Technical Assignment 2

Design Load Estimation and Energy Analysis

City of Hope: Amini Medical Center
Duarte, CA

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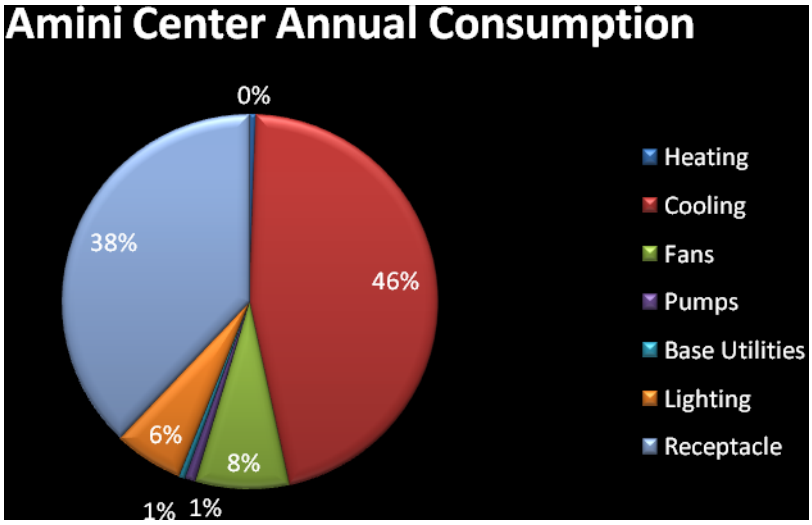
Executive Summary

Many factors and assumptions are taken into account when trying to determine the cooling load needed for a room or building. Some factors include climate data, envelope loads, internal loads, and ventilation air loads. To accurately estimate the loads of an entire building would take an engineer hours to calculate by hand. Due to advancements in technology, computer programs exist to help an engineer calculate cooling capacities much quicker. One particular program, TraneTrace 700, was used for the first part of this report to simulate the load needed to cool the Amini Medical Center.

After inputting the building envelope, people, lighting, plug load, and climate data for the Amini Center, based on the construction documents, the program then calculated the cooling capacities I would expect to see for this building. This particular simulation involved only 35,000 ft^2 of the center due to empty shell plans for the entire third floor. The simulation looked at two units serving lab areas on the first floor and another unit serving administrative and office areas on the remaining first floor and second floor. Overall for the space, the cooling capacity for the lab areas ranged from 115 - 190 ft^2/ton, while the office area unit saw about 471 ft^2/ton. This difference in capacity makes sense in this building because the lab spaces see a much higher internal load due to the many pieces of equipment contained in them.

The second part of this report investigates the energy consumption and cost associated with running the Amini Medical Center for one calendar year. To aid in estimating the consumption and cost to run this facility, the TraneTrace 700 program required more input.

To try and accurately model the space, schedules were created to simulate occupancy, lighting, equipment, ventilation, utility rate schedules, and other factors that have an effect on energy consumption and cost. After plants were created and all schedules were assigned, the program simulated the equipment consumption and produced the dollar figure it would cost to run this facility based on the inputs. For my simulation the energy consumption broke down as follows:



Total cost to run this facility was calculated to be $113,208 per year which ends up being $3.26/$ft^2$.

For the overall experience of using Energy Models, I believe they can be very beneficial tools to help produce information in a short amount of time. Due to the amount of input needed to

generate results, errors seem easy to come by. I don't believe they are good tools for estimating a building's electric bill due to the many assumptions that have to be made. Because this was a fast paced model simulation, I don't believe I spent enough time to develop a truly accurate figures. The values generated, however, do provide much insight into the building and how it will function.

Load Estimation

To aid in determining the cooling loads required for the Amini Medical Center, the TraneTrace 700 program was utilized. Due to the third floor remaining vacant on the construction documents received, this area was not included in the following analysis. This estimate will only include the cooling loads required for three air-handling units (AHUs) serving the first and second floors, along with fan coil units (FCUs) serving special need areas of the building. For a schematic of theses units and the areas they serve, please refer to Appendix A.

To determine the loads required for each HVAC unit, building envelope load, occupancy load, lighting load, plug load, ventilation air load, and climatic data were input into the program using the construction documents as a reference.

Inputs

Building Envelope:

The Amini Center building envelope consisted of three typical wall types and one specific glazing type. The u-values entered into the program for these wall types and glazing values can be viewed below. Refer to Appendix B for a more detailed breakdown of these entered values.

Construction	U-Value Btu/h*ft2*F	SC
Stone Wall	0.043	-
Fire/Stucco Wall	0.039	-
Spandrel Glass Wall	0.045	-
Glazing	0.26	0.43

Occupancy:

For this estimation, occupancy for each room was taken from the Architectural drawings. Maximum load was assumed to be the maximum number of chairs or seating locations in each room. Each person was assumed to giver off 250 Btu's sensible heat and 200 Btu's latent heat.

Lighting:

Lighting for every space was assumed to 0.85 W/ft^2, which happens to be the designed lighting density for this building, as seen in Technical Assignment 1.

Plug Load:

Plug load, or room equipment heat load, for this building was estimated on a room by room basis. Due to the assortment of equipment in lab areas and IT rooms, a general W/ft^2 load would produce inaccurate results. For these lab areas, I referred to a LEED energy model created by the design team and inserted the loads the design team used.

For general office areas, I estimated the equipment heat loads for computers, printers, copiers, etc. Refer to the Table below for some general equipment loads that were assumed in the office spaces.

Equipment	Heat Load Watts	Equipment	Heat Load Watts
Computer	155	Refrigerator	300
Desktop Printer	100	Microwave	300
Copier	400	Toaster	100
Fax Machines	100	Coffee Maker	200

Ventilation Air:

Supply air for each room was input based on the construction documents. In doing so, each AHU and FCU ventilation percentage was also input based on the minimum outdoor air (OA) quantity listed on the drawing schedules.

Climate Data:

The Amini Medical is being constructed in Duarte, California, a suburb of Los Angeles. For this estimation the Trace program is equipped with regional weather data from around the world. The weather data selected for this project was Pasadena, Ca, 10 miles away from this building site. Design conditions for this region are as follows:

Indoor Conditions			Outdoor Conditions							
Summer		Winter	Summer		Winter	Clearness		Ground Reflectance		CO2 Level
DB	RH	DB	DB	WB	DB	Summer	Winter	Summer	Winter	PPM
72	50	72	95	68	29	1.05	0.95	0.2	0.2	400

Output Results

The following table summarizes the results of my cooling load estimation and compares them to the capacities scheduled on the design documents. For a more detailed breakdown of the Trace load capacities, refer to Appendix C.

Unit	Trace Program		Design Documents		Unit	Trace Program		Design Documents	
	Total MBH	Sensible MBH	Total MBH	Sensible MBH		Total MBH	Sensible MBH	Total MBH	Sensible MBH
AHU-1	259.0	145.5	277.6	264.0	AHU-2	392.5	319.9	453.8	440.1
AHU-3	608.3	525.0	751.0	680.6	FCU-1-1	5.0	4.9	10.8	6.2
FCU-1-2	15.1	15.1	47.3	38.3	FCU-1-3	45.2	45.2	100.4	55.2
FCU-1-4	7.6	7.5	17.4	10.4	FCU-1-5	132.1	97.5	91.1	82.9
FCU-2-1	49.4	49.4	72.4	58.6	FCU-2-2	17.3	17.3	3.5	2.8
FCU-2-3	9.3	9.3	3.5	2.8	FCU-2-4	10.4	10.4	8.1	6.5

Discussion:

AHUs
In comparison to the estimated load calculations, AHU-1, 2 & 3 scheduled vary in total capacity by 6.7%, 13.5%, and 19% respectively. On a ft^2/ton basis the differences between estimated and calculated are as follows:

Unit	Estimated	Design Documents
	ft2/ton	ft2/ton
AHU-1	115	107
AHU-2	191	165
AHU-3	471	382

In viewing these calculations it appears that AHU-1 is pretty close to the actual scheduled unit and AHUs 2 & 3 are estimated to be a significant tonnage lower in capacity.

These capacity differences can be caused by a countless number of reasons, or a combination of reasons. Some reasons for the lower estimated values could include climate data, indoor design conditions, underestimating internal loads, and other differences, even calculation methodology.

FCUs

Because the loads in the rooms the fan coil units serve were taken from the design engineer EnergyPro simulation, the loads should match what was scheduled. Looking at the table above however shows that some FCUs are close to the scheduled capacities while others are well below or well over the design documents.

For these rooms, load calculations are hard to estimate and should be supplied to the design engineer to avoid any over or under sizing of equipment. The values estimated/taken from EnergyPro program could be old values that were initially intended for the rooms but were changed later during design.

Energy Analysis

This part of the report focuses on the energy used and the estimated cost to run the Amini Medical Center for one calendar year. The simulation program used for this analysis was the TraneTrace 700 program. The model described in the load estimation above is the exact model being run for the energy study.

Inputs

Systems & Plants:

For this simulation all air handling units were modeled as VAV Reheat systems, 30% minimum flow. Specific areas containing constant volume units had the default 30% minimum flow reset for 100% minimum flow. All supply air and outdoor air quantities for these units were input and locked to match the design documents. Fan coil units were modeled as such with the supply air set by the construction documents air flows.

Because this building is served by a central campus heating and cooling plant, the energy simulation was modeled as a purchased chilled water system and a purchased steam system. The energy analysis also includes the chilled water pumps and heating water pumps that run water throughout the building.

All fans including supply, return, exhaust, toilet exhaust and lab exhaust fans were modeled and input based on the BHP and air quantity. All fan energies were input as KW/cfm.

Exterior lighting was accounted for as a base utility, setting total KW for the lights on a schedule.

Operation Schedules:

Because buildings are not occupied 24/7 and all equipment and lighting is not in operation 24/7, schedules need to be made to try and simulate the actual building operation. For the Amini Medical Center, the design engineer created a model in EnergyPro to simulate the buildings operation. For this report, I looked over the schedules the engineer made and created the same schedules in this program. Please refer to Appendix D for all the schedules that were created.

Fuel Costs:

To estimate the actual cost that the building owner might see, energy rates need to be defined setting the cost per energy rate. For this building in Duarte California, the rate structure for SCE was used. Refer to the end of Appendix D for this rate schedule.

Outputs

Energy Consumption:

The energy consumption shown in the table below gives the break down for the Amini Medical Center.

	Elec Consumption (kwh)	Purchased Chilled Water (kBtu)	Purchased Steam (kBtu)	% Total Energy	Total Building Energy (kBtu/yr)	Total Source Energy (kBtu/yr)
Primary Htg			26,204	0.54	26,204	34,939
Other Htg Accessories	249			0.02	849	2,548
Primary Cooling		2,233,676		46.07	2,233,676	1,718,212
Supply Fans	113,671			8.00	387,959	1,163,993
Pumps	13,050			0.92	44,539	133,631
Base Utilities	8,038			0.57	27,434	82,310
Lighting	85,055			5.99	290,294	870,968
Receptacle	538,374			37.90	1,837,470	5,512,961
Totals	758,437	2,233,676	26,204	100	4,848,425	9,519,562

From this table it is easy to conclude to conclude that this is a cooling dominated building. From the weather conditions, internal loads, and envelope load; it does make sense that the building will be in cooling mode most of the time.

Annual Operation Cost:

According to the model simulation, it will cost the Amini Medical Center $113,208 per year to operate under the design conditions above assuming no change to energy prices throughout the year. The annual breakdown per square foot ends up being 3.26$/ft^2. Considering only the first two floors of this building were modeled, and the occupancy of these floors, I feel the operation cost does give a relatively accurate estimate for the building type. For the Trace Monthly Utility Costs, refer to Appendix E.

Design Engineer Energy Simulation:

Because this project is going for a LEED Gold rating, the design engineer produced an energy model comparison showing the saving of the Amini Medical Center design compared to a baseline building specified by LEED. The design engineer's energy model for the Amini Center resulted in a similar breakdown of energy use as shown in this report. The report indicates the building is a cooling dominated building. The cost indicated by the engineer's report indicates an annual energy cost of $3.84/ft^2 which is relatively close to the annual energy cost I had simulated. Please Refer to Appendix F for the EnergyPro reports and my simulated Energy/Cost budget.

Discussion:

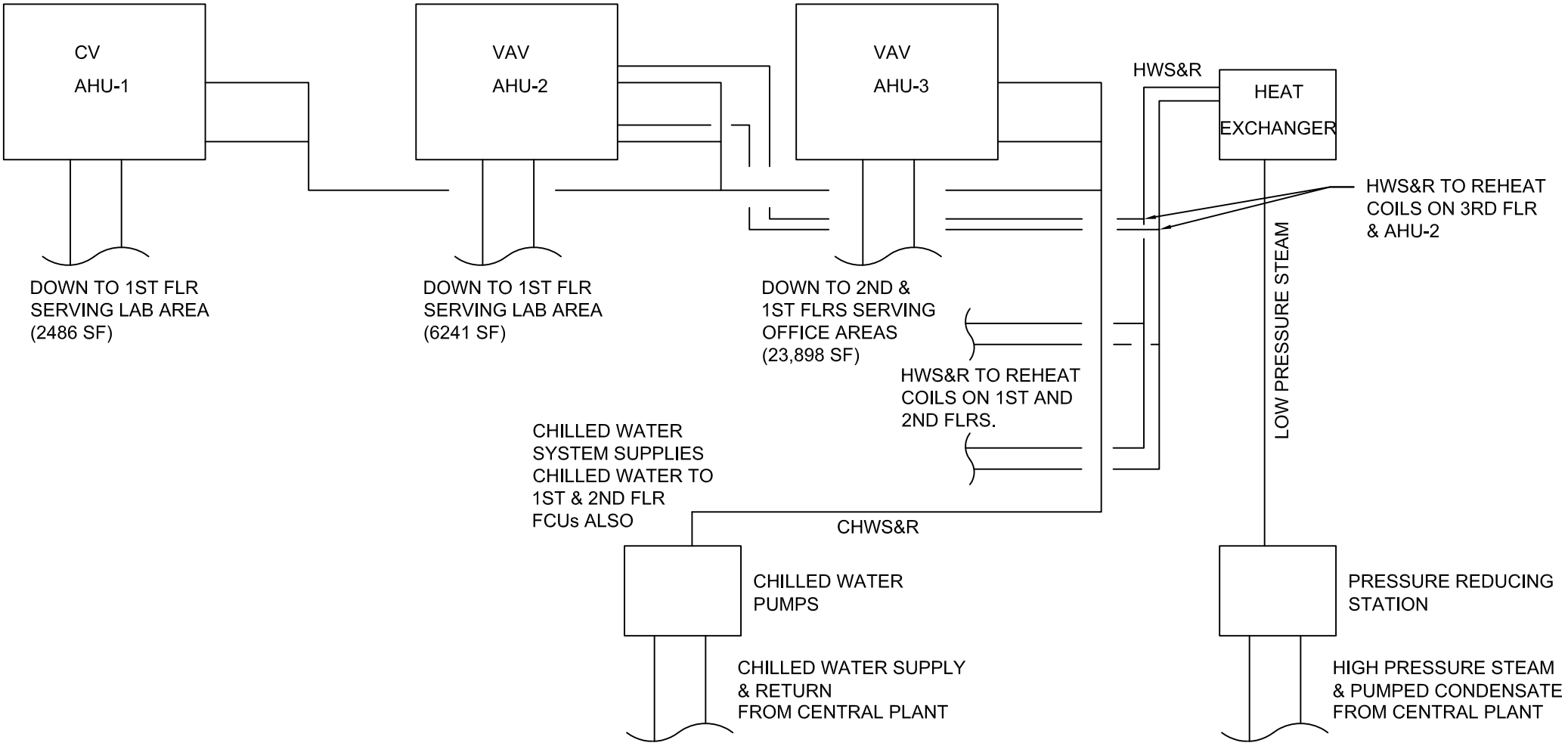
For the overall experience of using Energy Models, I believe they can be very beneficial tools to help produce information in a short amount of time. Due to the amount of input needed to generate results, errors seem easy to come by. I don't believe they are good tools for estimating a building's energy bill due to the many assumptions that have to be made. Because this was a fast paced model simulation, I don't believe I spent enough time to develop a truly accurate figures. The values generated, however, do provide much insight into the building and how it will function.

References

ASHRAE. 2005, 2005 ASHRAE Handbook – Fundamentals. American Society of Heating Refrigeration and Air Conditioning Engineers, Inc., Atlanta, GA. 2001.

EwingCole. 2007. City of Hope: Amini Medical Center Construction Documents and Specifications. EwingCole, Irvine, CA

Appendix A
AHU Schematic


CV
AHU-1
VAV
AHU-2
VAV
AHU-3
HWS&R
HEAT
EXCHANGER
HWS&R TO REHEAT
COILS ON 3RD FLR
& AHU-2
LOW PRESSURE STEAM
DOWN TO 1ST FLR
SERVING LAB AREA
(2486 SF)
DOWN TO 1ST FLR
SERVING LAB AREA
(6241 SF)
DOWN TO 2ND &
1ST FLRS SERVING
OFFICE AREAS
(23,898 SF)
HWS&R TO REHEAT
COILS ON 1ST AND
2ND FLRS.
CHILLED WATER
SYSTEM SUPPLIES
CHILLED WATER TO
1ST & 2ND FLR
FCUs ALSO
CHWS&R
CHILLED WATER
PUMPS
PRESSURE REDUCING
STATION
CHILLED WATER SUPPLY
& RETURN
FROM CENTRAL PLANT
HIGH PRESSURE STEAM
& PUMPED CONDENSATE
FROM CENTRAL PLANT

Appendix B

Wall & Glazing Breakdown

Library Members

Wall - Construction Types

COH_Typ Fire Wall

Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	M161	Outside Air Film					0.25 ft²·hr·°F/Btu
2	M153	5/8" Gyp Board					0.56 ft²·hr·°F/Btu
3	M153	5/8" Gyp Board					0.56 ft²·hr·°F/Btu
4	M208	6" Thermafiber FS-25					22.80 ft²·hr·°F/Btu
5	M153	5/8" Gyp Board					0.56 ft²·hr·°F/Btu
6	M158	Inside Air Film					0.68 ft²·hr·°F/Btu

Lamda	=	1.00	Weight	=	0.00	lb/ft²	U-Value	=	0.039	Btu/hr·ft²·°F	Alpha = 0.90
Delta	=	0 hours	Heat Capacity	=	0.00	Btu/ft²·lb·°F	C-Coefficient	=	0.0400	Btu/hr·ft²·°F	

COH_Typ Stone Wall

Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	M161	Outside Air Film					0.25 ft²·hr·°F/Btu
2	M207	Limestone Facade					1.20 ft²·hr·°F/Btu
3	B0	Air Space Resistance					0.91 ft²·hr·°F/Btu
4	M153	5/8" Gyp Board					0.56 ft²·hr·°F/Btu
5	M176	R-19 Batt					19.00 ft²·hr·°F/Btu
6	M153	5/8" Gyp Board					0.56 ft²·hr·°F/Btu
7	M158	Inside Air Film					0.68 ft²·hr·°F/Btu

Lamda	=	1.00	Weight	=	0.00	lb/ft²	U-Value	=	0.043	Btu/hr·ft²·°F	Alpha = 0.90
Delta	=	0 hours	Heat Capacity	=	0.00	Btu/ft²·lb·°F	C-Coefficient	=	0.0400	Btu/hr·ft²·°F	

Library Members

Wall - Construction Types

COH Spandral Glass Wall

Layer	Code	Description	Thickness	Conductivity	Density	Specific Heat	Resistance
1	M161	Outside Air Film					0.25 ft²·hr·°F/Btu
2	M205	COH Spandral Glass					3.85 ft²·hr·°F/Btu
3	M206	4" CB 300 Commercial Brd					17.40 ft²·hr·°F/Btu
4	M158	Inside Air Film					0.68 ft²·hr·°F/Btu

Lamda = 1.00 Weight = 0.00 lb/ft² U-Value = 0.045 Btu/hr·ft²·°F Alpha = 0.90

Delta = 0 hours Heat Capacity = 0.00 Btu/ft²·lb·°F C-Coefficient = 0.0500 Btu/hr·ft²·°F

Glass types

COH_Vision Glass

Properties based on Std DS Glass

Number of Panes	2	Visible Transmissivity	0.67	Inside Solar Reflectivity	0.11
Shading Coeff	0.43	Inside Visible Reflectivity	0.11	Outside Long Wave Emissivity	0.90
Glass U-Value	0.26 Btu/hr·ft²·°F	Solar Transmissivity	0.29	Inside Long Wave Emissivity	0.90

Lights

Fluorescent, hung below ceiling, 100% load to space

Fixture Type	SUSFLUOR	Longwave Radiant Fraction	67 %
Percent Lights to RA	0 %	Shortwave Radiant Fraction	0 %
Ballast Factor	1.00		

Misc. loads

Std Office Equipment

Energy Consumption	0.50 W/ft²	Percent Sensible	100 %	**Radiant Fraction**	60 %
		Percent To Room	100 %	The energy meter is Electricity	
		Percent To RA	0 %		

Appendix C
System Load Capacities

System Checksums

By META ENGINEERS

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

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 15
Outside Air: OADB/WB/HR: 92 / 69 / 73

	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	1,513	0	1,513	1
Glass Cond	719	0	719	0
Wall Cond	373	395	768	0
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	2,605	395	3,000	1
Internal Loads				
Lights	6,491	0	6,491	3
People	3,600		3,600	1
Misc	9,672	0	9,672	4
Sub Total ==>	19,763	0	19,763	8
Ceiling Load	39	-39	0	0
Ventilation Load	0	0	200,017	77
Adj Air Trans Heat	971		971	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	7,376		7,376	3
Exhaust Heat		-155	-155	0
Sup. Fan Heat			28,037	11
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	30,753	202	259,010	100.00

CLG SPACE PEAK

Mo/Hr: 2 / 10
OADB: 62

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	8,137	28
Glass Cond	-390	-1
Wall Cond	482	2
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	8,230	28
Internal Loads		
Lights	6,491	22
People	2,000	7
Misc	11,410	39
Sub Total ==>	19,901	68
Ceiling Load	45	0
Ventilation Load	0	0
Adj Air Trans Heat	971	3
Ov/Undr Sizing	8	0
Grand Total ==>	29,154	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 29

	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 Cond	-1,605	-1,605	0.73
Wall Cond	-561	-1,155	0.53
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	0	0	0.00
Sub Total ==>	-2,165	-2,760	1.26
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	-52	0	0.00
Ventilation Load	0	-190,269	86.99
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		294	-0.13
OA Preheat Diff.		-41	0.02
RA Preheat Diff.		-25,953	11.87
Additional Reheat		0	0.00
Grand Total ==>	-2,218	-218,730	100.00

TEMPERATURES

	Cooling	Heating
SADB	68.4	72.3
Plenum	72.1	71.9
Return	72.1	71.9
Ret/OA	82.8	48.7
Fn MtrTD	0.3	0.0
Fn BldTD	0.8	0.0
Fn Frict	2.3	0.0

AIRFLOWS

	Cooling	Heating
Vent	4,103	4,102
Infil	0	0
Supply	7,570	7,570
MinStop/Rh	7,570	7,570
Return	6,370	7,570
Exhaust	2,903	4,102
Rm Exh	1,200	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	54.2	54.2
cfm/ft²	3.05	3.05
cfm/ton	350.72	
ft²/ton	115.18	
Btu/hr·ft²	104.19	0.00
No. People	16	

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	21.6	259.0	145.5	7,569.9	82.8	62.4	54.4	65.0	50.3	32.4
Aux Clg	0.0	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	0.0
Total	21.6	259.0								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	2,486		
Part	0		
ExFlr	0		
Roof	0	0	0
Wall	765	142	19

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	0.0	7,570.0	65.0	72.3
Aux Htg	0.0	0	0	0
Preheat	0.0	4,103	29	65
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	0.0			

System Checksums

By META ENGINEERS

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

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 17
Outside Air: OADB/WB/HR: 90 / 68 / 74

	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	17,415	0	17,415	4
Glass Cond	1,225	0	1,225	0
Wall Cond	2,335	2,112	4,447	1
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	20,975	2,112	23,087	6
Internal Loads				
Lights	16,295	0	16,295	4
People	9,000		9,000	2
Misc	100,242	0	100,242	26
Sub Total ==>	125,537	0	125,537	32
Ceiling Load	236	-236	0	0
Ventilation Load	0	0	186,390	47
Adj Air Trans Heat	840		840	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	2,887		2,887	1
Exhaust Heat		-781	-781	0
Sup. Fan Heat			54,482	14
Ret. Fan Heat		1	1	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	150,475	1,096	392,444	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 11
OADB: 84

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	3,132	2
Glass Cond	747	1
Wall Cond	842	1
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	4,722	3
Internal Loads		
Lights	16,295	11
People	5,000	3
Misc	119,582	82
Sub Total ==>	140,877	96
Ceiling Load	74	0
Ventilation Load	0	0
Adj Air Trans Heat	886	1
Ov/Undr Sizing	8	0
Grand Total ==>	146,566	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 29

	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 Cond	-2,979	-2,979	0.73
Wall Cond	-1,704	-3,192	0.78
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	0	0	0.00
Sub Total ==>	-4,683	-6,171	1.51
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	-165	0	0.00
Ventilation Load	0	-287,930	70.40
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		559	-0.14
OA Preheat Diff.		-11	0.00
RA Preheat Diff.		-115,419	28.22
Additional Reheat		0	0.00
Grand Total ==>	-4,848	-408,973	100.00

TEMPERATURES

	Cooling	Heating
SADB	62.8	72.3
Plenum	72.1	71.9
Return	72.1	71.9
Ret/OA	79.5	53.8
Fn MtrTD	0.3	0.0
Fn BldTD	0.8	0.0
Fn Frict	2.3	0.0

AIRFLOWS

	Cooling	Heating
Vent	6,208	6,207
Infil	0	0
Supply	14,710	14,710
MinStop/Rh	14,710	14,710
Return	14,578	14,710
Exhaust	6,076	6,207
Rm Exh	132	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	42.2	42.2
cfm/ft²	2.36	2.36
cfm/ton	449.75	
ft²/ton	190.81	
Btu/hr·ft²	62.89	-32.98
No. People	40	

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	32.7	392.5	319.9	14,710.0	79.5	63.4	64.8	59.3	54.4	57.5
Aux Clg	0.0	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	0.0
Total	32.7	392.5								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	6,241		
Part	0		
ExFlr	0		
Roof	0	0	0
Wall	2,027	264	13

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-205.9	14,710.0	59.3	72.3
Aux Htg	0.0	0	0	0
Preheat	0.0	6,208	29	59
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-205.9			

System Checksums

By META ENGINEERS

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

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 17
Outside Air: OADB/WB/HR: 90 / 68 / 74

	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	100,552	0	100,552	17
Glass Cond	12,561	0	12,561	2
Wall Cond	6,160	6,579	12,739	2
Partition	0		0	0
Exposed Floor	0		0	0
Infiltration	0		0	0
Sub Total ==>	119,274	6,579	125,853	21
Internal Loads				
Lights	62,396	0	62,396	10
People	57,725		57,725	9
Misc	68,268	0	68,268	11
Sub Total ==>	188,389	0	188,389	31
Ceiling Load	1,362	-1,362	0	0
Ventilation Load	0	0	187,437	31
Adj Air Trans Heat	5,915		5,915	1
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	2,145		2,145	0
Exhaust Heat		-1,153	-1,153	0
Sup. Fan Heat			99,686	16
Ret. Fan Heat		2	2	0
Duct Heat Pkup		0	0	0
Reheat at Design			0	0
Grand Total ==>	317,084	4,065	608,273	100.00

CLG SPACE PEAK

Mo/Hr: 9 / 16
OADB: 91

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	101,373	35
Glass Cond	13,215	5
Wall Cond	6,761	2
Partition	0	0
Exposed Floor	0	0
Infiltration	0	0
Sub Total ==>	121,349	42
Internal Loads		
Lights	62,396	21
People	32,695	11
Misc	68,220	23
Sub Total ==>	163,311	56
Ceiling Load	1,471	1
Ventilation Load	0	0
Adj Air Trans Heat	5,932	2
Ov/Undr Sizing	26	0
Grand Total ==>	292,089	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 29

	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 Cond	-30,545	-30,545	7.89
Wall Cond	-7,087	-14,090	3.64
Partition	0	0	0.00
Exposed Floor	0	0	0.00
Infiltration	0	0	0.00
Sub Total ==>	-37,632	-44,635	11.53
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	-3,040	0	0.00
Ventilation Load	0	-315,836	81.56
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		3,025	-0.78
OA Preheat Diff.		-20	0.01
RA Preheat Diff.		-29,798	7.69
Additional Reheat		0	0.00
Grand Total ==>	-40,671	-387,262	100.00

TEMPERATURES

	Cooling	Heating
SADB	61.9	76.2
Plenum	72.2	71.6
Return	72.2	71.6
Ret/OA	76.6	39.1
Fn MtrTD	0.3	0.0
Fn BldTD	0.8	0.0
Fn Frict	2.3	0.0

AIRFLOWS

	Cooling	Heating
Vent	6,809	6,809
Infil	0	0
Supply	26,915	8,921
MinStop/Rh	8,921	8,921
Return	25,897	8,921
Exhaust	5,792	6,809
Rm Exh	1,018	0
Auxiliary	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	25.3	76.3
cfm/ft²	1.13	0.37
cfm/ton	530.96	
ft²/ton	471.45	
Btu/hr·ft²	25.45	0.00
No. People	262	

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	50.7	608.3	525.0	26,914.9	76.6	62.5	64.8	58.5	54.8	60.2
Aux Clg	0.0	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	0.0
Total	50.7	608.3								

AREAS

	Gross Total ft²	Glass ft²	Glass (%)
Floor	23,898		
Part	0		
ExFlr	0		
Roof	0	0	0
Wall	10,678	2,703	25

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	0.0	8,920.6	58.5	76.2
Aux Htg	0.0	0	0	0
Preheat	0.0	6,809	29	59
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	0.0			

Appendix D
Schedules

Library Members

Schedules

COH Cooling Schedule

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	5 a.m.	95.0	
		5 a.m.	8 p.m.	74.0	
		8 p.m.	Midnight	95.0	
January - December	**Saturday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	5 a.m.	95.0	
		5 a.m.	3 p.m.	74.0	
		3 p.m.	Midnight	95.0	
January - December	**Sunday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	Midnight	95.0	

Library Members

Schedules

SCE - Elec Consumption

Simulation type: Reduced year

January - May Cooling design to Weekday	**Start time**	**End time**	**Rate**	Time-of-day
	Midnight	8 a.m.	Off-peak	
	8 a.m.	9 p.m.	Mid-peak	
	9 p.m.	Midnight	Off-peak	
January - May Saturday to Sunday	**Start time**	**End time**	**Rate**	Time-of-day
	Midnight	Midnight	Off-peak	
October - December Cooling design to Weekday	**Start time**	**End time**	**Rate**	Time-of-day
	Midnight	8 a.m.	Off-peak	
	8 a.m.	9 p.m.	Mid-peak	
	9 p.m.	Midnight	Off-peak	
October - December Saturday to Sunday	**Start time**	**End time**	**Rate**	Time-of-day
	Midnight	Midnight	Off-peak	
June - September Cooling design to Weekday	**Start time**	**End time**	**Rate**	Time-of-day
	Midnight	8 a.m.	Off-peak	
	8 a.m.	noon	Mid-peak	
	noon	6 p.m.	Peak	
	6 p.m.	11 p.m.	Mid-peak	
	11 p.m.	Midnight	Off-peak	
June - September Saturday to Sunday	**Start time**	**End time**	**Rate**	Time-of-day
	Midnight	Midnight	Off-peak	

Library Members

Schedules

COH Heating Schedule

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	5 a.m.	55.0	
		5 a.m.	6 a.m.	63.0	
		6 a.m.	7 a.m.	68.0	
		7 a.m.	7 p.m.	70.0	
		7 p.m.	Midnight	55.0	
January - December	**Saturday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	5 a.m.	55.0	
		5 a.m.	6 a.m.	63.0	
		6 a.m.	7 a.m.	68.0	
		7 a.m.	2 p.m.	70.0	
		2 p.m.	Midnight	55.0	
January - December	**Sunday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	Midnight	55.0	

Storage

Simulation type: Reduced year

January - December	**Cooling design to Sunday**	**Start time**	**End time**	**Mode**	Thermal storage
		Midnight	7 a.m.	Charge	
		7 a.m.	7 p.m.	Discharge	
		7 p.m.	Midnight	Charge	

Library Members

Schedules

Misc - Low rise office

Simulation type: Reduced year

		Start time	End time	Percentage	
January - December	**Cooling design to Weekday**				Utilization
		Midnight	7 a.m.	5.0	
		7 a.m.	8 a.m.	80.0	
		8 a.m.	10 a.m.	90.0	
		10 a.m.	noon	95.0	
		noon	2 p.m.	80.0	
		2 p.m.	4 p.m.	90.0	
		4 p.m.	5 p.m.	95.0	
		5 p.m.	6 p.m.	80.0	
		6 p.m.	7 p.m.	70.0	
		7 p.m.	8 p.m.	60.0	
		8 p.m.	9 p.m.	40.0	
		9 p.m.	10 p.m.	30.0	
		10 p.m.	Midnight	20.0	
Heating Design		**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	
January - December	**Saturday to Sunday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	5.0	

COH 24-7 Cooling Schedule

Simulation type: Reduced year

		Start time	End time	Setpoint °F	
January - December	**Cooling design to Sunday**				Thermostat
		Midnight	Midnight	78.0	

Library Members

Schedules

COH 24-7 Heating Schedule

Simulation type: Reduced year

January - December	**Cooling design to Sunday**	**Start time**	**End time**	**Setpoint °F**	Thermostat
		Midnight	6 a.m.	60.0	
		6 a.m.	10 p.m.	68.0	
		10 p.m.	Midnight	60.0	

COH Room Exhaust Fans

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	5 a.m.	0.0	
		5 a.m.	8 p.m.	100.0	
		8 p.m.	Midnight	0.0	
January - December	**Saturday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	5 a.m.	0.0	
		5 a.m.	3 p.m.	100.0	
		3 p.m.	Midnight	0.0	
January - December	**Sunday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	
Heating Design		**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	

Library Members

Schedules

Parking lot lights

Simulation type: Reduced year

January - December Cooling design to Sunday	Start time	End time	Percentage	Utilization
	Midnight	7 a.m.	100.0	
	7 a.m.	6 p.m.	0.0	
	6 p.m.	Midnight	100.0	

Heating Design	Start time	End time	Percentage	Utilization
	Midnight	7 a.m.	100.0	
	7 a.m.	6 p.m.	0.0	
	6 p.m.	Midnight	100.0	

COH 24-7 Equip Schedule

Simulation type: Reduced year

January - December Cooling design to Sunday	Start time	End time	Percentage	Utilization
	Midnight	5 a.m.	10.0	
	5 a.m.	6 a.m.	30.0	
	6 a.m.	11 a.m.	45.0	
	11 a.m.	6 p.m.	30.0	
	6 p.m.	7 p.m.	60.0	
	7 p.m.	8 p.m.	80.0	
	8 p.m.	9 p.m.	90.0	
	9 p.m.	10 p.m.	80.0	
	10 p.m.	11 p.m.	60.0	
	11 p.m.	Midnight	30.0	

Heating Design	Start time	End time	Percentage	Utilization
	Midnight	Midnight	0.0	

Library Members

Schedules

COH Lighting

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	8 a.m.	5.0	
		8 a.m.	6 p.m.	90.0	
		6 p.m.	7 p.m.	40.0	
		7 p.m.	Midnight	5.0	
January - December	**Saturday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	8 a.m.	5.0	
		8 a.m.	noon	90.0	
		noon	1 p.m.	40.0	
		1 p.m.	2 p.m.	30.0	
		2 p.m.	Midnight	5.0	
January - December	**Sunday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	5.0	
Heating Design		**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	

Library Members

Schedules

Available (100%)

Simulation type: Reduced year

January - December	**Cooling design to Sunday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	100.0	
Heating Design		**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	100.0	

COH Receptacle

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	8 a.m.	5.0	
		8 a.m.	noon	50.0	
		noon	1 p.m.	30.0	
		1 p.m.	6 p.m.	50.0	
		6 p.m.	7 p.m.	35.0	
		7 p.m.	Midnight	5.0	
January - December	**Saturday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	8 a.m.	5.0	
		8 a.m.	1 p.m.	25.0	
		1 p.m.	2 p.m.	15.0	
		2 p.m.	Midnight	5.0	
January - December	**Sunday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	5.0	
Heating Design		**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	

Library Members

Schedules

SCE - Elec Demand

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Rate**	Time-of-day
		Midnight	noon	Mid-peak	
		noon	6 p.m.	Peak	
		6 p.m.	Midnight	Mid-peak	
January - December	**Saturday to Sunday**	**Start time**	**End time**	**Rate**	Time-of-day
		Midnight	Midnight	Mid-peak	

Library Members

Schedules

COH Occupancy

Simulation type: Reduced year

January - December	**Cooling design to Weekday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	7 a.m.	0.0	
		7 a.m.	8 a.m.	5.0	
		8 a.m.	11 a.m.	50.0	
		11 a.m.	1 p.m.	30.0	
		1 p.m.	6 p.m.	50.0	
		6 p.m.	7 p.m.	30.0	
		7 p.m.	Midnight	0.0	
January - December	**Saturday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	7 a.m.	0.0	
		7 a.m.	8 a.m.	5.0	
		8 a.m.	noon	15.0	
		noon	2 p.m.	5.0	
		2 p.m.	Midnight	0.0	
January - December	**Sunday**	**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	
Heating Design		**Start time**	**End time**	**Percentage**	Utilization
		Midnight	Midnight	0.0	

Off (0%)

Simulation type: Reduced year

January - December	**Cooling design to Sunday**	**Start time**	**End time**	**Status**	Equipment operation
		Midnight	Midnight	Off	

Library Members

Utility Rates

SCE Schedule - TOU-8 Demand

COH - Electric Demand

Electric demand	Min Charge	0	Start period	January		Rate	Cutoff
On peak	Min demand	0	End period	December	$	24.950	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	334.55					
Electric demand	Min Charge	0	Start period	January		Rate	Cutoff
Mid peak	Min demand	0	End period	December	$	2.580	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	334.55					

SCE Schedule - Energy Charges

COH - Electric Charges On peak Mid Peak Off Peak

Electric consumption	Min Charge	0	Start period	January		Rate	Cutoff
On peak	Min demand	0	End period	May	$	0.078	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	January		Rate	Cutoff
Off peak	Min demand	0	End period	May	$	0.056	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	January		Rate	Cutoff
Mid peak	Min demand	0	End period	May	$	0.078	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	October		Rate	Cutoff
On peak	Min demand	0	End period	December	$	0.078	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					

Library Members

Utility Rates

Electric consumption	Min Charge	0	Start period	October		Rate	Cutoff
Off peak	Min demand	0	End period	December	$	0.056	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	October		Rate	Cutoff
Mid peak	Min demand	0	End period	December	$	0.078	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	June		Rate	Cutoff
On peak	Min demand	0	End period	September	$	0.129	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	June		Rate	Cutoff
Off peak	Min demand	0	End period	September	$	0.055	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					
Electric consumption	Min Charge	0	Start period	June		Rate	Cutoff
Mid peak	Min demand	0	End period	September	$	0.069	
	Fuel adjustment	0					
	kWh/kW flag	No					
	Customer charge	0					

Base Utilities

Parking lot lights

Comments	
Schedule	Parking lot lights
Energy Type	Electricity
Hourly demand	0.10 kW
Entering	°F
Leaving	°F

Appendix E
Monthly Utility Costs

MONTHLY UTILITY COSTS

By META ENGINEERS

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
	------- Monthly Utility Costs -------												
Alternative 1													
Electric													
On-Pk Cons. ($)	0	0	0	0	0	2,400	2,200	2,529	2,197	0	0	0	9,327
Off-Pk Cons. ($)	1,399	1,270	1,312	1,393	1,362	1,045	1,251	1,067	1,174	1,363	1,328	1,461	15,425
Mid-Pk Cons. ($)	2,999	2,722	3,299	2,872	3,166	1,818	1,660	1,909	1,657	3,174	3,010	2,857	31,142
On-Pk Demand ($)	3,986	4,025	4,025	4,020	4,035	4,049	4,082	4,083	4,074	4,019	3,968	3,953	48,321
Mid-Pk Demand ($)	746	747	748	748	750	750	752	752	752	751	749	747	8,993
Total ($):	9,130	8,764	9,384	9,033	9,313	10,064	9,945	10,342	9,854	9,307	9,054	9,019	113,208
Monthly Total ($):	9,130	8,764	9,384	9,033	9,313	10,064	9,945	10,342	9,854	9,307	9,054	9,019	113,208

Building Area = 34,684 ft²

Utility Cost Per Area = 3.26 $/ft²

Appendix F

EnergyPro Results / Energy Cost Budget

UTILITY INCENTIVE WORKSHEET UTIL-1

PROJECT NAME	DATE
Amini Transfusion Medicine Center	2/27/2008

Step 1 ANNUAL TDV ENERGY USE (kBtu/sqft-yr)

ENERGY COMPONENT	Standard	Proposed	Margin
Space Heating	8.11	4.28	3.83
Space Cooling	226.70	123.90	102.80
Indoor Fans	93.17	101.36	-8.19
Heat Rejection	0.00	34.74	-34.74
Pumps	3.38	17.85	-14.47
Domestic Hot Water	5.58	5.58	0.00
Lighting	78.13	56.40	21.73
Receptacle	87.20	87.20	0.00
Process	431.39	431.39	0.00
TOTALS:	933.67	862.70	70.96

Step 2 PERCENT BELOW TITLE 24

Adjusted TDV Energy Use
(Excludes Process Energy)

Standard Design		Proposed Design		Margin
502.28	-	431.32	=	70.96

Margin		Standard Design		% Below Title 24*
70.96	/	502.28	=	14.1%

* % Below Title 24 is limited to a maximum of 25% in the incentive rate calculation.

Incentive Eligibility	Yes	No
Owner Incentive (>=10%):	X	

Conditioned Floor Area = 35,178 sq. ft.

Step 3 ANNUAL SITE ENERGY USE

	Standard	Proposed	Margin
Peak Demand (kW)	380.5	312.5	68.0

The values shown here are based upon the results of an EnergyPro Noncompliance energy analysis that incorporates building operating profile information supplied by the user.

ENERGY COMPONENT	Standard		Proposed		Margin	
	Electricity (kWh)	Natural Gas (therms)	Electricity (kWh)	Natural Gas (therms)	Electricity (kWh)	Natural Gas (therms)
Space Heating	0	8,853	0	0	0	8,853
Space Cooling	424,168	0	228,163	0	196,005	0
Indoor Fans	282,326	0	195,140	0	87,186	0
Heat Rejection	200,520	0	128,041	0	72,479	0
Pumps	59,306	0	38,972	0	20,334	0
Domestic Hot Water	0	1,326	0	0	0	1,326
Lighting	190,188	0	86,436	0	103,753	0
Receptacle	85,077	0	85,077	0	0	0
Process	681,104	0	681,104	0	0	0
TOTALS:	1,922,689	10,179	1,442,933	0	479,756	10,179

Step 4 POTENTIAL OWNER INCENTIVE CALCULATION

SOUTHERN CALIFORNIA EDISON
AN EDISON INTERNATIONAL Company

		% Below Title 24* (from step 2)		Incentive Rate		Savings (from step 3)		Subtotal
Electricity	10.0 ¢ [(	14.1%	- 10%)] =	14.1 ¢/kWh	X	479,756 kWh	=	$ 67,646
							+	
Natural Gas	34.0 ¢ [(	14.1%	- 10%) x 4.4] =	52.0 ¢/therm	X	10,179 therm	=	$ 5,293

Owner Incentive → ($150,000 max) = $ 72,939

Potential incentives indicated on this report are available only through the Whole Building Approach element of the Savings By Design Program for new construction and are NOT GUARANTEED. Projects MUST receive prior, written approval from Southern California Edison during conceptual or early design development and must meet all other program requirements to qualify.

* % Below in this equation is limited to 25%

Run Initiation Time: 02/27/08 15:59:03 **Run Code: 1204156743**

UTILITY INCENTIVE WORKSHEET UTIL-DT

PROJECT NAME	DATE
Amini Transfusion Medicine Center	2/27/2008

Step 1 ANNUAL TDV ENERGY USE (kBtu/sqft-yr)

ENERGY COMPONENT	Standard	Proposed	Margin
Space Heating	8.11	4.28	3.83
Space Cooling	226.70	123.90	102.80
Indoor Fans	93.17	101.36	-8.19
Heat Rejection	0.00	34.74	-34.74
Pumps	3.38	17.85	-14.47
Domestic Hot Water	5.58	5.58	0.00
Lighting	78.13	56.40	21.73
Receptacle	87.20	87.20	0.00
Process	431.39	431.39	0.00
TOTALS:	933.67	862.70	70.96

Step 2 PERCENT BELOW TITLE 24

Adjusted TDV Energy Use
(Excludes Process Energy)

Standard Design		Proposed Design		Margin
502.28	-	431.32	=	70.96

Margin		Standard Design		% Below Title 24*
70.96	/	502.28	=	14.1%

* % Below Title 24 is limited to a maximum of 25% in the incentive rate calculation.

Incentive Eligibility	Yes	No
Design Team Incentive (>=15%):	☐	X

Conditioned Floor Area = 35,178 **sq. ft.**

Step 3 ANNUAL SITE ENERGY USE

	Standard	Proposed	Margin
Peak Demand (kW)	380.5	312.5	68.0

The values shown here are based upon the results of an EnergyPro Noncompliance energy analysis that incorporates building operating profile information supplied by the user.

ENERGY COMPONENT	Standard		Proposed		Margin	
	Electricity (kWh)	Natural Gas (therms)	Electricity (kWh)	Natural Gas (therms)	Electricity (kWh)	Natural Gas (therms)
Space Heating	0	8,853	0	0	0	8,853
Space Cooling	424,168	0	228,163	0	196,005	0
Indoor Fans	282,326	0	195,140	0	87,186	0
Heat Rejection	200,520	0	128,041	0	72,479	0
Pumps	59,306	0	38,972	0	20,334	0
Domestic Hot Water	0	1,326	0	0	0	1,326
Lighting	190,188	0	86,436	0	103,753	0
Receptacle	85,077	0	85,077	0	0	0
Process	681,104	0	681,104	0	0	0
TOTALS:	1,922,689	10,179	1,442,933	0	479,756	10,179

Step 4 POTENTIAL DESIGN TEAM INCENTIVE CALCULATION

SOUTHERN CALIFORNIA EDISON
AN EDISON INTERNATIONAL Company

		% Below Title 24* (from step 2)		Incentive Rate		Savings (from step 3)		Subtotal
Electricity	5.0¢ [(	n/a	- 15%) / 3] =	n/a ¢/kWh	X	n/a kWh	=	$ n/a
Natural Gas	18.7¢ [(	n/a	- 15%)x 1.46] =	n/a ¢/therm		n/a therm	=	$ n/a

Design Team Incentive → ($50,000 max) = $ n/a

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* % Below in this equation is limited to 25%

Run Initiation Time: 02/27/08 15:59:03 **Run Code: 1204156743**

Energy Cost Budget / PRM Summary

By META ENGINEERS

Project Name: City of Hope Amini Medical Center	Date: October 27, 2008
City: Duarte California	Weather Data: Pasadena, California (CTZ09)

Note: The percentage displayed for the "Proposed/ Base %" column of the base case is actually the percentage of the total energy consumption.

* Denotes the base alternative for the ECB study.

		* Alt-1 COH Energy Model		
		Energy 10^6 Btu/yr	Proposed / Base %	Peak kBtuh
Lighting - Conditioned	Electricity	290.3	6	91
Space Heating	Electricity	0.8	0	0
	Purchased Steam	26.2	1	30
Space Cooling	Purchased Chilled Water	2,233.7	46	1,127
Pumps	Electricity	44.5	1	19
Fans - Conditioned	Electricity	388.0	8	165
Receptacles - Conditioned	Electricity	1,837.5	38	383
Stand-alone Base Utilities	Electricity	27.4	1	6
Total Building Consumption		**4,848.4**		

		* Alt-1 COH Energy Model
Total	**Number of hours heating load not met**	732
	Number of hours cooling load not met	5

	* Alt-1 COH Energy Model	
	Energy 10^6 Btu/yr	Cost/yr $/yr
Electricity	2,588.5	113,208
Purchased Chilled Water	2,233.7	0
Purchased Steam	26.2	0
Total	**4,848**	**113,208**