analysis:**

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)

TSH = PR x 1.10 x CFM x (DB entering - DB leaving)

TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)

GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH = 0.998 x 1.10 x 6,618 x ( 75.000 - 55.000 ) = 145,304 Btuh

TLH = 0.998 x 0.68 x 6,618 x ( 66.074 - 63.870 ) = 9,900 Btuh

SUM = -----  
155,204 Btuh

GTH = 0.998 x 4.50 x 6,618 x ( 28.331 - 23.105 ) = 155,314 Btuh

Total System Load = 155,204 Btuh

**Chilled and Hot Water Flow Rates and Steam Requirement**

Cooling GPM = 155,314 / ( 0.00 x 500 ) = 0.0 GPM

Heating GPM = 49,221 / ( 0.00 x 500 ) = 0.0 GPM

Steam Req. = 49,221 / 970 = 50.7 lb./hr

**Entering Cooling Coil Conditions**Dry bulb temperature: 75.00  
Wet bulb temperature: 62.82  
Relative humidity: 51.00  
Enthalpy: 28.33 Btu/lbm**Entering Heating Coil Conditions**

Dry bulb temperature: 70.00

**Leaving Cooling Coil Conditions**Dry bulb temperature: 55.00  
Wet bulb temperature: 54.84  
Relative humidity: 99.04  
Enthalpy: 23.11 Btu/lbm**Leaving Heating Coil Conditions**

Dry bulb temperature: 90.00