

# 2016 Savings By Design Healthcare Baseline Procedures



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## Acronyms

ASHRAE	American Society of Heating and Refrigeration Engineers
CEC	California Energy Commission
CMC	California Mechanical Code
GGHC	Green Guide for Healthcare
IESNA	Illuminating Engineering Society of North America
LEED	Leadership in Energy and Environmental Design
OSHPD	Office of Statewide Health Planning and Development
PBD	Performance By Design
PBDH	Performance By Design Hospitals
PG&E	Pacific Gas and Electric Company
SBDH	Savings by Design Healthcare
SCE	Southern California Edison
SHGC	Solar Heat Gain Coefficient
TDV	Time Dependent Valuation of Energy

## **1.0 Purpose & Background**

The purpose of this document is to provide specifications of how healthcare facilities are currently being built in the state of California as it pertains to the envelope, lighting, mechanical equipment, domestic or service hot water systems as well as process loads and occupancy assumptions. The development of the new Healthcare baseline for the 2016 Savings By Design program was based upon work previously performed on the 2012 Savings By Design program for Pacific Gas & Electric (PG&E) and Southern California Edison (SCE).

During the mid-1990's, PG&E developed a new incentive program as a spin-off of the Performance By Design (PBD) program developed in 1992. The PBD program was designed to provide performance based incentives to commercial new construction projects that were able to perform better than a basic Title 24 compliant building. The program had an incentive mechanism in place that rewarded projects in tiers based upon the relative performance of the project. However, the PBD program was targeted at general commercial building construction, and was ill suited for the healthcare industry. Given the significant differences in construction practices, as well as operating parameters of hospitals, it was decided to develop a program that would specifically address this market. The result of this development work was the Performance By Design Hospitals (PBDH) program.

The work done for the PBDH program included a wide range of activities involving both PG&E personnel as well as outside engineers and building owners. The initial work performed on PBDH included a series of focus groups involving various industry stakeholders including architects, mechanical engineers, lighting engineers, building owners as well as operations engineers. In addition, regulatory agencies such as the Office of Statewide Health Planning and Development (OSHPD) and the California Energy Commission (CEC) were involved in the development and direction of the program. Development work included an initial assessment of normal practice for the building types slated to be encompassed by the program. To help determine appropriate baselines, industry practice for energy efficiency was studied. This included obtaining detailed plans and specifications for numerous projects under design, and compiling those results in spreadsheet form. Included in this study were the following projects:

- Chico Community Hospital
- Clovis Community Hospital
- Community Hospital of Monterey Maternity Wing
- Kaiser Hospital San Francisco Geary
- Kaiser Hospital Vallejo
- Kaiser Hospital Fremont
- Kaiser Hospital Walnut Creek
- Kern Medical Center
- Marshall Medical Office Building
- Merrithew Hospital
- Natividad Hospital
- Oroville Hospital
- St. Joseph's CVS, Eureka
- St. Joseph's, Eureka
- St. Joseph's Heart Center Stockton
- San Joaquin General Hospital
- San Joaquin ER Addition
- Santa Clara Valley Memorial Hospital
- Santa Rosa Memorial Hospital
- Sierra Nevada Memorial Hospital
- Sutter Health Davis
- Sutter Health Santa Cruz
- VA Martinez
- Valley Children's Hospital
- Washington West Fremont
- Watsonville Community Hospital

As of 2016, OSHPD, the California Department of Health Services, California Energy Commission, and California Building Standards Commission are the governing regulatory bodies for building healthcare facilities in the state of California. The program transitioned from Performance By Design Healthcare to Savings by Design Healthcare (SBDH) in 1999 and is funded by ratepayers of private utilities in the state of California through the Public Purpose Program.

## **1.1 Standards for Healthcare**

### **OSHPD and Title 24**

Designated “I” occupancies, hospital and related facilities are primarily regulated by OSHPD. Traditionally, the Title 24 Standards have not regulated this type of occupancy since much of the activity that is performed relates to health and safety, and energy use is deemed to be a secondary consideration versus human well-being. However, parts of the current 2013 Title 24 standards regulate the building and retrofit of certain healthcare facilities.

Ultimately, the OSHPD requirements shape a large portion of the design decisions that are made. For the purposes of HVAC, much of the design is regulated by OSHPD, since the functions performed in these spaces are related to life safety. OSHPD requires that various rooms in these facilities either have positive, equal or negative air balance relationships. In addition, the air changes per hour and exhaust requirements are also driven by OSHPD.

### **ASHRAE and LEED**

During the PBDH development, the 1987 IES guidelines for lighting levels in healthcare facilities were studied, and compared against industry practice. In addition, the ASHRAE Standard 90.1-1989 recommendations for lighting levels were considered for the baseline. Ultimately, the IES guidelines became the lighting baseline that was applied to the PBDH projects. It is interesting to note that the newer ASHRAE/IESNA 90.1 Standard, beginning with 1999 does include occupancy types related to healthcare; however this standard is not applied in California.

The more recent ASHRAE 90.1-2010 Standard also includes updated information covering healthcare facilities. While LEED v3 (Leadership in Energy & Environmental Design) has adopted the ASHRAE 90.1-2007 standard, the ASHRAE 90.1-2010 has been recently adopted in LEED V4. GGHC (Green Guide for Health Care) still utilizes much of the work developed for the 2007 SBDH program as part of their criteria.

## **1.2 Developing the Baseline**

For typical commercial occupancies, the Savings By Design (SBD) baseline assumptions are taken from the 2013 Title 24 Standards minimum requirements. In the case of healthcare facilities, the variety of tasks and special safety requirements dictate some special requirements that deviate from Title 24 Part 6. As a result, a custom baseline is needed for modeling healthcare facilities for the SBD program.

Specific rules for modeling of the Standard Envelope, Lighting and Mechanical systems have been developed, and are presented in Section 2. In all cases, the basic rules of modeling that are outlined in the California Title 24 Alternative Calculation Method



(ACM) Manual are utilized, with specific variations and deviations noted in this document. Since the ACM manual has been in use for the last 18 years, and has served as the model for numerous other standards, it represents a solid foundation for the modeling guidelines.

### **1.3 Summary of Changes**

The last major update to the baseline was in 2012. For the 2014 update, revisions reflected both changes to the Title 24 Standards for the 2013 code change (effective date July 1, 2014) as well as changes in the 2010 version of ASHRAE 90.1.

#### Envelope Changes (shown in Table SBD-I)

- New fenestration requirements for low-e products that include thermally broken frames
- Requirements for air barriers in Climate Zones 10-16
- Minimum daylighting requirement triggered in spaces at 5,000 ft<sup>2</sup>.

#### Mechanical Changes

- Occupancy sensors used for Demand Control Ventilation requirements in high density zones
- New threshold for economizers at 54,000 Btuh
- New mandatory requirement for Fault Detection and Diagnostic controls on DX systems
- New requirements for the baseline central plant modeling as given by the 2013 Nonresidential ACM Manual

#### Lighting Changes

- New mandatory controls for lighting
- Changes in the Lighting Power Densities (LPDs) for the following occupancies:
  - Anesthesia Storage
  - Angiographic-All Other Types
  - Angiographic-Heart Only
  - Bedpan Room
  - Cast Room
  - Clean Linen Storage
  - Cystoscopy
  - Dietary Day Storage
  - Endoscopy
  - Isolation
  - Janitors Closet / Utility
  - Linen Storage, Clean
  - Pathology
  - Patient Room
  - Special Procedure Room, Diagnostic
  - Special Procedure Room, Invasive
  - Trash Chute Room
  - Trauma

## ***2.1 The Savings By Design Healthcare (SBDH) Process***

The process of developing an incentive and energy savings estimate for Healthcare projects is relatively similar to the current SBD procedures. Utilizing a software tool approved for use with SBD, the consultant models the proposed energy consumption of their design. The software tool will automatically develop a baseline, based upon the occupancy type and other choices made by the user. Various rules and baselines, as detailed in this document, will be used by the software to develop this baseline, for comparison to the proposed building.

The 2013 Title 24 Standard includes Time Dependent Valuation (TDV) energy usage in the code which recognizes the time of use component of energy. Just as in the 2012 SBD commercial program, incentive levels are determined by comparing the Proposed Energy Use (TDV kBtu/ft<sup>2</sup>) to the Standard Source Energy Budget (baseline), similar to the Title 24 performance compliance calculations. In order to receive an owner and design team incentive the Proposed TDV Energy Use of the project must be at least 10% less than the Standard budget.

## ***2.2 “I” Occupancy Procedures***

The Healthcare procedures included in this document have been specifically targeted towards the conventional California Building Code “I” occupancy classification. This type of occupancy will be subject to review and approval by the State of California Office of Statewide Health Planning and Development (OSHPD), but is not required to comply with Part 6 of the Title 24 standards. As a result, many of the requirements related to the lighting and mechanical system will be driven by OSHPD standards, which will ultimately influence what can be included in the design. As a result, this report contains specific categories of use that reflect those requirements. In the case of this type project, subject to OSHPD, all of the new occupancy categories listed later in this report should be used as the basis of analysis.

## ***2.3 “OSHPD 3” Occupancy Procedures***

Buildings that fall under the category of OSHPD 3 are also covered by these procedures. These are typically B occupancy buildings that require certain design criteria similar to the “I” occupancies, but are also are subject to some requirements in Title 24. An example might be a surgical or dialysis clinic. While plan review might be handled by the local enforcement agency or OSHPD, the requirements for mechanical system design as dictated by OSHPD requirements drives the type of mechanical system used for these buildings or spaces. Any areas in the building which are designated OSHPD 3 will be analyzed using the procedures outlined in this document for the “I” occupancies, as detailed above. Any areas that are not subject to the

OSHPD 3 requirements must use the conventional Title 24 occupancy types listed later in this document.

## **2.4 “MOB” Occupancy Procedures**

Medical Office Buildings (MOBs) that are not subject to any specific design requirements that may be dictated by OSHPD will use the conventional Savings By Design procedures and occupancies that are already in place. However, certain areas of the MOBs, while not directly subject to review and approval by OSHPD, may, by nature of the space function, need to be designed to those requirements. In specific cases where the design team can demonstrate that the design is driven by such requirements Group ‘B’ and other occupancies not covered by OSHPD requirements can be combined in the same model with Group ‘I’ spaces. If both occupancies are the served by the same proposed HVAC system, the baseline system is the Group ‘I’ system baseline.

## 3.1 Envelope

### Opaque Envelope

**Rule** – Opaque Envelope – All rules pertaining to the opaque envelope portion of the design (Walls, Roofs & Floors) shall be applied exactly as specified in the Title 24 Standards Section 120.7 (Mandatory Measures), Section 140.3, Table 140.3-C and the Nonresidential Alternative Calculation Method manual. Hence, the wall, roof and floor insulation requirements shall be identical for a healthcare facility as any other High-rise Residential / Hotel Motel building subject to the Title 24 Standards.

**Background** – The current 2013 Standards require a reasonable amount of insulation in framed construction, and significantly less, or none, in heavyweight construction. The installation of insulation in framed walls is standard practice in healthcare facilities and in the cases where heavyweight Concrete Masonry Unit (CMU) construction is used, will typically not be required in the design. Table 140.3-C was chosen, instead of Table 140.3-B, since the background assumptions for Table 140.3-C are a 24 hour occupancy building, versus Table 140.3-B which assumes a 12-hour occupancy facility, with no operation on weekends and holidays. Clearly, the healthcare building fits the profile of the 24-hour occupied building, and since the life cycle cost effectiveness studies that are the background of the Title 24 Standards have shown the values in Table 140.3-C to be cost effective, this is the logical table to use for the baseline.

### Fenestration

**Rule** – Fenestration – All rules pertaining to fenestration shall be applied exactly as specified in the Title 24 Standards Section 140.3, Table 140.3-C and the Nonresidential Alternative Calculation Method manual. Hence, the glazing requirements shall be identical for a healthcare facility as any other High-rise Residential / Hotel Motel building subject to the Title 24 Standards.

**Background** – The current 2013 Standards allow a commercial building to have up to 40% installed fenestration, as a percentage of gross exterior wall area. In addition, west facing fenestration is limited to 40% of the west facing wall area.<sup>1</sup> Surveys conducted on the projects in the sampling study showed that no projects had exceeded 40% of the wall area. Typically, the facilities keep glazing area to a minimum since many areas of the building rely more upon artificial light for exam functions. The Standards typically require a Low E glazing product (or equivalent) with a low Solar Heat Gain Coefficient (SHGC) and a thermally improved frame. This requirement has been shown to be cost effective for the 2013 Standards, and serves as a good baseline for the program. Utilizing this type of glazing will not impose any significant design considerations on the facility. As explained under the background description for the opaque envelope, the choice of Title 24 Table 140.3-C is driven by the 24-hour occupancy.

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<sup>1</sup> West is defined in Title 24 as being from 226 degrees to 315 degrees.

**TABLE SBD-I—BASELINE ENVELOPE CRITERIA FOR HEALTHCARE FACILITIES**

			Climate Zone															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Roofs/Ceilings	Metal Building		0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065
	Wood Framed and Other		0.034	0.028	0.039	0.028	0.039	0.039	0.039	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028
Roofing Products	Low-sloped	Aged Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.55	0.55	NR	0.55	0.55	0.55	NR
		Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	NR	0.75	0.75	0.75	NR
Walls	Metal Building		0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.057	0.057	0.057	0.057	0.057	0.057	0.057
	Metal-framed		0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105	0.105
	Mass Light		0.170	0.170	0.170	0.170	0.170	0.227	0.227	0.227	0.196	0.170	0.170	0.170	0.170	0.170	0.170	0.170
	Mass Heavy		0.160	0.160	0.160	0.184	0.211	0.690	0.690	0.690	0.690	0.690	0.184	0.253	0.211	0.184	0.184	0.160
	Wood-framed and Other		0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.042	0.059	0.059	0.042	0.042	0.042
Floors/Soffits	Mass		0.045	0.045	0.058	0.058	0.058	0.069	0.092	0.092	0.092	0.069	0.058	0.058	0.058	0.045	0.058	0.037
	Other		0.034	0.034	0.039	0.039	0.039	0.039	0.071	0.039	0.039	0.039	0.039	0.039	0.039	0.034	0.039	0.034
Doors, U-factor	Non-Swinging		0.50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45	0.50
	Swinging		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70

Notes:  
 1. Mass, Light walls are defined as having a heat capacity greater than or equal to 7.0 Btu/h-ft<sup>2</sup> and less than 15.0 Btu/h-ft<sup>2</sup>. Heavy mass walls are defined as having a heat capacity greater than or equal to 15.0 Btu/h-ft<sup>2</sup>.

Envelope	Fenestration	All Climate Zones					
		Vertical	Area-Weighted Performance Rating	Fixed Window	Operable Window	Curtainwall/Storefront	Glazed Doors
				Max U-factor	0.36	0.46	0.41
		Max RSHGC	0.25	0.22	0.26	0.23	
		Area-Weighted Performance Rating	Min VT	0.42	0.32	0.46	0.17
		Maximum WWR%	40%				
	Skylights		Glass, Curb Mounted	Glass, Deck Mounted	Plastic, Curb Mounted		
		Area-Weighted Performance Rating	Max U-factor	0.58	0.46	0.88	
			Max SHGC	0.25	0.25	NR	
		Area-Weighted Performance Rating	Min VT	0.49	0.49	0.64	
		Maximum SRR%	5%				

### 3.2 Lighting

**Rule** – Lighting Function Complete Building – Title 24 Standards section 140.6 rules and requirements shall be applied for all lighting in the building. This section is supplemented with an additional category named *Hospital / Healthcare* added to Table SBD-M (Complete Building Method Lighting Power Density Values). Note that this approach also provides for any lighting control credits in Section 140.6 (Table 140.6-A) such as occupancy sensors.

**Background** – The Healthcare lighting allowance is taken from ASHRAE/IES 90.1-2010 Table 9.5.1, Building Area Method Table.

TABLE SBD-M—COMPLETE BUILDING METHOD – BASELINE LIGHTING POWER DENSITY VALUES (Watts/ft<sup>2</sup>)

TYPE OF USE	BASELINE LIGHTING POWER LPD (W/ft <sup>2</sup> )
Auditoriums	1.5
Classroom Building	1.1
Commercial and industrial storage buildings	0.6
Convention centers	1.2
Financial Institutions	1.1
General commercial and industrial work buildings	1.0
Grocery stores	1.5
<b>Hospital/Healthcare</b>	<b>1.21</b>
Library	1.3
Medical buildings and clinics	1.1
Office buildings	0.8
Parking Garages	0.2
Religious facilities	1.6
Restaurants	1.2
Schools	1.0
Theaters	1.3
All others	0.6

**Rule** – Lighting Function Area Category – Title 24 Standards section 140.6 rules and requirements shall be applied for all lighting in the building. Table 140.6-C of the Standards, Area Category Functions, will be supplemented with additional Area Category Lighting functions specific to Healthcare. Selection of any valid Title 24 lighting functions from Table SBD-N, combined with any other categories in this additional table, shall be acceptable. Note that this approach also provides for any lighting control credits in Section 140.6 (Table 140.6-A) such as occupancy sensors.

**Background** – Healthcare facilities contain many occupancy types which are not adequately covered in the Title 24 Standards, but require special lighting allowances. The healthcare lighting category designations have been derived from the designations of spaces provided by OSHPD. Typically, a healthcare facility will need to be broken

out by each unique zone since each zone will have special air balance requirements (see section 2.3). The LPD values are derived from:

- IES Illuminance Category from IESNA RP-29-95 Table 1B
- ASHRAE/IESNA 90.1-2010 LPDs from Table 9.6.1
- Title 24 2013 Area Category LPDs from Table 140.6-D
- Title 24 2013 Tailored LPDs from Table 140.6-G
- Surveyed Lighting from the projects listed in Section 1.1

Note that several categories listed in the spreadsheet that cover mechanical and electrical rooms were consolidated into the category “Mechanical Equipment Room”. “Gift Shop” and “Office” were not included since these occupancies are covered by the categories “Retail / Wholesale Sales” and “Office” in Title 24. Utilizing the above listed data, the LPD values chosen for inclusion were taken from the Title 24 2013, Table 140.6-G, utilizing the IES Categories provided in the IESNA RP-29-95 Table 1B. Effectively, this provides a baseline which utilizes the recommended illumination levels provided by IES, using the maximum allowed power densities stipulated in Title 24.

A number of Title 24 rules for modeling lighting are adopted by reference to section 140.6 of Title 24, most notably the specific exclusion of Exam lighting in medical facilities. So, for example, a patient room is only allowed 0.6 w/ft<sup>2</sup> of lighting, however, in most modern designs, a separately switched exam light is included. This lighting would be excluded from the analysis, or modeled as process related lighting in both the standard and proposed.



TABLE SBD-N—AREA CATEGORY METHOD – BASELINE LIGHTING POWER DENSITY VALUES

PRIMARY FUNCTION	BASELINE LIGHTING POWER (w/ft <sup>2</sup> )
Auditorium	1.5
Auto repair	0.9
Beauty Salon	1.7
Civic Meeting Place	1.3
Classrooms, lecture, training, vocational room	1.2
Commercial and industrial storage	0.6
Convention, conference, multipurpose and meeting centers	1.4
Corridors, restrooms, stairs and support areas	0.6
Dining	1.1
Electrical, mechanical, telephone rooms	0.7
Exercise center, gymnasium	1.0
Exhibit, museum	2.0
Financial institution	1.2
General commercial and industrial work	
High bay	1.0
Low bay	0.9
Precision	1.2
Grocery sales	1.2
<b>Hospital / Healthcare</b>	
<b>Anesthesia Storage</b>	<b>1.7</b>
<b>Angiographic-All Other Types</b>	<b>1.7</b>
<b>Angiographic-Heart Only</b>	<b>1.7</b>
<b>Autopsy</b>	<b>1.2</b>
<b>Bathroom</b>	<b>0.6</b>
<b>Bedpan Room</b>	<b>0.6</b>
<b>Cast Room</b>	<b>1.7</b>
<b>Clean Linen Storage</b>	<b>0.6</b>
<b>Clean Utility / Workroom</b>	<b>1.2</b>
<b>Conference Rooms</b>	<b>1.2</b>
<b>Corridors</b>	<b>0.6</b>
<b>Cystoscopy</b>	<b>1.7</b>
<b>Darkroom</b>	<b>0.3</b>
<b>Decontamination</b>	<b>1.2</b>
<b>Delivery Room</b>	<b>1.89</b>
<b>Dietary Day Storage</b>	<b>0.6</b>
<b>Dining Room</b>	<b>1.1</b>
<b>Dishwashing</b>	<b>1.6</b>
<b>Emergency Operating Room</b>	<b>2.26</b>
<b>Endoscopy</b>	<b>1.7</b>
<b>Histology</b>	<b>1.89</b>
<b>Isolation</b>	<b>0.6</b>
<b>Janitors Closet / Utility</b>	<b>0.6</b>
<b>Kitchen, Food Preparation</b>	<b>1.6</b>
<b>L / D / R / Post Partum</b>	<b>0.80</b>
<b>Labor/Delivery/Recovery</b>	<b>1.89</b>
<b>Laboratory</b>	<b>1.4</b>
<b>Linen Storage, Clean</b>	<b>0.6</b>
<b>Lobby</b>	<b>0.8</b>
<b>Lockers</b>	<b>0.8</b>
<b>Mammography</b>	<b>1.8</b>
<b>Mechanical Equipment Room</b>	<b>0.7</b>
<b>Medical Records</b>	<b>1.7</b>
<b>Nuclear Medicine, Hot Lab</b>	<b>1.2</b>

TABLE SBD-N—AREA CATEGORY METHOD – BASELINE  
LIGHTING POWER DENSITY VALUES (cont.)

PRIMARY FUNCTION	BASELINE LIGHTING POWER
<b>Hospital / Healthcare (cont)</b>	
<b>Nursery, Exam</b>	<b>1.7</b>
<b>Nursery, General</b>	<b>0.6</b>
<b>Nursing Stations</b>	<b>0.87</b>
<b>Operating Room</b>	<b>1.89</b>
<b>Pathology</b>	<b>1.7</b>
<b>Patient Room</b>	<b>0.6</b>
<b>Pharmacy / Medicine Room</b>	<b>1.14</b>
<b>Physical Therapy and Hydrotherapy</b>	<b>0.91</b>
<b>Recovery</b>	<b>1.15</b>
<b>Scrub Up Area, Surgical Corridor</b>	<b>1.89</b>
<b>Soiled Linen, Sorting</b>	<b>1.2</b>
<b>Special Procedure Room, Diagnostic</b>	<b>1.7</b>
<b>Special Procedure Room, Invasive</b>	<b>1.7</b>
<b>Stairways</b>	<b>0.6</b>
<b>Sterilizer Room</b>	<b>1.2</b>
<b>Sub-Sterile</b>	<b>0.8</b>
<b>Surgical Supply</b>	<b>1.2</b>
<b>Trash Chute Room</b>	<b>0.6</b>
<b>Trauma</b>	<b>1.7</b>
<b>Treatment / Examination</b>	<b>1.2</b>
<b>Unsterile Supply</b>	<b>0.6</b>
<b>Waiting Areas/Lounges</b>	<b>0.8</b>
<b>X-ray. Diagnostic and Treatment</b>	<b>1.66</b>
Hotel function area	1.5
Kitchen, food preparation	1.6
Laboratory, Scientific	1.4
Laundry	0.9
Library	
Reading areas	1.2
Stacks	1.5
Lobbies:	
Hotel lobby	1.1
Main entry lobby	1.5
Locker/dressing room	0.8
Lounge/recreation	1.1
Malls and atria	1.2
Medical and clinical care	1.2
Offices	
>250 square feet	0.75
<= 250 square feet	1.0
Parking Garage Area	
Parking Area	0.14
Dedicated Ramps	0.3
Daylight Adaptation Zones	0.6
Religious worship	1.5
Retail merchandise sales, wholesale showrooms	1.2
Theaters	
Motion picture	0.9
Performance	1.4
Transportation function	1.2
Waiting area	1.1
All Others	0.6

### **3.3 Mechanical Equipment**

#### **Equipment Efficiency**

**Rule** – Equipment Efficiency – Title 24 Standards section 110.2 rules and requirements relating to minimum equipment efficiencies for space conditioning equipment shall apply.

**Background** – The mechanical equipment used in healthcare facilities is no different than the equipment that is used in any other occupancy in California. This section of the standards provides a good baseline for mechanical equipment efficiencies.

#### **Equipment Requirements**

**Rule** – Equipment Requirements - Title 24 Standards section 140.4 rules and requirements relating to equipment requirements such as economizers, variable speed drives, etc. shall be applied. Similar references in the ACM manual shall be applied to the mechanical equipment. This will result in the following rules being applied –

- Economizers - The standard (baseline) run includes integrated economizers on all air systems with cooling capacity over 54,000 btuh. Systems designed to deliver 100% outside air already will not be penalized, since the baseline will also include 100% outside air. In addition, DX systems have a mandatory requirement to include Fault Detection and Diagnostic controls.
- Indoor Design Conditions – Indoor design temperatures for both the standard and proposed designs are modeled identically. Thermostat settings for each occupancy type within the hospital are modeled according to 1999 ASHRAE Handbook, HVAC Applications Chapter 7 Health Care Facilities, Section 7.4 Specific Design Criteria.
- Outdoor Design Conditions - Outdoor design conditions shall be selected from ASHRAE publication SPCDX: Climatic Data for Region X, Arizona, California, Hawaii, and Nevada, 1982, either 0.1% or 0.5% condition. The same conditions shall be used in the standard and proposed analysis.
- Outside Air Ventilation – Outside Air Ventilation volume is modeled identically in both the standard and proposed designs. If the actual ventilation schedule is provided by the customer, the actual data will be used for the simulation. Otherwise, the calculation will be run using default ventilation data obtained from the OSHPD / CMC required values.
- The Baseline HVAC System shall be set per the 2013 ACM Manual as follows:
  - Buildings 10,000 ft<sup>2</sup> or less with one floor - Single Zone Packaged DX unit for each zone.
  - Buildings 10,000 ft<sup>2</sup> or less with more than one floor - Multi-Zone Packaged DX unit for each floor with zone terminal reheat for each zone.

- Buildings 10,000 ft<sup>2</sup> – 150,000 ft<sup>2</sup> - Multi-Zone Packaged DX unit for each floor with zone terminal reheat for each zone.
- Buildings greater than 150,000 ft<sup>2</sup> - Multi-Zone Chilled Water Air Handler for each floor with zone terminal reheat for each zone.
- For any zones having special pressurization relationships, cross-contamination requirements, or code required minimum circulation rates, the baseline zone terminal box shall be a constant volume unit.
- For systems that use reheat, the baseline will be hot water reheat coils, fed by a boiler.

**Background** – The equipment requirements listed here are similar to those requirements that were implemented in the later stages of the PBDH program. During the mid-90’s, a number of the projects participating in the PBDH program utilized VAV systems. There is a significant first cost associated with a VAV system in healthcare applications, since each zone must be provided with both supply and return VAV boxes in order to maintain pressure relationships. Using a CAV baseline in this situation credits the design with energy savings appropriate for this application, and is consistent with the language in ASHRAE 90.1, with the exception that 90.1 calls for single zone systems. A more appropriate central air handler was used as would be included in Title 24.

### **3.4 Domestic (Service) Hot Water**

**Rule** – DHW Energy Consumption – The rules applying to Domestic Hot Water shall be applied as specified in Section 140.5 (a) of Title 24, and the ACM Manual. Effectively, this makes the inclusion of DHW energy usage in the calculation of energy usage an optional feature. The consultant may choose to include the energy usage in both the Standard and Proposed, or exclude it completely.

**Background** – Healthcare facility DHW energy use is extremely variable at each site. Each facility is likely to have different water needs, depending on the number of beds, as well as the tasks performed on site. For example, DHW requirements climb tremendously if laundry services are performed on site. In addition, some components of DHW energy use is considered process (laundry, sterilization, etc.), which is modeled as “energy neutral”, which means the Standard and Proposed will include the usage. The only potential energy savings in the DHW system come from pumping and boiler efficiency.

### 3.5 Process Loads

#### Energy

**Rule** – Process Loads – Title 24 modeling rules for Process Loads shall be applied to healthcare facilities. Process load is modeled as “energy neutral”, meaning it is modeled the same in both the Standard and Proposed analyses. Process load is excluded from the Savings By Design Healthcare incentive calculation in the same manner as conventional occupancies.

**Background** – Process energy in hospitals is extremely variable, making it impossible to determine a baseline. However, by including the process energy in the SBD analysis, the potential benefits that can be gained by installing a more efficient cooling system will be amplified by the inclusion of this load. The net effect is that the savings from the cooling system will be greater, given the larger load that must be removed. However, efficiency gains that might be realized by installing, for example, a more efficient sterilization system would be negligible. Clearly this type of application is a process improvement, and there are other efficiency programs designed specifically to address process improvements. SBD incentive analyses are based on the building design and performance only.

Standards Section 140.4(b) 9 allows the inclusion of process loads as follows:

**Process loads.** *Loads caused by a process shall be based upon actual information on the intended use of the building.*

Additionally, ACM manual Section 5.4.9 provides guidelines for how process load is to be modeled as follows:

**Section 5.4.9** Process load is the electrical energy consumption in the conditioned space of a building resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Data center loads including transformers, UPS, PDU, server fans and power supplies are considered receptacle loads, not process loads, and the equipment schedules are given in Appendix 5.4B. Compliance software shall model and simulate process loads only if the amount of the process energy and the location and type of process equipment are specified in the construction documents. This information shall correspond to specific special equipment shown on the building plans and detailed in the specifications. The compliance software Compliance Documentation shall inform the user that the compliance software will output process loads including the types of process equipment and locations on the compliance forms.

The standard design shall use the same process loads and radiative/convective split for each zone as the proposed design.

## Ventilation

**Rule** – Process Outside Air Ventilation – Special outside air ventilation requirements in a healthcare facility is not unusual. While Tables SBD-2-1 and SBD-2-2 quantify the typical ventilation in a healthcare facility, spaces may occur that require higher ventilation rates. The higher ventilation rates will be simulated in both the Standard and Proposed simulation runs, making this an energy neutral feature, except in the case where special setback controls are utilized to reduce the air change rates in response to periods of non-occupancy, where allowed by code. In this case, the proposed building modeling shall use the lower rate during these periods.

**Background** –Title 24 provides language that permits us to deal with special outside air requirements such as we might find in healthcare facilities.

### Zone Ventilation Air

**Rule** – Process Fan Power – The current 2013 NACM documentation for process fan power for systems serving process spaces will be used.

**Background** - The reference method models mechanical supply of outdoor ventilation air as part of the simulation of any fan system. The ventilation rate for a fan system is the sum of all ventilation requirements for all zones served by the same fan system.

ACMs must allow the user to: 1) enter the ventilation rate for each zone; and, 2) identify the user input ventilation rate as a tailored ventilation rate. When tailored ventilation rates are entered for any zone, an ACM shall output on compliance forms that tailored ventilation rates have been used for compliance and that a Tailored Ventilation worksheet, and the reasons for different ventilation rates, must be provided as part of the compliance documentation. Tailored ventilation inputs are designed to allow special HVAC applications to comply, but to be used they must correspond to specific needs and the particular design and the plans and specifications used to meet those needs. The reference method determines the minimum building ventilation rate by summing the ventilation rates for all zones determined from Table 2-1 or Table 2-2 as well as zones with justified tailored ventilation rates, input by the user.

### 3.6 Occupancy

**Rule** – Occupancy and Space Function Assumptions – Tables SBD-2-1 and SBD-2-2 list the default values that shall be used in both the Standard and Proposed simulations. Should the user choose to use a different value for any of these assumptions based upon professional judgment, the same value will be used in both the Standard and Proposed simulations.

**Background** – These values will be used as defaults in the simulation to provide internal load profiles describing each zone in the building. Values have been taken from several sources, since no one source provided complete data for the variety of occupancies being encompassed. Allowing the user to use different internal load assumptions is consistent with the current SBD program, and can be important for spaces that differ dramatically from the assumptions listed here.

Table SBD-2-1 Complete Building Occupancy Assumptions

Occupancy Type <sup>(1)</sup>	Occupant Density <sup>(1)</sup> (people / 1000 ft <sup>2</sup> )	Sensible <sup>(2)</sup> (Btu/h / person)	Latent <sup>(2)</sup> (Btu/h / person)	Receptacle Power <sup>(1)</sup> (W/ft <sup>2</sup> )	Service Water Heating <sup>(1)</sup> (Btu/h-person)	Lighting Power Density <sup>(3)</sup> (W/ft <sup>2</sup> )	Minimum O.A. <sup>(1)</sup> (CFM/ft <sup>2</sup> )	Operating Schedule <sup>(1)</sup> (Table 7.1.C)
Hospital / Healthcare	5	250	213	1.00	135	1.21	0.40	G

**Notes for Tables SBD-2-1 and SBD-2-2**

- (1) From ASHRAE/IESNA 90.1-2001 ECB Supplement Tables 7.1A & 7.1B
- (2) From California Nonresidential Alternative Calculation Method Manual Tables 2-1 & 2-2.
- (3) See Section 2.2

Occupant density values have been taken from the ASHRAE 90.1 document since the corresponding schedules from 90.1 typically assume occupancy rates as high as 90%. Title 24 schedules reduce this number to about 50%, but assume twice the occupant density, resulting in the same overall occupancy diversity.

Table SBD-2-2 Area Occupancy Assumptions

Space Function <sup>(4)</sup>	Occupant Density <sup>(1)</sup> (people / 1000 ft <sup>2</sup> )	Sensible <sup>(2)</sup> (Btu/h / person)	Latent <sup>(2)</sup> (Btu/h / person)	Receptacle Power <sup>(1)</sup> (W/ft <sup>2</sup> )	Service Water Heating <sup>(1)</sup> (Btu/h-person)	Lighting Power Density <sup>(3)</sup> (W/ft <sup>2</sup> )	Minimum O.A. <sup>(4)</sup> (CFM/ft <sup>2</sup> )	Operating Schedule <sup>(1)</sup> (Table 7.1.C)
Anesthesia Storage	5	250	213	1.00	0	1.8	1.20	G
Angiographic-All Other Types	5	250	213	1.00	600	1.8	0.30	G
Angiographic-Heart Only	5	250	213	1.00	600	1.8	0.75	G
Autopsy	5	250	213	1.00	600	1.2	0.30	G
Bathroom/ Public	3.3	250	250	0.10	0	0.6	0.15	G
Bedpan Room	5	250	213	0.10	600	0.5	0.15	G
Cast Room	5	250	213	1.00	600	1.8	0.30	G
Clean Linen Storage	1	250	250	0.10	0	0.5	0.30	G
Clean Utility / Workroom	5	250	213	2.00	215	0.5	0.30	G
Conference Rooms	20	245	155	0.10	150	1.2	0.50	G
Corridors	10	250	250	0.10	0	0.6	0.30	G
Cystoscopy	5	250	213	1.00	600	1.8	0.75	G
Darkroom	5	250	213	1.00	600	0.3	0.30	G
Decontamination	5	250	213	1.00	600	1.2	0.30	G
Delivery Room	5	250	213	1.00	1000	2.2	0.75	G
Dietary Day Storage	2	250	250	0.10	0	0.5	0.30	G
Dining Room	10	275	275	0.10	300	1.1	1.50	B
Dishwashing	5	275	475	1.00	215	1.6	0.30	G
Endoscopy	5	250	213	1.00	600	1.8	0.30	G
Histology	5	150	213	1.00	600	2.2	0.30	G
Isolation	5	250	213	1.00	300	0.5	0.30	G
Janitors Closet / Utility	1	250	250	0.10	0	0.5	1.50	G
Kitchen, Food Preparation	5	275	475	1.00	400	1.6	0.30	B
Labor/ Delivery/Recovery	5	250	213	1.00	1000	2.2	0.30	G
L / D / R / Post Partum	5	250	213	1.00	1000	0.8	0.30	G
Laboratory	5	250	213	1.00	600	1.8	0.30	G
Linen Storage, Clean	2	250	250	0.10	0	0.5	0.30	G
Lobby	10	250	250	0.10	100	1.1	0.15	G
Lockers	10	250	250	0.25	0	0.7	0.15	G
Mammography	5	250	213	1.00	600	1.8	0.30	G
Mechanical Equipment Room	0.5	250	250	0.10	0	0.7	0.15	G
Medical Records	2	250	250	0.10	0	1.8	0.15	G
Nuclear Medicine, Hot Lab	5	250	213	1.00	600	1.2	0.30	G
Nursery, General	5	250	213	1.00	300	0.6	0.45	G
Nursery, Exam	5	250	213	1.00	300	1.8	0.45	G
Nursing Stations- General	5	250	213	0.25	150	1.0	0.15	G
Operating Room	5	250	213	1.00	1000	3.5	0.75	G
Pathology	5	250	213	1.00	600	1.8	0.30	G
Patient Room	5	245	155	1.00	300	0.5	0.30	G
Pharmacy / Medicine Room	5	250	213	1.00	150	1.2	0.30	G
Physical Therapy and Hydrotherapy	5	250	213	1.00	150	0.9	0.30	C
Recovery	5	250	213	1.00	300	0.8	0.30	G
Scrub Up Area, Surgical Corridor	5	250	213	1.00	1000	2.2	0.30	G
Soiled Linen, Sorting	5	250	213	1.00	600	1.2	1.50	G
Special Procedure Room, Diagnostic	5	250	213	1.00	600	1.8	0.30	G
Special Procedure Room, Invasive	5	250	213	1.00	600	1.8	0.75	G
Stairways	1	250	213	0.10	0	0.6	0.15	G
Sterilizer Room	5	250	213	1.00	600	1.2	1.50	G
Sub-Sterile	5	250	213	1.00	600	0.8	0.30	G
Surgical Supply	5	250	213	1.00	0	1.2	0.30	G
Trash Chute Room	0.5	250	250	0.10	0	0.5	1.50	G



Space Function <sup>(4)</sup>	Occupant Density <sup>(1)</sup> (people / 1000 ft <sup>2</sup> )	Sensible <sup>(2)</sup> (Btu/h / person)	Latent <sup>(2)</sup> (Btu/h / person)	Receptacle Power <sup>(1)</sup> (W/ft <sup>2</sup> )	Service Water Heating <sup>(1)</sup> (Btu/h-person)	Lighting Power Density <sup>(3)</sup> (W/ft <sup>2</sup> )	Minimum O.A. <sup>(4)</sup> (CFM/ft <sup>2</sup> )	Operating Schedule <sup>(1)</sup> (Table 7.1.C)
Trauma	5	250	213	1.00	600	1.8	0.75	G
Treatment / Examination	5	250	213	1.00	300	1.2	0.30	C
Unsterile Supply	2	250	250	1.00	0	0.5	0.30	G
Waiting Areas/Lounges	10	250	250	0.10	0	0.8	0.15	G
X-ray, Diagnostic and Treatment	5	250	213	1.00	600	1.8	0.30	G

#### Notes for Tables SBD-2-2

- (1) From ASHRAE/IESNA 90.1-2001 ECB Supplement Tables 7.1A & 7.1B
- (2) From California Nonresidential Alternative Calculation Method Manual Tables 2-1 & 2-2.
- (3) See Section 2.2
- (4) From 2013 California Mechanical Code when listed, otherwise from California Nonresidential Alternative Calculation Method Manual.

Occupant density values have been taken from the ASHRAE 90.1 document since the corresponding schedules from 90.1 typically assume occupancy rates as high as 90%. Title 24 schedules reduce this number to about 50%, but assume twice the occupant density, resulting in the same overall occupancy diversity.

**Rule** – Operating Schedules – Listed below are the default occupancy profiles that shall be used in both the Standard and Proposed simulations. Should the user choose to use a different schedule for any of these functions based upon professional judgment, the same schedule will be used in both the Standard and Proposed simulations.

**Background** – These operating schedules have been taken from the GGHC Prescriptive Path for healthcare and ASHRAE 90.1-1999 for offices. They are also similar to the schedules used in the Canadian MNECB code, and were based upon those used in a previous version of Title 24. The schedules chosen for inclusion here are those that relate to healthcare facilities. In particular, the operating schedule “G” is used mostly, since this is a “24-hour” operation schedule. The Title 24 “24-hour” schedule was considered, however this schedule is intended for hotel/motel and high-rise residential buildings. These buildings have occupancy patterns which typically have the rooms mostly unoccupied during most of the day; clearly a poor choice for a healthcare facility. Allowing the user to use different occupancy schedules is consistent with the current SBD program.

Table SBD-7.1C OPERATING SCHEDULE 'B'

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12
<b>Occupants</b>																								
Mon - Fri	0.1	0	0	0	0	0	0	0	0.1	0.2	0.5	0.9	0.8	0.5	0.2	0.2	0.3	0.6	0.9	0.9	0.9	0.6	0.4	0.3
Sat	0.3	0	0	0	0	0	0	0	0.1	0.2	0.5	0.9	0.8	0.5	0.2	0.2	0.3	0.6	0.9	0.9	0.9	0.6	0.6	0.5
Sun	0.3	0	0	0	0	0	0	0	0	0.1	0.4	0.5	0.5	0.4	0.2	0.2	0.2	0.5	0.7	0.7	0.5	0.3	0.1	0.1
<b>Lighting</b>																								
Mon - Fri	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Sat	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Sun	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.5
<b>Receptacle</b>																								
Mon - Fri	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Sat	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Sun	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.5
<b>Fans</b>																								
Mon - Fri	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On
Sat	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On
Sun	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off
<b>Cooling</b>																								
Mon - Fri	99	99	99	99	99	99	99	87	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Sat	99	99	99	99	99	99	99	87	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Sun	99	99	99	99	99	99	99	87	75	75	75	75	75	75	75	75	75	75	75	75	75	75	99	99
<b>Heating</b>																								
Mon - Fri	55	55	55	55	55	55	55	62.5	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Sat	55	55	55	55	55	55	55	62.5	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Sun	55	55	55	55	55	55	55	62.5	70	70	70	70	70	70	70	70	70	70	70	70	70	70	55	55
<b>Hot Water</b>																								
Mon - Fri	0.5	0	0	0	0	0	0	0	0.7	0.7	0.4	0.5	0.6	0.6	0.4	0.3	0.3	0.4	0.5	0.8	0.8	0.9	0.9	0.6
Sat	0.6	0	0	0	0	0	0	0	0.7	0.7	0.4	0.5	0.6	0.6	0.4	0.3	0.3	0.4	0.5	0.8	0.8	0.9	0.9	0.7
Sun	0.6	0	0	0	0	0	0	0	0.7	0.4	0.5	0.6	0.6	0.4	0.3	0.3	0.4	0.5	0.8	0.8	0.5	0.5	0.5	

From ASHRAE/IESNA 90.1-2001 ECB Supplement Tables 7.1A & 7.1B

Table SBD-7.1C OPERATING SCHEDULE 'C'

	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	12	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	12
<b>Occupants</b>																								
Mon - Fri	0	0	0	0	0	0	0	0.1	0.2	0.5	0.5	0.7	0.7	0.7	0.7	0.8	0.7	0.5	0.3	0.3	0	0	0	0
Sat	0	0	0	0	0	0	0	0.1	0.2	0.5	0.6	0.8	0.9	0.9	0.9	0.8	0.7	0.5	0.2	0.2	0	0	0	0
Sun	0	0	0	0	0	0	0	0	0	0.1	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.2	0	0	0	0	0	0
<b>Lighting</b>																								
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05
<b>Receptacle</b>																								
Mon - Fri	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05
Sat	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.05	0.05	0.05	0.05
Sun	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.05	0.05	0.05	0.05	0.05	0.05
<b>Fans</b>																								
Mon - Fri	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off
Sat	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off
Sun	Off	Off	Off	Off	Off	Off	Off	Off	On	On	On	On	On	On	On	On	On	On	Off	Off	Off	Off	Off	Off
<b>Cooling</b>																								
Mon - Fri	99	99	99	99	99	99	87	75	75	75	75	75	75	75	75	75	75	75	75	75	99	99	99	99
Sat	99	99	99	99	99	99	87	75	75	75	75	75	75	75	75	75	75	75	75	75	99	99	99	99
Sun	99	99	99	99	99	99	99	87	75	75	75	75	75	75	75	75	75	75	99	99	99	99	99	99
<b>Heating</b>																								
Mon - Fri	55	55	55	55	55	55	62.5	70	70	70	70	70	70	70	70	70	70	70	70	70	55	55	55	55
Sat	55	55	55	55	55	55	62.5	70	70	70	70	70	70	70	70	70	70	70	70	70	55	55	55	55
Sun	55	55	55	55	55	55	55	62.5	70	70	70	70	70	70	70	70	70	70	55	55	55	55	55	55
<b>Hot Water</b>																								
Mon - Fri	0	0	0	0	0	0	0	0.1	0.2	0.3	0.4	0.8	0.8	0.8	0.8	0.6	0.4	0.3	0.2	0.2	0	0	0	0
Sat	0	0	0	0	0	0	0	0.1	0.2	0.3	0.5	0.9	0.9	0.9	0.9	0.7	0.5	0.3	0.2	0.2	0	0	0	0
Sun	0	0	0	0	0	0	0	0	0	0.1	0.2	0.4	0.8	0.8	0.6	0.4	0.3	0.2	0	0	0	0	0	0

From ASHRAE/IESNA 90.1-2001 ECB Supplement Tables 7.1A & 7.1B

## GGHC Operating Schedules (G)

### Occupancy Schedules

<b>Pharmacy</b>		
All days	Midnight - 7:00 a.m.	20%
	7:00 a.m. - 8:00 p.m.	100%
	8:00 p.m. - Midnight	20%
<b>Mechanical/Electrical Rooms</b>		
All days	Midnight - 6:00 a.m.	50%
	6:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	50%
<b>Basement Linen Collection &amp; General Storage</b>		
All days	Midnight - 6:00 a.m.	50%
	6:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	50%
<b>Imaging</b>		
Weekdays	Midnight - 6:00 a.m.	10%
	6:00 a.m. - 5:00 p.m.	80%
	5:00 p.m. - Midnight	10%
Weekends/Holiday	All hours	10%
<b>Trauma / Emergency Operating</b>		
	All hours	100%
<b>Emergency Corridor</b>		
	All hours	100%
<b>Emergency Waiting Lounge</b>		
	All hours	100%
<b>General Lobby</b>		
Weekdays	Midnight - 7:00 a.m.	5%
	7:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	5%
Weekends/Holiday	All hours	5%
<b>Coffee shop</b>		
All days	Midnight - 7:00 a.m.	0%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	0%
<b>Kitchen</b>		
All days	Midnight - 6:00 a.m.	0%
	6:00 a.m. - 10:00 a.m.	100%
	10:00 a.m. - 2:00 p.m.	90%
	2:00 p.m. - 5:00 p.m.	100%
	5:00 p.m. - 7:00 p.m.	90%
	7:00 p.m. - 11:00 p.m.	100%
	11:00 p.m. - Midnight	0%
<b>Surgery</b>		
Weekdays	Midnight - 6:00 a.m.	0%
	6:00 a.m. - 5:00 p.m.	80%
	5:00 p.m. - Midnight	0%
Weekends/Holiday	All hours	0%

<b>Central Sterile</b>		
Weekdays	Midnight - 6:00 a.m.	0%
	6:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	0%
Weekends/Holiday	All hours	0%
<b>Physical Therapy and Hydrotherapy</b>		
Weekdays	Midnight - 7:00 a.m.	0%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	0%
Saturday	Midnight - 7:00 a.m.	0%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	0%
Sunday/Holiday	All hours	0%
<b>Corridor &amp; Storage Areas</b>		
All days	Midnight - 6:00 a.m.	0%
	6:00 a.m. - 7:00 a.m.	50%
	7:00 a.m. - 2:00 p.m.	0%
	2:00 p.m. - 3:00 p.m.	50%
	3:00 p.m. - 10:00 p.m.	0%
	10:00 p.m. - 11:00 p.m.	50%
	11:00 p.m. - Midnight	0%
<b>Nurses Workstations &amp; Core Storage Spaces</b>		
All days	Midnight - 6:00 a.m.	80%
	6:00 a.m. - 7:00 a.m.	100%
	7:00 a.m. - 2:00 p.m.	100%
	2:00 p.m. - 3:00 p.m.	100%
	3:00 p.m. - 10:00 p.m.	100%
	10:00 p.m. - 11:00 p.m.	100%
	11:00 p.m. - Midnight	80%
<b>Offices on patient floors</b>	All hours	100%
<b>Patients Rooms, Patient Special Care Units, Nursery and Pediatric Patient Rooms, includes visitors</b>	All hours	100%
<b>Visitor lounges</b>	All hours	100%
<b>Pediatric Playroom</b>		
All days	Midnight - 9:00 a.m.	0%
	9:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	0%
<b>On-call Rooms</b>		
All days	Midnight - 6:00 a.m.	0%
	6:00 a.m. - 7:00 a.m.	50%
	7:00 a.m. - 2:00 p.m.	0%
	2:00 p.m. - 3:00 p.m.	50%
	3:00 p.m. - 10:00 p.m.	0%
	10:00 p.m. - 11:00 p.m.	50%
	11:00 p.m. - Midnight	0%

### General Lighting Schedules

<b>Pharmacy</b>		
All days	Midnight - 7:00 a.m.	100%
	7:00 a.m. - 8:00 p.m.	100%
	8:00 p.m. - Midnight	100%
<b>Mechanical/Electrical Rooms</b>		
All days	Midnight - 6:00 a.m.	100%
	6:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	100%
<b>Basement Linen Collection &amp; General Storage</b>		
All days	Midnight - 6:00 a.m.	100%
	6:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	100%
<b>Imaging</b>		
Weekdays	Midnight - 6:00 a.m.	25%
	6:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	25%
Weekends/Holiday	All hours	25%
<b>Trauma / Emergency Operating</b>		
	All hours	100%
<b>Emergency Corridor</b>		
	All hours	100%
<b>Emergency Waiting Lounge</b>		
	All hours	100%
<b>General Lobby</b>		
Weekdays	Midnight - 7:00 a.m.	100%
	7:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	100%
Weekends/Holiday	All hours	100%
<b>Coffee shop</b>		
All days	Midnight - 7:00 a.m.	5%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	5%
<b>Kitchen</b>		
All days	Midnight - 6:00 a.m.	5%
	6:00 a.m. - 10:00 a.m.	100%
	10:00 a.m. - 2:00 p.m.	100%
	2:00 p.m. - 5:00 p.m.	100%
	5:00 p.m. - 7:00 p.m.	100%
	7:00 p.m. - 11:00 p.m.	100%
	11:00 p.m. - Midnight	5%
<b>Surgery</b>		
Weekdays	Midnight - 6:00 a.m.	5%
	6:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	5%
Weekends/Holiday	All hours	5%

<b>Central Sterile</b>		
Weekdays	Midnight - 6:00 a.m.	5%
	6:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	5%
Weekends/Holiday	All hours	5%
<b>Physical Therapy and Hydrotherapy</b>		
Weekdays	Midnight - 7:00 a.m.	5%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	5%
Saturday	Midnight - 7:00 a.m.	5%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	5%
Sunday/Holiday	All hours	5%
<b>Corridor &amp; Storage Areas</b>		
All days	Midnight - 6:00 a.m.	0%
	6:00 a.m. - 7:00 a.m.	50%
	7:00 a.m. - 2:00 p.m.	0%
	2:00 p.m. - 3:00 p.m.	50%
	3:00 p.m. - 10:00 p.m.	0%
	10:00 p.m. - 11:00 p.m.	50%
	11:00 p.m. - Midnight	0%
<b>Nurses Workstations &amp; Core Storage Spaces</b>		
All days	Midnight - 6:00 a.m.	100%
	6:00 a.m. - 7:00 a.m.	100%
	7:00 a.m. - 2:00 p.m.	100%
	2:00 p.m. - 3:00 p.m.	100%
	3:00 p.m. - 10:00 p.m.	100%
	10:00 p.m. - 11:00 p.m.	100%
	11:00 p.m. - Midnight	100%
<b>Offices on patient floors</b>	All hours	100%
<b>Patients Rooms, Patient Special Care Units except Pediatric Patient Rooms</b>		
All days	Midnight - 8:00 a.m.	25%
	8:00 a.m. - 5:00 p.m.	50%
	5:00 p.m. - 11:00 p.m.	100%
	11:00 p.m. - Midnight	25%
<b>Pediatric Patient Rooms</b>		
All days	Midnight - 7:00 a.m.	25%
	7:00 a.m. - 8:00 p.m.	100%
	8:00 p.m. - Midnight	25%
<b>Nursery</b>	All hours	100%
<b>Visitor lounges</b>	All hours	100%
<b>Storage Areas</b>	All hours	50%



<b>Pediatric Playroom</b>		
All days	Midnight - 9:00 a.m.	5%
	9:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	5%
<b>On-call Rooms</b>		
All days	Midnight - 6:00 a.m.	30%
	6:00 a.m. - 7:00 a.m.	30%
	7:00 a.m. - 2:00 p.m.	30%
	2:00 p.m. - 3:00 p.m.	30%
	3:00 p.m. - 10:00 p.m.	30%
	10:00 p.m. - 11:00 p.m.	30%
	11:00 p.m. - Midnight	30%

### Miscellaneous Electrical Equipment Schedules

<b>Pharmacy</b>		
All days	Midnight - 7:00 a.m.	100%
	7:00 a.m. - 8:00 p.m.	100%
	8:00 p.m. - Midnight	100%
<b>Mechanical/Electrical Rooms</b>		
All days	Midnight - 6:00 a.m.	100%
	6:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	100%
<b>Basement Linen Collection &amp; General Storage</b>		
All days	Midnight - 6:00 a.m.	25%
	6:00 a.m. - 10:00 p.m.	50%
	10:00 p.m. - Midnight	25%
<b>Imaging</b>		
Weekdays	Midnight - 6:00 a.m.	50%
	6:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	50%
Weekends/Holiday	All hours	50%
<b>Trauma / Emergency Operating</b>		
	All hours	100%
<b>Emergency Corridor</b>		
	All hours	100%
<b>Emergency Waiting Lounge</b>		
	All hours	100%
<b>General Lobby</b>		
Weekdays	Midnight - 7:00 a.m.	100%
	7:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	100%
Weekends/Holiday	All hours	100%
<b>Coffee shop</b>		
All days	Midnight - 7:00 a.m.	10%
	7:00 a.m. - 10:00 p.m.	100%
	10:00 p.m. - Midnight	10%
<b>Kitchen</b>		
All days	Midnight - 6:00 a.m.	10%
	6:00 a.m. - 10:00 a.m.	100%
	10:00 a.m. - 2:00 p.m.	100%
	2:00 p.m. - 5:00 p.m.	100%
	5:00 p.m. - 7:00 p.m.	100%
	7:00 p.m. - 11:00 p.m.	100%
	11:00 p.m. - Midnight	20%
<b>Surgery</b>		
Weekdays	Midnight - 6:00 a.m.	10%
	6:00 a.m. - 5:00 p.m.	100%
	5:00 p.m. - Midnight	20%
Weekends/Holiday	All hours	10%

Source: The Green Guide for Healthcare