Technical Report 2

Mechanical

# Building Load and Energy Analysis

Author: Kale Mullikin

Advisor: Donghyun Rim

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# Contents

# Mechanical System Summary

The Medical Office Building is located in North-East United States and is to house many medical offices as well as some examination rooms and a physical therapy area. The building is two stories with a total square footage of 72,706.

The main heating and cooling for the Medical Office Building will be provided by two roof top units supplying VAV boxes with reheat coils. The roof top units are self-contained, meaning that there are no hot or cold water lines running to the units. The units utilize a closed loop refrigerant system for cooling and a gas furnace system fueled by propane for heating. The VAV system utilizes electric resistance for the reheat system.

A few additional electric baseboard heating systems are utilized at the entrances to the building. There are also five ductless split system units that supply control rooms for important medical equipment.

# Executive Summary

The purpose of this technical report is to analyze the building loads and energy consumption of the Medical Office Building. The analysis was performed with the computer program Trane TRACE 700. This program is designed to provide an easy and detailed model for a building's loads and how much energy the building will consume. The program has many variables that can be modified to provide a very accurate model of a particular buildings systems.

The Medical Office Building has a very typical heating and cooling profile. There is a large heating period in the winter with almost no cooling necessary. In the summer there is a large amount of cooling needed as well as a small amount of heating due to the fact that the building has VAV boxes with reheat. The overall cooling and heating values are very reasonable for a building of this size.

Using the TRACE program, utility costs were also established. The overall cost for electricity for the building during a one year period is $42,514 and the overall cost for gas is $3,546. The gas value is most likely low due to the fact that TRACE did not have the exact type of fuel that will be used for heating as well as an accurate location of a fuel supplier. These values come to an overall cost of $1.02 per square foot.

The Medical Office Building also has five ductless split system units that provide extra cooling to the rooms that house important medical equipment and the control rooms that accompany them. These systems were not considered in this analysis due to their small size and the low impact on the overall performance of the building.

# Building Load Calculations

The building analysis for technical report two was performed by the computer program Trane TRACE 700. This program is used to calculate load design as well as energy analysis. Pertinent building information was obtained from the construction documents and assumptions that were made came from the ASHRAE standards.

**Design Conditions**

The Medical Office Building is located in the North-East United States. This area is in zone 5A according to ASHREA 90.1 table B-1. This area is very humid in the summers and can be quite cold in the winters. Indoor and outdoor air conditions for the building were obtained from the ASHRAE Handbook of Fundamentals 2009.

The indoor design temperatures were designed to be 72°F for the winter and 75°F for the summer with a maintained relative humidity of 50%.

| | Summer Design Cooling (0.4%) | Winter Design Heating (99.6%) |
|---|---|---|
| Outdoor Air Dry Bulb (°F) | 92.4 | 9.4 |
| Outdoor Air Wet Bulb (°F) | 74.1 | - |
| Indoor Air Design Temp (°F) | 75 | 72 |

Table 1: Design temperatures

**Model Development**

The calculations in this report were done under the assumption of a block load procedure. Similar areas were designed and considered to be one block. For example, the offices in the building are all similar so they were considered to be one block. In TRACE a template was created for each block and then the template was modified for each individual room. In the Medical Office Building there were eight different blocks considered. These blocks were:

- Conference
- Corridor
- Lobby
- Office

- Physical Therapy
- Procedure
- Reception
- Storage

The Medical Office Building has 131 different rooms that need to be considered in the analysis of the loads. Each room was categorized into a different block. The breakdown of the building into the different blocks can be seen below.


Figure 1: Building breakdown into different blocks

TRACE uses the nomenclature of 0°, 90°, 180°, and 270° to represent North, East, South, and West respectively. The main entrance of the Medical Office Building is located on the North side.

**Load Assumptions**

Load information was taken from the mechanical drawings and schedules. Information that could not be found in the drawings or schedules was taken from ASHRAE standards.

**Occupancy Loads**

For the Medical Office Building, occupancy densities were given in the design documents so no assumptions needed to be made. These values also conveniently were the same as the values in the TRACE library since the Medical Office Building is compliant with ASHRAE standards.

| Room Type | Occupancy Density (S.F. / person) |
|---|---|
| Conference | 20 |
| Corridor | 0 |
| Lobby | 33.3 |
| Office | 143 |
| Physical Therapy | 0 |
| Procedure Room | 100 |
| Reception | 16.7 |
| Storage | 0 |

Table 2: Room occupancy density

**Ventilation Rates**

The Medical Office Building was designed to be compliant with AHSRAE standard 62.1. TRACE has a convenient feature where compliance to ASHRAE 62.1 can be selected and the type of room can also be selected, automatically filling in the correct outdoor air ventilation rates for people based and area based calculations.

| Room Type | People-Based (CFM/Person) | Area-Based (CFM/S.F) |
|---|---|---|
| Conference | 5 | 0.06 |
| Corridor | 0 | 0.06 |
| Lobby | 5 | 0.06 |
| Office | 5 | 0.06 |
| Physical Therapy | 20 | 0.06 |
| Procedure Room | 15 | 0.06 |
| Reception | 5 | 0.06 |
| Storage | 0 | 0.12 |

Table 3: Room ventilation requirements

**Lighting and Electric Loads**

Lighting and electric loads were not given in the design documents so assumptions had to be made. The assumptions were based off of the ASHRAE standard 90.1 table 9-5. TRACE has the option to add extra load where it may be needed. This was done in the offices and reception areas where there will be extra load associated with printers and computers.

| Room Type | Heat Gain (W/S.F.) |
|---|---|
| Conference | 1.23 |
| Corridor | 0.99 |
| Lobby | 0.9 |
| Office | 1.66 |
| Physical Therapy | 0.91 |
| Procedure Room | 2.48 |
| Reception | 0.71 |
| Storage | 0.74 |

Table 4: Room lighting heat gain

**Calculated Load vs. Designed Load**

No load calculation data was provided with the mechanical drawings or the mechanical specifications to compare the TRACE data to. TRACE data will therefore be checked for logicality.

The total cooling load for the building was 115.1 tons and the heating load was 1380 MBh. These numbers are very logical due to the building size. It was expected that the cooling load for the building was going to be around 100 tons. The individual split for the cooling loads between the two roof top units

also corresponds well with the capacity of the roof top units that were selected to be installed in the building.

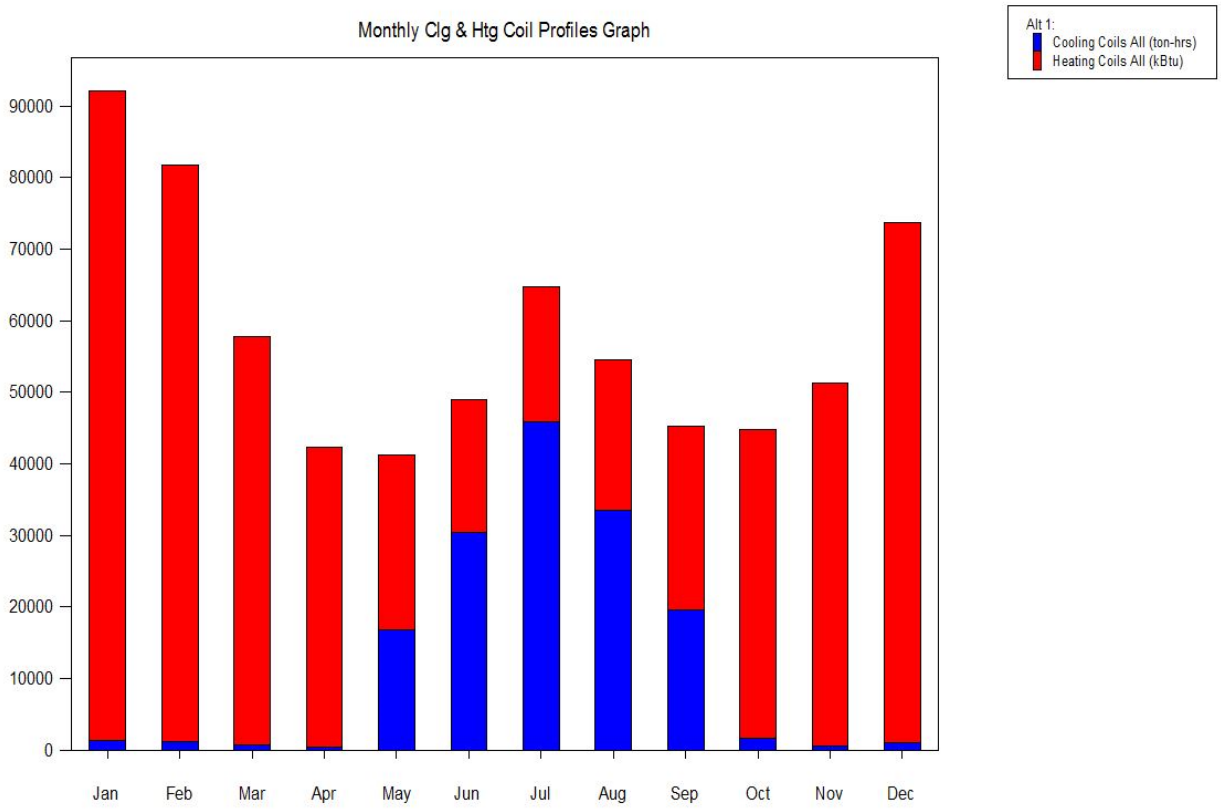



Figure 2: Monthly heating and cooling profiles

The figure above is exactly the shape of graph that was expected. There will naturally be a little cooling load in the winter to deal with some days that have a higher humidity. The VAV boxes in the building are equipped with electric heat so there will also be some heating load in the summer to bring the supply air up to the desired temperature.

It can be assumed that the mechanical designers for the Medical Office Building developed a much more detailed model for analysis of the building. A more detailed model would be necessary to show the owner and for bid documents. Other TRACE calculation outputs can be seen in Appendix A.

# Building Energy and Cost Analysis

### Energy Consumption

The Trane TRACE program was used to do an energy analysis on the Medical Office Building. From this analysis, it was determined that the Medical Office Building would use an estimated 3.6 million kBtu per year.

Detailed information was not able to be obtained from the design documents regarding fuel costs, water and air flow rates and equipment performance characteristics so the default information provided by TRACE was utilized and gave a quite reasonable estimation for energy and cost analysis.

It is unknown if an energy analysis was performed by the designing engineers. If one was not performed, it would be most likely because this building was designed to be compliant with ASHRAE. ASHRAE standards are already designed to be energy efficient, therefore performing another analysis could be a waste of time and money. If one was performed, it can be speculated that the design engineer used a software that is very similar to Trane TRACE.

### Annual Cost Summary

The following table provides an annual cost summary provided by TRACE. The actual summary sheet output from TRACE can be seen in Appendix A.

| | Electric (kWh) | Gas (kBtu) | Total Building Energy |
|---|---|---|---|
| Heating | - | 709,240 | 709,240 |
| Cooling | 204,744 | - | 698,791 |
| Lighting | 529,746 | - | 1,808,024 |
| Receptacles | 115,781 | - | 395,161 |

Table 5: Annual cost summary

The total cost per year for electricity is $42,514 and the total cost per year for gas is $3,546. The average cost per square foot is $1.02.

**Environmental Impact**

| Contributor | Amount |
|---|---|
| CO2 | 1,027,144 lbm/year |
| SO2 | 7,991 gm/year |
| NOX | 1,536 gm/year |

Table 6: Environmental impact summary

# Appendix A: TRACE Calculation Outputs

**RTU-1**

**System 5 - Packaged RTU VAV Reheat, DX & Hot Water**

## COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 16
Outside Air: OADB/WB/HR: 90 / 73 / 99

| | Space Sens. + Lat. Btu/h | Plenum Sens. + Lat Btu/h | Net Total Btu/h | Percent Of Total (%) |
|---|---|---|---|---|
| **Envelope Loads** | | | | |
| Skylite Solar | 11,424 | 0 | 11,424 | 2 |
| Skylite Cond | 0 | 3,043 | 3,043 | 0 |
| Roof Cond | 0 | 80,883 | 80,883 | 13 |
| Glass Solar | 152,710 | 0 | 152,710 | 24 |
| Glass/Door Cond | 28,820 | 0 | 28,820 | 4 |
| Wall Cond | 6,698 | 6,567 | 13,265 | 2 |
| Partition/Door | 0 | | 0 | 0 |
| Floor | 0 | | 0 | 0 |
| Adjacent Floor | 0 | 0 | 0 | 0 |
| Infiltration | 0 | | 0 | 0 |
| *Sub Total ==>* | 199,652 | 90,493 | 290,145 | 45 |
| **Internal Loads** | | | | |
| Lights | 73,702 | 18,426 | 92,128 | 14 |
| People | 151,602 | 0 | 151,602 | 24 |
| Misc | 25,014 | 0 | 25,014 | 4 |
| *Sub Total ==>* | 250,318 | 18,426 | 268,744 | 42 |
| **Ceiling Load** | 23,559 | -23,559 | 0 | 0 |
| **Ventilation Load** | 0 | 0 | 70,608 | 11 |
| **Adj Air Trans Heat** | 0 | | 0 | 0 |
| **Dehumid. Ov Sizing** | | | 0 | 0 |
| **Ov/Undr Sizing** | 11,924 | | 11,924 | 2 |
| **Exhaust Heat** | | -12,238 | -12,238 | -2 |
| **Sup. Fan Heat** | | | 13,215 | 2 |
| **Ret. Fan Heat** | | 0 | 0 | 0 |
| **Duct Heat Pkup** | | 0 | 0 | 0 |
| **Underflr Sup Ht Pkup** | | | 0 | 0 |
| **Supply Air Leakage** | | 0 | 0 | 0 |
| ***Grand Total ==>*** | 485,453 | 73,122 | 642,397 | 100.00 |

## CLG SPACE PEAK

Mo/Hr: 7 / 17
OADB: 88

| | Space Sensible Btu/h | Percent Of Total (%) |
|---|---|---|
| **Envelope Loads** | | |
| Skylite Solar | 10,635 | 2 |
| Skylite Cond | 0 | 0 |
| Roof Cond | 0 | 0 |
| Glass Solar | 160,533 | 37 |
| Glass/Door Cond | 27,529 | 6 |
| Wall Cond | 6,531 | 2 |
| Partition/Door | 0 | 0 |
| Floor | 0 | 0 |
| Adjacent Floor | 0 | 0 |
| Infiltration | 0 | 0 |
| *Sub Total ==>* | 205,228 | 48 |
| **Internal Loads** | | |
| Lights | 73,702 | 17 |
| People | 91,033 | 21 |
| Misc | 25,014 | 6 |
| *Sub Total ==>* | 189,749 | 44 |
| **Ceiling Load** | 22,439 | 5 |
| **Ventilation Load** | 0 | 0 |
| **Adj Air Trans Heat** | 0 | 0 |
| **Ov/Undr Sizing** | 12,081 | 3 |
| ***Grand Total ==>*** | 429,497 | 100.00 |

## HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 14

| | Space Peak Space Sens Btu/h | Coil Peak Tot Sens Btu/h | Percent Of Total (%) |
|---|---|---|---|
| **Envelope Loads** | | | |
| Skylite Solar | 0 | 0 | 0.00 |
| Skylite Cond | 0 | -15,035 | 3.76 |
| Roof Cond | 0 | -81,694 | 20.44 |
| Glass Solar | 0 | 0 | 0.00 |
| Glass/Door Cond | -119,843 | -119,843 | 29.99 |
| Wall Cond | -11,365 | -22,384 | 5.60 |
| Partition/Door | 0 | 0 | 0.00 |
| Floor | 0 | 0 | 0.00 |
| Adjacent Floor | 0 | 0 | 0 |
| Infiltration | 0 | 0 | 0.00 |
| *Sub Total ==>* | -131,207 | -238,955 | 59.80 |
| **Internal Loads** | | | |
| Lights | 0 | 0 | 0.00 |
| People | 0 | 0 | 0.00 |
| Misc | 0 | 0 | 0.00 |
| *Sub Total ==>* | 0 | 0 | 0.00 |
| **Ceiling Load** | -44,751 | 0 | 0.00 |
| **Ventilation Load** | 0 | -134,478 | 33.65 |
| **Adj Air Trans Heat** | 0 | 0 | 0 |
| **Ov/Undr Sizing** | 0 | 0 | 0.00 |
| **Exhaust Heat** | | 23,248 | -5.82 |
| **OA Preheat Diff.** | | 0 | 0.00 |
| **RA Preheat Diff.** | | -49,400 | 12.36 |
| **Additional Reheat** | | 0 | 0.00 |
| **Underflr Sup Ht Pkup** | | 0 | 0.00 |
| **Supply Air Leakage** | | 0 | 0.00 |
| ***Grand Total ==>*** | -175,959 | -399,585 | 100.00 |

## TEMPERATURES

| | Cooling | Heating |
|---|---|---|
| **SADB** | 57.9 | 90.2 |
| **Ra Plenum** | 78.4 | 65.5 |
| **Return** | 78.4 | 65.5 |
| **Ret/OA** | 79.2 | 54.0 |
| **Fn MtrTD** | 0.1 | 0.0 |
| **Fn BldTD** | 0.1 | 0.0 |
| **Fn Frict** | 0.4 | 0.0 |

## AIRFLOWS

| | Cooling | Heating |
|---|---|---|
| **Diffuser** | 22,542 | 8,668 |
| **Terminal** | 22,542 | 8,668 |
| **Main Fan** | 22,542 | 8,668 |
| **Sec Fan** | 0 | 0 |
| **Nom Vent** | 3,199 | 3,199 |
| **AHU Vent** | 3,199 | 3,199 |
| **Infil** | 0 | 0 |
| **MinStop/Rh** | 8,668 | 8,668 |
| **Return** | 22,542 | 8,668 |
| **Exhaust** | 3,199 | 3,199 |
| **Rm Exh** | 0 | 0 |
| **Auxiliary** | 0 | 0 |
| **Leakage Dwn** | 0 | 0 |
| **Leakage Ups** | 0 | 0 |

## ENGINEERING CKS

| | Cooling | Heating |
|---|---|---|
| **% OA** | 14.2 | 36.9 |
| **cfm/ft²** | 1.04 | 0.40 |
| **cfm/ton** | 367.04 | |
| **ft²/ton** | 352.83 | |
| **Btu/hr·ft²** | 34.01 | -21.93 |
| **No. People** | 370 | |

## COOLING COIL SELECTION

| | Total Capacity ton | Total Capacity MBh | Sens Cap. MBh | Coil Airflow cfm | Enter DB/WB/HR °F | Enter DB/WB/HR °F | Enter DB/WB/HR gr/lb | Leave DB/WB/HR °F | Leave DB/WB/HR °F | Leave DB/WB/HR gr/lb |
|---|---|---|---|---|---|---|---|---|---|---|
| **Main Clg** | 61.4 | 737.0 | 543.2 | 22,300 | 79.2 | 64.5 | 67.4 | 57.4 | 53.5 | 55.1 |
| **Aux Clg** | 0.0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 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 |
| ***Total*** | 61.4 | 737.0 | | | | | | | | |

## AREAS

| | Gross Total | Glass ft² | Glass (%) |
|---|---|---|---|
| **Floor** | 21,669 | | |
| **Part** | 0 | | |
| **Int Door** | 0 | | |
| **ExFlr** | 0 | | |
| **Roof** | 34,451 | 572 | 2 |
| **Wall** | 12,810 | 4,047 | 32 |
| **Ext Door** | 0 | 0 | 0 |

## HEATING COIL SELECTION

| | Capacity MBh | Coil Airflow cfm | Ent °F | Lvg °F |
|---|---|---|---|---|
| **Main Htg** | -396.6 | 8,668 | 57.4 | 90.2 |
| **Aux Htg** | 0.0 | 0 | 0.0 | 0.0 |
| **Preheat** | -78.7 | 3,199 | 39.7 | 57.4 |
| **Reheat** | -176.6 | 8,668 | 57.4 | 72.0 |
| **Humidif** | 0.0 | 0 | 0.0 | 0.0 |
| **Opt Vent** | 0.0 | 0 | 0.0 | 0.0 |
| ***Total*** | -475.2 | | | |

**RTU-2**

**System 5 - Packaged RTU VAV Reheat, DX & Hot Water**

## COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 17
Outside Air: OADB/WB/HR: 88 / 72 / 94

| | Space Sens. + Lat. Btu/h | Plenum Sens. + Lat Btu/h | Net Total Btu/h | Percent Of Total (%) |
|---|---|---|---|---|
| **Envelope Loads** | | | | |
| Skylite Solar | 0 | 0 | 0 | 0 |
| Skylite Cond | 0 | 0 | 0 | 0 |
| Roof Cond | 0 | 73,545 | 73,545 | 13 |
| Glass Solar | 150,821 | 0 | 150,821 | 27 |
| Glass/Door Cond | 16,024 | 0 | 16,024 | 3 |
| Wall Cond | 5,318 | 5,283 | 10,601 | 2 |
| Partition/Door | 0 | | 0 | 0 |
| Floor | 0 | | 0 | 0 |
| Adjacent Floor | 0 | 0 | 0 | 0 |
| Infiltration | 0 | | 0 | 0 |
| *Sub Total ==>* | 172,163 | 78,828 | 250,991 | 44 |
| **Internal Loads** | | | | |
| Lights | 91,414 | 22,853 | 114,267 | 20 |
| People | 97,085 | 0 | 97,085 | 17 |
| Misc | 19,637 | 0 | 19,637 | 3 |
| *Sub Total ==>* | 208,136 | 22,853 | 230,989 | 41 |
| **Ceiling Load** | 23,862 | -23,862 | 0 | 0 |
| **Ventilation Load** | 0 | 0 | 55,901 | 10 |
| **Adj Air Trans Heat** | 0 | | 0 | 0 |
| **Dehumid. Ov Sizing** | | | 0 | 0 |
| **Ov/Undr Sizing** | 27,425 | | 27,425 | 5 |
| **Exhaust Heat** | | -10,222 | -10,222 | -2 |
| **Sup. Fan Heat** | | | 12,795 | 2 |
| **Ret. Fan Heat** | | 0 | 0 | 0 |
| **Duct Heat Pkup** | | 0 | 0 | 0 |
| **Underflr Sup Ht Pkup** | | | 0 | 0 |
| **Supply Air Leakage** | | 0 | 0 | 0 |
| ***Grand Total ==>*** | 431,585 | 67,599 | 567,880 | 100.00 |

## CLG SPACE PEAK

Mo/Hr: 7 / 17
OADB: 88

| | Space Sensible Btu/h | Percent Of Total (%) |
|---|---|---|
| **Envelope Loads** | | |
| Skylite Solar | 0 | 0 |
| Skylite Cond | 0 | 0 |
| Roof Cond | 0 | 0 |
| Glass Solar | 150,821 | 39 |
| Glass/Door Cond | 16,024 | 4 |
| Wall Cond | 5,318 | 1 |
| Partition/Door | 0 | 0 |
| Floor | 0 | 0 |
| Adjacent Floor | 0 | 0 |
| Infiltration | 0 | 0 |
| *Sub Total ==>* | 172,163 | 44 |
| **Internal Loads** | | |
| Lights | 91,414 | 23 |
| People | 56,645 | 14 |
| Misc | 19,637 | 5 |
| *Sub Total ==>* | 167,695 | 43 |
| **Ceiling Load** | 23,862 | 6 |
| **Ventilation Load** | 0 | 0 |
| **Adj Air Trans Heat** | 0 | 0 |
| **Ov/Undr Sizing** | 27,425 | 7 |
| ***Grand Total ==>*** | 391,145 | 100.00 |

## HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 14

| | Space Peak Space Sens Btu/h | Coil Peak Tot Sens Btu/h | Percent Of Total (%) |
|---|---|---|---|
| **Envelope Loads** | | | |
| Skylite Solar | 0 | 0 | 0.00 |
| Skylite Cond | 0 | 0 | 0.00 |
| Roof Cond | 0 | -62,249 | 18.74 |
| Glass Solar | 0 | 0 | 0.00 |
| Glass/Door Cond | -69,803 | -69,803 | 21.01 |
| Wall Cond | -6,987 | -13,923 | 4.19 |
| Partition/Door | 0 | 0 | 0.00 |
| Floor | 0 | 0 | 0.00 |
| Adjacent Floor | 0 | 0 | 0 |
| Infiltration | 0 | 0 | 0.00 |
| *Sub Total ==>* | -76,790 | -145,974 | 43.94 |
| **Internal Loads** | | | |
| Lights | 0 | 0 | 0.00 |
| People | 0 | 0 | 0.00 |
| Misc | 0 | 0 | 0.00 |
| *Sub Total ==>* | 0 | 0 | 0.00 |
| **Ceiling Load** | -28,734 | 0 | 0.00 |
| **Ventilation Load** | 0 | -127,147 | 38.27 |
| **Adj Air Trans Heat** | 0 | 0 | 0 |
| **Ov/Undr Sizing** | 0 | 0 | 0.00 |
| **Exhaust Heat** | | 12,309 | -3.70 |
| **OA Preheat Diff.** | | 0 | 0.00 |
| **RA Preheat Diff.** | | -71,427 | 21.50 |
| **Additional Reheat** | | 0 | 0.00 |
| **Underflr Sup Ht Pkup** | | 0 | 0.00 |
| **Supply Air Leakage** | | 0 | 0.00 |
| ***Grand Total ==>*** | -105,524 | -332,239 | 100.00 |

## TEMPERATURES

| | Cooling | Heating |
|---|---|---|
| **SADB** | 58.8 | 82.2 |
| **Ra Plenum** | 78.2 | 68.1 |
| **Return** | 78.2 | 68.1 |
| **Ret/OA** | 78.9 | 57.1 |
| **Fn MtrTD** | 0.1 | 0.0 |
| **Fn BldTD** | 0.1 | 0.0 |
| **Fn Frict** | 0.4 | 0.0 |

## AIRFLOWS

| | Cooling | Heating |
|---|---|---|
| **Diffuser** | 21,592 | 9,316 |
| **Terminal** | 21,592 | 9,316 |
| **Main Fan** | 21,592 | 9,316 |
| **Sec Fan** | 0 | 0 |
| **Nom Vent** | 2,835 | 2,835 |
| **AHU Vent** | 2,835 | 2,835 |
| **Infil** | 0 | 0 |
| **MinStop/Rh** | 9,316 | 9,316 |
| **Return** | 21,592 | 9,316 |
| **Exhaust** | 2,835 | 2,835 |
| **Rm Exh** | 0 | 0 |
| **Auxiliary** | 0 | 0 |
| **Leakage Dwn** | 0 | 0 |
| **Leakage Ups** | 0 | 0 |

## ENGINEERING CKS

| | Cooling | Heating |
|---|---|---|
| **% OA** | 13.1 | 30.4 |
| **cfm/ft²** | 0.93 | 0.40 |
| **cfm/ton** | 399.27 | |
| **ft²/ton** | 430.67 | |
| **Btu/hr·ft²** | 27.86 | -16.26 |
| **No. People** | 229 | |

## COOLING COIL SELECTION

| | Total Capacity ton | Total Capacity MBh | Sens Cap. MBh | Coil Airflow cfm | Enter DB/WB/HR °F | Enter DB/WB/HR °F | Enter DB/WB/HR gr/lb | Leave DB/WB/HR °F | Leave DB/WB/HR °F | Leave DB/WB/HR gr/lb |
|---|---|---|---|---|---|---|---|---|---|---|
| **Main Clg** | 54.1 | 649.0 | 497.7 | 21,592 | 78.9 | 64.3 | 66.8 | 58.2 | 54.4 | 56.9 |
| **Aux Clg** | 0.0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 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 |
| ***Total*** | 54.1 | 649.0 | | | | | | | | |

## AREAS

| | Gross Total | Glass ft² | Glass (%) |
|---|---|---|---|
| **Floor** | 23,290 | | |
| **Part** | 0 | | |
| **Int Door** | 0 | | |
| **ExFlr** | 0 | | |
| **Roof** | 24,563 | 0 | 0 |
| **Wall** | 7,672 | 2,357 | 31 |
| **Ext Door** | 0 | 0 | 0 |

## HEATING COIL SELECTION

| | Capacity MBh | Coil Airflow cfm | Ent °F | Lvg °F |
|---|---|---|---|---|
| **Main Htg** | -310.8 | 9,316 | 58.2 | 82.2 |
| **Aux Htg** | 0.0 | 0 | 0.0 | 0.0 |
| **Preheat** | -67.9 | 2,835 | 41.1 | 58.2 |
| **Reheat** | -178.9 | 9,316 | 58.2 | 72.0 |
| **Humidif** | 0.0 | 0 | 0.0 | 0.0 |
| **Opt Vent** | 0.0 | 0 | 0.0 | 0.0 |
| ***Total*** | -378.7 | | | |

## System - RTU-1

## Type - System 5 - Packaged RTU VAV Reheat, DX & Hot Water

### Coil Location - System

Coil Peak Calculation Time: July, hour 16
Ambient DB/WB/HR: 90 / 73 / 99

### COOLING COIL LOAD INFORMATION

| Load Component | Sensible Btu/h | Latent Btu/h | Total Btu/h | Percent of Total |
|---|---|---|---|---|
| Solar Gain | 164,134 | | 164,134 | 25.6% |
| Glass Transmission | 28,820 | | 28,820 | 4.5% |
| Wall Transmission | 6,698 | | 6,698 | 1.0% |
| Roof Transmission | 0 | | 0 | 0.0% |
| Floor Transmission | 0 | | 0 | 0.0% |
| Adj Floor Transmission | 0 | | 0.00 | 0.0% |
| Partition Transmission | 0 | | 0 | 0.0% |
| Net Ceiling Load | 0 | | 0 | 0.0% |
| Lighting | 73,702 | | 73,702 | 11.5% |
| People | 91,033 | 60,569 | 151,602 | 23.6% |
| Misc. Equipment Loads | 25,014 | 0 | 25,014 | 3.9% |
| Cooling Infiltration | 0 | 0 | 0 | 0.0% |
| ***Sub-Total ==>*** | 389,401 | 60,569 | 449,970 | 70.0% |
| Ventilation Load | 31,978 | 38,630 | 70,608 | 11.0% |
| Exhaust Heat | -12,238 | 0 | -12,238 | -1.9% |
| Supply Fan Load | 13,215 | | 13,215 | 2.1% |
| Return Fan Load | 0 | | 0 | 0.0% |
| Net Duct Heat Pickup | 0 | | 0 | 0.0% |
| Wall Load to Plenum | 6,567 | | 6,567 | 1.0% |
| Roof Load to Plenum | 80,883 | | 80,883 | 12.6% |
| Adj Floor to Plenum | 0 | | 0 | 0.0% |
| Lighting Load to Plenum | 18,426 | | 18,426 | 2.9% |
| Misc. Equip. Load to Plenum | 0 | 0 | 0 | 0.0% |
| Glass Transmission to Plenum | 3,043 | | 3,043 | 0.5% |
| Glass Solar to Plenum | 0 | | 0 | 0.0% |
| Over/Under Sizing | 11,924 | | 11,924 | 1.9% |
| Reheat at Design | 0 | 0 | 0 | 0.0% |
| Underfloor Sup Heat Pickup | 0 | | 0 | 0.0% |
| Supply Air Leakage | 0 | 0 | 0 | 0.0% |
| ***Total Cooling Loads*** | 543,198 | 99,199 | 642,397 | 100.0 % |

### COOLING COIL SELECTION

**Coil Selection Parameters**

| | | |
|---|---|---|
| Coil Entering Air (DB / WB) | 79.2 / 64.5 | °F |
| Coil Entering Humidity Ratio | 67.35 | gr/lb |
| Coil Leaving Air (DB / WB) | 57.4 / 53.5 | °F |
| Coil Leaving Humidity Ratio | 55.05 | gr/lb |
| Coil Sensible Load | 543.20 | MBh |
| Coil Total Load | 736.97 | MBh |
| Cooling Supply Air Temperature | 57.91 | °F |
| Total Cooling Airflow | 22,299.57 | cfm |
| Resulting Room Relative Humidity | 49.74 | % |

### General Engineering Checks

| | | |
|---|---|---|
| Total Cooling Load | 61.4 | ton |
| Area / Load | 352.83 | ft²/ton |
| Total Floor Area | 21,669 | ft² |
| Cooling Airflow | 1.04 | cfm/ft² |
| Airflow / Load | 367.04 | cfm/ton |
| Percent Outdoor Air | 14.2 | % |
| Cooling Load Methodology | TETD-TA1 | |

## System - RTU-2

## Type - System 5 - Packaged RTU VAV Reheat, DX & Hot Water

### Coil Location - System

Coil Peak Calculation Time: July, hour 17

Ambient DB/WB/HR: 88 / 72 / 94

### COOLING COIL LOAD INFORMATION

| Load Component | Sensible Btu/h | Latent Btu/h | Total Btu/h | Percent of Total |
|---|---|---|---|---|
| Solar Gain | 150,821 | | 150,821 | 26.6% |
| Glass Transmission | 16,024 | | 16,024 | 2.8% |
| Wall Transmission | 5,318 | | 5,318 | 0.9% |
| Roof Transmission | 0 | | 0 | 0.0% |
| Floor Transmission | 0 | | 0 | 0.0% |
| Adj Floor Transmission | 0 | | 0.00 | 0.0% |
| Partition Transmission | 0 | | 0 | 0.0% |
| Net Ceiling Load | 0 | | 0 | 0.0% |
| Lighting | 91,414 | | 91,414 | 16.1% |
| People | 56,645 | 40,440 | 97,085 | 17.1% |
| Misc. Equipment Loads | 19,637 | 0 | 19,637 | 3.5% |
| Cooling Infiltration | 0 | 0 | 0 | 0.0% |
| ***Sub-Total ==>*** | 339,858 | 40,440 | 380,299 | 67.0% |
| Ventilation Load | 26,132 | 29,768 | 55,901 | 9.8% |
| Exhaust Heat | -10,222 | 0 | -10,222 | -1.8% |
| Supply Fan Load | 12,795 | | 12,795 | 2.3% |
| Return Fan Load | 0 | | 0 | 0.0% |
| Net Duct Heat Pickup | 0 | | 0 | 0.0% |
| Wall Load to Plenum | 5,283 | | 5,283 | 0.9% |
| Roof Load to Plenum | 73,545 | | 73,545 | 13.0% |
| Adj Floor to Plenum | 0 | | 0 | 0.0% |
| Lighting Load to Plenum | 22,853 | | 22,853 | 4.0% |
| Misc. Equip. Load to Plenum | 0 | 0 | 0 | 0.0% |
| Glass Transmission to Plenum | 0 | | 0 | 0.0% |
| Glass Solar to Plenum | 0 | | 0 | 0.0% |
| Over/Under Sizing | 27,425 | | 27,425 | 4.8% |
| Reheat at Design | 0 | 0 | 0 | 0.0% |
| Underfloor Sup Heat Pickup | 0 | | 0 | 0.0% |
| Supply Air Leakage | 0 | 0 | 0 | 0.0% |
| ***Total Cooling Loads*** | 497,671 | 70,209 | 567,880 | 100.0 % |

### COOLING COIL SELECTION

| Coil Selection Parameters | | |
|---|---|---|
| Coil Entering Air (DB / WB) | 78.9 / 64.3 | °F |
| Coil Entering Humidity Ratio | 66.82 | gr/lb |
| Coil Leaving Air (DB / WB) | 58.2 / 54.4 | °F |
| Coil Leaving Humidity Ratio | 56.91 | gr/lb |
| Coil Sensible Load | 497.67 | MBh |
| Coil Total Load | 648.95 | MBh |
| Cooling Supply Air Temperature | 58.75 | °F |
| Total Cooling Airflow | 21,591.90 | cfm |
| Resulting Room Relative Humidity | 49.59 | % |

### General Engineering Checks

| | | |
|---|---|---|
| Total Cooling Load | 54.1 | ton |
| Area / Load | 430.67 | ft²/ton |
| Total Floor Area | 23,290 | ft² |
| Cooling Airflow | 0.93 | cfm/ft² |
| Airflow / Load | 399.27 | cfm/ton |
| Percent Outdoor Air | 13.1 | % |
| Cooling Load Methodology | TETD-TA1 | |

# SYSTEM SUMMARY

## DESIGN AIRFLOW QUANTITIES

By ACADEMIC

| System Description | System Type | MAIN SYSTEM Outside Airflow cfm | Cooling Airflow cfm | Heating Airflow cfm | Return Airflow cfm | Exhaust Airflow cfm | Auxiliary System Supply Airflow cfm | Room Exhaust Airflow cfm |
|---|---|---|---|---|---|---|---|---|
| **Alternative 1** | | | | | | | | |
| RTU-1 | System 5 - Packaged RTU VAV Reheat, DX & Hot | 3,199 | 22,542 | 8,668 | 22,542 | 22,542 | 0 | 0 |
| RTU-2 | System 5 - Packaged RTU VAV Reheat, DX & Hot | 2,835 | 21,592 | 9,316 | 21,592 | 21,592 | 0 | 0 |
| **Totals** | | **6,033** | **44,134** | **17,984** | **44,134** | **44,134** | **0** | **0** |

**Note: Airflows on this report are not additive because they are each taken at the time of their respective peaks. To view the balanced system design airflows, see the appropriate Checksums report (Airflows section).**

# SYSTEM SUMMARY

## DESIGN COOLING CAPACITIES

By ACADEMIC

### Alternative 1

**Building Airside Systems and Plant Capacities**

| Plant | System | Peak Plant Loads: Main Coil ton | Aux Coil ton | Opt Vent Coil ton | Misc Load ton | Stg 1 Desic Cond ton | Stg 2 Desic Cond ton | Base Utility ton | Peak Total ton | Block Plant Loads: Time Of Peak mo/hr | Main Coil ton | Aux Coil ton | Opt Vent Coil ton | Misc Load ton | Stg 1 Desic Cond ton | Stg 2 Desic Cond ton | Base Utility ton | Block Total ton |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cooling plant - 001 | | 115.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 115.5 | 7/17 | 99.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 99.8 |
| | RTU-1 | 61.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 61.4 | 7/17 | 53.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 53.1 |
| | RTU-2 | 54.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.1 | 7/17 | 46.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 46.7 |
| Building totals | | 115.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 115.5 | | 99.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 99.8 |

Building peak load is 115.5 tons.

**Building maximum block load of 99.8 tons occurs in July at hour 17 based on system simulation.**

# SYSTEM SUMMARY

## DESIGN HEATING CAPACITIES

By ACADEMIC



### Alternative 1

#### System Coil Capacities

| System Description | System Type | Main System Btu/h | Aux System Btu/h | Preheat Btu/h | Reheat Btu/h | Humid. Btu/h | Optional Vent Btu/h | Stg 1 Desic Regen Btu/h | Stg 2 Desic Regen Btu/h | Stg 1 Frost Prevention Btu/h | Stg 2 Frost Prevention Btu/h | Heating Totals Btu/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RTU-1 | System 5 - Packaged RTU VAV Reheat, DX & | -396,561 | 0 | -78,651 | -176,610 | 0 | 0 | 0 | 0 | 0 | 0 | -475,212 |
| RTU-2 | System 5 - Packaged RTU VAV Reheat, DX & | -310,807 | 0 | -67,847 | -178,898 | 0 | 0 | 0 | 0 | 0 | 0 | -378,654 |
| **Totals** | | **-707,368** | **0** | **-146,498** | **-355,508** | **0** | **0** | **0** | **0** | **0** | **0** | **-853,865** |

#### Building Plant Capacities

| Plant | System | Peak Loads: Main Coil MBh | Preheat Coil MBh | Reheat Coil MBh | Humid. Coil MBh | Aux Coil MBh | Opt Vent Coil MBh | Misc Load MBh | Stg 1 Desic. Regen. MBh | Stg 2 Desic. Regen. MBh | Stg 1 Frost Prev. MBh | Stg 2 Frost Prev. MBh | Base Utility MBh | Absorption Load MBh |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heating plant - 002 | | 707 | 147 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RTU-1 | 397 | 79 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | RTU-2 | 311 | 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Building peak load is 853.9 MBh.**

# MONTHLY ENERGY CONSUMPTION

By ACADEMIC

------- Monthly Energy Consumption -------

| Utility | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Alternative: 1** | | | | | | | | | | | | | |
| Electric | | | | | | | | | | | | | |
| On-Pk Cons. (kWh) | 56,496 | 50,942 | 55,609 | 53,463 | 76,919 | 94,484 | 117,428 | 99,826 | 78,694 | 56,777 | 53,622 | 56,011 | 850,271 |
| On-Pk Demand (kW) | 80 | 80 | 77 | 94 | 203 | 212 | 222 | 211 | 210 | 117 | 93 | 78 | 222 |
| Gas | | | | | | | | | | | | | |
| On-Pk Cons. (therms) | 1,179 | 1,046 | 741 | 545 | 317 | 242 | 247 | 274 | 335 | 562 | 661 | 945 | 7,092 |
| On-Pk Demand (therms/hr) | 3 | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 3 |



## Energy Consumption

| | | |
|---|---|---|
| Building | 80,322 | Btu/(ft2-year) |
| Source | 210,266 | Btu/(ft2-year) |
| Floor Area | 44,959 | ft2 |

## Environmental Impact Analysis

| | |
|---|---|
| CO2 | 1,027,144 lbm/year |
| SO2 | 7,991 gm/year |
| NOX | 1,536 gm/year |

# ENERGY CONSUMPTION SUMMARY

By ACADEMIC

| | Elect Cons. (kWh) | Gas Cons. (kBtu) | % of Total Building Energy | Total Building Energy (kBtu/yr) | Total Source Energy* (kBtu/yr) |
|---|---|---|---|---|---|
| **Alternative 1** | | | | | |
| **Primary heating** | | | | | |
| Primary heating | | 709,240 | 19.6 % | 709,240 | 746,569 |
| Other Htg Accessories | | | 0.0 % | 0 | 0 |
| **Heating Subtotal** | | **709,240** | **19.6** % | **709,240** | **746,569** |
| **Primary cooling** | | | | | |
| Cooling Compressor | 179,489 | | 17.0 % | 612,595 | 1,837,969 |
| Tower/Cond Fans | 24,459 | | 2.3 % | 83,480 | 250,465 |
| Condenser Pump | | | 0.0 % | 0 | 0 |
| Other Clg Accessories | 796 | | 0.1 % | 2,716 | 8,149 |
| **Cooling Subtotal....** | **204,744** | | **19.4** % | **698,791** | **2,096,583** |
| **Auxiliary** | | | | | |
| Supply Fans | | | 0.0 % | 0 | 0 |
| Pumps | | | 0.0 % | 0 | 0 |
| Stand-alone Base Utilities | | | 0.0 % | 0 | 0 |
| Aux Subtotal.... | | | 0.0 % | 0 | 0 |
| **Lighting** | | | | | |
| Lighting | 529,746 | | 50.1 % | 1,808,024 | 5,424,614 |
| **Receptacle** | | | | | |
| Receptacles | 115,781 | | 10.9 % | 395,161 | 1,185,601 |
| **Cogeneration** | | | | | |
| Cogeneration | | | 0.0 % | 0 | 0 |
| **Totals** | | | | | |
| **Totals**** | **850,271** | **709,240** | **100.0** % | **3,611,216** | **9,453,366** |

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

# MONTHLY UTILITY COSTS

By ACADEMIC

| Utility | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ------- Monthly Utility Costs ------- | | | | | | | | | | | | |
| **Alternative 1** | | | | | | | | | | | | | |
| Electric | | | | | | | | | | | | | |
| On-Pk Cons. ($) | 2,825 | 2,547 | 2,780 | 2,673 | 3,846 | 4,724 | 5,871 | 4,991 | 3,935 | 2,839 | 2,681 | 2,801 | 42,514 |
| Gas | | | | | | | | | | | | | |
| On-Pk Cons. ($) | 590 | 523 | 370 | 272 | 159 | 121 | 123 | 137 | 168 | 281 | 330 | 473 | 3,546 |
| Monthly Total ($): | 3,414 | 3,070 | 3,151 | 2,946 | 4,005 | 4,845 | 5,995 | 5,128 | 4,102 | 3,120 | 3,011 | 3,273 | 46,060 |

Building Area = 44,959 ft²

Utility Cost Per Area = 1.02 $/ft²

# Economic Summary

## Project Information

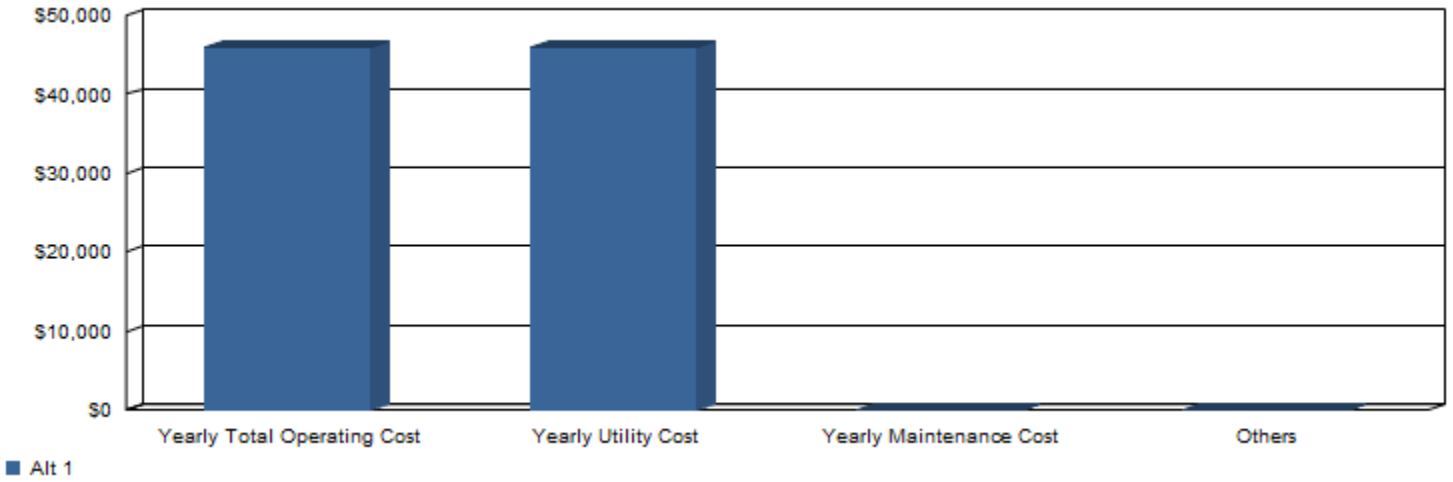
Location
Project Name
User
Company
Comments

Study Life: 20 years
Cost of Capital: 10 %
Alternative 1:

## Economic Comparison of Alternatives

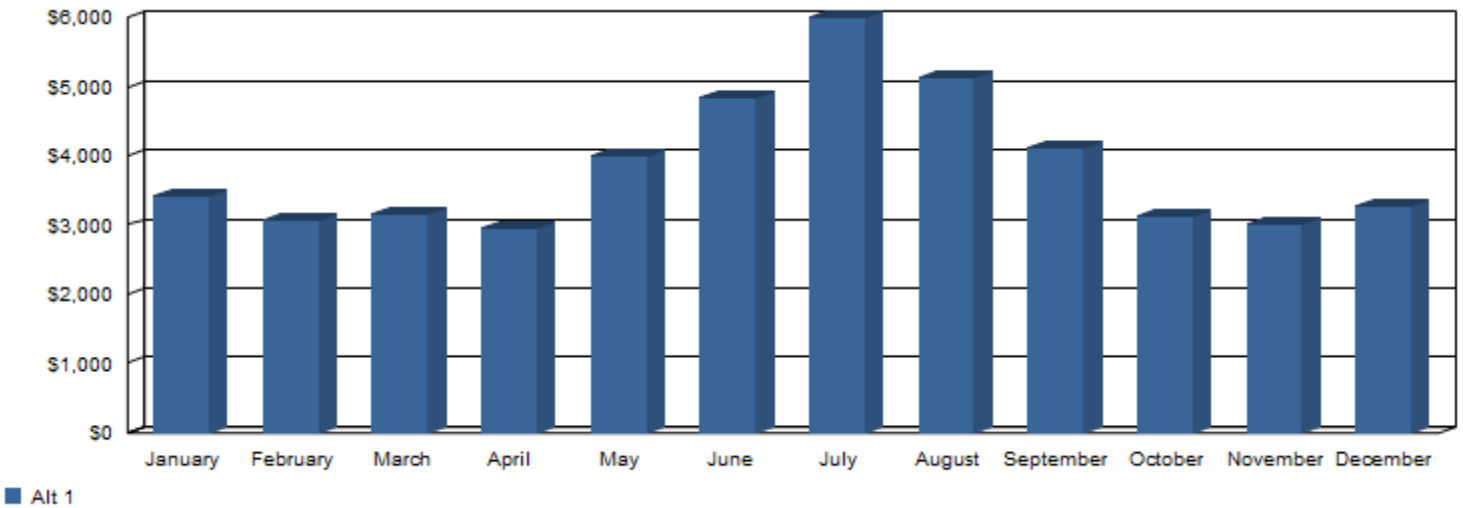
| Yearly Savings ($) | First Cost Difference ($) | Cumulative Cash Flow Difference ($) | Simple Payback (yrs.) | Net Present Value ($) | Life Cycle Payback (yrs.) | Internal Rate of Return (%) | Life Cycle Cost |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

## Annual Operating Costs

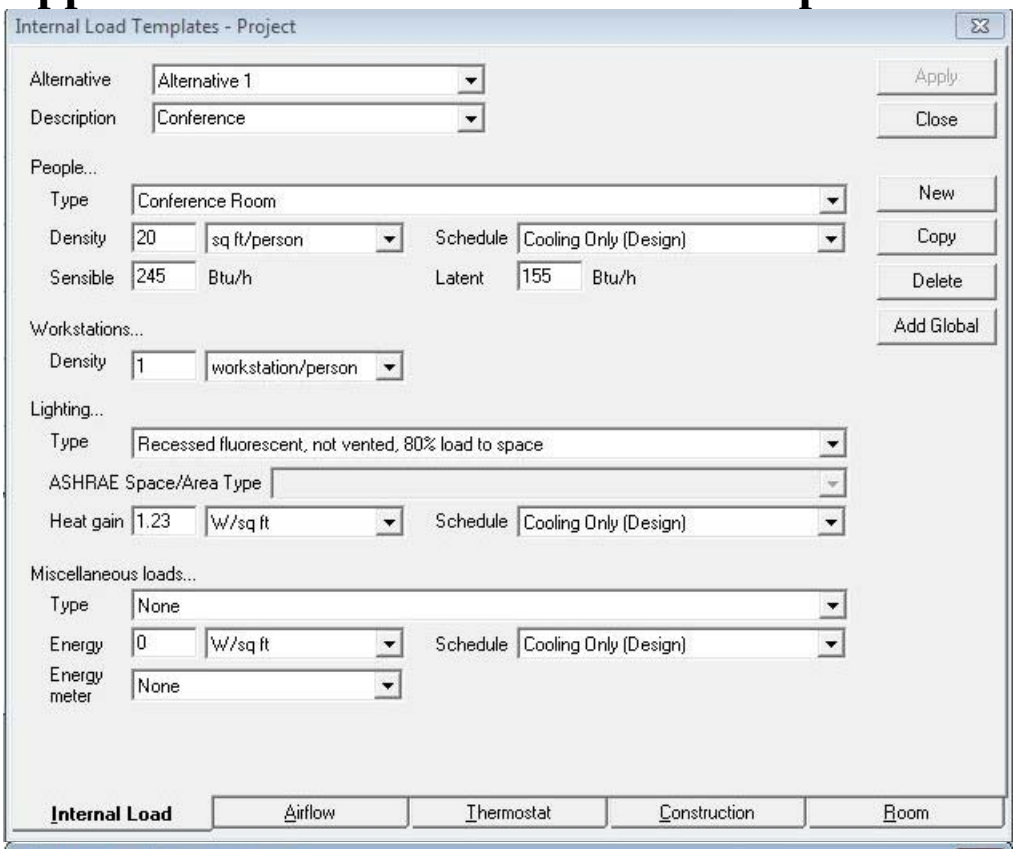


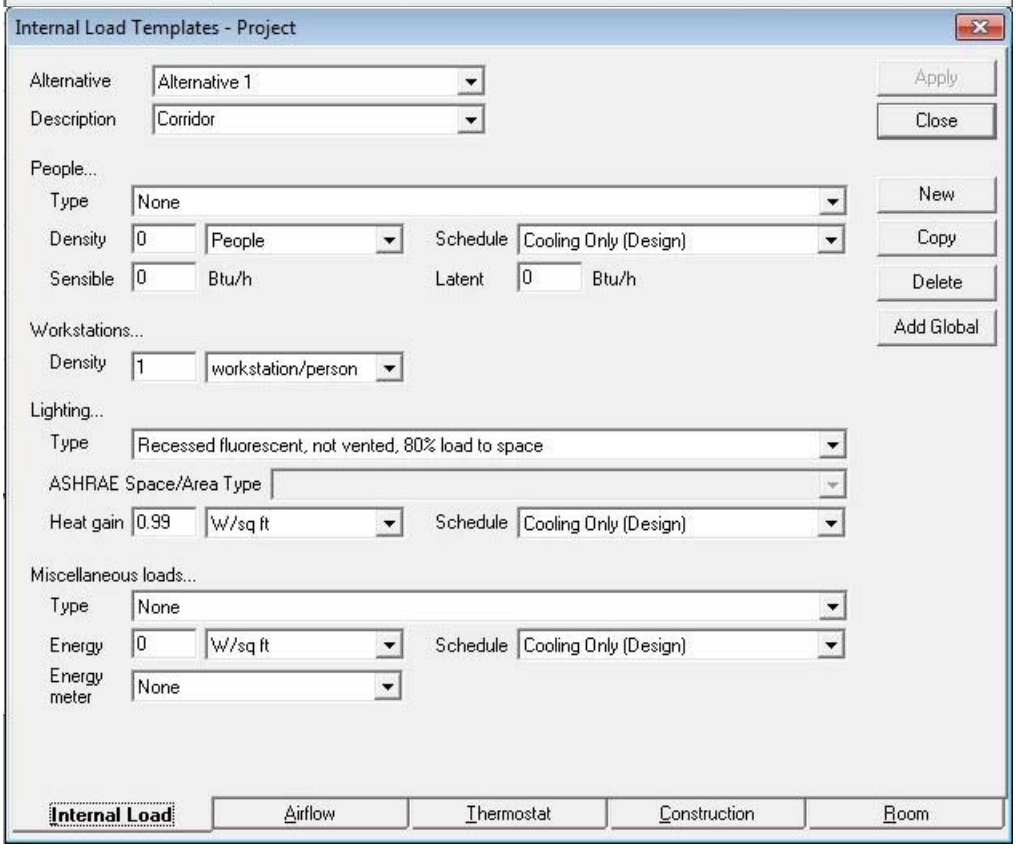

| Yearly Total Operating Cost ($) | Yearly Utility Cost ($) | Yearly Maintenance Cost ($) | Plant kWh/ton-hr |
|---|---|---|---|
| | | | |

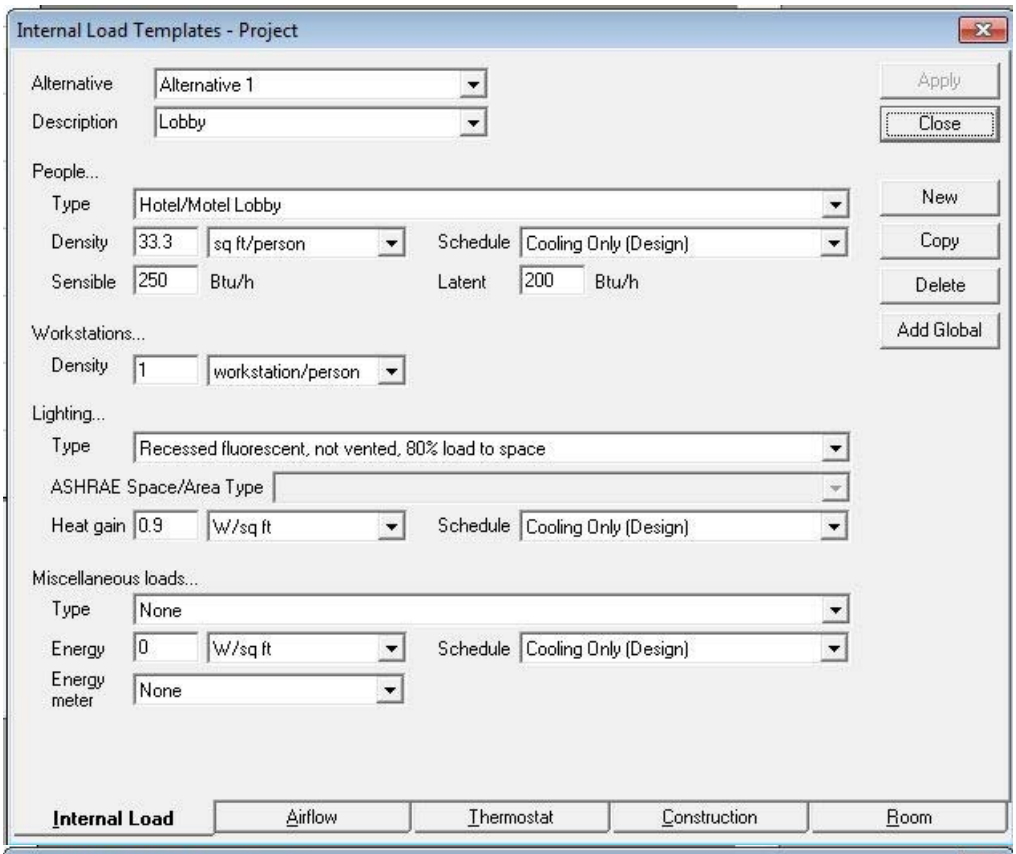
## Monthly Utility Costs

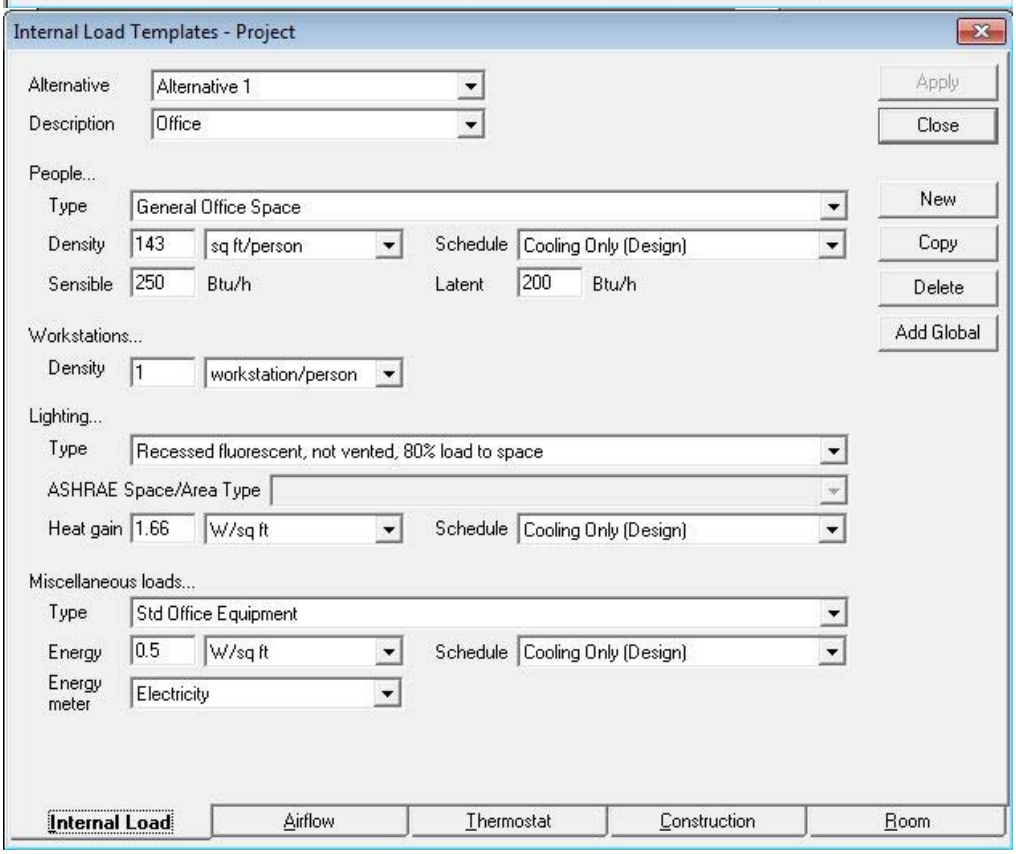


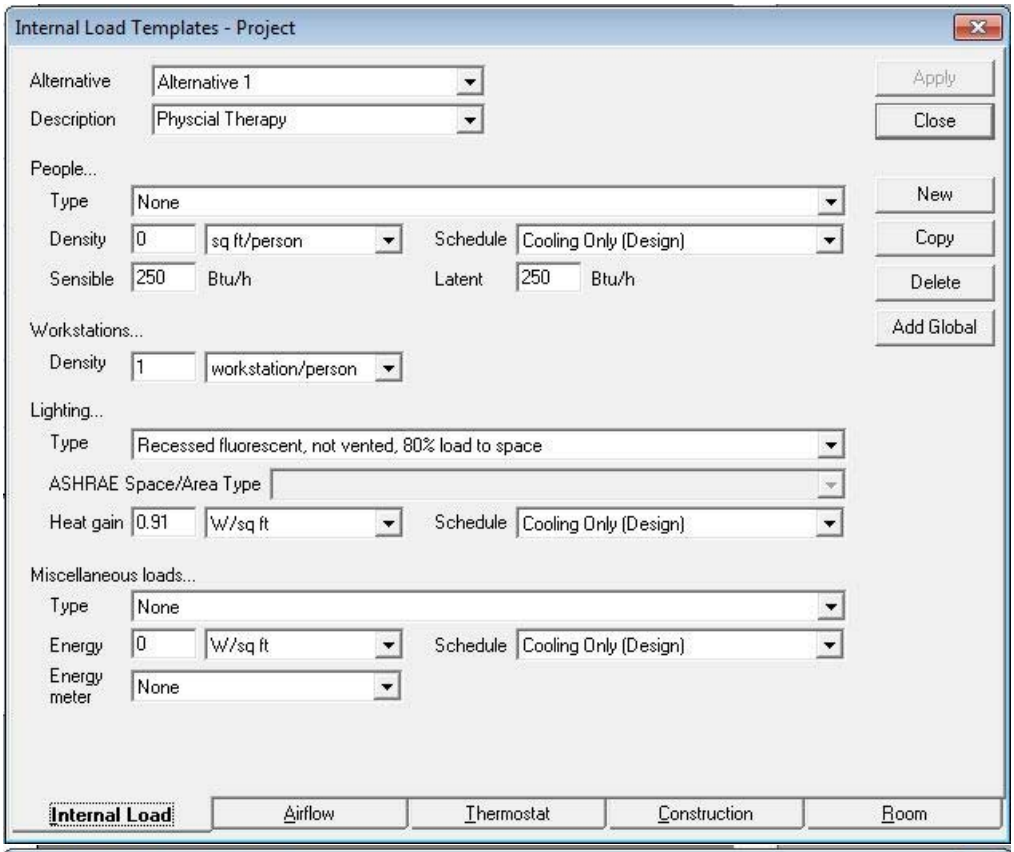
# Appendix B: TRACE Internal Load Inputs

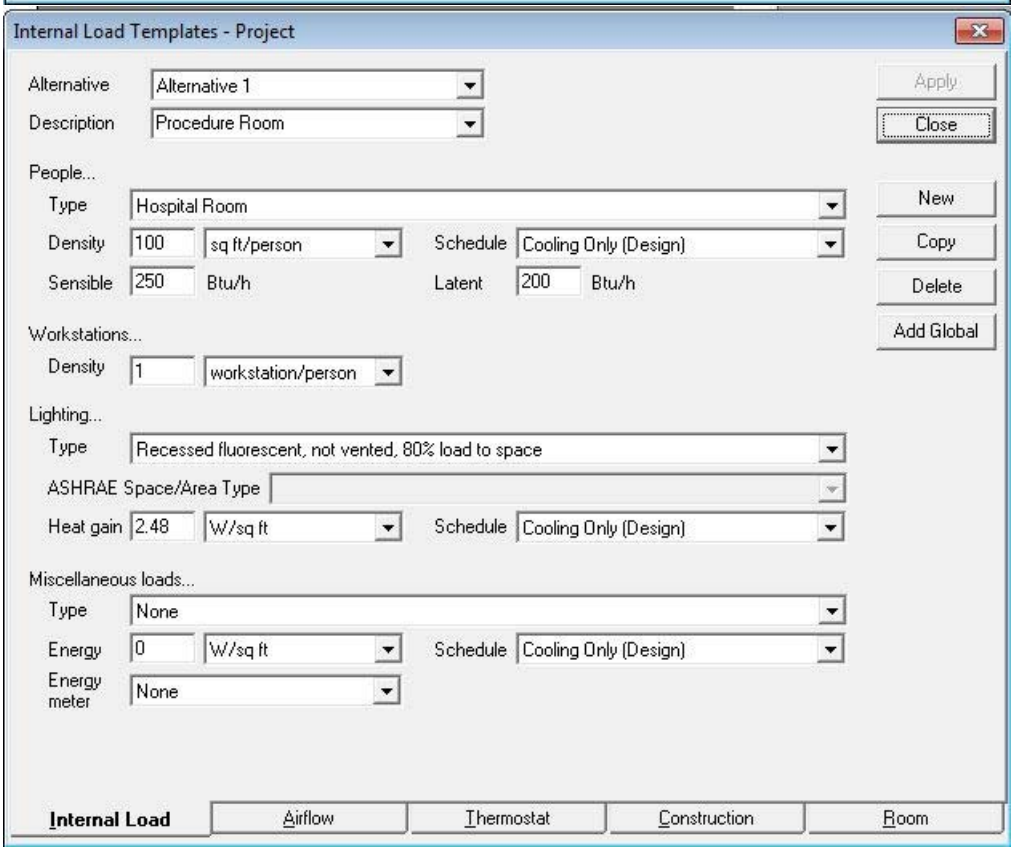


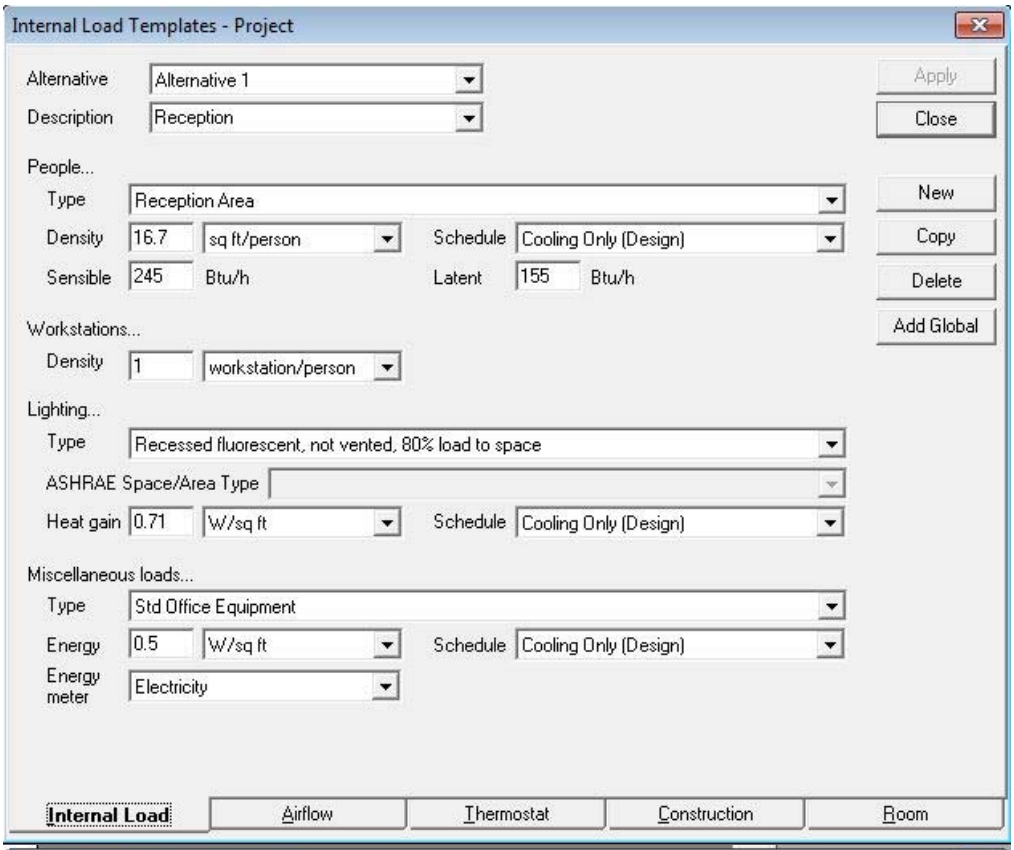



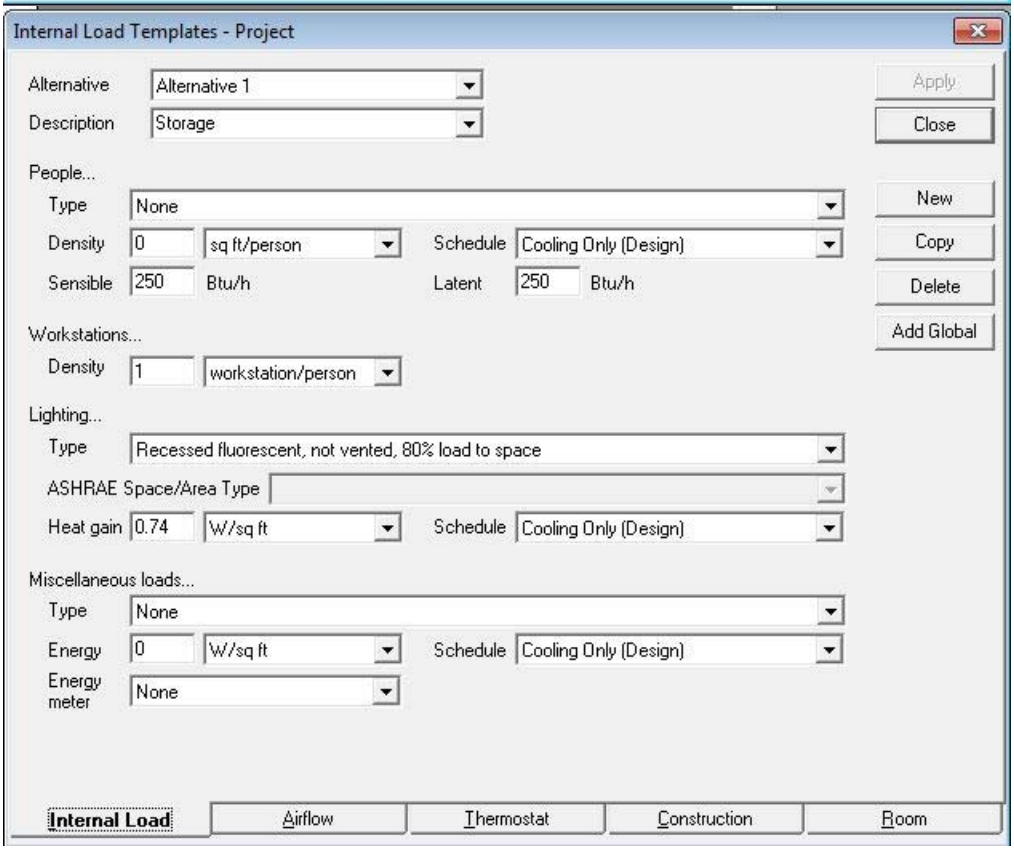

Internal Load Templates - Project
Alternative
Alternative 1
Description
Lobby
Apply
Close
People...
Type
Hotel/Motel Lobby
New
Density
33.3
sq ft/person
Schedule
Cooling Only (Design)
Copy
Sensible
250
Btu/h
Latent
200
Btu/h
Delete
Add Global
Workstations...
Density
1
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
ASHRAE Space/Area Type
Heat gain
0.9
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
Apply
Close
People...
Type
General Office Space
New
Density
143
sq ft/person
Schedule
Cooling Only (Design)
Copy
Sensible
250
Btu/h
Latent
200
Btu/h
Delete
Add Global
Workstations...
Density
1
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
ASHRAE Space/Area Type
Heat gain
1.66
W/sq ft
Schedule
Cooling Only (Design)
Miscellaneous loads...
Type
Std Office Equipment
Energy
0.5
W/sq ft
Schedule
Cooling Only (Design)
Energy meter
Electricity
Internal Load
Airflow
Thermostat
Construction
Room

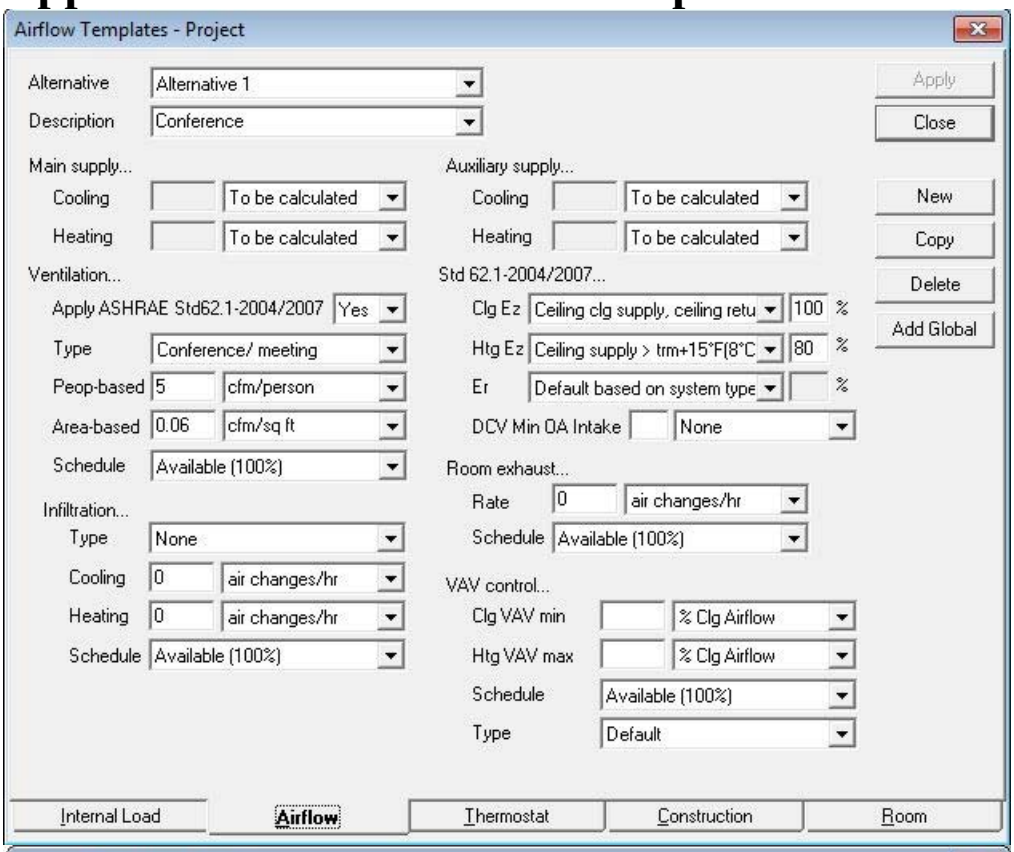

Internal Load Templates - Project
Alternative
Alternative 1
Description
Physcial Therapy
Apply
Close
People...
Type
None
Density
0
sq ft/person
Schedule
Cooling Only (Design)
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
1
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
ASHRAE Space/Area Type
Heat gain
0.91
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

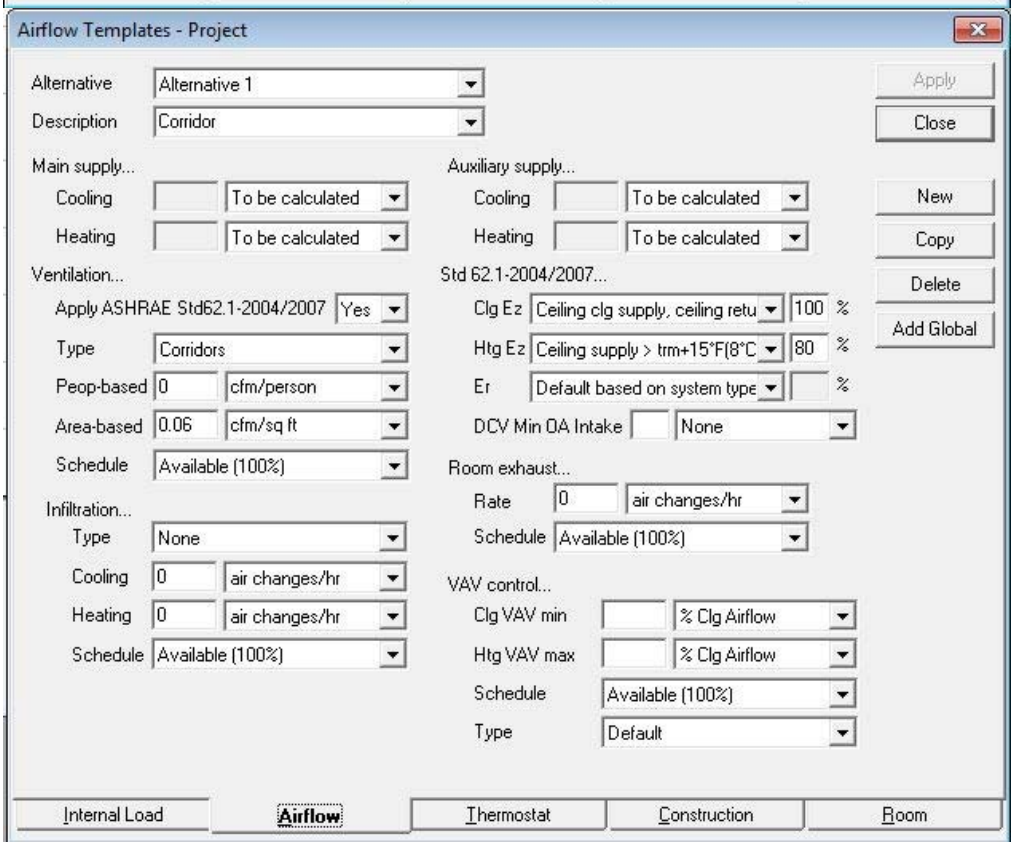

Internal Load Templates - Project
Alternative
Alternative 1
Description
Procedure Room
Apply
Close
People...
Type
Hospital Room
Density
100
sq ft/person
Schedule
Cooling Only (Design)
Sensible
250
Btu/h
Latent
200
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
1
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
ASHRAE Space/Area Type
Heat gain
2.48
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

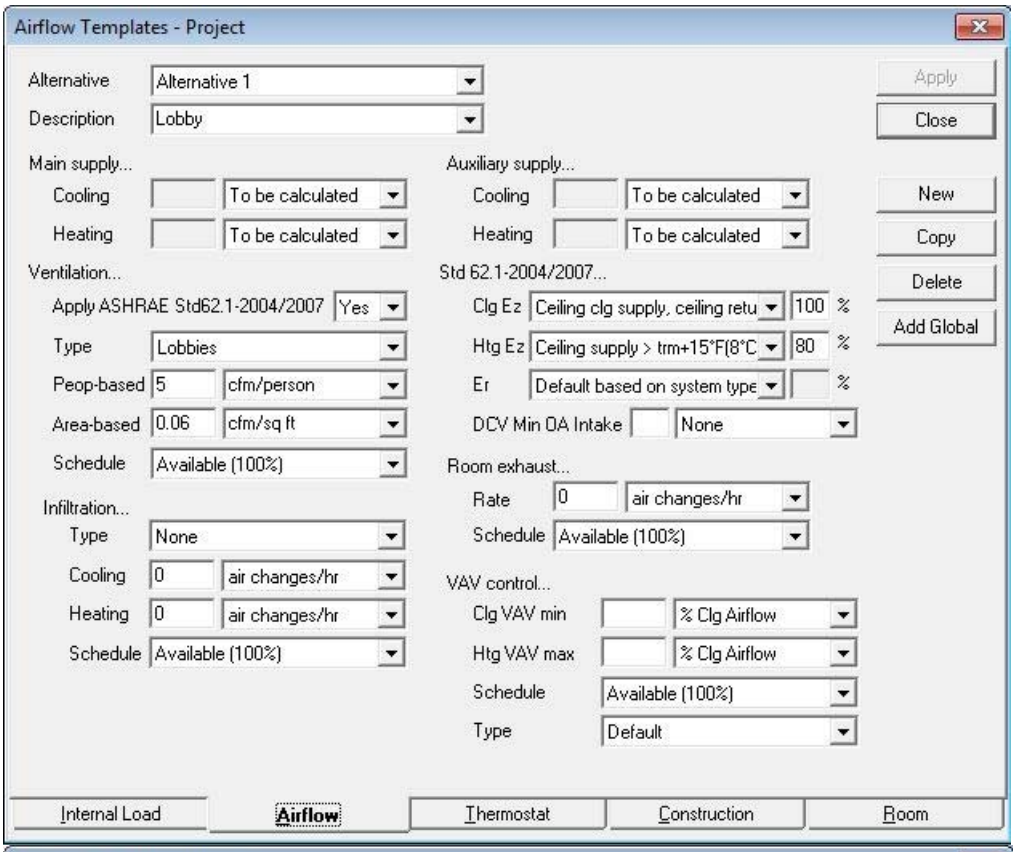

Internal Load Templates - Project
Alternative
Alternative 1
Description
Reception
Apply
Close
People...
Type
Reception Area
New
Density
16.7
sq ft/person
Schedule
Cooling Only (Design)
Copy
Sensible
245
Btu/h
Latent
155
Btu/h
Delete
Add Global
Workstations...
Density
1
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
ASHRAE Space/Area Type
Heat gain
0.71
W/sq ft
Schedule
Cooling Only (Design)
Miscellaneous loads...
Type
Std Office Equipment
Energy
0.5
W/sq ft
Schedule
Cooling Only (Design)
Energy meter
Electricity
Internal Load
Airflow
Thermostat
Construction
Room

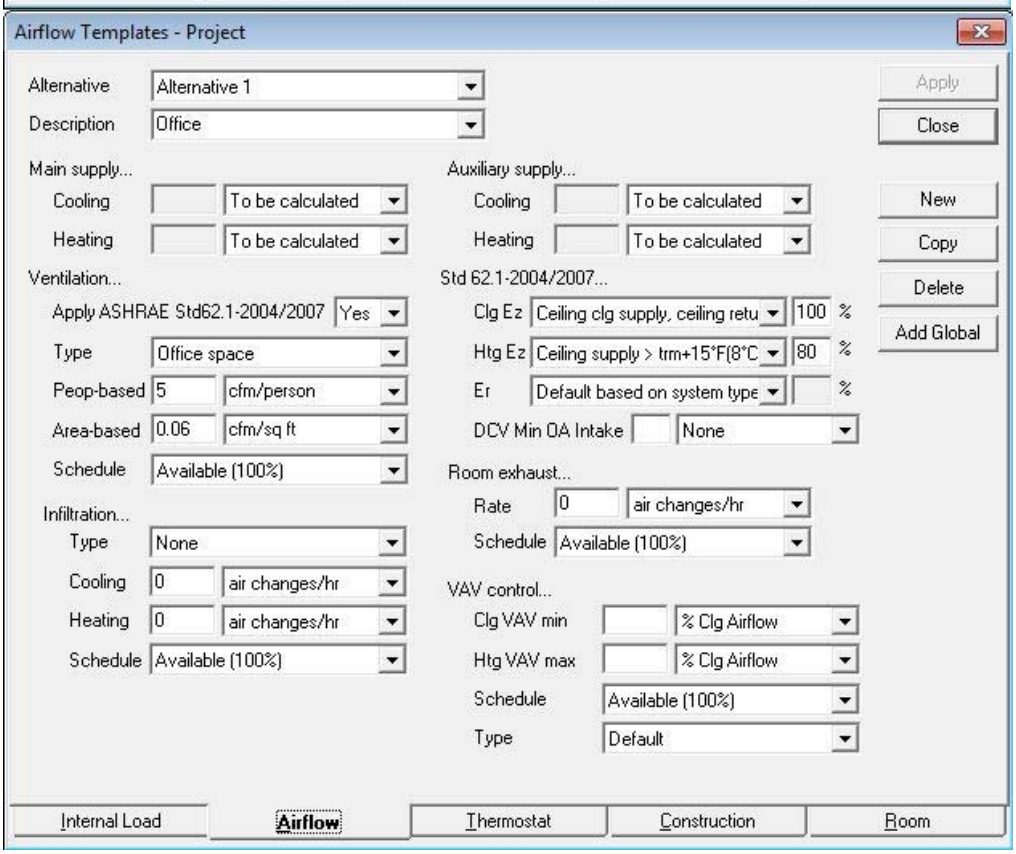

Internal Load Templates - Project
Alternative
Alternative 1
Description
Storage
Apply
Close
People...
Type
None
New
Density
0
sq ft/person
Schedule
Cooling Only (Design)
Copy
Sensible
250
Btu/h
Latent
250
Btu/h
Delete
Add Global
Workstations...
Density
1
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
ASHRAE Space/Area Type
Heat gain
0.74
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

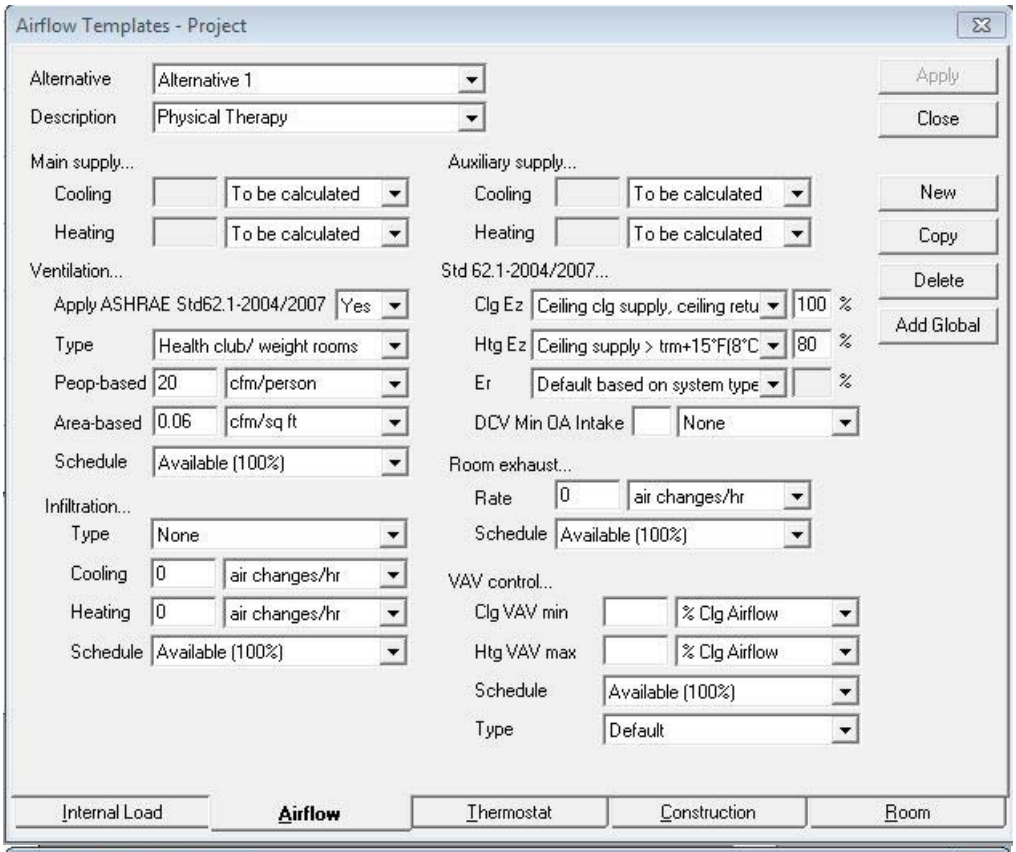
# Appendix C: TRACE Airflow Inputs

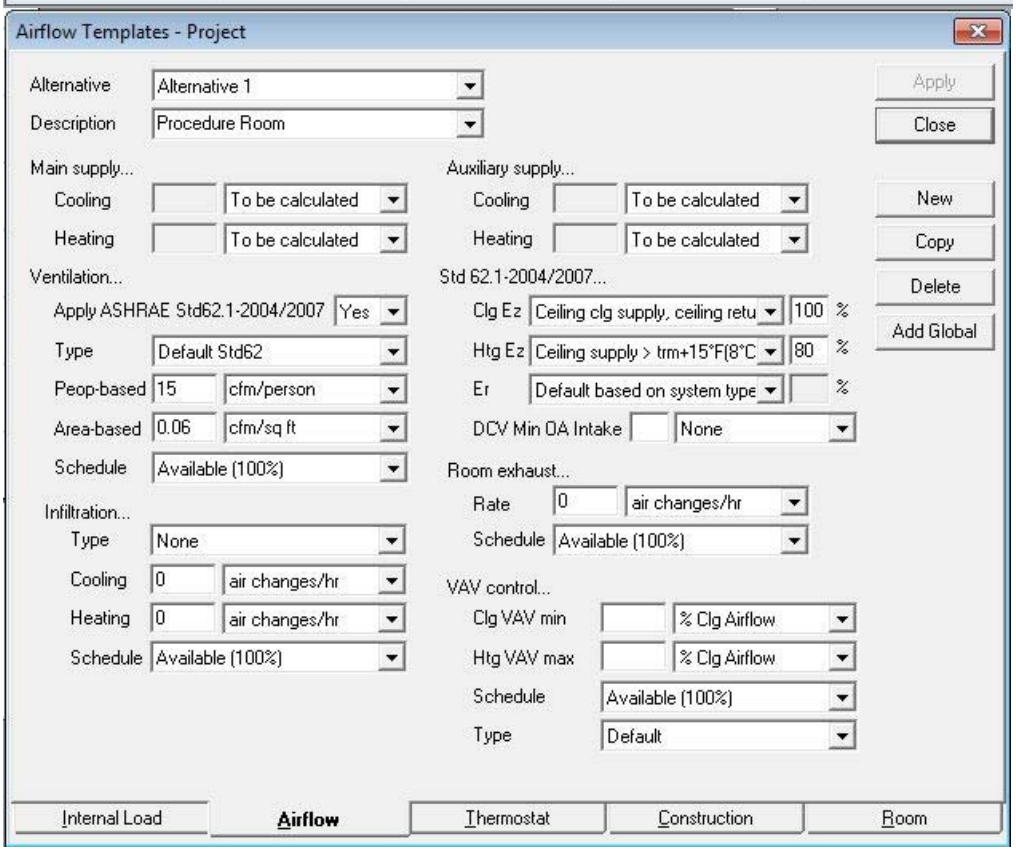


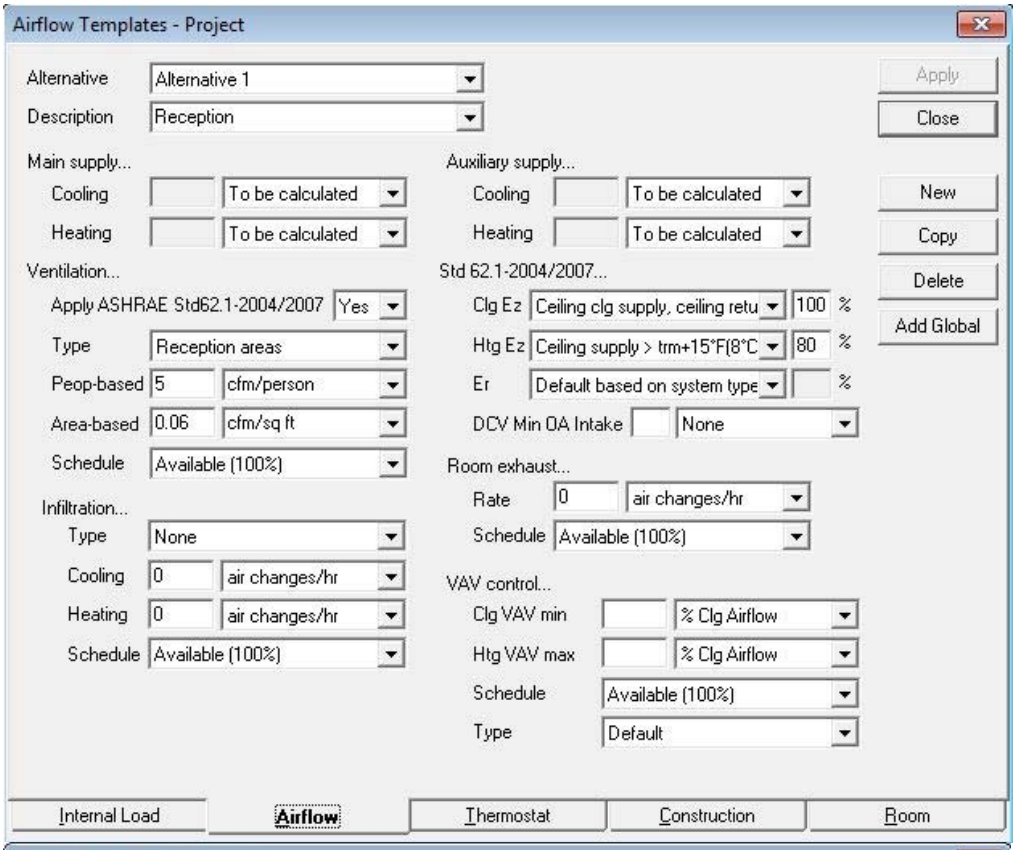



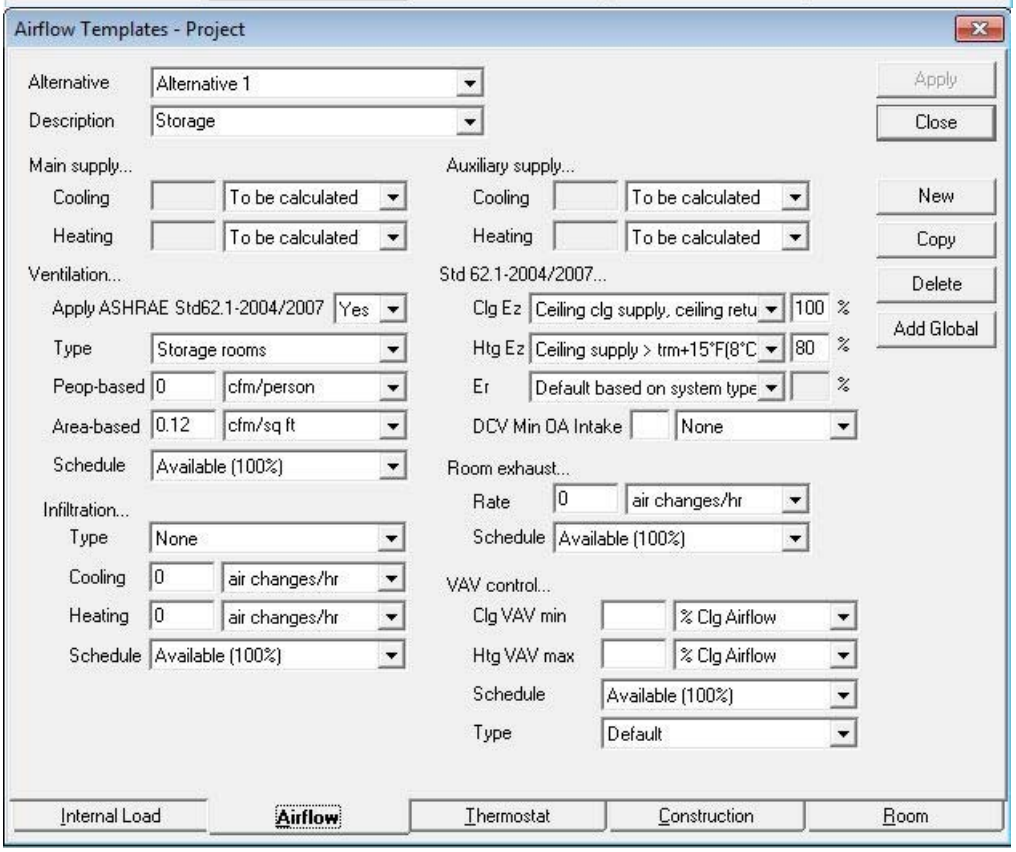

Airflow Templates - Project
Alternative
Alternative 1
Description
Lobby
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Lobbies
Peop-based
5
cfm/person
Area-based
0.06
cfm/sq ft
Schedule
Available (100%)
Infiltration...
Type
None
Cooling
0
air changes/hr
Heating
0
air changes/hr
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Ceiling clg supply, ceiling retu
100
%
Htg Ez
Ceiling supply > trm+15°F(8°C
80
%
Er
Default based on system type
%
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
VAV control...
Clg VAV min
% Clg Airflow
Htg VAV max
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Office
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Office space
Peop-based
5
cfm/person
Area-based
0.06
cfm/sq ft
Schedule
Available (100%)
Infiltration...
Type
None
Cooling
0
air changes/hr
Heating
0
air changes/hr
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Ceiling clg supply, ceiling retu
100
%
Htg Ez
Ceiling supply > trm+15°F(8°C
80
%
Er
Default based on system type
%
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
VAV control...
Clg VAV min
% Clg Airflow
Htg VAV max
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Physical Therapy
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Health club/ weight rooms
Peop-based
20
cfm/person
Area-based
0.06
cfm/sq ft
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Ceiling clg supply, ceiling retu
100
%
Htg Ez
Ceiling supply > trm+15°F(8°C
80
%
Er
Default based on system type
%
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
None
Cooling
0
air changes/hr
Heating
0
air changes/hr
Schedule
Available (100%)
VAV control...
Clg VAV min
% Clg Airflow
Htg VAV max
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Procedure Room
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Default Std62
Peop-based
15
cfm/person
Area-based
0.06
cfm/sq ft
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Ceiling clg supply, ceiling retu
100
%
Htg Ez
Ceiling supply > trm+15°F(8°C
80
%
Er
Default based on system type
%
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
None
Cooling
0
air changes/hr
Heating
0
air changes/hr
Schedule
Available (100%)
VAV control...
Clg VAV min
% Clg Airflow
Htg VAV max
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Reception
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Reception areas
Peop-based
5
cfm/person
Area-based
0.06
cfm/sq ft
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Ceiling clg supply, ceiling retu
100
%
Htg Ez
Ceiling supply > trm+15°F(8°C
80
%
Er
Default based on system type
%
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
None
Cooling
0
air changes/hr
Heating
0
air changes/hr
Schedule
Available (100%)
VAV control...
Clg VAV min
% Clg Airflow
Htg VAV max
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Storage
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Storage rooms
Peop-based
0
cfm/person
Area-based
0.12
cfm/sq ft
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Ceiling clg supply, ceiling retu
100
%
Htg Ez
Ceiling supply > trm+15°F(8°C
80
%
Er
Default based on system type
%
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
None
Cooling
0
air changes/hr
Heating
0
air changes/hr
Schedule
Available (100%)
VAV control...
Clg VAV min
% Clg Airflow
Htg VAV max
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room