DUKE CANCER CENTER

EXPANSION

Durham, NC

TECHNICAL REPORT II

Building and Central Plant Load and Energy Analysis

Erin Popa
The Pennsylvania State University
Architectural Engineering, Mechanical
Advisor: William P. Bahnfleth, PhD, PE
October 19, 2011

Table of Contents

Executive Summary

The purpose of this report is to perform a block load and energy analysis of the Duke Cancer Center Expansion using a whole building load and energy simulation program to estimate design load, annual energy consumption and operating costs of the project. Using actual design values when specified in the design documents, the results of the constructed model from Trane TRACE™ were then compared with the design of the implemented system provided by the mechanical engineer.

In addition to the design of the mechanical engineer, a third party consultant, Air Water Energy Engineers, Inc. (AWE) was hired by Tsoi/Kobus & Associates Architects to perform a Whole Building Energy Simulation based on design and final construction documents in order to verify points towards LEED energy performance. AWE used VisualDOE 4.1 energy models to simulate annual energy consumption in order to compare the results of the proposed design to a baseline building case per ASHRAE 90.1-2004. The results of the third party energy analysis and compared with the results of this Trane TRACE™ analysis in the latter half of this report.

The block load analysis of the Cancer Center resulted in an estimated cooling load of 317, 191 and 222 SF/ton for air-handlers 1, 2 and 3 respectively. The heating load for each system modeled came in around 28, 47 and 36 BTUh/SF. These values are within 30% of the design load. The supply rate and ventilation rate of the modeled clinical building average to be about 1 CFM/SF and 0.62 CFM/SF which are also within 30% of the design.

An energy analysis of the annual consumption and utility costs showed a total energy utilization of 18,664,538 kBtu/yr with about 39% attributed to receptacle loads. Using actual utility rates of the Duke campus plant, the annual cost of energy was about $149,989 which is about $0.69 per square foot.

The last analysis of the Duke Cancer Center included an estimate of the expected pollution emittance from the new building based on electricity demand. Based on average emission factors in North Carolina, the Duke Cancer Center Expansion can expect to produce around 5.6 million pounds of CO_2 per year.

Building Overview

The Duke Cancer Center expansion is a state-of-the-art facility designed to better serve the Triangle population and the growing need for specialty cancer services and programs at Duke. Located in the southeast region of Duke University's medical campus in Durham, North Carolina, the Duke Cancer Center Expansion includes a 7-story + penthouse, 265,457 square foot addition to the Morris Cancer Center as well as renovations to the current Morris building (*see **Figure 2** below*). Construction of the Cancer Center which began in 2009 is scheduled for completion in February 2012 costing around $220 million.

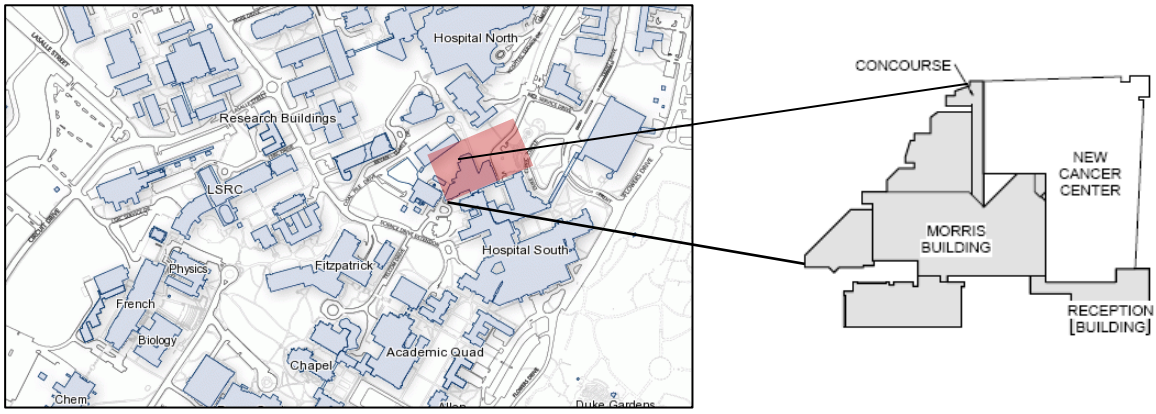


Figure 1-The Cancer Center Expansion located in Duke's medical campus. The scope of this report does not include the renovations done to the existing Morris Building (*key plan courtesy of TK&A Architects*).

Tsio/Kobus & Associates Architects designed new spaces and features of the facility with input from patients, care-givers and staff to better serve their needs and provide a comfortable healing environment. Primary medical spaces include 123 clinical rooms, 73 infusion stations, radiation oncology, radiology services and a mammography suite (*Note: The Mammography Suite is not included in the original design scope of TK&A and will be considered future tenant fit-out for the purposes of this report*). The center will also feature a cancer patient shop, an outdoor garden terrace with an infusion area for patients, a retail pharmacy, a patient resource center, a café, and a quiet room to improve the patient and family experience.

DCC is pursuing LEED © Silver Certification on the project by considering several energy conservation measures in its design. Sustainable design features include energy recovery between outside and exhaust air, efficient glazing for the façade and skylights, innovative design with shadow boxes, efficient lighting design, improved roof and wall insulation and a green roof.

Mechanical System Overview

Steam/Heating System

Duke University's central plant on campus provides high pressure steam and chilled water to the Cancer Center. High pressure steam from the plant enters the lowest level (00) mechanical room where it is reduced to medium pressure (~60 psi) and low pressure (~10psi) steam. The medium pressure steam is used to serve domestic hot water heaters, sterilizers, autoclaves and other medium pressure process equipment. Steam converted to lower pressure is used via heat exchangers to produce hot water for

space heating. The hot water is pumped to heating coils in the air handling units; reheat coils in the VAV terminal boxes and a few fan coil units serving the front vestibule on the entry level. Steam condensate is pumped back to the central utility plant.

Chilled Water System
The chilled water also provided by the campus plant enters the lowest mechanical room and is distributed directly to the main air-handling systems and fan coil units. Some water is also delivered to plate and frame heat exchangers as a secondary process to provide cooling to some medical equipment in the building like the linear accelerators and MRI's. There are also two air-cooled chillers on the roof on emergency power to back up the secondary process chilled water.

Air Handling System & Distribution
The building is served by three main combination constant/variable air volume air handling units summarized in *Table 1* below. AHU-1 and 3 each have a corresponding return air unit as well as economizers to maximize outdoor air intake in appropriate conditions. AHU-2 is a 100% outdoor air unit that matches with an exhaust unit (EAHU-1) serving the large waiting areas and triage rooms. An energy recovery wheel is utilized between AHU-2 and EAHU-1.

Table 1- DCC Air Handling Units

Unit Number	Service	Location	CFM	Minimum Outside Air CFM
AHU-1	Cancer Center	Penthouse	120000	24000
AHU-2	Cancer Center	Penthouse	120000	120000
AHU-3	Cancer Center/Atrium Smoke Make-up	00 Mech. Room	70000	14000
AHU-4	Cancer Center	00 Mech. Room	7000	0
EAHU-1	Cancer Center	Stacked on AHU-2	110000	-

Note AHU-4 supplies the large existing electrical room in the Morris Building and is not included in the scope of this report

Each comfort zone is provided with a separate variable volume terminal box with reheat coils that tracks the airflow to maintain a predetermined pressure for the zone and a space thermometer to track and modulate the damper on the box.

Telecommunication Rooms
The main telecommunication rooms are supplied by Computer Room Air-Conditioning Systems with supply fans, filter, chilled water cooling coil, hot water reheat coils, humidifiers and controls.

Atrium Smoke Control System
Two exhaust fans sized at 60,000 CFM are used to exhaust the 5-story Atrium in a smoke situation. Make-up air is supplied to the Atrium via louvers and dampered outside air along with make-up air from AHU-3.

System Design Load Estimation

To perform a block load and energy analysis of the Duke Cancer Center Expansion, a model was built using Trane TRACE™ 700 software with information from the design documents provided by TK&A Architects as well as information from a Whole Building Energy Simulation per LEED NC v2.2/ ASHRAE 90.1-2004 prepared by Air Water Energy Engineers, Inc. Information from the construction documents was first used to create the geometries for the spaces in the Cancer Center addition and then to create templates that were assigned to each space based on block load assumptions. The spaces were then assigned to the three air-handling systems serving them in order to run an 8,760 hour energy analysis and determine the design heating and cooling loads.

Occupancy Assumptions

The occupancy density per space for the Duke Cancer Center was determined by Basis of Design documentation and relative reports provided by the mechanical engineer, Bard, Rao + Athanas Consulting Engineers (BR+A). The architect did not prescribe exact values in furniture plans; therefore, the estimated values of the mechanical engineer which are similar to those provided in ASHRAE 62.1 Table 6-1 based on occupancy category were used for this analysis.

Ventilation Assumptions

Duke Cancer Center consists of a variety of clinical spaces that require more stringent ventilation rates than those specified for occupancy spaces in ASHRAE 62.1-2007. In order to more accurately reflect this in the energy model, air change rates per hour provided by the mechanical engineer (BR+A) in their BOD documentation were used in this analysis. Since the Cancer Center is served by three air-handling units, two of which are a minimum of 20% outdoor air and one of which is 100% outdoor air, the ventilation rates for a particular space were determined by the designated air change rate adjusted by the outdoor air percentage of the system the zone is serviced by. Below in *Table 2* is a summary of the air change rates for typical spaces in the Cancer Center.

Table 2- Typical Air Change Rate for DCC (air change per hour)

Space Type	ACHR
Infusion/Treatment	6
Isolation (Ante)	12
Examination/ Radiology	8
Laboratory	10
CT Scan/ Linear Accelerator	8
Office	6
Conference	8
Pharmacy	8
Food Service	10
Locker/Lounge	8
Corridor/Storage	2
Toilet/ Housekeeping/ Soiled Utility	10 (exhaust)

Infiltration

Duke Cancer Center has been designed to be positively pressurized to the surrounding outdoor air to prevent untreated and unfiltered air from leaking into conditioned spaces where patients are cared for. According to energy reports provided by the mechanical engineer, BR+A, infiltration rates at perimeter zones have been assumed to be 0.2 air changes per hour for new, tight building construction.

Lighting and Equipment Electrical Load Assumptions

The lighting loads for the Cancer Center addition used in this analysis were based off a detailed list of Watts per square foot assumptions provided by the third party consultant Air Water Energy Engineers, Inc. Lower lighting power densities (LPD) than the ASHRAE 90.1-2004 baselines were utilized in most spaces in this clinical building for a more efficient lighting design toward LEED accreditation. Typical LPD values can be seen in *Appendix A* as part of the template breakdown used to classify each room input in the Trane TRACE™ model.

Typical miscellaneous equipment loads were also based on Watts per square foot. Assumptions which can be seen below in *Table 3* were based off of design reports prepared by the mechanical engineer. In order to account towards the load in the later energy analysis, the energy meter which specifies what utility type is being used to produce the given internal load needed to be adjusted. Most of the equipment required electricity, however there were a few spaces like laboratories where the meter was set to heating load to account for the steam-to-hot water needed to serve autoclaves and sterilizing equipment.

Table 3- Assumed Miscellaneous Equipment Loads

Space Type	Misc. Equipment Load (W/SF)
Typical	0.5-1
CT Scan/Linear Accelerators, Comm	5
Elec, Food Service, Laboratory	8
Mechanical	10
Corridors, Storage, Toilets	0

The main electrical room in the basement (Level 00) is served solely by AHU-4 and is considered to be a part of the Morris Building renovations which is out of the scope of this report. Therefore, the load is not accounted for in this analysis.

Exterior Wall Construction

The exterior wall construction of the Duke Cancer Center consists primarily of concrete paneling and glazing. The bottom level (Level 00) is fully underground with concrete structured walls. The exterior walls of Level 0, Level 1 and Level 2 are a combination of concrete walls, precast concrete panels, metals panels, limestone walls and curtain wall type windows. The exterior walls of levels 3, 4, and 5 are curtain wall shadow box consisting of spandrel and vision glass mounted on a steel frame structure. The averaged U-values for the exterior wall panels and the fenestration used in this analysis were provided by the architect and can be found below in *Table 4*.

Table 4- Exterior Wall Construction

Building Envelope Material	U-Value	SHGC
Below Grade Wall	0.056	-
Limestone Wall (limestone + air gap + insulation + CMU)	0.053	-
Glass and frame	0.32	0.38

Weather Data

The weather data from the ASHRAE Handbook of Fundamentals for Raleigh, North Carolina was used for this analysis because of its similarities with Durham, North Carolina which is around 25 miles northwest. *Table 5* below provides a summary of the heating and cooling weather design conditions along with the design indoor temperatures based on the design documents provided by BR+A.

Table 5- Design Air Conditions for DCC

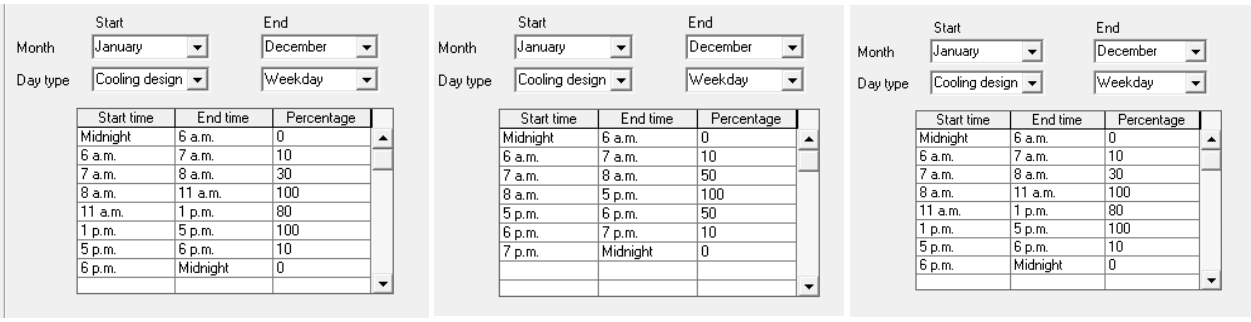
Space Type	Summer Season (0.4%)			Winter Season (99.6%)		
	Indoor Design (°F)	Outdoor DB (°F)	Outdoor WB (°F)	Indoor Design (°F)	Outdoor DB (°F)	Outdoor WB (°F)
Typical	75	93.7	72.4	70	16.3	-
Office	78	93.7	72.4	72	16.3	-
Food Services	80	93.7	72.4	75	16.3	-

Schedules

Three main schedules were used in this analysis to properly model the planned operation of the Cancer Center. The occupancy, lighting and equipment loads are based on an operation schedule from 8 AM to 6 PM Monday through Friday, 8 AM to 12 PM Saturday and unoccupied on Sunday. For the internal load

templates, a majority of the rooms were assigned the TRACE™ preset schedule for midrise buildings which is defined below for the cooling load in *Figure 2*. The schedule for heating design is set from midnight to midnight at 0%. This allows for 100% of loads to be accounted for during the core hours of the work day and to be reduced during lunch hours and flex time. Other spaces such as mechanical, electrical, storage and toilet rooms were set to a schedule for cooling only because those are defined more by maximum allowable temperatures and exhaust rates than an operation schedule.

Figure 2- Schedule Definition for Trace Preset: Midrise Buildings *(People, Lighting, Misc. Equip from Left to Right)*



Design documents specify HVAC operation from 7 AM to 6 PM Monday through Friday, 7 AM to 12 PM Saturday and off on Sunday with the air-handling units cycled on during off hours to satisfy any zone. To accommodate for the cycling during off hours, the 100% available preset schedule was chosen to model the airflow rates.

Calculated Load vs. Design Load Analysis

The results of the block load energy analysis are shown below in *Table 6* compared with the design values from another Trane TRACE™ report provided by the mechanical engineer.

Table 6- Calculated Load vs. Design Load Summary

		Service Area	Cooling SF/ton	Heating BTUh/SF	Total Supply CFM/SF	Ventilation Supply CFM/SF
Calculated	AHU-1	84221	317.47	27.8	0.99	0.38
	AHU-2	63443	190.53	47.11	0.98	0.86
	AHU-3	70065	221.73	35.84	1.03	0.62
	TOTAL	217729	729.73	110.75	3.00	1.86
Designed	AHU-1	68569	137.51	70.95	1.26	1.26
	AHU-2	55337	150.93	62.17	1.08	1.08
	AHU-3	97858	244.22	64.65	1.50	1.13
	TOTAL	221764	532.7	197.77	3.84	3.47
% Difference		1%	-16%	28%	12%	30%

The main differences in the calculated load versus the designed load can be seen in the heating load and ventilation rate and can be attributed to several differences in the assumptions made by the mechanical engineer and those used in the analysis.

The heating load of the calculated model which is 28% less than that designed would most likely be lower because of the airflow assumptions made. While the calculated model assumed air change rates based on space type for the heating airflow, the mechanical engineer could have used a heating load of 50% of the total cooling load which would make it higher. There is also the possibility that some of the heating load can be associated with all of the medical equipment required to operate this sort of healthcare facility. The designer most likely had more exact information and manufacturers cut sheets on equipment in order to specify greater heat loads.

Smaller differences may be seen in the differences in the geometry of the model. The calculated load may have accounted for or discounted some of the spaces that are included in the actual design. In particular, the model used in this analysis did not account for stairs which are served by cabinet unit heaters in the actual design. In the same respect, the modeled analysis blocked all equipment rooms as the same load whereas the actual design designates that some of the equipment rooms are to be served by computer room A/C units.

In addition to a comparison with the mechanical engineer's design, the cooling load and supply rate were also compared to the ASHRAE 1997 Pocket Guide in *Table 7*.

Table 7- Cooling and Supply Engineering Checks

Air Handler Zone	Calculated Cooling SF/ton	Total Supply CFM/SF
AHU-1	317	0.99
AHU-2	191	0.98
AHU-3	222	1.03
ASHRAE Guide	110-275	.7-1.3

The results show that the calculated model falls within the range for supply air rate under the hospital classification as determined by ASHRAE. The cooling loads of air-handling units are also similar to the range provided in the guide aside from AHU-1 which is a little larger than normal.

Annual Energy Consumption and Cost

A system energy consumption and operating cost analysis was also performed using the Trane TRACE™ model used in the block load analysis. In order to perform a full year energy simulation, the earlier model with the same assumed internal loads, ventilation rates, thermostat requirements and exterior wall construction was assigned to a plant. Duke University uses two campus steam plants (East and West) to provide high-pressure steam to the entire University, Hospital and Medical Center via coal, natural gas and fuel oil. While the West Campus Steam plant used to be the primary plant, the recently renovated

East Plant has taken its place allowing the West plant to be used as a peak shaving plant to meet higher demands during the winter season. The East Campus plant includes 15 natural gas boilers that use propane as a backup. For the purpose of analysis the TRACE™ model, a cooling plant with and air cooled chiller and a heating plant with a boiler were selected to represent the campus utility plants.

System Energy Consumption

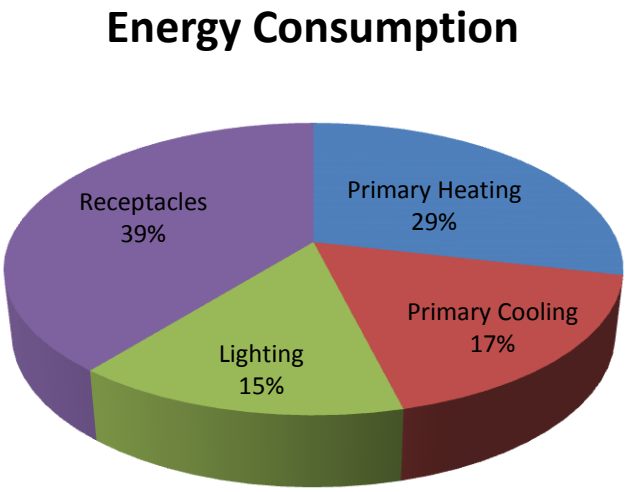
A breakdown of the system's energy consumption can be seen below in *Table 8*. The heating load represented in the TRACE™ analysis as gas consumption will actually be considered the steam consumption for this report since the Cancer Center is not running off of its own boilers.

Table 8- Energy Usage Breakdown

	Electical Consumption (kWh)	Gas Consumption (kBTU)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy (kBtu/yr)
Primary Heating					
Primary Heating		5,097,214	27.3%	5,097,214	5,365,488
Other Htg Accessories	72,986		1.3%	249,102	747,382
Heating Subtotal	72,986	5,097,214	28.6%	5,346,316	6,112,870
Primary Cooling					
Cooling Compressor	838,034		15.3%	2,860,210	8,581,487
Tower/Cond Fans	118,128		2.2%	403,171	1,209,634
Condenser Pump			0.0%	0	0
Other Clg Accessories	826		0.0%	2,820	8,460
Cooling Subtotal	956,988		17.5%	3,266,201	9,799,581
Lighting	801,327		14.7%	2,734,930	8,205,610
Receptacle	2,143,889		39.2%	7,317,091	21,953,468
Total	**3,975,190**	**5,097,214**	**100.0%**	**18,664,538**	**46,071,529**

The breakdown of energy consumption by category can be more easily seen in *Figure 3* below. The receptacle loads and heating loads dominate the energy consumption of the clinical facility because of the large miscellaneous equipment assumed to be a part of the radiological and radiation services offered by the Cancer Center.

Figure 3- DCC Modeled Energy Consumption

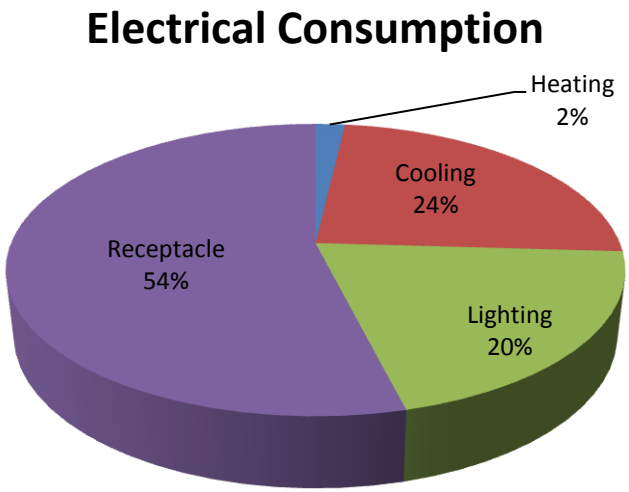


Electrical Consumption

A further breakdown of the energy consumption based on source was completed to see the main contributors to the electrical demand and can be seen below in *Figure 4*. While the receptacles still dominate the load, it is clearly seen that heating no longer dominates because it is sourced by steam water provided to the building rather than electricity. Cooling which represents about a quarter of the electrical load would not actually represent as much usage if the amount of chilled water provided to the systems vs. electricity had been taken into consideration.

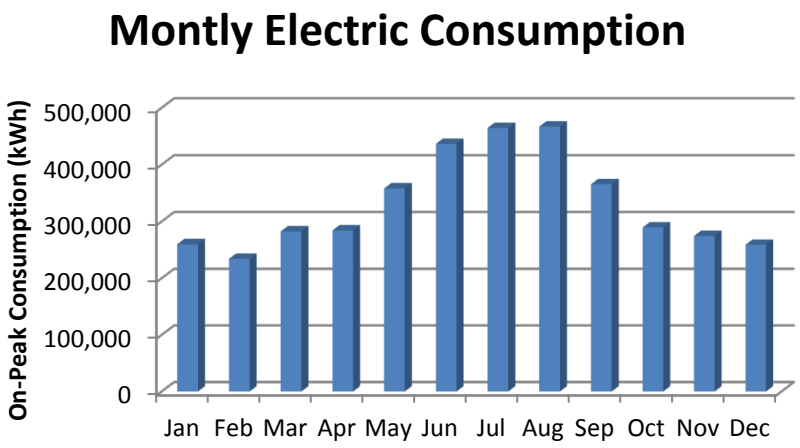
Figure 4- DCC Electrical Consumption

Component	Electrical Consumption (kWh)
Heating	72,986
Cooling	956,988
Lighting	801,327
Receptacle	2,143,889



A monthly breakdown of the electric consumption shown below in *Figure 5* displays the electrical peaks during the summer months. This would be the typical trend assumed because while there is always a base load from lighting and other equipment, cooling equipment would require more electricity during the hotter months. The reverse would be expected for the steam consumption of the Caner Center. The peak loads would occur during the colder months of the year when more water must be sent to terminal units for reheat with a minimum base load from various processing equipment that require hot water.

Figure 5- DCC Monthly Electric Consumption



Energy Consumption Comparison

A third party consultant Air Water Energy Engineers used VisualDOE 4.1 energy models to simulate annual energy consumption in order to compare the results of the proposed design to a baseline building case per ASHRAE 90.1-2004. The results of the third party energy analysis can be seen below in Figures 6 and 7.

Figure 6- AWE Analysis Energy Consumption

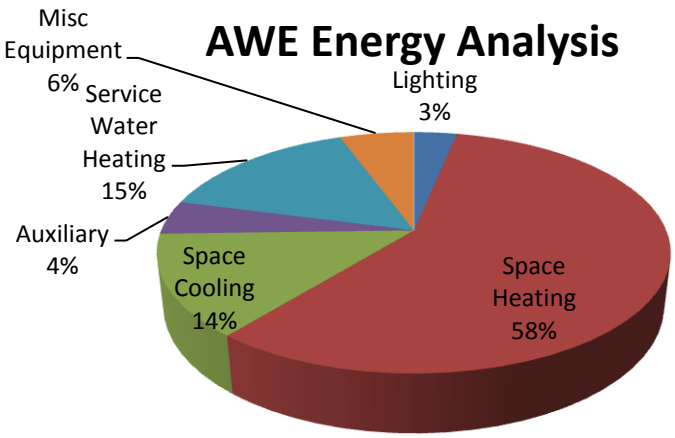


Figure 7-AWE Analysis Breakdown of Energy Usage

End Use	Energy Type	Proposed Building Energy (MBtu/yr)	Proposed Building Peak (kBtu/h)
Lighting - interior	Electricity	2125.5	675.8
Lighting - exterior	Electricity	70.7	15
Space heating (1)	Electricity	0.1	3.1
Space heating (2)	District Steam	39325.8	13410
Space Cooling (1)	Electricity	68.1	28.7
Space cooling (2)	District Chilled Water	9248.9	5758.8
Pumps	Electricity	99.4	53.9
Fans	Electricity	2995.5	836.9
Service water heating	District Steam	10446.5	4287
Misc Equipment	Elec-unregulated	3809.1	831.4
Total Building Consumption (Regulated)		64380.5	

The results of the calculated model from TRACE™ are compared with those of the AWE analysis in *Table 9* and *10* below. The differences in the energy usage between the two are quite extreme and the calculated model predicts much less especially with regards to district steam. While there are definitely differences in assumptions made between the two models, there may also be a distinct difference in the operation of the software used to analyze the same building. While the AWE model may account for the energy wheel utilized between AHU-2 (100% outdoor air) and EAHU-1 which the TRACE™ model does not, one would not expect a higher heating load with the inclusion of an energy recovery system.

Table 9- Calculated vs. AWE Analysis Total Energy Consumption

Fuel Type	Energy Use per year (kWh)		
	Calculated	**AWE Analysis**	**% Difference**
Electricity	10,301	5,359	32%
District Steam	5,094	49,772	81%
District Chilled Water	3,266	9,248	48%

Table 10- Calculated vs. AWE Analysis Peak Loads

	Calculated	**AWE Energy Analysis**	**% Δ**
Heating Peak (kBtu/h)	7,753	13,413	27%
Cooling Peak (kBtu/h)	10,784	5,788	30%

In order to investigate the details causing such magnitude of differences in consumption totals, more research must be done of the third party consultant's assumptions.

Building Energy Costs

The assumed rates for purchased electricity, steam and chilled water were based on the actual rates charged by the Duke campus plant and were taken from the energy report prepared by the third party energy consultants. They can be seen below in *Table 11.* The steam is initially $.011 per pound, but in order to account for heat losses at the at the Steam-to-Hot Water heat exchanger and the pressure reducing station the rate is converted to $11.63 per MBTU which is the value used for this analysis.

Table 11- Duke Campus Plant Utility Rates

Source	Rate
Electricity	$0.06 per kWh
Chilled Water	$0.14 per Ton-Hour
Steam	$11.63 per MBTU

Using the above defined rates, it can be concluded that Duke Cancer Center Expansion would expect to spend around $150,000 each year on utilities which is about $0.69 per square foot. A cost breakdown can be seen below in *Table 12*. This approximation seems reasonable because the facility is purchasing from a campus plant and not running off of its own generation. This estimate however pales in comparison to that of the AWE analysis which comes in at about $976,829 per year, almost 7x as much.

Table 12- DCC Energy Costs

	Total Building Energy	Cost Rate ($/kBtu)	Cost per year $	Cost per SF $
Electricity	2,991,349	0.01758	52,602.85	0.24
Chilled Water	3,266,201	0.01167	38,105.68	0.18
Steam	5,097,214	0.01163	59,280.60	0.27
TOTAL			149,989.13	0.69

System Emission Rates

The emissions associated with the delivered electric energy to the Duke Cancer Center are shown below in *Table 13*. Using the total electrical consumption and emission rates for the state of North Carolina, the emissions per year of Co_2, NO_X, SO_X, PM10 (highlighted in red) and other pollutants were calculated. The emission factors are taken from Table B-10 Total Emission Factors for Delivered Electricity by State (lb. of pollutant per kWh of electricity) provided by the National Renewable Energy Laboratory which can also be found in Appendix C. Because the Cancer Center uses steam from a central plant, emissions from on-site combustion are not taken into account.

Table 13- DCC Pollutant Emissions

Pollutant	Emission Factor #/kWh	Electrical Consumption kWh/yr	Pollutant Total #/yr
CO_{2e}	1.47E+00	3,975,191	5,843,531
CO_2	1.41E+00	3,975,191	5,605,019
CH_4	2.37E-03	3,975,191	9,421
N_2O	3.11E-05	3,975,191	124
NO_X	2.83E-03	3,975,191	11,250
SO_X	8.26E-03	3,975,191	32,835
CO	4.31E-04	3,975,191	1,713
TNMOC	5.25E-05	3,975,191	209
Lead	1.16E-07	3,975,191	0
Mercury	2.40E-08	3,975,191	0
PM10	6.55E-05	3,975,191	260
Solid Waste	1.78E-01	3,975,191	707,584

Conclusion

With improved building energy performance becoming more and more essential in today's industry, the use of energy modeling and simulation is of critical importance. In addition to aiding in the design of the mechanical engineers, models help create visuals for owners to better understand the operation and maintenance of their building and its impact of the environment. While a model is useful in many ways, correct assumptions and inputs are key in gauging the accurateness of the model.

Without absolutes, differences as large as those between the calculated model in this report and that of the third party consultant for the Duke Cancer Center can result in completely different designs of the same program space.

References

Air Water Energy Engineers, Inc. *LEED Energy Performance Analysis*. 19 Mar. 2010. Duke University Cancer Center Expansion.

ANSI/ASHRAE. (2007). *Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality*. Atlanta, GA: American Society of Heating Refrigeration and Air Conditioning Engineers, Inc.

ANSI/ASHRAE. (2007). *Standard 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings*. Atlanta, GA: American Society of Heating Refrigeration and Air Conditioning Engineers, Inc.

ANSI/ASHRAE. (2008). *Standard 170-2008, Ventilation of Health Care Facilities*. Atlanta, GA: American Society of Heating Refrigeration and Air Conditioning Engineers, Inc.

ASHRAE. Pocket Guide. Atlanta: ASHRAE, 1997.

Bard, Rao + Athanas Consulting Engineers, LLP. Electrical Construction Documents. Bard, Rao + Athanas Consulting Engineers, LLP, Watertown, MA

Bard, Rao + Athanas Consulting Engineers, LLP. Mechanical Construction Documents. Bard, Rao + Athanas Consulting Engineers, LLP, Watertown, MA

National Renewable Energy Laboratory. *Source Energy and Emission Factors for Energy Use in Buildings*. M. Deru and P. Torcellini. 2007.

Trane TRACE™ 700 v.6.2.6.5 (2010) Tyler, TX, United States of America.

Tsoi/Kobus & Associates Architects. Architectural Construction Documents. Tsoi/Kobus & Associates Architects, Cambridge, MA

Appendix A- Trace Template Inputs

Template	Internal Load							Airflow			Thermostat		
	People	Schedule	Workstations (per person)	Lighting (W/sq ft)	Schedule	Misc Loads	Schedule	Cooling (ACHR)	Heating (ACHR)	VAV Min	Cooling DB	Heating DB	RH (±5%)
Comm	33.3 sf/per	Midrise Bldg	1	1	Midrise Bldg	5	Midrise Bldg	2 cfm/sf	2 cfm/sf	30% clg	75	70	-
Conference Rooms	16 ppl	Midrise Bldg	1	1.86	Midrise Bldg	0	Midrise Bldg	8	8	8	75	70	-
Corridors	0	Midrise Bldg	0	0.64	Midrise Bldg	0	Midrise Bldg	100% clg	50% clg	50% clg	78	70	-
CT Scan/ Liner Accelerators	2 ppl	Midrise Bldg	1	1.5	Midrise Bldg	5	Cooling Only	8	8	8	75	70	-
Distribution Elec	0	Cooling Only	1	1.61	Cooling Only	8	Cooling Only	100% clg	50% clg	30% clg	78 MAX	-	-
Emergency Elec	0	Cooling Only	1	2	Cooling Only	8	Cooling Only	100% clg	50% clg	30% clg	78 MAX	-	-
Examination Rooms	50 sf/per	Midrise Bldg	1	1.95	Midrise Bldg	0.75	Midrise Bldg	8	8	8	75	70	-
Infusion Rooms	50 sf/per	Midrise Bldg	1	1.07	Midrise Bldg	0.5	Midrise Bldg	6	6	6	80	70	-
Isolation Rooms	50 sf/per	Midrise Bldg	1	1.95	Midrise Bldg	0.5	Midrise Bldg	12	12	12	75	70	-
Food Service	33.3 sf/per	Midrise Bldg	1	1.5	Midrise Bldg	8	Midrise Bldg	10	10	10	80	75	-
Laboratories	33.3 sf/per	Midrise Bldg	1	1.79	Midrise Bldg	8	Midrise Bldg	10	10	10	75	70	-
Lobby	33.3	Midrise Bldg	1	0.61	Midrise Bldg	1	Midrise Bldg	15 cfm/per	15 cfm/per	30% clg	75	70	-
Lockers/Lounges	50 sf/per	Midrise Bldg	1	0.47	Midrise Bldg	0.5	Midrise Bldg	8	8	8	75	70	-
Mechanical Rooms	0	Cooling Only	1	0.23	Midrise Bldg	10	Midrise Bldg	100% clg	50% clg	30% clg	78 MAX	-	-
Office	50 sf/per	Midrise Bldg	1	0.77	Midrise Bldg	0.75	Midrise Bldg	6	6	6	78	72	-
Pharmacy	50 sf/per	Midrise Bldg	1	1.23	Midrise Bldg	0	Midrise Bldg	8	8	8	75	70	50%
Radiology Rooms	50 sf/per	Midrise Bldg	1	0.36	Midrise Bldg	1	Midrise Bldg	8	8	8	75	70	-
Soiled Holding/Recycle	0	Cooling Only	1	0.94	Cooling Only	0	Cooling Only	10	10	-	75	70	-
Storage	0	Cooling Only	1	0.94	Cooling Only	0	Cooling Only	.12 cfm/sf	.12 cfm/sf	-	78	70	-
Toilets	0	Cooling Only	1	0.56	Cooling Only	0	Cooling Only	0	0	-	75	70	-
Treatment Rooms	50 sf/per	Midrise Bldg	1	1.95	Midrise Bldg	0.75	Midrise Bldg	6	6	6	75	70	-
Waiting Rooms	20 sf/per	Midrise Bldg	1	1.5	Midrise Bldg	0.5	Midrise Bldg	8	8	8	75	70	-
Workstation	100 sf/per	Midrise Bldg	1	0.89	Midrise Bldg	1	Midrise Bldg	100% clg	50% clg	30% clg	75	70	-

Appendix B- Room Details

Room Level	Room Number	Room Name	Zone	Exterior Wall	VAV Service	AHU		Floor Area	Room Type
0	0001	Comm	Exterior	W-14'6	0-11	AHU -1		117	Comm
0	0002	Emergency Electric	Interior		0-13	AHU -1		53	Emergency Elec
0	0003	Recycle	Interior				Exhaust Only	98	Soiled Holding/Recycle
0	0005	Zoned Mechanical	Interior		0-3	AHU -1		96	Mechanical
0	0006	Building Storage	Interior		0-5	AHU -1		167	Storage
0	0007	Housekeeping	Interior				Exhaust Only	61	Soiled Holding/Recycle
0	0008	Staff Lounge	Interior		0-7	AHU -1		179	Lounge/Locker
0	0009	Lockers	Interior		0-7	AHU -1		129	Lounge/Locker
0	0010	Staff Toilet	Interior				Exhaust Only	45	Toilet
0	0011	Boutique Storage	Interior		0-8	AHU -1		43	Storage
0	0011D	Pharmacy	Interior		0-9, 0-10, 0-24	AHU -1		1250	Pharmacy
0	0011H	Haz Drugs	Interior		0-14	AHU -1		71	Pharmacy
0	0011I	Pharm Office	Interior		0-16	AHU -1		114	Office
0	0011K	Consult	Interior		0-44	AHU -2		90	Office
0	0013	Electric	Interior		0-29	AHU -2		111	Distribution Elec
0	0014	Food Services Dining	Exterior	N-81'10 (730sf)	0-37, 0-39	Ahu-2		1337	Kitchen/Dietary
0	0014A	Food Servery	Interior		0-36	AHU -2		608	Kitchen/Dietary
0	0016A	Passage	Interior					79	Corridor
0	0016B	Toilet	Interior				Exhaust Only	48	Toilet
0	0016C	Toilet	Interior				Exhaust Only	48	Toilet
0	0016D	Trash Holding	Interior				Exhaust Only	38	Soiled Holding/Recycle
0	0017	Prep Storage	Interior		0-28	AHU -2		288	Storage
0	0017A	Office/Storage	Interior		0-35	AHU -2		97	Office
0	0017B	Walk-in Cool/Frz	Interior				none	122	DELETED
0	0017C	Housekeeping	Interior				Exhaust Only	27	Soiled Holding/Recycle
0	0019	Conference	Exterior	N-27'2 (39sf), E-27'2	0-40	AHU -2		487	Conference
0	0023D	Retail Pharm Drop-off	Interior		0-23	AHU -2		896	Waiting
0	0025	Retail Pharm Waiting	Interior		0-27	AHU -2		217	Waiting
0	0026	Office	Interior		0-21	AHU		89	Office

						-2			
0	0027	Vanity Station	Interior		0-21	AHU -2		67	Office
0	0028	Vanity Station	Interior		0-21	AHU -2		67	Office
0	0029	Passage	Interior		0-21	AHU -2		128	Corridor
0	0030	Dressing	Interior		0-18	AHU -2		68	Office
0	0031	Prosth Consult	Interior		0-18	AHU -2		280	Office
0	0032	Boutique	Interior		0-19, 0-20	AHU -2		750	Office
0	0033	Office	Interior		0-17	AHU -2		106	Office
0	0034	Passage	Interior		0-17	AHU -2		60	Corridor
0	0035	Office	Interior		0-17	AHU -2		116	Office
0	0036	Skills Lab	Interior		0-31	AHU -2		156	Laboratory
0	0037	Resource Center	Interior		0-32, 0-33	AHU -2		1501	Office
0	0038	Passage	Interior		0-38	AHU -2		128	Corridor
0	0040	Lobby	Exterior	E-30' (80%)	1-46, 1-48, 1-50	AHU -2		2450	Lobby
0	0041	Reception	Interior		1-46, 1-48, 1-50	AHU -2		211	Waiting
0	0042	Quiet Room	Interior		0-26	AHU -2		942	Office
0	0044	Vestibule	Interior					128	Lobby
0	0045	Women	Interior		0-84	AHU -3		307	Toilet
0	0046	Men	Interior		0-84	AHU -3		246	Toilet
0	0047	Registration	Interior		0-80	AHU -1		398	Waiting
0	0048	Waiting	Exterior	E-58' (75%)	0-72, 0-73, 0-80, 0-81, 0-82	AHU -3		3444	Waiting
0	0049	Fin Consult	Interior		0-79	AHU -3		84	Office
0	0050	Fin Consult	Interior		0-79	AHU -3		84	Office
0	0051	Fin Consult	Interior		0-79	AHU -3		84	Office
0	0052	Fin Consult	Interior		0-78	AHU -3		84	Office
0	0053	Fin Consult	Interior		0-78	AHU -3		81	Office
0	0054	Fin Consult	Interior		0-78	AHU -3		84	Office
0	0055	Fin Consult	Interior		0-78	AHU -3		84	Office
0	0056	Fin Consult	Interior		0-78	AHU -3		79	Office
0	0057	Port Draw	Interior		0-77	AHU -3		84	Office
0	0058	Port Draw	Interior		0-77	AHU -3		84	Office
0	0059	Port Draw	Interior		0-77	AHU -3		97	Office

0	0060	Passage	Interior		0-76	AHU -3		179	Office
0	0061A	Pat Toilet	Interior				Exhaust Only	45	Toilet
0	0061B	Pat Toilet	Interior				Exhaust Only	45	Toilet
0	0062	Priv	Interior		0-75	AHU -3		92	Treatment
0	0063	Office	Interior		0-76	AHU -3		67	Office
0	0064	Blood Draw	Interior		0-74	AHU -3		748	Treatment
0	0065	Storage	Interior		0-75	AHU -3		117	Storage
0	0066	Comm	Interior		0-83	AHU -3		135	Comm
1	1000	Holding	Exterior	N-12'3	1-6	AHU -1		370	Corridor
1	1002	Team Workstation	Exterior	N-19'3	1-7	AHU -1		189.3	Workstation
1	1003	Pedi	Exterior	N-12'	1-8	AHU -1		84	Treatment
1	1004	Injection	Exterior	N-10'1	1-9	AHU -1		102.6	Treatment
1	1005	Injection	Exterior	N-10'8	1-9	AHU -1		216.6	Treatment
1	1006	Injection	Exterior	N-10'5	1-32	AHU -1		100	Treatment
1	1007	Injection	Exterior	N-10'4	1-32	AHU -1		102	Treatment
1	1008	Injection	Exterior	N-8'10	1-32	AHU -1		100	Treatment
1	1009	Anteroom	Exterior	N-7'	1-33	AHU -1			Laboratory
1	1009A	Hot Lab	Exterior	N-10'2	1-33.	AHU -1			Office
1	1010	DR	Exterior	N-6'7	1-33	AHU -1			Office
1	1011	Injection	Exterior	N-10'	1-35	AHU -2		124.3	Treatment
1	1013	Injection	Exterior	N-9'8	1-35	AHU -2		157.6	Treatment
1	1014	Injection	Exterior	N-9'6	1-36	AHU -2		285.1	Treatment
1	1015	Control	Exterior	N-10'3	1-37	AHU -2		116.2	Office
1	1016	Spect Control	Exterior	N-21'3	1-38	AHU -2		57.4	Office
1	1017	Pat Toilet	Interior				Exhaust Only	46	Toilet
1	1018	Injection	Interior		1-43	AHU -2		85	Treatment
1	1020	Ultrasound	Exterior	E-7'	1-42	AHU -2		250	Treatment
1	1020A	Pat Toilet	Exterior	E-7'			Exhaust Only		Toilet
1	1020B	Work Area	Exterior	N-13'	1-40	AHU -2		129	Workstation
1	1020C	Re-Process	Interior		1-39	AHU -2		162	Office
1	1021	Conference	Exterior	N-22'2, E-22'2, S-12'6	1-41	AHU -2		526	Conference
1	1022	Stress Test	Interior		1-4	AHU -1		158	Treatment

1	1022A	Reading	Interior		1-3	AHU -1		318	Office
1	1023	Staff Lounge	Interior		1-57	AHU -1		182	Lounge/Locker
1	1024	Lockers	Interior		1-2	AHU -1		112	Lounge/Locker
1	1025	Soiled Holding	Interior		1-2	AHU -1		68	Soiled Holding/Recycle
1	1026	Recycle	Interior				Exhaust Only	52	Soiled Holding/Recycle
1	1027	Emergency Electric	Interior		1-1	AHU -1		56	Emergency Elec
1	1028	Housekeeping	Interior				Exhaust Only	25	Soiled Holding/Recycle
1	1030	Pet/CT	Interior		1-10	AHU -1		427	CT Scan/Linear Accelerator
1	1031	Control	Interior		1-11	AHU -1		319	Office
1	1031A	Work Area	Interior		1-12	AHU -1		168	Workstation
1	1032	Pet/CT	Interior		1-30	AHU -1		428	CT Scan/Linear Accelerator
1	1034	Control	Interior		1-31	AHU -1		88	Office
1	1035	Pat Toilet	Interior				Exhaust Only	48	Toilet
1	1036	Storage	Interior		1-29	AHU -1		420	Storage
1	1038	Spect Control	Interior		1-34	AHU -2		407	Office
1	1037	Office	Interior		1-28	AHU -1		140	Office
1	1039	Staff Toilet	Interior				Exhaust Only	61	Toilet
1	1040	Work Area	Interior		1-14	AHU -1		228	Workstation
1	1045	CT Coordinator	Interior		1-27	AHU -1		154	Office
1	1045A	Staff Toilet	Interior				Exhaust Only	48	Toilet
1	1046	Fins Cons	Interior		1-44	AHU -2		115	Office
1	1047	Post-Proc Consult	Interior		1-43	AHU -2		136	Office
1	1048	Elec	Interior		1-45	AHU -2		135	Distribution Elec
1	1049	Control	Interior		1-16	AHU -1		360	Office
1	1050	CT	Interior		1-17	AHU -1		340	CT Scan/Linear Accelerator
1	1050A	Control	Interior		1-15	AHU -1		130	Office
1	1051	CT	Interior		1-18	AHU -1		375	CT Scan/Linear Accelerator
1	1052	Control	Interior		1-20	AHU -1		107	Office
1	1052A	Control	Interior		1-22	AHU -1		103	Office
1	1053	CT	Interior		1-21	AHU -1		384	CT Scan/Linear Accelerator
1	1054	CT	Interior		1-23	AHU -1		376	CT Scan/Linear Accelerator

1	1055	Control	Interior		1-26	AHU -1		99	Office
1	1056	CT	Interior		1-25	AHU -1		331	CT Scan/Linear Accelerator
1	1058	Pat Toilet	Interior				Exhaust Only	55	Toilet
1	1059	Pat Toilet	Interior				Exhaust Only	55	Toilet
1	1060	Gown Waiting	Interior				Exhaust Only	85	Office
1	1061	Work Area	Interior		1-19	AHU -1		90	Workstation
1	1062	Gown Waiting	Interior				Exhaust Only	112	Office
1	1063	Prep	Interior		1-24	AHU -1		72	Storage
1	1064	Prep	Interior		1-24	AHU -1		74	Storage
1	1065	Prep	Interior		1-24	AHU -1		75	Storage
1	1066	DR	Interior				Return Only	40	Office
1	1067A	Pat Toilet	Interior				Exhaust Only	57	Toilet
1	1067	DR	Interior				Return Only	57	Office
1	1068	Reception	Interior		1-47, 1-49, 1-51	AHU -2		220	waiting
1	1069	Waiting	Interior		1-47, 1-49, 1-51	AHU -2		1736	waiting
1	1071	Women	Interior		1-53	AHU -2		246	Toilet
1	1072	Men	Interior		1-53	AHU -2		216	Toilet
1	1072A	Housekeeping	Interior				Exhaust Only	11	Soiled Holding/Recycle
1	1073	Waiting	Exterior	E-26'5	1-62, 1-63	AHU -3		1279	waiting
1	1073A	Reception	Interior		1-62, 1-63	AHU -3		96	waiting
1	1074	Comm	Interior		1-78	AHU -3		267	Comm
1	1075	X-Ray	Interior		1-79	AHU -3		375	Radiology Room
1	1076	Pat Toilet	Interior				Exhaust Only	47	Toilet
1	1077	Gown Waiting	Interior		1-78	AHU -3		60	Office
1	1078	Gown Waiting	Interior		1-78	AHU -3		58	Office
1	1079	Equipment	Interior				CAC	200	Distribution Elec
1	1080	Equipment	Interior				CAC	140	Distribution Elec
1	1081	MRI	Interior		1-77	AHU -3		530	CT Scan/Linear Accelerator
1	1082	MRI	Interior		1-74	AHU -3		562	CT Scan/Linear Accelerator
1	1083	Control	Interior		1-76	AHU -3		157	Office
1	1084	Prep	Interior		1-66	AHU -3		95	Storage
1	1085	Prep	Interior		1-66	AHU -3		95	Storage

1	1086	Passage	Interior		1-67	AHU -3		368	Corridor
1	1087	MRI	Interior		1-75	AHU -3		553	CT Scan/Linear Accelerator
1	1088	MRI Coordination	Interior		1-65	AHU -3		150	Office
1	1091	Gown Waiting	Interior		1-67	AHU -3		54	Office
1	1092	Gown Waiting	Interior		1-67	AHU -3		54	Office
1	1093	Pat Toilet	Interior				Exhaust Only	46	Toilet
1	1094	Pat Toilet	Interior				Exhaust Only	50	Toilet
1	1095	Equipment	Interior				CAC	199	Distribution Elec
1	1096	Reading	Interior		1-71	AHU -3		430	Office
1	1097	Storage	Interior		1-73	AHU -3		101	Storage
1	1098	Lockers	Interior		1-72	AHU -3		125	Lounge/Locker
1	1099	Staff Lounge	Interior		1-70	AHU -3		198	Lounge/Locker
1	1100	Soiled Holding	Interior				Exhaust Only	84	Soiled Holding/Recycle
1	1101	Staff Toilet	Interior				Exhaust Only	52	Toilet
1	1103	Electrical	Interior		1-69, 1-68	AHU -3		75	Distribution Elec
1	1104	Emergency Electric	Interior		1-69, 1-68	AHU -3		35	Emergency Elec
1	1106	Equipment	Interior		1-13	AHU -1		221	Distribution Elec
1	1106A	Lead-Lined Storage	Interior				none	79	DELETED
1	1120	Rad/Fluoro	Interior		1-61, 1-60	AHU -3		393	Radiology Room
1	1121	DR	Interior				Exhaust Only	49	Office
1	1122	DR	Interior				Exhaust Only	45	Office
1	1123	Storage	Interior		1-60	AHU -3		53	Storage
1	1195	Passage	Interior		1-73, 1-70	AHU -3		53	Corridor
2	2000	Nurse Manager	Exterior	N-12'4 (28sf)	2-4	AHU -1		148	Office
2	2001	Support Office	Exterior	N-10' (28sf)	2-3	AHU -1		132	Office
2	2002	Support Office	Exterior	N-10'6 (28sf)	2-3	AHU -1		144	Office
2	2003	Clinical Trials	Exterior	N-10'2 (28sf)	2-3	AHU -1		148	Treatment
2	2004	Physician Workroom	Exterior	N-21' (56sf)	2-2	AHU -1		310	Workstation
2	2005	Physician Workroom	Exterior	N-21' (56sf)	2-22	AHU -1		325	Workstation
2	2006	Support Office	Exterior	N-10'10 (28sf)	2-23	AHU -1		165	Office
2	2007	Support Office	Exterior	N-10' (28sf)	2-23	AHU -1		169	Office
2	2008	Physician Workroom	Exterior	N-21' (56sf)	2-25	AHU -1		353	Workstation

2	2009	Physician Workroom	Exterior	N-20'8 (56sf)	2-26	AHU -1		366	Workstation
2	2010	Clinical Trials	Exterior	N-10'6 (28sf)	2-27	AHU -1		184	Treatment
2	2011	Staff Lounge	Exterior	N-21'7 (56sf)	2-30	AHU -1		395	Lounge/Locker
2	2012	Lockers	Exterior	N-11'4 (80%)	2-31	AHU -1		258	Lounge/Locker
2	2013	Exam	Interior		2-7	AHU -1		134	Examination Room
2	2014	Exam	Interior		2-5	AHU -1		116	Examination Room
2	2015	Exam	Interior		2-7	AHU -1		124	Examination Room
2	2016	Exam	Interior		2-7	AHU -1		130	Examination Room
2	2017	Zone Mechanical	Interior		2-6	AHU -1		86	Mechanical
2	2018	Physician Workroom	Interior		2-8	AHU -1		226	Workstation
2	2019	Housekeeping	Interior				Exhaust Only	24	Soiled Holding/Recycle
2	2020	Emergency Electric	Interior		2-50	AHU -2		69	Emergency Elec
2	2021	Staff Toilet	Interior				Exhaust Only	48	Toilet
2	2022	Pat Toilet	Interior				Exhaust Only	61	Toilet
2	2023	Exam	Interior		2-1	AHU -1		115	Examination Room
2	2024	Exam	Interior		2-1	AHU -1		116	Examination Room
2	2025	Exam	Interior		2-10	AHU -1		125	Examination Room
2	2026	Triage	Interior		2-11	AHU -1		120	Examination Room
2	2027	Exam	Interior		2-10	AHU -1		119	Examination Room
2	2028	Team Workstation	Interior		2-13	AHU -1		618	Workstation
2	2028A	Workroom	Interior		2-13	AHU -1		134	Workstation
2	2029	Exam	Interior		2-14	AHU -1		108	Examination Room
2	2030	Assess Exam	Interior		2-15	AHU -1		120	Examination Room
2	2031	Clean Supply	Interior		2-14	AHU -1		118	Office
2	2032	Assessment	Interior		2-15	AHU -1		117	Office
2	2033	Equipment	Interior		2-21	AHU -1		114	Distribution Elec
2	2034	Pat Toilet	Interior				Exhaust Only	61	Toilet
2	2035	Staff Toilet	Interior				Exhaust Only	48	Toilet
2	2036	Exam	Interior		2-17	AHU -1		118	Examination Room
2	2037	Exam	Interior		2-12	AHU -1		118	Examination Room
2	2038	Exam	Interior		2-17	AHU -1		120	Examination Room
2	2039	Soiled Holding	Interior		2-17	AHU -1		117	Soiled Holding/Recycl

									e
2	2040	Assess Exam	Interior		2-15	AHU -1		132	Examination Room
2	2041	Check Out	Interior		2-16	AHU -1		298	Office
2	2042	Financial Consult	Interior		2-15	AHU -1		105	Office
2	2043	Staff Toilet	Interior				Exhaus t Only	48	Toilet
2	2044	Pat Toilet	Interior				Exhaus t Only	52	Toilet
2	2045	Exam	Interior		2-24	AHU -1		119	Examination Room
2	2046	Exam	Interior		2-18	AHU -1		118	Examination Room
2	2047	Triage	Interior		2-36	AHU -2		118	Examination Room
2	2048	Exam	Interior		2-18	AHU -1		120	Examination Room
2	2049	Exam	Interior		2-18	AHU -1		119	Examination Room
2	2050	Team Workstation	Interior		2-38	AHU -2		619	Workstation
2	2051	Procedure	Interior		2-20	AHU -1		134	Treatment
2	2052	Assess Exam	Interior		2-43	AHU -2		120	Examination Room
2	2053	Comm	Interior		2-19	AHU -1		141	Comm
2	2054	Assessment	Interior		2-43	AHU -2		117	Office
2	2055	Exam	Interior		2-24	AHU -1		117	Examination Room
2	2056	Equipment	Interior		2-28	AHU -1		113	Distribution Elec
2	2057	Exam	Interior		2-29	AHU -1		126	Examination Room
2	2058	Exam	Interior		2-37	AHU -2		118	Examination Room
2	2059	Electical	Interior		2-39	AHU -2		132	Distribution Elec
2	2060	Exam	Interior		2-42	AHU -2		116	Examination Room
2	2061	Assess Exam	Interior		2-43	AHU -2		132	Examination Room
2	2062	Check Out	Interior		2-42	AHU -2		301	Office
2	2063	Financial Consult	Interior		2-43	AHU -2		105	Office
2	2064	Staff Toilet	Interior				Exhaus t Only	46	Toilet
2	2065	Pat Toilet	Interior				Exhaus t Only	46	Toilet
2	2066	Procedure	Interior		2-33	AHU -1		224	Treatment
2	2067	Physician Workroom	Interior		2-34	AHU -1		316	Workstation
2	2068	Clean Supply	Interior		2-35	AHU -1		113	Office
2	2069	Exam	Interior		2-42	AHU -2		109	Examination Room
2	2070	Exam	Interior		2-41	AHU -2		121	Examination Room

2	2071	Exam	Interior		2-41	AHU -2		132	Examination Room
2	2072	Exam	Interior		2-41	AHU -2		127	Examination Room
2	2074	Conference	Exterior	N-22'2 (232sf) , E-22'2 (232sf), S-12'6	2-32	AHU -1		536	Conference
2	2079	Waiting	Interior		2-45, 2-46, 2-47, 48, 2-49, 2-51, 2-54	AHU -2		3096	waiting
2	2080	Reception	Interior		2-47	AHU -2		184	waiting
2	2081	Host Station Resource	Interior		2-45	AHU -2		239	Office
2	2083	Reception	Interior		2-51	AHU -2		184	waiting
2	2084	Waiting	Exterior	E-27' (182sf)	2-54, 2-55	AHU -2		1196	waiting
2	2085	Women	Interior		2-44	AHU -2		247	Toilet
2	2086	Men	Interior		2-44	AHU -2		215	Toilet
2	2086A	Housekeeping	Interior				Exhaus t Only	10	Soiled Holding/Recycl e
2	2087	Mammography Suite	Interior		2-XX	AHU -3		1027 1	Corridor
2	2088	Elec	Interior		2-XX	AHU -3		13	Corridor
2	2089	Elec	Interior		2-XX	AHU -3		35	Corridor
2	2090	Zone Mechanical	Interior		2-56	AHU -3		65	Mechanical
2	2091	Emergency Electric	Interior		2-56	AHU -3		38	Emergency Elec
2	2096	Exam	Interior		2-35	AHU -1		117	Examination Room
3	3000	Nurse Manager	Exterior	N-11'10	3-4	AHU -1		145	Office
3	3001	Support Office	Exterior	N-9'11	3-3	AHU -1		118	Office
3	3002	Support Office	Exterior	N-10'10	3-3	AHU -1		126	Office
3	3003	Clinical Trials	Exterior	N-10'5	3-3	AHU -1		126	Treatment
3	3004	Physician Workroom	Exterior	N-20'5	3-2	AHU -1		258	Workstation
3	3005	Physician Workroom	Exterior	N-20'10	3-22	AHU -1		258	Workstation
3	3006	Support Office	Exterior	N-10'7	3-23	AHU -1		126	Office
3	3007	Support Office	Exterior	N-10'7	3-23	AHU -1		126	Office
3	3008	Physician Workroom	Exterior	N-20'8	3-25	AHU -1		258	Workstation
3	3009	Physician Workroom	Exterior	N-20'8	3-26	AHU -1		258	Workstation
3	3010	Clinical Trials	Exterior	N-10'8	3-29	AHU -1		126	Treatment
3	3011	Lockers	Exterior	N-10'3	3-29	AHU -1		126	Lounge/Locker
3	3012	Staff Lounge	Exterior	N-21	3-30	AHU -1		284	Lounge/Locker
3	3013	Exam	Exterior	W-11'4	3-6	AHU -1		133	Examination Room

3	3014	Exam	Interior		3-5	AHU -1		116	Examination Room
3	3015	Exam	Exterior	W-10'10	3-6	AHU -1		133	Examination Room
3	3016	Physician Workroom	Exterior	W-18'2	3-8	AHU -1		227	Workstation
3	3017	Zone Mechanical	Interior		3-7	AHU -1		85	Mechanical
3	3018	Exam	Exterior	W-14'6	3-9	AHU -1		134	Examination Room
3	3019	Recycle	Exterior	W-10'6	3-9	AHU -1		136	Soiled Holding/Recycle
3	3020	Housekeeping	Interior				Exhaust Only	29	Soiled Holding/Recycle
3	3021	Emergency Electric	Interior		3-49	AHU -2		69	Emergency Elec
3	3022	Staff Toilet	Interior				Exhaust Only	48	Toilet
3	3023	Pat Toilet	Interior				Exhaust Only	61	Toilet
3	3024	Exam	Interior		3-1	AHU -1		116	Examination Room
3	3025	Exam	Interior		3-1	AHU -1		114	Examination Room
3	3026	Exam	Interior		3-10	AHU -1		125	Examination Room
3	3027	Triage	Interior		3-11	AHU -1		120	Examination Room
3	3028	Exam	Interior		3-10	AHU -1		119	Examination Room
3	3029	Team Workstation	Interior		3-13	AHU -1		746	Workstation
3	3030	Exam	Interior		3-14	AHU -1		108	Examination Room
3	3031	Assess Exam	Interior		3-15	AHU -1		120	Examination Room
3	3032	Clean Supply	Interior		3-14	AHU -1		118	Office
3	3033	Assessment	Interior		3-15	AHU -1		119	Office
3	3034	Equipment	Interior		3-21	AHU -1		128	Distribution Elec
3	3035	Pat Toilet	Interior				Exhaust Only	61	Toilet
3	3036	Staff Toilet	Interior				Exhaust Only	48	Toilet
3	3037	Exam	Interior		3-21	AHU -1		119	Examination Room
3	3038	Exam	Interior		3-12	AHU -1		118	Examination Room
3	3039	Exam	Interior		3-17	AHU -1		120	Examination Room
3	3040	Soiled Holding	Interior		3-17	AHU -1		116	Soiled Holding/Recycle
3	3041	Assess Exam	Interior		3-15	AHU -1		132	Examination Room
3	3042	Check Out	Interior		3-16	AHU -1		298	Office
3	3043	Financial Consult	Interior		3-15	AHU -1		107	Office
3	3044	Staff Toilet	Interior				Exhaust Only	48	Toilet

3	3045	Pat Toilet	Interior				Exhaust Only	52	Toilet
3	3046	Exam	Interior		3-24	AHU-1		119	Examination Room
3	3047	Exam	Interior		3-18	AHU-1		118	Examination Room
3	3048	Exam	Interior		3-18	AHU-1		120	Examination Room
3	3049	Triage	Interior		3-34	AHU-2		118	Examination Room
3	3050	Exam	Interior		3-18	AHU-1		118	Examination Room
3	3051	Team Workstation	Interior		3-36	AHU-2		753	Workstation
3	3052	Procedure	Interior		3-20	AHU-1		148	Treatment
3	3053	Assess Exam	Interior		3-43	AHU-2		120	Examination Room
3	3054	Comm	Interior		3-19	AHU-1		141	comm
3	3055	Assessment	Interior		3-43	AHU-2		119	Office
3	3056	Exam	Interior		3-24	AHU-1		119	Examination Room
3	3057	Equipment	Interior		3-27	AHU-1		113	Distribution Elec
3	3058	Exam	Interior		3-28	AHU-1		121	Examination Room
3	3059	Exam	Interior		3-35	AHU-2		118	Examination Room
3	3060	Electrical	Interior		3-37	AHU-2		129	Distribution Elec
3	3061	Exam	Interior		3-40	AHU-2		119	Examination Room
3	3062	Assess Exam	Interior		3-43	AHU-2		132	Examination Room
3	3063	Check Out	Interior		3-38	AHU-2		297	Office
3	3064	Financial Consult	Interior		3-43	AHU-2		108	Office
3	3067	Exam	Exterior	E-10'10	3-32	AHU-1		145	Examination Room
3	3068	Exam	Exterior	E-10'6	3-32	AHU-1		137	Examination Room
3	3069	Exam	Interior		3-40	AHU-2		115	Examination Room
3	3070	Microscope	Exterior	E-18'2	3-33	AHU-1		237	Laboratory
3	3071	Exam	Interior		3-39	AHU-2		120	Examination Room
3	3072	Exam	Exterior	E-11'8	3-42	AHU-2		132	Examination Room
3	3073	Clean Supply	Interior		3-39	AHU-2		174	Office
3	3074	FNA	Exterior	E-14'7	3-41	AHU-2		184	Treatment
3	3075	Waiting	Exterior	W-27'7, S-39'4	3-44, 3-45, 3-46, 3-47, 3-48, 3-52, 53	AHU-2		2092	waiting
3	3076	Reception	Interior		3-44, 3-45, 3-46, 3-47, 3-48, 3-52, 3-53	AHU-2		197	waiting

3	3077	Host Station Resource	Interior		3-46, 3-52	AHU -2		239	Office
3	3079	Reception	Interior		3-52	AHU -2		197	waiting
3	3080	Waiting	Exterior	E-24'6	3-53	AHU -2		330	waiting
3	3081	Women	Interior		3-50	AHU -2		244	Toilet
3	3082	Men	Interior		3-50	AHU -2		211	Toilet
3	3082A	Housekeeping	Interior				Exhaust Only	11	Soiled Holding/Recycle
3	3083	Host Resource	Interior		3-56	AHU -3		250	Office
3	3086	Reception	Exterior	W-18'6	3-54	AHU -3		207	waiting
3	3087	Waiting	Exterior	E-29'8	3-54, 3-55, 3-56	AHU -3		2385	waiting
3	3088	Physician Workroom	Exterior	W-11'7	3-66	AHU -3		179	Workstation
3	3089	Procedure Holding	Exterior	W-11'5	3-65	AHU -3		169	Corridor
3	3090	Exam	Interior		3-63	AHU -3		134	Examination Room
3	3091	Exam	Interior		3-63	AHU -3		120	Examination Room
3	3092	Check Out	Interior		3-58	AHU -3		261	Office
3	3093	Financial Consult	Interior		3-57	AHU -3		97	Office
3	3094	Assess Exam	Interior		3-59	AHU -3		132	Examination Room
3	3095	Assessment	Interior		3-57	AHU -3		109	Office
3	3096	Assess Exam	Interior		3-59	AHU -3		122	Examination Room
3	3097	Clean Supply	Interior		3-80	AHU -3		118	Office
3	3098	Exam	Interior		3-80	AHU -3		110	Examination Room
3	3099	Physician Workroom	Exterior	E-22'3	3-79	AHU -3		229	Workstation
3	3100	Team Workstation	Interior		3-67	AHU -3		541	Workstation
3	3101	Clinical Trials	Exterior	W-12'1	3-64	AHU -3		181	Treatment
3	3102	Support Office	Exterior	W-18'3	3-64	AHU -3		234	Office
3	3104	Staff Toilet	Interior				Exhaust Only	64	Toilet
3	3105	Housekeeping	Interior				Exhaust Only	43	Soiled Holding/Recycle
3	3106	Emergency Electric	Interior		3-73	AHU -3		32	Emergency Elec
3	3107	Scope Process	Interior		3-61	AHU -3		119	Treatment
3	3108	Exam	Interior		3-61	AHU -3		120	Examination Room
3	3109	Exam	Interior		3-60	AHU -3		125	Examination Room
3	3110	Pat Toilet	Interior				Exhaust Only	47	Toilet

3	3111	Staff Toilet	Interior				Exhaust Only	50	Toilet
3	3112	Pat Toilet	Interior				Exhaust Only	60	Toilet
3	3113	Exam	Interior		3-60	AHU-3		119	Examination Room
3	3114	Exam	Interior		3-60	AHU-3		120	Examination Room
3	3115	Exam	Interior		3-60	AHU-3		118	Examination Room
3	3116	Exam	Interior		3-69	AHU-3		120	Examination Room
3	3117	Exam	Interior		3-70	AHU-3		118	Examination Room
3	3118	Electrical	Interior		3-71	AHU-3		81	Distribution Elec
3	3119	Triage	Interior		3-68	AHU-3		123	Examination Room
3	3120	Exam	Interior		3-70	AHU-3		118	Examination Room
3	3121	Exam	Interior		3-77	AHU-3		110	Examination Room
3	3122	Exam	Exterior	E-11'8	3-78	AHU-3		117	Examination Room
3	3123	Exam	Interior		3-77	AHU-3		116	Examination Room
3	3124	Equipment	Interior		3-75	AHU-3		63	Distribution Elec
3	3126	Staff Lounge	Exterior	E-26'3	3-76	AHU-3		277	Lounge/Locker
3	3127	Nurse Manager	Exterior	S-11'3	3-72	AHU-3		108	Office
3	3128	Office	Exterior	S-10'5	3-72	AHU-3		99	Office
3	3129	Physician Workroom	Exterior	S-21'4	3-74	AHU-3		236	Workstation
3	3130	Conference	Exterior	S-20'11	3-31	AHU-1		595	Conference
4	4000	Infusion	Exterior	N-16'10, W-10'5	4-8	AHU-1		110	Infusion
4	4001	Infusion	Exterior	W-10'	4-9	AHU-1		110	Infusion
4	4002	Infusion	Exterior	N-15'10	4-7	AHU-1		95	Infusion
4	4003	Infusion	Interior		4-4	AHU-1		102	Infusion
4	4004	Infusion	Exterior	N-15'10	4-6	AHU-1		95	Infusion
4	4005	Infusion	Interior		4-5	AHU-1		102	Infusion
4	4006	Infusion	Exterior	N-15'5	4-6	AHU-1		95	Infusion
4	4007	Infusion	Interior		4-5	AHU-1		102	Infusion
4	4008	Infusion	Exterior	N-15'5	4-22	AHU-1		95	Infusion
4	4009	Infusion	Interior		4-21	AHU-1		102	Infusion
4	4010	Infusion	Exterior	N-15'5	4-22	AHU-1		95	Infusion
4	4011	Infusion	Interior		4-21	AHU-1		102	Infusion
4	4012	Infusion	Exterior	N-15'8	4-24	AHU-1		95	Infusion

4	4013	Infusion	Interior		4-23	AHU -1		102	Infusion
4	4014	Infusion	Exterior	N-15'8	4-24	AHU -1		94	Infusion
4	4015	Infusion	Interior		4-23	AHU -1		102	Infusion
4	4016	Infusion	Exterior	N-15'8	4-26	AHU -1		95	Infusion
4	4017	Infusion	Interior		4-27	AHU -1		98	Infusion
4	4018	Infusion	Exterior	N-15'8	4-26	AHU -1		95	Infusion
4	4019	Infusion	Interior		4-27	AHU -1		98	Infusion
4	4020	Infusion	Exterior	N-14'6	4-30	AHU -1		128	Infusion
4	4021	Infusion	Interior		4-30	AHU -1		125	Infusion
4	4022	Pat Toilet	Exterior	N-6'7, E-9'9			Exhaust Only	44	Toilet
4	4023	Private Infusion	Exterior	N-12'3	4-31	AHU -1		115	Infusion
4	4024	Private Infusion	Exterior	W-10'1	4-9	AHU -1		120	Infusion
4	4025	Pat Toilet	Exterior	W-8'1			Exhaust Only	39	Toilet
4	4027	Private Infusion	Exterior	W-11'6	4-10	AHU -1		133	Infusion
4	4028	Private Infusion	Exterior	W-10'	4-10	AHU -1		129	Infusion
4	4029	Private Infusion	Exterior	W-11'8	4-11	AHU -1		108	Infusion
4	4030	Recycle	Interior				Exhaust Only	89	Soiled Holding/Recycle
4	4031	Clean Supply	Exterior	W-14'4	4-11	AHU -1		147	Office
4	4032	Emergency Electric	Interior		4-12	AHU -1		71	Emergency Elec
4	4033	Team Workstation	Interior		4-3	AHU -1		261	Workstation
4	4034	Team Workstation	Interior		4-2	AHU -1		269	Workstation
4	4035	Work Area	Interior		4-25	AHU -1		181	Workstation
4	4036	Team Workstation	Interior		4-28	AHU -1		270	Workstation
4	4037	Team Workstation	Interior		4-29	AHU -1		228	Workstation
4	4038	Pat Toilet	Interior				Exhaust Only	44	Toilet
4	4039	Pat Toilet	Interior				Exhaust Only	44	Toilet
4	4040	Private Infusion	Interior		4-1	AHU -1		117	Infusion
4	4041	Private Infusion	Interior		4-1	AHU -1		117	Infusion
4	4042	Pat Toilet	Interior				Exhaust Only	42	Toilet
4	4043	Pat Toilet	Interior				Exhaust Only	42	Toilet
4	4044	Private Infusion	Interior		4-20	AHU -1		106	Infusion
4	4045	Pat Toilet	Interior				Exhaust Only	45	Toilet

4	4046	Private Infusion	Interior		4-20	AHU -1		109	Infusion
4	4047	Private Infusion	Interior		4-20	AHU -1		106	Infusion
4	4048	Pat Toilet	Interior				Exhaust Only	45	Toilet
4	4049	Private Infusion	Interior		4-20	AHU -1		109	Infusion
4	4050	Private Infusion	Interior		4-35	AHU -2		113	Infusion
4	4051	Private Infusion	Interior		4-35	AHU -2		113	Infusion
4	4052	Pat Toilet	Interior				Exhaust Only	42	Toilet
4	4053	Staff Toilet	Interior				Exhaust Only	42	Toilet
4	4054	Electrical	Interior		4-38	AHU -2		116	Distribution Elec
4	4056	Pat Toilet	Interior				Exhaust Only	45	Toilet
4	4057	Pat Toilet	Interior				Exhaust Only	45	Toilet
4	4058	Private Infusion	Exterior	E-10'9	4-32	AHU -1		96	Infusion
4	4059	Private Infusion	Exterior	E-11'6	4-32	AHU -1		96	Infusion
4	4060	Private Infusion	Exterior	E-11'1	4-33	AHU -1		99	Infusion
4	4061	Private Infusion	Exterior	E-10'	4-33	AHU -1		99	Infusion
4	4062	Investigational Drugs	Interior		4-51	AHU -2		402	Pharmacy
4	4064	Lockers	Interior		4-49	AHU -2		78	Lounge/Locker
4	4065	Pharmacy Consult	Interior		4-53	AHU -2		95	Office
4	4066	Chemo	Interior		4-48	AHU -2		151	Pharmacy
4	4067	Gene Therapy	Interior		4-47	AHU -2		38	Pharmacy
4	4068	Anteroom	Interior		4-46	AHU -2		244	Pharmacy
4	4069	Non-Chemo	Interior		4-44	AHU -2		158	Pharmacy
4	4070	Order Entry	Interior		4-52	AHU -2		398	Pharmacy
4	4071	Dispensing	Interior		4-52	AHU -2		102	Pharmacy
4	4072	Soiled Holding	Interior		4-34	AHU -2		88	Soiled Holding/Recycle
4	4073	Clean Supply	Interior		4-42	AHU -2		277	Office
4	4074	Comm	Interior		4-54	AHU -2		133	comm
4	4075	Nourish	Interior		4-42	AHU -2		104	Corridor
4	4076	Equipment	Interior		4-43	AHU -2		100	Distribution Elec
4	4077	Private Infusion	Interior		4-39	AHU -2		112	Infusion
4	4078	Private Infusion	Interior		4-39	AHU -2		109	Infusion
4	4079	Pat Toilet	Interior				Exhaust Only	42	Toilet

4	4081	Passage	Exterior	E-7'3	4-41	AHU -2		302	Corridor
4	4082	Work Area	Interior		4-40	AHU -2		99	Workstation
4	4083	Infusion	Exterior	E-10'10	4-41	AHU -2		95	Infusion
4	4084	PK Lab	Interior		4-36	AHU -2		126	Laboratory
4	4085	Team Workstation	Interior		4-37	AHU -2		129	Workstation
4	4086	Infusion	Interior		4-40	AHU -2		119	Infusion
4	4087	Infusion	Exterior	E-10'10	4-41	AHU -2		102	Infusion
4	4088	Lockers	Exterior	W-14'	4-13	AHU -1		164	Lounge/Locker
4	4089	Staff Lounge	Exterior	W-19'10, S-15'4	4-14	AHU -1		255	Lounge/Locker
4	4090	Staff Toilet	Interior				Exhaust Only	50	Toilet
4	4091	Staff Toilet	Interior				Exhaust Only	50	Toilet
4	4092	Housekeeping	Interior				Exhaust Only	24	Soiled Holding/Recycle
4	4093	Nurse Manager	Exterior	S-10'4	4-15	AHU -1		121	Office
4	4094	Infusion Director Office	Exterior	S-10'6	4-15	AHU -1		110	Office
4	4095	Office	Exterior	S-10'	4-16	AHU -1		117	Office
4	4096	Pharmacy Manager	Exterior	S-10'7	4-16	AHU -1		116	Office
4	4097	Financial Consult	Exterior	S-10'8	4-17	AHU -1		116	Office
4	4098	Financial Consult	Exterior	S-12'9	4-17	AHU -1		118	Office
4	4099	Charge Office	Interior		4-53	AHU -2		94	Office
4	4100	Workroom	Interior		4-18	AHU -1		112	Workstation
4	4101	Waiting	Interior		4-55, 4-56, 4-57	AHU -2		920	waiting
4	4101A	Host Station Resource	Interior		4-56	AHU -2		52	Office
4	4102	Reception	Interior		4-56	AHU -2		123	waiting
4	4103	Waiting	Exterior	E-30'3	4-57	AHU -2		1,767	waiting
4	4104	Women	Exterior		4-19	AHU -1		241	Toilet
4	4105	Men	Exterior		4-19	AHU -1		215	Toilet
4	4105A	Housekeeping	Interior				Exhaust Only	11	Soiled Holding/Recycle
4	4106	Infusion	Exterior	W-15'2	4-74	AHU -3		106	Infusion
4	4107	Infusion	Interior		4-75	AHU -3		103	Infusion
4	4108	Infusion	Exterior	W-14'6	4-74	AHU -3		104	Infusion
4	4109	Infusion	Interior		4-75	AHU -3		100	Infusion

4	4110	Pat Toilet	Interior				Exhaust Only	47	Toilet
4	4111	Infusion	Exterior	W-14'8	4-72	AHU-3		104	Infusion
4	4112	Infusion	Interior		4-73	AHU-3		99	Infusion
4	4113	Meds	Interior		4-73	AHU-3		84	Treatment
4	4114	Infusion	Exterior	W-14'6	4-72	AHU-3		104	Infusion
4	4115	Infusion	Interior		4-73	AHU-3		100	Infusion
4	4116	Pat Toilet	Interior				Exhaust Only	48	Toilet
4	4117	Infusion	Exterior	W-14'6	4-70	AHU-3		99	Infusion
4	4118	Infusion	Interior		4-71	AHU-3		102	Infusion
4	4119	Nourish	Interior				Exhaust Only	59	Corridor
4	4121	Infusion	Exterior	W-15'3	4-70			108	Infusion
4	4122	Infusion	Interior		4-71	AHU-3		104	Infusion
4	4123	Pat Toilet	Interior				Exhaust Only	47	Toilet
4	4124	Elec	Interior				Exhaust Only	25	Distribution Elec
4	4125	Clean Supply	Interior		4-69	AHU-3		144	Office
4	4126	Soiled Holding	Interior				Exhaust Only	55	Soiled Holding/Recycle
4	4127	Housekeeping	Interior				Exhaust Only	32	Soiled Holding/Recycle
4	4128	Staff Toilet	Interior				Exhaust Only	45	Toilet
4	4129	Pat Toilet	Interior				Exhaust Only	51	Toilet
4	4130	Infusion	Exterior	E-10'4	4-60	AHU-3		75	Infusion
4	4131	Team Workstation	Interior		4-59	AHU-3		275	Workstation
4	4132	Infusion	Interior		4-60	AHU-3		101	Infusion
4	4133	Infusion	Exterior	E-11'1	4-60	AHU-3		101	Infusion
4	4134	Infusion	Interior		4-63	AHU-3		99	Infusion
4	4135	Infusion	Exterior	E-10'1	4-61	AHU-3		98	Infusion
4	4136	Infusion	Interior		4-62	AHU-3		107	Infusion
4	4137	Infusion	Interior		4-63	AHU-3		101	Infusion
4	4138	Infusion	Exterior	E-10'8	4-61	AHU-3		101	Infusion
4	4139	Infusion	Interior		4-62	AHU-3		107	Infusion
4	4140	Infusion	Interior		4-67	AHU-3		99	Infusion
4	4141	Infusion	Exterior	E-10'8	4-64	AHU-3		99	Infusion

4	4142	Team Workstation	Interior		4-65	AHU -3		256	Workstation
4	4143	Infusion	Interior		4-67	AHU -3		101	Infusion
4	4144	Infusion	Exterior	E-10'1	4-64	AHU -3		99	Infusion
4	4145	Equipment	Exterior	S-11'3	4-69	AHU -3		95	Distribution Elec
4	4146	Infusion	Interior		4-66	AHU -3		91	Infusion
4	4147	Infusion	Exterior	E-7'11	4-66	AHU -3		89	Infusion
4	4148	Infusion	Exterior	S-10'10	4-68	AHU -3		91	Infusion
4	4149	Infusion	Exterior	S-10'10	4-68	AHU -3		82	Infusion
4	4150	Workroom	Interior		4-50	AHU -2		173	Workstation
4	4151	Workroom	Interior		4-52	AHU -2		206	Workstation
4	4152	Anteroom	Interior		4-46	AHU -2		301	Pharmacy
4	4153	Zoned Mechanical	Interior				Return Only	32	Mechanical
5	5000	Nurse Manager	Exterior	N-14'10, W-16'8	5-3	AHU -1		145	Office
5	5001	Support Office	Exterior	N-10'5	5-2	AHU -1		118	Office
5	5002	Support Office	Exterior	N-10'3	5-2	AHU -1		126	Office
5	5003	Clinical Trials	Exterior	N-10'8	5-2	AHU -1		126	Treatment
5	5004	Physician Workroom	Exterior	N-20'9	5-1	AHU -1		258	Workstation
5	5005	Physician Workroom	Exterior	N-20'11	5-21	AHU -1		258	Workstation
5	5006	Support Office	Exterior	N-10'5	5-22	AHU -1		124	Office
5	5007	Support Office	Exterior	N-10'5	5-23	AHU -1		126	Office
5	5008	Physician Workroom	Exterior	N-20'9	5-24	AHU -1		258	Workstation
5	5009	Physician Workroom	Exterior	N-20'8	5-25	AHU -1		258	Workstation
5	5010	Clinical Trials	Exterior	N-10'5	5-29	AHU -1		126	Treatment
5	5011	Lockers	Exterior	N-10'3	5-29	AHU -1		126	Lounge/Locker
5	5012	Staff Lounge	Exterior	N-25'6, E-16'8	5-30	AHU -1		271	Lounge/Locker
5	5013	Exam	Exterior	W-10'10	5-5	AHU -1		131	Examination Room
5	5014	Exam	Interior		5-4	AHU -1		116	Examination Room
5	5015	Exam	Exterior	W-10'10	5-5	AHU -1		132	Examination Room
5	5016	Physician Workroom	Exterior	W_18'2	5-7	AHU -1		227	Workstation
5	5017	Zoned Mechanical	Interior		5-6	AHU -1		85	Mechanical
5	5018	Exam	Exterior	W-10'9	5-8	AHU -1		134	Examination Room
5	5019	Recycle	Exterior	W-14'6	5-8	AHU -1		114	Soiled Holding/Recycle

5	5020	Housekeeping	Interior				Exhaust Only	36	Soiled Holding/Recycle
5	5021	Emergency Electric	Interior		5-49	AHU-2		67	Distribution Elec
5	5022	Staff Toilet	Interior				Exhaust Only	48	Toilet
5	5023	Pat Toilet	Interior				Exhaust Only	61	Toilet
5	5024	Exam	Interior		5-11	AHU-1		114	Examination Room
5	5025	Exam	Interior		5-11	AHU-1		116	Examination Room
5	5026	Exam	Interior		5-9	AHU-1		125	Examination Room
5	5027	Triage	Interior		5-10	AHU-1		120	Examination Room
5	5028	Exam	Interior		5-9	AHU-1		120	Examination Room
5	5029	Team Workstation	Interior		5-12	AHU-1		599	Workstation
5	5029A	Workroom	Interior		5-12	AHU-1		134	Workstation
5	5030	Exam	Interior		5-13	AHU-1		108	Examination Room
5	5031	Assess Exam	Interior		5-14	AHU-1		120	Examination Room
5	5032	Clean Supply	Interior		5-13	AHU-1		116	Office
5	5033	Assessment	Interior		5-14	AHU-1		111	Office
5	5034	Equipment	Interior		5-20	AHU-1		125	Distribution Elec
5	5035	Pat Toilet	Interior				Exhaust Only	61	Toilet
5	5036	Staff Toilet	Interior				Exhaust Only	48	Toilet
5	5037	Exam	Interior		5-20	AHU-1		103	Examination Room
5	5038	Exam	Interior		5-11	AHU-1		118	Examination Room
5	5039	Exam	Interior		5-16	AHU-1		119	Examination Room
5	5040	Soiled Holding	Interior		5-16	AHU-1		114	Soiled Holding/Recycle
5	5041	Assess Exam	Interior		5-14	AHU-1		132	Examination Room
5	5042	Check Out	Interior		5-15	AHU-1		293	Office
5	5043	Financial Consult	Interior		5-14	AHU-1		102	Office
5	5044	Staff Toilet	Interior				Exhaust Only	47	Toilet
5	5045	Pat Toilet	Interior				Exhaust Only	51	Toilet
5	5046	Exam	Interior		5-26	AHU-1		119	Examination Room
5	5047	Exam	Interior		5-18	AHU-1		119	Examination Room
5	5048	Exam	Interior		5-18	AHU-1		120	Examination Room
5	5049	Triage	Interior		5-34	AHU-2		118	Examination Room

5	5050	Exam	Interior		5-18	AHU -1		118	Examination Room
5	5051	Team Workstation	Interior		5-35	AHU -2		578	Workstation
5	5051A	Workroom	Interior		5-35	AHU -2		134	Workstation
5	5052	Procedure Holding	Interior		5-19	AHU -1		148	Corridor
5	5053	Assess Exam	Interior		5-43	AHU -2		120	Examination Room
5	5054	Comm	Interior		5-17	AHU -1		141	comm
5	5055	Assessment	Interior		5-43	AHU -2		115	Office
5	5056	Exam	Interior		5-26	AHU -1		118	Examination Room
5	5057	Equipment	Interior		5-28	AHU -1		113	Distribution Elec
5	5058	Exam	Interior		5-27	AHU -1		126	Examination Room
5	5059	Exam	Interior		5-33	AHU -1		118	Examination Room
5	5060	Electrical	Interior		5-36	AHU -2		132	Distribution Elec
5	5061	Exam	Interior		5-39	AHU -2		116	Examination Room
5	5062	Assess Exam	Interior		5-43	AHU -2		133	Examination Room
5	5063	Check Out	Interior		5-37	AHU -2		295	Office
5	5064	Financial Consult	Interior		5-43	AHU -2		104	Office
5	5065	Staff Toilet	Interior				Exhaust Only	46	Toilet
5	5066	Pat Toilet	Interior				Exhaust Only	46	Toilet
5	5067	Exam	Exterior	E-11'8	5-31	AHU -1		147	Examination Room
5	5068	Exam	Exterior	E-10'10	5-31	AHU -1		136	Examination Room
5	5069	Exam	Interior		5-39	AHU -2		114	Examination Room
5	5070	Physician Workroom	Exterior	E-18'2	5-32	AHU -1		232	Workstation
5	5071	FNA	Exterior	E-14'5	5-41	AHU -2		181	Treatment
5	5072	Procedure Holding	Interior		5-38	AHU -2		168	Corridor
5	5073	Clean Supply	Interior		5-38	AHU -2		122	Office
5	5074	Exam	Exterior	E-10'10	5-40	AHU -2		135	Examination Room
5	5075	Waiting	Exterior	W-29'5, S-83'3	5-42, 5-44, 5-46, 5-47, 5-48	AHU -2		1500	waiting
5	5076	Reception	Interior		5-44, 5-47	AHU -2		184	waiting
5	5077	Host Station Resource	Interior		5-46	AHU -2		239	Office
5	5079	Reception	Exterior	E-29'7	5-44, 5-47	AHU -2		196	waiting
5	5081	Women	Exterior	W-13'6	5-45	AHU -2		244	Toilet
5	5082	Men	Exterior	W-13'8	5-45	AHU		213	Toilet

						-2			
5	5082A	Housekeeping	Interior				Exhaust Only	14	Soiled Holding/Recycle
0	0C6	Service Elevator Lobby	Exterior	W-41'2 (425sf)	0-12	AHU-1		348	Lobby
0	0C7	Elevator Lobby	Interior		0-42	AHU-3		391	Lobby
0	0C9	Passage	Interior		0-8	AHU-1		717	Corridor
0	0C11	Vestibule	Exterior	N-11', E-58', S-13'10 (100%)	0-43	AHU-3		750	Corridor
0	0C12	Passage	Interior					482	Corridor
0	0C13	Passage	Exterior	E-47' (153sf)				409	Corridor
0	0C14	Corridor	Interior		0-79	AHU-3		168	Corridor
0	0C15	Passage	Exterior	E-26'4 (60%)	0-82	AHU-3		142	Corridor
0	0C18	Passage	Interior		0-25, 0-34	AHU-2		1635	Corridor
1	1C7	Elevator Lobby	Interior		1-58, 1-59	AHU-3		405	Corridor
1	1C8	Corridor	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		506	Corridor
1	1C9	Corridor	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		744	Corridor
1	1C10	Corridor	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		249	Corridor
1	1C10A	Corridor	Interior		1-39	AHU-1		122	Corridor
1	1C12	Passage	Interior		1-39	AHU-1		192	Corridor
1	1C13	Passage	Interior					173	Corridor
1	1C14	Corridor	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		654	Corridor
1	1C15	Passage	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		186	Corridor
1	1C17	Passage	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		186	Corridor
1	1C18	Passage	Interior		1-4, 1-9, 1-15, 1-19, 1-22, 1-24, 1-33	AHU-1		646	Corridor
1	1C19	Corridor	Interior					188	Corridor
1	1C20	Corridor	Interior		1-52, 1-53, 1-54, 1-55, 1-56	AHU-2		1511	Corridor
1	1C21	Passage	Interior					402	Corridor
1	1C26	Passage	Interior		1-79, 1-65	AHU-3		102	Corridor

1	1C27	Corridor	Interior		1-79, 1-65	AHU -3		705	Corridor
1	1C28	Corridor	Interior		1-73	AHU -3		109	Corridor
1	1C28A	Corridor	Interior		1-73	AHU -3		136	Corridor
1	1C29	Corridor	Interior		1-73, 1-70	AHU -3		558	Corridor
1	1C30	Corridor	Exterior	E-57' (85%)	1-64	AHU -3		595	Corridor
2	2C7	Elevator Lobby	Interior		2-52	AHU -2		408	Corridor
2	2C8	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		638	Corridor
2	2C9	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		501	Corridor
2	2C10	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		283	Corridor
2	2C11	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		189	Corridor
2	2C12	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		103	Corridor
2	2C13	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		189	Corridor
2	2C14	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		103	Corridor
2	2C15	Corridor	Interior					189	Corridor
2	2C16	Corridor	Interior					103	Corridor
2	2C17	Passage	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		189	Corridor
2	2C18	Corridor	Interior					104	Corridor

2	2C19	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		269	Corridor
2	2C21	Passage	Exterior	E-53'4 (273sf)				560	Corridor
2	2C22	Ramp	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35	AHU -1		414	Corridor
2	2C23	Corridor	Interior					116	Corridor
2	2C24	Corridor	Interior					152	Corridor
2	2C25	Corridor	Interior		2-42	AHU -2		125	Corridor
2	2C25A	Corridor	Interior		2-2, 2-4, 2-6, 2-9, 2-10, 2-12, 2-14, 2-16, 2-25, 2-27, 2-29, 35			180	Corridor
2	2C26	Passage	Interior		2-44	AHU -2		390	Corridor
2	2C27	Passage	Interior					398	Corridor
2	2C28	Corridor	Interior					488	Corridor
2	2C29	Corridor	Exterior	E-84'10 (540sf)				655	Corridor
3	3C6	Service Elevator Lobby	Interior		3-9, 3-7	AHU -1		192	Corridor
3	3C7	Elevator Lobby	Interior		3-50, 3-51	AHU -2		408	Corridor
3	3C8	Corridor	Interior		3-4, 3-2, 3-32, 3-26	AHU -1		648	Corridor
3	3C9	Corridor	Interior					532	Corridor
3	3C10	Corridor	Interior		3-32, 3-33, 3-9	AHU -1		363	Corridor
3	3C11	Corridor	Interior		3-10, 3-12	AHU -1		189	Corridor
3	3C12	Corridor	Interior		3-14	AHU -1		104	Corridor
3	3C13	Corridor	Interior					189	Corridor
3	3C14	Corridor	Interior		3-16	AHU -1		104	Corridor
3	3C15	Corridor	Interior		3-18	AHU -1		189	Corridor
3	3C16	Corridor	Interior					105	Corridor
3	3C17	Corridor	Interior		3-28	AHU -1		189	Corridor
3	3C18	Corridor	Interior					106	Corridor
3	3C19	Corridor	Interior		3-32, 3-33, 3-9	AHU -1		269	Corridor
3	3C20	Corridor	Interior		3-39	AHU -2		155	Corridor
3	3C21	Passage	Interior					116	Corridor
3	3C22	Passage	Interior					152	Corridor
3	3C23	Corridor	Interior		3-40	AHU -2		125	Corridor

3	3C23A	Passage	Interior		3-32, 3-33, 3-9	AHU -1		141	Corridor
3	3C24	Passage	Interior		3-50, 3-51	AHU -2		371	Corridor
3	3C24A	Passage	Interior					383	Corridor
3	3C26	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		171	Corridor
3	3C27	Passage	Exterior	E-6'	3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		102	Corridor
3	3C28	Corridor	Interior					151	Corridor
3	3C29	Passage	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		378	Corridor
3	3C30	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		99	Corridor
3	3C31	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		98	Corridor
3	3C32	Passage	Exterior	E-6'	3-78	AHU -3		134	Corridor
3	3C33	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		167	Corridor
3	3C34	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		187	Corridor
3	3C35	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		162	Corridor
3	3C36	Corridor	Interior		3-70, 3-72, 3-68, 3-64, 3-63, 3-60, 3-59	AHU -3		253	Corridor
4	4C6	Service Elevator Lobby	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU -1		324	Corridor
4	4C7	Elevator Lobby	Interior		4-58	AHU -2		494	Corridor
4	4C8	Corridor	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU -1		465	Corridor
4	4C9	Passage	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU -1		396	Corridor

4	4C10	Passage	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		383	Corridor
4	4C11	Passage	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		384	Corridor
4	4C12	Passage	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		431	Corridor
4	4C13	Passage	Exterior	E-7'	4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		153	Corridor
4	4C14	Corridor	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		263	Corridor
4	4C15	Corridor	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		534	Corridor
4	4C16	Corridor	Interior		4-1, 4-6, 4-7, 4-10, 4-11, 4-20, 4-22, 4-24, 4-26, 4-31, 4-33	AHU-1		542	Corridor
4	4C17	Corridor	Interior					220	Corridor
4	4C18	Corridor	Interior					163	Corridor
4	4C19	Corridor	Interior		4-16	AHU-1		302	Corridor
4	4C20	Corridor	Interior					162	Corridor
4	4C21	Passage	Interior		4-58	AHU-2		383	Corridor
4	4C22	Corridor	Interior		4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU-3		115	Corridor
4	4C23	Corridor	Interior		4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU-3		691	Corridor
4	4C24	Passage	Exterior	E-6'11	4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU-3		240	Corridor

4	4C25	Passage	Exterior	E-8'3	4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU -3		224	Corridor
4	4C26	Passage	Exterior	E-8'3	4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU -3		223	Corridor
4	4C27	Passage	Interior					187	Corridor
4	4C28	Corridor	Exterior	S-27'4	4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU -3		200	Corridor
4	4C31	Passage	Interior		4-74, 4-72, 4-70, 4-69, 4-68, 4-64, 4-61, 4-60, 4-59	AHU -3		184	Corridor
5	5C6	Service Elevator Lobby	Interior		5-6,5-8	AHU -1		201	Corridor
5	5C7	Elevator Lobby	Interior		5-1A, 5-9A, 5-13A, 5-15A, 5-16B	AHU -1		212	Corridor
5	5C8	Corridor	Exterior	W-7'2	5-1A, 5-9A, 5-13A, 5-15A, 5-16B	AHU -1		599	Corridor
5	5C9	Corridor	Exterior	E-6'4	5-25	AHU -1		614	Corridor
5	5C10	Corridor	Interior		5-6,5-8	AHU -1		363	Corridor
5	5C11	Corridor	Interior		5-25	AHU -1		213	Corridor
5	5C12	Corridor	Interior		5-25	AHU -1		102	Corridor
5	5C13	Corridor	Interior					209	Corridor
5	5C14	Corridor	Interior					102	Corridor
5	5C15	Corridor	Interior		5-25	AHU -1		213	Corridor
5	5C16	Corridor	Interior		5-25	AHU -1		103	Corridor
5	5C17	Corridor	Interior		5-1A, 5-9A, 5-13A, 5-15A, 5-16B	AHU -1		209	Corridor
5	5C18	Corridor	Interior		5-25A	AHU -1		103	Corridor
5	5C20	Corridor	Interior		5-31			572	Corridor
5	5C21	Corridor	Exterior	W-7'4	5-6A,5-8C	AHU -1		116	Corridor
5	5C22	Corridor	Interior		5-25	AHU -1		120	Corridor
5	5C23	Corridor	Interior		5-1A, 5-9A, 5-13A, 5-15A, 5-16B	AHU -1		123	Corridor
5	5C24	Passage	Exterior	E-7'3	5-25	AHU -1		403	Corridor
PH	PH01	Mech Penthouse						1483 4	Corridor
PH	PH02	Stair 1 Vestibule						75.8	Corridor

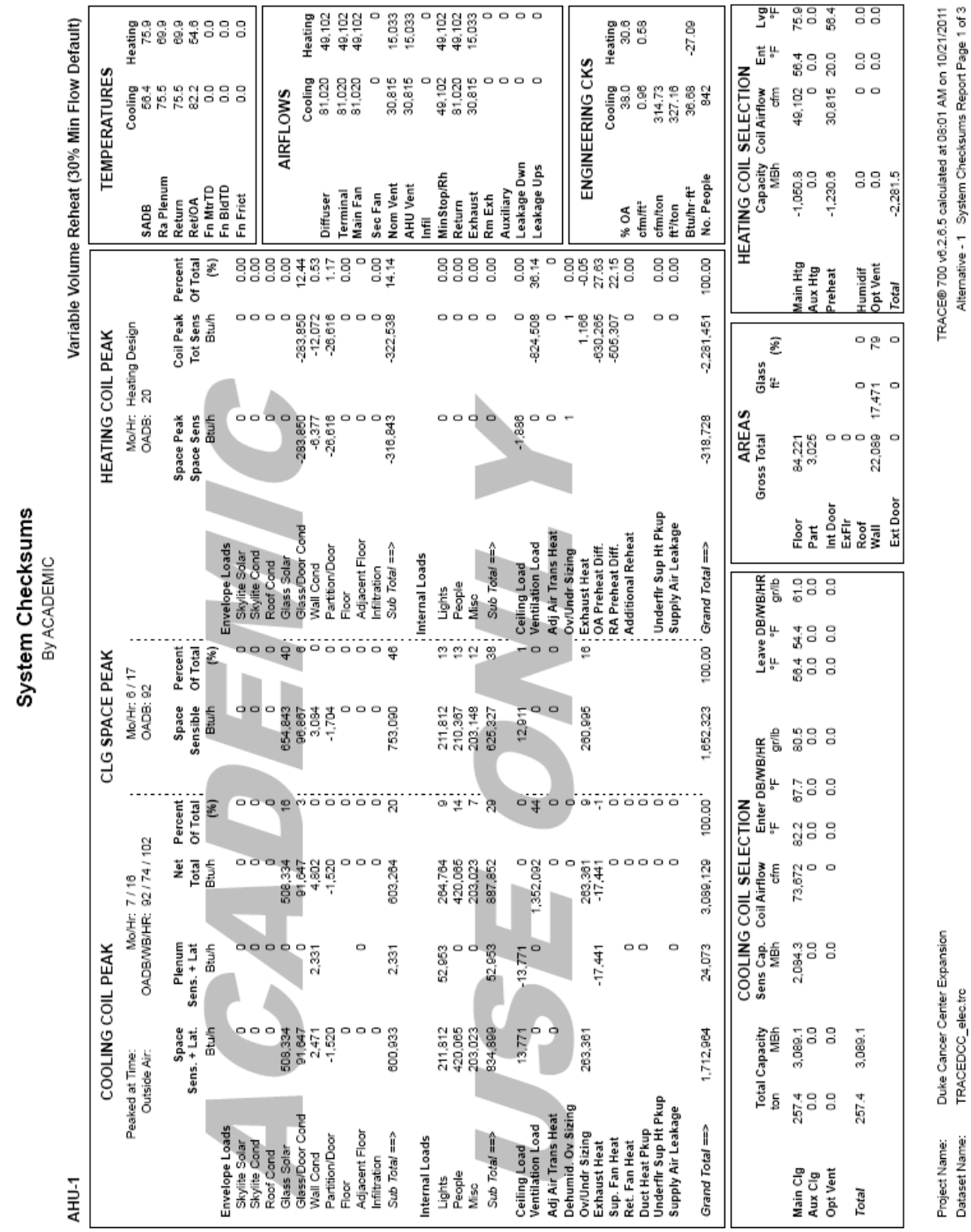
PH	PH03	Stair 2 Vestibule						95.2	Corridor
PH	PH04	Emergency Electric						73.2	Corridor
PH	PHC6	Service Elevator Lobby						512	Corridor
SB	SB01	Linear Accelerator	Basement Perimeter	W-36'7, N-35'6	0-2	AHU -1		760	CT Scan/Linear Accelerator
SB	SB02	Linear Accelerator	Basement Perimeter	N-30'	0-4	AHU -1		664	CT Scan/Linear Accelerator
SB	SB03	Linear Accelerator	Basement Perimeter	N-33'6	0-1	AHU -1		698	CT Scan/Linear Accelerator
SB	SB04	Recycle	Basement Perimeter				Exhaust Only	101	Soiled Holding/Recycle
SB	SB05	Stretcher Alcove	Interior		00-22A	AHU -1		104	Corridor
SB	SB06	Shower	Interior		00-22	AHU -1		212	Office
SB	SB07	Emergency Electric	Interior		00-21	AHU -1		74	Emergency Elec
SB	SB08	Equipment	Basement Perimeter	W-23'2	00-23	AHU -1		184	Distribution Elec
SB	SB09	Control	Interior		00-16	AHU -1		203	Office
SB	SB09A	Access	Interior		00-16	AHU -1		21	DELETED
SB	SB10	Control	Interior		00-17	AHU -1		198	Office
SB	SB10A	Access	Interior		00-17	AHU -1		37	DELETED
SB	SB11	Gowned Waiting	Interior		00-18	AHU -1		195	Office
SB	SB12	DR	Interior				Exhaust Only	27	Office
SB	SB13	DR	Interior				Exhaust Only	35	Office
SB	SB14	Staff Toilet	Interior				Exhaust Only	51	Toilet
SB	SB15	Pat Toilet	Interior				Exhaust Only	45	Toilet
SB	SB16	Control	Interior		00-10	AHU -1		310	Office
SB	SB16A	Access	Interior		00-10-	AHU -1		17	DELETED
SB	SB17	Gowned Waiting	Interior		00-11	AHU -1		205	Office
SB	SB18	Pat Toilet	Interior				Exhaust Only	48	Toilet
SB	SB19	Pat Toilet	Interior				Exhaust Only	48	Toilet
SB	SB20	DR	Interior				Exhaust Only	30	Office
SB	SB21	DR	Interior				Exhaust Only	34	Office
SB	SB22	Holding	Interior		00-14	AHU -1		323	Corridor
SB	SB23	Pedi Waiting	Basement Perimeter	S-11'10	00-1, 00-2, 00-7, 00-12, 00-13, 00-37, 00-38	AHU -3		130	waiting
SB	SB24	Host Station Resource	Basement Perimeter	S-19'	00-13	AHU -3		137	Office
SB	SB25	Team Workstation	Interior		00-15	AHU -1		166	Workstation

SB	SB26	Infusion	Interior		00-9	AHU -1		347	Infusion
SB	SB27	Social Worker	Interior		00-8	AHU -1		97	Office
SB	SB28	Dietician Office	Interior		00-8	AHU -1		98	Office
SB	SB29A	Waiting	Basement Perimeter	S-29'4	00-1, 00-2, 00-7, 00-12, 00-13, 00-37, 00-38	AHU -3		2486	waiting
SB	SB30	Lab	Basement Perimeter	W-14'5	00-6	AHU -3		185	Laboratory
SB	SB31	Men	Basement Perimeter	W-19'10	00-51	AHU -3		215	Toilet
SB	SB31A	Housekeeping	Interior				Exhaust Only	10	Soiled Holding/Recycle
SB	SB32	Women	Basement Perimeter	W-13'5	00-51	AHU -3		236	Toilet
SB	SB33	Exam	Basement Perimeter	N-10'7	00-49	AHU -2		121	Examination Room
SB	SB34	Exam	Basement Perimeter	N-10'7	00-36	AHU -2		121	Examination Room
SB	SB35	Exam	Basement Perimeter	N-10'	00-36	AHU -2		125	Examination Room
SB	SB36	Workstation Meds	Basement Perimeter	N-10'7	00-35	AHU -2		120	Workstation
SB	SB37	Exam	Basement Perimeter	N-10'7	00-47	AHU -2		120	Examination Room
SB	SB38	Exam	Basement Perimeter	N-10'5	00-47	AHU -2		124	Examination Room
SB	SB39	Exam	Basement Perimeter	N-10'7	00-47	AHU -2		121	Examination Room
SB	SB40	Exam	Interior		00-48	AHU -2		120	Examination Room
SB	SB41	Physician Workroom	Basement Perimeter	N-27'2 E-27'2 S-14'4	00-3	AHU -2		431	Workstation
SB	SB42	Exam	Interior		00-32	AHU -2		125	Examination Room
SB	SB43	Exam	Interior		00-32	AHU -2		125	Examination Room
SB	SB44	Physician Workroom	Interior		00-31	AHU -2		279	Workstation
SB	SB45	Exam	Interior		00-33	AHU -2		123	Examination Room
SB	SB46	Electrical	Interior		00-28	AHU -2		117	Distribution Elec
SB	SB47	Triage	Interior		00-29	AHU -2		109	Examination Room
SB	SB48	Team Workstation	Interior		00-29	AHU -2		117	Workstation
SB	SB49	Exam	Interior		00-27	AHU -2		121	Examination Room
SB	SB50	Assessment	Interior		00-27	AHU -2		117	Office
SB	SB51	Reception	Interior		00-1	AHU -3		396	waiting
SB	SB52	Pat Toilet	Interior				Exhaust Only	50	Toilet
SB	SB53	Staff Toilet	Interior				Exhaust Only	50	Toilet
SB	SB54	Exam	Interior		00-44	AHU -2		116	Examination Room
SB	SB55	Exam	Basement Perimeter	E-4'3	00-45	AHU -2		135	Examination Room

SB	SB56	Exam	Interior		00-44	AHU -2		133	Examination Room
SB	SB57	Exam	Interior		00-45	AHU -2		134	Examination Room
SB	SB58	Exam	Interior		00-44	AHU -2		137	Examination Room
SB	SB59	Exam	Interior		00-45	AHU -2		138	Examination Room
SB	SB60	Exam	Interior		00-30	AHU -2		132	Examination Room
SB	SB61	Exam	Interior		00-30	AHU -2		135	Examination Room
SB	SB62	Exam	Interior		00-45	AHU -2		139	Examination Room
SB	SB63	Zoned Mechanical	Basement Perimeter	E-8'	00-43	AHU -2		72	Mechanical
SB	SB63A	Electrical	Interior					13	DELETED
SB	SB64	Check Out	Interior		00-24	AHU -2		170	Office
SB	SB65	Scope Process	Interior		00-42	AHU -2		82	Treatment
SB	SB66	Financial Consult	Interior		00-25	AHU -2		112	Office
SB	SB67	Clean Scope	Interior		00-42	AHU -2		94	Office
SB	SB68	Clean Supply	Interior		00-42	AHU -2		157	Office
SB	SB69	Plumbing	Interior		00-40	AHU -2		556	Distribution Elec
SB	SB70	Atrium	Interior		00-5	AHU -3		1476	Lobby
SB	SB71	Utility	Basement Perimeter	E-10'4	00-40	AHU -2		134	Distribution Elec
SB	SB71A	Steam Room	Basement Perimeter	N-12'10 E-38'6	00-40	AHU -2		478	office
SB	SB72	Mechanical Room	Basement Perimeter	E-69'9 S-20'1				6966	Mechanical
SB	SB73	Soiled Holding	Interior		00-39	AHU -1		84	Soiled Holding/Recycle
SB	SB74	Equipment	Basement Perimeter		00-34	AHU -2		233	Distribution Elec
SB	SB75	Operational Storage	Basement Perimeter	E-17'8 S-10'6	00-52	AHU -3		171	storage
SB	SB76	Waiting	Interior		00-1, 00-2, 00-7, 00-12, 00-13, 00-37, 00-38	AHU -3		743	waiting
SB	SB78	Bone Marrow + Lactation	Basement Perimeter	S-34'5, E-16'4	00-19, 00-20	AHU -3		514	Treatment
SB	SB79	Lact	Interior		00-19	AHU -3		117	Treatment
SB	SB80	Housekeeping	Interior				Exhaust Only	53	Soiled Holding/Recycle
SB	SB81	Comm	Basement Perimeter	E-10'4	00-41	AHU -2		169	comm
SB	SBC6	Service Elevator Lobby	Interior		00-22	AHU -1		371	Corridor
SB	SBC7	Elevator Lobby	Interior		00-4	AHU -3		378	Corridor
SB	SBC8	Corridor	Interior		00-12	AHU -3		178	Corridor

SB	SBC10	Passage	Interior		00-8, 00-11, 00-39, 0016	AHU -1		172	Corridor
SB	SBC12	Passage	Interior		00-8, 00-11, 00-39, 0016	AHU -1		200	Corridor
SB	SBC13	Corridor	Interior		00-8, 00-11, 00-39, 0016	AHU -1		266	Corridor
SB	SBC14	Corridor	Interior		00-27,00-35,00-45,00-47,00-50	AHU -2		466	Corridor
SB	SBC16	Corridor	Interior		00-27,00-35,00-45,00-47,00-50	AHU -2		264	Corridor
SB	SBC17	Corridor	Interior		00-27,00-35,00-45,00-47,00-50	AHU -2		264	Corridor
SB	SBC18	Corridor	Interior		00-8, 00-11, 00-39, 0016	AHU -1		604	Corridor
SB	SBC19	Passage	Interior					95	Corridor
SB	SBC20	Passage	Interior		00-12	AHU -3		147	Corridor
SB	SBC21	Passage	Basement Perimeter	E-8'	00-5	AHU -3		518	Corridor
SB	SBC22	Future Connection to Parking	Basement Perimeter	S-16', E-10'4	00-40	AHU -2		105	Corridor

Appendix C- System Checksums



System Checksums
By ACADEMIC

AHU-1 Variable Volume Reheat (30% Min Flow Default)

COOLING COIL PEAK — Peaked at Time: Mo/Hr: 7 / 16; Outside Air: OADB/WB/HR: 92 / 74 / 102

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	508,334	0	508,334	16
Glass/Door Cond	91,647	0	91,647	3
Wall Cond	2,471	2,331	4,802	0
Partition/Door	-1,520		-1,520	0
Floor	0		0	0
Adjacent Floor	0	0	0	0
Infiltration	0		0	0
Sub Total ==>	600,933	2,331	603,264	20
Internal Loads				
Lights	211,812	52,953	264,764	9
People	420,065	0	420,065	14
Misc	203,023	0	203,023	7
Sub Total ==>	834,899	52,953	887,852	29
Ceiling Load	13,771	-13,771	0	0
Ventilation Load	0	0	1,352,092	44
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	283,381		283,381	9
Exhaust Heat		-17,441	-17,441	-1
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	1,712,964	24,073	3,098,129	100.00

CLG SPACE PEAK — Mo/Hr: 6 / 17; OADB: 92

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	654,643	40
Glass/Door Cond	96,897	6
Wall Cond	3,094	0
Partition/Door	-1,704	0
Floor	0	0
Adjacent Floor	0	0
Infiltration	0	0
Sub Total ==>	753,040	46
Internal Loads		
Lights	211,812	13
People	210,367	13
Misc	203,148	12
Sub Total ==>	625,327	38
Ceiling Load	12,911	1
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Dehumid. Ov Sizing		
Ov/Undr Sizing	260,995	16
Exhaust Heat		
Sup. Fan Heat		
Ret. Fan Heat		
Duct Heat Pkup		
Underflr Sup Ht Pkup		
Supply Air Leakage		
Grand Total ==>	1,652,323	100.00

HEATING COIL PEAK — Mo/Hr: Heating Design; OADB: 20

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	0	0.00
Glass Solar	0	0	0.00
Glass/Door Cond	-283,850	-283,850	12.44
Wall Cond	-6,377	-12,072	0.53
Partition/Door	-26,616	-26,616	1.17
Floor	0	0	0.00
Adjacent Floor	0	0	0
Infiltration	0	0	0.00
Sub Total ==>	-316,843	-322,538	14.14
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-1,886	0	0.00
Ventilation Load	0	-824,508	36.14
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	1	1,166	0.00
Exhaust Heat		-630,266	-0.05
OA Preheat Diff.		27.63	
RA Preheat Diff.		-505,307	22.15
Additional Reheat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-318,728	-2,281,451	100.00

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB/HR °F	Enter WB/HR gr/lb	Leave DB °F	Leave WB/HR °F	Leave WB/HR gr/lb
Main Clg	257.4	3,089.1	2,094.3	73,672	82.2	67.7	80.5	56.4	54.4	61.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	257.4	3,089.1								

AREAS

	Gross Total ft²	Glass ft²	(%)
Floor	84,221		
Part	3,025		
Int Door	0		
ExFlr	0		
Roof	0	0	0
Wall	22,089	17,471	79
Ext Door	0	0	0

TEMPERATURES

	Cooling	Heating
SADB	58.4	75.9
Ra Plenum	75.5	69.9
Return	75.5	69.9
Ret/OA	82.2	54.6
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Fric	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	81,020	49,102
Terminal	81,020	49,102
Main Fan	81,020	49,102
Sec Fan	0	0
Nom Vent	30,815	15,033
AHU Vent	30,815	15,033
Infil	0	0
MinStop/Rh	49,102	49,102
Return	81,020	49,102
Exhaust	30,815	15,033
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	38.0	30.8
cfm/ft²	0.96	0.58
cfm/ton	314.73	
ft²/ton	327.16	
Btu/hr-ft²	36.68	-27.09
No. People	842	

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1,050.8	49,102	58.4	75.9
Aux Htg	0.0	0	0.0	0.0
Preheat	-1,230.8	30,815	20.0	58.4
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-2,281.5			

Project Name: Duke Cancer Center Expansion
Dataset Name: TRACEDCC_elec.trc

TRACE® 700 v6.2.6.5 calculated at 08:01 AM on 10/21/2011
Alternative - 1 System Checksums Report Page 1 of 3

System Checksums

By ACADEMIC

AHU-2 — Variable Volume Reheat (30% Min Flow Default)

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 92 / 75 / 106

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	147,042	0	147,042	4
Glass/Door Cond	37,309	0	37,309	1
Wall Cond	2,124	1,821	3,946	0
Partition/Door	-1,562		-1,562	0
Floor	0		0	0
Adjacent Floor	0	0	0	0
Infiltration	0		0	0
Sub Total ==>	184,913	1,821	186,735	5
Internal Loads				
Lights	193,838	48,460	242,297	6
People	689,061	0	689,061	18
Misc	198,511	0	198,511	5
Sub Total ==>	1,081,409	48,460	1,129,869	29
Ceiling Load	11,971	-11,971	0	0
Ventilation Load	0	0	2,257,706	58
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	379,482		379,482	10
Exhaust Heat		-35,365	-35,365	-1
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	1,657,775	2,945	3,918,427	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 11
OADB: 86

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	238,438	17
Glass/Door Cond	20,215	1
Wall Cond	1,089	0
Partition/Door	-1,562	0
Floor	0	0
Adjacent Floor	0	0
Infiltration	0	0
Sub Total ==>	258,180	19
Internal Loads		
Lights	192,297	14
People	348,394	25
Misc	202,090	15
Sub Total ==>	742,781	54
Ceiling Load	11,204	1
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	366,371	27
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
Underflr Sup Ht Pkup		
Supply Air Leakage		
Grand Total ==>	1,378,536	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 20

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	0	0.00
Glass Solar	0	0	0.00
Glass/Door Cond	-116,015	-116,015	3.90
Wall Cond	-4,802	-8,797	0.30
Partition/Door	-27,359	-27,359	0.92
Floor	0	0	0.00
Adjacent Floor	0	0	0
Infiltration	0	0	0.00
Sub Total ==>	-148,176	-152,172	5.12
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-1,150	0	0.00
Ventilation Load	0	-2,193,395	73.76
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	1	1	0.00
Exhaust Heat		2,506	-0.08
OA Preheat Diff.		-539,833	18.12
RA Preheat Diff.		-91,608	3.08
Additional Reheat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-149,325	-2,973,500	100.00

TEMPERATURES

	Cooling	Heating
SADB	54.7	73.0
Ra Plenum	75.6	69.9
Return	75.6	69.9
Ret/OA	90.7	26.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	61,943	45,475
Terminal	61,943	45,475
Main Fan	61,943	45,475
Sec Fan	0	0
Nom Vent	54,143	39,992
AHU Vent	54,143	39,992
Infil	0	0
MinStop/Rh	45,475	45,475
Return	61,943	45,475
Exhaust	54,143	39,992
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	87.4	87.9
cfm/ft²	0.98	0.72
cfm/ton	189.70	
ft²/ton	194.29	
Btu/hr·ft²	61.76	-46.87
No. People	1,406	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	326.5	3,918.4	2,318.9	58,699	90.7	74.2	103.1	54.7	54.6	64.4
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	326.5	3,918.4								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	63,443		
Part	3,291		
Int Door	0		
ExFlr	0		
Roof	0	0	0
Wall	10,890	7,141	67
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-912.0	45,475	54.7	73.0
Aux Htg	0.0	0	0.0	0.0
Preheat	-2,061.6	54,143	20.0	54.7
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-2,973.5			

Project Name: Duke Cancer Center Expansion
Dataset Name: TRACEDCC_elec.trc

TRACE® 700 v6.2.6.5 calculated at 08:01 AM on 10/21/2011
Alternative - 1 System Checksums Report Page 2 of 3

System Checksums

By ACADEMIC

AHU-3 — **Variable Volume Reheat (30% Min Flow Default)**

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 92 / 75 / 106

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	188,601	0	188,601	5
Glass/Door Cond	45,846	0	45,846	1
Wall Cond	911	1,110	2,021	0
Partition/Door	-933		-933	0
Floor	0		0	0
Adjacent Floor	0	0	0	0
Infiltration	0		0	0
Sub Total ==>	234,425	1,110	235,535	6
Internal Loads				
Lights	208,042	52,011	260,052	7
People	470,466	0	470,466	12
Misc	626,636	0	626,636	17
Sub Total ==>	1,305,144	52,011	1,357,155	36
Ceiling Load	11,996	-11,996	0	0
Ventilation Load	0	0	2,003,907	53
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	204,772		204,772	5
Exhaust Heat		-25,418	-25,418	-1
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	1,756,336	15,707	3,775,951	100.00

CLG SPACE PEAK

Mo/Hr: 6 / 10
OADB: 82

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	362,128	23
Glass/Door Cond	14,730	1
Wall Cond	345	0
Partition/Door	-1,046	0
Floor	0	0
Adjacent Floor	0	0
Infiltration	0	0
Sub Total ==>	376,157	24
Internal Loads		
Lights	197,509	12
People	206,533	13
Misc	621,009	39
Sub Total ==>	1,025,051	64
Ceiling Load	10,791	1
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Dehumid. Ov Sizing		
Ov/Undr Sizing	187,861	12
Exhaust Heat		
Sup. Fan Heat		
Ret. Fan Heat		
Duct Heat Pkup		
Underflr Sup Ht Pkup		
Supply Air Leakage		
Grand Total ==>	1,599,860	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 20

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	0	0.00
Glass Solar	0	0	0.00
Glass/Door Cond	-142,367	-142,367	5.70
Wall Cond	-1,579	-3,460	0.14
Partition/Door	-16,343	-16,343	0.65
Floor	0	0	0.00
Adjacent Floor	0	0	0
Infiltration	0	0	0.00
Sub Total ==>	-160,289	-162,170	6.49
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-612	0	0.00
Ventilation Load	0	-924,419	37.01
Adj Air Trans Heat	0	0	0
Dehumid. Ov Sizing	5	5	0.00
Exhaust Heat		510	-0.02
OA Preheat Diff.		-1,001,081	40.08
RA Preheat Diff.		-410,542	16.44
Additional Reheat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-160,895	-2,497,697	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.1	73.5
Ra Plenum	75.5	70.0
Return	75.5	70.0
Ret/OA	85.7	49.9
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	73,136	41,949
Terminal	73,136	41,949
Main Fan	73,136	41,949
Sec Fan	0	0
Nom Vent	42,887	16,855
AHU Vent	42,887	16,855
Infil	0	0
MinStop/Rh	41,949	41,949
Return	73,136	41,949
Exhaust	42,887	16,855
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	58.6	40.2
cfm/ft²	1.04	0.60
cfm/ton	232.43	
ft²/ton	222.67	
Btu/hr·ft²	53.89	-35.65
No. People	959	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	314.7	3,776.0	2,331.9	69,325	85.7	70.6	90.2	55.1	53.7	60.5
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	314.7	3,776.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	70,065		
Part	2,176		
Int Door	0		
ExFlr	0		
Roof	0	0	0
Wall	10,261	8,763	85
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-848.5	41,949	55.1	73.5
Aux Htg	0.0	0	0.0	0.0
Preheat	-1,649.3	42,887	20.0	55.1
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-2,497.7			

Project Name: Duke Cancer Center Expansion
Dataset Name: TRACEDCC_elec.trc

Appendix D- Emission Factors for Delivered Electricity

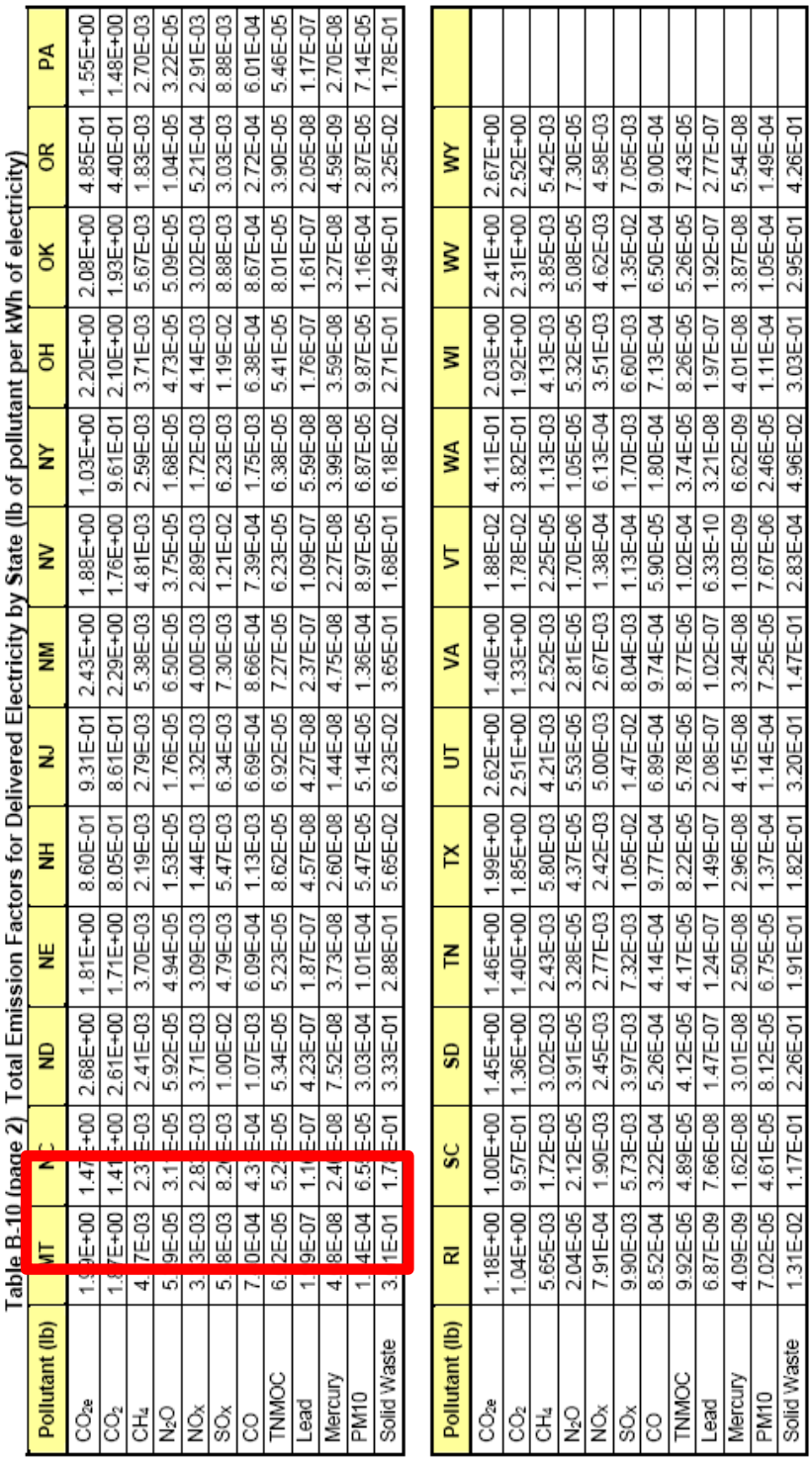


Table B-10 (page 2) Total Emission Factors for Delivered Electricity by State (lb of pollutant per kWh of electricity)

Pollutant (lb)	MT	N	ND	NE	NH	NJ	NM	NV	NY	OH	OK	OR	PA
CO_{2e}	1.99E+00	1.47E+00	2.68E+00	1.81E+00	8.60E-01	9.31E-01	2.43E+00	1.88E+00	1.03E+00	2.20E+00	2.08E+00	4.85E-01	1.55E+00
CO_2	1.87E+00	1.41E+00	2.61E+00	1.71E+00	8.05E-01	8.61E-01	2.29E+00	1.76E+00	9.61E-01	2.10E+00	1.93E+00	4.40E-01	1.48E+00
CH_4	4.17E-03	2.31E-03	2.41E-03	3.70E-03	2.19E-03	2.79E-03	5.38E-03	4.81E-03	2.59E-03	3.71E-03	5.67E-03	1.83E-03	2.70E-03
N_2O	5.19E-05	3.11E-05	5.92E-05	4.94E-05	1.53E-05	1.76E-05	6.50E-05	3.75E-05	1.68E-05	4.73E-05	5.09E-05	1.04E-05	3.22E-05
NO_x	3.13E-03	2.81E-03	3.71E-03	3.09E-03	1.44E-03	1.32E-03	4.00E-03	2.89E-03	1.72E-03	4.14E-03	3.02E-03	5.21E-04	2.91E-03
SO_x	5.18E-03	8.24E-03	1.00E-02	4.79E-03	5.47E-03	6.34E-03	7.30E-03	1.21E-02	6.23E-03	1.19E-02	8.88E-03	3.03E-03	8.88E-03
CO	7.10E-04	4.31E-04	1.07E-03	6.09E-04	1.13E-03	6.69E-04	8.66E-04	7.39E-04	1.75E-03	6.38E-04	8.67E-04	2.72E-04	6.01E-04
TNMOC	6.12E-05	5.21E-05	5.34E-05	5.23E-05	8.62E-05	6.92E-05	7.27E-05	6.23E-05	6.38E-05	5.41E-05	8.01E-05	3.90E-05	5.46E-05
Lead	1.19E-07	1.11E-07	4.23E-07	1.87E-07	4.57E-08	4.27E-08	2.37E-07	1.09E-07	5.59E-08	1.76E-07	1.61E-07	2.05E-08	1.17E-07
Mercury	4.18E-08	2.41E-08	7.52E-08	3.73E-08	2.60E-08	1.44E-08	4.75E-08	2.27E-08	3.99E-08	3.59E-08	3.27E-08	4.59E-09	2.70E-08
PM10	1.14E-04	6.51E-05	3.03E-04	1.01E-04	5.47E-05	5.14E-05	1.36E-04	8.97E-05	6.87E-05	9.87E-05	1.16E-04	2.87E-05	7.14E-05
Solid Waste	3.11E-01	1.72E-01	3.33E-01	2.88E-01	5.65E-02	6.23E-02	3.65E-01	1.68E-01	6.18E-02	2.71E-01	2.49E-01	3.25E-02	1.78E-01

Pollutant (lb)	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	
CO_{2e}	1.18E+00	1.00E+00	1.45E+00	1.46E+00	1.99E+00	2.62E+00	1.40E+00	1.88E-02	4.11E-01	2.03E+00	2.41E+00	2.67E+00	
CO_2	1.04E+00	9.57E-01	1.36E+00	1.40E+00	1.85E+00	2.51E+00	1.33E+00	1.78E-02	3.82E-01	1.92E+00	2.31E+00	2.52E+00	
CH_4	5.65E-03	1.72E-03	3.02E-03	2.43E-03	5.80E-03	4.21E-03	2.52E-03	2.25E-05	1.13E-03	4.13E-03	3.85E-03	5.42E-03	
N_2O	2.04E-05	2.12E-05	3.91E-05	3.28E-05	4.37E-05	5.53E-05	2.81E-05	1.70E-06	1.05E-05	5.32E-05	5.08E-05	7.30E-05	
NO_x	7.91E-04	1.90E-03	2.45E-03	2.77E-03	2.42E-03	5.00E-03	2.67E-03	1.38E-04	6.13E-04	3.51E-03	4.62E-03	4.58E-03	
SO_x	9.90E-03	5.73E-03	3.97E-03	7.32E-03	1.05E-02	1.47E-02	8.04E-03	1.13E-04	1.70E-03	6.60E-03	1.35E-02	7.06E-03	
CO	8.52E-04	3.22E-04	5.26E-04	4.14E-04	9.77E-04	6.89E-04	9.74E-04	5.90E-05	1.80E-04	7.13E-04	6.50E-04	9.00E-04	
TNMOC	9.92E-05	4.89E-05	4.12E-05	4.17E-05	8.22E-05	5.78E-05	8.77E-05	1.02E-04	3.74E-05	8.26E-05	5.26E-05	7.43E-05	
Lead	6.87E-09	7.66E-08	1.47E-07	1.24E-07	1.49E-07	2.08E-07	1.02E-07	6.33E-10	3.21E-08	1.97E-07	1.92E-07	2.77E-07	
Mercury	4.09E-09	1.62E-08	3.01E-08	2.50E-08	2.96E-08	4.15E-08	3.24E-08	1.03E-09	6.62E-09	4.01E-08	3.87E-08	5.54E-08	
PM10	7.02E-05	4.61E-05	8.12E-05	6.75E-05	1.37E-04	1.14E-04	7.25E-05	7.67E-06	2.46E-05	1.11E-04	1.05E-04	1.49E-04	
Solid Waste	1.31E-02	1.17E-01	2.26E-01	1.91E-01	1.82E-01	3.20E-01	1.47E-01	2.83E-04	4.96E-02	3.03E-01	2.95E-01	4.26E-01	