

Technical Assignment 2

Thermal Load Calculations & Energy Analysis



Butler Memorial Hospital | New Inpatient Tower

Butler Healthcare Providers

Butler, PA

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Executive Summary

This report is a compilation of input data, assumptions, and results pertaining to a building energy model performed on the New Inpatient Tower at the Butler Memorial Hospital. In order to perform the energy model Trane Trace 700H software was utilized. The building was broken down into core and perimeter zones in order to alleviate conflicts which occur when doing a room by room analysis.

After extracting numerous pieces of data and information from design documents, a weighted average of all rooms within each zone was computed and the average values were assigned to each zone. Upon completion of the energy model, it has been found that the design cooling load is 491 tons, and the design heating capacity is 7,200 Mbh. This works out to roughly 297 ft²/ton of cooling capacity and 49 Btu/ft².

Upon doing an energy consumption analysis, it was found that the majority of the energy use in the hospital is a direct result of medical equipment and lighting loads which account for 62% of the overall energy consumption within the building. The remaining 38% of the energy consumption is due to mechanical equipment operation within the hospital. It should also be noted that the carbon footprint of the hospital is caused by both on-site combustion in gas fired boilers as well as off-site electric production which produces emissions at the power plant. The following sections will explain in further detail methods in which the analysis was performed as well as more detailed results.

Part 1: Design Load Estimation

Assumptions

Energy Simulation Software

The energy analysis which follows in this report is a direct result of a simulated model performed using Trane Trace 700H. In order to model the simulation, a number of assumptions were made using available data within schedules, historic weather information, and best judgment. A number of design variables were given in the basis of design provided by HGA Engineers and certain values were used.

The Trace model used for this report is a block model which will attempt to accurately depict all of the zones without doing a room by room comparison. When analyzing a block zone, all the interior zones were considered and then the weighted averages were calculated when entering the “block” data. Sample weighted average calculations will be demonstrated later in the report. The following sections will describe the data input into the model, data output, and an analysis of the results.

Design Conditions

The weather data and outdoor conditions were taken from the design data within ASHRAE Fundamentals 2009 and are shown below. Indoor design conditions were taken from the design documents basis of design. The driftpoint was also specified.

Outdoor Design Conditions	
Location	Butler, PA
Summer Dry Bulb (°F)	89
Summer Wet Bulb (°F)	73
Winter Dry Bulb (°F)	2
Summer Clearance #	.97
Winter Clearance #	.97
Summer Reflectance	.2
Winter Reflectance	.2
Carbon Dioxide Level	400

Table 1: Outdoor Design Conditions

Typical Thermostat Parameter		Operating Room Thermostat Parameter	
Cooling Dry Bulb (°F)	75	Cooling Dry Bulb (°F)	60
Heating Dry Bulb (°F)	72	Heating Dry Bulb (°F)	60
Relative Humidity (%)	50	Relative Humidity (%)	50
Cooling Driftpoint (°F)	77	Cooling Driftpoint (°F)	62
Heating Driftpoint (°F)	70	Heating Driftpoint (°F)	58

Auxiliary Settings	
Thermostat Location	Room
Moisture Capacitance	Medium
Humidistat Location	Room

Figure 1: Indoor Design Conditions

Airflow

Airflow design was taken directly off of the design documents and then averaged to find the appropriate ventilation air designated to each zone. Chart found in Appendix B.

Infiltration

It was assumed that the building is pressurized and built using average construction techniques; therefore the infiltration rate is 0.3 air changes/hr.

Building Construction

Building U-values were taken directly from the basis of design performed by HGA Engineering and utilized for the purpose of the energy simulation.

Construction Type		
Type	Construction	U-Value
Slab	4" LW Concrete	0.2
Roof	Thermoplastic Membrane W/ Insulation	0.06
Walls	6" Steel Stud W/ Insulation and Brick	0.1
Glass	Low e Tinted Glass (Shading Co = 0.28)	0.26

Figure 2: Construction Materials

Wall Heights	
Walls	9'
Floor to Floor	14.75'
Plenum	5.75'

Figure 3: Wall Heights

Energy Simulation Block Zones

The block load model used to project the energy consumption of the New Inpatient Tower was set to alleviate tedious configuration which is necessary if the analysis is performed on a room by room basis. The block load approach has broken up the building into the seven different floors. Within each floor there are core and perimeter zones. The perimeter zones are further broken down into North, South, East, and West zones. This is to account for solar gain due to windows facing in different directions. It should be noted that AHU-6, 7, & 8 which all serve single rooms were excluded from the analysis due to their negligible impact.

The following figures identify each zone within the building:

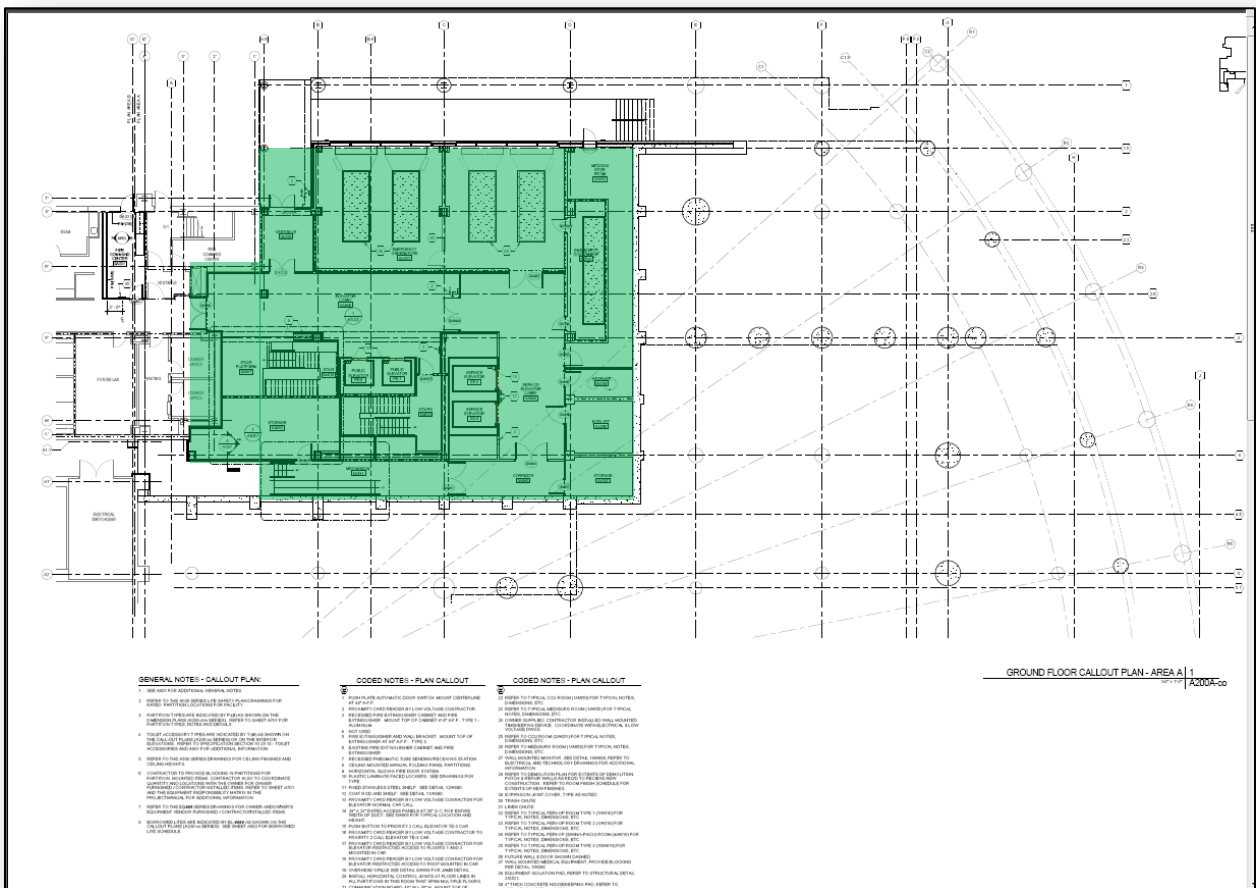



Figure 4: Ground Floor Block Zones

= Core Zone



Figure 5: First Floor Block Zones

 = Core Zone

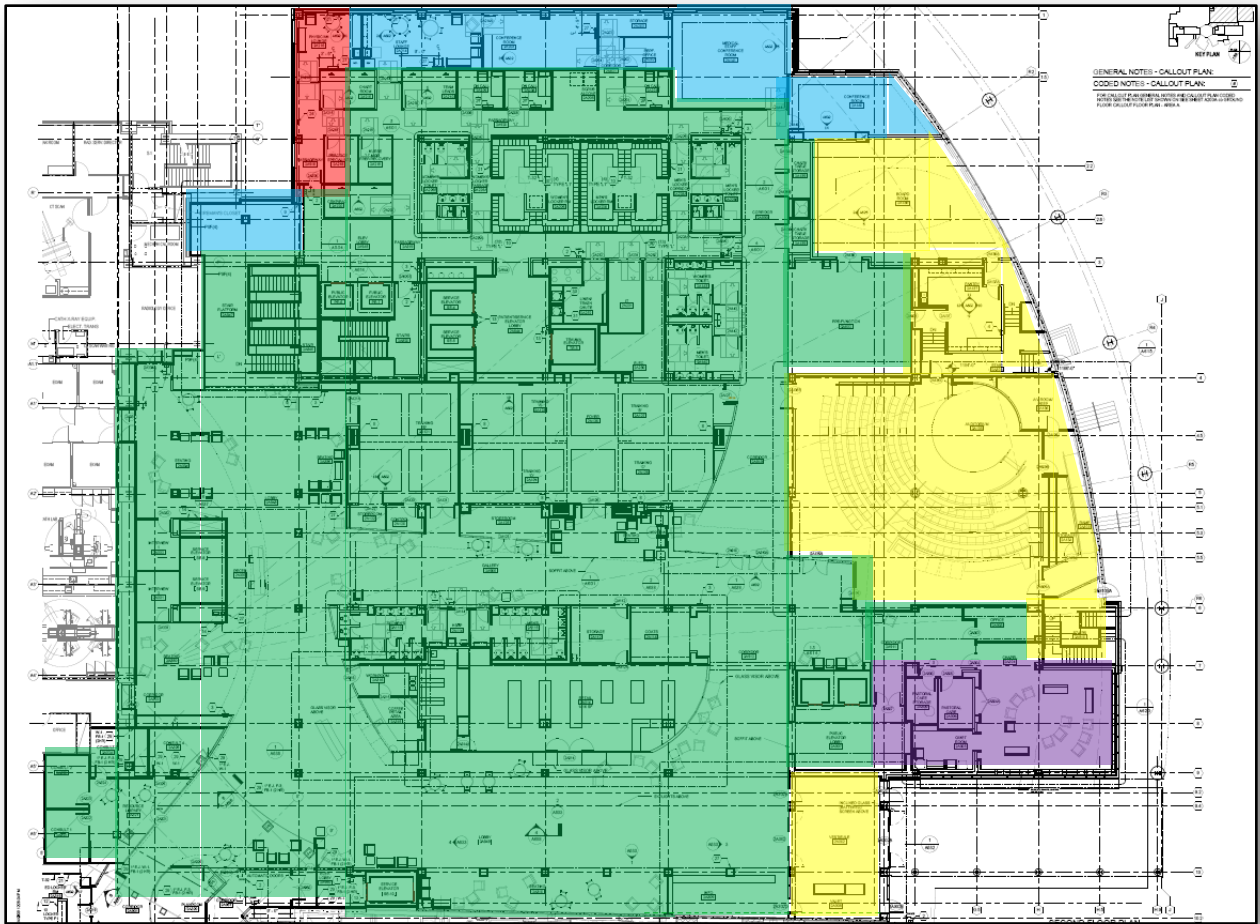







Figure 6: Second Floor Block Zones

-  = Core Zone
-  = Perimeter North
-  = Perimeter South
-  = Perimeter East
-  = Perimeter West

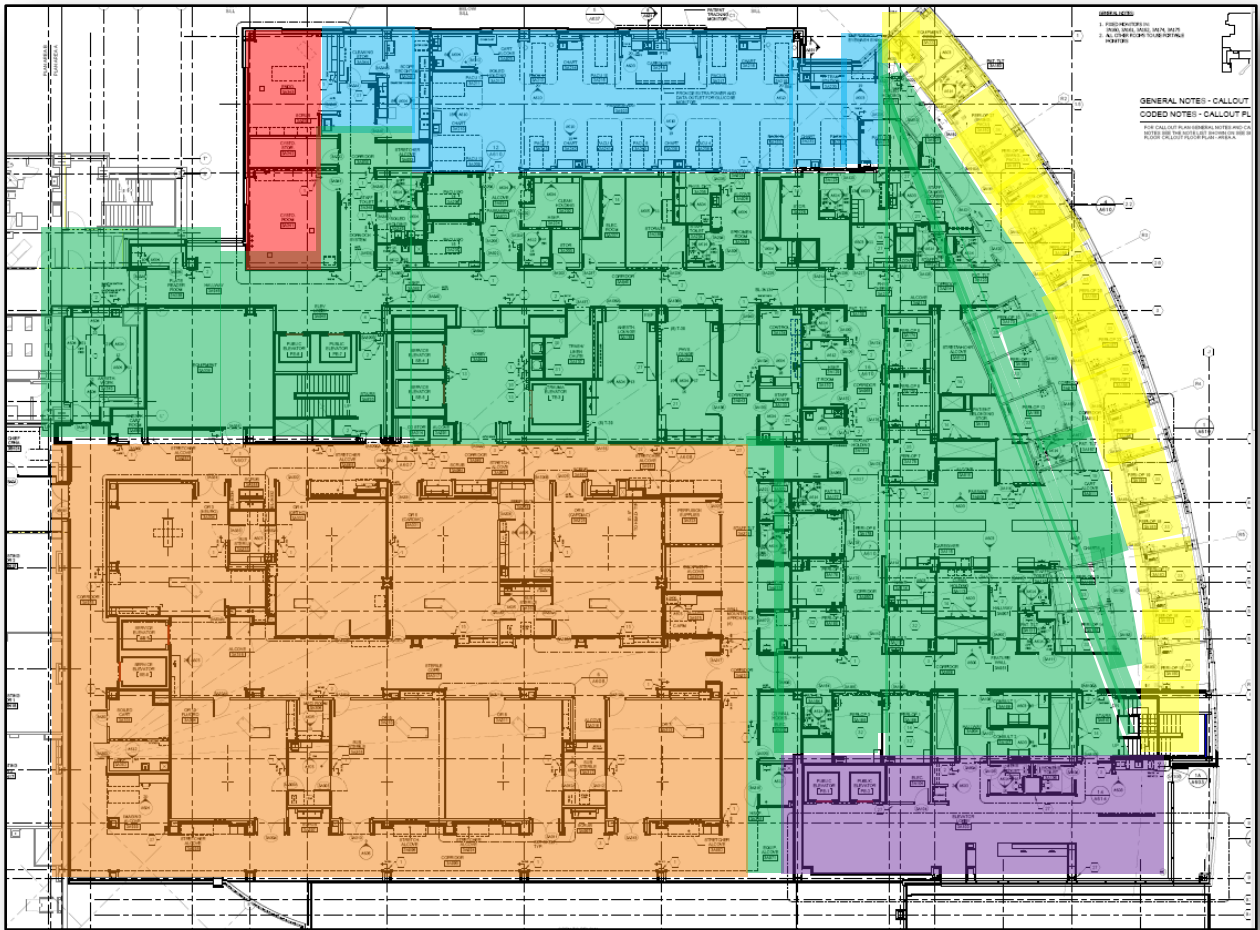








Figure 7: Third Floor Block Zones

-  = Core Zone
-  = Perimeter North
-  = Perimeter South
-  = Perimeter East
-  = Perimeter West
-  = Core Operating Rooms

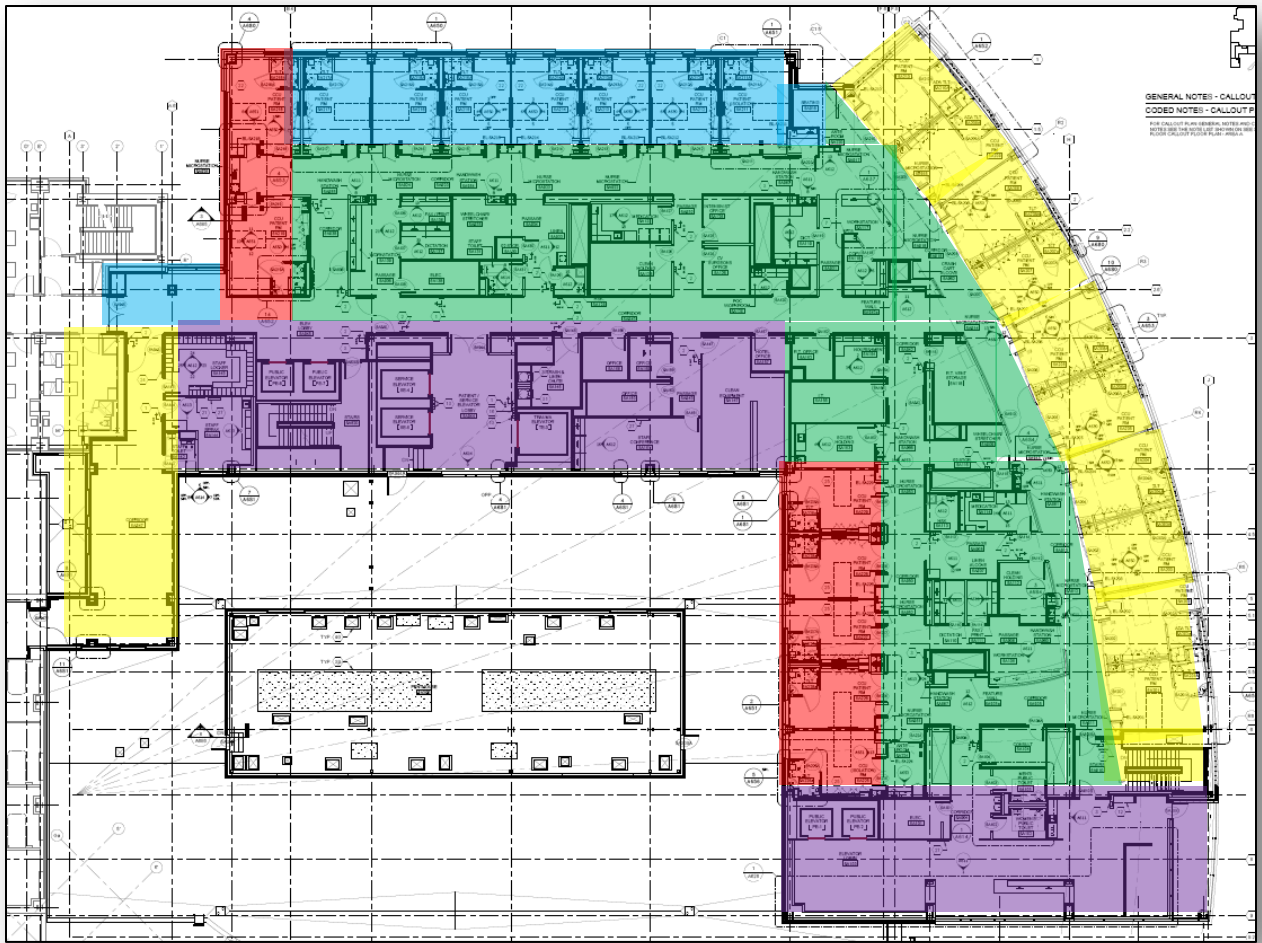







Figure 8: Typical Fifth, Sixth, & Seventh Floor Block Zones

-  = Core Zone
-  = Perimeter North
-  = Perimeter South
-  = Perimeter East
-  = Perimeter West

The individual rooms were broken down into block loads by using the room schedule. Below is a sample schedule depicting how the second floor rooms were broken up into blocks. Please note that all rooms and corresponding blocks were properly correlated and the results are displayed in Appendix B.

BUTLER MEMORIAL HOSPITAL													
INPATIENT TOWER ADDITION & RENOVATION - SECOND FLOOR													
Thermal Load Zones													
ROOM NO.	ROOM NAME	ZONE	FACE	TYPE	ROOM DATA		OA CFM	OA ACH	ACH	SUPPLY	RETURN	EXHAUST	
					AREA	PEOPLE	MIN	ACTUAL	ACTUAL	TOTAL	TOTAL	TOTAL	
2A112	STORAGE	Core		Corridor	198	0	---	59	2	7	180	180	
2A113	WOMEN'S	Core		Restroom	280	0	375	500	4	13	500		500
2A124	TRAINING 'D'	Core		Office	388	19	285	297	4	13	900	900	
2A126	FOYER	Core		Corridor	320	0	16	231	4	13	700	700	
2A127	TRAINING 'B'	Core		Office	379	19	285	297	4	14	900	900	
2A128	TRAINING 'C'	Core		Office	351	18	270	297	5	15	900	900	
2A135	AUDITORIUM	Ext	North	Conference	3077	159	795	1434	3	8	4345	4345	
2A136	A/V ROOM/PREP	Ext	North	Mechanical	178	1	20	56	2	7	170	170	
2A137	PANTRY	Ext	North	Corridor	304	1	20	165	4	12	500	500	
2A138	BOARD ROOM	Ext	North	Conference	1186	32	480	535	3	9	1620	1620	
2A140	CONFERENCE ROOM	Ext	West	Conference	463	16	320	353	5	14	1070	1070	
2A141	MEDICAL STAFF CONFERENCE ROOM	Ext	West	Conference	661	16	320	353	3	10	1070	1070	
2A142	MEN'S	Core		Restroom	214		225	430	5	14	430		430
2A143	WOMEN'S	Core		Restroom	212		225	430	5	14	430		430
2A201	ON CALL	Core		Office	98	1	20	33	3	8	100	100	
2A202	PERF. OFFICE	Core		Office	86	1	20	33	3	9	100	100	
2A203	STORAGE	Ext	West	Corridor	95	0	---	33	3	8	100	100	
2A204	CONFERENCE ROOM	Ext	West	Conference	372	16	240	248	4	13	750	750	
2A205	SCRUB ALCOVE	Core		Corridor	102	1	20	33	2	7	100	100	

Table 2: Example Zone Breakout from Room Schedule

Referencing **Table 2** above, green highlighted cells correspond to core zones, yellow to north perimeter zones, and blue corresponds to west perimeter zones. It should be noted that the colors are coordinated between the plan view of the room layouts (**Figures 4 – 8**) and the room schedule zone breakout shown in **Table 2** and **Appendix B**.

Block Load Zones	
Ground Floor - Core	Fifth Floor - North
First Floor - Core	Fifth Floor - South
Second Floor - Core	Fifth Floor - East
Second Floor - North	Fifth Floor - West
Second Floor - South	Sixth Floor - Core
Second Floor - East	Sixth Floor - North
Second Floor - West	Sixth Floor - South
Third Floor - Core	Sixth Floor - East
Third Floor - North	Sixth Floor - West
Third Floor - South	Seventh Floor - Core
Third Floor - East	Seventh Floor - North
Third Floor - West	Seventh Floor - South
Third Floor - Operating Rooms	Seventh Floor - East
Fifth Floor - Core	Seventh Floor - West

Figure 9: Summary of Block Zones

To the right is a list of all the different zones that were used within the Trane Trace model. A list of rooms within each zone can be found in Appendix B, as previously mentioned.

When performing block load calculations it is imperative that each room within the block is accounted for to ensure that any critical loads are not overlooked. To ensure that each zone is well representative of their rooms within, a weighted average of every room and their respective loads has been calculated. The weighted average of all the rooms within the zone was used in the final zone calculation. An example of how this procedure was performed is shown below:

Second Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	6502	0.24	3	1.20	0.28	1.00	0.24
Lobby	13336	0.49	70	1.80	0.88	1.00	0.49
Mechanical	262	0.01	0	1.40	0.01	25.00	0.24
Office	4713	0.17	101	1.70	0.29	2.00	0.34
Restroom	2620	0.10	0	1.10	0.11	0.00	0.00
	27433		174		1.57		1.31

Table 3: Example Calculation of Weighted Zone Calculation Method

In the above example, the following values were placed into the model for the Second Floor-Core. Referencing **Table 3** above, the number of people in the zone was entered as 174, lighting load entered as 1.57 W/sqft, and equipment load entered as 1.31 W/sqft. The overall size of the zone is also shown and was entered as 27,433 sqft. All values were calculated for each zone and are shown in Appendix C.

Similarly, each perimeter zone within the building has an exterior wall and glazing, which needs to be taken into account for the envelope loads when doing the thermal load model. In order to determine the exterior wall and glazing area of each perimeter zone, a calculation was performed combining all the rooms within each zone. A sample calculation for the Second Floor - Perimeter zones are shown in **Table 4**. A compilation of all exterior walls for various zones can be found in **Appendix D**.

Second Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	238	14.75	3510.5	59	8	472
South	44	14.75	649	12	6	72
East	55	14.75	811.25	53	2	106
West	154	14.75	2271.5	72	6	432
			7242.25			1082

Table 4: Example Calculation of Window and Wall Areas

Energy Simulation Systems

When modeling the New Inpatient Tower at the Butler Memorial Hospital, only the (5) main air handlers were modeled. The remaining air handlers, units 6, 7, & 8 all serve mechanical rooms and were neglected from the overall building energy model. AHU-1, 2, & 3 serve the majority of the hospital and are coupled together, enabling each air handler to supply every room if called upon. AHU-4 & 5 serve the operating rooms and are also coupled together. Due to the nature of the systems being coupled, a detailed breakdown of each zone and the corresponding air handler, as modeled in Trane Trace is shown in **Table 5**.

Zone vs. Air Handler	
Zone	Air Handler
Ground Floor - Core	AHU-1
First Floor - Core	AHU-1
Second Floor (All)	AHU-1
Third Floor (All except OR)	AHU-2
Fifth Floor (All)	AHU-2
Sixth Floor (All)	AHU-3
Seventh Floor (All)	AHU-3
Third Floor OR # 1	AHU-4
Third Floor OR # 2	AHU-5

When modeling the operating rooms, the zone was split into 2 sub-zones. Each sub-zone corresponds to a different air handler; either AHU-4 or AHU-5. The sub-zones are exactly half of the area of the overall zone and are therefore identical except when comparing the air handler which serves them.

Table 5: Zone and Corresponding Air Handler

Trane Trace Results vs. Design

Ventilation and Cooling Capacity Comparison

Air Handler Loads					
Air Handler	Zones Served	(cfm) Ventilation	(cfm) Supply	(ton) Cooling	(Mbh) Heating
AHU-1	Ground - 2nd Floor	12,604	38,193	143	2,464
AHU-2	3rd & 5th Floor	12,534	37,982	142	2,160
AHU-3	6th & 7th Floor	10,321	31,277	122	1,864
AHU-4	Operating # 1	4,621	14,002	42	317
AHU-5	Operating # 2	4,621	14,002	42	317
		44,700	135,456	491	7,122

Table 6: Air Handler Capacity

Due to the fact that loads were not assigned to each air handler within the building design or schedule, the Trane Trace model was compared to the design calculations using a whole building approach. The results of the comparison can be seen in **Table 7** below.

Energy Model vs. Design Comparison			
Data Compared	Trace Energy Model	Design Data	% Difference
Building Area (sqft)	146,095	196,254	-0.26
Ventilation Air (cfm)	44,700	53,812	-0.17
Ventilation Air (cfm/sqft)	0.31	0.27	0.12
Supply Air (cfm)	135,456	153,848	-0.12
Supply Air (cfm/sqft)	0.93	0.78	0.18
Cooling Capacity (tons)	491	725	-0.32
Cooling Capacity (sqft/ton)	297.55	270.70	0.10
Heating Capacity (Mbh)	7,122	12,000	-0.41
Heating Capacity (Btu/sqft)	48.75	61.15	-0.20

Table 7: Energy Model vs. Design

The Trane Trace model varies from the design calculations in most instances; however, the only drastic difference deals with the heating load. Due to the fact that the Trane Trace model neglected rooms with negligible impact, stairwells, elevator shafts, etc., the Trane Trace model was significantly less square footage than the actual design data. Because of this, even though the cooling and heating capacity of the Trace model were low, when we compare the two on a square foot basis the differences are not as noticeable. The heating value of the Trace model was calculated at 7,122 Mbh at peak load, compared to designed value of 12,000 Mbh at peak load. The reason for the drastic differences in peak

load is not clear. After many approaches were made to determine the discrepancy, it is understood that the designers assumed that the peak heating load would occur with 100% outdoor air supplying the rooms. This is not the case within the building, due to the VAV system only requiring, at most, 33% outside air. Why the designer's model was done in such manner is not clear.

Part 2: Energy and Operating Costs

Energy Consumption Summary

After developing and fine tuning a Trane Trace model to develop heating and cooling loads within the New Inpatient Tower, Trace was then utilized to account for total building energy consumption and operating costs. The following sections will analyze and breakdown the energy consumption and economic impact of the hospital addition.

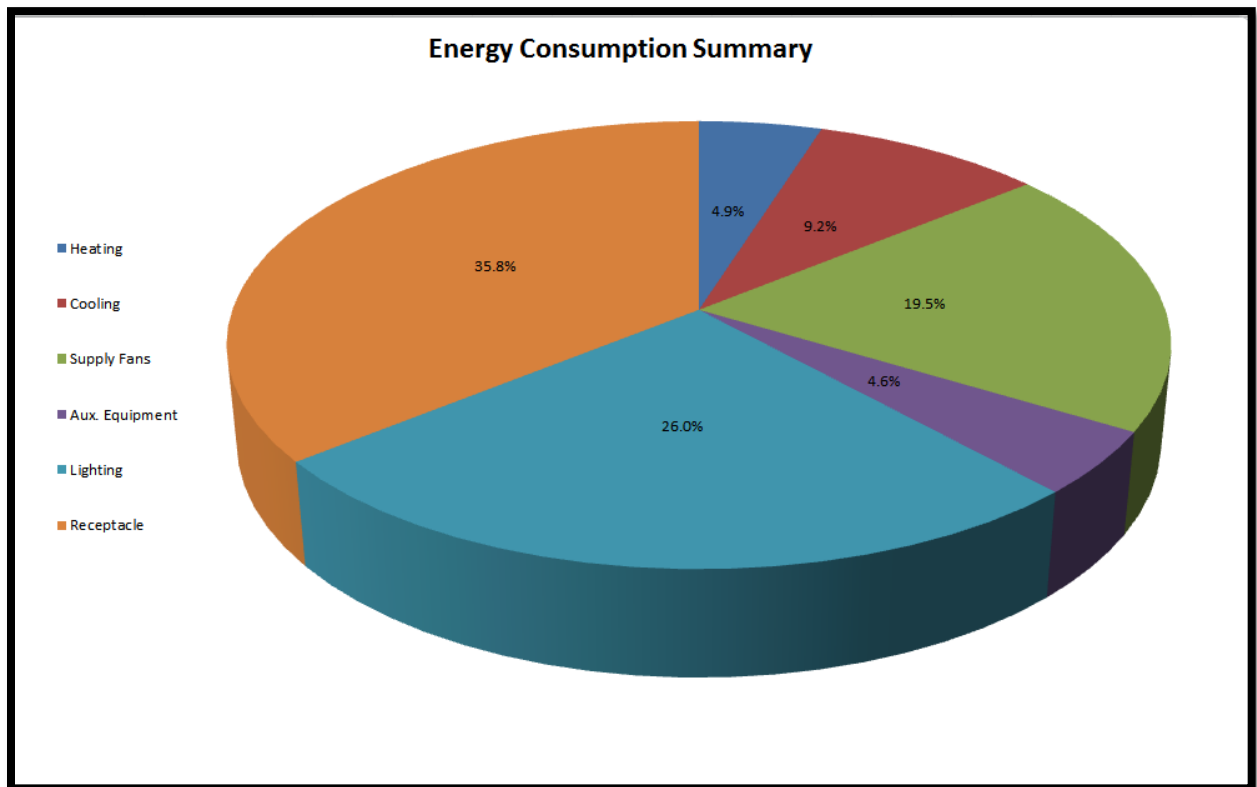


Figure 10: Energy Consumption Summary

Figure 10 clearly displays the energy consumption breakout for the different loads within the building. As seen in the pie chart, the bulk of the energy consumption is due to lighting and receptacle loads. Since this is a hospital which requires extensive amounts of medical equipment and proper lighting twenty four hours a day seven days a week, it is appropriate to assume these values are fairly accurate. The cooling load is higher than the heating load which is also expected. A further breakdown of the actual amount of energy used for each process will follow.

Equipment Energy Consumption			
Type	Energy (10 ⁶ Btu/yr)	Cost	Cost/sqft
Lights	6,751	\$79,954	\$0.55
Heating	1,274	\$7,611	\$0.05
Cooling	18,000	\$21,318	\$0.15
Pumps	703	\$8,326	\$0.06
Heat Rejection	211	\$2,499	\$0.02
Fans	5,054	\$59,856	\$0.41
Receptacles	9,305	\$110,202	\$0.75

Figure 11: Equipment Energy Consumption

Energy Cost				
Type	Energy (10 ⁶ Btu/yr)	Unit Cost	Cost (\$/yr)	Cost (\$/sqft)
On Peak Elec.	11,171	10.00 \$/KW	\$163,924	
Off Peak Elec.	13,672	5.00 \$/KW	\$120,378	
Total Electricity	24,844		\$284,301	\$1.95
Gas	1,093	0.50\$/Therm	\$5,468	\$0.04
	25,937		\$289,769	\$1.98
Type	Energy (1000gal/yr)		Cost (\$/yr)	Cost (\$/sqft)
Water	2,072	1.00 \$/1000gal	\$2,072.00	\$0.01
			\$291,841.00	\$2.00

Figure 12: Energy Cost Including Make-up Water

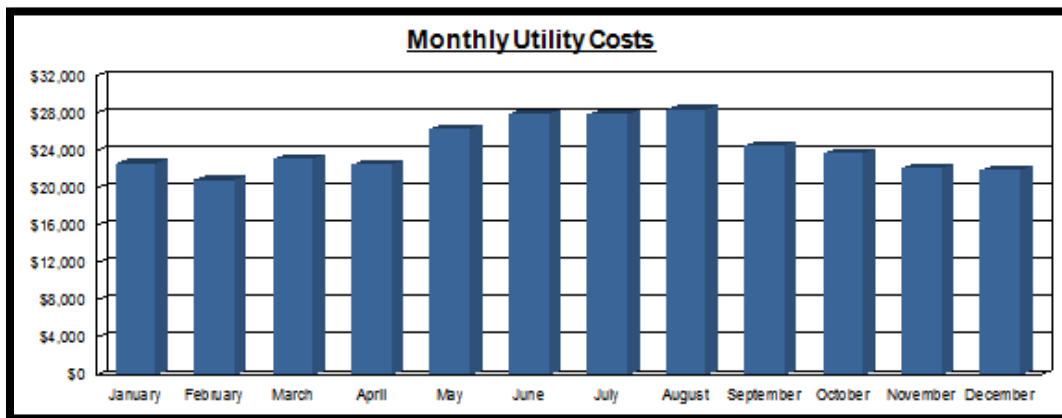


Figure 13: Monthly Energy Consumption

An energy analysis was not done on the New Inpatient Tower when the building was designed. The reason that an energy analysis was not done is due to the fact that the addition is not a LEED certified building, and to perform energy analysis adds extra costs which the owners and engineers did not desire to support. The owners were also unwilling to supply information regarding utility bills. For these reasons there is not any way to compare the Trane Trace model results with actual energy consumption. **Figure 14** shows the monthly electric consumption with the different equipment types broken out. It should be noted that Misc Equip. refers to receptacle loads within the hospital.

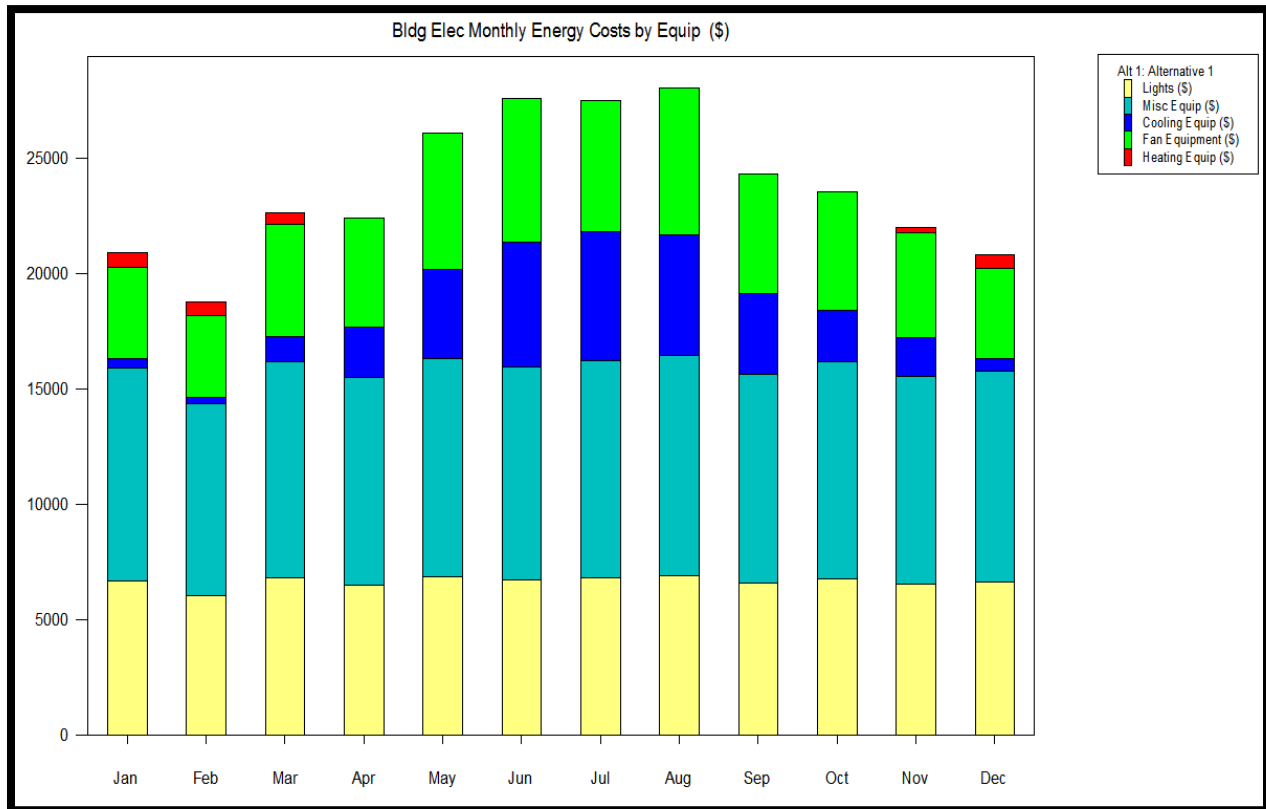


Figure 14: Monthly Electric Costs

As **Figure 14** depicts, the receptacle and lighting loads are fairly constant throughout the year. This is due to the fact that these loads are not seasonal. There should be a constant lighting and equipment load regardless of the outside temperature. Below, in **Figure 15** there is a breakout of the cooling energy utilized. The graph depicts the amount of energy that each cooling component uses, as well as the profile variation on a monthly basis. **Figure 16** represents the amount of make-up water that must be supplied due to evaporation and drift in the cooling tower. Due to increased solar heat gain and envelope loads, cooling equipment load is highest during summer months. Since the chillers are running more often in the summer, make-up water for cooling towers also increases.

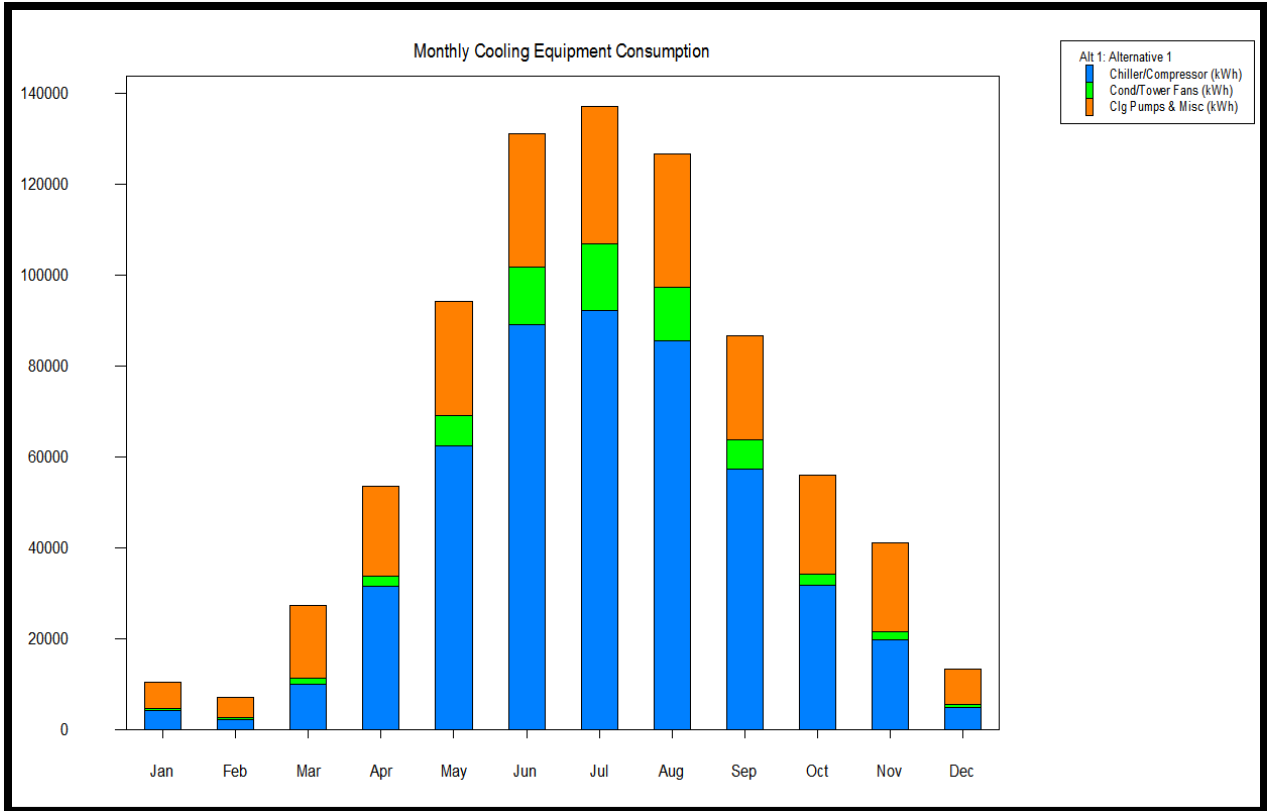


Figure 15: Monthly Cooling Energy

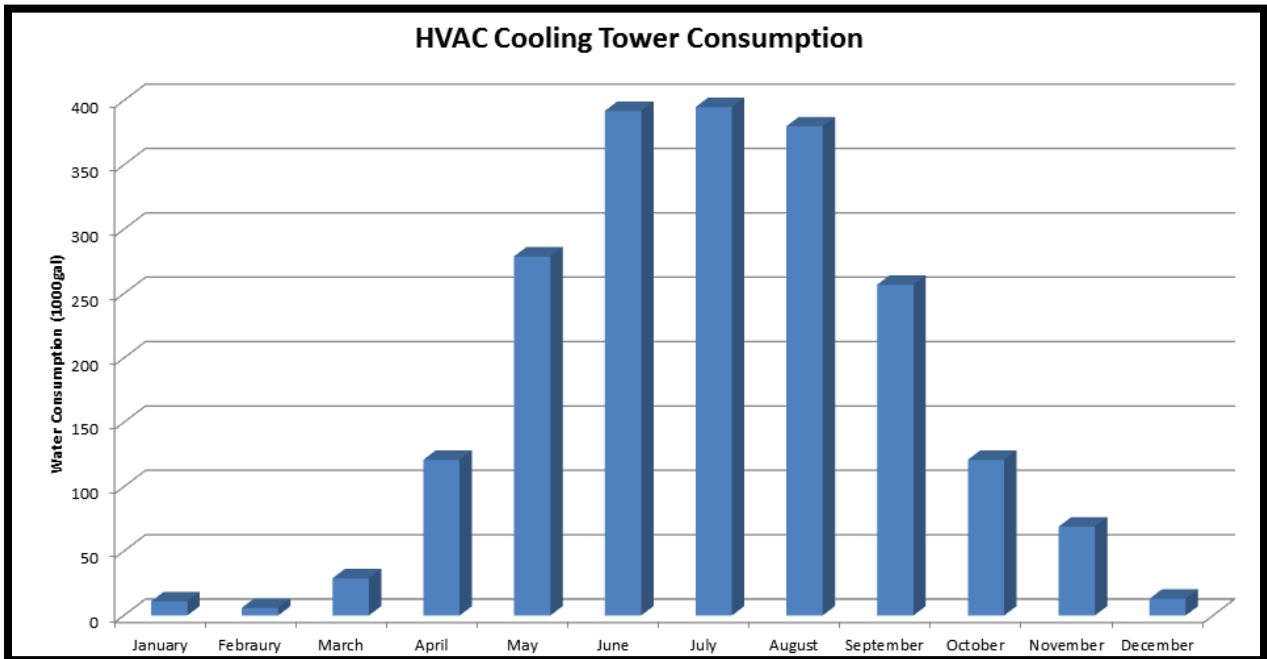


Figure 16: HVAC Water Consumption

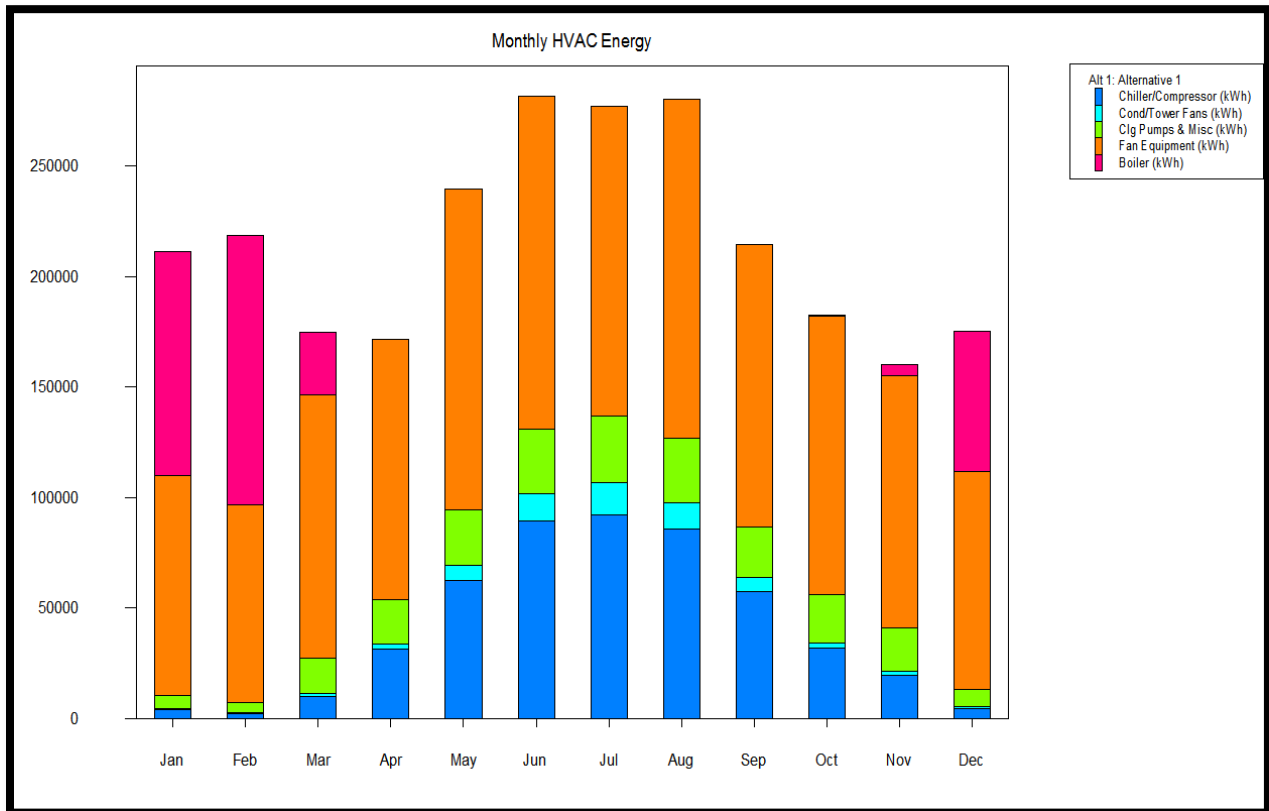


Figure 17: Monthly Analysis of HVAC Energy Usage

Figure 17 is a chart depicting the overall amount of energy consumed throughout the year by the HVAC equipment. Chiller and cooling tower loads are highest during summer months. The boiler is utilized primarily in the winter months in order to provide heating to meet loads due infiltration, conduction, and ventilation air. Supply fan energy remains fairly constant through the year although increases marginally in the summer months.

Emissions

The emissions from energy use within the New Inpatient Tower were estimated using emission factors from the Regional Grid Emission Factors 2007 database. Since Butler, Pennsylvania is within the RFC region and the Eastern Interconnection in **Figure 18**, when analyzing emission rate factors, the Eastern zone data was used.

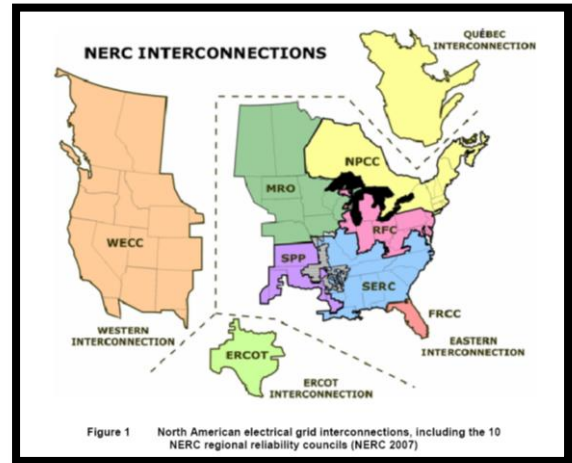


Figure 18: NERC Interconnections

Pollutant	Annual Emission				Total (lb/yr)
	Delivered Electricity		On-Site Combustion		
	(lb pol./KWh Elec.)	lb Pollutant/yr	(lb pol./1000ft ³ Nat. Gas)	lb Pollutant/yr	
CO ₂	1.64	11,942,112.6	122	133,407,000.0	145,349,112.6
CH ₄	0.00359	26,141.6	0.0025	2,733.8	28,875.3
N ₂ O	0.0000387	281.8	0.0025	2,733.8	3,015.6
NO _x	0.003	21,845.3	0.111	121,378.5	143,223.8
SO _x	0.00857	62,404.8	0.000632	691.1	63,095.9
CO	0.000854	6,218.6	0.0933	102,023.6	108,242.2
TNMOC	0.0000726	528.7			528.7
VOC			0.00613	6,703.2	6,703.2
Lead	0.000000139	1.0	0.0000005	0.5	1.6
Mercury	3.36E-08	0.2	0.00000026	0.3	0.5
PM10	0.0000926	674.3	0.0084	9,185.4	9,859.7
Solid Waste	0.205	1,492,764.1			1,492,764.1

Table 8: Annual Emissions

Summary

As noted in previous sections, the overall cooling load within the hospital addition is roughly 491 tons on a design day and 297 ft²/ton. The design heating load is roughly 7,200 Mbh and 49 btu/ft². This analysis appears quite accurate although it differs from design documents. Unaccounted for heating loads could be due to the use of radiant finned ceilings and flooring in the perimeter zones which was not able to be modeled using Trane Trace.

Over 60% of the energy consumption within the hospital addition is due to lighting and receptacle loads while the remainder is a direct effect of the mechanical equipment. After analyzing many of the features within the hospital addition, it is becoming more apparent that an energy efficient design was sacrificed for redundancy and reliability. The hospital also shows great potential for the possible use of heat recovery from exhaust vents which were not taken advantage of in the original design.

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APPENDIX B

Room-Zone Breakout Schedule

BUTLER MEMORIAL HOSPITAL												
INPATIENT TOWER ADDITION & RENOVATION - GROUND FLOOR												
Thermal Load Zones												
ROOM NO.	ROOM NAME	ZONE	Type	ROOM DATA		OA CFM	OA CFM	OA ACH	ACH	SUPPLY CFM TOTAL	RETURN CFM TOTAL	EXHAUST CFM TOTAL
				AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL			
0A333	MED/GAS STORAGE ROOM	Core	Mechanical	186	N/A	9.3	132	5.0	17.1	400		450
0A334	EMERGENCY DISCONNECT	Core	Mechanical	285	N/A	14.25	139	2.1	6.3	420	420	
0A335	STORAGE	Core	Corridor	104	N/A	5.2	33	2.2	6.8	100	100	
0A337	STORAGE	Core	Corridor	146	N/A	7.3	40	1.9	5.8	120	120	
0A940	CORRIDOR	Core	Corridor	227	N/A	11.35	50	1.5	4.7	150	150	
0A941	MECHANICAL CORRIDOR	Core	Corridor	657	N/A	33	112	0.7	2.2	340	340	
0A942	STORAGE	Core	Corridor	446	N/A	22.3	201	3.2	9.7	610	610	
0A944	ELEVATOR LOBBY	Core	Corridor	807	N/A	40.35	158	1.4	4.2	480	480	
0A946	ELEVATOR LOBBY	Core	Corridor	993	N/A	49.65	403	2.9	8.7	1220	1220	

BUTLER MEMORIAL HOSPITAL												
INPATIENT TOWER ADDITION & RENOVATION - FIRST FLOOR												
Thermal Load Zones												
ROOM NO.	ROOM NAME	ZONE	TYPE	ROOM DATA		OA CFM	OA CFM	OA ACH	ACH	SUPPLY CFM TOTAL	RETURN CFM TOTAL	EXHAUST CFM TOTAL
				AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL			
1A101	TOILET	Core	Restroom	60	1		120	---	15			120
1A102	STERILE STORAGE	Core	Corridor	1869	0	94	1010	4	11	3060	3060	
1A103	DECASING	Core	Office	159	2	40	40	2	6	120	120	
1A104	OFFICE	Core	Office	115	1	20	33	2	7	100	100	
1A105	HSKP	Core	Corridor	67	0	---	---	---	13			120
1A106	STAFF LOUNGE	Core	Lobby	171	2	40	50	2	7	150	150	
1A107	ASSEMBLY	Core	Lobby	1799	0	---	693	3	8	2100	2100	
1A110	E.T.O. ROOM	Core	Office	95	0	---	83	7	20	250		250
1A111	CART WASH	Core	Mechanical	95	0	---	330	15	45	1000		1000
1A112	STEAM STERILIZERS	Core	Mechanical	137	0	---	530	26	78	1605		1605
1A113	BARREL ROOM	Core	Mechanical	43	0	---	33	6	17	100		100
1A114	VENDOR EQUIPMENT	Core	Mechanical	291	0	15	97	2	6	230		230
1A115	HSKP	Core	Corridor	71	0	---	97	10	24	230		230
1A120	STORAGE	Core	Corridor	108	0	5.4	42	3	7	100	100	
1A121	TOILET/SHOWER	Core	Restroom	72	0	75	140	6	15	140		140
1A122	HOLDING	Core	Office	506	0	---	1067	14	33	2540		2540
1A123	FIRE ALARM PANELS	Core	Mechanical	66	1	20	50	3	8	120	120	
1A130	INSTRUMENT DECONTAM	Core	Mechanical	955	0	---	731	5	12	1740		1740
1A131	ELEV. MACHINE ROOM	Core	Mechanical	188	0	---	206	5	12	490		540
1A200	TRASH/LINEN CHUTE	Core	Corridor	114	0	---	118	8	18	280		280
1A203	MECH. ROOM	Core	Mechanical	1023	0	75						
1A204	FIRE PUMP ROOM	Core	Mechanical	197	0	80						
1A207	TOILET	Core	Restroom	65	0	---	100	5	12	100		100
1A208	FACILITY STAFF ROOM	Core	Office	580	4	5	185	2	6	440	440	
1A209	ELECTRICAL	Core	Mechanical	184	0	16.9	134	3	7	320	320	
1A210	STORAGE	Core	Corridor	143	0	---	55	3	7	130	130	
1A211	STORAGE	Core	Corridor	338	0	---	97	2	5	230	230	
1A212	ELEV. EQUIPMENT ROOM	Core	Mechanical	143	0	---	113	6	17	270		320
1A213	SUMP ROOM	Core	Mechanical	99	0	---	50	2	5	120	120	
1A214	IT CLOSET	Core	Mechanical	43	0	---	59	10	24	140	140	
1A944	ELEVATOR LOBBY	Core	Corridor	785	0	---	353	3	8	840	840	
1A945	PATIENT/SERVER ELEVATOR LOBBY	Core	Lobby	815	0	5	542	5	12	1290	1290	
1A948	CORRIDOR	Core	Corridor	1719	0	12.3	309	1	3	735	735	
1A950	STORAGE	Core	Corridor	101	0		25	2	4	60	60	
1A951	STORAGE	Core	Corridor	246	0		55	2	4	130	130	

BUTLER MEMORIAL HOSPITAL													
INPATIENT TOWER ADDITION & RENOVATION - SECOND FLOOR													
Thermal Load Zones													
ROOM NO.	ROOM NAME	ZONE	FACE	TYPE	ROOM DATA		OA CFM	OA CFM	OA ACH	ACH	SUPPLY CFM	RETURN CFM	EXHAUST CFM
					AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL	TOTAL	TOTAL	TOTAL
2A112	STORAGE	Core		Corridor	198	0	---	59	2	7	180	180	
2A113	WOMEN'S	Core		Restroom	280	0	375	500	4	13	500		500
2A114	HWKP	Core		Corridor	50	0	---	59	9	27	180		180
2A115	MEN'S	Core		Restroom	270	0	525	525	5	14	500		500
2A116	COATS	Core		Corridor	238	0	11.9	59	2	5	180		180
2A119	SEATING	Core		Lobby	250	9	180	330	9	28	1000	1000	
2A120	CONTROL	Core		Office	53	1	20	25	4	11	75		75
2A121	TRAINING 'E'	Core		Office	753	38	570	594	5	14	1800	1800	
2A123	TRAINING 'A'	Core		Office	362	18	270	297	5	14	900	900	
2A124	TRAINING 'D'	Core		Office	388	19	285	297	4	13	900	900	
2A126	FOYER	Core		Corridor	320	0	16	231	4	13	700	700	
2A127	TRAINING 'B'	Core		Office	379	19	285	297	4	14	900	900	
2A128	TRAINING 'C'	Core		Office	351	18	270	297	5	15	900	900	
2A135	AUDITORIUM	Ext	North	Conference	3077	159	795	1434	3	8	4345	4345	
2A136	A/V ROOM/PREF	Ext	North	Mechanical	178	1	20	56	2	7	170		170
2A137	PANTRY	Ext	North	Corridor	304	1	20	165	4	12	500	500	
2A138	BOARD ROOM	Ext	North	Conference	1186	32	480	535	3	9	1620	1620	
2A140	CONFERENCE ROOM	Ext	West	Conference	463	16	320	352	5	14	1070	1070	
2A141	MEDICAL STAFF CONFERENCE ROOM	Ext	West	Conference	661	16	320	353	3	10	1070	1070	
2A142	MEN'S	Core		Restroom	214		225	430	5	14	430		430
2A143	WOMEN'S	Core		Restroom	212		225	430	5	14	430		430
2A201	ON CALL	Core		Office	98	1	20	33	3	8	100	100	
2A202	PERF. OFFICE	Core		Office	86	1	20	33	3	9	100	100	
2A203	STORAGE	Ext	West	Corridor	95	0	---	33	3	8	100	100	
2A204	CONFERENCE ROOM	Ext	West	Conference	372	16	240	248	4	13	750	750	
2A205	SCRUB ALCOVE	Core		Corridor	102	1	20	33	2	7	100	100	
2A208	ON CALL	Core		Corridor	98	1	20	33	3	8	100	100	
2A209	ON CALL	Core		Corridor	98	1	20	33	3	8	100	100	
2A210	TEAM LEADS	Core		Office	117	2	40	50	3	10	150	150	
2A214	STAFF LOUNGE	Ext	West	Office	405	4	80	185	3	9	560	560	
2A215	CHART ROOM	Core		Office	120	1	20	50	3	9	150	150	
2A216	PHYSICIAN LOUNGE	Ext	West	Office	227	2	40	96	3	9	290	290	
2A218	PRACTICE SPECIALIST	Core		Office	90	1	20	33	3	8	100	100	
2A219	NURSE MGR PREP/RECOVERY	Core		Office	90	1	20	33	3	8	100	100	
2A220	CRN/PAC	Core		Office	130	1	20	53	3	9	160	160	
2A225	WOMEN'S LOCKER ROOM	Core		Restroom	822	0	410	750	2	6	750		750
2A228	MEN'S LOCKER ROOM	Core		Restroom	822	0	410	750	2	6	750		750
2A230	ELEC.	Core		Mechanical	262		13.1	96	2	5	290	290	
2A231	IT	Core		Office	141		7	69	2	6	210	210	
2A232	LINEN/TRASH CHUTE	Core		Corridor	128			92	5	16	280		280
2A303	OFFICE	Ext	North	Office	126	1	20	33	2	6	100	100	
2A304	CHAPEL	Ext	North	Office	870	16	320	475	3	10	1440	1440	
2A305	QUIET ROOM	Core		Office	150	3	60	66	3	8	200	200	
2A306	PASTORAL CARE	Core		Office	80	1	20	33	3	8	100	100	
2A307	PUBLIC ELEVATOR LOBBY	Ext	East	Lobby	413		21	125	2	6	380	380	
2A308	VELET	Core		Lobby	228	1	20	168	6	17	510	510	
2A309	INFO	Core		Lobby	274	2	40	1188	33	99	3600	3600	
2A310	SEATING	Core		Lobby	638	12	240	1188	14	42	3600	3600	
2A314	RETAIL	Core		Lobby	1421		71	581	3	8	1760	1760	
2A315	COFFEE RETAIL AREA	Core		Lobby	142		7	56	3	9	170	170	
2A316	WORKROOM	Core		Office	118	2	40	66	4	13	200		200
2A319	ED LOCKER ROOM	Core		Office	162		81	172	7	21	520		520
2A320	AUSTIN'S PLAYROOM	Core		Lobby	270	4	80	99	2	7	300	300	
2A321	RESOURCE LIBRARY	Core		Office	327	4	80	116	2	7	350	350	
2A322	CONSULT 1	Core		Office	66	1	20	36	4	11	110	110	
2A323	CONSULT 2	Core		Office	132	1	20	40	2	6	120	120	
2A324	CONSULT 3	Core		Office	125	1	81	50	3	8	150	150	
2A325	CONSULT 4	Core		Office	165	1	20	53	2	6	160	160	
2A330	SEATING	Core		Lobby	323	12	240	248	5	15	750	750	
2A331	INTERVIEW 2	Core		Office	114	2	40	40	3	8	120	120	
2A332	INTERVIEW 1	Core		Office	117	2	40	40	3	8	120	120	
2A333	RECEP.	Core		Lobby	300	2	40	162	4	11	490	490	
2A334	SEATING	Core		Lobby	1440	14	280	416	2	6	1260	1260	
2A335	SEATING	Core		Lobby	480	14	280	416	6	18	1260	1260	
2A901	CORRIDOR	Core		Corridor	639		32	198	2	6	600	600	
2A905	GALLERY	Core		Lobby	1370		68.5	330	2	5	1000	1000	
2A910	CORRIDOR	Core		Corridor	860		43	300	2	7	910	910	
2A911	CORRIDOR	Core		Corridor	690		34.5	165	0	0	500	500	
2A912	CORRIDOR	Core		Corridor	960		48	165	1	3	500	500	
2A918	PASSAGEWAY	Ext	South	Corridor	73		4	40	4	11	120	120	
2A919	PASSAGEWAY	Core		Corridor	655		33	58	1	2	175	175	
2A920	PASSAGEWAY	Core		Corridor	654		33	107	1	3	325	325	
2A930	CORRIDOR	Core		Corridor	739		37	205	2	5	620	620	

2A932	PRE-FUNCTION	Core		Lobby	798		40	211	2	5	640	640
2A945	ELEVATOR LOBBY	Core		Lobby	737		37	139	1	2	420	420
2A948	LOBBY	Core		Lobby	1800		90	330	1	4	1000	1000
2A949	LOBBY	Core		Lobby	2715		135	396	1	2	1200	1200
2A950	ELEVATOR LOBBY	Core		Lobby	150		7.5	53	3	6	160	160

BUTLER MEMORIAL HOSPITAL													
INPATIENT TOWER ADDITION & RENOVATION - THIRD FLOOR													
Thermal Load Zones													
ROOM NO.	ROOM NAME	ZONE	FACE	TYPE	ROOM DATA		OA CFM	OA CFM	OA ACH	ACH	SUPPLY	RETURN	EXHAUST
					AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL	CFM TOTAL	CFM TOTAL	CFM TOTAL
2A100	ELEVATOR LOBBY	Ext	East	Lobby	1316	0	66	792	4	12	2400	2400	
2A104	ELEC.	Core		Mechanical	78	0	4	172	15	44	520	520	
2A105	MENS TOILET	Core		Restroom	51	0	75	100	5	15	100	100	
2A106	WOMENS TOILET	Core		Restroom	51	0	75	100	5	15	100	100	
2A107	CONSULT 2	Core		Office	95	2	40	40	3	9	120	120	
2A108	CONSULT 1	Core		Office	95	2	40	40	3	9	120	120	
2A110	PERI-OP9	Core		Office	107	1	20	32	2	6	100	100	
2A111	PAT. TLT	Core		Restroom	58	0	75	120	---	16			120
2A112	STAFF TOILET	Core		Restroom	55	0	75	110	---	15			110
2A113	CLEAN HOLDING	Core		Office	118	0	---	43	3	8	130	130	
2A114	NOURISHMENT	Core		Office	90	1	20	66	6	17	200	200	
2A115	CAREGIVER	Core		Corridor	490	1	20	172	2	7	520	520	
2A116	PATIENT BELONGING STOR.	Core		Corridor	180	0	---	40	2	5	120	120	
2A120	PAT. TLT	Core		Restroom	54	0	75	36	5	15	110	110	
2A121	STAFF LOUNGE/LOCKERS	Core		Restroom	271	0	136	116	3	10	350	350	
2A123	STAFF TOILET	Core		Restroom	60	0	75	120	---	15			120
2A125	STAFF TOILET	Core		Restroom	53	0	75	110	---	16			110
2A129	HSKP	Core		Corridor	42	0	21	---	---	16			90
2A130	PAT. TLT	Core		Restroom	53	0	75	110	---	16			110
2A131	SOILED HOLDING	Core		Office	64	0	---	---	---	15			130
2A132	IT ROOM	Core		Office	88	0	5	46	4	12	140	140	
2A133	STAFF LOUNGE	Core		Office	101	2	40	36	3	8	110	110	
2A134	CONTROL	Core		Office	150	2	40	66	3	10	200	200	
2A135	PHYS. LOUNGE	Core		Office	382	4	80	172	3	10	520	520	
2A136	ANESTH. LOUNGE	Core		Office	415	4	80	185	3	10	560	560	
2A137	TRASH/LINEN CHUTE	Core		Corridor	129	0	65	260	5	15	260	260	
2A150	PERI-OP 15	Ext	North	Patient	101	1	20	43	3	10	130	130	
2A151	PERI-OP 16	Ext	North	Patient	113	1	20	43	3	9	130	130	
2A152	PERI-OP 17	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A153	PERI-OP 18	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A154	PERI-OP 19	Ext	North	Patient	113	1	20	43	3	9	130	130	
2A155	PERI-OP 20	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A156	PERI-OP 21	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A157	PERI-OP 22	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A158	PERI-OP 23	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A159	PERI-OP 24	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A160	PERI-OP 25	Ext	North	Patient	112	1	20	43	3	9	130	130	
2A161	PERI-OP 26	Ext	North	Patient	112	1	20	43	3	8	130	130	
2A162	PERI-OP 27 (SWING-PACU)	Ext	North	Patient	112	1	20	43	3	8	130	130	
2A163	PAT. TLT	Ext	North	Restroom	58	0	75	120	---	16			120
2A165	PERI-OP 14	Core		Patient	111	1	20	33	2	6	100	100	
2A166	PERI-OP 13	Core		Patient	109	1	20	33	2	6	100	100	
2A167	PAT. TLT	Core		Restroom	51	0	75	---	---	16			110
2A168	PERI-OP 12	Core		Patient	110	1	20	33	2	6	100	100	
2A169	PERI-OP 11	Core		Patient	114	1	20	33	2	6	100	100	
2A170	PERI-OP 10	Core		Patient	116	1	20	33	2	6	100	100	
2A174	PERI-OP 9	Core		Patient	126	1	20	33	2	5	100	100	
2A175	PERI-OP 8	Core		Patient	126	1	20	33	2	5	100	100	
2A176	PERI-OP 7	Core		Patient	115	1	20	33	2	6	100	100	
2A177	PAT. TLT	Core		Restroom	66		75	130	---	15			130
2A178	PERI-OP 6	Core		Patient	111	1	20	33	2	6	100	100	
2A179	PERI-OP 5	Core		Patient	110	1	20	33	2	6	100	100	
2A180	PERI-OP 4	Core		Patient	110	1	20	33	2	6	100	100	
2A184	PAT. TLT	Core		Restroom	55		75	110	---	15			110
2A185	PERI-OP 2	Core		Patient	158	1	20	43	2	6	130	130	
2A186	PERI-OP 1	Core		Patient	158	1	20	43	2	6	130	130	
2A202	CLEAN HOLDING	Core		Office	122		6.1	23	1	4	70	70	
2A204	HSKP	Core		Corridor	50		25	---	---	15			100
2A205	PACU ISO 15	Core		Patient	120	1	20	73	5	24	220		380
2A206	PACU ISO 14	Core		Patient	120	1	20	73	5	24	220		380

3A209	PACU 13	Ext	West	Patient	80	1	20	30	2	8	90	90
3A211	PACU 12	Ext	West	Patient	80	1	20	30	2	8	90	90
3A212	SOILED HOLDING	Ext	West	Patient	72		---	30	3	16	90	150
3A213	PACU 11	Ext	West	Patient	80	1	20	43	4	11	130	130
3A215	PACU 10	Ext	West	Patient	80	1	20	33	3	8	100	100
3A216	CAREGIVER	Ext	West	Patient	190	2	40	73	3	8	220	220
3A217	PACU 9	Ext	West	Patient	80	1	20	33	3	8	100	100
3A219	PACU 8	Ext	West	Patient	80	1	20	43	4	11	130	130
3A220	IV TEAM STATION	Ext	West	Patient	110	1	20	66	4	12	200	200

BUTLER MEMORIAL HOSPITAL													
INPATIENT TOWER ADDITION & RENOVATION - FIFTH FLOOR													
Thermal Load Zones													
ROOM NO.	ROOM NAME	ZONE	FACE	TYPE	ROOM DATA		OA CFM	OA CFM	OA ACH	ACH	SUPPLY CFM	RETURN CFM	EXHAUST CFM
					AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL	TOTAL	TOTAL	TOTAL
5A100	ELEVATOR LOBBY	Ext	East	Lobby	640	20	400	396	4	13	1200	1200	
5A100A	FAMILY WAITING	Ext	East	Lobby	733	26	520	693	6	19	2100	2100	
5A101	ELEC.	Core		Mechanical	126	0	7	257	14	41	780	780	
5A102	WOMEN'S PUBLIC TOILET	Core		Restroom	68	0	75	---	---	11			100
5A103	MEN'S PUBLIC TOILET	Core		Restroom	68	0	75	---	---	11			100
5A104	CONSULT	Core		Office	118	1	20	33	2	7	100	100	
5A105	WORKSTATION	Core		Corridor	179	2	40	76	3	9	230	230	
5A110	DICTIONATION	Core		Office	70	1	20	33	4	11	100	100	
5A111	FAX/PRINT	Core		Corridor	60	1	20	33	4	13	100	100	
5A112	CLEAN HOLDING	Core		Office	138	0	---	50	3	8	150	120	
5A113	HSK	Core		Corridor	52	0	---	---	---	14			100
5A114	MEDICATION	Core		Office	131	1	20	36	2	6	110	110	
5A116	R.T. VENT STORAGE	Core		Corridor	199	0	10	106	4	12	320	320	
5A117	WORKSTATION	Core		Corridor	142	3	60	79	4	11	240	240	
5A118	COPY	Core		Corridor	83	1	20	50	4	14	150	150	
5A119	DICTIONATION	Core		Office	116	1	20	33	2	6	100	100	
5A120	POC WORKROOM	Core		Office	48	1	20	33	5	16	100	100	
5A123	INTENSIVIST OFFICE	Core		Office	99	1	20	33	3	8	100	100	
5A126	CV SURGEONS OFFICE	Core		Office	103	1	20	33	2	7	100	100	
5A127	MEDICATION	Core		Office	138	1	20	36	2	6	110	110	
5A128	CLEAN HOLDING	Core		Office	193	0	---	63	2	7	190	190	
5A129	HSK	Core		Corridor	45	0	---	---	---	27			160
5A131	STAFF TOILET	Core		Restroom	60		75	---	---	13			100
5A136	FAX/PRINT	Core		Corridor	61	1	20	33	4	12	100	100	
5A137	DICTIONATION	Core		Office	79	1	20	33	3	9	100	100	
5A138	ELEC.	Core		Mechanical	120	0	6	172	11	33	520	520	
5A139	WORKSTATION	Core		Corridor	78	3	60	79	8	23	240	240	
5A142	STAFF TOILET	Ext	North	Restroom	48	0	75	---	---	16			100
5A143	STAFF LOCKER	Core		Restroom	233	0	---	---	---	14			500
5A144	STAFF BREAK	Ext	East	Office	224	6	120	178	6	18	540	540	
5A145	TRASH & LINEN CHUTE	Core		Corridor	124	0	---	56	3	21	170		340
5A147	CLEAN EQUIPMENT	Ext	East	Office	466	0	---	165	3	8	500	500	
5A151	STAFF CONFERENCE	Ext	East	Office	313	3	60	79	2	6	240	240	
5A152	R.T. OFFICE	Core		Office	67	1	20	79	9	27	240	240	
5A153	SOILED HOLDING	Core		Office	188	0	---	40	2	10	120		220
5A154	NOURISHMENT	Core		Office	104	1	20	79	6	17	240	240	
5A155	I.T.	Core		Office	178	0	9	56	2	7	170	170	
5A157	HOTEL OFFICE	Core		Office	61	1	20	33	4	12	100	100	
5A158	OFFICE	Core		Office	90	1	20	33	3	8	100	100	
5A159	OFFICE	Core		Office	76	1	20	33	3	10	100	100	
5A160	OFFICE	Core		Office	138	1	20	33	2	6	100	100	
5A201	CCU PATIENT ROOM	Ext	North	Patient	225	2	40	92	3	9	280	160	
5A201a	TLT	Ext	North	Restroom	54		---	---	---	17			120
5A202	CCU PATIENT ROOM	Ext	North	Patient	235	2	40	92	3	9	280	190	
5A202a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A203	CCU PATIENT ROOM	Ext	North	Patient	249	2	40	92	3	8	280	190	
5A203a	TLT	Ext	North	Restroom	54	0	---	---	---	13			90
5A204	CCU PATIENT ROOM	Ext	North	Patient	248	2	40	92	3	8	280	190	
5A204a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A205	CCU PATIENT ROOM	Ext	North	Patient	248	2	40	92	3	8	280	190	
5A205a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A206	CCU PATIENT ROOM	Ext	North	Patient	248	2	40	92	3	8	280	190	
5A206a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A207	CCU PATIENT ROOM	Ext	North	Patient	259	2	40	92	3	8	280	190	
5A207a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A208	CCU PATIENT ROOM	Ext	North	Patient	248	2	40	92	3	8	280	190	
5A208a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A209	CCU PATIENT ROOM	Ext	North	Patient	250	2	40	92	3	8	280	190	
5A209a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A210	CCU PATIENT ROOM	Ext	North	Patient	262	2	40	92	3	8	280	190	
5A210a	TLT	Ext	North	Restroom	54		---	---	---	13			90
5A211	CCU PATIENT ROOM (ISOLATION)	Ext	West	Patient	248	2	40	122	4	14	370		470
5A211a	TLT	Ext	West	Restroom	54		---	---	---	14			100
5A212	CCU PATIENT ROOM	Ext	West	Patient	232	2	40	86	3	8	260	170	
5A212a	TLT	Ext	West	Restroom	54		---	---	---	13			90
5A213	CCU PATIENT ROOM	Ext	West	Patient	232	2	40	86	3	8	260	170	
5A213a	TLT	Ext	West	Restroom	54		---	---	---	13			90
5A214	CCU PATIENT ROOM	Ext	West	Patient	232	2	40	86	3	8	260	170	
5A214a	TLT	Ext	West	Restroom	54		---	---	---	13			90
5A215	CCU PATIENT ROOM	Ext	West	Patient	232	2	40	86	3	8	260	170	
5A215a	TLT	Ext	West	Restroom	54		---	---	---	13			90
5A216	CCU PATIENT ROOM	Ext	West	Patient	232	2	40	86	3	8	260	170	
5A216a	TLT	Ext	West	Restroom	54		---	---	---	13			90

5A217	CCU PATIENT ROOM	Ent	West	Patient	232	2	40	86	3	8	260	170
5A217a	TLT	Ent	West	Restroom	54	---	---	---	---	13		90
5A218	CCU PATIENT ROOM	Ent	South	Patient	232	2	40	86	3	8	260	170
5A218a	TLT	Core		Restroom	54	---	---	---	---	13		90
5A219	CCU PATIENT ROOM	Ent	South	Patient	273	2	40	86	2	7	260	170
5A219a	TLT	Core		Restroom	54	---	---	---	---	13		90
5A220	ANTE-ROOM	Core		Mechanical	37	---	26	5	20		80	100
5A224	ANTE-ROOM	Core		Mechanical	90	---	33	3	16		100	190
5A225	CCU (ISOLATION) ROOM	Ent	South	Patient	226	2	40	122	4	16	370	470
5A225a	TLT	Ent	South	Restroom	54	---	---	---	---	13		90
5A226	CCU PATIENT ROOM	Ent	South	Patient	210	2	40	79	3	9	240	150
5A226a	TLT	Ent	South	Restroom	54	---	---	---	---	13		90
5A227	CCU PATIENT ROOM	Ent	South	Patient	210	2	40	79	3	9	240	150
5A227a	TLT	Ent	South	Restroom	54	---	---	---	---	13		90
5A228	CCU PATIENT ROOM	Ent	South	Patient	210	2	40	79	3	9	240	150
5A228a	TLT	Ent	South	Restroom	54	---	---	---	---	13		90
5A229	CCU PATIENT ROOM	Ent	South	Patient	210	2	40	79	3	9	240	150
5A229a	TLT	Ent	South	Restroom	54	---	---	---	---	13		90
5A904	CORRIDOR	Core		Corridor	124	---	33	2	5		100	100
5A905	CORRIDOR	Core		Corridor	285	---	89	2	6		270	270
5A908	PASSAGE	Core		Corridor	215	---	66	2	6		200	200
5A909	WHEELCHAIR/STRETCHER	Core		Corridor	148	---	33	1	5		100	100
5A910	CORRIDOR	Core		Corridor	669	---	178	2	6		540	540
5A920	CORRIDOR	Core		Corridor	977	---	165	1	4		500	500
5A932	PASSAGE	Core		Corridor	132	---	26	1	4		80	80
5A934	PASSAGE	Core		Corridor	177	---	26	1	3		80	80
5A935	WHEELCHAIR/STRETCHER	Core		Corridor	158	---	33	1	4		100	100
5A937	WORKSTATION	Core		Corridor	145	3	60	79	4	11	240	240
5A940	CORRIDOR	Core		Corridor	1042	---	277	2	6		840	840
5A944	PATIENT/SERVICE ELEVATOR LOBBY	Ent	East	Corridor	325	---	234	5	16		710	710
5A945	ELEVATOR LOBBY	Core		Corridor	330	---	86	2	6		260	260
5A947	CORRIDOR	Ent	North	Corridor	1021	---	125	1	2		380	380
5A950	CORRIDOR	Core		Corridor	700	---	172	2	5		520	520

BUTLER MEMORIAL HOSPITAL													
INPATIENT TOWER ADDITION & RENOVATION - SIXTH FLOOR													
Thermal Load Zones													
ROOM NO.	ROOM NAME	ZONE	FACE	TYPE	ROOM DATA		OA CFM	OA CFM	OA ACH	ACH	SUPPLY CFM	RETURN CFM	EXHAUST CFM
					AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL	TOTAL	TOTAL	TOTAL
6A100	ELEVATOR LOBBY	Ent	East	Lobby	640	20	400	396	4	13	1200	1200	
6A100A	FAMILY WAITING	Ent	East	Lobby	733	26	520	692	6	19	2100	2100	
6A101	ELEC.	Core		Mechanical	126	0	7	257	14	41	780		780
6A102	WOMEN'S PUBLIC TOILET	Core		Restroom	68	0	75	200	4	22	100		200
6A103	MEN'S PUBLIC TOILET	Core		Restroom	68	0	75	200	4	22	100		200
6A104	CONSULT	Core		Office	115	1	20	33	2	7	100	100	
6A105	WORKSTATION	Core		Corridor	179	2	40	76	3	9	230	230	
6A110	DICTATION	Core		Office	70	1	20	33	4	11	100	100	
6A111	FAX/PRINT	Core		Corridor	60	1	20	33	4	13	100	100	
6A112	CLEAN HOLDING	Core		Office	138	0	---	50	3	8	150	150	100
6A113	STAFF TOILET	Core		Restroom	52	0	75	100	---	14	0	0	100
6A114	MEDICATION ROOM	Core		Office	131	1	20	36	2	6	110	110	
6A116	EQUIPMENT	Core		Mechanical	199	1	10	50	2	6	150	150	
6A117	WORKSTATION	Core		Corridor	142	2	40	79	4	11	240		
6A118	MONITOR WORKROOM	Core		Office	65	2	40	50	6	17	150		
6A119	DICTATION	Core		Office	72	1	20	50	5	16	150		
6A120	COPY	Core		Corridor	101	1	20	33	2	7	100		
6A125	HOTELING OFFICE	Core		Office	138	1	20	33	2	5	100		
6A126	HSK	Core		Corridor	111	0	---	---	---	14			210
6A127	MEDICATION	Core		Office	122	1	20	36	2	7	110		
6A128	CLEAN HOLDING	Core		Office	174	0	---	63	3	8	190	90	
6A135	STAFF TOILET	Core		Restroom	80		75	100	---	11			120
6A136	FAX/PRINT	Core		Corridor	61	1	20	33	4	12	100		
6A137	DICTATION	Core		Office	79	1	20	33	3	9	100		
6A138	ELEC.	Core		Mechanical	120	0	6	172	11	33	820	820	
6A140	OFFICE	Core		Office	91	1	20	33	3	8	100	100	
6A141	OFFICE	Core		Office	88	1	20	33	3	9	100	100	
6A142	STAFF CONFERENCE	Ent	South	Office	247	6	120	158	5	15	480	480	
6A143	STAFF LOCKER	Core		Restroom	233	0	---	73	2	14	220		500
6A144	STAFF BREAK	Ent	East	Office	224	4	80	178	6	18	540		
6A146	TRASH & LINEN CHUTE	Core		Corridor	124	0	---	112	7	21	340		340
6A149	POC WORKROOM	Core		Office	69	1	20	33	4	11	100	100	
6A150	SOILED HOLDING	Core		Office	148	0	---	112	6	17	340		340
6A151	NOURISHMENT	Core		Office	104	1	20	79	6	17	240	240	
6A152	I.T.	Core		Office	179	0	9	53	2	7	160	160	
6A201	MED/SURG	Ent	North	Patient	225	2	40	96	3	10	290	170	
6A201a	TLT	Ent	North	Restroom	54		75	120	---	17			120
6A202	MED/SURG	Ent	North	Patient	235	2	40	99	3	10	300	180	
6A202a	TLT	Ent	North	Restroom	54		75	120	---	17			120

6A203	MED/SURG	Ext	North	Patient	249	2	40	102	3	9	310	210	
6A203a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
6A204	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310	210	
6A204a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
6A205	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310	210	
6A205a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
6A206	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310	210	
6A206a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
6A207	MED/SURG	Ext	North	Patient	259	2	40	102	3	9	310	210	
6A207a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
6A208	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310	210	
6A208a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
6A209	MED/SURG	Ext	North	Patient	250	2	40	102	3	9	310	210	
6A209a	TLT	Ext	North	Restroom	54	0	75	100	---	17			120
6A210	MED/SURG	Ext	North	Patient	262	2	40	109	3	9	330	210	
6A210a	TLT	Ext	North	Restroom	54	0	75	100	---	17			120
6A211	MED/SURG	Ext	West	Patient	248	2	40	116	3	11	350	250	
6A211a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A212	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350	250	
6A212a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A213	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350	250	
6A213a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A214	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350	250	
6A214a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A215	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350	250	
6A215a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A216	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350	250	
6A216a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A217	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350	250	
6A217a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
6A218	MED/SURG	Ext	South	Patient	232	2	40	116	4	11	350	250	
6A218a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
6A225	MED/SURG	Ext	South	Patient	226	2	40	96	3	10	290	190	
6A225a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
6A226	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280	180	
6A226a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
6A227	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280	180	
6A227a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
6A228	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280	180	
6A228a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
6A229	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280	180	
6A229a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
6A231	ANTE-ROOM	Core		Office	105	---	33	2	14	100			200
6A232	MED/SURG (ISOLATION)	Ext	East	Patient	248	2	40	122	4	14	370		470
6A232a	TLT	Ext	East	Restroom	36	0	75	130	---	27			130
6A233	ANTE-ROOM	Core		Office	105	---	33	2	13	100			200
6A234	MED/SURG (ISOLATION)	Ext	East	Patient	248	2	40	122	4	14	370		470
6A234a	TLT	Ext	East	Restroom	36	0	75	130	---	27			130
6A235	ANTE-ROOM	Core		Office	105	---	33	2	14	100			200
6A236	MED/SURG (ISOLATION)	Ext	East	Patient	248	2	40	122	4	14	370		470
6A236a	TLT	Ext	East	Restroom	36	0	75	130	---	27			130
6A905	CORRIDOR	Core		Corridor	285	---	89	2	6	270			270
6A908	PASSAGE	Core		Corridor	215	---	66	2	6	200			200
6A909	WHEELCHAIR/STRETCHER	Core		Corridor	148	---	33	1	5	100			100
6A910	CORRIDOR	Core		Corridor	669	---	178	2	6	540			540
6A920	CORRIDOR	Core		Corridor	977	---	165	1	4	500			500
6A922	PASSAGE	Core		Corridor	132	---	26	1	4	80			80
6A935	WHEELCHAIR/STRETCHER	Core		Corridor	158	---	33	1	4	100			100
6A937	WORKSTATION	Core		Corridor	128	2	40	79	4	13	240		240
6A940	CORRIDOR	Core		Corridor	1042	---	277	2	6	840			840
6A944	PATIENT/SERVICE ELEVATOR LOBBY	Ext	East	Corridor	325	---	294	5	16	710			710
6A945	ELEVATOR LOBBY	Core		Corridor	330	---	86	2	6	260			260
6A947	CORRIDOR	Ext	North	Corridor	1021	---	172	1	3	520			520
6A950	CORRIDOR	Core		Corridor	700	---	172	2	5	520			520

BUTLER MEMORIAL HOSPITAL															
INPATIENT TOWER ADDITION & RENOVATION - SEVENTH FLOOR															
Thermal Load Zones															
ROOM NO.	ROOM NAME	ZONE	FACE	TYPE	ROOM DATA				OA CFM		OA ACH		SUPPLY CFM TOTAL	RETURN CFM TOTAL	EXHAUST CFM TOTAL
					AREA	PEOPLE	MIN	ACTUAL	ACTUAL	ACTUAL	ACTUAL	ACTUAL			
7A100	ELEVATOR LOBBY	Ext	East	Lobby	640	20	400	396	4	13	1200		1200		
7A100A	FAMILY WAITING	Ext	East	Lobby	733	26	520	692	6	19	2100		2100		
7A101	ELEC.	Core		Mechanical	126	0	7	257	14	41	780		780		
7A102	WOMEN'S PUBLIC TOILET	Core		Restroom	68	0	75	200	4	22	100			200	
7A103	MEN'S PUBLIC TOILET	Core		Restroom	68	0	75	200	4	22	100			200	
7A104	CONSULT	Core		Office	115	1	20	33	2	7	100		100		
7A105	WORKSTATION	Core		Corridor	179	2	40	76	3	9	230		230		
7A110	DICTATION	Core		Office	70	1	20	33	4	11	100		100		
7A111	FAK/PRINT	Core		Corridor	60	1	20	33	4	13	100		100		

7A112	CLEAN HOLDING	Core		Office	138	0	---	50	3	8	150	150	100
7A113	STAFF TOILET	Core		Restroom	52	0	75	100	---	14	0	0	100
7A114	MEDICATION ROOM	Core		Office	131	1	20	36	2	6	110		110
7A116	EQUIPMENT	Core		Mechanical	199	1	10	50	2	6	150		150
7A117	WORKSTATION	Core		Corridor	142	2	40	79	4	11	240		
7A118	MONITOR WORKROOM	Core		Office	65	2	40	50	6	17	150		
7A119	DICTATION	Core		Office	72	1	20	50	5	16	150		
7A120	COPY	Core		Corridor	101	1	20	33	2	7	100		
7A125	HOTELING OFFICE	Core		Office	138	1	20	33	2	5	100		
7A126	NSK	Core		Corridor	111	0	---	---	---	14			210
7A127	MEDICATION	Core		Office	122	1	20	36	2	7	110		
7A128	CLEAN HOLDING	Core		Office	174	0	---	63	3	8	190		90
7A135	STAFF TOILET	Core		Restroom	80			75	100	---	11		120
7A136	FAX/PRINT	Core		Corridor	61	1	20	33	4	12	100		
7A137	DICTATION	Core		Office	79	1	20	33	3	9	100		
7A138	ELEC.	Core		Mechanical	120	0	6	172	11	33	520		520
7A140	OFFICE	Core		Office	91	1	20	33	3	8	100		100
7A141	OFFICE	Core		Office	88	1	20	33	3	9	100		100
7A142	STAFF CONFERENCE	Ext	South	Office	247	6	120	158	5	15	480		480
7A143	STAFF LOCKER	Core		Restroom	233	0	---	73	2	14	220		500
7A144	STAFF BREAK	Ext	East	Office	224	4	80	178	6	18	540		
7A146	TRASH & LINEN CHUTE	Core		Corridor	124	0	---	112	7	21	340		340
7A149	POC WORKROOM	Core		Office	69	1	20	33	4	11	100		100
7A150	SOILED HOLDING	Core		Office	148	0	---	112	6	17	340		340
7A151	NOURISHMENT	Core		Office	104	1	20	79	6	17	240		240
7A152	I. T.	Core		Office	173	0	9	53	2	7	160		160
7A201	MED/SURG	Ext	North	Patient	225	2	40	96	3	10	290		170
7A201a	TLT	Ext	North	Restroom	54			75	120	---	17		120
7A202	MED/SURG	Ext	North	Patient	235	2	40	99	3	10	300		180
7A202a	TLT	Ext	North	Restroom	54			75	120	---	17		120
7A203	MED/SURG	Ext	North	Patient	249	2	40	102	3	9	310		210
7A203a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
7A204	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310		210
7A204a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
7A205	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310		210
7A205a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
7A206	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310		210
7A206a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
7A207	MED/SURG	Ext	North	Patient	259	2	40	102	3	9	310		210
7A207a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
7A208	MED/SURG	Ext	North	Patient	248	2	40	102	3	9	310		210
7A208a	TLT	Ext	North	Restroom	54	0	75	100	---	14			100
7A209	MED/SURG	Ext	North	Patient	250	2	40	102	3	9	310		210
7A209a	TLT	Ext	North	Restroom	54	0	75	100	---	17			120
7A210	MED/SURG	Ext	North	Patient	262	2	40	109	3	9	330		210
7A210a	TLT	Ext	North	Restroom	54	0	75	100	---	17			120
7A211	MED/SURG	Ext	West	Patient	248	2	40	116	3	11	350		250
7A211a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A212	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350		250
7A212a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A213	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350		250
7A213a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A214	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350		250
7A214a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A215	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350		250
7A215a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A216	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350		250
7A216a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A217	MED/SURG	Ext	West	Patient	232	2	40	116	4	11	350		250
7A217a	TLT	Ext	West	Restroom	54	0	75	100	---	14			100
7A218	MED/SURG	Ext	South	Patient	232	2	40	116	4	11	350		250
7A218a	TLT	Ext	South	Restroom	54	0	75	100	---	14			100
7A225	MED/SURG	Ext	South	Patient	226	2	40	96	3	10	290		190
7A225a	TLT	Ext	South	Restroom	54			75	100	---	14		100
7A226	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280		180
7A226a	TLT	Ext	South	Restroom	54			75	100	---	14		100
7A227	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280		180
7A227a	TLT	Ext	South	Restroom	54			75	100	---	14		100
7A228	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280		180
7A228a	TLT	Ext	South	Restroom	54			75	100	---	14		100
7A229	MED/SURG	Ext	South	Patient	210	2	40	92	3	10	280		180
7A229a	TLT	Ext	South	Restroom	54			75	100	---	14		100
7A231	ANTE-ROOM	Core		Office	105			---	33	2	14	100	200
7A232	MED/SURG (ISOLATION)	Ext	East	Patient	248	2	40	122	4	14	370		470
7A232a	TLT	Ext	East	Restroom	36			75	130	---	27		130
7A233	ANTE-ROOM	Core		Office	105			---	33	2	13	100	200
7A234	MED/SURG (ISOLATION)	Ext	East	Patient	248	2	40	122	4	14	370		470
7A234a	TLT	Ext	East	Restroom	36			75	130	---	27		130
7A235	ANTE-ROOM	Core		Office	105			---	33	2	14	100	200
7A236	MED/SURG (ISOLATION)	Ext	East	Patient	248	2	40	122	4	14	370		470
7A236a	TLT	Ext	East	Restroom	36			75	130	---	27		130
7A905	CORRIDOR	Core		Corridor	285			---	89	2	6	270	270
7A906	PASSAGE	Core		Corridor	215			---	66	2	6	200	200
7A909	WHEELCHAIR/STRETCHER	Core		Corridor	148			---	33	1	5	100	100
7A910	CORRIDOR	Core		Corridor	669			---	178	2	6	540	540
7A920	CORRIDOR	Core		Corridor	977			---	165	1	4	500	500
7A932	PASSAGE	Core		Corridor	132			---	26	1	4	80	80

7A935	WHEELCHAIR/STRETCHER	Core		Corridor	158	---	39	1	4	100	100	
7A937	WORKSTATION	Core		Corridor	128	2	40	79	4	13	240	240
7A940	CORRIDOR	Core		Corridor	1042	---	277	2	6	840	840	
7A944	PATIENT/SERVICE ELEVATOR LOBBY	Ext	East	Corridor	325	---	234	5	16	710	710	
7A945	ELEVATOR LOBBY	Core		Corridor	230	---	86	2	6	260	260	
7A947	CORRIDOR	Ext	North	Corridor	1021	---	172	1	3	520	520	
7A950	CORRIDOR	Core		Corridor	700	---	172	2	5	520	520	

APPENDIX C

Weighted Zone Parameters

Ground Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	3380	0.88	0	1.20	1.05	0.50	0.44
Mechanical	471	0.12	0	1.40	0.17	50.00	6.12
	3851		0		1.22		6.55

First Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	5561	0.41	0	1.20	0.50	0.50	0.21
Lobby	2785	0.21	2	1.80	0.37	0.50	0.10
Mechanical	3464	0.26	1	1.40	0.36	6.00	1.54
Office	1455	0.11	7	1.70	0.18	2.00	0.22
Restroom	197	0.01	1	1.10	0.02	0.00	0.00
	13462		11		1.43		2.07

Second Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	6502	0.24	3	1.20	0.28	1.00	0.24
Lobby	13336	0.49	70	1.80	0.88	1.00	0.49
Mechanical	262	0.01	0	1.40	0.01	25.00	0.24
Office	4713	0.17	101	1.70	0.29	2.00	0.34
Restroom	2620	0.10	0	1.10	0.11	0.00	0.00
	27433		174		1.57		1.31

Second Floor - Exterior North							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Conference	4263	0.74	191	2.00	1.49	2.00	1.49
Corridor	304	0.05	1	1.20	0.06	1.00	0.05
Mechanical	178	0.03	1	1.40	0.04	2.50	0.08
Office	996	0.17	17	1.70	0.29	2.00	0.35
	5741		210		1.89		1.96

Second Floor - Exterior South							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	73	1.00	2	1.20	1.20	1.00	1.00
	73		0		1.20		1.00

Second Floor - Exterior East							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Lobby	413	1.00	2	1.80	1.80	1.00	1.00
	413		2		1.80		1.00

Second Floor - Exterior West							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Conference	1496	0.67	48	2.00	1.35	2.00	1.35
Corridor	95	0.04	0	1.20	0.05	1.00	0.04
Office	632	0.28	6	1.70	0.48	2.00	0.57
	2223		54		1.88		1.96

Third Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	11590	0.61	7	1.20	0.73	1.00	0.61
Mechanical	1077	0.06	0	1.40	0.08	22.00	1.24
Office	3389	0.18	35	1.70	0.30	2.00	0.36
Patient	1932	0.10	16	1.60	0.16	2.00	0.20
Restroom	1095	0.06	0	1.10	0.06	0.00	0.00
	19083		58		1.33		2.41

Third Floor - Core (Operating Rooms)							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Operating	8012	1.00	87	2.80	2.80	4.00	4.00
	8012		87		2.80		4.00

Third Floor - Exterior North							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Patient	1447	0.89	13	1.60	1.43	2.00	1.79
Mechanical	115	0.07	0	1.40	0.10	2.50	0.18
Restroom	58	0.04	0	1.10	0.04	0.00	0.00
	1620		13		1.57		1.96

Third Floor - Exterior South							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	136	0.14	0	1.20	0.17	1.00	0.14
Office	820	0.86	7	1.70	1.46	2.00	1.72
	956		7		1.63		1.86

Third Floor - Exterior East							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Lobby	1316	1.00	4	1.80	1.80	1.00	1.00
	1316		4		1.80		1.00

Third Floor - Exterior West							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	1458	0.47	0	1.20	0.56	1.00	0.47
Office	730	0.24	7	1.70	0.40	2.00	0.47
Patient	910	0.29	9	1.60	0.47	2.00	0.59
	3098		16		1.44		1.53

Fifth Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	6125	0.64	14	1.20	0.77	1.00	0.64
Mechanical	373	0.04	0	1.40	0.05	35.00	1.37
Office	2102	0.22	15	1.70	0.38	2.00	0.44
Restroom	915	0.10	0	1.10	0.11	0.00	0.00
	9515		29		1.31		2.46

Fifth Floor - Exterior North							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	1021	0.25	0	1.20	0.30	1.00	0.25
Patient	2472	0.61	20	1.60	0.97	2.00	1.21
Restroom	588	0.14	0	1.10	0.16	0.00	0.00
	4081		20		1.43		1.46

Fifth Floor - Exterior South							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Patient	1571	0.85	14	1.60	1.37	2.00	1.71
Restroom	270	0.15	0	1.10	0.16	0.00	0.00
	1841		14		1.53		1.71

Fifth Floor - Exterior East							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	325	0.12	0	1.20	0.14	1.00	0.12
Lobby	1373	0.51	46	1.80	0.91	1.00	0.51
Office	1003	0.37	9	1.70	0.63	2.00	0.74
	2701		55		1.69		1.37

Fifth Floor - Exterior West							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Patient	1640	1.00	14	1.60	1.60	2.00	2.00
	1640		14		1.60		2.00

Sixth Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	5562	0.65	9	1.20	0.78	1.00	0.65
Mechanical	445	0.05	1	1.40	0.07	30.00	1.55
Office	2098	0.24	13	1.70	0.41	2.00	0.49
Restroom	501	0.06	0	1.10	0.06	0.00	0.00
	8606		23		1.33		2.69

Sixth Floor - Exterior North							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	1021	0.25	0	1.20	0.30	1.00	0.25
Patient	2472	0.61	20	1.60	0.97	2.00	1.21
Restroom	588	0.14	0	1.10	0.16	0.00	0.00
	4081		20		1.43		1.46

Sixth - Exterior South							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Office	247	0.13	6	1.70	0.22	2.00	0.26
Patient	1298	0.69	12	1.60	1.11	2.00	1.39
Restroom	324	0.17	0	1.10	0.19	0.00	0.00
	1869		18		1.53		1.65

Sixth - Exterior East							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	325	0.12	0	1.20	0.14	1.00	0.12
Lobby	1373	0.49	46	1.80	0.89	1.00	0.49
Office	224	0.08	4	1.70	0.14	2.00	0.16
Patient	744	0.27	6	1.60	0.43	2.00	0.54
Restroom	108	0.04	0	1.10	0.04	0.00	0.00
	2774		56		1.64		1.31

Sixth Floor - Exterior West							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Patient	1640	0.81	14	1.60	1.30	2.00	1.63
Restroom	378	0.19	0	1.10	0.21	0.00	0.00
	2018		14		1.51		1.63

Seventh Floor - Core							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	5562	0.65	9	1.20	0.78	1.00	0.65
Mechanical	445	0.05	1	1.40	0.07	30.00	1.55
Office	2098	0.24	13	1.70	0.41	2.00	0.49
Restroom	501	0.06	0	1.10	0.06	0.00	0.00
	8606		23		1.33		2.69

Seventh Floor - Exterior North							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	1021	0.25	0	1.20	0.30	1.00	0.25
Patient	2472	0.61	20	1.60	0.97	2.00	1.21
Restroom	588	0.14	0	1.10	0.16	0.00	0.00
	4081		20		1.43		1.46

Seventh - Exterior South							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Office	247	0.13	6	1.70	0.22	2.00	0.26
Patient	1298	0.69	12	1.60	1.11	2.00	1.39
Restroom	324	0.17	0	1.10	0.19	0.00	0.00
	1869		18		1.53		1.65

Seventh - Exterior East							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Corridor	325	0.12	0	1.20	0.14	1.00	0.12
Lobby	1373	0.49	46	1.80	0.89	1.00	0.49
Office	224	0.08	4	1.70	0.14	2.00	0.16
Patient	744	0.27	6	1.60	0.43	2.00	0.54
Restroom	108	0.04	0	1.10	0.04	0.00	0.00
	2774		56		1.64		1.31

Seventh Floor - Exterior West							
Space Type	(sqft) Area	(%) Zone Area	(#) People	(W / sqft) Lighting Load	(W / sqft) Avg. Lighting Load	(W / sqft) Equip. Load	(W / sqft) Avg. Equip. Load
Patient	1640	0.81	14	1.60	1.30	2.00	1.63
Restroom	378	0.19	0	1.10	0.21	0.00	0.00
	2018		14		1.51		1.63

Internal People Loads				
Zone Type	Density	Activity	Sensible (Btu/hr)	Latent (Btu/hr)
Conference	Ref. Schedule	Hospital	250	200
Office	Ref. Schedule	Hospital	250	200
Operating Rooms	Ref. Schedule	Hospital	250	200
Patient Rooms	Ref. Schedule	Hospital	250	200
Lobby	Ref. Schedule	Lobby	250	200
Corridor	Ref. Schedule	Hospital	250	200
Mechanical Space	Ref. Schedule	Hospital	250	200
Restroom	Ref. Schedule	Hospital	250	200

Internal Lighting Loads		
Zone Type	Light Fixture	Energy Use (W/sqft)
Conference	Fluorescent, not vented, 80% to load	2.00
Office	Fluorescent, not vented, 80% to load	1.70
Operating Rooms	Fluorescent, not vented, 80% to load	2.80
Patient Rooms	Fluorescent, not vented, 80% to load	1.60
Lobby	Fluorescent, not vented, 80% to load	1.80
Corridor	Fluorescent, not vented, 80% to load	1.20
Mechanical Space	Fluorescent, not vented, 80% to load	1.40
Restroom	Fluorescent, not vented, 80% to load	1.10

Internal Equipment Loads		
Zone Type	Equipment Loads	Energy Use (W/sqft)
Conference	Projectors, Computers, Office Equip	2.00
Office	Computers, Office Equip, Desk Lights	2.00
Operating Rooms	Medical Equipment, Computers	4.00
Patient Rooms	Medical Equipment, Televisions	2.00
Lobby	Computers, Televisions	1.00
Corridor	Medical Equipment, Monitors	1.00
Mechanical Space	Heat load from equipment	Varies
Restroom	No equipment load	0.00

APPENDIX D

Exterior Wall, Roof, & Window Calculations

Ground Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	0	14.75	0	0	0	0
South	0	14.75	0	0	0	0
East	0	14.75	0	0	0	0
West	109	14.75	1607.75	12	8	96
			1607.75			96

First Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	38	14.75	560.5	0	0	0
South	0	14.75	0	0	0	0
East	0	14.75	0	0	0	0
West	140	14.75	2065	12	6	72
			2625.5			72

Second Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	238	14.75	3510.5	59	8	472
South	44	14.75	649	12	6	72
East	55	14.75	811.25	53	2	106
West	154	14.75	2271.5	72	6	432
			7242.25			1082

Third Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	238	14.75	3510.5	145	6	870
South	44	14.75	649	12	6	72
East	55	14.75	811.25	52	6	312
West	154	14.75	2271.5	69	6	414
			7242.25			1668

Fifth Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	179	14.75	2640.25	119	6	714
South	137	14.75	2020.75	42	6	252
East	245	14.75	3613.75	98	6	588
West	154	14.75	2271.5	69	6	414
			10546.25			1968

Sixth Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	179	14.75	2640.25	119	6	714
South	137	14.75	2020.75	42	6	252
East	245	14.75	3613.75	98	6	588
West	154	14.75	2271.5	69	6	414
			10546.25			1968

Seventh Floor						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Ext. Face	Wall Length	Wall Height	Wall Area	Window Length	Window Height	Window Area
North	179	14.75	2640.25	128	6	768
South	137	14.75	2020.75	42	6	252
East	245	14.75	3613.75	103	6	618
West	154	14.75	2271.5	69	6	414
			10546.25			2052

Third Floor Roof						
	(ft)	(ft)	(sqft)	(ft)	(ft)	(sqft)
Zone	Roof Length	Roof Width	Roof Area	Skylight Length	Skylight Width	Skylight Area
Core	135	139	18765	88	18	1584
			18765			1584

Seventh Floor Roof			
	(ft)	(ft)	(sqft)
Ext. Face	Roof Length	Roof Width	Roof Area
Core	100	86.06	8606
North	179	22.7	4081
South	137	13.6	1869
East	245	11.3	2774
West	154	13.1	2018
			19348