



# The State Institute of Rehabilitation

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## Technical Investigation, Part Two

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## Executive Summary

The following report is an in depth investigation into the mechanical requirements of the Institute of Rehabilitation as it now stands. Using what information was available on the building; the heating and cooling loads of the building were calculated and, furthermore, analyzed. These results were compared to the design which currently handles the loads presented by the building.

The load and ventilation calculations themselves were done via block load. Bundles of rooms with similar exterior exposures and characteristics were grouped to create a comprehensive, but intimate, look at the sufficiency of the in-place system to serve the buildings' needs.

To the same extent, the resulting loads were analyzed alongside the building's existing equipment to generate an energy consumption profile and building energy expenditure summary.

Finally, the energy usage of the building was analyzed against emission profiles to gain a better understanding about the building not just in terms of its usage but also its contribution to pollution and exhaust profiles.

## Building Summary

### Building History

The building in question is actually a sizeable addition to the Institute of Rehabilitation, a healthcare and rehabilitation center located in the northeastern United States. Completed in 2005, the addition is an approximately 120,000 ft<sup>2</sup>, three story, stand-alone addition to an existing structure dating, at its earliest, to 1949.

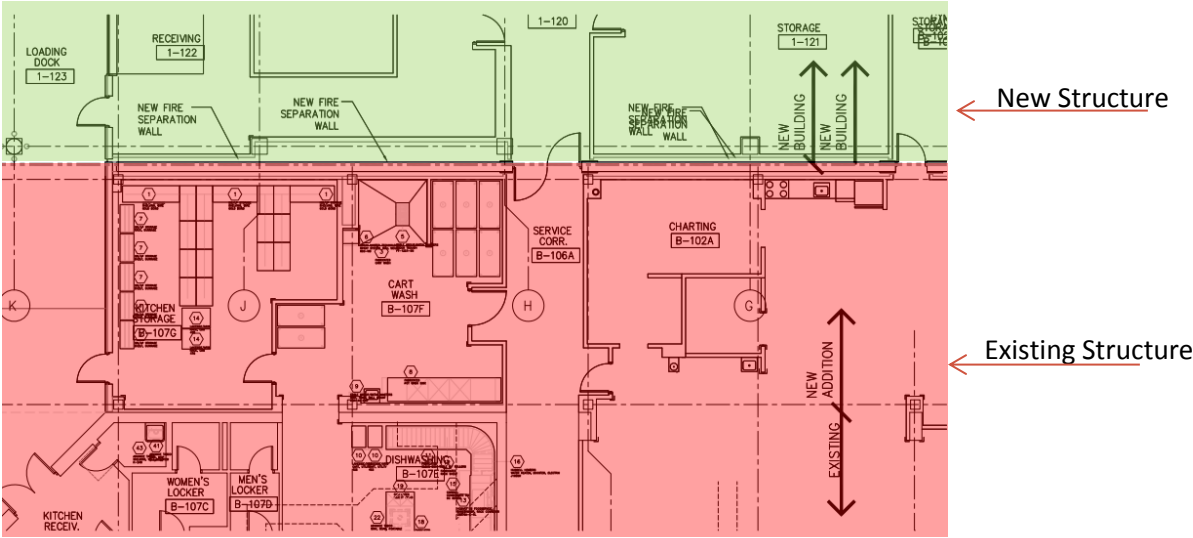


Figure 1: A color diagram depicting the interface between the existing Rehabilitation Center and the new wing

The building addition, proposed, designed, and constructed in the early ought's, was meant to expand the Institutes' ability to care for its booming inpatient and outpatient populations. The addition was built entirely on its own mechanical and chilled water systems to avoid disturbing the operation of the existing facility, which remained fully operational during construction.

## Mechanical Summary

Mechanically, the addition abutting the existing structure is a stand-alone. The equipment installed in the building handles, by itself, the loads generated by building occupants, equipment, and ambient conditions.

The cooling, heating, and ventilation requirements of the buildings are handled by nine (9) packaged, variable air volume Rooftop Air Handling Units (RTU's) and one (1) make-up air unit. Cooling is provided, in each unit, by direct expansion (dx) cooling coils. The building's heating requirements are met, however, by a natural gas fired heating bay.

Three natural-gas fed, 1600 MBH hot water boilers feed the systems zone heat requirements. The building is zoned for effective space conditioning, and each of the zones is controlled by a single duct Variable Air Volume unit. The reheat coils on these 137 VAV boxes are fed by the hot water produced by these three boilers.

Additionally, eight (8) unit heaters and eight (8) cabinet unit heaters provide additional heating when needed. For the sake of this report, they have been neglected and their capacities have been blanketed under the "heating plant" in the Trane 700 model.

## System Design Load Estimation

### Assumptions

Though all efforts have been made in this report to accurately represent the building in question, some simplifications have been made in order to ease the analysis. The most significant simplification made, in this report, is the willful disregard for the application of a diversity factor. Though not entirely accurate, this simplification is acceptable.

The Institute of Rehabilitation houses both out and in-patient services, requiring mechanical equipment to be run at all times of the day. Unlike an office building, where occupancy drops off to near zero during evening and night hours, a healthcare building providing in-patient services will never have occupancy of zero. Though nighttime occupancy in the Institute of Rehabilitation is a fraction of the daytime occupancy, the exact ratio of inpatient to outpatient care is variable. It is thus more accurate, in this modeling exercise, to oversize space conditioning equipment by assuming a diversity factor of 1- that nighttime and daytime occupancies are exactly the same.

### Internal/External Environments

The building is closest in location to the Newark International Airport, and so the temperature data used in the load and energy model is that of Newark. The summary of the temperatures used is shown below. A more extensive view of the weather data, retrieved from the 2009 ASHRAE Handbook of Fundamentals, can be found in Appendix A.

It is important to note that because the Institute of Rehabilitation is a healthcare building, and because a number of the building’s in-patient population is compromised, all effort was made to design the building with stricter standards. The heating and cooling design temperatures were retrieved from the 99.6% and 0.4%, respectively.

The indoor environment was designed at a relative humidity (RH) of 50%, for 72°F and 75°F for the winter and summer, respectively.

	Summer: Design Cooling (0.4%)	Winter: Design Heating(99.6%)
Outdoor Air Dry Bulb (°F)	94	11
Outdoor Air Wet Bulb (°F)	74.9	-
Indoor Air Temperature (°F)	75	72

Figure 2: ASHRAE weather data for Newark, NJ

### Block Layout

The building, as far as air distribution is concerned, had already been split into block loads. A visual representation of the assignment of RTU’s to area blocks can be viewed below. They are, in a general way, split up by exposure. In order to accurately compare the design to the analytical calculation, the same convention was followed.



Figure 3: Floor 1

**RTU-Block Assignment;**

**Key Plan**

RTU-1;  
block 1 

RTU-2;  
block 2 

RTU-3;  
block 3 

RTU-4;  
block 4 

RTU-5;  
block 5 

RTU-6;  
block 6 

RTU-7;  
block 7 

RTU-8;  
block 8 

RTU-9;  
block 9 

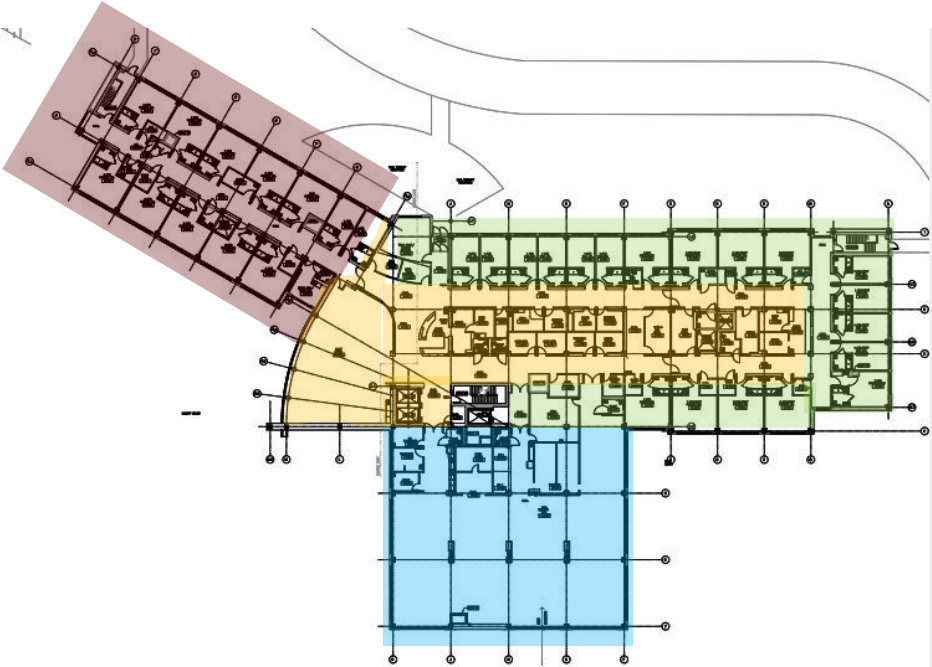


Figure 4: Floor 2

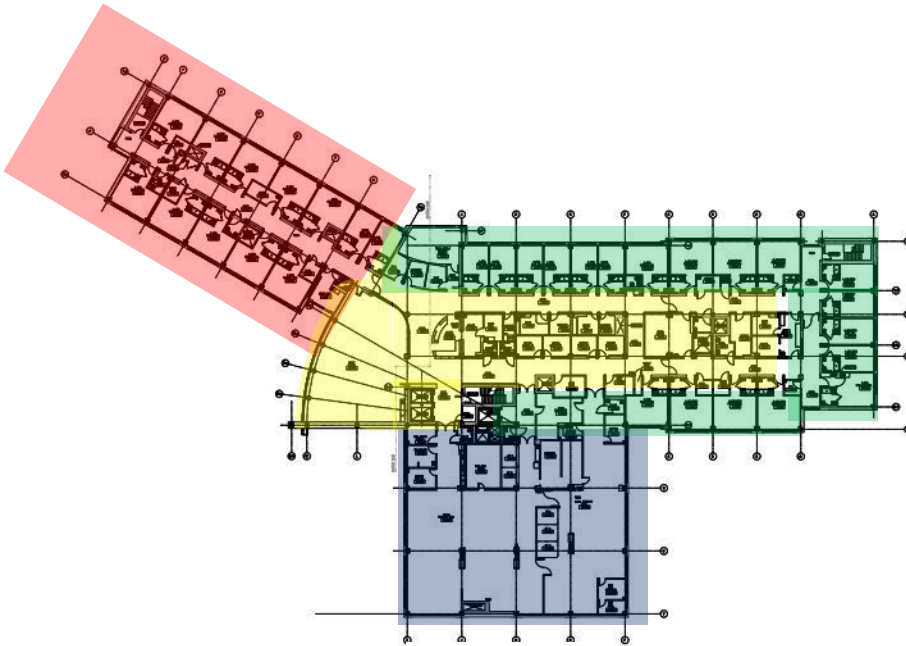


Figure 5: Floor 3

### Design Occupancies

In general, although ASHRAE occupancy guidelines were considered, the assumed occupancy of each room is based more specifically on the actual design. The occupancy of each room can be found both in the ASHRAE 62.1 Ventilation calculation.

### Lighting Loads

In general, most spaces were assumed to have a lighting density of 2W/sf, although a more detailed tabulation can be found in the Trace templates in Appendix B. The lighting densities were assumed to be larger in the trace model as a precaution.

### Miscellaneous Equipment Loads

Though the State Institute of Rehabilitation is a healthcare building, there is not much in the way of excess cooling load which is contributed by miscellaneous equipment. Though there are a number of medical devices and machines present in each of the patient rooms, their heat generation is insignificant in comparison to that produced by occupants, light, and fenestration.

### System Design Load Estimations- Results

The results following would indicate that, as modeled, the amount of cooling required by the building exceeds what was designed for the space by approximately 14%. Although this is a concerning outcome at first glance, it is less worrisome when compared to the system capacity of the installed RTU's. Additionally, it should be recalled that no diversity factor was applied to the model occupancies. In the model, occupancy most likely exceeds 100% as it accounts for staff in each of the offices, therapy rooms, and even in some cases the patient rooms.

The air flow per unit floor area (cfm/ft<sup>2</sup>) is within reason of the expected outcome. In a healthcare setting, in which air is changed volumetrically for a certain number of air changes per hour, the expected cfm/ft<sup>2</sup> is expected to be a bit higher. A cfm/ft<sup>2</sup> of 1 is appropriate for office and educational settings, and so an average cfm/ft<sup>2</sup> around 1.5 is well within the expected value.

Very evident, however, is the difference between modeled and designed heating loads. The disparity between the two may be owing to the presence of VAV/reheat coils in the space. The modeled heating load, in terms of air flow, is much less than that of the modeled cooling loads. Less air is required in heating mode than in cooling mode to achieve a desired space conditioning. Theoretically, once a desired set point has been reached, and because the RTU's are themselves VAV, the air would shut off. This is undesirable, however, and so instead approximately the same amount of air as in cooling mode (minus about 30%) will be provided in heating mode, and the supplemental heating on the single duct VAV's will provide the rest of the heating required.

		Zone/ System	System Capacity	A <sub>floor</sub>	Supply Air Flow (cooling)	cfm/ft <sup>2</sup>
Modeled	RTU-1	11500	5895	8755	1.49	
	RTU-2	11500	5907	11260	1.91	
	RTU-3	12000	10139	19966	1.97	
	RTU-4	12000	9874	19379	1.96	
	RTU-5	14000	6830	11993	1.76	
	RTU-6	14000	4745	7811	1.65	
	RTU-7	12500	10069	12510	1.24	
	RTU-8	12500	9920	10911	1.10	
	RTU-9	12500	11090	14454	1.30	
	<b>Total</b>	<b>112500</b>	<b>74469</b>	<b>117039</b>	<b>1.57</b>	

		Zone/ System	System Capacity	A <sub>floor</sub>	Supply Air Flow (heating)	cfm/ft <sup>2</sup>
Modeled	RTU-1	11500	5895	3467	0.59	
	RTU-2	11500	5907	4345	0.74	
	RTU-3	12000	10139	6949	0.69	
	RTU-4	12000	9874	7271	0.74	
	RTU-5	14000	6830	4263	0.62	
	RTU-6	14000	4745	2464	0.52	
	RTU-7	12500	10069	3774	0.37	
	RTU-8	12500	9920	3502	0.35	
	RTU-9	12500	11090	5141	0.46	
	<b>Total</b>	<b>112500</b>	<b>74469</b>	<b>41176</b>	<b>0.55</b>	

		Zone/ System	System Capacity	A <sub>floor</sub>	Supply Air Flow (cooling)	cfm/ft <sup>2</sup>
Designed	RTU-1	11500	4930	10385	2.11	
	RTU-2	11500	4930	10835	2.20	
	RTU-3	12000	8366	11310	1.35	
	RTU-4	12000	8466	11480	1.36	
	RTU-5	14000	7277	12000	1.65	
	RTU-6	14000	7189	12723	1.77	
	RTU-7	12500	8229	10250	1.25	
	RTU-8	12500	7490	11600	1.55	
	RTU-9	12500	11025	11510	1.04	
	<b>Total</b>	<b>112500</b>	<b>67902</b>	<b>102093</b>	<b>1.50</b>	

		Zone/ System	System Capacity	A <sub>floor</sub>	Supply Air Flow (heating)	cfm/ft <sup>2</sup>
Designed	RTU-1	11500	4930	6600	1.34	
	RTU-2	11500	4930	6600	1.34	
	RTU-3	12000	8366	9060	1.08	
	RTU-4	12000	8466	9230	1.09	
	RTU-5	14000	7277	8865	1.22	
	RTU-6	14000	7189	9090	1.26	
	RTU-7	12500	8229	8610	1.05	
	RTU-8	12500	7490	9250	1.23	
	RTU-9	12500	11025	5120	0.46	
	<b>Total</b>	<b>112500</b>	<b>67902</b>	<b>72425</b>	<b>1.07</b>	

Figure 6: Modeled vs. Designed Heating and Cooling air supplies



## System Energy Consumption & Operating Costs

### System Comparison

The State Institute of Rehabilitation consumes approximately 2,307,550 kwh/yr. The individual contributors to this total are shown below. The largest energy usage, by far, is lights. There is little, however, that can be done about this usage. The Institute of Rehabilitation is a 24/7 operation healthcare building and so, aside from the use of light sensors or LED installation, lights will continue to contribute significantly to the energy usage.

The second largest contributor to energy usage is mechanical cooling. This is largely due to the use of dx cooling in each RTU. The use of electricity in building mechanical systems is extremely inefficient. Inherent transmission and distribution losses between power plants and building sites ensure the use of more primary energy units than would otherwise be necessary with a non-electric system.

Equipment Energy Consumption		
Equipment	Energy Used (kwh/yr)	%
Lights	1304703.9	56.54%
Cooling	741086	32.12%
Heating	168589	7.31%
Heat Rejection	88218.5	3.82%
Receptacles	4949.5	0.21%
Total	2307546.9	100.00%

Figure 7: Detail of building energy usage

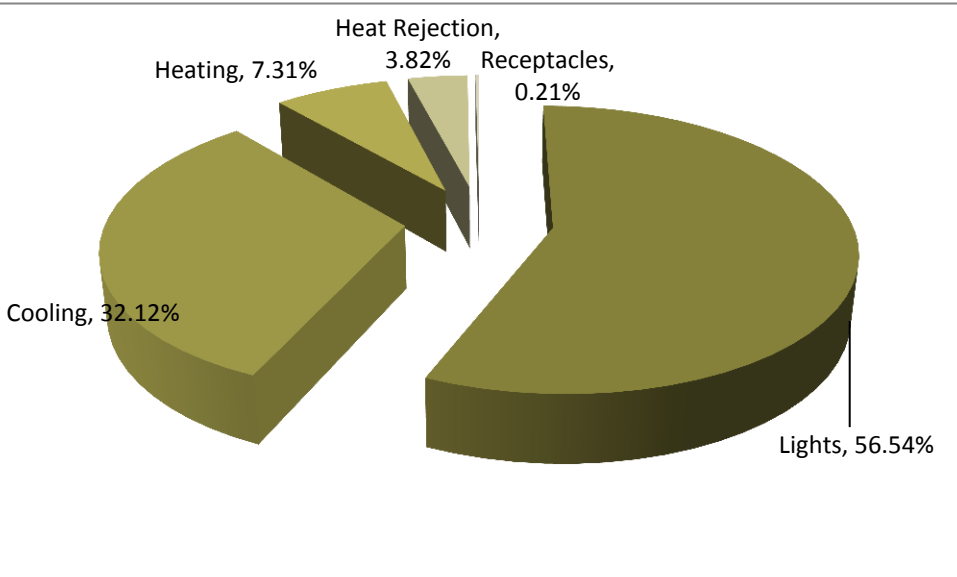


Figure 8: Visual comparison of energy used by different building systems

### Monthly Energy Usage

The largest amount of energy used, converting units of energy for Natural-gas (therms) to kWh, is the electricity. The amount of electricity used peaks around July when more cooling is needed. Were the dx system to be replaced, the electricity usage at the building would decrease significantly, resulting in additional monetary savings.

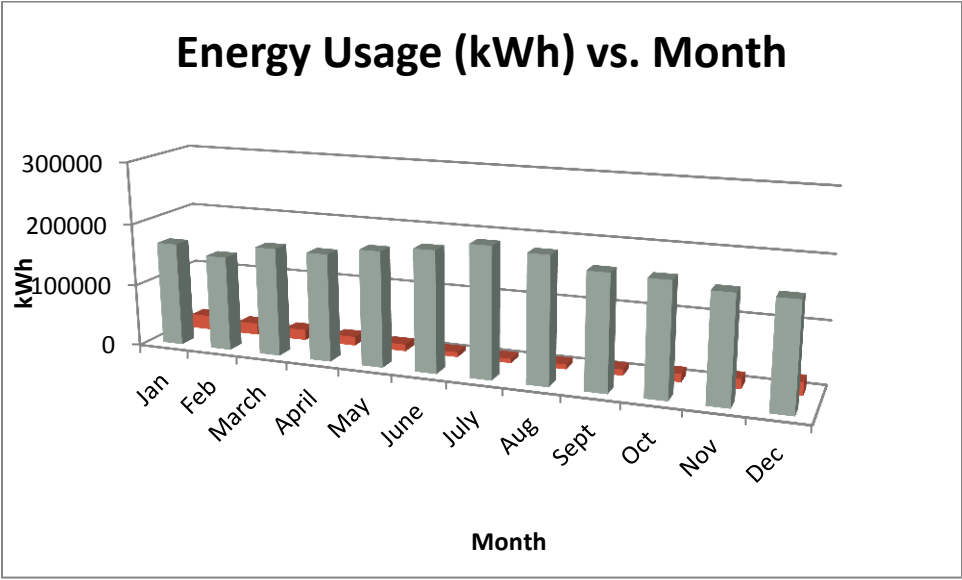


Figure 9: Energy Use of (natural gas) vs. (electricity) vs. Month

### Cost of Energy Usage

Electricity, though seemingly less expensive than natural gas, is quite a bit less efficient. One therm, the energy unit used to describe natural gas, contains about 29.3 kWh. In terms of Btu’s, this means that (1) kWh = 3412.14 Btu while (1) therm = 99,976.12 Btu. One therm contains 29x the energy of 1kWh, and to burn a therm on site means that there are no transmission charges. The direct heat exchange cooling system utilized in the RTU is extremely inefficient. The space conditioning expenditures of the Institute of Rehabilitation have the potential to be dramatically reduced by the conversion to a non-electric system.

### Environmental Impact

The environmental impact which the building currently has is outlined below. The inefficiency of electricity greatly contributes. About 3x more primary energy units are used at a power plant to create one unit of electricity than if those primary energy units were used on site.

Environmental Impact		
CO <sub>2</sub>	1,506,555	lb <sub>m</sub> /yr
SO <sub>2</sub>	5734	lb <sub>m</sub> /yr
NO <sub>x</sub>	1572	lb <sub>m</sub> /yr

Figure 10: Gaseous emissions associated with energy use in building

### Mechanical Energy Use, break down

The largest amount of energy used in the mechanical system, by far, is the chiller compressor. The chiller compressor is the electrical component to the cooling loop. As discussed above, the impact of electricity use for mechanical equipment on site is extremely inefficient.

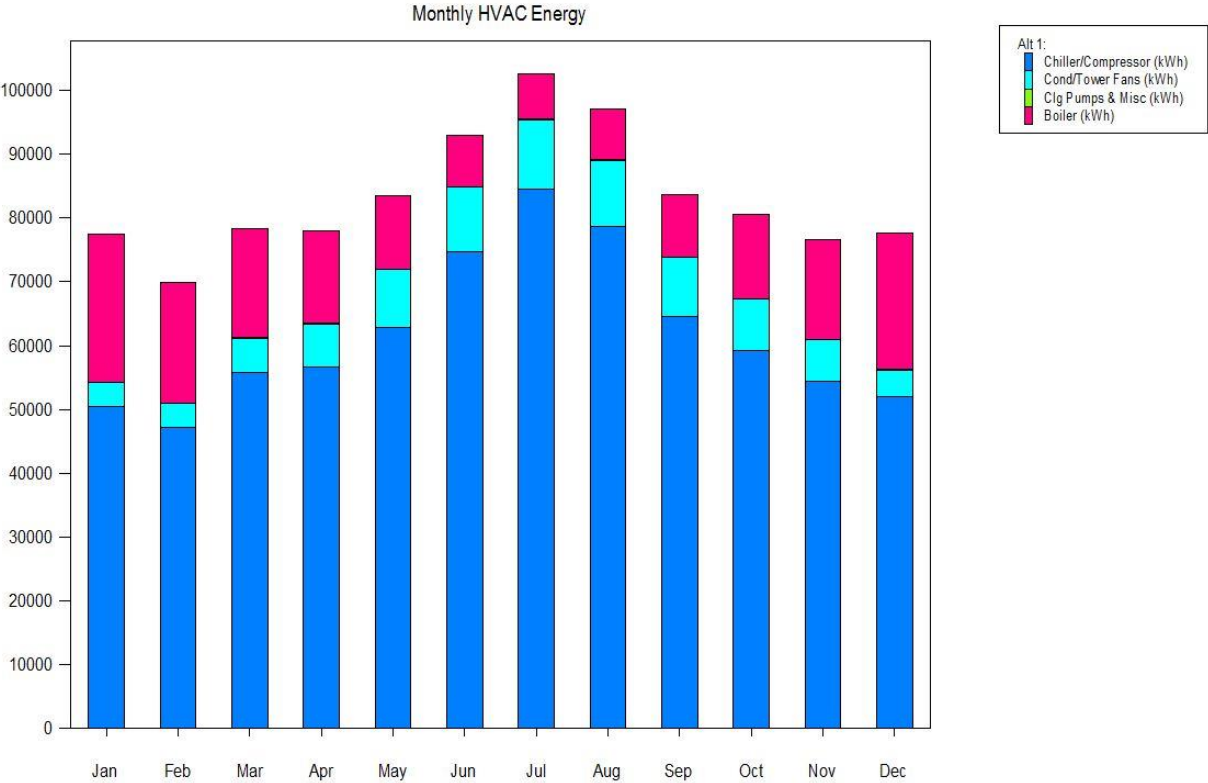


Figure 11: Energy use (kWh) by Mechanical component vs. Month

## References

ASHRAE (2009), Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc., Atlanta,GA, 2009.

ASHRAE (2009), Standard 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential Buildings. American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc., Atlanta,GA, 2009

ASHRAE (2009). 2005 ASHRAE Handbook - Fundamentals. Atlanta, GA: American Society of Heating Refrigeration and Air Conditioning Engineers, Inc.

# APPENDIX A-Weather

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Station	Lat	Long	Elev	Heating DB		Cooling DB/MCWB			Evaporation WB/MCDB			Dehumidification DP/HR/MCDB			Extreme Annual WS		Heat/Cool. Degree-Days HDD / CDD 65										
				99.6%	99%	0.4%	1%	2%	0.4%	1%	1%	0.4%	1%	1%	1%	2.5%		5%									
MANCHESTER AIRPORT	42.93N	71.44W	233	1.0	6.7	91.2	72.1	88.6	70.8	85.8	69.7	75.8	86.4	74.1	83.4	72.5	121.4	80.6	71.5	117.3	79.1	19.0	17.7	15.5	6212	739	
PEASE INTL TRADEPOR	43.08N	70.82W	102	2.6	7.7	89.3	72.7	85.9	71.1	82.4	69.5	75.5	84.5	73.5	82.0	72.5	120.8	80.4	71.0	114.7	78.3	22.6	19.4	17.2	6442	534	
<i>New Jersey</i>																											
ATLANTIC CITY INTL AP	39.46N	74.46W	66	9.9	14.9	92.3	75.0	89.4	74.0	86.4	72.8	77.9	87.5	76.6	85.0	75.2	132.4	81.8	74.1	127.8	80.6	24.8	21.1	18.8	4950	995	
BELMAR-FARMINGDALE	40.18N	74.13W	85	10.7	15.7	90.7	73.6	88.1	72.5	84.3	71.0	76.4	86.5	74.8	83.8	73.1	123.3	80.9	72.2	119.4	80.1	25.4	22.1	19.4	5118	867	
MCCUIRE AFB	40.02N	74.60W	148	10.3	15.1	92.9	75.7	90.3	74.7	87.8	73.4	78.8	87.8	77.2	86.3	76.5	139.1	83.3	74.6	130.1	81.8	23.3	19.8	17.6	4897	1074	
MILLVILLE MUNICIPAL AP	39.37N	75.08W	75	10.3	15.3	91.9	74.9	89.5	74.1	86.9	73.0	78.0	87.1	76.7	85.0	75.4	133.3	81.4	74.3	128.7	80.4	19.8	18.2	16.6	4860	1052	
NEWARK INTERNATIONAL ARPT	40.72N	74.17W	30	11.0	15.5	94.0	74.9	91.0	73.5	88.2	72.2	77.7	88.8	76.3	85.9	74.7	140.1	82.0	73.5	124.7	80.8	25.0	21.9	19.3	4710	1242	
TETERBORO AIRPORT	40.85N	74.06W	7	9.9	14.5	92.4	75.1	89.7	74.0	86.8	72.4	78.0	88.0	76.3	85.5	75.1	131.8	82.8	73.4	124.2	80.5	20.6	18.7	17.3	5055	1002	
TRENTON MERCER COUNTY AP	40.28N	74.81W	213	9.8	14.1	92.6	74.4	89.9	73.7	87.2	72.6	77.5	88.9	76.0	85.7	73.7	126.6	81.9	72.9	123.0	81.1	23.5	20.0	18.4	5144	987	

Meaning of acronyms: DB: Dry bulb temperature, °F; MCWB: Mean coincident wet bulb temperature, °F; WB: Wet bulb temperature, °F; MCDDB: Mean coincident dry bulb temperature, °F; DP: Dew point temperature, °F; HR: Humidity ratio, grains of moisture per lb of dry air; HDD and CDD 65: Annual heating and cooling degree-days, base 65°F, °F-day; Lat: Latitude, °; Long: Longitude, °; Elev: Elevation, ft; WS: Wind speed, mph; DP/HR/MCDB: Dehumidification DP/HR/MCDB; WB/MCDB: Evaporation WB/MCDB; DB/MCWB: Cooling DB/MCWB; DP/HR/MCDB: Dehumidification DP/HR/MCDB; WB/MCDB: Evaporation WB/MCDB; DP/HR/MCDB: Dehumidification DP/HR/MCDB; Extreme Annual WS: Extreme Annual WS; Heat/Cool. Degree-Days: Heat/Cool. Degree-Days; HDD / CDD 65: HDD / CDD 65; 7 sites, 1 more on CDA-ROM

## Appendix B- Trace Templates

**Internal Load Templates - Project**

Alternative: Alternative 1  
Description: Conference/Activity

People...  
Type: None  
Density: 0 People  
Schedule: Cooling Only (Design)  
Sensible: 250 Btu/h  
Latent: 250 Btu/h

Workstations...  
Density: 1 workstation/person

Lighting...  
Type: Recessed fluorescent, not vented, 80% load to space  
Heat gain: 2 W/sq ft  
Schedule: Cooling Only (Design)

Miscellaneous loads...  
Type: None  
Energy: 2 W/sq ft  
Schedule: Cooling Only (Design)  
Energy meter: None

**Internal Load** | Airflow | Thermostat | Construction | Room

**Internal Load Templates - Project**

Alternative: Alternative 1  
Description: Patient Room

People...  
Type: None  
Density: 2 People  
Schedule: Cooling Only (Design)  
Sensible: 250 Btu/h  
Latent: 250 Btu/h

Workstations...  
Density: 1 workstation/person

Lighting...  
Type: Recessed fluorescent, not vented, 80% load to space  
Heat gain: 2 W/sq ft  
Schedule: Cooling Only (Design)

Miscellaneous loads...  
Type: None  
Energy: 4 W/sq ft  
Schedule: Cooling Only (Design)  
Energy meter: None

**Internal Load** | Airflow | Thermostat | Construction | Room

**Internal Load Templates - Project**

Alternative: Alternative 1  
 Description: Storage

People...  
 Type: None  
 Density: 0 People  
 Schedule: Cooling Only (Design)  
 Sensible: 250 Btu/h  
 Latent: 250 Btu/h

Workstations...  
 Density: 1 workstation/person

Lighting...  
 Type: Recessed fluorescent, not vented, 80% load to space  
 Heat gain: 2 W/sq ft  
 Schedule: Cooling Only (Design)

Miscellaneous loads...  
 Type: None  
 Energy: 0 W/sq ft  
 Schedule: Cooling Only (Design)  
 Energy meter: None

**Internal Load** | Airflow | Thermostat | Construction | Room

**Internal Load Templates - Project**

Alternative: Alternative 1  
 Description: Office

People...  
 Type: None  
 Density: 1 People  
 Schedule: Cooling Only (Design)  
 Sensible: 250 Btu/h  
 Latent: 250 Btu/h

Workstations...  
 Density: 1 workstation/person

Lighting...  
 Type: Recessed fluorescent, not vented, 80% load to space  
 Heat gain: 2 W/sq ft  
 Schedule: Cooling Only (Design)

Miscellaneous loads...  
 Type: None  
 Energy: 2 W/sq ft  
 Schedule: Cooling Only (Design)  
 Energy meter: None

**Internal Load** | Airflow | Thermostat | Construction | Room

**Internal Load Templates - Project**

Alternative:    
Description:

People...  
Type:   
Density:     
Schedule:    
Sensible:  Btu/h Latent:  Btu/h

Workstations...  
Density:

Lighting...  
Type:   
Heat gain:

Miscellaneous loads...  
Type:   
Energy:      
Energy meter:

**Internal Load**           

**Internal Load Templates - Project**

Alternative:    
Description:

People...  
Type:   
Density:     
Schedule:    
Sensible:  Btu/h Latent:  Btu/h

Workstations...  
Density:

Lighting...  
Type:   
Heat gain:

Miscellaneous loads...  
Type:   
Energy:      
Energy meter:

**Internal Load**



Construction Templates - Project

Alternative: Alternative 1  
Description: Default

Apply  
Close

Construction...

		U-factor Btu/h ft <sup>2</sup> °F
Slab	4" LW Concrete	0.212615
Roof	8" HW Conc, 4" Ins	0.0651477
Wall	Metal, 3" Ins	0.0907574
Partition	0.75" Gyp Frame	0.387955

Glass type...

		U-factor Btu/h ft <sup>2</sup> °F	Shading coeff
Window	Single Clear 1/4"	0.64	0.95
Skylight	Single Clear 1/4"	0.64	0.95
Door	Standard Door	0.2	0

Height...

Wall	10	ft	Pct wall area to underfloor plenum		%
Fir to fir	14	ft	Room type	Conditioned	
Plenum	2	ft			

Internal Load    Airflow    Thermostat    **Construction**    Room

## Appendix C- Zone Checksums

# Zone Checksums

By ACADEMIC

1st

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES				
Peaked at Time:		Mo/Hr: 10 / 14		Mo/Hr: 10 / 14		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Cooling	Heating			
Outside Air:		OADB/WB/HR: 66 / 56 / 50		OADB: 66		OADB: 66		OADB: 14		OADB: 14		SADB	61.1	81.1		
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	75.8	71.8		
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Return	75.8	71.8		
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0		
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0		
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0		
Roof Cond	0	0	0	0	0	Roof Cond	0	0.00	Roof Cond	0	0.00	ACADEMIC				
Glass Solar	138,099	138,099	56	138,099	61	Glass Solar	0	0.00	Glass Solar	0	0.00					
Glass/Door Cond	-7,438	-7,438	-3	-7,438	-3	Glass/Door Cond	-47,607	-41.41	Glass/Door Cond	-47,607	-41.41					
Wall Cond	1,224	1,540	1	1,224	1	Wall Cond	-4,064	-4.90	Wall Cond	-5,630	-4.90					
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00					
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00					
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00					
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00					
<b>Sub Total ==&gt;</b>	<b>131,884</b>	<b>316</b>	<b>132,200</b>	<b>53</b>	<b>131,884</b>	<b>59</b>	<b>Sub Total ==&gt;</b>	<b>-51,671</b>	<b>-53,237</b>	<b>46.31</b>	USE					
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>								
Lights	60,560	15,140	75,700	31	60,560	27	Lights	0	0.00	Lights				0	0.00	
People	21,500	0	21,500	9	10,750	5	People	0	0.00	People				0	0.00	
Misc	13,809	0	13,809	6	13,809	6	Misc	0	0.00	Misc				0	0.00	
<b>Sub Total ==&gt;</b>	<b>95,869</b>	<b>15,140</b>	<b>111,009</b>	<b>45</b>	<b>85,119</b>	<b>38</b>	<b>Sub Total ==&gt;</b>	<b>0</b>	<b>0.00</b>	<b>0</b>				<b>0.00</b>		
<b>Ceiling Load</b>	<b>2,739</b>	<b>-2,739</b>	<b>0</b>	<b>0</b>	<b>2,739</b>	<b>1</b>	<b>Ceiling Load</b>	<b>-595</b>	<b>0</b>	<b>0.00</b>						
Ventilation Load	0	0	0	0	0	0	Ventilation Load	0	0.00	Ventilation Load				0	0.00	
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0.00	Adj Air Trans Heat				0	0.00	
Dehumid. Ov Sizing	0	0	0	0	0	0	Ov/Undr Sizing	0	0.00	Ov/Undr Sizing				0	0.00	
Ov/Undr Sizing	4,854	0	4,854	2	4,854	2	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00				
Exhaust Heat	0	0	0	0	0	0	OA Preheat Diff.	0	0.00	OA Preheat Diff.	0	0.00				
Sup. Fan Heat	0	0	0	0	0	0	RA Preheat Diff.	0	0.00	RA Preheat Diff.	0	0.00				
Ret. Fan Heat	0	0	0	0	0	0	Additional Reheat	-61,717	53.69	Additional Reheat	-61,717	53.69				
Duct Heat Pkup	0	0	0	0	0	0	System Plenum Heat	0	0.00	System Plenum Heat	0	0.00				
Underflr Sup Ht Pkup	0	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00				
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00				
<b>Grand Total ==&gt;</b>	<b>235,347</b>	<b>12,717</b>	<b>248,064</b>	<b>100.00</b>	<b>224,597</b>	<b>100.00</b>	<b>Grand Total ==&gt;</b>	<b>-52,266</b>	<b>-114,954</b>	<b>100.00</b>	ONLY					

AIRFLOWS		
	Cooling	Heating
Diffuser	14,454	5,141
Terminal	14,454	5,141
Main Fan	14,454	5,141
Sec Fan	0	0
Nom Vent	0	0
AHU Vent	0	0
Infil	0	0
MinStop/Rh	5,141	5,141
Return	14,454	5,141
Exhaust	0	0
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS		
	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	1.30	0.46
cfm/ton	699.20	
ft²/ton	536.47	
Btu/hr-ft²	22.37	-10.37
No. People	43	

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION				
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR	Leave DB/WB/HR	Gross Total	Glass	Capacity		Coil Airflow	Ent	Lvg	Capacity		Coil Airflow	Ent	Lvg	
ton	MBh	cfm	°F °F gr/lb	°F °F gr/lb		ft² (%)	MBh	MBh	cfm	°F	°F	MBh	MBh	cfm	°F	°F	
Main Clg	20.7	248.1	237.3	14,454	75.8 62.8 64.7	61.1 57.1 63.6	Floor	11,090		5,141	61.1	81.1	Main Htg	-115.0	5,141	61.1	81.1
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0		0	0.0	0.0	Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Int Door	0		0	0.0	0.0	Preheat	0.0	0	0.0	0.0
							ExFlr	0		5,141	61.1	72.0	Reheat	-62.7	5,141	61.1	72.0
							Roof	0	0	0	0.0	0.0	Humidif	0.0	0	0.0	0.0
							Wall	2,337	1,267	54	0.0	0.0	Opt Vent	0.0	0	0.0	0.0
							Ext Door	0	0	0	0.0	0.0	<b>Total</b>	<b>-115.0</b>			
<b>Total</b>	<b>20.7</b>	<b>248.1</b>															

# Zone Checksums

By ACADEMIC

## 2nd Central

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 9 / 16		Mo/Hr: 9 / 16		Mo/Hr: Heating Design						Cooling	Heating	
Outside Air:		OADB/WB/HR: 75 / 66 / 79		OADB: 75		OADB: 14						SADB	60.7	77.8
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent	Space Sens	Tot Sens	Of Total (%)	Ra Plenum	75.6	71.9
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Return	75.6	71.9
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0
Roof Cond	0	0	0	0	0	Roof Cond	0	0.00	Roof Cond	0	0.00	<b>AIRFLOWS</b>		
Glass Solar	164,712	164,712	47	164,712	52	Glass Solar	0	0.00	Glass Solar	0	0.00	Diffuser	19,966	6,949
Glass/Door Cond	79	79	0	79	0	Glass/Door Cond	-40,249	30.38	Glass/Door Cond	-40,249	30.38	Terminal	19,966	6,949
Wall Cond	3,832	4,749	1	3,832	1	Wall Cond	-3,996	3.74	Wall Cond	-4,960	3.74	Main Fan	19,966	6,949
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00	Sec Fan	0	0
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00	Nom Vent	0	0
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00	AHU Vent	0	0
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00	Infil	0	0
<b>Sub Total ==&gt;</b>	<b>168,623</b>	<b>917</b>	<b>169,540</b>	<b>48</b>	<b>168,623</b>	<b>53</b>	<b>Sub Total ==&gt;</b>	<b>-44,244</b>	<b>-45,209</b>	<b>34.12</b>	MinStop/Rh	6,949	6,949	
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				Return	19,966	6,949
Lights	55,367	13,842	69,209	20	55,367	17	Lights	0	0	0.00	Exhaust	0	0	
People	39,000	0	39,000	11	19,500	6	People	0	0	0.00	Rm Exh	0	0	
Misc	74,151	0	74,151	21	74,151	23	Misc	0	0	0.00	Auxiliary	0	0	
<b>Sub Total ==&gt;</b>	<b>168,518</b>	<b>13,842</b>	<b>182,360</b>	<b>52</b>	<b>149,018</b>	<b>47</b>	<b>Sub Total ==&gt;</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	Leakage Dwn	0	0	
Ceiling Load	1,860	-1,860	0	0	1,860	1	Ceiling Load	-283	0	0.00	Leakage Ups	0	0	
Ventilation Load	0	0	0	0	0	0	Ventilation Load	0	0	0.00	<b>ENGINEERING CKS</b>			
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0	0	% OA	0.0	0.0	
Dehumid. Ov Sizing	0	0	0	0	0	0	Ov/Undr Sizing	0	0	0.00	cfm/ft²	1.97	0.69	
Ov/Undr Sizing	0	0	0	0	0	0	Exhaust Heat	0	0	0.00	cfm/ton	680.84		
Exhaust Heat	0	0	0	0	0	0	OA Preheat Diff.	0	0	0.00	ft²/ton	345.75		
Sup. Fan Heat	0	0	0	0	0	0	RA Preheat Diff.	0	0	0.00	Btu/hr-ft²	34.71	-13.07	
Ret. Fan Heat	0	0	0	0	0	0	Additional Reheat	-87,278	65.88		No. People	78		
Duct Heat Pkup	0	0	0	0	0	0	System Plenum Heat	0	0	0.00				
Underflr Sup Ht Pkup	0	0	0	0	0	0	Underflr Sup Ht Pkup	0	0	0.00				
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0	0.00				
<b>Grand Total ==&gt;</b>	<b>339,001</b>	<b>12,899</b>	<b>351,900</b>	<b>100.00</b>	<b>319,501</b>	<b>100.00</b>	<b>Grand Total ==&gt;</b>	<b>-44,527</b>	<b>-132,487</b>	<b>100.00</b>				

COOLING COIL SELECTION											AREAS			HEATING COIL SELECTION						
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR	Leave DB/WB/HR	Gross Total	Glass					Capacity	Coil Airflow	Ent	Lvg						
ton	MBh	cfm	°F °F gr/lb	°F °F gr/lb		ft² (%)					MBh	cfm	°F	°F						
Main Clg	29.3	351.9	332.4	19,966	75.6	62.7	64.7	60.7	56.9	63.3	Floor	10,139				Main Htg	-132.5	6,949	60.7	77.8
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0				Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0				Preheat	0.0	0	0.0	0.0
<b>Total</b>	<b>29.3</b>	<b>351.9</b>									ExFlr	0				Reheat	-88.0	6,949	60.7	72.0
											Roof	0	0	0		Humidif	0.0	0	0.0	0.0
											Wall	2,014	1,071	53		Opt Vent	0.0	0	0.0	0.0
											Ext Door	0	0	0	<b>Total</b>	-132.5				

# Zone Checksums

By ACADEMIC

## 2nd East

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 10 / 13		Mo/Hr: 10 / 13		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Cooling	Heating	
Outside Air:		OADB/WB/HR: 64 / 55 / 48		OADB: 64		OADB: 64		OADB: 14		OADB: 14		SADB	61.1	80.2
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	75.9	71.6
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Return	75.9	71.6
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0
Roof Cond	0	-162	0	0	0	Roof Cond	0	0.75	Roof Cond	-600	0.75	<b>AIRFLOWS</b>		
Glass Solar	67,076	0	31	67,076	35	Glass Solar	0	0.00	Glass Solar	0	0.00	Diffuser	Cooling	Heating
Glass/Door Cond	-4,015	0	-2	-4,015	-2	Glass/Door Cond	-21,793	27.14	Glass/Door Cond	-21,793	27.14	Terminal	12,510	3,774
Wall Cond	4,589	943	3	4,589	2	Wall Cond	-11,233	16.93	Wall Cond	-13,598	16.93	Main Fan	12,510	3,774
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00	Sec Fan	0	0
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00	Nom Vent	0	0
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00	AHU Vent	0	0
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00	Infil	0	0
Sub Total ==>	67,650	781	32	67,650	35	Sub Total ==>	-33,026	44.81	Sub Total ==>	-35,991	44.81	MinStop/Rh	3,774	3,774
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				Return	12,510	3,774
Lights	54,985	13,746	32	54,985	28	Lights	0	0.00	Lights	0	0.00	Exhaust	0	0
People	19,000	0	9	9,500	5	People	0	0.00	People	0	0.00	Rm Exh	0	0
Misc	59,530	0	28	59,530	31	Misc	0	0.00	Misc	0	0.00	Auxiliary	0	0
Sub Total ==>	133,514	13,746	68	124,014	64	Sub Total ==>	0	0.00	Sub Total ==>	0	0.00	Leakage Dwn	0	0
<b>Ceiling Load</b>				<b>Ceiling Load</b>				<b>Ceiling Load</b>				Leakage Ups	0	0
Ventilation Load	0	-2,707	0	2,707	1	Ventilation Load	-1,279	0.00	Ventilation Load	0	0.00	<b>ENGINEERING CKS</b>		
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0.00	Adj Air Trans Heat	0	0.00	% OA	Cooling	Heating
Dehumid. Ov Sizing	0	0	0	0	0	Dehumid. Ov Sizing	0	0.00	Dehumid. Ov Sizing	0	0.00	cfm/ft²	0.0	0.0
Ov/Undr Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	Ov/Undr Sizing	0	0.00	cfm/ton	1.24	0.37
Exhaust Heat	0	0	0	0	0	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00	ft²/ton	695.98	
Sup. Fan Heat	0	0	0	0	0	Sup. Fan Heat	0	0.00	Sup. Fan Heat	0	0.00	Btu/hr-ft²	21.42	-7.98
Ret. Fan Heat	0	0	0	0	0	Ret. Fan Heat	0	0.00	Ret. Fan Heat	0	0.00	No. People	38	
Duct Heat Pkup	0	0	0	0	0	Duct Heat Pkup	0	0.00	Duct Heat Pkup	0	0.00			
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00			
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00			
Grand Total ==>	203,872	11,820	215,692	100.00	194,372	Grand Total ==>	-34,305	100.00	Grand Total ==>	-80,312	100.00			

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION				
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR	Leave DB/WB/HR	Gross Total	Glass	Capacity		Coil Airflow	Ent	Lvg						
ton	MBh	cfm	°F °F gr/lb	°F °F gr/lb		ft² (%)	MBh	MBh	cfm	°F	°F						
Main Clg	18.0	215.7	206.2	12,510	75.9 62.8 64.8	61.1 57.2 63.7	Floor	10,069	-80.3	3,774	61.1	80.2					
Aux Clg	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	0.0	0	0.0	0.0					
Opt Vent	0.0	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Int Door	0	0.0	0	0.0	0.0					
							ExFlr	0	0.0	0	0.0	0.0					
							Roof	160	0	0	0.0	0.0					
							Wall	3,166	580	18	0.0	0.0					
							Ext Door	0	0	0	0.0	0.0					
<b>Total</b>	<b>18.0</b>	<b>215.7</b>							<b>-80.3</b>								

## Zone Checksums

By ACADEMIC

2nd North

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES																																															
Peaked at Time:		Mo/Hr: 7 / 17		Mo/Hr: 7 / 17		Mo/Hr: Heating Design						Cooling	Heating																																														
Outside Air:		OADB/WB/HR: 89 / 72 / 91		OADB: 89		OADB: 14						SADB	60.9	80.0																																													
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total				Ra Plenum	75.7	71.7																																													
Btu/h	Btu/h	Btu/h		Btu/h		Space Sens	Tot Sens					Return	75.7	71.7																																													
Envelope Loads				Envelope Loads							Ret/OA	75.7	71.7																																														
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00				Fn MtrTD	0.0	0.0																																													
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00				Fn BldTD	0.0	0.0																																													
Roof Cond	0	0	0	0	0	Roof Cond	0	0.00				Fn Frict	0.0	0.0																																													
Glass Solar	68,657	0	68,657	33	68,657	Glass Solar	0	0.00				<b>AIRFLOWS</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Cooling</th> <th>Heating</th> </tr> </thead> <tbody> <tr><td>Diffuser</td><td>11,993</td><td>4,263</td></tr> <tr><td>Terminal</td><td>11,993</td><td>4,263</td></tr> <tr><td>Main Fan</td><td>11,993</td><td>4,263</td></tr> <tr><td>Sec Fan</td><td>0</td><td>0</td></tr> <tr><td>Nom Vent</td><td>0</td><td>0</td></tr> <tr><td>AHU Vent</td><td>0</td><td>0</td></tr> <tr><td>Infil</td><td>0</td><td>0</td></tr> <tr><td>MinStop/Rh</td><td>4,263</td><td>4,263</td></tr> <tr><td>Return</td><td>11,993</td><td>4,263</td></tr> <tr><td>Exhaust</td><td>0</td><td>0</td></tr> <tr><td>Rm Exh</td><td>0</td><td>0</td></tr> <tr><td>Auxiliary</td><td>0</td><td>0</td></tr> <tr><td>Leakage Dwn</td><td>0</td><td>0</td></tr> <tr><td>Leakage Ups</td><td>0</td><td>0</td></tr> </tbody> </table>				Cooling	Heating	Diffuser	11,993	4,263	Terminal	11,993	4,263	Main Fan	11,993	4,263	Sec Fan	0	0	Nom Vent	0	0	AHU Vent	0	0	Infil	0	0	MinStop/Rh	4,263	4,263	Return	11,993	4,263	Exhaust	0	0	Rm Exh	0	0	Auxiliary	0	0	Leakage Dwn	0	0	Leakage Ups	0	0
	Cooling	Heating																																																									
Diffuser	11,993	4,263																																																									
Terminal	11,993	4,263																																																									
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Exhaust	0	0																																																									
Rm Exh	0	0																																																									
Auxiliary	0	0																																																									
Leakage Dwn	0	0																																																									
Leakage Ups	0	0																																																									
Glass/Door Cond	6,398	0	6,398	3	6,398	Glass/Door Cond	-27,091	-27,091	29.70																																																		
Wall Cond	7,647	1,727	9,374	4	7,647	Wall Cond	-10,397	-12,749	13.97																																																		
Partition/Door	0	0	0	0	0	Partition/Door	0	0	0.00																																																		
Floor	0	0	0	0	0	Floor	0	0	0.00																																																		
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0	0.00																																																		
Infiltration	0	0	0	0	0	Infiltration	0	0	0.00																																																		
<b>Sub Total ==&gt;</b>	<b>82,701</b>	<b>1,727</b>	<b>84,428</b>	<b>40</b>	<b>82,701</b>	<b>Sub Total ==&gt;</b>	<b>-37,489</b>	<b>-39,840</b>	<b>43.67</b>																																																		
<b>Internal Loads</b>				<b>Internal Loads</b>																																																							
Lights	37,297	9,324	46,622	22	37,297	Lights	0	0	0.00																																																		
People	21,000	0	21,000	10	10,500	People	0	0	0.00																																																		
Misc	57,181	0	57,181	27	57,181	Misc	0	0	0.00																																																		
<b>Sub Total ==&gt;</b>	<b>115,479</b>	<b>9,324</b>	<b>124,803</b>	<b>60</b>	<b>104,979</b>	<b>Sub Total ==&gt;</b>	<b>0</b>	<b>0</b>	<b>0.00</b>																																																		
<b>Ceiling Load</b>	<b>1,548</b>	<b>-1,548</b>	<b>0</b>	<b>0</b>	<b>1,548</b>	<b>Ceiling Load</b>	<b>-736</b>	<b>0</b>	<b>0.00</b>																																																		
Ventilation Load	0	0	0	0	0	Ventilation Load	0	0	0.00																																																		
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0	0																																																		
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0	0.00																																																		
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0	0.00																																																		
Exhaust Heat	0	0	0	0	0	OA Preheat Diff.	0	0	0.00																																																		
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0	0.00																																																		
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	-51,388	56.33																																																			
Duct Heat Pkup	0	0	0	0	0	System Plenum Heat	0	0.00																																																			
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00																																																			
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00																																																			
<b>Grand Total ==&gt;</b>	<b>199,728</b>	<b>9,503</b>	<b>209,231</b>	<b>100.00</b>	<b>189,228</b>	<b>Grand Total ==&gt;</b>	<b>-38,224</b>	<b>-91,229</b>	<b>100.00</b>																																																		

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION								
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass					Capacity	Coil Airflow	Ent	Lvg			
ton	MBh	MBh	cfm	°F	°F	gr/lb	°F	°F	gr/lb		ft²	(%)	MBh	cfm	°F	°F					
Main Clg	17.4	209.2	198.7	11,993	75.7	62.8	64.8	60.9	57.0	63.5	Floor	6,830					Main Htg	-91.2	4,263	60.9	80.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0					Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0					Preheat	0.0	0	0.0	0.0
<b>Total</b>	<b>17.4</b>	<b>209.2</b>									ExFlr	0					Reheat	-53.0	4,263	60.9	72.0
											Roof	0	0	0			Humidif	0.0	0	0.0	0.0
											Wall	3,146	721	23			Opt Vent	0.0	0	0.0	0.0
											Ext Door	0	0	0			<b>Total</b>	<b>-91.2</b>			

# Zone Checksums

By ACADEMIC

## 2nd South

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time:		Mo/Hr: 7 / 17		Mo/Hr: 7 / 17		Mo/Hr: Heating Design						Cooling	Heating		
Outside Air:		OADB/WB/HR: 89 / 72 / 91		OADB: 89		OADB: 14						SADB	55.0	85.0	
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	75.9	71.6	
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Btu/h		Btu/h	Btu/h		Return	75.9	71.6	
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0	
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0	
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0	
Roof Cond	0	0	0	0	0	Roof Cond	0	0.00	Roof Cond	0	0.00	<b>AIRFLOWS</b>			
Glass Solar	78,583	78,583	36	78,583	40	Glass Solar	0	0.00	Glass Solar	0	0.00	Diffuser	8,755	3,467	
Glass/Door Cond	6,551	6,551	3	6,551	3	Glass/Door Cond	-27,768	23.94	Glass/Door Cond	-27,768	23.94	Terminal	8,755	3,467	
Wall Cond	8,279	10,213	5	8,279	4	Wall Cond	-9,253	9.85	Wall Cond	-11,429	9.85	Main Fan	8,755	3,467	
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00	Sec Fan	0	0	
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00	Nom Vent	0	0	
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00	AHU Vent	0	0	
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00	Infil	0	0	
Sub Total ==>	93,413	1,934	95,347	44	93,413	48	Sub Total ==>	33.79	Sub Total ==>	-37,021	-39,197	MinStop/Rh	3,467	3,467	
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				Return	8,755	3,467	
Lights	32,191	8,048	40,239	19	32,191	16	Lights	0	0.00	Lights	0	0.00	Exhaust	0	0
People	24,500	0	24,500	11	12,250	6	People	0	0.00	People	0	0.00	Rm Exh	0	0
Misc	55,789	0	55,789	26	55,789	29	Misc	0	0.00	Misc	0	0.00	Auxiliary	0	0
Sub Total ==>	112,480	8,048	120,528	56	100,230	51	Sub Total ==>	0	0.00	Sub Total ==>	0	0.00	Leakage Dwn	0	0
<b>Ceiling Load</b>				<b>Ceiling Load</b>				<b>Ceiling Load</b>				Leakage Ups	0	0	
Ventilation Load	0	-1,605	0	0	1,605	1	Ventilation Load	-709	0.00	Ventilation Load	0	0.00	<b>ENGINEERING CKS</b>		
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0.00	Adj Air Trans Heat	0	0.00	% OA	0.0	0.0
Dehumid. Ov Sizing	0	0	0	0	0	0	Ov/Undr Sizing	-12,531	10.80	Ov/Undr Sizing	-12,531	10.80	cfm/ft²	1.49	0.59
Ov/Undr Sizing	0	0	0	0	0	0	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00	cfm/ton	486.65	
Exhaust Heat	0	0	0	0	0	0	OA Preheat Diff.	0	0.00	OA Preheat Diff.	0	0.00	ft²/ton	327.69	
Sup. Fan Heat	0	0	0	0	0	0	RA Preheat Diff.	0	0.00	RA Preheat Diff.	0	0.00	Btu/hr-ft²	36.62	-19.68
Ret. Fan Heat	0	0	0	0	0	0	Additional Reheat	-64,259	55.40	Additional Reheat	-64,259	55.40	No. People	49	
Duct Heat Pkup	0	0	0	0	0	0	System Plenum Heat	0	0.00	System Plenum Heat	0	0.00			
Underflr Sup Ht Pkup	0	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00			
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00			
Grand Total ==>	207,499	8,376	215,875	100.00	195,249	100.00	Grand Total ==>	-50,261	100.00	Grand Total ==>	-115,987	100.00			

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION					
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR	Leave DB/WB/HR	Gross Total	Glass	Capacity	Coil Airflow	Ent	Lvg				Capacity	Coil Airflow	Ent	Lvg	
ton	MBh	cfm	°F °F gr/lb	°F °F gr/lb		ft² (%)	MBh	cfm	°F	°F				MBh	cfm	°F	°F	
Main Clg	18.0	215.9	203.6	8,755	75.9	60.7	54.9	55.0	52.0	52.8	Floor	5,895						
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0						
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0						
											ExFlr	0						
<b>Total</b>	<b>18.0</b>	<b>215.9</b>									Roof	0	0	0				
											Wall	2,913	739	25				
											Ext Door	0	0	0				
											<b>Total</b>	<b>-116.0</b>						

# Zone Checksums

By ACADEMIC

3rd central

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 8 / 17		Mo/Hr: 9 / 17		Mo/Hr: Heating Design						Cooling	Heating	
Outside Air:		OADB/WB/HR: 85 / 72 / 99		OADB: 74		OADB: 14						SADB	60.1	80.3
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	76.3	68.7
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Btu/h		Btu/h	Btu/h		Return	76.3	68.7
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0
Roof Cond	0	16,004	4	0	0	Roof Cond	0	21.53	Roof Cond	-35,191	21.53			
Glass Solar	147,140	147,140	40	164,626	51	Glass Solar	0	0.00	Glass Solar	0	0.00			
Glass/Door Cond	7,926	7,926	2	-480	0	Glass/Door Cond	-48,619	29.75	Glass/Door Cond	-48,619	29.75			
Wall Cond	6,874	1,581	2	4,911	2	Wall Cond	-8,270	6.18	Wall Cond	-10,108	6.18			
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00			
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00			
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00			
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00			
<b>Sub Total ==&gt;</b>	<b>161,939</b>	<b>17,586</b>	<b>49</b>	<b>169,056</b>	<b>53</b>	<b>Sub Total ==&gt;</b>	<b>-56,888</b>	<b>57.47</b>	<b>Sub Total ==&gt;</b>	<b>-93,917</b>	<b>57.47</b>			
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				<b>AIRFLOWS</b>		
Lights	53,922	13,480	18	53,922	17	Lights	0	0.00	Lights	0	0.00	Diffuser	19,379	7,271
People	49,000	0	13	24,500	8	People	0	0.00	People	0	0.00	Terminal	19,379	7,271
Misc	71,136	0	19	71,136	22	Misc	0	0.00	Misc	0	0.00	Main Fan	19,379	7,271
<b>Sub Total ==&gt;</b>	<b>174,057</b>	<b>13,480</b>	<b>51</b>	<b>149,557</b>	<b>47</b>	<b>Sub Total ==&gt;</b>	<b>0</b>	<b>0.00</b>	<b>Sub Total ==&gt;</b>	<b>0</b>	<b>0.00</b>	Sec Fan	0	0
<b>Ceiling Load</b>	<b>3,993</b>	<b>-3,993</b>	<b>0</b>	<b>2,692</b>	<b>1</b>	<b>Ceiling Load</b>	<b>-10,310</b>	<b>0.00</b>	<b>Ceiling Load</b>	<b>0</b>	<b>0.00</b>	Nom Vent	0	0
Ventilation Load	0	0	0	0	0	Ventilation Load	0	0.00	Ventilation Load	0	0.00	AHU Vent	0	0
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0	Adj Air Trans Heat	0	0	Infil	0	0
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	Ov/Undr Sizing	0	0.00	MinStop/Rh	7,271	7,271
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00	Return	19,379	7,271
Exhaust Heat	0	0	0	0	0	OA Preheat Diff.	0	0.00	OA Preheat Diff.	0	0.00	Exhaust	0	0
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0.00	RA Preheat Diff.	0	0.00	Rm Exh	0	0
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	-69,511	42.53	Additional Reheat	-69,511	42.53	Auxiliary	0	0
Duct Heat Pkup	0	0	0	0	0	System Plenum Heat	0	0.00	System Plenum Heat	0	0.00	Leakage Dwn	0	0
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00	Leakage Ups	0	0
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00			
<b>Grand Total ==&gt;</b>	<b>339,989</b>	<b>27,073</b>	<b>100.00</b>	<b>321,306</b>	<b>100.00</b>	<b>Grand Total ==&gt;</b>	<b>-67,199</b>	<b>100.00</b>	<b>Grand Total ==&gt;</b>	<b>-163,428</b>	<b>100.00</b>	<b>ENGINEERING CKS</b>		
												% OA	0.0	0.0
												cfm/ft²	1.96	0.74
												cfm/ton	633.53	
												ft²/ton	322.81	
												Btu/hr-ft²	37.17	-16.55
												No. People	98	

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION						
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR			Leave DB/WB/HR			Gross Total	Glass	Capacity	Coil Airflow	Ent	Lvg					
ton	MBh	cfm	°F	°F	gr/lb	°F	°F	gr/lb		ft² (%)	MBh	cfm	°F	°F					
Main Clg	30.6	367.1	342.6	19,028	76.3	63.0	64.7	60.1	56.6	62.9	Floor	9,874			Main Htg	-163.4	7,271	60.1	80.3
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0			Aux Htg	0.0	0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0			Preheat	0.0	0	0.0	0.0
											ExFlr	0			Reheat	-96.2	7,271	60.1	72.0
											Roof	9,874	0	0	Humidif	0.0	0	0.0	0.0
<b>Total</b>	<b>30.6</b>	<b>367.1</b>									Wall	3,235	1,294	40	Opt Vent	0.0	0	0.0	0.0
											Ext Door	0	0	0	<b>Total</b>	<b>-163.4</b>			



# Zone Checksums

By ACADEMIC

3rd East

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 8 / 15		Mo/Hr: 9 / 14		Mo/Hr: Heating Design						Cooling	Heating	
Outside Air:		OADB/WB/HR: 86 / 73 / 101		OADB: 75		OADB: 14						SADB	59.6	83.8
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	76.8	66.8
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Btu/h		Btu/h	Btu/h		Return	76.8	66.8
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0
Roof Cond	0	11,741	5	0	0	Roof Cond	0	36.16	Roof Cond	-34,151	36.16			
Glass Solar	36,597	0	16	46,589	25	Glass Solar	0	0.00	Glass Solar	0	0.00			
Glass/Door Cond	2,824	0	1	-612	0	Glass/Door Cond	-18,036	19.09	Glass/Door Cond	-18,036	19.09			
Wall Cond	7,188	1,380	4	5,953	3	Wall Cond	-11,918	14.94	Wall Cond	-11,918	14.94			
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00			
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00			
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00			
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00			
<b>Sub Total ==&gt;</b>	<b>46,609</b>	<b>13,122</b>	<b>59,730</b>	<b>27</b>	<b>51,930</b>	<b>28</b>	<b>Sub Total ==&gt;</b>	<b>-29,954</b>	<b>-66,298</b>	<b>70.19</b>				
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				<b>AIRFLOWS</b>		
Lights	54,171	13,543	30	54,171	29	Lights	0	0.00	Lights	0	0.00	Cooling	Heating	
People	34,500	0	16	17,250	9	People	0	0.00	People	0	0.00	Diffuser	10,911	3,502
Misc	60,294	0	27	60,294	32	Misc	0	0.00	Misc	0	0.00	Terminal	10,911	3,502
<b>Sub Total ==&gt;</b>	<b>148,965</b>	<b>13,543</b>	<b>162,508</b>	<b>73</b>	<b>131,715</b>	<b>70</b>	<b>Sub Total ==&gt;</b>	<b>0</b>	<b>0</b>	<b>0.00</b>	<b>Main Fan</b>	<b>10,911</b>	<b>3,502</b>	
<b>Ceiling Load</b>	<b>5,547</b>	<b>-5,547</b>	<b>0</b>	<b>3,314</b>	<b>2</b>	<b>Ceiling Load</b>	<b>-16,207</b>	<b>0</b>	<b>0.00</b>	<b>Sec Fan</b>	<b>0</b>	<b>0</b>		
Ventilation Load	0	0	0	0	0	Ventilation Load	0	0.00	Ventilation Load	0	0.00	Nom Vent	0	0
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0.00	Adj Air Trans Heat	0	0.00	AHU Vent	0	0
Dehumid. Ov Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	Ov/Undr Sizing	0	0.00	Infil	0	0
Ov/Undr Sizing	0	0	0	0	0	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00	MinStop/Rh	3,502	3,502
Exhaust Heat	0	0	0	0	0	OA Preheat Diff.	0	0.00	OA Preheat Diff.	0	0.00	Return	10,911	3,502
Sup. Fan Heat	0	0	0	0	0	RA Preheat Diff.	0	0.00	RA Preheat Diff.	0	0.00	Exhaust	0	0
Ret. Fan Heat	0	0	0	0	0	Additional Reheat	-28,157	29.81	Additional Reheat	-28,157	29.81	Rm Exh	0	0
Duct Heat Pkup	0	0	0	0	0	System Plenum Heat	0	0.00	System Plenum Heat	0	0.00	Auxiliary	0	0
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00	Leakage Dwn	0	0
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00	Leakage Ups	0	0
<b>Grand Total ==&gt;</b>	<b>201,121</b>	<b>21,117</b>	<b>222,238</b>	<b>100.00</b>	<b>186,959</b>	<b>100.00</b>	<b>Grand Total ==&gt;</b>	<b>-46,161</b>	<b>-94,455</b>	<b>100.00</b>	<b>ENGINEERING CKS</b>			
											% OA	0.0	0.0	
											cfm/ft²	1.10	0.35	
											cfm/ton	589.16		
											ft²/ton	535.64		
											Btu/hr-ft²	22.40	-9.52	
											No. People	69		

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION			
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR		Leave DB/WB/HR			Gross Total	Glass		Capacity	Coil Airflow	Ent	Lvg		
ton	MBh	cfm	°F	°F	°F	°F	gr/lb	ft²	(%)	MBh	cfm	°F	°F			
Main Clg	18.5	222.2	205.0	10,731	76.8	63.1	64.7	59.6	56.3	62.4	Floor	9,920				
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0				
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0				
											ExFlr	0				
<b>Total</b>	<b>18.5</b>	<b>222.2</b>									Roof	9,920	0	0		
											Wall	3,201	480	15		
											Ext Door	0	0	0		
											<b>Total</b>	<b>-94.5</b>				

# Zone Checksums

By ACADEMIC

## 3rd North

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES			
Peaked at Time:		Mo/Hr: 7 / 18		Mo/Hr: 7 / 18		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Mo/Hr: Heating Design		Cooling	Heating		
Outside Air:		OADB/WB/HR: 87 / 71 / 88		OADB: 87		OADB: 87		OADB: 14		OADB: 14		SADB	60.7	83.1	
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Coil Peak Tot Sens	Percent Of Total	Ra Plenum	76.8	67.8	
Btu/h	Btu/h	Btu/h	(%)	Btu/h	(%)	Btu/h	Btu/h	(%)	Btu/h	Btu/h	(%)	Return	76.8	67.8	
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0	
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0	
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0	
Roof Cond	0	10,563	7	0	0	Roof Cond	0	26.94	Roof Cond	-16,616	26.94	<b>AIRFLOWS</b>			
Glass Solar	43,909	43,909	30	43,909	35	Glass Solar	0	0.00	Glass Solar	0	0.00	Diffuser	7,811	2,464	
Glass/Door Cond	3,799	3,799	3	3,799	3	Glass/Door Cond	-17,228	27.93	Glass/Door Cond	-17,228	27.93	Terminal	7,811	2,464	
Wall Cond	5,706	6,945	5	5,706	5	Wall Cond	-6,967	13.64	Wall Cond	-6,967	13.64	Main Fan	7,811	2,464	
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00	Sec Fan	0	0	
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00	Nom Vent	0	0	
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00	AHU Vent	0	0	
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00	Infil	0	0	
Sub Total ==>	53,414	11,802	65,215	44	53,414	43	Sub Total ==>	68.51	Sub Total ==>	-24,195	-42,260	MinStop/Rh	2,464	2,464	
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				Return	7,811	2,464	
Lights	25,912	6,478	32,389	22	25,912	21	Lights	0	0.00	Lights	0	0.00	Exhaust	0	0
People	15,000	0	15,000	10	7,500	6	People	0	0.00	People	0	0.00	Rm Exh	0	0
Misc	35,222	0	35,222	24	35,222	28	Misc	0	0.00	Misc	0	0.00	Auxiliary	0	0
Sub Total ==>	76,134	6,478	82,612	56	68,634	55	Sub Total ==>	0	0.00	Sub Total ==>	0	0.00	Leakage Dwn	0	0
<b>Ceiling Load</b>				<b>Ceiling Load</b>				<b>Ceiling Load</b>				Leakage Ups	0	0	
Ventilation Load	0	-2,693	0	0	2,693	2	Ventilation Load	-6,389	0.00	Ventilation Load	0	0.00	<b>ENGINEERING CKS</b>		
Adj Air Trans Heat	0	0	0	0	0	0	Adj Air Trans Heat	0	0.00	Adj Air Trans Heat	0	0.00	% OA	0.0	0.0
Dehumid. Ov Sizing	0	0	0	0	0	0	Dehumid. Ov Sizing	0	0.00	Dehumid. Ov Sizing	0	0.00	cfm/ft²	1.65	0.52
Ov/Undr Sizing	0	0	0	0	0	0	Ov/Undr Sizing	0	0.00	Ov/Undr Sizing	0	0.00	cfm/ton	634.06	
Exhaust Heat	0	0	0	0	0	0	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00	ft²/ton	385.18	
Sup. Fan Heat	0	0	0	0	0	0	Sup. Fan Heat	0	0.00	Sup. Fan Heat	0	0.00	Btu/hr-ft²	31.15	-13.00
Ret. Fan Heat	0	0	0	0	0	0	Ret. Fan Heat	0	0.00	Ret. Fan Heat	0	0.00	No. People	30	
Duct Heat Pkup	0	0	0	0	0	0	Duct Heat Pkup	0	0.00	Duct Heat Pkup	0	0.00			
Underflr Sup Ht Pkup	0	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00			
Supply Air Leakage	0	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00			
Grand Total ==>	132,240	15,587	147,827	100.00	124,740	100.00	Grand Total ==>	-30,585	100.00	Grand Total ==>	-61,687	100.00			

COOLING COIL SELECTION										AREAS				HEATING COIL SELECTION				
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR	Leave DB/WB/HR	Gross Total	Glass				Capacity	Coil Airflow	Ent	Lvg					
ton	MBh	cfm	°F °F gr/lb	°F °F gr/lb		ft² (%)				MBh	cfm	°F	°F					
Main Clg	12.3	147.8	140.3	76.8 63.1 64.7	60.7 56.9 63.4	Floor	4,745			Main Htg	-61.7	2,464	60.7	83.1				
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0			Aux Htg	0.0	0	0.0	0.0				
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Int Door	0			Preheat	0.0	0	0.0	0.0				
						ExFlr	0			Reheat	-31.1	2,464	60.7	72.0				
						Roof	4,745	0	0	Humidif	0.0	0	0.0	0.0				
<b>Total</b>	<b>12.3</b>	<b>147.8</b>				Wall	2,079	459	22	Opt Vent	0.0	0	0.0	0.0				
						Ext Door	0	0	0	<b>Total</b>	<b>-61.7</b>							

# Zone Checksums

By ACADEMIC

## 3rd South

COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				TEMPERATURES		
Peaked at Time:		Mo/Hr: 7 / 18		Mo/Hr: 7 / 18		Mo/Hr: Heating Design						Cooling	Heating	
Outside Air:		OADB/WB/HR: 87 / 71 / 88		OADB: 87		OADB: 14						SADB	60.4	81.1
Space Sens. + Lat.	Plenum Sens. + Lat	Net Total	Percent Of Total (%)	Space Sensible	Percent Of Total (%)	Space Peak	Coil Peak	Percent Of Total	Space Sens	Tot Sens	Percent Of Total	Ra Plenum	76.6	68.6
Btu/h	Btu/h	Btu/h		Btu/h		Btu/h	Btu/h		Btu/h	Btu/h		Return	76.6	68.6
<b>Envelope Loads</b>				<b>Envelope Loads</b>				<b>Envelope Loads</b>				Fn MtrTD	0.0	0.0
Skylite Solar	0	0	0	0	0	Skylite Solar	0	0.00	Skylite Solar	0	0.00	Fn BldTD	0.0	0.0
Skylite Cond	0	0	0	0	0	Skylite Cond	0	0.00	Skylite Cond	0	0.00	Fn Frict	0.0	0.0
Roof Cond	0	13,246	6	0	0	Roof Cond	0	21.00	Roof Cond	-20,995	21.00	<b>AIRFLOWS</b>		
Glass Solar	65,387	65,387	30	65,387	36	Glass Solar	0	0.00	Glass Solar	0	0.00	Diffuser	11,260	4,345
Glass/Door Cond	6,134	6,134	3	6,134	3	Glass/Door Cond	-27,805	27.81	Glass/Door Cond	-27,805	27.81	Terminal	11,260	4,345
Wall Cond	7,985	9,792	5	7,985	4	Wall Cond	-9,708	11.84	Wall Cond	-9,708	11.84	Main Fan	11,260	4,345
Partition/Door	0	0	0	0	0	Partition/Door	0	0.00	Partition/Door	0	0.00	Sec Fan	0	0
Floor	0	0	0	0	0	Floor	0	0.00	Floor	0	0.00	Nom Vent	0	0
Adjacent Floor	0	0	0	0	0	Adjacent Floor	0	0.00	Adjacent Floor	0	0.00	AHU Vent	0	0
Infiltration	0	0	0	0	0	Infiltration	0	0.00	Infiltration	0	0.00	Infil	0	0
Sub Total ==>	79,505	15,053	44	79,505	43	Sub Total ==>	-37,513	60.65	Sub Total ==>	-60,641	60.65	MinStop/Rh	4,345	4,345
<b>Internal Loads</b>				<b>Internal Loads</b>				<b>Internal Loads</b>				Return	11,260	4,345
Lights	32,257	8,064	19	32,257	18	Lights	0	0.00	Lights	0	0.00	Exhaust	0	0
People	24,500	0	11	12,250	7	People	0	0.00	People	0	0.00	Rm Exh	0	0
Misc	55,823	0	26	55,823	31	Misc	0	0.00	Misc	0	0.00	Auxiliary	0	0
Sub Total ==>	112,580	8,064	56	100,330	55	Sub Total ==>	0	0.00	Sub Total ==>	0	0.00	Leakage Dwn	0	0
<b>Ceiling Load</b>				<b>Ceiling Load</b>				<b>Ceiling Load</b>				Leakage Ups	0	0
Ventilation Load	0	-2,999	0	2,999	2	Ventilation Load	-6,444	0.00	Ventilation Load	0	0.00	<b>ENGINEERING CKS</b>		
Adj Air Trans Heat	0	0	0	0	0	Adj Air Trans Heat	0	0.00	Adj Air Trans Heat	0	0.00	% OA	0.0	0.0
Dehumid. Ov Sizing	0	0	0	0	0	Dehumid. Ov Sizing	0	0.00	Dehumid. Ov Sizing	0	0.00	cfm/ft²	1.91	0.74
Ov/Undr Sizing	0	0	0	0	0	Ov/Undr Sizing	0	0.00	Ov/Undr Sizing	0	0.00	cfm/ton	627.87	
Exhaust Heat	0	0	0	0	0	Exhaust Heat	0	0.00	Exhaust Heat	0	0.00	ft²/ton	329.38	
Sup. Fan Heat	0	0	0	0	0	Sup. Fan Heat	0	0.00	Sup. Fan Heat	0	0.00	Btu/hr-ft²	36.43	-16.93
Ret. Fan Heat	0	0	0	0	0	Ret. Fan Heat	0	0.00	Ret. Fan Heat	0	0.00	No. People	49	
Duct Heat Pkup	0	0	0	0	0	Duct Heat Pkup	0	0.00	Duct Heat Pkup	0	0.00			
Underflr Sup Ht Pkup	0	0	0	0	0	Underflr Sup Ht Pkup	0	0.00	Underflr Sup Ht Pkup	0	0.00			
Supply Air Leakage	0	0	0	0	0	Supply Air Leakage	0	0.00	Supply Air Leakage	0	0.00			
Grand Total ==>	195,085	20,118	100.00	182,835	100.00	Grand Total ==>	-43,958	100.00	Grand Total ==>	-99,980	100.00			

COOLING COIL SELECTION										AREAS			HEATING COIL SELECTION			
Total Capacity	Sens Cap.	Coil Airflow	Enter DB/WB/HR		Leave DB/WB/HR			Gross Total	Glass		Capacity	Coil Airflow	Ent	Lvg		
ton	MBh	cfm	°F	°F	°F	°F	gr/lb	°F	°F	gr/lb	MBh	cfm	°F	°F		
Main Clg	17.9	215.2	203.0	11,260	76.6	63.1	64.7	60.4	56.8	63.2	Floor	5,907				
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0				
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Int Door	0				
											ExFlr	0				
<b>Total</b>	<b>17.9</b>	<b>215.2</b>									Roof	5,907	0	0		
											Wall	3,015	740	25		
											Ext Door	0	0	0		
											<b>Total</b>	<b>-100.0</b>				
											Main Htg	-100.0	4,345	60.4	81.1	
											Aux Htg	0.0	0	0.0	0.0	
											Preheat	0.0	0	0.0	0.0	
											Reheat	-56.0	4,345	60.4	72.0	
											Humidif	0.0	0	0.0	0.0	
											Opt Vent	0.0	0	0.0	0.0	
											<b>Total</b>	<b>-100.0</b>				