TECHNICAL REPORT 2:

Thermal Load Calculation and Energy Analysis

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INOVA South Patient Tower
Falls Church, VA
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Executive Summary

This report is a compilation of input data, assumptions and results that pertain to an energy model performed on the INOVA South Patient Tower. To perform the energy model, Trane TRACE 700 modeling software was utilized. After inputting the geometry of the building, the rooms were placed into zones corresponding to the interior core and exterior exposures to accurately model the different exterior loads.

When the modeling of systems and plants was completed, the model was run, it was determined that the design cooling load is 732 tons and the design heating capacity is 4,645 MBh. This works out to roughly 275.8 ft^2/ton of cooling capacity. The ventilation was determined to be lower than the designer's specifications for the building system and reasons for this are discussed later in this report.

Upon doing an energy consumption analysis, it was found that a majority of the energy use in the South Patient Tower comes from the cooling equipment and process. This accounts for 45% while heating and lighting both account for 22%. The remaining percentage can be attributed to the mechanical equipment operation in the building. It should be noted that while miscellaneous equipment was entered into the model, it was taken as part of the cooling load and is included in that percentage. Finally, an emissions report was compiled for the buildings carbon footprint from both on-site combustion as well as the off-site electric production measures for the state of Virginia. The following sections will explain in further detail the methods in which the analysis was performed as well as more detailed results.

Introduction

Building Information

The South Patient Tower is located on the INOVA Fairfax Hospital campus in Falls Church, Virginia. The tower is a 236,000 SF, thirteen (13) story (12 above grade and 1 below) hospital patient bed tower that expands the existing hospital patient building. The project was contracted under a single prime with negotiated lump-sum contract valued around $76 million overall project cost and delivered via a design-bid-build method.

Project Team

Owner:	INOVA Health System
Architect:	Wilmot/Sanz Inc.
General Contractor:	Turner Construction Company
Structural Engineer:	Cagley & Associates
Mechanical Engineer:	RMF Engineering, Inc.
Electrical Engineer:	RMF Engineering, Inc.
Civil Engineer:	Dewberry & Davis

Architecture

The South Patient Tower was designed to complement and respect the recent Heart Institute to the building's west, while maintaining an architectural style that is consistent with the rest of the INOVA Fairfax Hospital Campus. The building can be broken into two distinctive architectural parts; the lower four floors (podium) and the upper nine floors (tower). The podium section of the building hosts the entrance lobby, cafeteria, kitchen, services, offices and ultrasound exam rooms while the tower is strictly for patient bedrooms. A two floored atrium is used for the entrance lobby and has a circular fountain located on the ground level. The mechanical systems are located on the fifth floor due to a trauma helicopter pad located on the roof of the tower.

Building Façade

The façade of the tower is made up of a curtain wall system. This curtain wall consists of three elements that help to respect the existing patient bed tower while mirroring the newer Heart Institute's façade style. Precast concrete panels, aluminum curtain wall with glazing and metal panels all work together to create this building's façade. There are two varieties of precast concrete panels.

One is a panel formed into thin brick laid in soldier courses and help to tie the building into the older all brick patient tower, and the other is a basic precast panel in the center of each elevation and on the façade of the podium level. The aluminum curtain wall with glazing helps to provide ample amounts of daylight for the interior patient rooms and other interior spaces. Metal panels are used to continue to look of the building but help to hide some of the interior elements such as columns or the mechanical fifth floor.

Zoning

The INOVA South Patient Tower is located in Fairfax County, Virginia and falls under the *I, Merrifield Suburban Center, Land Unit M, Sub-Unit M1* planning area and district. Innovative energy efficiency and conservation strategies should be incorporated into all new buildings in this district. A setback of 100 feet on the western boundary of the district and a maximum height of 165 feet are requirements within Sub-Unit M1.

Roofing

The roofing for the South Patient Tower consists of a similar base of a 9-1/2" reinforced concrete slab, insulation, and a 4" light-weight concrete topping for the three types of roofing materials on the project. These materials include; polyvinyl-chloride (PVC), a fluid-applied protected membrane, and a vegetated roof system. The lower podium roof consists of both the vegetated roof system and the fluid-applied protected membrane, while the higher tower roof is made of the polyvinyl-chloride (PVC) material.

Sustainability

The INOVA Hospital South Patient Tower is pursuing LEED Silver certification which exceeds the zoning requirement to be LEED Certified. This project has an energy reduction goal of at least 24.5% based on a database of similar buildings. Some aspects to help the project reach this goal include a vegetated green roof covering most of the low podium roof, a white reflective PVC roofing material on the upper tower roofs, water efficient landscaping using no potable water, automatic sensors on sinks and dual flush valves on toilets, recycled and local materials and community connectivity by building a new bus stop for the hospital

Mechanical Systems Overview

The INOVA hospital campus has its own existing central utility plant and campus loop for steam and chilled water. The chilled water enters the basement of the tower through two 24" lines and goes directly to the fifth floor mechanical room and low podium roof to serve the air-handling units. The fifth floor mechanical room houses the tower's main air handling equipment and building's return and exhaust fans. The return is combined in a return air plenum and supplied back to the various air-handlers for mixing with outdoor air. A majority of the tower is served from four (4) 50,000 CFM air handlers coupled together that feed into various risers that serve upper and lower floors. The kitchen is served from two (2) air handlers on the western roof of the second floor. These air handlers are 10,000 CFM and 13,000 CFM respectively. The 10,000 CFM air-handler provides make-up air for the exhaust hoods located in the kitchen and the 13,000 CFM air-handler serving the ventilation and supply air for the space. Heating is provided by three (3) steam to heating hot water heat exchangers located in the basement of the tower. These heat exchangers are sized for 715 gallons per minute and provide hot water directly to three (3) 715 GPM pumps that each provide 60 feet of head to serve the air handler heating coils. The distribution throughout the building will be served by constant air volume (CAV) units with the boxes that serve the perimeter patient rooms equipped with hot water reheat coils.

Part 1: Design Load Estimation

Assumptions

Energy Simulation Model

The energy analyses presented in this report are results of running the building model in Trane TRACE 700 software. In order to better analysis the building as a whole, a number of assumptions were made for the various room types. Most of the occupancy and airflow data was pulled directly from the original basis of design, while lighting was pulled from ASHRAE Fundamentals 2009 and miscellaneous loads were estimated from prior hospital design experience.

Design Conditions

The INOVA South Patient Tower is located in Falls Church, VA. To estimate the weather data, values were taken from ASHRAE Fundamentals 2009 for Washington, D.C. Reagan Airport. A brief summary of the data inputs for the TRACE weather data can be seen below in *Table 1.* For more detailed weather input information refer to *Appendix A*.

Table 1: Weather Conditions

Washington, D.C. Reagan Airport	
Latitude	38.87N
Longitude	77.03W
Heating DB (99.6%)	16.3 F
Cooling DB (0.4%)	94.3 F

Internal Loads

Templates were created for each of the various space types. Internal load assumptions were taken from the basis of design and typical lighting levels noted in ASHRAE Standard 90.1-2007 were used for the space. Miscellaneous loads were estimated from types of equipment that would be in the space. Computers and coffee makers were assumed to have 350 W of miscellaneous load a piece and all other loads were assumed on a typical W/SF basis. A summary of the lighting and miscellaneous loads can be seen in *Table 2*, while the typical occupancy for a space can be seen in *Table 3*.

Table 2: Assumed Lighting and Miscellaneous Loads

Template Name	LPD (W/SF)	Misc. (W/SF)
Active Storage	0.9	0
Corridor	1.0	0
Lobby	1.3	0
Electrical/Mechanical	1.5	1.5
Inactive Storage	0.3	0
Hospital Lounge	0.8	350 W (Coffee)
Office	1.1	350 W (CPU)
Restroom	0.9	0
Kitchen	1.2	5.0
Café	2.1	0
Locker Room	0.6	0
Patient Room	0.7	3.0
Nurses' Station	1.0	700 W (CPU x2)
Conference Room	1.3	1.0
Exam/Treatment	1.5	3.0

Airflows

Assumptions for airflows to the various spaces were determined from the designer's original basis of design and typical ASHRAE Standard 170 air change rates for hospital spaces. The infiltration was selected as a pressurized, average construction of 0.3 air changes per hour for patient and exam rooms, and a neutral, average construction of 0.6 air changes per hour for all other spaces. A summary of the typical values used can be seen in *Table 3* below. For detailed information on individual airflow templates, refer to *Appendix B*.

Table 3: Basis of Design Values by Space Type

Minimum Ventilation Rates			
Program Occupancy	Design Values		Default Values
	Outdoor Air Rate CFM/person	Space Outdoor Air Rate CFM/SF	Occupancy Density No./1000 SF
Patient Rooms	25	0.25	10
Conference/Meeting	5	0.06	50
Corridors	-	0.06	-
Storage Rooms	-	0.12	-
Reception Areas	5	0.06	30
Main Entry Lobbies	5	0.06	10

Thermostat

The values for the thermostat templates were taken from the designer's basis of design documentation and do not vary throughout the hospital. The thermostats are located in the room and the drift points were not specified, rather assumed for this template. Table 4 below summarizes the set points for heating and cooling for the South Patient Tower.

Table 4: Summary of Thermostat Settings

South Patient Tower Temperature Set Points	
Cooling Dry Bulb	72 F
Heating Dry Bulb	72 F
Relative Humidity	50 %
Cooling Drift Point	81 F
Heating Drift Point	64 F

Construction

The construction information for this template was taken directly from design documents for the South Patient Tower. *Table 5* below summarizes the U-values for the various elements of construction. The windows and curtain walls were assumed to be the same, as they were specified by the designer to be very close in U-value and shading coefficients. Also seen below, *Table 6* shows the wall heights for the South Patient Tower. It consists of eleven and a half (11.5) foot floor-to-floor height with a three (3) foot plenum, giving a typical ceiling height throughout of eight and a half (8.5) feet.

Table 5: Construction U-values

South Patient Tower Construction Values		
Element	**Construction**	**U-Value (BTU/hr-ft^2-F)**
Slab	8" HW Concrete	0.49
Roof	6" LW Concrete, 6" Ins.	0.024
Wall	Steel Framed Wall, 3" Ins.	0.043
Window	Low-e Double Pane (SC = 0.36)	0.29

Table 6: Wall Height

Wall Heights	
Walls	11.5 ft
Floor-to-Floor	8.5 ft
Plenum	3 ft

Model Zone Breakdown

In order to accurately model the effects of the solar path and exterior conditions on the building loads, zones were created with a typical pattern on every floor. The building is oriented directly with the cardinal directions, and the zone names follow the direction for naming purposes. All the exterior rooms on the upper floors were patient rooms while on the lower floors; these exterior spaces were primarily entrance lobby and shell space for the future addition to the East. The zones were also grouped in a way that similar space types were accounted for in that zone, examples being the patient rooms being grouped together. Special zones were created for the rooms on the Southwest and Southeast corners since they have windows on two exterior walls and would see a different gain. For basic zoning breakdowns see *Figure 1* below.

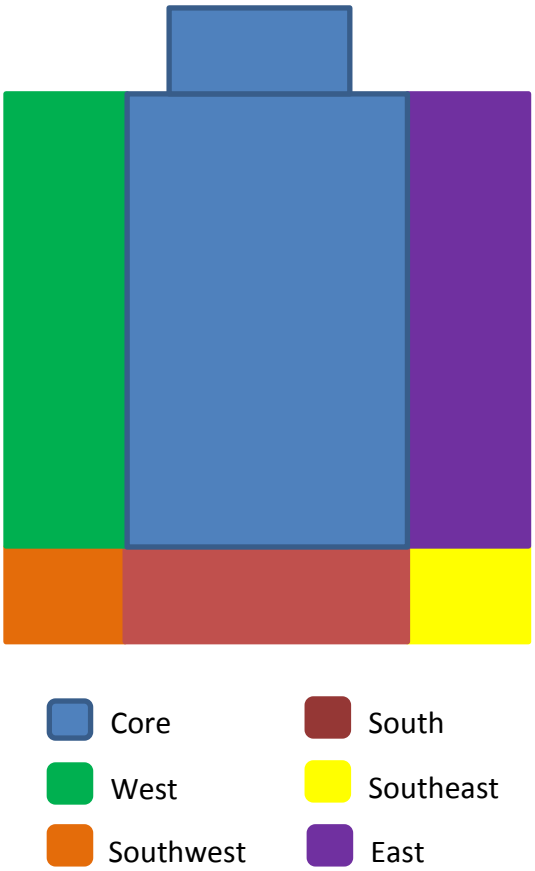


Figure 1: Breakdown of Typical Zoning per Floor

Systems

The systems in the South Patient Tower consist of multiple air handlers ducted together to create one (1) supply system for the hospital as a whole. A separate air-handler supplies the kitchen and food preparation area. Information for both of these systems was taken from design documents and created in TRACE. The zones were then placed under the appropriate system for the analysis.

Trane TRACE Results Analysis

The designers did not perform a software based load analysis for this building. All loads were calculated by hand without the use of a program using guidelines suggested in ASHRAE Load Calculation methods. The following presents a comparison of the designers hand calculation and TRACE model results.

Supply Air and Ventilation Comparison

The ventilation rate provided in the documentation was 184,553 cubic feet per minute with 40% outdoor air and a CFM/SF value of 0.95. The TRACE model results in a lower total supply and ventilation rate, but a higher outdoor air percentage. Due to the weather data being the same as what the designer specified in their basis of design, and ventilation being from this documentation also, this can be attributed to inaccurate internal load assumptions in the miscellaneous loads. *Table 7* below shows a comparison of the design air-handler and the results of the TRACE model analysis.

Table 7: System Ventilation Comparison

	Design Values	TRACE Values	% Difference
Area (SF)	195,163	200,591	3 %
Total Supply (CFM)	184,553	119,995	-35 %
Outdoor Air (CFM)	73,741	52,778	-28 %
% Outdoor Air	40 %	44 %	10 %
CFM/SF	0.95	0.60	-37 %

Cooling Plant Comparison

Since there was no designer record of plant loads for this building, the results from the TRACE model have been compared to typical cooling load values from the ASHRAE Pocket Guide-2005 Cooling Load Check Figures table. Since the South Patient Tower is primarily patient rooms, the value for a Hospital Patient Room was used from this table. The range in the ASHRAE Pocket Guide-2005 is 275

SF/ton for the lowest to 165 SF/tons for the highest. *Table 8* below shows the comparison between the model results and the typical values for this type of building.

Table 8: Cooling SF/ton Comparison

	ASHRAE Typical (Lo)	TRACE Value	% Difference
SF/ton	275	275.8	0.29

The value is slightly higher than the lowest suggested value in the ASHRAE Pocket Guide-2005 but this can be partly attributed to inaccuracies in the miscellaneous loads on the spaces since the lighting and occupancy were taken directly from design documentation.

Part 2: Energy and Operating Costs

Energy Consumption Summary

After developing a Trane TRACE model to calculate the various loads on the South Patient Tower, the software was used to determine the buildings total energy consumption. The following section will breakdown the energy usage and associated costs that were determined through the analysis. Although the building is connected to a campus loop, the portion used from that plant was modeled for use in this consumption summary.

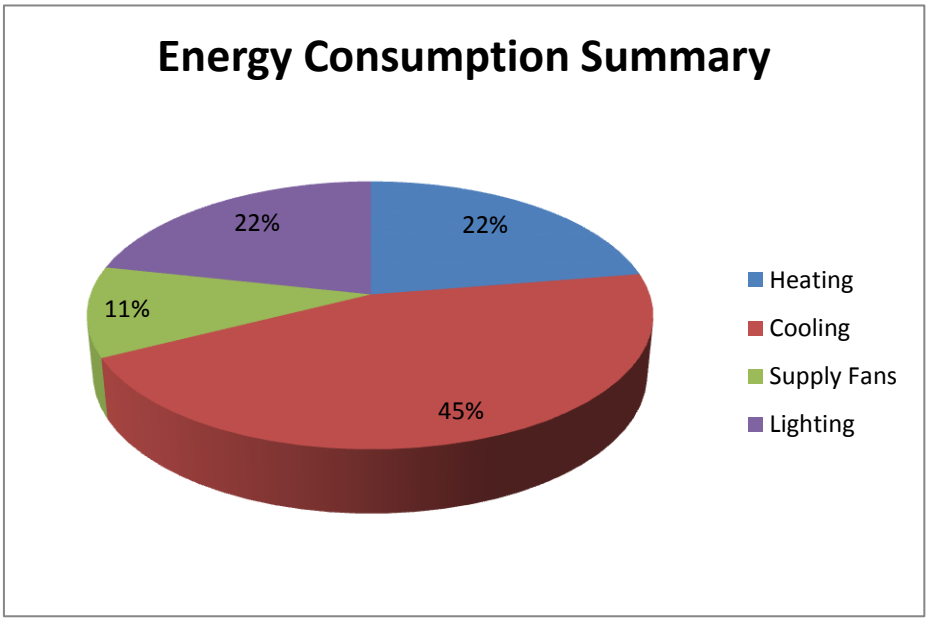


Figure 2: Energy Consumption Summary

As shown previously, *Figure 2* breaks down the various consumers of energy in the South Patient Tower. It can be seen that cooling dominates the energy consumption as there are many loads within the hospital that are operating continuously and create heat load. Lighting also seems higher than expected but since the building is under continuous operation, this percentage seems creditable. Further breakdowns can be seen in the following tables and figures. *Table 9* shows the Cost/SF of the equipment and includes the water consumption, while *Figure 3* shows the monthly utility costs from the analysis. The total Cost/SF for the building seems lower than it should be indicating the inaccurate miscellaneous equipment levels that were previously assumed.

Table 9: Equipment Cost Summary (Includes Water Consumption)

	Energy Usage (kBTU/yr)	Cost ($/yr)	Cost/SF ($/SF)
Heating	2,347,473	$ 10,623	$ 0.05
Cooling	2,917,553	$ 32,451	$ 0.16
Lighting	2,255,491	$ 21,661	$ 0.11
Supply Fans	1,139,462	$ 10,943	$ 0.05
Heat Rejection	1,792,296	$ 17,212	$ 0.09
Other Clg	2,066	$ 19.84	$ 0.00
Totals	**10,454,341**	**$ 92,909**	**$ 0.46**

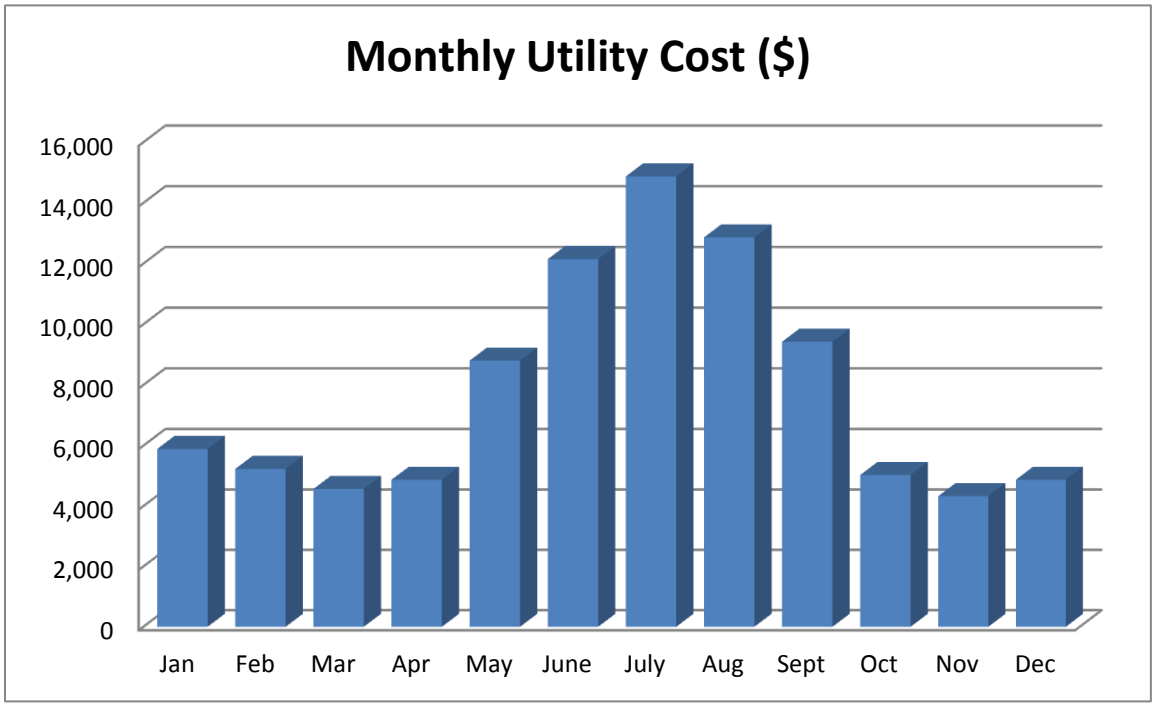


Figure 3: Monthly Utility Costs

An energy analysis was not performed by the designers of the South Patient Tower, thus this data could not be obtained. Energy modeling adds costs to a project and an overall model is expected to be completed when the addition Women's Clinic is added as part of the next phase of construction for LEED purposes. Also the owner was not willing to release utility data. Due to this there is no way to compare the monthly costs to the TRACE results, and the default utility rates were used. *Figure 4* shows the electric monthly cost by equipment. It follows suit that the cooling equipment is higher during the summer months and lower during the winter. It also can be seen that lighting is basically constant throughout the year. It seems as though the miscellaneous loads were placed as effect on the cooling load rather than energy from the templates so no values are shown in this graph.

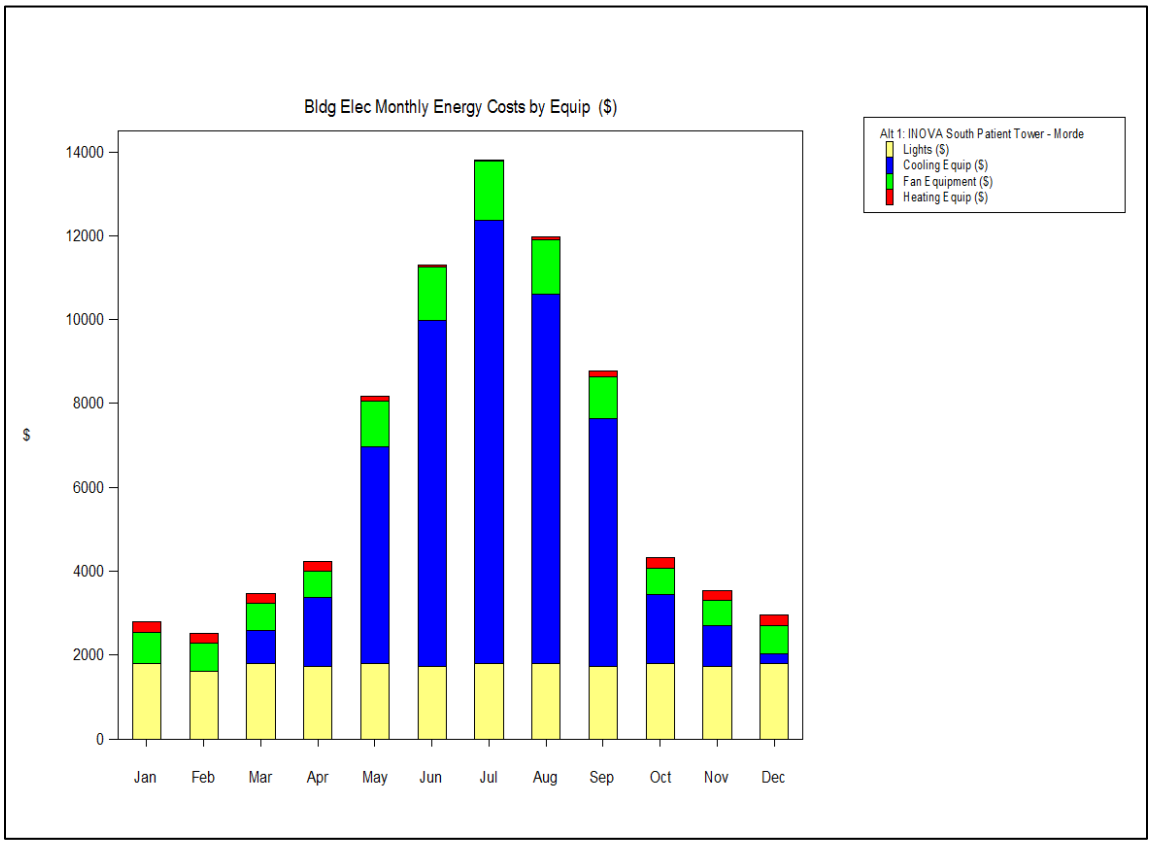


Figure 4: Electric Monthly Energy Cost by Equipment

The monthly cooling equipment consumption, cooling tower consumption and monthly HVAC energy were also investigated from this energy cost analysis. *Figure 5* shows the monthly cooling equipment consumption dominating the summer months and non-existent in the dead of winter. This seems unlikely as there will be larger equipment loads in the hospital and some cooling will be needed in the winter. *Figure 6* shows the cooling tower consumption which can be seen to correlate with the cooling equipment consumption curves. Finally, *Figure 7* shows the overall HVAC monthly energy in kWh. It can be seen how the cooling dominates the summer and the heating dominates the winter months.

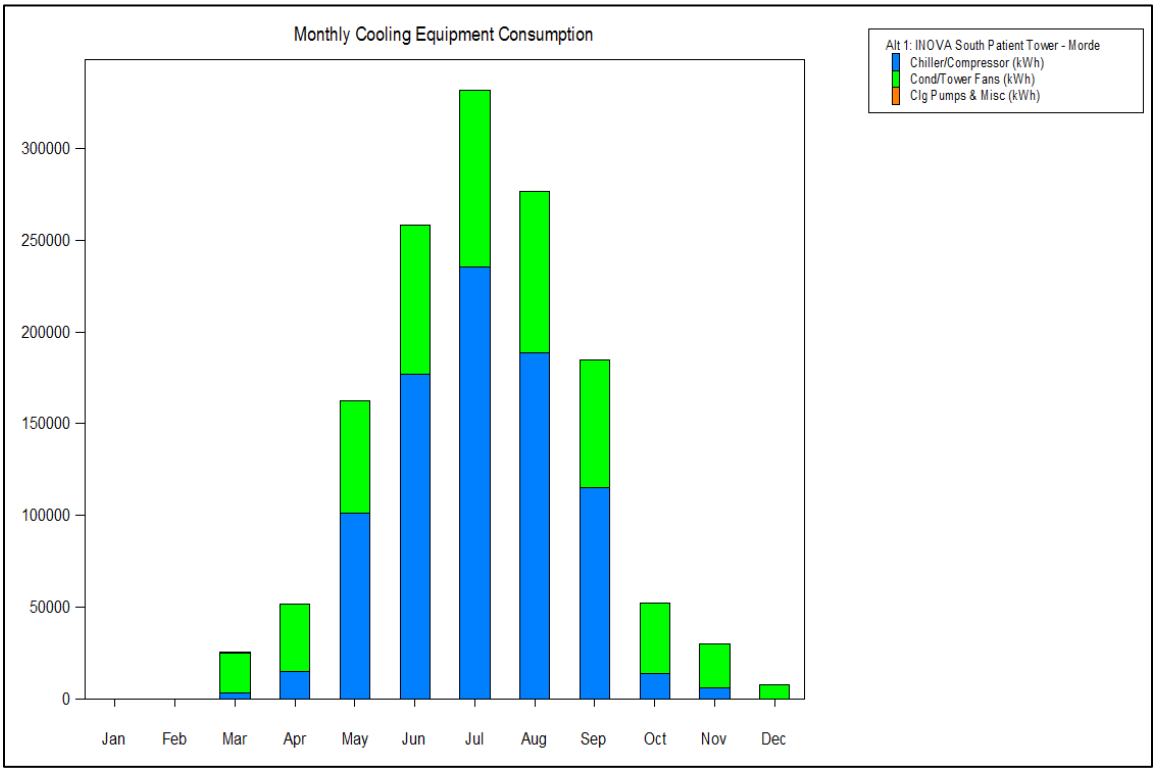


Figure 5: Monthly Cooling Equipment Consumption

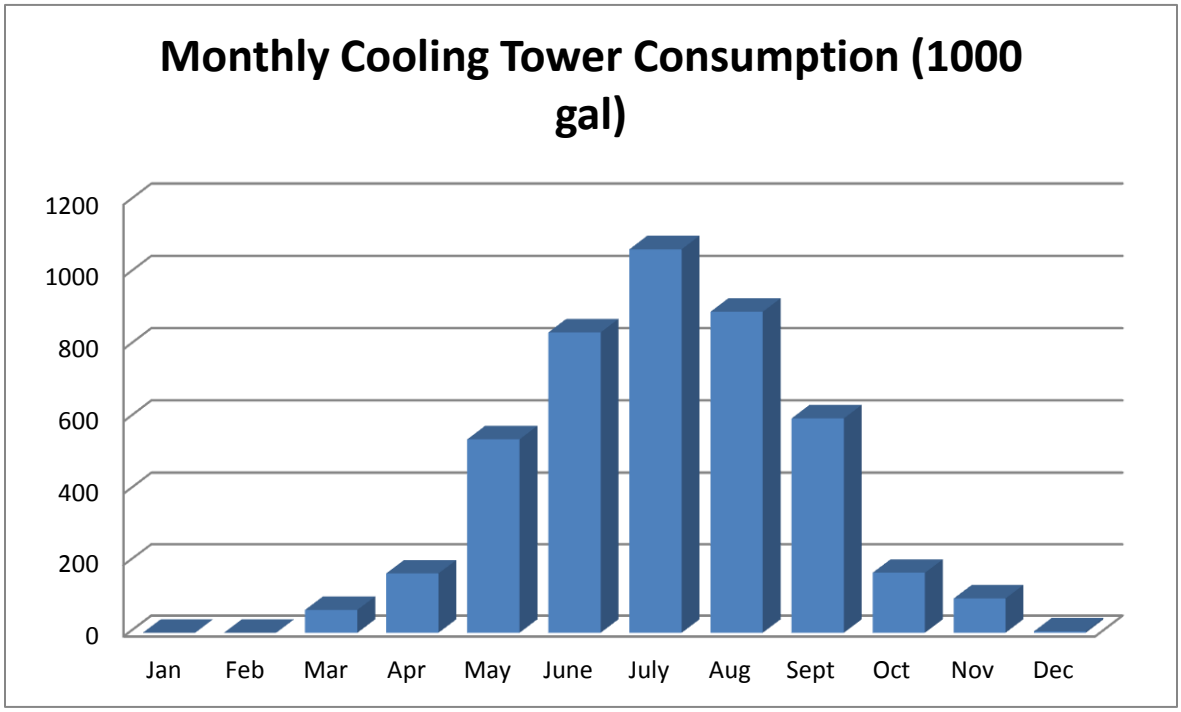


Figure 6: Monthly Cooling Tower Consumption

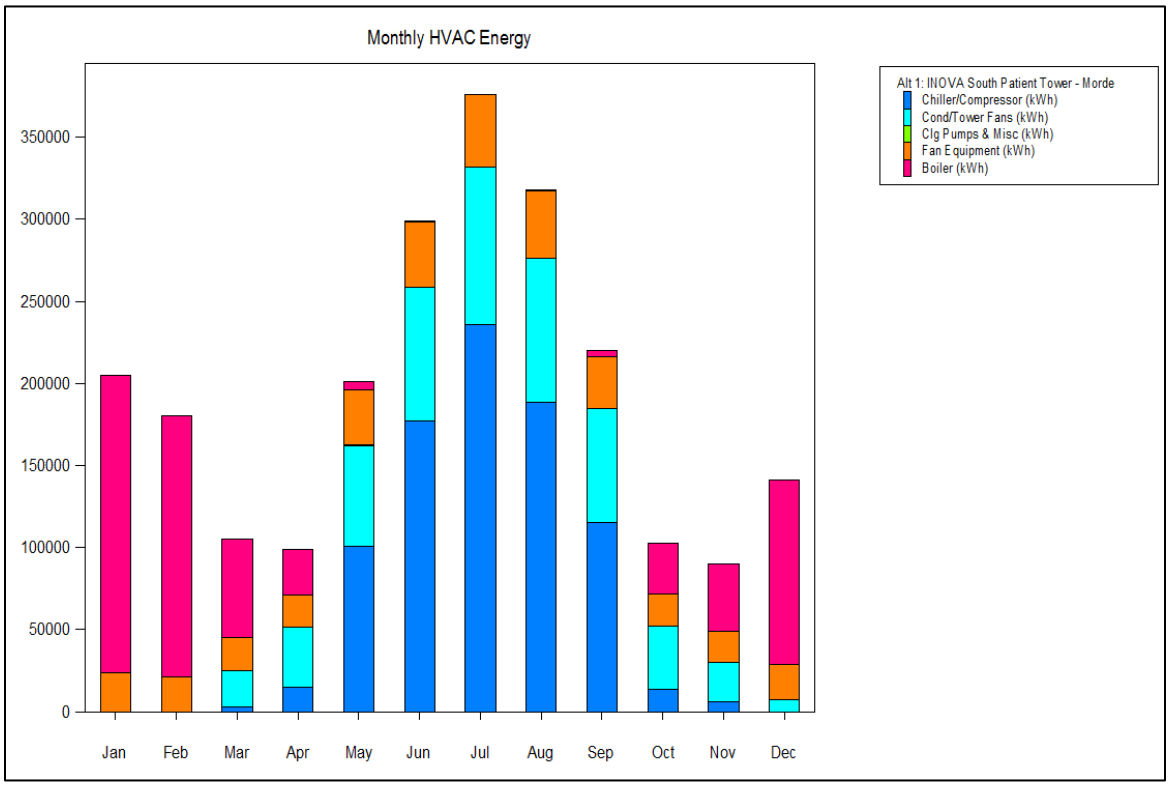


Figure 7: Monthly HVAC Energy

Emissions

The emissions for the South Patient Data were determined from the Regional Grid Emission Factors using the state of Virginia as reference for values. *Table 10* that follows shows the amount of total pollutants using the reference values of pound of pollutant per kWh of electricity. Although there is no on-site combustion in the building itself, the portion of the heating load from the central plant boilers was accounted for in this emissions report.

Table 10: Emission Factors for Virginia

	Delivered Energy		On Site Combustion (Natural Gas)		
Pollutant	**lb of Pollutant per kWh electricity**	**lb/yr**	**Lb of Pollutant per 1000 ft^3**	**Lb/yr**	**Total**
CO_2	1.33E00	3,245,958	1.22E+02	259,213	**3,505,171**
CH_4	2.52E-03	6,150	2.50E-03	5.31	**6,155**
N_2O	2.81E-05	68.6	2.50E-03	5.31	**73.91**
NO_x	2.67E-03	6,516	1.11E-01	235.8	**6,752**
SO_x	8.04E-03	19,622	6.32E-04	1.34	**19,623**
CO	9.74E-04	2,377	9.33E-02	198	**2,575**
TNMOC	8.77E-05	214	6.13E-03	13	**227**
Lead	1.02E-07	0.249	5.00E-07	1.06E-03	**0.25**
Mercury	3.24E-08	0.0791	2.60E-07	5.52E-04	**0.08**
PM10	7.25E-05	176.9	8.40E-03	17.8	**195**
Solid Waste	1.47E-01	358,764	-	-	**358,764**

Summary

After completing the analysis in Trane TRACE of the South Patient Tower, it was determined that the loads were well below the specifications in the designer's documentation. This can be attributed to the conservative estimates made to the internal miscellaneous loads, as the lighting, occupancy and ventilation rates were taken from the basis of design. If these loads were to be adjusted, a more accurate representation of the South Patient Tower loads may be found.

The energy analysis of the building as seemed to show some conservative estimates to the internal loads, which created some lower loads resulting in lower cost and emissions. If these loads were adjusted to reflect the internal loads more accurately, a better approximation to the energy consumption, costs, and emission could be made.

Appendix A: Detailed Weather Data

2009 ASHRAE Handbook - Fundamentals (IP)

WASHINGTON DC REAGAN AP, VA, USA

WMO#: 724050

Lat: 38.87N Long: 77.03W Elev: 66 StdP: 14.66 Time Zone: -5.00 (NAE) Period: 82-06 WBAN: 13743

Annual Heating and Humidification Design Conditions

Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest month WS/MCDB				MCWS/PCWD to 99.6% DB	
	99.6%	99%	99.6% DP	99.6% HR	99.6% MCDB	99% DP	99% HR	99% MCDB	0.4% WS	0.4% MCDB	1% WS	1% MCDB	MCWS	PCWD
1	16.3	20.3	-2.3	4.9	19.7	2.4	6.2	23.7	26.6	34.6	24.6	33.2	11.7	330

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

Hottest Month	Hottest Month DB Range	Cooling DB/MCWB						Evaporation WB/MCDB						MCWS/PCWD to 0.4% DB	
		0.4% DB	0.4% MCWB	1% DB	1% MCWB	2% DB	2% MCWB	0.4% WB	0.4% MCDB	1% WB	1% MCDB	2% WB	2% MCDB	MCWS	PCWD
7	16.1	94.3	76.0	91.7	75.2	89.2	73.9	78.6	89.1	77.5	87.3	76.4	85.3	10.3	170

Dehumidification DP/MCDB and HR									Enthalpy/MCDB						Hours 8 to 4 & 55/69
0.4%			1%			2%			0.4%		1%		2%		
DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB	
76.0	136.0	83.3	74.8	130.8	82.2	73.7	125.8	81.2	42.1	89.5	40.9	87.7	39.8	85.4	727

Extreme Annual Design Conditions

Extreme Annual WS			Extreme Max	Extreme Annual DB				n-Year Return Period Values of Extreme DB							
				Mean		Standard deviation		n=5 years		n=10 years		n=20 years		n=50 years	
1%	2.5%	5%	WB	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
23.2	20.0	18.1	84.9	9.9	98.1	6.9	2.9	4.9	100.2	0.9	101.9	-3.0	103.6	-8.0	105.7

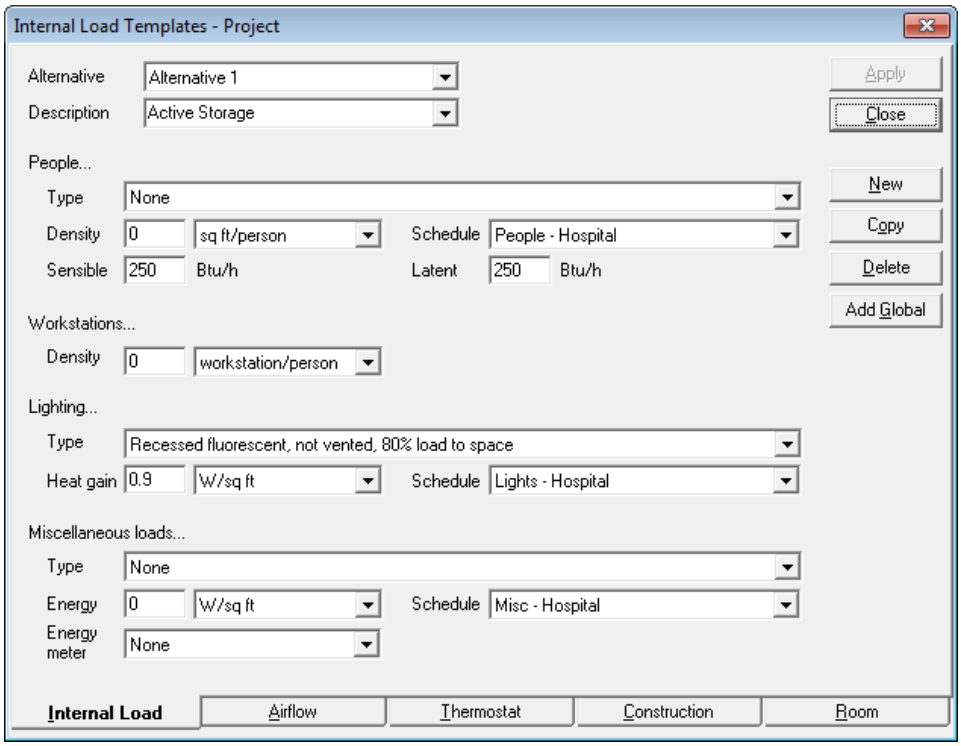
Monthly Climatic Design Conditions

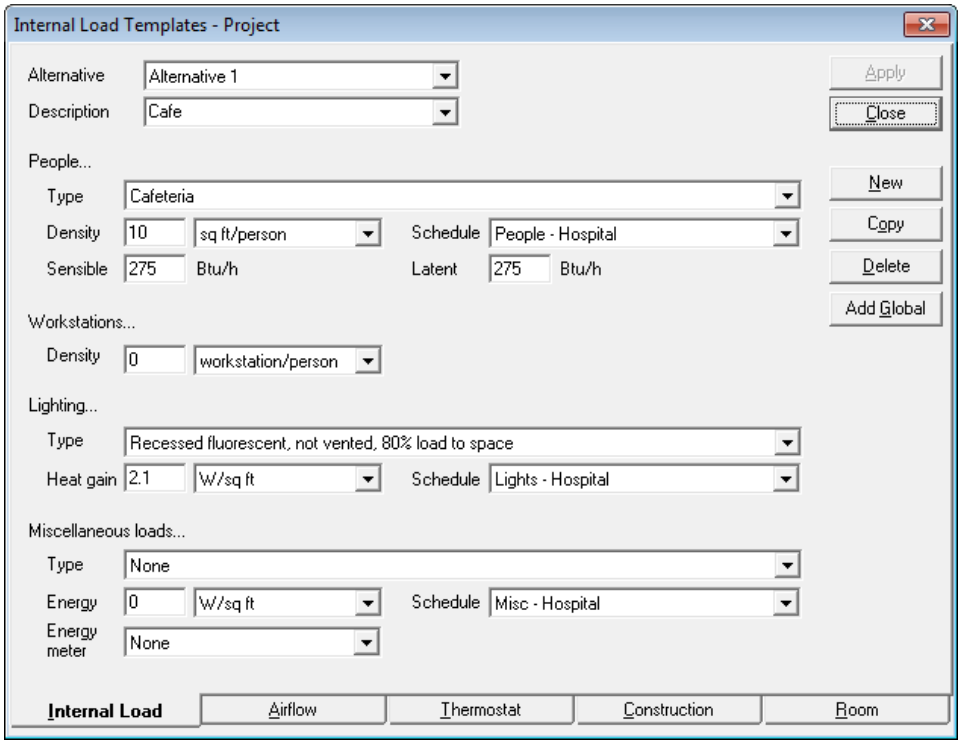
			Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperatures, Degree-Days and Degree-Hours		Tavg	58.2	36.3	39.4	46.7	56.6	65.9	74.8	79.7	78.0	70.8	59.4	49.7	40.1
		Sd		9.67	8.51	9.11	8.10	7.25	6.01	4.76	5.00	6.71	7.45	8.27	9.00
		HDD50	1389	436	311	174	26	0	0	0	0	0	8	108	326
		HDD65	4001	891	717	571	272	78	6	0	1	24	207	463	771
		CDD50	4390	10	14	72	225	494	745	921	869	623	300	97	20
		CDD65	1524	0	0	4	22	107	300	456	404	196	33	2	0
		CDH74	13494	0	1	39	206	883	2593	4585	3679	1324	174	10	0
		CDH80	5085	0	0	8	54	281	955	1960	1406	393	28	0	0
Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4%	DB		64.8	68.8	79.8	86.5	91.0	95.7	98.2	96.8	93.1	83.5	75.1	68.7
		MCWB		57.6	56.4	63.3	66.9	73.2	75.8	76.8	77.1	74.9	70.2	63.6	60.4
	2%	DB		59.4	61.7	71.1	79.9	86.6	91.4	95.1	93.1	87.8	78.6	69.7	62.1
		MCWB		54.0	53.8	58.4	63.5	70.2	74.3	76.4	76.1	72.6	68.4	61.3	55.8
	5%	DB		53.6	56.6	65.9	74.8	83.0	88.6	92.3	90.2	84.3	74.9	66.0	57.1
		MCWB		47.7	48.3	55.3	61.3	69.3	73.6	75.6	74.9	71.3	65.7	59.4	52.0
	10%	DB		48.8	51.9	61.0	70.3	79.0	85.6	89.5	87.4	81.3	71.3	62.5	52.6
		MCWB		43.2	45.6	51.7	58.9	66.9	72.3	74.7	73.7	70.1	63.4	56.4	47.1
Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4%	WB		60.1	60.1	64.7	69.4	76.1	78.9	80.5	80.1	77.9	73.3	66.8	62.4
		MCDB		63.5	65.4	76.2	80.2	87.0	89.2	91.2	91.1	86.5	78.9	71.2	66.5
	2%	WB		54.9	54.5	60.5	66.4	73.1	77.2	79.1	78.3	75.9	70.7	63.8	57.5
		MCDB		58.6	59.7	68.9	75.9	82.7	86.9	89.8	88.7	83.1	76.2	67.8	60.7
	5%	WB		48.8	50.1	56.7	63.7	70.8	76.0	77.8	77.2	74.3	67.8	60.5	53.1
		MCDB		52.3	55.0	63.4	71.9	79.8	84.9	87.9	86.6	80.7	73.2	64.8	56.4
	10%	WB		44.0	46.4	53.2	60.7	68.7	74.6	76.6	76.0	72.7	65.2	57.4	48.1
		MCDB		47.9	51.2	59.8	68.5	77.0	82.6	85.8	83.9	78.6	69.9	61.0	51.5
Mean Daily Temperature Range		MDBR		13.6	15.0	17.0	18.3	17.7	16.9	16.1	15.6	15.8	16.5	15.7	13.5
	5% DB	MCDBR		20.4	22.4	24.4	25.0	22.7	20.0	19.4	18.6	18.8	19.7	20.1	19.8
		MCWBR		15.4	15.4	14.5	12.7	10.5	8.2	7.1	7.4	7.8	11.0	13.7	15.4
	5% WB	MCDBR		18.8	19.1	22.0	21.6	19.7	17.7	17.2	16.6	15.9	16.7	17.5	17.8
		MCWBR		16.2	15.2	14.9	12.3	10.5	8.1	7.5	7.2	8.0	10.7	14.4	15.9
Clear Sky Solar Irradiance		taub		0.319	0.349	0.401	0.415	0.469	0.541	0.563	0.591	0.424	0.371	0.340	0.317
		taud		2.399	2.228	2.044	2.051	1.916	1.766	1.747	1.662	2.152	2.288	2.374	2.463
		Ebn,noon		270	275	270	274	260	241	234	222	260	264	260	264
		Edh,noon		30	39	50	52	61	70	71	75	44	36	30	27

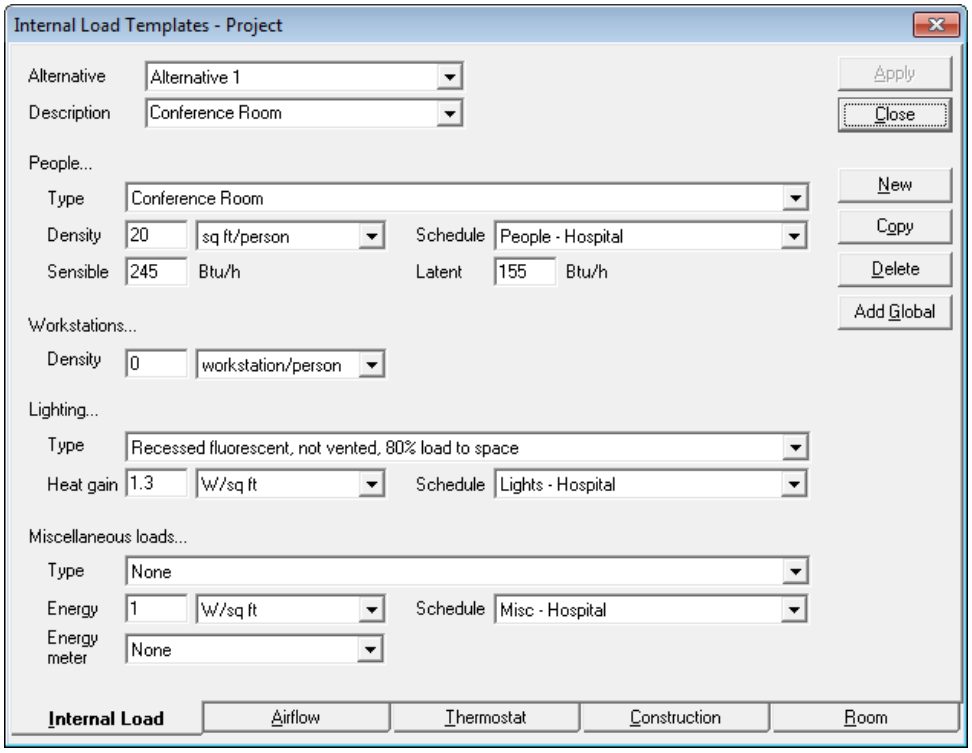
CDDn Cooling degree-days base n°F, °F-day
CDHn Cooling degree-hours base n°F, °F-hour
DB Dry bulb temperature, °F
DP Dew point temperature, °F
Ebn,noon } Clear sky beam normal and diffuse hori-
Edh,noon } zontal irradiances at solar noon, Btu/h/ft2
Elev Elevation, ft
Enth Enthalpy, Btu/lb
HDDn Heating degree-days base n°F, °F-day
Hours 8/4 & 55/69 Number of hours between 8 a.m. and 4 p.m with DB between 55 and 69 °F
HR Humidity ratio, grains of moisture per lb of dry air
Lat Latitude, °
Long Longitude, °
MCDB Mean coincident dry bulb temperature, °F
MCDBR Mean coincident dry bulb temp. range, °F
MCDP Mean coincident dew point temperature, °F
MCWB Mean coincident wet bulb temperature, °F
MCWBR Mean coincident wet bulb temp. range, °F
MCWS Mean coincident wind speed, mph
MDBR Mean dry bulb temp. range, °F
PCWD Prevailing coincident wind direction, °, 0 = North, 90 = East
Period Years used to calculate the design conditions
Sd Standard deviation of daily average temperature, °F
StdP Standard pressure at station elevation, psi
taub Clear sky optical depth for beam irradiance
taud Clear sky optical depth for diffuse irradiance
Tavg Average temperature, °F
Time Zone Hours ahead or behind UTC, and time zone code
WB Wet bulb temperature, °F
WBAN Weather Bureau Army Navy number
WMO# World Meteorological Organization number
WS Wind speed, mph

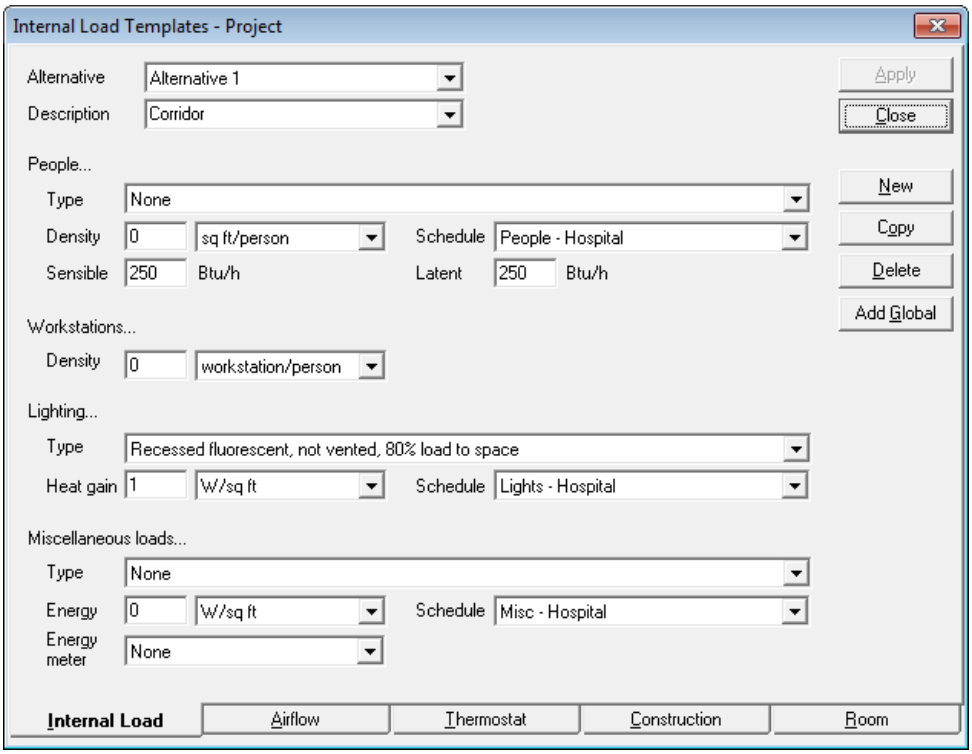
Appendix B: Trane TRACE Templates

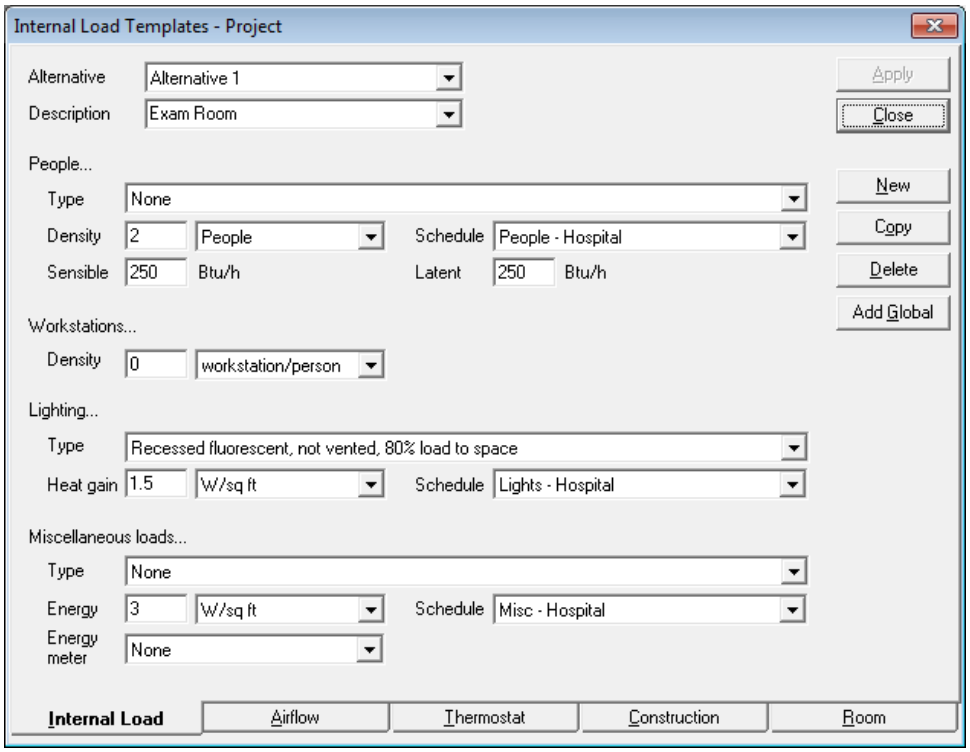
Internal Load

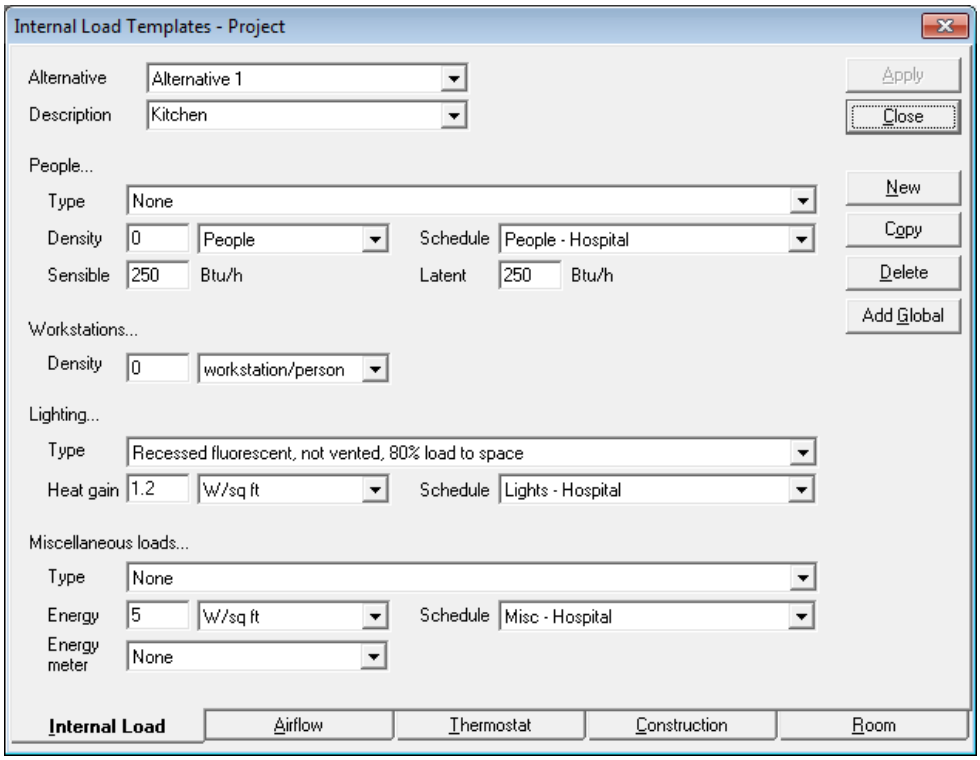


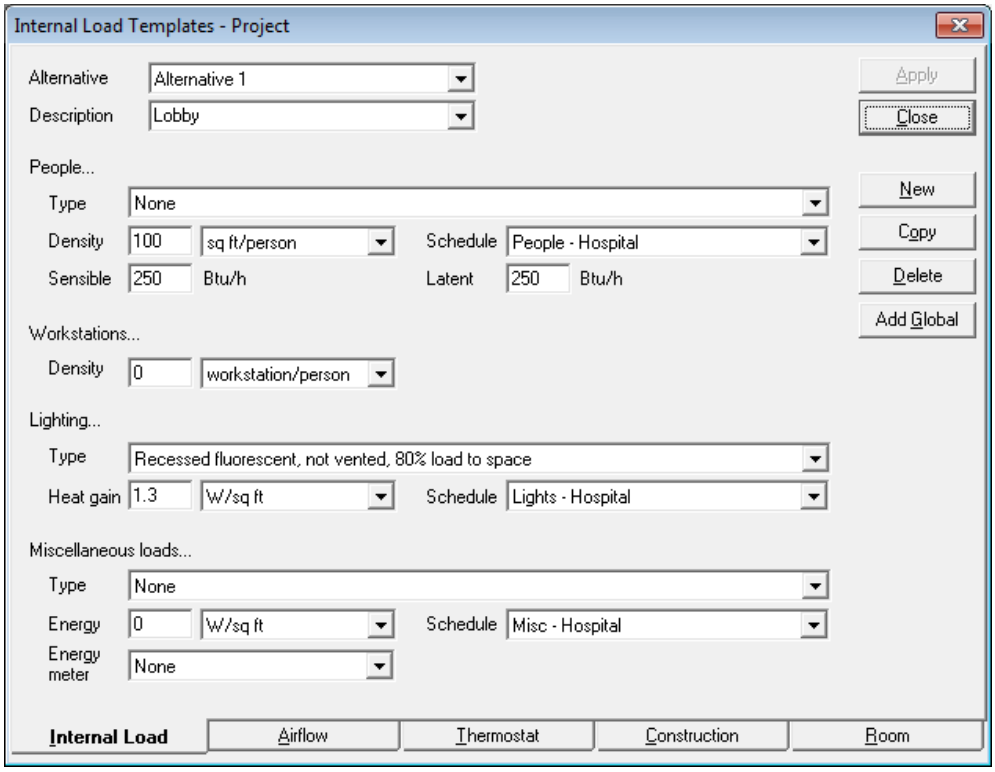


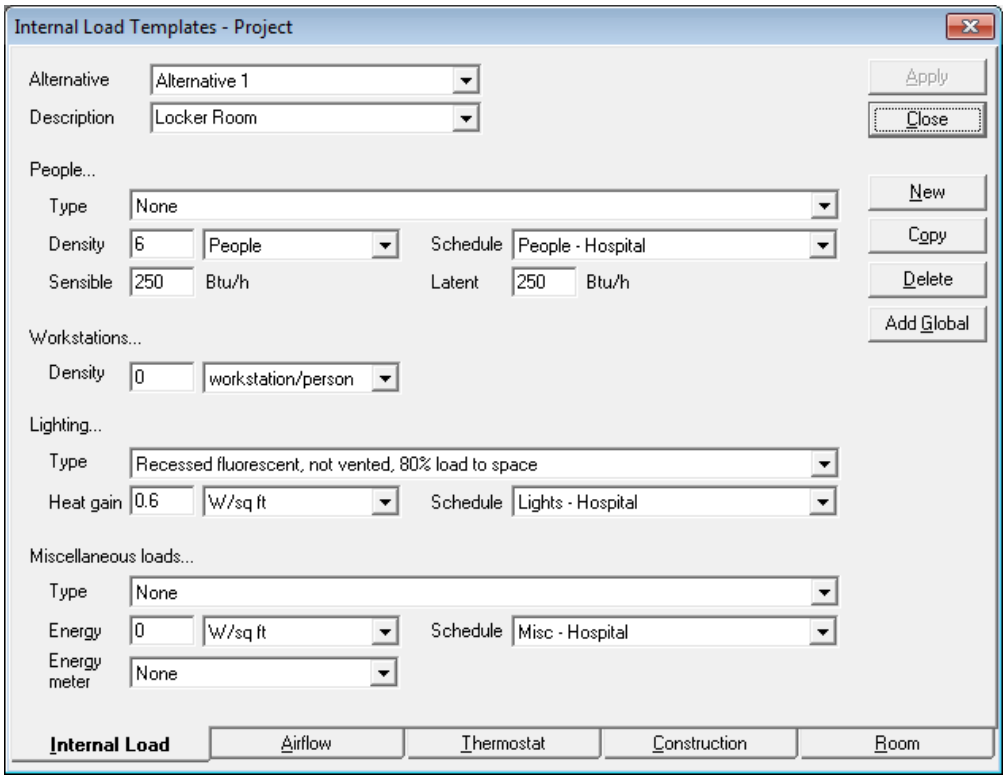

Internal Load Templates - Project
Alternative
Alternative 1
Description
Conference Room
Apply
Close
People...
Type
Conference Room
Density
20
sq ft/person
Schedule
People - Hospital
Sensible
245
Btu/h
Latent
155
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1.3
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
1
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

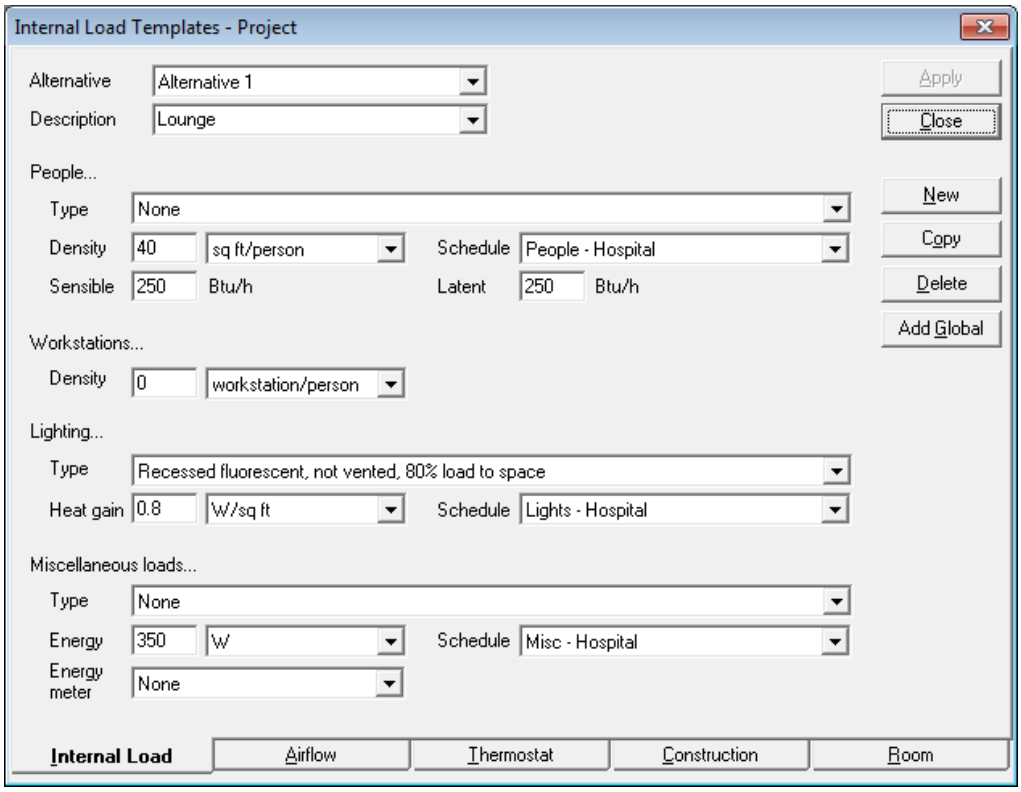

Internal Load Templates - Project
Alternative
Alternative 1
Description
Corridor
Apply
Close
People...
Type
None
Density
0
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
0
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

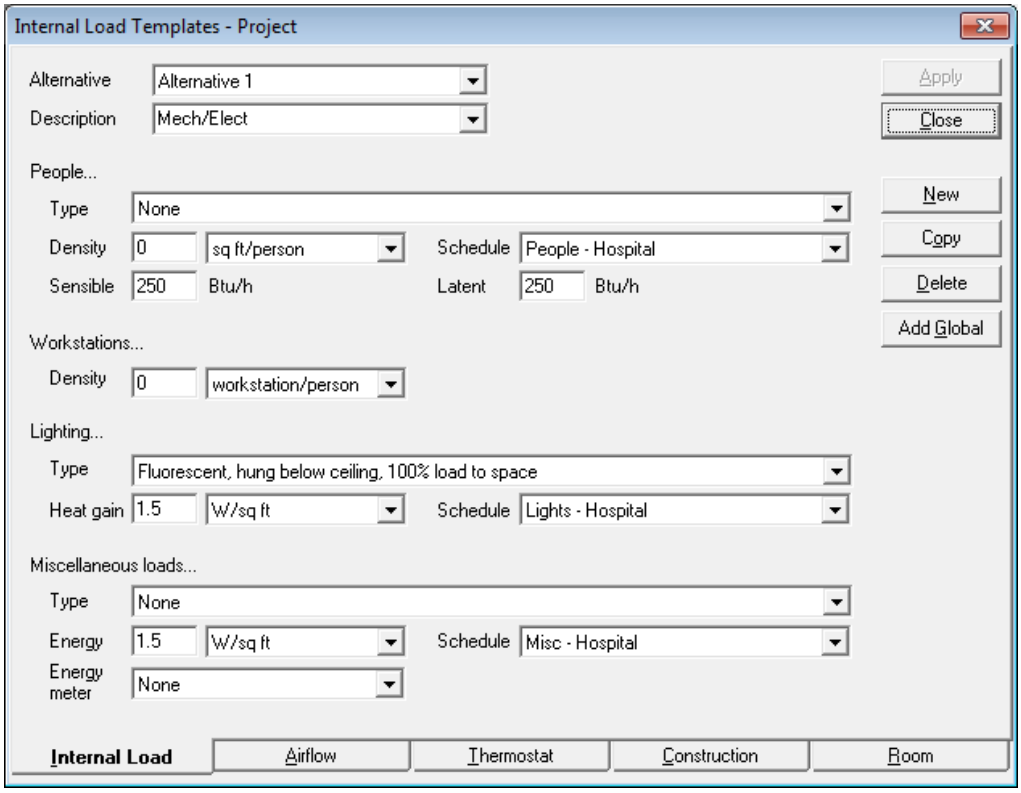

Internal Load Templates - Project
Alternative
Alternative 1
Description
Exam Room
Apply
Close
People...
Type
None
Density
2
People
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1.5
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
3
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

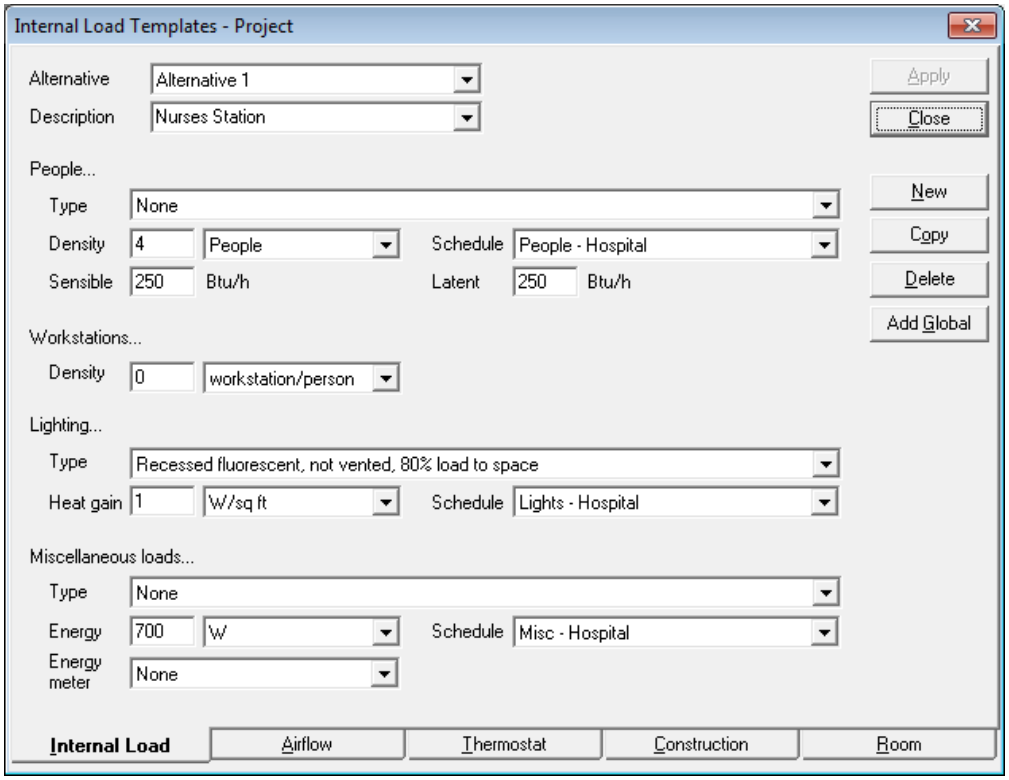

Internal Load Templates - Project
Alternative
Alternative 1
Description
Kitchen
Apply
Close
People...
Type
None
Density
0
People
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1.2
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
5
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

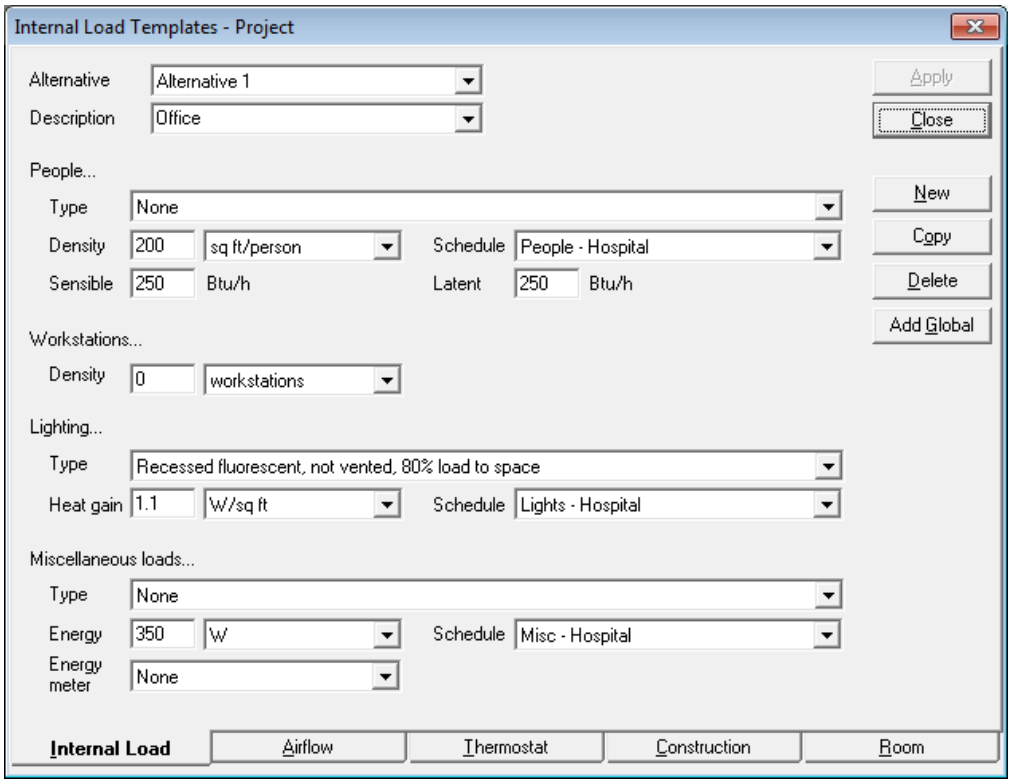

Internal Load Templates - Project
Alternative
Alternative 1
Description
Lobby
Apply
Close
People...
Type
None
Density
100
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1.3
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
0
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

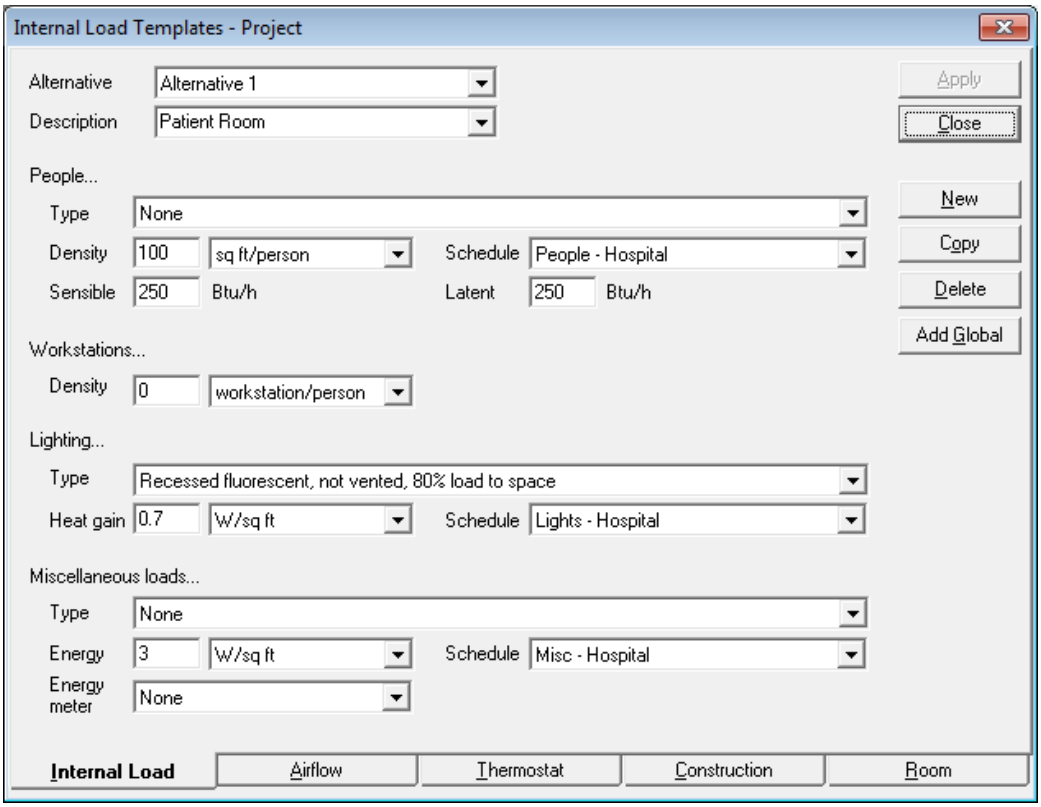

Internal Load Templates - Project
Alternative
Alternative 1
Description
Locker Room
Apply
Close
People...
Type
None
Density
6
People
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
0.6
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
0
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

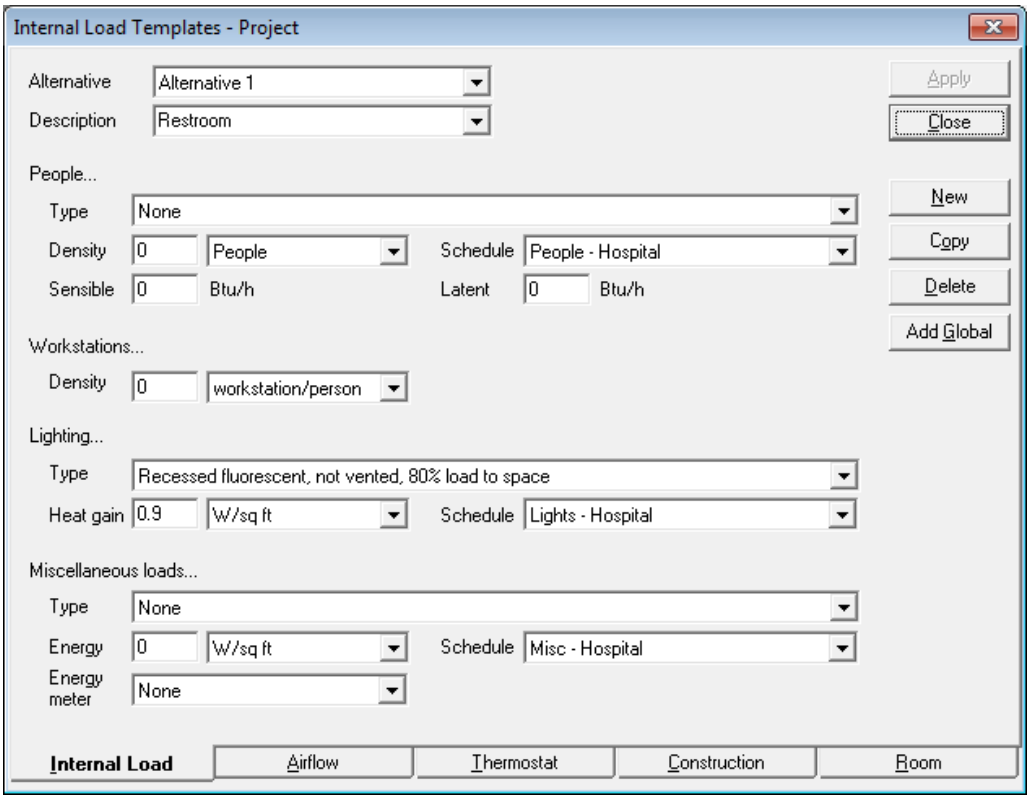

Internal Load Templates - Project
Alternative
Alternative 1
Description
Lounge
Apply
Close
People...
Type
None
Density
40
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
0.8
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
350
W
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

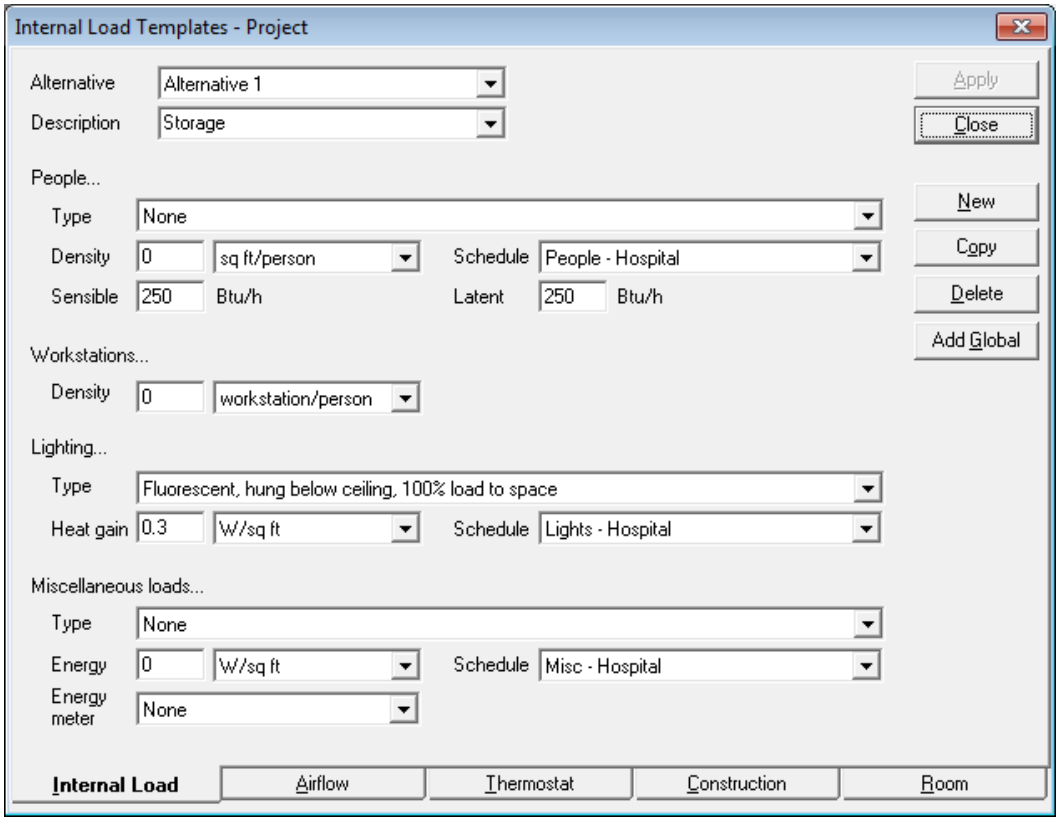

Internal Load Templates - Project
Alternative
Alternative 1
Description
Mech/Elect
Apply
Close
People...
Type
None
Density
0
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Fluorescent, hung below ceiling, 100% load to space
Heat gain
1.5
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
1.5
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

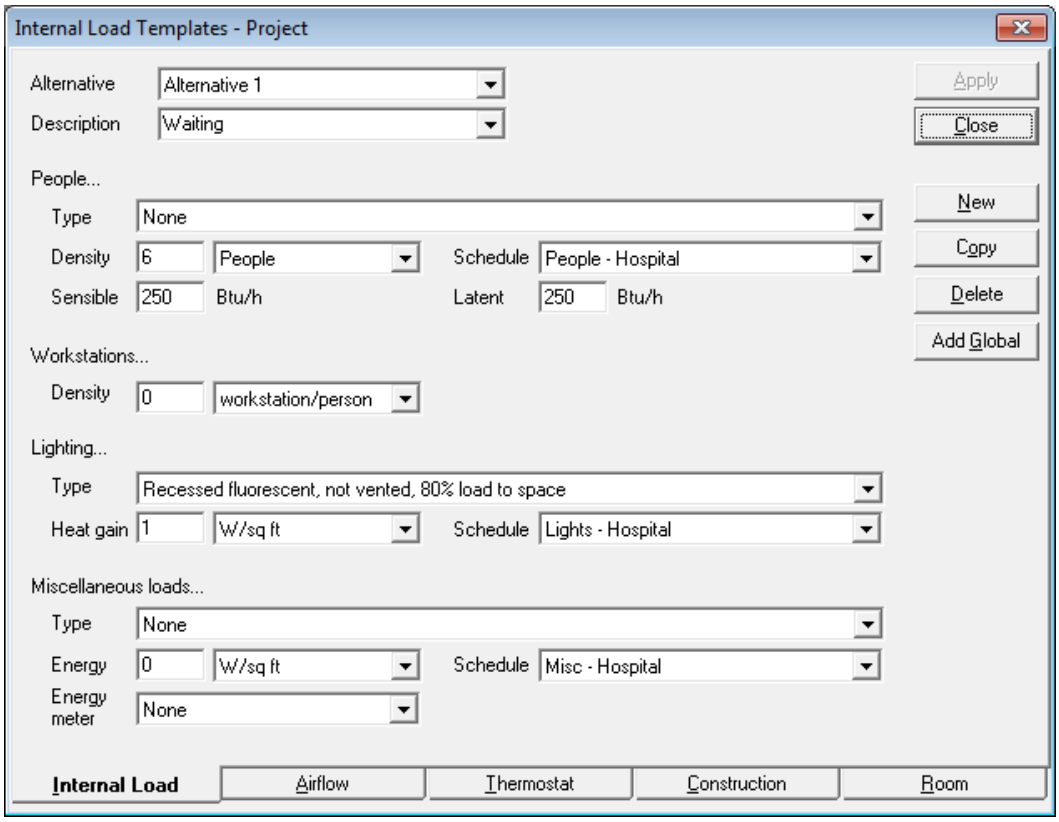

Internal Load Templates - Project
Alternative
Alternative 1
Description
Nurses Station
Apply
Close
People...
Type
None
Density
4
People
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
700
W
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room


Internal Load Templates - Project
Alternative
Alternative 1
Description
Office
Apply
Close
People...
Type
None
Density
200
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstations
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1.1
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
350
W
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

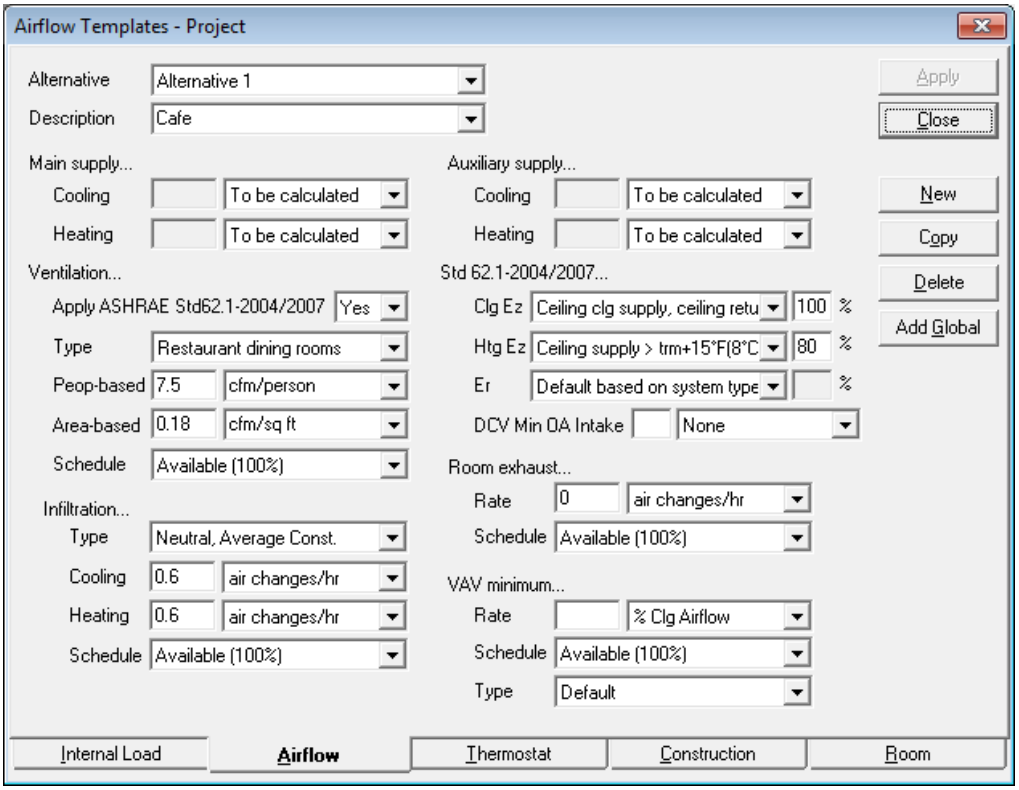

Internal Load Templates - Project
Alternative
Alternative 1
Description
Patient Room
Apply
Close
People...
Type
None
Density
100
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
0.7
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
3
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

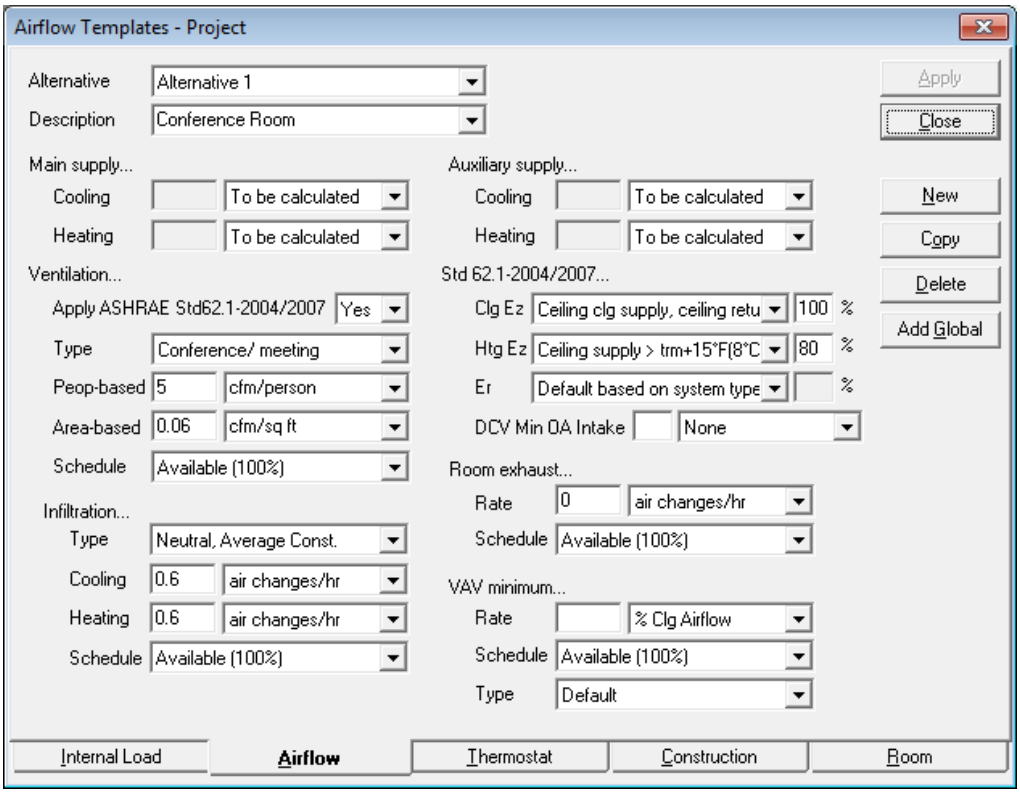

Internal Load Templates - Project
Alternative
Alternative 1
Description
Restroom
Apply
Close
People...
Type
None
Density
0
People
Schedule
People - Hospital
Sensible
0
Btu/h
Latent
0
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
0.9
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
0
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

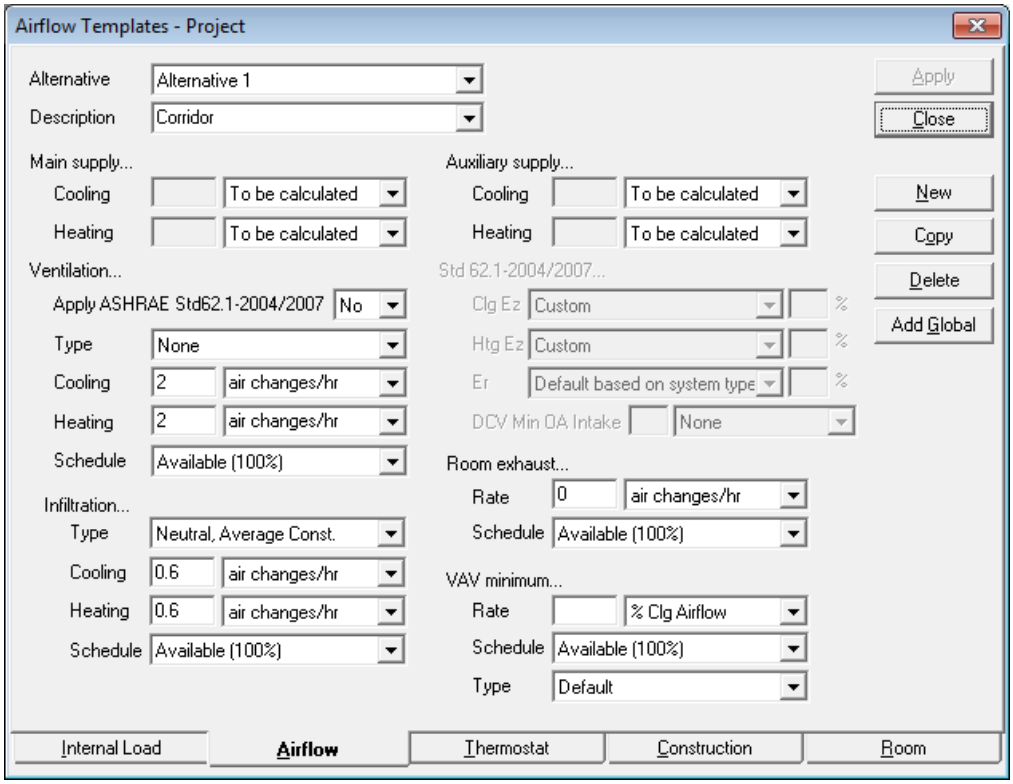

Internal Load Templates - Project
Alternative
Alternative 1
Description
Storage
Apply
Close
People...
Type
None
Density
0
sq ft/person
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Fluorescent, hung below ceiling, 100% load to space
Heat gain
0.3
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
0
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

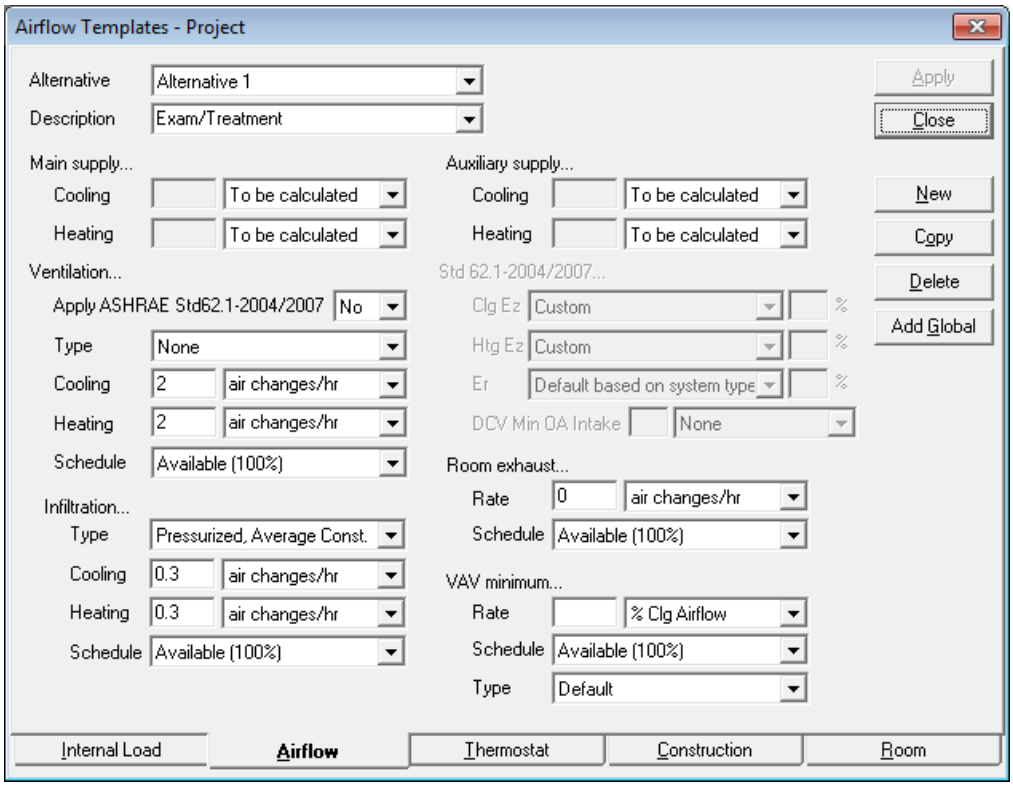

Internal Load Templates - Project
Alternative
Alternative 1
Description
Waiting
Apply
Close
People...
Type
None
Density
6
People
Schedule
People - Hospital
Sensible
250
Btu/h
Latent
250
Btu/h
New
Copy
Delete
Add Global
Workstations...
Density
0
workstation/person
Lighting...
Type
Recessed fluorescent, not vented, 80% load to space
Heat gain
1
W/sq ft
Schedule
Lights - Hospital
Miscellaneous loads...
Type
None
Energy
0
W/sq ft
Schedule
Misc - Hospital
Energy meter
None
Internal Load
Airflow
Thermostat
Construction
Room

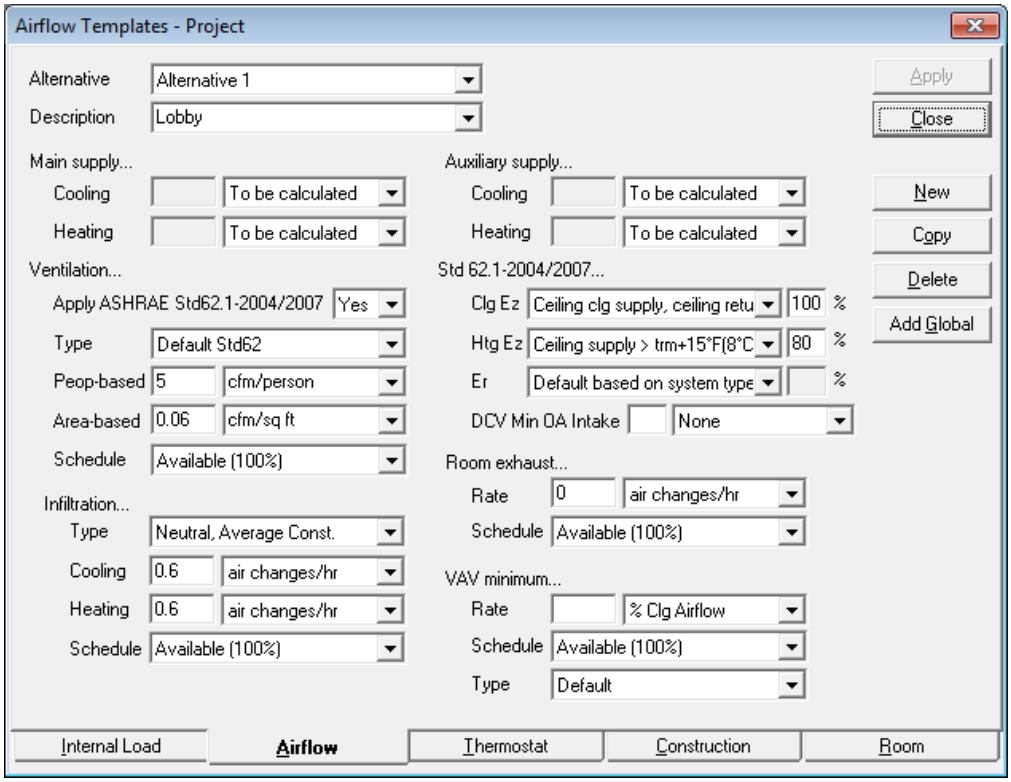
Airflow

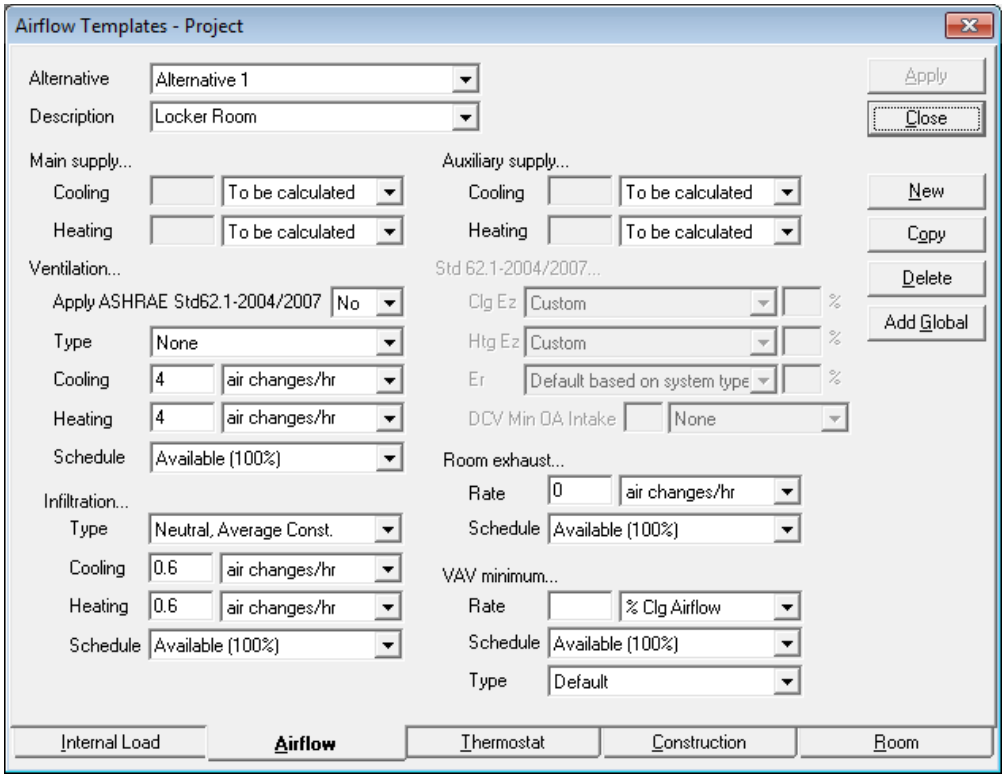

Airflow Templates - Project
Alternative
Alternative 1
Description
Cafe
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Restaurant dining rooms
Peop-based
7.5
cfm/person
Area-based
0.18
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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

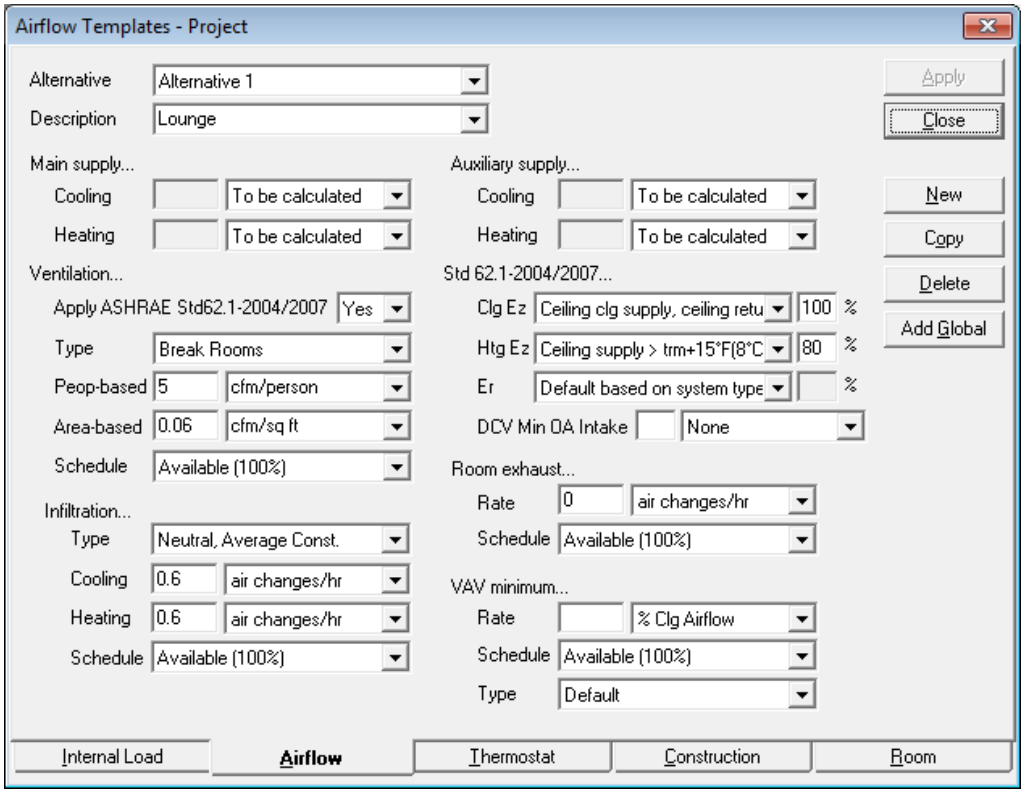

Airflow Templates - Project
Alternative
Alternative 1
Description
Conference Room
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Conference/ meeting
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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

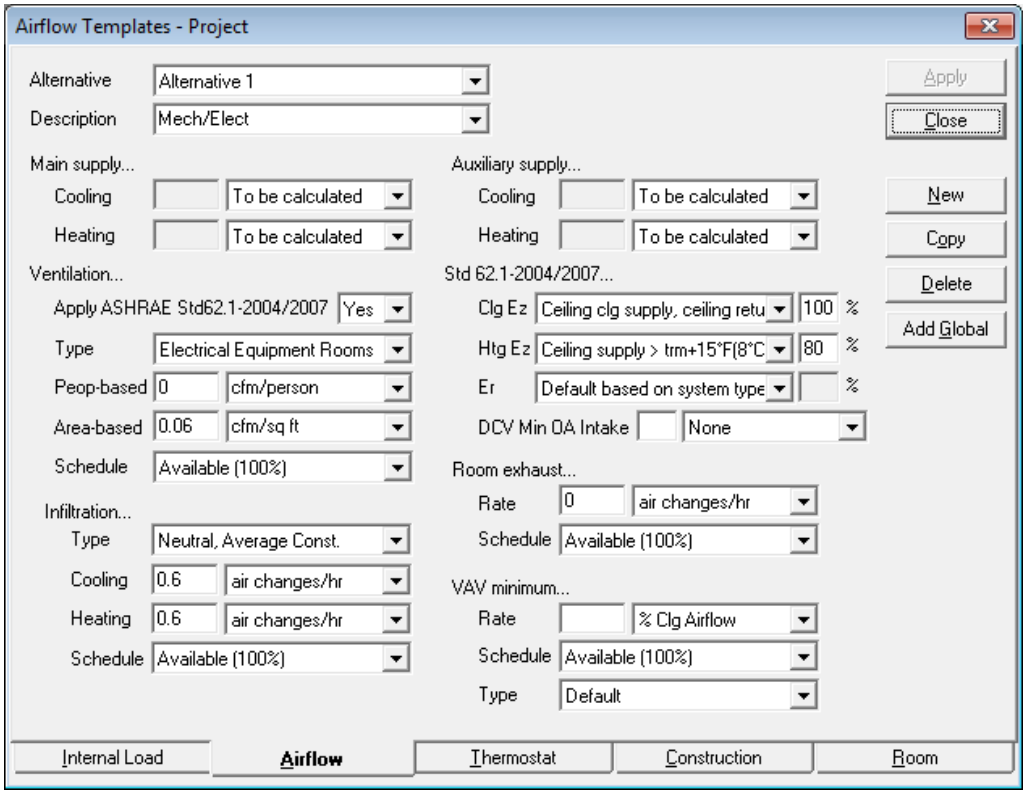

Airflow Templates - Project
Alternative
Alternative 1
Description
Corridor
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
No
Type
None
Cooling
2
air changes/hr
Heating
2
air changes/hr
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Custom
Htg Ez
Custom
Er
Default based on system type
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

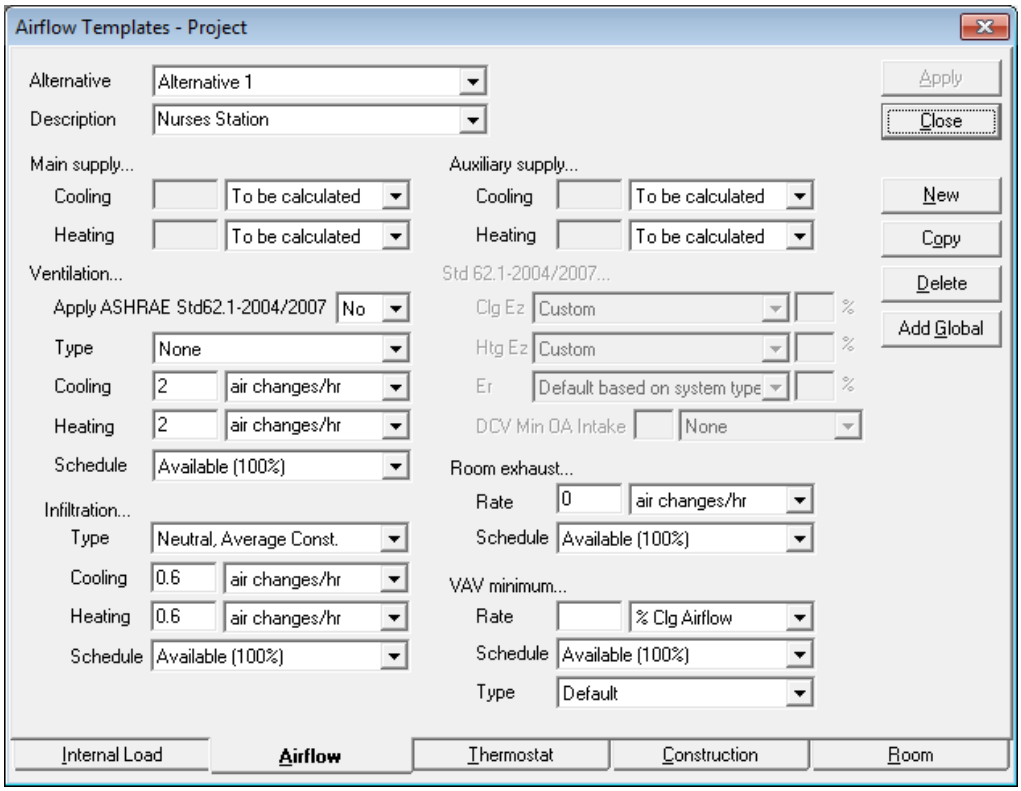

Airflow Templates - Project
Alternative
Alternative 1
Description
Exam/Treatment
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
No
Type
None
Cooling
2
air changes/hr
Heating
2
air changes/hr
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Custom
Htg Ez
Custom
Er
Default based on system type
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
Pressurized, Average Const.
Cooling
0.3
air changes/hr
Heating
0.3
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

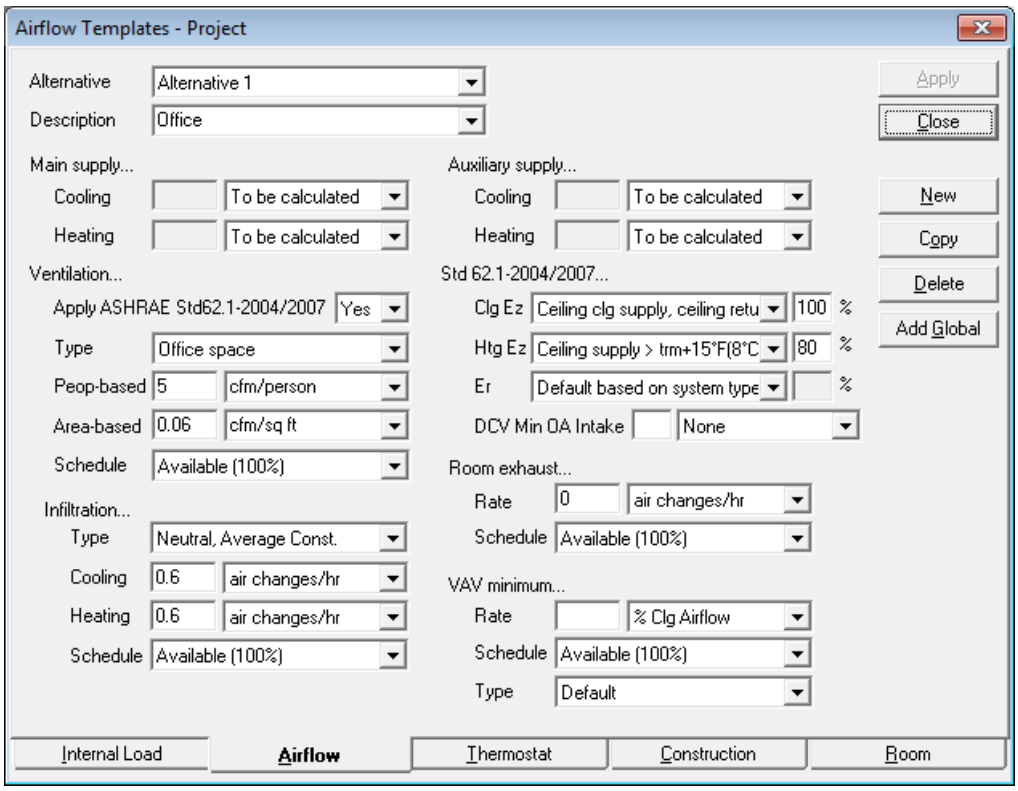

Airflow Templates - Project
Alternative
Alternative 1
Description
Lobby
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Default Std62
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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

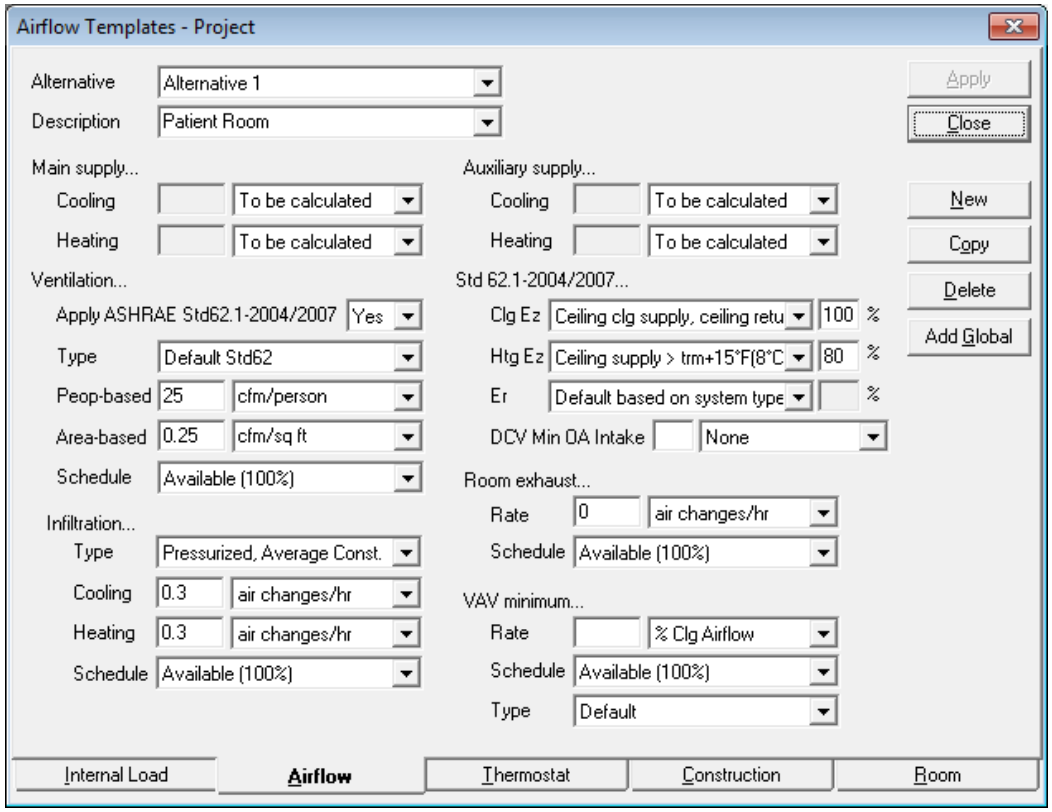

Airflow Templates - Project
Alternative
Alternative 1
Description
Locker Room
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
No
Type
None
Cooling
4
air changes/hr
Heating
4
air changes/hr
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Custom
Htg Ez
Custom
Er
Default based on system type
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

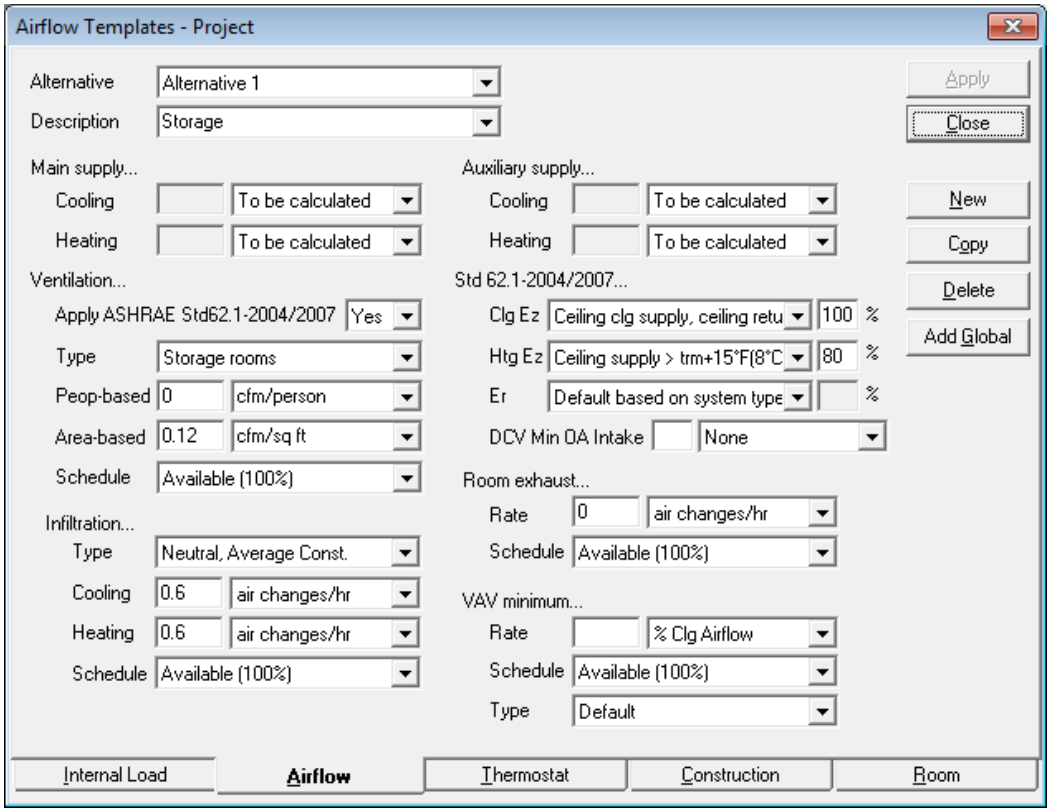

Airflow Templates - Project
Alternative
Alternative 1
Description
Lounge
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Break Rooms
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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room

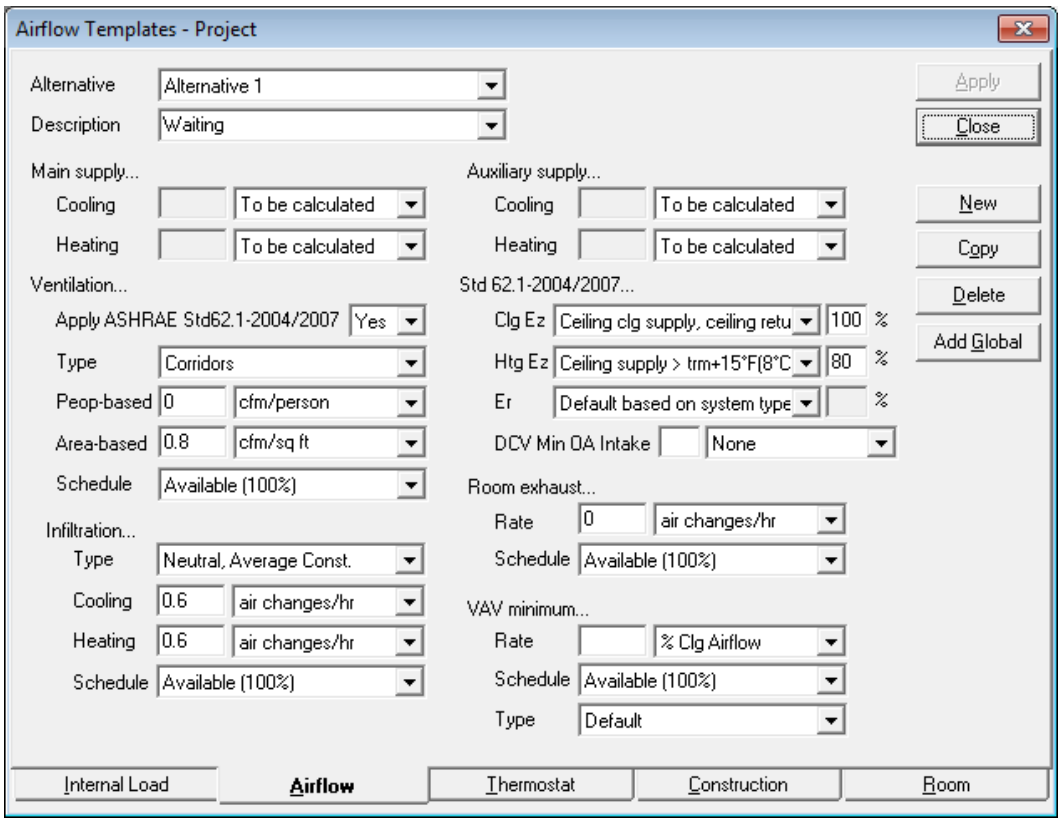

Airflow Templates - Project
Alternative
Alternative 1
Description
Mech/Elect
Apply
Close
Main supply...
Cooling
To be calculated
Heating
To be calculated
Auxiliary supply...
Cooling
To be calculated
Heating
To be calculated
New
Copy
Delete
Add Global
Ventilation...
Apply ASHRAE Std62.1-2004/2007
Yes
Type
Electrical Equipment Rooms
Peop-based
0
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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Nurses Station
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
No
Type
None
Cooling
2
air changes/hr
Heating
2
air changes/hr
Schedule
Available (100%)
Std 62.1-2004/2007...
Clg Ez
Custom
Htg Ez
Custom
Er
Default based on system type
DCV Min OA Intake
None
Room exhaust...
Rate
0
air changes/hr
Schedule
Available (100%)
Infiltration...
Type
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% 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%)
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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Patient 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
25
cfm/person
Area-based
0.25
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
Pressurized, Average Const.
Cooling
0.3
air changes/hr
Heating
0.3
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% 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
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
air changes/hr
Schedule
Available (100%)
VAV minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room


Airflow Templates - Project
Alternative
Alternative 1
Description
Waiting
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
Corridors
Peop-based
0
cfm/person
Area-based
0.8
cfm/sq ft
Schedule
Available (100%)
Infiltration...
Type
Neutral, Average Const.
Cooling
0.6
air changes/hr
Heating
0.6
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 minimum...
Rate
% Clg Airflow
Schedule
Available (100%)
Type
Default
Internal Load
Airflow
Thermostat
Construction
Room