

---

# United States Air Force

---

## *Passive Solar Handbook*

### Comprehensive Planning Guide

---

### Programming Guide

---

**Building Energy Use** **Appendix C**

REGION 2	Energy Use Priority					Energy Use (kBtu/ft <sup>2</sup> -yr)		Peak (Watts/ft <sup>2</sup> )	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
A Admin. <5000 sf	○	■	◆	⊗	▲	90	70	9.0	5.0
B Admin. <5000 sf	○	■	◆	⊗	▲	70	50	7.5	4.0
C Admin. Multi-story	○	■	◆	⊗	▲	45	45	7.0	4.5
D Admin. < 10000 sq ft									
E Dining Facility									
F Distribution									
G Fuel Station									
H Industrial/Storage Facility									
I Mass. <5000 sf									
J Mass. High-Den.									
K Mass. 10% Air									
L Mass. Low-Den.									
M Multi-story									
N Training <5000 sf									
O Training <5000 sf									
P Training Multi-story									
Q Warehouse									
R Warehouse									

**CLIMATE REGION 2** **Appendix A**

**Climate Characteristics** **U.S. Air Force Bases**

HDD (Range)	4,750
CDD (Range)	500 to
LESH (Range)	2,500
RAD (Range)	0.40 to

**Volumes II and III**

The United States Air Force is committed to energy efficiency and the use of renewable forms of energy in all of its facilities when shown to be reliable and cost effective. In its response to the Military Construction Codification Act of 10 USC 2801, Executive Order 12003 and Office of the Secretary of Defense directives, the Air Force has implemented numerous policies and procedures to significantly reduce the usage of fossil fuel derived energy. Since the oil embargo of the early 1970's, the Air Force has encouraged and demonstrated the integration of a variety of energy conserving features, including solar applications, in its facilities. Passive solar systems represent one type of solar application that can be used in almost all facilities to improve their energy efficiency and to lower their energy costs.

The audience for this five-volume passive solar handbook is the numerous Air Force personnel and others responsible for programming, planning, designing, supervising construction, commissioning, and operating and maintaining Air Force commercial-type facilities worldwide. This handbook was developed in response to MAJCOM and base needs for information on the integration of passive solar systems into new Air Force commercial-type facilities.

The goal of the Air Force Passive Solar Handbook series is to integrate passive solar concepts into the Air Force planning, programming, design, construction, and operation processes for commercial-type facilities.

The five volumes of the Passive Solar Handbook are as follows:

- Volume I: Introduction To Passive Solar Concepts*
- Volume II: Comprehensive Planning Guide**
- Volume III: Programming Guide*
- Volume IV: Passive Solar Design (proposed)*
- Volume V: Construction Inspection (proposed)*

This is the second volume of the series.

**Joseph A. Ahearn, Major General, USAF**  
Director of Engineering and Services







# Foreword

---

This handbook was written by Architectural Energy Corporation under contract to the United States Air Force Engineering Directorate. We wish to acknowledge the support and technical assistance of Refugio Fernandez, HQ USAF/LEEDE, and Charles F. Lewis, HQ USAF/LEEDX. On their behalf, we wish to acknowledge others throughout the United States Air Force who reviewed earlier drafts of this handbook.

Architectural Energy Corporation staff responsible for the research, building energy simulations, software development, writing, graphic design, layout, proofreading and camera-ready production include Michael J. Holtz, Claude L. Robbins, Donald J. Frey, David N. Wortman, Peter A. Oatman, Joan M. Gregerson, Chris Mack, Linda J. Ross, and Tracy Ashleigh. P.S. Computer Graphics Inc. assisted with the camera-ready production and coordinated the color separation and printing.

We would also like to thank Dr. Subrato Chandra and Dr. Ross McCluney of the Florida Solar Energy Center for their help in our analysis of warm-humid climates.

Michael J Holtz, A.I.A. President  
Architectural Energy Corporation

Additional copies of this handbook may be obtained from:

Architectural Energy Corporation  
2540 Frontier Avenue, Suite 201  
Boulder, Colorado 80301 USA  
(303) 444-4149 FAX (303) 444-4304

# Table of Contents

---

## Foreword

## Acknowledgements

<b>1.0</b>	<b>Energy and Site Planning</b>	<b>1</b>
	Introduction	1
	Base Comprehensive Plan	1
	Site Planning For Passive Heating	2
	Site Planning For Passive Cooling	4
	Planning For Daylighting	5
	Building Orientation and Shape	6
<b>2.0</b>	<b>Energy and Buildings</b>	<b>8</b>
	Introduction	8
	Climate and Buildings	8
	Energy Responsive Buildings	9
	Energy Costs	10
<b>3.0</b>	<b>Facility Energy Use</b>	<b>12</b>
	Introduction	12
	Step 1: Determine Climate Region	12
	Step 2: Establish Building Type	13
	Step 3: Conventional Building Energy Use and Priority	13
	Step 4: Determine Peak Demand	16
	Detailed Building Energy Use, Priority and Peak Demand Information	16
	Example 1: A Credit Union	18
	Example 2: A Warehouse	21
	Special Cases	23
<b>4.0</b>	<b>Choosing Passive Solar Systems</b>	<b>27</b>
	Introduction	27
	Step 5: Choosing Solar Energy Systems	27
	Step 6: Match Energy Use and Solar Energy System	29
	Example 1: A Credit Union	30
	Example 2: A Warehouse	32
<b>5.0</b>	<b>Passive Solar System Performance</b>	<b>34</b>
	Introduction	34
	Step 7: Determine Passive Building Energy Use and Peak Demand	34
	Step 8: Determine Energy Costs	37
	Step 9: HVAC System Analysis	40
	Example 1: A Credit Union	42
	Combinations Of Passive Solar Systems	44
	Example 2: A Warehouse	46

## Table of Contents (Continued)

---

<b>Appendix A: USAF Climate Regions</b>	<b>49</b>
<b>Appendix B: Commercial-Type Building Codes</b>	<b>61</b>
<b>Appendix C: Energy Use Data</b>	<b>69</b>
<b>Appendix D: Energy Cost Data</b>	<b>81</b>
<b>Appendix E: Detailed Energy Use Data</b>	<b>93</b>
<b>Index</b>	<b>165</b>



Passive solar systems use the energy from the sun to heat, cool, and illuminate buildings. A properly designed passive commercial-type building will not completely eliminate the need for auxiliary energy systems for heating, cooling, or lighting. Building size, large internal loads, and diverse building use patterns will cause continual reliance on conventional auxiliary energy sources. However, it is possible, through a combination of passive solar concepts, to reduce total energy costs by as much as 40% while maintaining positive savings-to-investment ratios (SIR).

*It is virtually impossible to separate the passive solar design features of a building from the building as a whole.* In this regard a passive solar building is nonconventional; one must learn to think of such a building and the site as a totality, not as a collection of separate, interchangeable parts. In a conventional (nonsolar) building, if a particular heating, cooling, or lighting system is not economically viable then it usually can be changed without influencing any other aspect of the building design. *To change the passive features of a solar building may require a complete relocation and / or redesign of the building.* Therefore, it is important to choose correctly, during the planning stage, the appropriate site and passive solar concepts.

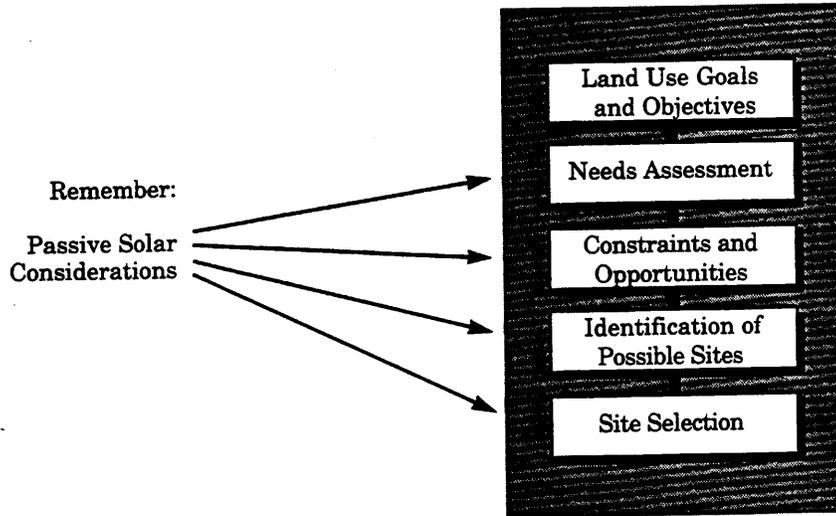
For additional information about passive solar systems, see Volume I: Introduction to Passive Solar Concepts.

## Introduction

Energy-conserving planning and passive solar design begins with site selection. If the base has implemented a *Base Comprehensive Plan (BCP)*, then energy requirements are specified in the plan, Section II-J. The BCP may require certain building types and functions to occur in specific interrelationships with other existing buildings. These restrictions are critical to good base planning and have minimal adverse impact on site planning for solar buildings. Frequently, their impact is supportive of solar planning techniques and objectives. See Figure 1-1 on the following page.

The site selection process generally follows the guidelines set down by the BCP in terms of working within the overall land use goals and objectives for the base. Based on the needs, constraints, and opportunities afforded by the BCP, it is possible to identify several possible sites appropriate for the proposed buildings. From these sites, it is possible to pick out one site that achieves all or most of the needs and goals of the project, including any site planning constraints caused by the use of passive solar systems. It is not anticipated that energy issues will dictate site selection. *However, all other things being equal, if one site has better access to the sun and sky, then it should receive a higher priority than other sites*

## Base Comprehensive Plan



**Figure 1-1: Site Selection Process**

## Site Planning For Passive Heating

Site planning for passively heated buildings involves ensuring that the solar collection facades of the building have 'access' to the sun. Since not all facades of any building have access to the sun, site planning for solar access typically involves consideration of one, or possibly two, key facades. The most important facade usually is the south facade (north facade in the Southern Hemisphere). Next, usually, is the east facade, although protecting the solar access of this facade is not as critical as it is with the primary solar facade.

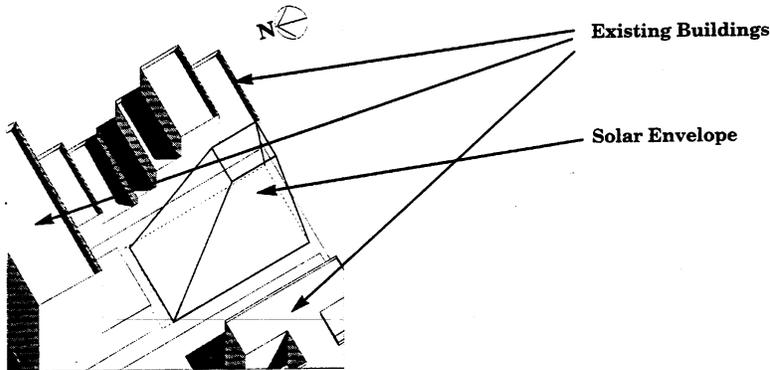
### Solar Envelope

The primary method of site planning for passive heating in commercial-type buildings is a concept called the *solar envelope*. A solar envelope is defined as the boundaries of a three-dimensional volume, on the site, having unobstructed access to the sun during a certain time period over the year. The solar envelope is explained in more detail in Volume I; the methods for delineating one are presented in Volume IV.

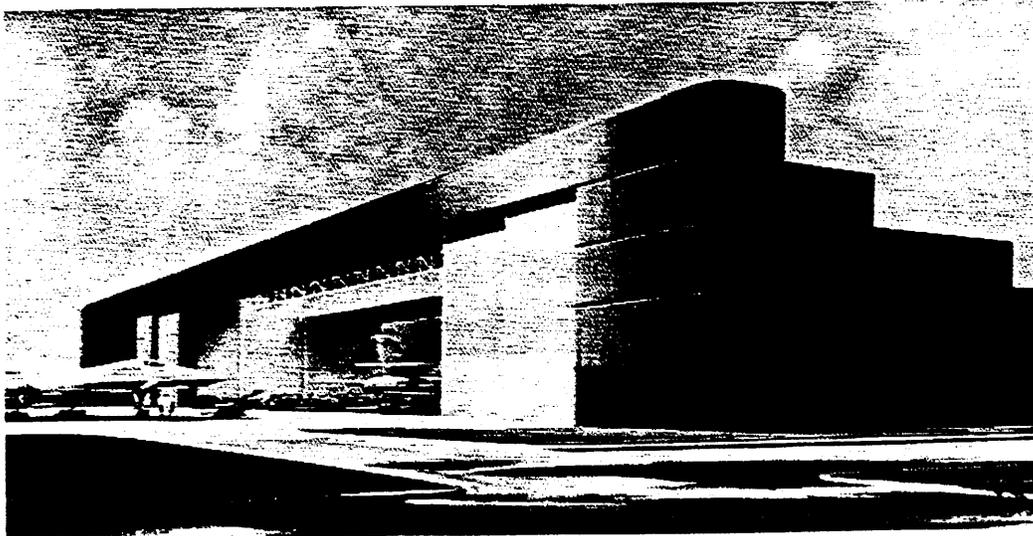
The solar envelope concept offers an approach to providing solar access that is potentially useful to any Air Force base, irrespective of changing economic or technological factors or the specific solar-related use. The solar envelope concept was developed specifically for use in urbanized areas, in which other buildings surround the site.

Solar envelopes can be simple or complex, depending upon the surrounding buildings, topography, and the ingenuity of the planner. Figure 1-2, on the following page, illustrates the solar envelope for a site. The final building form may be quite different from the solar envelope but must fit within the three dimensional boundaries established by the envelope.

Buildings designed within the solar envelope, such as the one shown in Figure 1-3, may sometimes be different from current architectural practice. *Passive commercial-type buildings will be lower, where possible, and fill more of the site than do most present day buildings.* However, the inability to "fit" a solar envelope to a site, or to fit the functional spatial needs of a building to the solar envelope, does not negate the possible use of passive solar systems in the building. Buildings larger than the solar envelope still have access to the sun; however, they block access to surrounding buildings or undeveloped sites.



**Figure 1-2: Solar Envelope**



**Figure 1-3: B-1B Bomber Hangar, Dyess AFB, Texas**  
 Note expression of the solar envelope  
 in the architectural form.

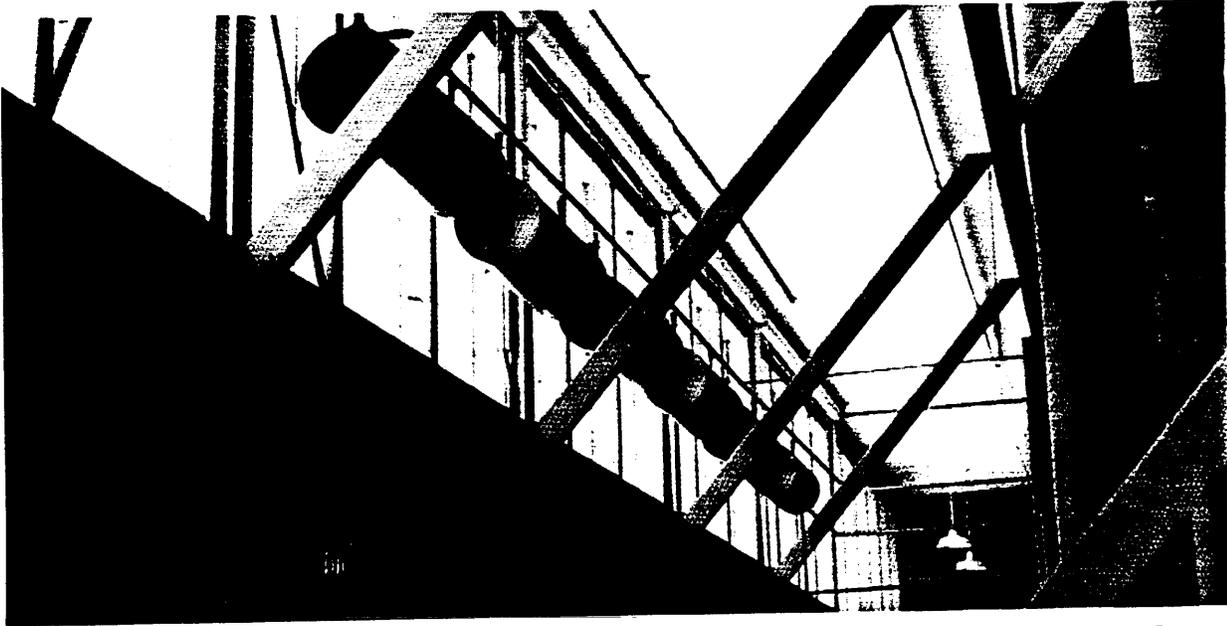
## Site Planning For Passive Cooling

Passive cooling of commercial-type buildings relies on cooling load avoidance and ventilation to reduce dependency on mechanical cooling equipment. Site planning for passive cooling should only be done for building types in which cooling is an important requirement and in climates where passive cooling strategies can be effective.

If no passive cooling strategies are appropriate, there is no need to go through the detailed site planning process for passive cooling. *None of the passive cooling strategies are as effective as either the passive heating or the daylighting strategies.* Therefore, site planning for passive cooling may be of secondary importance.

### Natural Ventilation Night Mechanical Ventilation

Of the two cooling strategies recommended in this handbook, only one of them, natural ventilation (NVN), requires special site planning consideration. The second, night mechanical ventilation (NMV), as illustrated in Figure 1-4, is not usually affected by most site conditions. *Other site considerations that impact cooling energy use include building orientation and shape*



**Figure 1-4: Night Mechanical Ventilation. Colorado Mountain College, Glenwood Springs, Colorado**

The vertical duct system on the right hand side of the picture is part of the night mechanical ventilation system.

Adequate ventilation is perhaps the most important aspect of passive cooling. Air movement as low as 2.3 miles per hour can reduce the effective air temperature in a building by as much as 50F. Site planning to allow for ventilation should focus on prevailing wind directions and speeds and a knowledge of what parts of a site are most favorable for ventilation. Rapid changes in slope, dense vegetation, tall surrounding buildings, and the design of the building facades can effectively block prevailing breezes even though the same features may be useful in shading the building from the sun.

Site planning for daylighting is different from site planning for solar thermal systems. Daylighting systems use the light from a clear or overcast sky to illuminate the interior of buildings. In most cases, direct sunlight is avoided. Therefore, it is not necessary to protect a specific facade (such as the south or east facade) as in a passive thermal system. *In general, any facade can be used to daylight the interior of a building.* When site planning for daylight, the following simple rules can be applied:

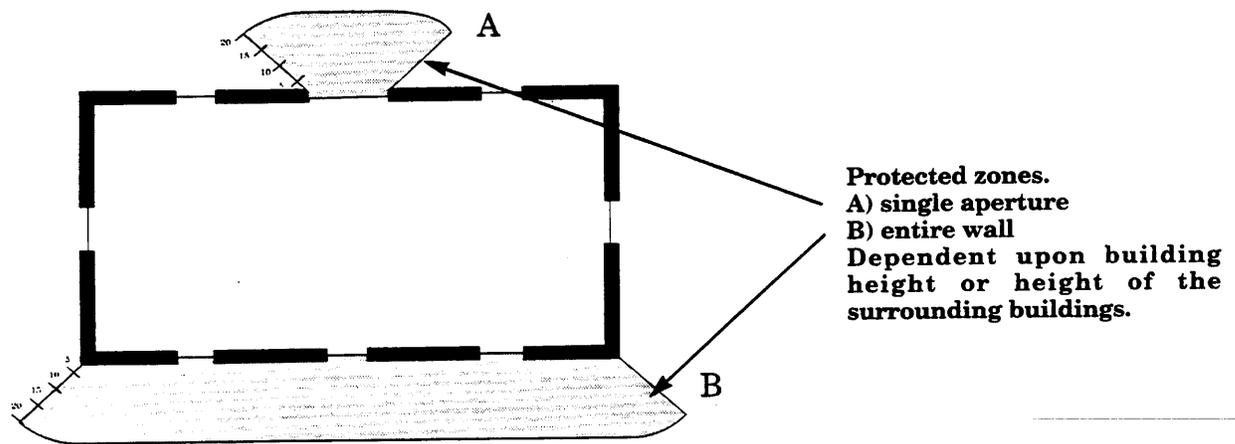
*Protect any two opposite facades of a building.*

*Protect any facade and the roof of the building.*

Site planning to "protect" a facade of a building means to keep it free of major obstructions, such as adjacent buildings and large trees. For a daylighted building, this means a space, adjacent to the daylighted facade(s) equal to one-half of the building height must be left relatively free of obstructions to ensure that light from the sky can reach the facade(s). This type of daylight access requirement is far less constraining than most requirements for passive heating systems.

## Planning For Daylighting

### Daylight Planning Rules



**Figure 1-5: Site Planning For Daylight**

For example, if the north and south facades of a building are being used to daylight the building and the building is 40 feet tall, then a space 20 feet wide must be left clear adjacent to the daylighted facades of the building. See Figure 1-5. Similarly, if the site already has a building 60 feet tall, no new buildings can be built within 30 feet of it, assuming the new buildings are less than 60 feet tall. All of the values used in these examples represent minimum protection zones. Good design sense and the scale of the building will also help determine the size and shape of the protected zone. Daylight planning tools are explained in more detail in Volume IV: Passive Solar Design.

No special protection or site planning is needed for toplighting and core daylighting because they typically have an unobstructed view of the sky.

**Daylighting  
plus  
Passive Thermal**

When looking at a possible building site and attempting to determine whether the site has appropriate space for daylighting, it is helpful to have some sense of the building's overall size and volume so that an estimate of the space needed to protect the daylighting facades can be made. If the building is also going to use passive solar heating systems, then the space surrounding the solar envelope must be protected.

Most building sites are adjacent to streets or alleyways. Facades facing these usually are relatively easy to protect even if the surrounding buildings are tall. Sites used for low (one-story, low-bay) buildings which are surrounded by tall or high-bay buildings should consider the use of toplighting concepts, assuming these concepts are appropriate for the building type and climate.

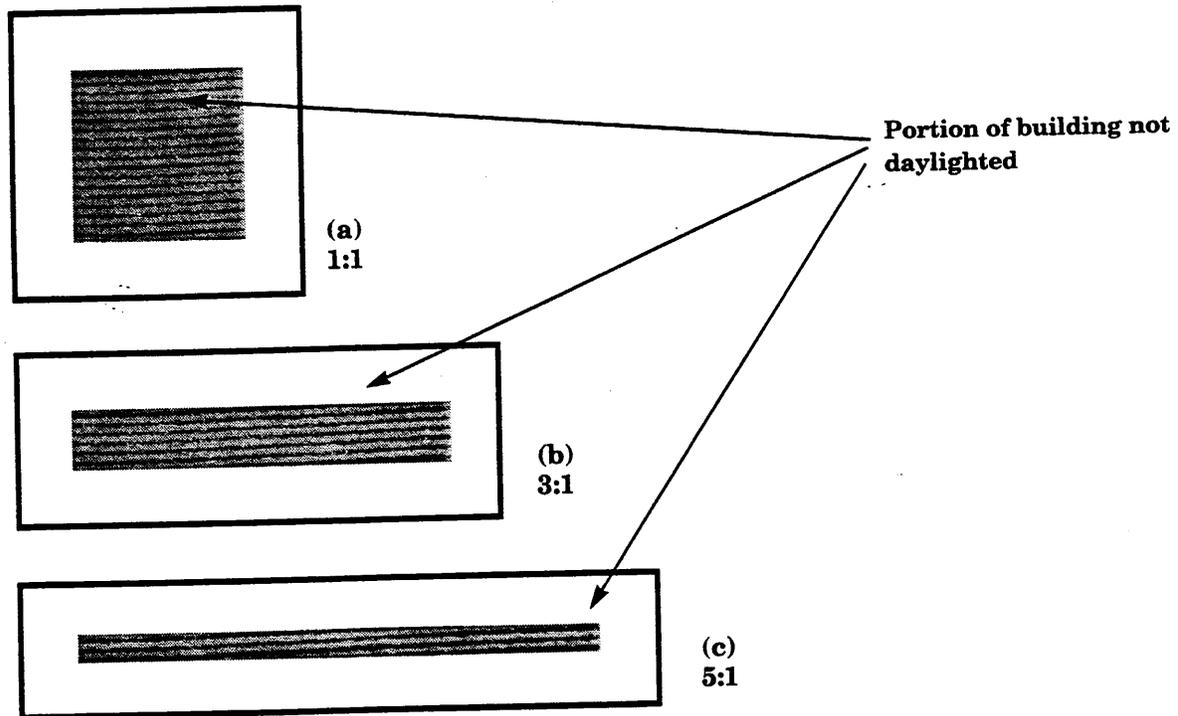
*Daylighting is the most appropriate passive system for all building types in all climate regions.* Therefore, site planning for daylighting will be a routine part of the comprehensive building planning process. Fortunately, it is also the easiest to accommodate.

**Building  
Orientation  
and Shape**

In general, passive solar buildings which take advantage of the climate are less tolerant to changes in orientation and shape than are climate rejecting buildings. However, sites do not have to be ideal for passive solar strategies to be appropriate. This does not negate the need for site planning; it just helps keep the site planning process, as applied to large passive solar commercial-type buildings, in its proper perspective. The impact of building orientation on site selection is discussed in more detail in Volumes I and IV:

Elongated shapes, such as (b) and (c) in Figure 1-6, are effective in all kinds of passive solar buildings, but especially daylighted buildings. *An elongated building can have as much as a 15-25%*

reduction in energy use over a compact building of the same size, due to its greater ability to use daylight.



**Figure 1-6: Changing the building aspect ratio**

The buildings in Figure 1-6 are assumed to have the same floor area, occupancy, and internal loads. The building with the 1:1 aspect ratio has a total energy use of 62,000 Btu per square foot per year (Btu/sf-yr). The building with the 3:1 aspect ratio has an energy use of 50,000 Btu/sf-yr and the building with the 5:1 aspect ratio has an energy use of 46,000 Btu/sf-yr. This example is for Climate Region 5 (Denver, Colorado). In most cases it will be easier to daylight a building that is 45 feet deep (5:1 aspect ratio) as opposed to one that is 100 feet deep (1:1 aspect ratio). Energy savings can vary from site to site, depending upon the climate region and the building type.

**Introduction**

A total of 18 different commercial-type buildings were analyzed for this handbook. A listing of these building types, in the order they appear in various charts and appendices throughout the handbook, is as follows:

- A. ADMIN, <5000 SF
- B. ADMIN, >5000 SF
- C. ADMIN, MULTISTORY
- D. ADMIN, COMPUTER FACILITY
- E. DINING FACILITY
- F. DORMITORY
- G. FIRE STATION
- H. INDUSTRIAL FACILITY
- I. MAINTENANCE, <5000 SF
- J. MAINTENANCE, HIGH-BAY
- K. MAINTENANCE, AIR CONDITIONED
- L. MAINTENANCE, LOW-BAY
- M. TRAINING, AUDITORIUM
- N. TRAINING, <5000 SF
- O. TRAINING, >5000 SF
- P. TRAINING, MULTISTORY
- Q. TRAINING, GYMNASIUM
- R. WAREHOUSE

These buildings represent general categories of commercial-type buildings and do not describe specific buildings as found in the USAF building-type category codes. For example, a law office, building code 610-112, would be an administrative building, but it could be less than 5000 square feet (<5000 sf), greater than 5000 square feet (>5000 sf), or multistory.

**Appendix B:  
USAF Building-Type Codes**

*Appendix B lists all of the USAF building-type category codes and the building types they represent.*

**Climate and  
Buildings**

To determine the energy use in commercial-type buildings, four climate variables are used to establish climate regions:

- o Heating Degree Days (HDD)
- o Cooling Degree Days (CDD)
- o Latent Enthalpy Hours (LEH)
- o Cloudiness Index (RAD)

Using these four climate variables results in twelve climate regions, worldwide, for use in planning commercial-type USAF buildings. *These variables are discussed in more detail in Volume I: Introduction To Passive Solar Concepts, and the charts presented in Appendix A.*

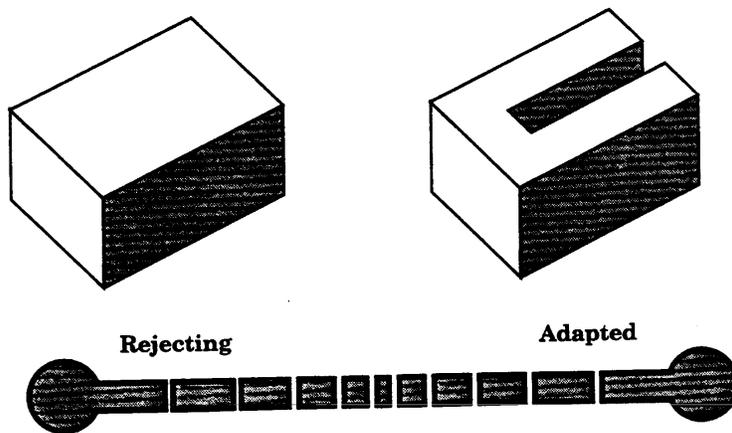
**Appendix A:  
USAF Climate Regions**

This handbook guides the planning and design of “climate adapted” buildings, as opposed to “climate rejecting” buildings. A climate rejecting building isolates the building energy use from interaction with the surrounding environment. It uses large mechanical and electrical systems to heat, cool, and light the building, regardless of the possibilities of using the environmental conditions to best advantage.

The concept of climate adapted or climate rejecting buildings represents the extremes of possible solutions: one uses the climate while the other isolates the building from it. In reality, solutions to real building energy problems lie somewhere between the two. Energy use and energy economics may make some passive concepts attractive and others impractical when considered within the constraints of real project needs, fuel availability, and budgetary requirements. Therefore, some compromise is expected and the planner should keep in mind that not all passive systems will work in all buildings, and the final solution may be a combination of climate adapted and rejecting concepts.

## Energy Responsive Buildings

### Climate Adapting Climate Rejecting



**Figure 2-1: Climate Rejecting vs. Climate Adapted**

Commercial-type buildings have two categories of loads:

- (1) *envelope loads*
- (2) *internal loads*

*Envelope loads* are associated with energy transfer through the building shell. In some building types, such as single family detached housing or a warehouse, envelope loads are often the single dominant energy use.

### Envelope Loads

**Internal Loads**

*Internal loads* can be divided into two subcategories: (1) those due to occupancy, and (2) those due to lighting and process energy use. It is primarily the variation in internal load characteristics that determines which passive solar systems will be most effective in commercial-type buildings.

**Occupancy Characteristics:**

**People load**  
**Period of operation**  
**Hours of operation**  
**Schedule**

Each building type has specific *occupancy characteristics* that can be expressed in terms of people loads, period of operation, hours of operation, and schedules. The *people load* is an estimate of the number of people in the building. This varies considerably from one building type to another. For example, an administration building is assumed to house one person per 65 square feet while a warehouse typically has one person per 4,000 square feet. The *period of operation* is a designation of whether the building is open during the daytime, at night, or both. An administration building is usually open during the day, while a warehouse may be used day and night. The *hours of operation* are the average number of hours per day that the building is occupied, while the *schedule* is the number of days per week that the building is occupied. An administration building is typically occupied 10 hours a day, 5 days a week, while a warehouse may be occupied 24 hours a day, 7 days a week.

Energy use associated with lighting and process loads (coffee pots, vending machines, etc.) makes up the second major internal load category. In most commercial-type buildings, these loads are assumed to be continuous during the occupied period of each day. One example of a continuous lighting load is the electric lights which are turned on in the morning and off at night and stay on all day long. It is the continuous nature of these internal loads that make them so critical in impacting the overall energy use and costs for the building.

**Energy Costs**

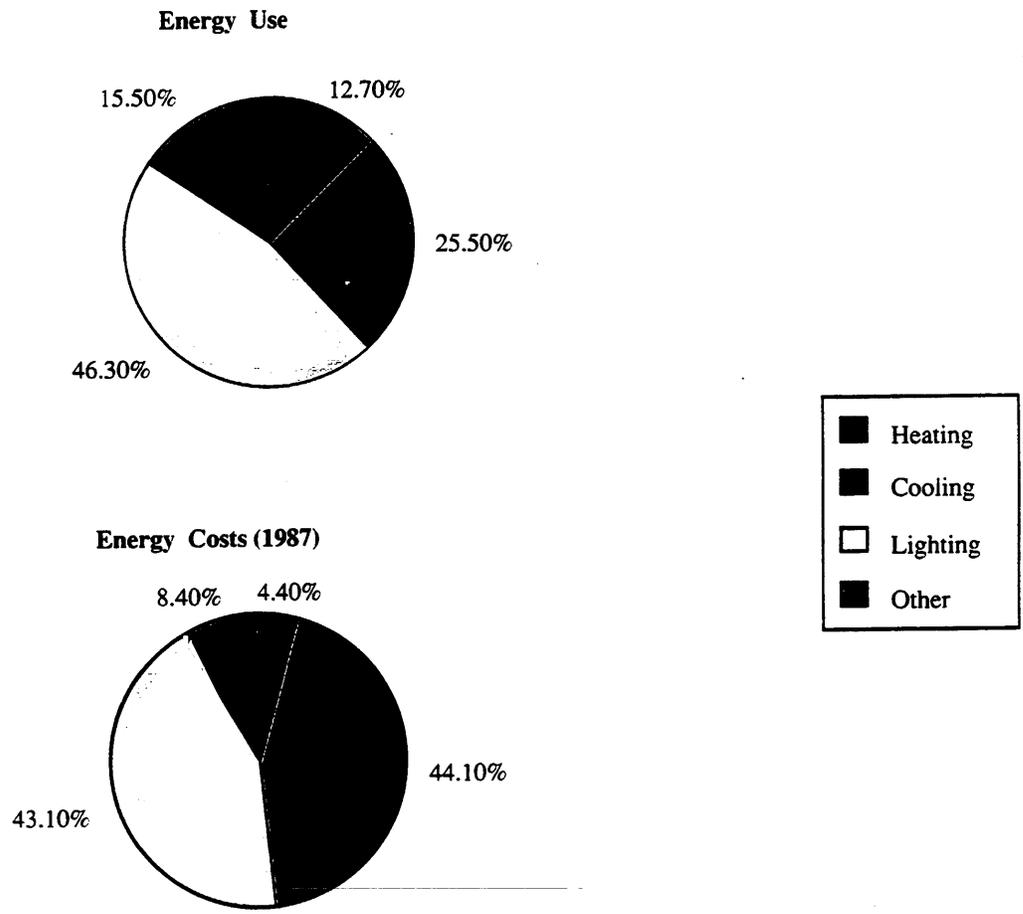
Energy costs represent another way to consider the impact of energy use on buildings. The impact of different fuels used for heating (such as electricity, natural gas, or fuel oil), as well as the costs of electricity for cooling and lighting a building, can provide another important clue as to what kinds of passive concepts are most effective in commercial-type buildings.

**Cost per unit of area:**  
**\$/sf**

In this handbook, energy costs are considered in terms of dollars per square foot of building area per year. Thus, an energy cost of \$1.00/sf-yr in a 10,000 sf building would mean that the building spends \$10,000 per year on energy. Using a cost-per-unit-of-area measure allows one to easily compare the energy costs of different building types, or different sizes of the same building type.

In large commercial-type buildings, no direct link exists between energy use and energy costs. Put another way, saving energy is not directly proportional to saving energy costs. This is a startling revelation to many people who are not familiar with energy costs in commercial-type buildings. For example, Figure 2-2 below illustrates the energy use and energy cost for a small administration building. Although heating is 28% of the energy use, it is only 7% of the costs. Cooling, which was 22% of the energy use, is 48% of the energy costs.

By knowing these data, building users and managers can make informed decisions about how the building should be designed and where it should be sited. For a more detailed explanation see Volumes I and IV.



**Figure 2-2: Energy Use vs. Energy Costs**

## Introduction

The remaining chapters of this volume present a step-by-step procedure for considering passive solar systems in the comprehensive planning process for commercial-type buildings.

### Steps in the comprehensive planning for passive solar facilities

The comprehensive planning process for passive solar facilities consists of ten steps:

#### Volume II

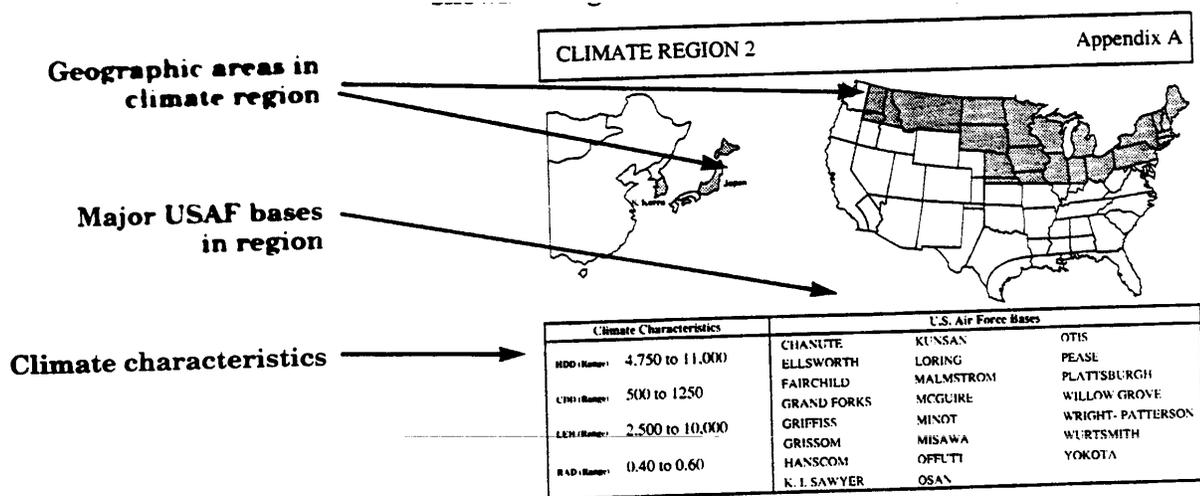
#### Volume III

- Step 1. Determine Air Force base climate region.
- Step 2. Establish building type to be planned.
- Step 3. Determine conventional building energy use and energy use priority.
- Step 4. Determine conventional building electricity peak demand.
- Step 5. Choose appropriate passive solar systems.
- Step 6. Match energy use to passive solar systems.
- Step 7. Determine passive building energy use and peak demand.
- Step 8. Determine energy costs of conventional and passive solar building.
- Step 9. Determine HV or HVAC system size.
- Step 10. Complete appropriate documentation.

Steps 1 through 4 are discussed in this chapter; steps 5 and 6 are presented in Chapter 4; and steps 7 through 9 are presented in Chapter 5. Step 10 is presented in Volume III: programming Guide.

## Step 1: Determine Climate Region

The climate region for a major air base is determined using *Appendix A*. The appropriate climate region for any facility not listed in *Appendix A* can be determined using a procedure discussed later in this chapter (page 23). *Once the climate region has been established, only data for that climate region is used throughout the planning process* An example of *Appendix A* is shown in Figure 3-1.



**Figure 3-1: Appendix A, Climate Region 2**

Select the appropriate building type from *Appendix B*. The building codes used in this handbook represent general categories of commercial-type buildings and do not represent specific buildings as found in the USAF building-type category code. For example, a law office, USAF building-type code 610- 112, would be an administrative building type in this handbook, but could be <5000 sf, >5000 sf, or multistory; that is, building types A, B or C, respectively. *Multiuse buildings are not analyzed in this handbook.* Figure 3-2 is an example page from Appendix B.

### Step 2: Establish Building Type

BUILDING-TYPE CATEGORY CODES		
Building Code	USAF Category Code	Building Description
A.B.C.D	100-000	C31 FACILITY
L.J.K.L	111-000	ACFT OPS/MAINT FACILITY
A.B.C	120-000	DOE OPS FACILITY
NC	121-111	PETROLEUM OPS BUILDING
A.B	121-120	QUICK-TURN FACILITY
G	130-142	FIRE STATION
A.B.C	130-833	CENTRAL SECURITY CONTROL
A.B.C	130-835	SP OPERATIONS
D	131-111	TELECOMM CENTER
D	131-118	DIGITAL FACILITY
D	131-132	SATCOM GROUND TERMINAL
D	131-134	AIR COMM FACILITY
D	131-136	AIR COMM RELAY FACILITY
D	131-138	RECEIVER/TRANSMITTER FACILITY
D	131-139	MICROWAVE RELAY STATION
D	131-143	RADAR FACILITY
NC	134-XXX	REMOTE CONTROL AND GROUND CONTROL FAC
NC	134-375	RAFCON
A.B.C	140-000	COMMAND POST

#### Building-Type Code Used In This Handbook

- A. ADMIN, <5000 SF
- B. ADMIN, >5000 SF
- C. ADMIN, MULTISTORY
- D. ADMIN, COMPUTER FACILITY
- E. DINING FACILITY
- F. DORMITORY
- G. FIRE STATION
- H. INDUSTRIAL FACILITY
- I. MAINTENANCE, <5000 SF
- J. MAINTENANCE, HIGH BAY
- K. MAINTENANCE, HVAC
- L. MAINTENANCE, LOW BAY
- M. TRAINING, AUDITORIUM
- N. TRAINING, <5000 SF
- O. TRAINING, >5000 SF
- P. TRAINING, MULTISTORY
- Q. TRAINING, GYMNASIUM
- R. WAREHOUSE
- NC. NO CURRENT BUILDING TYPE

Figure 3-2: Appendix B, Building-Type Category Codes

The conventional building is defined as the proposed building before any passive solar systems are considered. It is the nonsolar building against which the performance of the solar building will be compared to ascertain whether the solar building is more (or less) energy efficient and saves energy costs. Figure 3-3, on the following page, illustrates an energy data sheet for Climate Region 2. A complete set of similar data sheets for all twelve climate regions can be found in *Appendix C*. A more detailed explanation of energy use, by building type, can be found in *Appendix E*

### Step 3: Conventional Building Energy Use and Priority

The Appendix C data sheet contains the following information needed to complete Steps 3 and 4:

- o Climate region and building type
- o Energy end use priority
- o Building energy use and peak demand

		Energy Use Priority					Energy Use (Btu/sf-yr)		Peak (W/s/sf)		
		1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar	
<b>REGION 2</b>											
Climate Region (Step 1)	A Admin. <5000 sf	○	■	◆	⊗	▲	90	70	9.0	5.0	
	B Admin. >5000 sf	○	■	◆	⊗	▲	70	50	7.5	4.0	
Building Type (Step 2)	C Admin. Multistory	○	◆	■	▲	⊗	65	45	7.0	4.5	
	D Admin. Comp. Fac.	▲	○	◆	■	⊗	145	120	13.0	8.5	
Energy Use Priority (Step 3)	E Dining Facility	■	○	▲	◆	⊗	150	130	7.0	4.5	
	F Dormitory	○	◆	■	⊗	▲	45	35	4.5	3.0	
Energy Use (Step 3)	G Fire Station	■	○	⊗	◆	▲	80	65	4.0	2.0	
	H Industrial Facility	▲	○	■	⊗		55	40	4.0	3.0	
Peak Demand (Step 4)	I Main. <5000 sf	■	○	▲	⊗		35	25	2.0	1.3	
	J Main. High-Bay	○	■	▲	⊗		60	40	3.5	2.0	
Energy End Use Code	K Main. HVAC	○	■	▲	◆	⊗	55	45	5.5	4.0	
	L Main. Low-Bay	○	▲	■	⊗		40	25	3.0	1.7	
	M Auditorium	■	◆	○	⊗	▲	70	60	7.0	6.0	
	N Training. <5000 sf	○	■	◆	⊗	▲	90	70	9.0	5.0	
	O Training. >5000 sf	○	■	◆	⊗	▲	70	50	7.5	4.0	
	P Training. Multistory	○	◆	■	▲	⊗	65	45	2.0	1.0	
	Q Gymnasium	○	■	⊗			70	60	2.0	1.0	
	R Warehouse	■	○	⊗			25	20	1.0	0.5	

■	◆	○	⊗	▲
Heating	Cooling	Lighting	Ventilation	Process

Figure 3-3: Appendix C: Building Energy Data Sheet.

W/O Solar = conventional

Energy use and peak demand data include both a conventional (W/O Solar) and a solar value for each building type. The conventional building value represents the performance of a typical building of the type being considered. For example, from Figure 3-4 on the following page, for an ADMIN, <5000 SF, the w/o solar energy use value is 90; that is, 90,000 Btu's per square foot per year. This means that most administration buildings of this size, in this climate region, use about 90,000 Btu/sf-yr of energy for all end uses combined. Specific real buildings may use more or less, but this is the average energy use value.

REGION 2		Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)		
		1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar	
A	Admin, <5000 sf	●	■	◆	⊗	▲	90	70	9.0	5.0	
B	Admin, >5000 sf	●	■	◆	⊗	▲	70	50	7.5	4.0	
C	REGION 2		Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
D			1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
E	A Admin, <5000 sf		○	■	◆	⊗	▲	90	70	9.0	5.0
F			H Industrial Facility		▲	●	■	⊗			
G	I Maint, <5000 sf		■	●	▲	⊗					
H	Industrial Facility		▲	●	■	⊗	55	40	4.0	3.0	
I	Maint, <5000 sf		■	●	▲	⊗	35	25	2.0	1.3	

Figure 3-4: Appendix C, Example Building

Step 3

Step 4

solar thermal or daylighting system. This information is useful if the planner is required to suggest or document an energy goal for a project. Values for both the nonsolar and solar building have been rounded to the nearest 5000 Btu's (per sf-yr). See Figure 3-4. See Volume III for more details on how to use this information to document a proposed project.

Energy use priority provides a rank ordering of energy use by end use category. Five end use categories are considered:

- o Heating
- o Cooling
- o Lighting
- o Ventilation
- o Process

These are rank ordered from largest energy end use category (1) to the smallest (5). For example, the small administration building (<5000 sf) in Figure 3-4 has the following energy use priority: (1) lighting, (2) heating, (3) cooling, (4) ventilation, and (5) process. This means that of the 90,000 Btu's per square foot per year for the nonsolar case energy use, lighting is the largest single end use, followed by heating, cooling, ventilation, and process loads, respectively. Chapter 5 of this volume illustrates how to quantify the amount of energy use by end use category.

Some variation in energy use exists between building types in a climate region, or for one building type across several climate regions. Therefore, it is important to select the correct climate region and building energy use tables.

**Energy Use Priority**

### Step 4: Determine Peak Demand

*Peak demand* is the maximum instantaneous and simultaneous usage of electricity by all end uses in the building. It is often used in calculating the electrical energy costs for a building. Reducing peak demand may be an important reason to use some passive solar concepts. Peak demand is explained in more detail in Volume I: Introduction to Passive Solar Concepts.

Conventional (w/o solar) and solar building *peak demand* values are provided. These represent an average conventional building and best case, or target, solar solution. Values are in watts per square foot. Therefore, a value of 9.0 equals 9 watts per square foot. Values are rounded to the nearest half of a watt. This information allows you to document peak demand targets as part of the overall energy savings goals for a particular project.

### Detailed Building Energy Use, Priority, and Peak Demand Information

For many projects, the simplified determination of the nonsolar building total energy use, and the rank ordering of energy end use categories determined in Steps 3 and 4, is sufficient for this phase of the comprehensive planning process. However, for some projects, the simplified information found in Appendix C will not be sufficient. In these cases, *Appendix E* can be used for a more detailed description of the energy use, energy cost, and peak demand characteristics of both conventional and solar buildings. An example of Appendix E for Climate Region 2 is shown in Figure 3-5 on the following page.

#### Appendix E

*Appendix E is the key technical appendix for this handbook.* It is used for detailed analysis of all nonsolar and solar buildings and is subdivided into four groups of data:

- o *Energy Use*
- o *Energy Costs*
- o *HVAC System Size*
- o *Peak Demand*

To calculate detailed energy use, energy priority, and peak demand targets, information from the sections entitled "Energy Use" and "Peak Demand" are used. The other portions of this chart will be explained in subsequent chapters of this volume as well as in Volume IV: Passive Solar Design.

In Figure 3-5, twelve lines of data are included for each building type. The top line of data, corresponding to the heading ADMIN, <5000 SF, represents the conventional nonsolar building. Subsequent lines of data represent different solar options for that particular building type. *The only row of data needed to determine energy use for the conventional nonsolar building is the top line for each building type*

CLIMATE REGION 2						Appendix E								
BUILDING DESC	ENERGY USE					ENERGY COST					HV AC		PEAK LOAD (twsf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>87635</b>	<b>29.0%</b>	<b>24.2%</b>	<b>32.6%</b>	<b>8.4%</b>	<b>5.8%</b>	<b>\$1.56</b>	<b>11.4%</b>	<b>49.0%</b>	<b>33.0%</b>	<b>6.6%</b>	<b>37</b>	<b>46</b>	<b>8.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	84509	30.0%	21.4%	33.8%	8.7%	6.0%	\$1.53	11.6%	47.9%	33.8%	6.7%	37	46	8.9
(C) Natural Vent	79906	36.3%	26.0%	23.3%	8.0%	6.4%	\$1.36	14.7%	53.5%	24.2%	7.6%	40	40	6.9
(L) Windows	69920	53.6%	18.6%	11.6%	8.9%	7.3%	\$1.03	24.9%	50.2%	14.9%	10.0%	30	38	5.3
(L) Skylights	65917	50.3%	21.4%	12.6%	7.9%	7.7%	\$1.02	22.0%	52.7%	15.2%	10.1%	39	29	5
(L) Sawtooth Ap.	72461	48.5%	22.7%	13.9%	7.8%	7.0%	\$1.10	21.8%	54.2%	14.9%	9.3%	43	31	5.3
(L) Monitor Ap.	81420	46.6%	26.3%	10.7%	10.1%	6.3%	\$1.28	20.7%	58.9%	12.3%	8.1%	37	50	6.9
(L) Atrium														
<b>B ADMIN &gt;5000 SF</b>	<b>70708</b>	<b>22.7%</b>	<b>22.5%</b>	<b>40.6%</b>	<b>7.3%</b>	<b>7.3%</b>	<b>\$1.29</b>	<b>8.7%</b>	<b>43.2%</b>	<b>40.1%</b>	<b>8.0%</b>	<b>25</b>	<b>34</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	70519	23.0%	21.3%	40.7%	7.7%	7.3%	\$1.28	8.8%	43.0%	40.1%	8.0%	25	34	7
(C) Natural Vent	68633	23.4%	19.9%	41.8%	7.5%	7.5%	\$1.25	8.9%	11.6%	41.2%	8.2%	25	34	7.3
(L) Windows	62015	30.0%	21.6%	34.0%	6.2%	8.3%	\$1.02	12.4%	43.3%	34.2%	10.1%	26	23	4.9
(L) Skylights	55356	46.6%	19.7%	15.7%	8.8%	9.3%	\$0.86	20.5%	49.3%	18.2%	11.9%	22	31	4.3
(L) Sawtooth Ap.	58916	45.9%	25.2%	11.1%	8.3%	9.5%	\$0.92	18.3%	54.9%	15.6%	11.2%	32	26	4.8
(L) Monitor Ap.	60025	42.0%	25.2%	16.4%	7.8%	8.5%	\$0.97	17.7%	54.8%	16.9%	10.6%	34	27	4.8
(L) Atrium	57750	39.5%	23.8%	19.1%	8.8%	8.9%	\$0.92	17.2%	53.1%	18.6%	11.2%	25	33	4.6

Figure 3-5: Appendix E: Detailed Building Energy Data

Energy Use (Step 3)      Peak Demand (Step 4)

For example, for a typical small administration building, the total building energy use is

$$87,635 \text{ Btu /sf-yr}$$

This is determined from the ENERGY USE category of data under the heading "Bldg (Btu/sf-yr)." This is a more exact determination of the total energy use, per unit of area, for this type of building than that found in Appendix C. In the same data category is detailed information about the end use priority. Under the headings "QHeat (%)", "QCool (%)", and so on, is the percentage of the total energy use for each end use category. For example, heating is 29.0% of the total for the conventional nonsolar building.

To determine the average energy use by end use category, multiply the end use category percent, as a fraction, by the building total energy use. That is:

$$\text{End Use Energy} = \text{End Use Fraction} \times \text{Bldg. Energy Use}$$

For this example these values would be:

QHeat	=	0.290 x 87,635	=	25,414 Btu/sf-yr
QCool	=	0.242 x 87,635	=	21,208 Btu/sf-yr
QLite	=	0.326 x 87,635	=	28,569 Btu/sf-yr
QVent	=	0.084 x 87,635	=	7,361 Btu/sf-yr
QProc	=	0.058 x 87,635	=	<u>5,083 Btu/sf-yr</u>
				87,635 Btu/sf-yr

End Use Energy Calculation

In this way a more detailed calculation of energy use by end use category can be determined.

### Peak Demand

Similarly, the simultaneous peak demand can be determined from the category entitled "Peak Demand." For this example the conventional building peak demand is 8.8 watts per square foot. This is the maximum use of electricity, per square foot, for the building. The peak demand consists of three components:

- (1) *lighting load*
- (2) *process load*
- (3) *HVAC cooling load*

These can be broken out of this total, if needed.

The lighting and process load portion of the total can be determined from Table 3-3 on page 42 of Volume I. For a small administrative building (<5000 sf), these values are 2.5 and 0.5 watts per square foot, respectively. The cooling portion of the simultaneous peak demand is:

### Cooling Peak Demand Calculation

$$\text{Cooling Peak} = \text{Total Peak} - (\text{Lighting Peak} + \text{Process Peak})$$

For this example the cooling peak is:

$$\text{Cooling Peak} = 8.8 - (2.5 + 0.5) = 5.8 \text{ watts/sf}$$

This information may be critical if peak demand is a major part of the electricity costs for an air base. The information is also important for sizing HVAC systems as discussed in Volume IV

## Example 1: A Credit Union

In the remainder of this chapter, two examples will be presented to demonstrate how to apply Steps 1 through 4 of the passive solar building comprehensive planning process. In this section a credit union will be analyzed; in the following section a warehouse will be analyzed. These two building types were chosen because they are quite different and will require different passive solar design solutions. Both examples will also be analyzed in Chapters 4 and-5.

### Step 1: Climate Region

The example credit union (USAF code: 740-155) has a total usable floor area of 10,000 square feet. The shape of the building is not critical, and would not normally be known during this part of the comprehensive planning process. It is also assumed that the building is located on an unobstructed site on an air base in Climate Region 2. This data is sufficient to begin the planning process.

### Step 2: Building Type

Energy information necessary to establish the conventional (nonsolar) case energy use pattern can be determined from either Appendix C or E for Climate Region 2. A copy of Appendix C is shown in Figure 3-6.

REGION 2		Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
		1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
A	Admin, <5000 sf	●	■	◆	⊗	▲	90	70	9.0	5.0
B	Admin, >5000 sf	○	■	◆	⊗	▲	70	50	7.5	4.0
C	Admin, Multistory	●	◆	■	▲	⊗	65	45	7.0	4.5
D	Admin, Comp. Fac.	▲	○	◆	■	⊗	140	120	13.0	8.5
E	Dining Facility	■	○	▲	◆	⊗	150	130	7.0	4.5
F		○	▲	■	◆	⊗	45	35	4.5	3.0
G		○	▲	■	◆	⊗	45	35	4.5	3.0
H		○	▲	■	◆	⊗	45	35	4.5	3.0
I		○	▲	■	◆	⊗	45	35	4.5	3.0

REGION 2		Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
		1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
B	Admin, >5000 sf	○	■	◆	⊗	▲	70	50	7.5	4.0

Figure 3-6: Credit Union Example (Admin, >5000 sf)

The example credit union building falls into the category entitled "B. ADMIN, >5000 SF". From Figure 3-6 it can be determined that the conventional (w/o solar) energy use is approximately 70,000 Btu/sf-yr and the best savings from any of the passive solar systems would reduce it to about 50,000 Btu/sf-yr (Step 3). For this example the energy use priority is lighting, heating, cooling, ventilation, and process loads, respectively (also Step 3). This means that lighting is normally the largest energy end use, followed by heating and cooling.

**Step 3:  
Energy Use  
Energy Use Priority**

The typical peak demand would be 7.5 w/sf, or 75 kW (75,000 w) for the 10,000 sf building. It can be reduced to approximately 4.0 w/sf, or 40 kW. Most of this information could be included in the descriptive material used in DD Form 1391, as discussed in Volume III: Programming Guide.

**Step 4:  
Peak Demand**

If more detail is desired or requested, this can be determined from Appendix E; a copy of the appropriate section is shown in Figure 3-7. Under the section entitled "ENERGY USE" can be found a breakdown of energy use by subcategory.

For an administration building that is 10,000 sf, the total building energy use is:

- o Bldg 70,708 Btu /sf-yr

The various energy end use categories are the following percent of the total:

- o heating 22.7%
- o cooling 22.2%
- o lighting 40.6%
- o ventilation 7.3%
- o process 7.3%

By multiplying the percent, as a fraction, by the building total, it is possible to determine the energy use by end use category; that is:

- o heating = 0.227 x 70708 = 16,051 Btu / sf-yr
- o cooling = 0.222 x 70708 = 15,697 Btu / sf-yr
- o lighting = 0.406 x 70708 = 28,707 Btu / sf-yr
- o ventilation = 0.073 x 70708 = 5,162 Btu / sf-yr
- o process = 0.073 x 70708 = 5,162 Btu / sf-yr
  
- o Building total = 70,779 Btu / sf-yr

The small difference (1%) between the total from the chart (70708) and the total from the above calculations (70779) is due to rounding error in the percent of energy in each end use category.

ENERGY USE		ENERGY COST					HV AC		PEAK LOAD			
Bldg	QHeat	QCool	QLite	QVent	QProc	\$Heat	\$Cool	\$Lite	\$Othr	Heat	Cool	(w/af)
Btu/sf-yr	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(w/af)	(w/af)	
<b>ADMIN &gt;5000 SF</b>	<b>70708</b>	<b>22.7%</b>	<b>22.2%</b>	<b>40.6%</b>	<b>7.3%</b>	<b>7.3%</b>				<b>25</b>	<b>34</b>	<b>7.1</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent	70519	23.0%	21.3%	40.7%	7.7%	7.3%	\$1.28	8.8%	43.0%	40.1%	8.0%	7
(C) Natural Mech Vent	68633	23.4%	19.9%	41.8%	7.6%	7.5%	\$1.25	8.9%	41.6%	41.2%	8.2%	7.3
(L) Windows	62015	30.0%	21.6%	34.0%	6.2%	8.3%	\$1.02	12.4%	43.3%	34.2%	10.1%	4.9
(L) Skylights	55356	46.6%	19.7%	15.7%	8.8%	9.3%	\$0.86	20.5%	49.3%	18.2%	11.9%	4.3
(L) Sawtooth Ap	53916	45.9%	25.2%	11.1%	8.3%	9.5%	\$0.92	18.3%	54.9%	15.6%	11.2%	4.8
(L) Monitor Ap.	60025	42.0%	25.2%	16.4%	7.8%	8.5%	\$0.97	17.7%	54.8%	16.9%	10.6%	4.8
(L) Atrium	57750	39.5%	23.8%	19.1%	8.8%	8.9%	\$0.92	17.2%	63.1%	18.5%	11.2%	4.6

Figure 3-7: Credit Union Detailed Energy Use

The example warehouse has a total usable floor area of 5,000 sf and is used as a range supply and equipment storage facility. It is assumed that this building is also located in Climate Region 2.

Energy information necessary to establish the nonsolar building energy use pattern can be determined from either Appendix C or E for Climate Region 2.

This example building obviously falls into the category entitled "WAREHOUSE." From Figure 3-8, the average conventional building energy use is 25,000 Btu/sf-yr, and the best savings from any of the passive solar systems would reduce it to about 20,000 Btu/sf-yr. For this example, the order of the energy use priorities is heating, lighting, and ventilation, respectively. This means that heating is normally the largest energy use category, followed by lighting and then ventilation. Note that there are only three categories of energy end use rather than the five categories listed for the first example. This is because a warehouse normally does not have a cooling system and does not have any major process loads.

It can be seen in Figure 3-8 that the normal peak demand would be 1.0 w/sf, or 5 kW (5,000 w) for the 5,000 sf warehouse. This can be reduced to approximately 0.5 w/sf, or 2.5 kW.

## Example 2: A Warehouse

Step 1: Climate Region

Step 2: Building Type

Step 3: Energy Use  
Energy Use Priority

Step 4: Peak Demand

Building Energy Use		Appendix C							
REGION 2	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
A Admin. <5000 sf	●	◊	◐	◑	▲	90	70	9.0	5.0
B Admin. >5000 sf	●	◊	◐	◑	▲	70	50	7.5	4.0
C Admin. Multistory	●	◊	◐	◑	▲	65	45	7.0	4.5
D Admin. Comp. Fac.	▲	◊	◐	◑	▲	145	120	13.0	8.5

REGION 2	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
R Warehouse	■	○	◑			25	20	1.0	0.5

M Auditorium	◊	◐	◑	▲		70	60	7.0	6.0
N Training, <5000 sf	●	◊	◐	◑	▲	90	70	9.0	5.0
O Training, >5000 sf	●	◊	◐	◑	▲	70	50	7.5	4.0
p Training, Multistory	●	◊	◐	◑	▲	65	45	2.0	1.0
Q Gymnasium	●	◊	◐	◑	▲	70	60	2.0	1.0
R Warehouse	■	○	◑			25	20	1.0	0.5

 Heating	 Cooling	 Lighting	 Ventilation	 Process
---	---	--	---	---

Figure 3-8: Warehouse Example

As in the previous example, if more detail is desired or requested, this can be determined from Appendix E. An example page from Appendix E is shown in Figure 3-9. Under the section entitled "ENERGY USE" can be found a breakdown of energy use by subcategory.

CLIMATE REGION 2							Appendix E							
BUILDING DESC	ENERGY USE					Bldg \$/sf	ENERGY COST				HV AC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)		QProc (%)	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>P TRAINING, MULTI</b>	<b>61970</b>	<b>12.8%</b>	<b>25.5%</b>	<b>48.3%</b>	<b>7.3%</b>	<b>8.3%</b>	<b>\$1.33</b>	<b>4.5%</b>	<b>44.1%</b>	<b>43.1%</b>	<b>8.4%</b>	<b>17</b>	<b>31</b>	<b>6.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap														
(L) Atrium														
<b>Q TRAIL R WAREHOUSE</b>	<b>25127</b>	<b>63.9%</b>	<b>0.0%</b>	<b>28.2%</b>	<b>7.9%</b>	<b>0.0%</b>	<b>\$0.36</b>	<b>41.3%</b>	<b>8.1%</b>	<b>50.3%</b>	<b>0.0%</b>	<b>17</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap														
(L) Atrium														
<b>R WAREHOUSE</b>	<b>25127</b>	<b>63.9%</b>	<b>0.0%</b>	<b>28.2%</b>	<b>7.9%</b>	<b>0.0%</b>	<b>\$0.36</b>	<b>41.3%</b>	<b>8.1%</b>	<b>50.3%</b>	<b>0.0%</b>	<b>17</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap														
(L) Atrium														

Figure 3-9: Warehouse Example, Detailed Energy Use

For a warehouse, the total building energy use is:

- o Bldg 25,127 Btu /sf-yr

The various energy end use categories are the following percent of the total:

- o heating 63.9%
- o cooling 0.0%
- o lighting 28.2%
- o ventilation 7.9%
- o process 0.0%

By multiplying the percent by the building total, the energy use by end use category is:

- o *heating* =  $0.639 \times 25127 = 16,056 \text{ Btu / sf-yr}$
- o *cooling* =  $0.000 \times 25127 = 0 \text{ Btu / sf-yr}$
- o *lighting* =  $0.282 \times 25127 = 7,086 \text{ Btu / sf-yr}$
- o *ventilation* =  $0.079 \times 25127 = 1,985 \text{ Btu / sf-yr}$
- o *process* =  $0.000 \times 25127 = 0 \text{ Btu / sf-yr}$
  
- o *Building total* =  $25,127 \text{ Btu / sf-yr}$

In this example, there is no rounding error.

It is also possible to estimate the total annual energy use using the building total energy use and the building area; that is:

$$\text{Annual Energy Use} = \text{Building Energy Use} \times \text{Building Area}$$

### Annual Energy Use Calculation

In this example the annual energy use would be:

$$\begin{aligned} \text{Annual Energy Use} &= 25,127 \text{ (Btu /sf-yr)} \times 5000 \text{ (sf)} \\ &= 125,635,000 \text{ Btu / yr} \\ &= 1.26 \times 10^8 \text{ Btu / yr} \end{aligned}$$

This calculation can be done for any building or end use category given the area and annual energy use.

The extended list of building types in Appendix B should enable you to plan a wide range of building types. However, special cases always exist. A few of these cases include:

- o *Air Force base on the border between two regions.*
- o *A building type not listed in the tables.*
- o *The building type with / without an HVAC system.*
- o *Multistory building.*
- o *Excessive equipment loads.*

### Special Cases

A great deal of care was taken to see that no major air base was located close to the border between two climate regions. However, if this handbook is used to plan buildings for the Air National Guard, the possibility exists that a locale will be close to the border between two regions.

### Climate Region

To determine the climate region in which a particular locale should be placed, the following methods should be considered:

- o *Known HDD, CDD, LEH, RAD.*
- o *An air base listed in Appendix A is within 50 miles.*
- o *Similar climate.*
- o *Best judgment.*

If the HDD, CDD, LEH, and RAD values for a particular locale are known, then it is possible to use Table 3-2, page 38 in Volume I, to determine which climate region is appropriate to use. Methods for calculating the LEH values are discussed in Volume IV: Passive Solar Design.

If an Air Force base listed in Appendix A is within 50 miles of the locale, then it is reasonable to assume that the locale being considered is in the same climate region. If more than one base is within 50 miles of the locale, and they are in different climate regions, then pick the one with the most similar climate.

If there are no other air bases within 50 miles of the locale then consider the climate characteristics of air bases within 100 miles, 150 miles, 200 miles, and so on, and find one with a similar climate. Air bases selected should be in the same or adjacent climate regions.

If none of the above procedures seem to work, then use your best judgment to select the climate region in which the locale should be placed. Check the detailed data in Appendix E for the particular building being planned. In some cases, for a specific building type, the variation in energy performance of the same building in two geographically adjacent climate regions is small.

*Regardless of the method used to ascertain the climate region of a locale, it is important to document the choice so that future planning decisions are consistent.*

### Different Building Types

Many building types are not included in the eighteen studied for this handbook. Some of them have performance characteristics similar to buildings analyzed, others are quite different. The key consideration is usually the internal loads. If the building has internal loads similar to those listed for a building type in Table 3-1 on the following page, then use the data for that building type. For example, neither an Officers Club nor an NCO Club are specifically included in the eighteen building types. However, both function quite similarly to a DINING FACILITY and that category could be used to represent either of them. Similarly a BOQ is not listed, but the category DORMITORY is similar. *Check Appendix B to see if the building type has already been given a designation.* Internal loads can be determined from Volume IV: Passive Solar Design.

In order to use a building type listed in Table 3-1, at least two of the three occupancy characteristics must be similar. In addition, both lighting and process loads must be less than or equal to those listed. *Unless both of these conditions are met, none of the information in this handbook can be used.*

### HVAC Systems

In addition to matching internal loads, it is important to have the same set of thermal comfort systems, whether heating and ventilation (HV) or HVAC, which includes air conditioning. If the building type normally has an HVAC system, and the

proposed building only has an HV system, then this handbook can be used. However, you will have to assume that the cooling load is zero, and reduce the energy use and energy cost accordingly. The magnitude of the heating, lighting, venting, and process energy will not change. If the building normally has an HV system and an HVAC system is proposed, this handbook cannot be used to calculate energy use and costs.

		Operational Characteristics			Internal Load		Thermal System
		Day-Night	Hr/Day	Days/Week	Light (w/sf)	Process (w/sf)	
A.	ADMIN. <5000 SF	D	10	5	2.5	0.5	HVAC
B.	ADMIN. >5000 SF	D	10	5	2.5	0.5	HVAC
C.	ADMIN. MULTISTORY	D	10	5	2.5	0.5	HVAC
D.	ADMIN. COMPUTER FACILITY	D	10	5	2.5	2.0	HVAC
E.	DINING FACILITY	D+N	14	7	1.3	2.8	HVAC
F.	DORMITORY	D+N	24	7	1.3	0.5	HVAC
G.	FIRE STATION	D+N	24	7	1.3	0.5	HVAC
H.	INDUSTRIAL FACILITY	D	10	5	1.7	2.0	HV
I.	MAINTENANCE. <5000 SF	D	10	5	1.0	0.5	HV
J.	MAINTENANCE. HIGH-BAY	D	10	5	2.1	1.0	HV
K.	MAINTENANCE. AIR COND	D	10	5	1.7	1.0	HVAC
L.	MAINTENANCE. LOW-BAY	D	10	5	1.7	1.0	HV
M.	TRAINING. AUDITORIUM	D+N	8	7	1.3	0.5	HVAC
N.	TRAINING. <5000 SF	D	10	5	2.5	0.5	HVAC
O.	TRAINING. >5000 SF	D	10	5	2.5	0.5	HVAC
P.	TRAINING. MULTISTORY	D	10	5	2.5	0.5	HVAC
Q.	TRAINING. GYMNASIUM	D	10	7	1.7	0.0	HV
R.	WAREHOUSE	D	10	7	1.7	0.0	HV

**Table 3-1: Internal Load Characteristics**

The energy use patterns of some, but not all, building types are affected if they are multistory rather than single story buildings. The extent to which the energy use changes depends on how sensitive the energy consumption is to the envelope characteristics of the building. In general, the more a building is dominated by internal loads, the less sensitive it will be to the characteristics of the envelope. For example, a three-story administration building uses about 20% less energy per square foot than does a single story building of the same size. In using this handbook, it is assumed that a proposed building is single story except where specifically otherwise listed, i.e., ADMIN: MULTISTORY TRAINING: MULTISTORY, and DORMITORY. Exceptions are as follows:

**Multistory Buildings**

- o *A dining facility can be single or multistory.*
- o *The sleeping section of a fire station can be single or multistory*

A dining facility can be single or multistory because the building is dominated by the process loads. The internal loads for a dining facility are 1.3 w/sf for lighting and 2.8 w/sf for process (food preparation, etc.) for a total of 4.1 w/sf. The only building type with greater internal loads is a computer facility with 4.5 w/sf. For the dining facility, the energy exchanges through the

envelope have a minimal impact on overall energy consumption. A multistory sleeping section of a fire station can be analyzed because the usage pattern is similar to a dormitory, which has been analyzed as a multistory building.

**Equipment**

Equipment loads in industrial or maintenance buildings have been purposely ignored in the analysis done for this handbook. The energy used and heat given off by heavy equipment such as electric welders, air compressors, process boilers, and so on, can overshadow the building's energy performance and dominate energy costs, if they are included in the cost of operating the building. Furthermore, passive solar systems are not capable of impacting these uses of energy. *In the one maintenance facility with air conditioning analyzed for this handbook, the assumption has been made that no heavy equipment is used in the building.* Increases in the internal loads of buildings from what were assumed in the analysis and shown in Table 3-1 will tend to shift the energy priorities toward increased cooling and ventilating requirements and away from heating requirements. This should be kept in mind when using the information in the handbook.

This chapter-presents Steps 5 and 6 of the comprehensive planning process as applied to passive solar buildings.

## Introduction

*Step 5: Choose appropriate passive solar systems.*

*Step 6: Match energy use to passive solar systems.*

Passive solar systems appropriate for each building type and climate zone have been preselected through building energy analysis. From the available set of passive solar systems, you must match high priority energy use categories with solar systems that address that particular energy end use. Much like the energy analyses carried out in the previous chapter, the determination of appropriate passive solar systems can be done in either a simplified or a detailed manner. The detailed calculation method is explained in Chapter 5.

Figure 4-1 on the following page is an example of an Energy Cost Savings data sheet for Climate Region 2. A complete set of similar data sheets for all twelve climate regions can be found in *Appendix D*. This data sheet, along with the results of the analysis in the previous chapter, are all that are needed to complete a simplified determination of appropriate passive solar system options (Step 5).

## Step 5: Choosing Solar Energy Systems

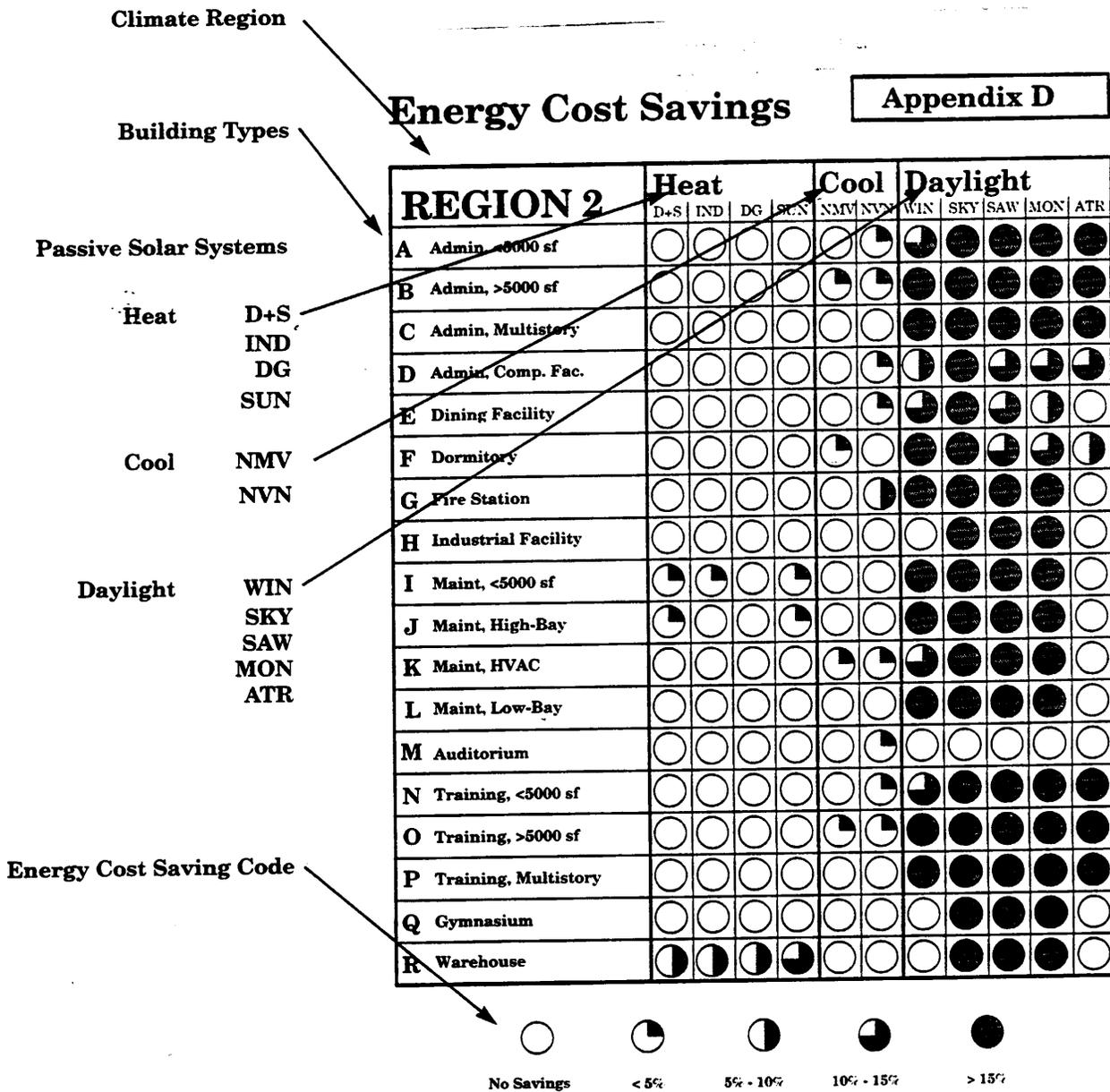
The Energy Cost Savings data sheet contains information about the anticipated annual cost savings associated with each passive solar system. The eleven passive solar technologies are abbreviated as follows:

<i>HEAT</i>	<i>D+S</i>	<i>Direct Gain plus Storage</i>
	<i>IND</i>	<i>Indirect Gain (plus Storage)</i>
	<i>DG</i>	<i>Direct Gain (without storage)</i>
	<i>SUN</i>	<i>Sunspace (plus storage)</i>
<i>COOL</i>	<i>NMV</i>	<i>Night Mechanical Ventilation</i>
	<i>NVN</i>	<i>Natural Ventilation</i>
<i>DAYLIGHT</i>	<i>WIN</i>	<i>Windows (sidelighting)</i>
	<i>SKY</i>	<i>Skylights (toplighting)</i>
	<i>SAW</i>	<i>Sawtooth apertures (toplighting)</i>
	<i>MON</i>	<i>Monitor apertures (top lighting)</i>
	<i>ATR</i>	<i>Atria (core daylighting)</i>

For a detailed explanation of each passive solar system, see Volume I: Introduction To Passive Solar Concepts.

The information in Figure 4-1 is coded for rapid identification of possible energy cost savings. The coding system uses "pies" to designate energy cost savings. The quarter-pie represents first year cost savings of 5% or less. The half-pie represents savings of 5 to 10%; the three-quarter pie represents savings from 10 to

15%, and the fully shaded pie represents energy cost savings the first year greater than 15%. The blank pie indicates that a passive solar system is inappropriate for the specified building type



**Figure 4-1: Example Energy Cost Data Sheet, Appendix D**

For example, from Figure 4-1, for an ADMIN, <5000 SF, the following are passive solar systems that save energy costs:

<i>System</i>	<i>Savings</i>	<i>Strategy</i>
<i>o natural ventilation</i>	<i>&lt; 5%</i>	<i>cooling</i>
<i>o windows</i>	<i>10 - 15%</i>	<i>lighting</i>
<i>o skylights</i>	<i>&gt;15%</i>	<i>lighting</i>
<i>o sawtooth</i>	<i>&gt;15%</i>	<i>lighting</i>
<i>o monitor</i>	<i>&gt;15%</i>	<i>lighting</i>
<i>o atria</i>	<i>&gt;15%</i>	<i>lighting</i>

All of the remaining passive solar systems are inappropriate for an ADMIN, <5000 SF building type in Climate Region 2; none of them save an appreciable amount of energy cost. Looking at the charts in Appendix D and determining which passive solar systems are appropriate completes Step 5.

The next step is to match appropriate passive solar systems with the energy use characteristics of the building. For the ADMIN, <5000 SF in our example, the energy use priorities were:

- (1) *lighting*
- (2) *heating*
- (3) *cooling*
- (4) *ventilation*
- (5) *process*

## **Step 6: Match Energy Use and Solar Energy System**

Five appropriate passive solar systems will reduce the lighting (and cooling) energy costs and one will reduce the cooling (and ventilation) energy costs. None are appropriate for reducing the heating costs.

Although heating is the second largest energy use, none of the passive solar systems will save any heating energy costs. *Therefore, it would be inappropriate to choose a passive heating system for this building type in this climate region if cost savings were the only criteria.* However, other design criteria might make one or more of the passive solar systems appropriate. For example, a demonstration project might allow you to plan for the use of a wider range of possible solar technologies in a building.

Five daylighting systems are appropriate for a small administration building. Since only one cooling strategy will work, only that one can be justified on the basis of energy cost savings. It would be appropriate to suggest a combination of lighting and cooling strategies, or only daylighting, or only the natural ventilation strategy.

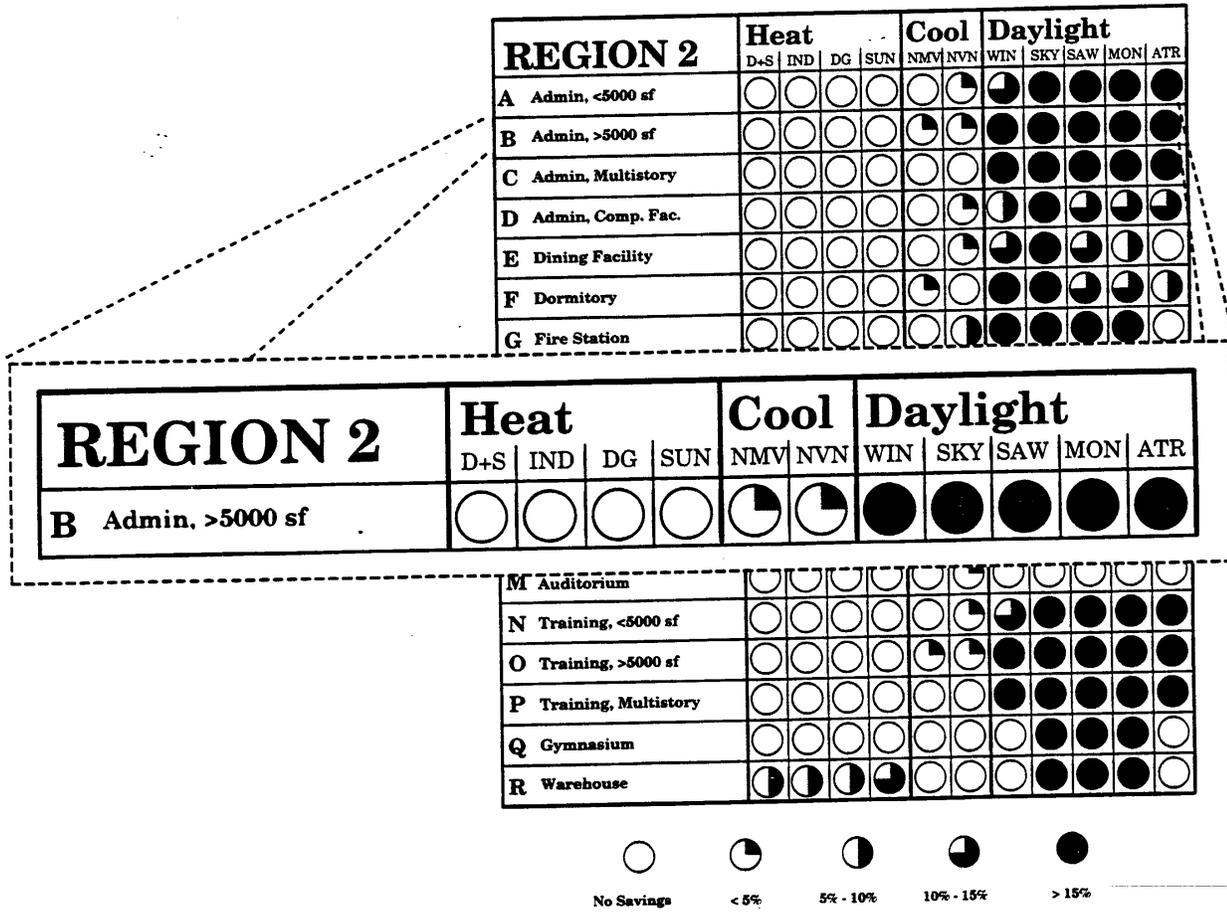
Criteria such as site constraints and the solar envelope for the building might eliminate any options at this stage of the planning process. When the building is designed using Volume IV, then an appropriate set of passive solar systems will be considered and analyzed.

**Example 1:  
A Credit Union**

The credit union example discussed in Chapter 3 has a total usable floor area of 10,000 square feet and is located in Climate Region 2.

**Energy Cost Savings**

**Appendix D**



**Figure 4-2: Credit Union Example, Appendix D**

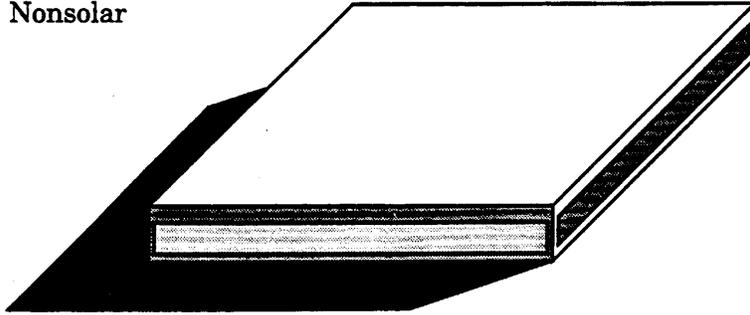
**Step 5**

Using Figure 4-2 from Appendix D, the following passive solar systems are appropriate for this building type and climate region:

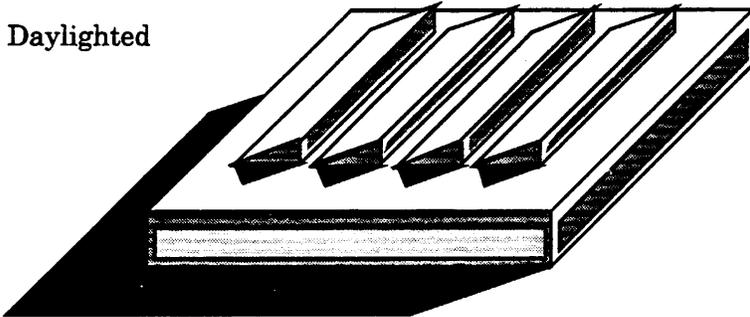
Passive Solar System	Savings	Strategy
o Night Mech Vent	< 5%	cooling
o Natural Ventilation	< 5%	cooling
o Windows	> 15%	lighting
o Skylights	> 15%	lighting
o Sawtooth	> 15%	lighting
o Monitor	> 15%	lighting
o Atria	> 15%	lighting

The architectural impact of choosing a daylighted passive solar system for the credit union is conceptually illustrated in Figure 4-3. A building example is shown in Figure 44 on the following page.

**Nonsolar**



**Daylighted**



**Figure 4-3: Daylighted (SAW) Credit Union**

The energy use priority for this building, as determined in Chapter 3, is:

**Step 6**

- (1) *lighting*
- (2) *heating*
- (3) *cooling*
- (4) *ventilation*
- (5) *process*

In comparing the list of appropriate-passive solar systems with the energy use priority for the building, match-ups exist for lighting and cooling. *Although heating is the second largest energy use, no passive heating systems will save heating energy costs in this building type in this climate region*

During the comprehensive planning process, it is not necessary to ascertain which daylighting and cooling systems are most appropriate. This is part of the design function of the

**DD Form 1391  
CBD Announcement**

architectural/engineering team. However, it might be useful to list a variety of possible solutions in DD Form 1391 or a CBD announcement. These possibilities are discussed in Volume III.



**Figure 4-4: Operations and Training Facility, Kulis A.N.G., Alaska**

**Example 2:  
A Warehouse**

The example warehouse has a total usable floor area of 5,000 sf and is one story in height. This building is also located in Climate Region 2.

**Step 5**

Using Figure 4-5 on the following page from Appendix D, the following are appropriate passive solar systems for this building type:

<i>Passive Solar System</i>	<i>Savings</i>	<i>Strategy</i>
<i>o Direct Gain + Storage</i>	<i>5 - 10%</i>	<i>heating</i>
<i>o Indirect Gain</i>	<i>5 - 10%</i>	<i>heating</i>
<i>o Direct Gain</i>	<i>5 - 10%</i>	<i>heating</i>
<i>o Sunspace</i>	<i>10 - 15%</i>	<i>heating</i>
<i>o Skylight</i>	<i>&gt; 15%</i>	<i>lighting</i>
<i>o Sawtooth</i>	<i>&gt; 15%</i>	<i>lighting</i>
<i>o Monitor</i>	<i>&gt; 15%</i>	<i>lighting</i>

The seven passive systems appropriate for the warehouse are quite different than those that were appropriate for the 10,000 sf administration building. Because of the moderate (1.5 w/sf) internal loads in the warehouse, all of the passive heating strategies will work, as well as several of the daylighting

Energy Cost Savings

Appendix D

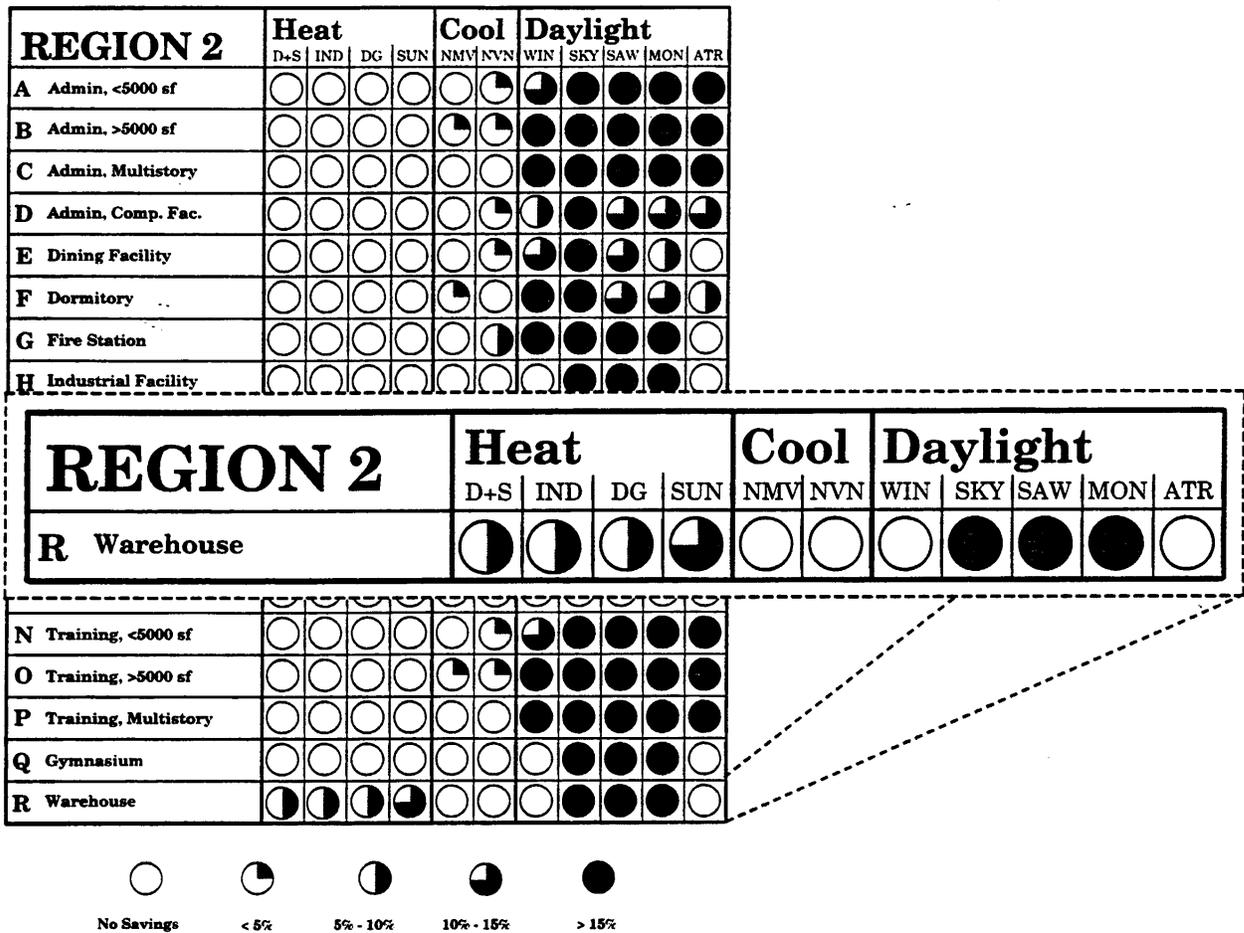


Figure 4-5: Warehouse Example

strategies.

Step 6

The energy use priority for this building, as determined in Chapter 4, is:

- (1) heating
- (2) lighting
- (3) ventilation

In comparing the list of appropriate passive solar concepts with the energy use priority, match-ups exist for heating and lighting. Thus, these passive solar systems should be included in a facility programming document. See Volume III: Programming Guide.

## Introduction

This chapter presents Steps 7, 8, and 9 of the passive solar building comprehensive planning process.

*Step 7. Determine passive building energy use and peak demand.*

*Step 8. Determine annual energy costs of conventional and passive solar buildings.*

*Step 9. Determine HV or HVAC system size.*

The detailed performance characteristics of the passive solar commercial-type building is determined in Steps 7 and 8. Step 9 determines first costs savings, if any, associated with the passive solar building. Incorporating the results of the comprehensive planning process for passive solar buildings is discussed in Volume III: Programming Guide. The energy use, energy costs, and HVAC system size calculations done in these three steps are comparisons with the conventional nonsolar building and are used to strengthen the documentation about the effectiveness of the passive building to reduce energy costs.

## Step 7: Determine Passive Building Energy Use and Peak Demand

Once a candidate passive solar system has been determined it is necessary to estimate the energy use by end use category of the passive building. This data can be compared with the conventional nonsolar building to illustrate the improved energy performance characteristics of the passive solar building.

If a single passive system is chosen, rather than a combination of two or more passive systems, then the performance can be taken directly from Appendix E. If a combination is chosen, then the data in Appendix E must be applied according to a set of guidelines discussed later in this chapter ( page 44).

Data for Step 7 is obtained from Appendix E under the category heading "Energy Use." The calculation process is identical to the detailed energy analysis calculations done for the conventional nonsolar building.

For example, for an ADMIN, <5000 SF, the following passive solar systems save energy costs:

<i>System</i>	<i>Savings</i>	<i>Strategy</i>
<i>o natural ventilation</i>	<i>&lt; 5%</i>	<i>cooling</i>
<i>o windows</i>	<i>10 - 15%</i>	<i>lighting</i>
<i>o skylights</i>	<i>&gt;15%</i>	<i>lighting</i>
<i>o sawtooth</i>	<i>&gt;15%</i>	<i>lighting</i>
<i>o monitor</i>	<i>&gt;15%</i>	<i>lighting</i>
<i>o atria</i>	<i>&gt;15%</i>	<i>lighting</i>

These were determined in Step 6 of the passive solar building comprehensive planning process.

Using Appendix E as shown in Figure 5-1, if windows are used for daylighting, the building total energy use is:

### Step 7

- o 79,906 Btu/sf-yr

and the energy use by specific end use category is:

- o heating = 36.3% x 79,906 = 29,006 (Btu/sf-yr)
- o cooling = 26.0% x 79,906 = 20,776 (Btu/sf-yr)
- o lighting = 23.3% x 79,906 = 18,618 (Btu/sf-yr)
- o ventilation = 8.0% x 79,906 = 6,392 (Btu/sf-yr)
- o process = 6.4% x 79,906 = 5,114 (Btu/sf-yr)
- o building total = 79,906 (Btu/sf-yr)

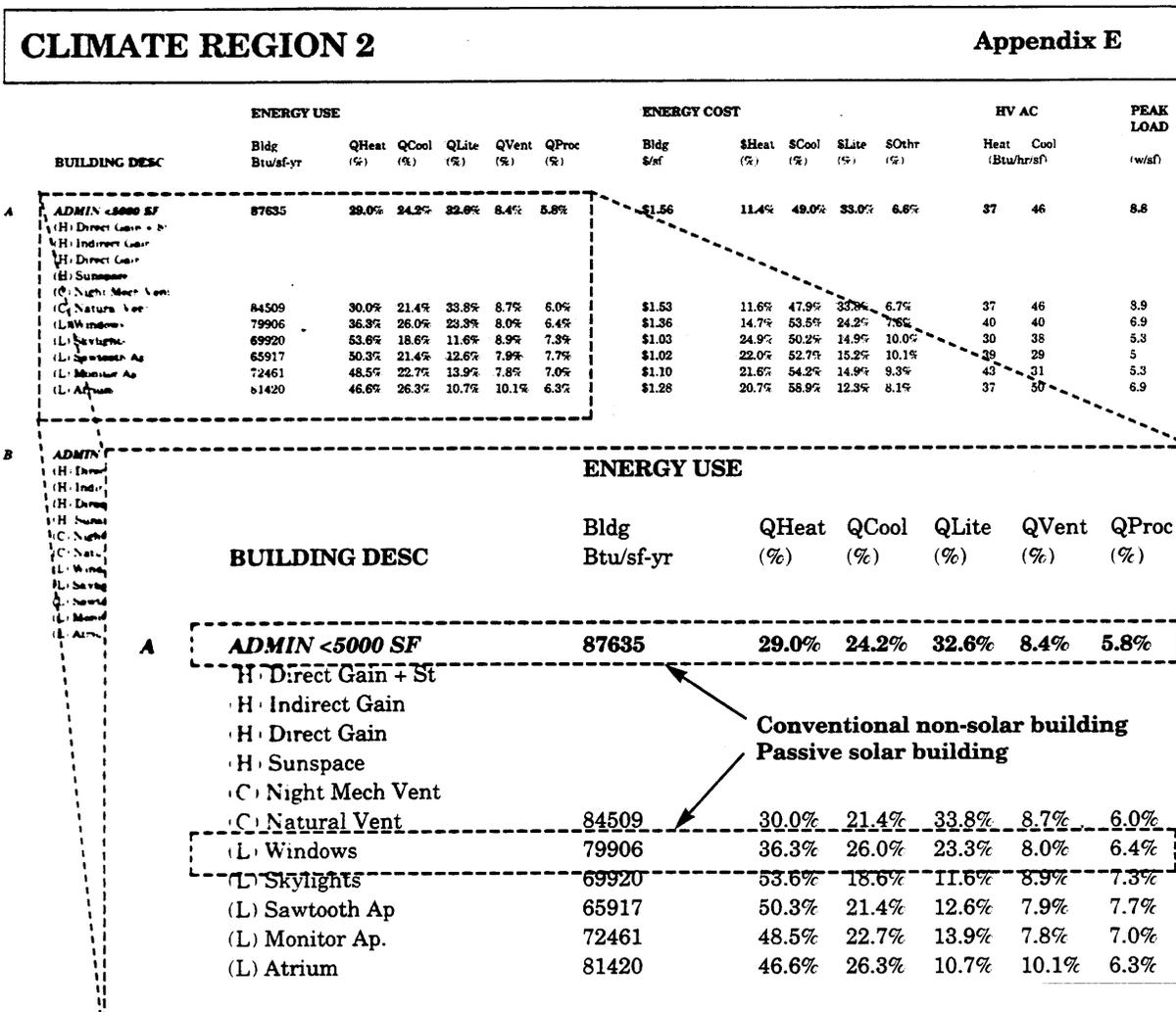


Figure 5-1: Admin, <5000 SF, Windows Case

The percent of energy savings is one minus the ratio of the passive building to the conventional nonsolar building. That is:

**% energy savings calculation**       $\% \text{ savings} = (1 - [\text{passive bldg} / \text{conventional bldg}])$

For this example the percent of energy savings is:

$\% \text{ savings} = (1 - [79906/87635]) = 0.088 = 8.8\%$

In a number of cases, the passive solar building may not use less energy than the conventional building. These are included because they save energy costs and the purpose of this handbook is to help reduce energy costs in commercial-type buildings. The reason that some cases do not save energy but save energy costs is directly related to the use of peak demand charges as part of the electric utility rate structure and trading off electricity for a different fuel. See Volume I: Introduction to Passive Solar Concepts.

**Peak Demand**

Peak demand can also be determined using Appendix E. For the daylighting case using windows, the peak demand is 6.9 watts per square foot. The peak demand in kilowatts (kW) is equal to the peak demand per square foot multiplied by the floor area of the building, then divided by 1,000 to convert it from watts to kilowatts.

$$\text{Peak Demand} = [(\text{watts per square feet}) (\text{area})] / 1000$$

For the ADMIN, <5000 SF building that is using windows for daylighting, the peak demand is:

$$\text{Peak Demand} = [(6.9) (5000)]/1000 = 35 \text{ kW}$$

This compares well with the nonsolar conventional building that has a peak demand of 44 kW. The passive building has reduced peak demand by almost 25% over the nonsolar building.

Passive solar buildings do not necessarily save energy in all end use categories. Table 5-1 compares the nonsolar building and the passive solar building with windows for daylighting.

<b>Conventional Nonsolar Building</b>		<b>Passive Solar Building (Windows)</b>	
o heating	= 25,414 Btu/sf-yr	o heating	= 29,006 Btu/sf-yr
o cooling	= 21,208 Btu/sf-yr	o cooling	= 20,776 Btu/sf-yr
o lighting	= 28,569 Btu/sf-yr	o lighting	= 18,618 Btu/sf-yr
o ventilation	= 7,361 Btu/sf-yr	o ventilation	= 6,392 Btu/sf-yr
o process	= 5,083 Btu/sf-yr	o process	= 5,083 Btu/sf-yr
o building	= 87,635 Btu/sf-yr	o building	= 79,906 Btu/sf-yr

**Table 5-1: Comparison of conventional and passive buildings energy end use (ADMIN, <5000SF)**

---

In Table 5-1, energy savings is achieved in three end use categories (cooling, lighting, and ventilation) but increases occur in heating energy use. It is typical in a daylighted building that the heating energy increases over a similar nonsolar building. The reason for this is that the electric lighting in the nonsolar building is helping to heat the building. In the daylighted building, the electric lighting system is controlled such that there is a reduction in the overall usage of the lighting system. By turning the electric lighting off (or dimming it), not as much heat is added to the building and the heating system must be used more.

---

Energy costs for the conventional nonsolar building, as well as all of the appropriate passive solar systems for a given building type and climate region, can be found in Appendix E. An example of this appendix section is shown in Figure 5-2. All energy costs are in 1987 dollars.

## **Step 8: Determine Energy Costs**

Energy costs are listed in two ways: (1) total energy costs for the building, per square foot per year, and (2) cost by end use category as a percent of the total. End use categories are:

- o  $\$Heat$  = heating (including parasitic electricity)
- o  $\$Cool$  = cooling (including ventilation)
- o  $\$Lite$  = lighting
- o  $\$Othr$  = process

Energy costs for electricity include peak demand as well as consumption costs.

The data in Appendix E are used: (1) to calculate an estimate of the total energy costs, in 1987 dollars, for the first year of operation, and (2) to calculate the cost by end use category.

From Figure 5-2, the total energy cost of a conventional ADMIN, <5000 SF building is \$1.56 per square foot per year (in 1987 dollars). The total energy costs for the building would be \$7,800 if the building were 5000 sf; that is:

#### Annual Energy Cost Calculation

$$\$Total\ Energy = Area \times (\$/sf)$$

In this case

$$\$Total\ Energy = 5000 \times 1.56 = \$7,800$$

The fraction of the total energy cost for each end use category is:

- o  $\$Heat = 11.4\%$
- o  $\$Cool = 49.0\%$
- o  $\$Lite = 33.0\%$
- o  $\$Othr = 6.6\%$

The cost by end use, in dollars per square foot or dollars per (1987) year, would be:

#### End Use Energy Cost Calculation

$$\$End\ Use = \$Total \times \%End\ Use$$

For the above set of end use data, the resulting costs for an administration building of 5000 square feet in Climate Region 2 are:

$$\begin{aligned} \$Heat &= 1.56 \times 0.114 = \$0.178/sf\text{-yr} \text{ or } 7,800 \times 0.114 \\ &= \$ 889/\text{yr} \end{aligned}$$

$$\begin{aligned} \$Cool &= 1.56 \times 0.490 = \$0.764/sf\text{-yr} \text{ or } 7,800 \times 0.490 \\ &= \$3,822/\text{yr} \end{aligned}$$

$$\begin{aligned} \$Lite &= 1.56 \times 0.330 = \$0.515/sf\text{-yr} \text{ or } 7,800 \times 0.330 \\ &= \$2,574/\text{yr} \end{aligned}$$

$$\begin{aligned} \$Othr &= 1.56 \times 0.066 = \$0.103/sf\text{-yr} \text{ or } 7,800 \times 0.066 \\ &= \$ 515/\text{yr} \end{aligned}$$

Energy cost data can be used in a detailed comparison of the conventional nonsolar building and a passive solar building. Comparing the previous cost data for a conventional ADMIN, <5000 SF building with the same building daylighted using sawtooth apertures (SAW), the passive solar building energy costs are:

$$\text{\$Tot} = 1.02 \times 5000 = \text{\$5,100/yr}$$

$$\begin{aligned} \text{\$Heat} &= 1.02 \times 0.220 = \text{\$.224/sf-yr or } 5,100 \times 0.220 \\ &= \text{\$1,122/yr} \end{aligned}$$

$$\begin{aligned} \text{\$Cool} &= 1.02 \times 0.527 = \text{\$.538/sf-yr or } 5,100 \times 0.527 \\ &= \text{\$2,688/yr} \end{aligned}$$

$$\begin{aligned} \text{\$Lite} &= 1.02 \times 0.152 = \text{\$.155/sf-yr or } 5,100 \times 0.150 \\ &= \text{\$ 775/yr} \end{aligned}$$

$$\begin{aligned} \text{\$Othr} &= 1.02 \times 0.101 = \text{\$.103/sf-yr or } 5,100 \times 0.101 \\ &= \text{\$ 515/yr} \end{aligned}$$

and the savings, by end use category are:

	Conventional	Passive	Savings
\$Tot	= \$7,800/yr	\$5,100/yr	\$2,700/yr
\$Heat	= \$ 889/yr	\$1,122/yr	- 33/yr
\$Cool	= \$3,822/yr	\$2,688/yr	\$1,134/yr
\$Lite	= \$2,574/yr	\$ 775/yr	\$1,799/yr
\$Othr	= \$ 515/yr	\$ 515/yr	0/yr

It is relatively easy to make end use cost comparisons, or comparisons of the total energy costs, for the nonsolar and solar buildings. For this example the cost savings is 34.6% (conventional nonsolar case vs. sawtooth case), or \$0.54 per square foot for the first year of operation.

Turning off the electric lighting impacts not only the lighting energy use but also the heating and cooling energy use. Electric lighting, at best, is only about 25 - 30% efficient. That is, only about 25% of the input energy is converted to light, the rest is converted to heat. During the winter heating season this extra heat helps offset heating fuel usage; during summer it increases the need for cooling. When daylighting is used and the electric lighting is turned off, there is a decrease in lighting energy use, a decrease in cooling energy use, and an increase in heating energy use. The net result should be a decrease in both energy use and costs, as long as electricity is not used as a heating fuel. This can be seen in the conventional nonsolar building and the daylighted building (sawtooth) for the small administration building example discussed above.

**Step 9:  
HVAC System  
Analysis**

Most passive heating and cooling concepts reduce energy use and cost but do not impact the size (capacity) of the HVAC or HV system. However, the use of daylighting may impact both the heating and cooling components of an HVAC or HV system. The net result is usually an increase in the heating plant size and a decrease in the cooling plant size.

In an HVAC system, it is usually advantageous to trade off heating capacity for cooling capacity, primarily because heating systems are only about one-tenth as expensive, per Btu/hr of capacity, as cooling systems. In this step, the impact of the passive solar strategy on the actual size of the HVAC or HV system will be considered.

CLIMATE REGION 2											Appendix E			
BUILDING DESC	ENERGY USE					ENERGY COST					HV AC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>87635</b>	<b>29.0%</b>	<b>24.2%</b>	<b>32.8%</b>	<b>8.4%</b>	<b>5.9%</b>	<b>\$1.56</b>	<b>11.4%</b>	<b>49.0%</b>	<b>33.0%</b>	<b>6.6%</b>	<b>37</b>	<b>46</b>	<b>8.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	84509	30.0%	21.4%	33.8%	8.7%	6.0%	\$1.53	11.6%	47.9%	33.8%	6.7%	37	46	8.9
(L) Windows	79906	36.3%	26.0%	22.3%	8.0%	6.4%	\$1.36	14.7%	53.5%	24.2%	7.6%	40	40	6.9
(L) Skylights	69920	53.6%	18.6%	11.6%	8.9%	7.3%	\$1.03	24.9%	50.2%	14.9%	10.0%	39	38	5.3
(L) Sawtooth Ap	65917	60.3%	21.4%	12.6%	7.9%	7.7%	\$1.02	22.0%	52.7%	15.2%	10.1%	39	29	5
(L) Monitor Ap.	72461	46.5%	22.7%	13.9%	7.8%	7.0%	\$1.10	21.6%	54.2%	14.9%	9.3%	43	31	5.3
(L) Atrium	81420	46.6%	26.3%	10.7%	10.1%	6.3%	\$1.28	20.7%	58.9%	12.3%	8.1%	37	50	6.9
<b>B ADMIN &gt;5000 SF</b>												<b>25</b>	<b>34</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>HVAC</b>														
<b>BUILDING DESC</b>														
<b>A ADMIN &lt;5000 SF</b>														
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent												37	46	
(L) Windows												40	40	
(L) Skylights												30	38	
(L) Sawtooth Ap												39	29	
(L) Monitor Ap.												43	31	
(L) Atrium												37	50	

Figure 5-3: HVAC System Analysis

Thermal system size, per square foot of floor area, can be determined from Appendix E in the section entitled "HVAC" as illustrated in Figure 5-3.

For the small administration building, the nonsolar building thermal system sizes are:

- o 37 Btu/hr/sf, heating
- o 46 Btu/hr/sf, cooling

The daylighted building, using sawtooth apertures, requires the following thermal systems:

- o 39 Btu/hr/sf, heating
- o 29 Btu/hr/sf, cooling

This represents a slight increase in the heating capacity and a substantial reduction in cooling capacity. The actual size of the thermal system will vary depending upon the floor area. For example, if the building is 2000 sf, the nonsolar case and daylighted case thermal capacity is:

	Nonsolar Case	Daylighted Case	
Heating	74,000 Btu/hr	78,000 Btu/hr	<b>HVAC Plant Size</b>
Cooling	92,000 Btu/hr	58,000 Btu/hr	

Sometimes it is useful to convert the cooling capacity to tons of cooling. One ton of cooling is equal to approximately 12,000 Btu/hr. Therefore, 92,000 Btu/hr equals 7.6 tons and 58,000 Btu/hr is 4.8 tons of cooling, respectively. *These calculations are useful only for planning purposes and cannot be used to size an actual HVAC system.*

Knowing the approximate size of the plant is not as critical as showing a change in the size was achieved using passive solar systems. For most HVAC systems, the reduced cost of the cooling component will more than offset the increased cost of the heating component. In an HV system the increased cost of the heating component is usually very minor.

When documenting changes in the size of the heating or cooling equipment, it is best to denote the change as a percentage rather than as an absolute value, because this is not an engineering calculation of an HVAC system. Thus, a reduction in cooling capacity of 37%, or an increase in heating capacity of 5% may be more useful than stating that it is anticipated that the passive system will reduce the cooling plant from 78,000 Btu/hr to 58,000 Btu/hr. When the first cost of the HVAC system in a passive solar building is less than the HVAC system in the nonsolar building, it provides further justification for the use of the passive solar system.

### Example 1: A Credit Union

As the previous discussion shows, determining performance characteristics for a given passive solar building follows much the same process used to determine the detailed nonsolar building performance. The purpose of doing a detailed passive building performance analysis is to document the energy and energy cost savings associated with the passive building.

#### Step 7

The total energy use, energy use priority, and peak demand for the example 10,000 sf administration building using sawtooth apertures for daylighting, as compared with the conventional nonsolar building, are as follows:

- o Total energy use:

$$\begin{array}{ll} \text{Nonsolar Bldg} & = 70,708 \text{ Btu /sf-yr} \\ \text{Passive Solar Bldg} & = 53,916 \text{ Btu /sf-yr} \end{array}$$

- o Energy use priority (in Btu/sf-yr):

Nonsolar Building	Passive Solar Building
<i>QHeat</i> = 16,050	<i>QHeat</i> = 24,747
<i>QCool</i> = 15,697	<i>QCool</i> = 13,587
<i>QLite</i> = 28,707	<i>QLite</i> = 5,985
<i>QVent</i> = 5,161	<i>QVent</i> = 4,475
<i>QProc</i> = 5,161	<i>QProc</i> = 5,161

- o Peak Demand (w/sf):

$$\begin{array}{ll} \text{Nonsolar Peak} & = 7.1 \text{ (w / sf)} \\ \text{Solar Peak} & = 4.8 \text{ (w / sf)} \end{array}$$

From the above information, the solar building uses 23.7% less energy than does the nonsolar building. This decrease is primarily in lighting (79% reduction) and cooling (13% reduction), with an offsetting increase in heating (54% increase) energy use. Peak demand is 71 kW for the nonsolar case and 48 kW for the passive solar case, a savings of 32% in needed utility capacity. Figure 54 is representative of a small administrative building employing a daylighting passive system.

#### Annual Energy Use

Total energy use per year can also be calculated from the total energy per square foot data. For the conventional nonsolar building, the total energy use is approximately 707,000,000 Btu's per year (10,000 sf x 70708 Btu/sf-yr); for the passive solar building, it is 539,000,000 Btu's per year. This is a savings of 168,000,000 Btu's per year.

#### Step 8

Energy costs comparisons are as follows:

- o Total energy costs:

$$\begin{array}{ll} \text{Nonsolar Bldg} & = \$1.29 \text{ per sf-yr} \\ \text{Passive Solar Bldg} & = \$0.92 \text{ per sf-yr} \end{array}$$

- o Energy cost priority (in \$/sf-yr):

Nonsolar Building		Passive Solar Building	
<i>\$Heat</i>	= 0.112	<i>\$Heat</i>	= 0.168
<i>\$Cool</i>	= 0.557	<i>\$Cool</i>	= 0.505
<i>\$Lite</i>	= 0.517	<i>\$Lite</i>	= 0.114
<i>\$Othr</i>	= 0.103	<i>\$Othr</i>	= 0.103

Energy cost savings (1987 dollars) are approximately 28% in the passive solar building. Total energy costs would be \$12,900 for the conventional nonsolar building, as compared with \$9,200 for the passive solar building.

The HVAC equipment comparisons are as follows:

### Step 9

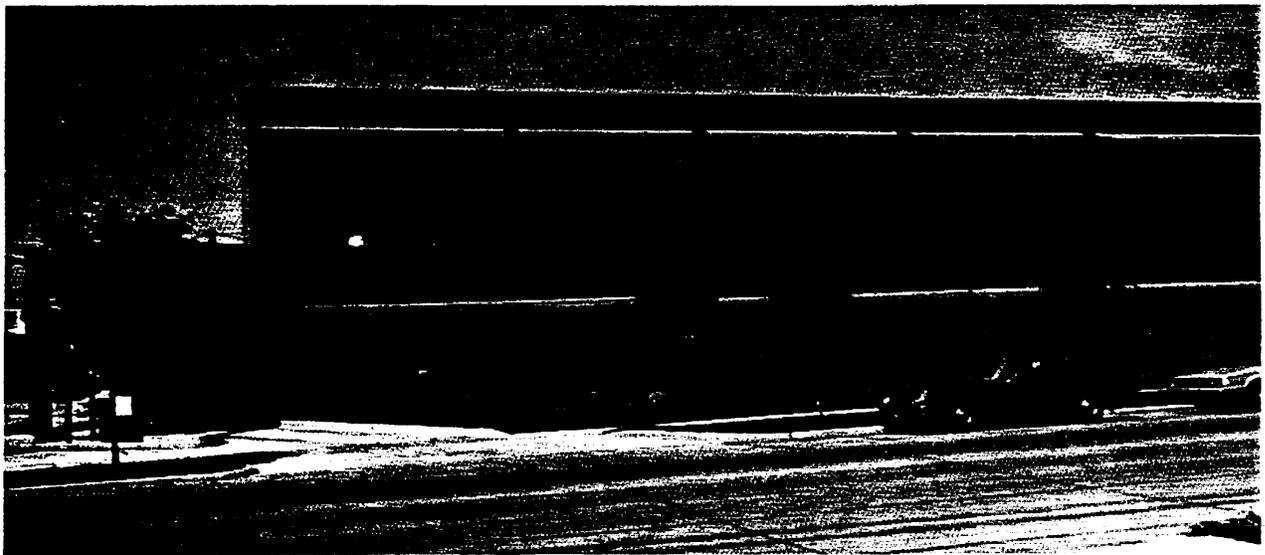
- o Heating Plant:

<i>Nonsolar</i>	= 250,000 Btu / hr
<i>Solar</i>	= 320,000 Btu / hr

- o Cooling Plant

<i>Nonsolar</i>	= 340,000 Btu / hr	<i>Solar</i>	= 260,000 Btu / hr
<i>Nonsolar</i>	= 28 tons	<i>Solar</i>	= 22 tons

The heating plant has increased 28% in size, the cooling plant decreased 21%. The net impact is likely to be reduced first costs in the passive solar building. The impact of the HVAC system size changes on the economics of the building construction are discussed in Volume IV: Passive Solar Design.



**Figure 5-4: Security State Bank, Wells, Minnesota**

## Combinations Of Passive Solar Systems

In the credit union example, a single daylighting concept was analyzed. In many cases, combinations of passive solar options must be considered. The data in Appendix E was not intended to provide information about combinations of passive solar systems. Therefore, a set of guidelines has been developed to help you document the impact of combined passive systems.

There are five passive solar system combination guidelines:

1. *Passive heating plus passive cooling.*  
 Use the heating (energy use, energy cost, HVAC system) values for the passive heating system, plus the lighting, cooling, ventilation, and process energy values from the passive cooling system.
2. *Passive heating plus daylighting.*  
 Determine the net heating value from the combination of passive heating and daylighting, plus the lighting, cooling, ventilation, and process energy values from the daylighting system.
3. *Passive cooling plus daylighting.*  
 Determine the net cooling value from the combination of passive cooling and daylighting, plus the values for lighting, heating, ventilation, and process energy from the daylighting system performance data.
4. *Passive heating, cooling and daylighting.*  
 Determine the net heating from the passive heating and daylighting system performance, the net cooling from the combination of passive cooling and daylighting. Determine all other values from the daylighting system performance data.
5. *Converting an HVAC system to an HV system.*  
 Set the cooling load to 0.0 for both the base and passive cases. Recalculate total energy use. Set cooling cost to 0.0 and recalculate values for all other uses. Add 6% to represent ventilation energy costs. Set cooling peak demand and HVAC system size to 0.0.

To illustrate the application of these rules, imagine a case in which natural ventilation in combination with daylighting is to be analyzed (Combination Guideline 3: Passive Cooling plus Daylighting). If the cooling energy uses are 21,208 (Btu/sf-yr), 18,085 (Btu/sf-yr), and 13,005 (Btu/sf-yr) for the conventional nonsolar building, a naturally ventilated building, and a daylighted building, respectively, then the net cooling energy use

is determined in three operations:

- (1) *determine net cooling savings from natural ventilation.*
- (2) *determine net cooling savings from daylighting.*
- (3) *determine net cooling savings from combined systems.*

That is:

Ventilation savings	= Conventional - NVent = 21,208 - 18,085 = 3,123 Btu/sf-yr
Daylight savings	= Conventional - Daylt = 21,208 - 13,005 = 8,203 Btu/sf-yr
Net savings	= Conventional - (net vent + net daylt) = 21,208 - (3,123 + 8,203) = 9,882 Btu/sf-yr

### Example Use of Guidelines

The procedure for determining net heating savings is similar. Given a combined passive heating plus daylighting system (Combination Guideline 2), if the conventional nonsolar building heating energy use is 17,464 Btu/sf-yr, the passive heating system heating energy use is 12,403 Btu/sf-yr and the daylighting system heating use is 19,710 Btu/sf-yr, then the net energy use would be:

Heating savings	= Conventional - Heating = 17,464 - 12,403 = 5,067 Btu/sf-yr
Daylight savings	= Conventional - Daylt = 17,464 - 19,710 = 2,246 Btu/sf-yr
Net savings	= Conventional - (Net Heating + Net Daylt) = 17,464 - (5,067 - 2,246) = 14,649 Btu/sf-yr

Note that the combined effect of the daylighting plus passive heating produces a net energy savings for heating as opposed to the increase produced by the daylighting system alone.

These guidelines for combining the results of several cases provide a manual method for approximating the net result of a combination of two or more passive solar features. The same basic rules are used to calculate net energy use, net energy costs, peak demand, and HVAC system size.

A majority of the buildings ultimately constructed as a result of the recommendations in this handbook will make use of a variety of appropriate passive concepts. Therefore, we believe that it is important that you learn how to calculate the impact of combined systems on energy use and costs.

### Example 2: A Warehouse

This building will be assumed to have two passive solar features, direct gain (DG) for heating and skylights (SKY) for daylighting. The building is located in Climate Region 2. Data is from Appendix E. Figure 5-5 is representative of a warehouse employing daylight and direct gain passive solar features.

The total energy use, energy use priority, and peak demand for the example 5,000 sf warehouse using both direct gain and skylights as compared with the conventional nonsolar building are as follows:

#### Step 7

- o Total energy use:

Nonsolar building	= 25,127 Btu/sf-yr
Solar, direct gain	= 21,584 Btu/sf-yr
Solar, daylighting	= 23,252 Btu/sf-yr
Combined Solar	= 19,801 Btu/sf-yr (see below)

- o Energy use priority (in Btu/sf-yr):

Nonsolar building:

QHeat	= 16,056
QLite	= 7,086
QVen	= 1,985

Solar, direct gain	Solar, daylighting
--------------------	--------------------

QHeat = 12,605	QHeat = 19,252
	QLite = 2,000
	QVent = 2,000

Direct gain savings = 16,056 - 12,605 = 3,451

Daylighting savings = 16,056 - 19,252 = -3,196

Net QHeat = 16,056 - (3,451 - 3,196) = 15,801

Combined Solar Energy Use:

QHeat	= 15,801
QLite	= 2,000
QVent	= 2,000

QTot = 19,801 Btu/sf-yr

- o Peak Demand (w/sf):

Nonsolar building	Solar, daylighting
Peak = 0.7	Peak = 0.3

From this information, it is shown that the solar building uses 21.1% less energy than does the nonsolar building. Energy use reductions are primarily in lighting (28% reduction) and heating (2% reduction).

Total energy use per year can also be calculated from the total per square foot data. For the conventional nonsolar building the total energy use is approximately 125,000,000 Btu's per year (5,000 sf x 25127 Btu/sf-yr); for the passive building it is 99,000,000 Btu's per year. This is a savings of 26,000,000 Btu's per year.

Peak demand is 3.5kW for the nonsolar building and 1.5kW for the passive building, a savings of 57% in needed utility capacity.

### Step 8

Energy cost comparisons are as follows:

o Total energy costs:

Nonsolar building	= \$0.26 per sf-yr
Solar, heat	= \$0.24 per sf-yr
Solar, daylight	= \$0.17 per sf-yr
Solar, combined	= \$0.15 per sf-yr (see below)

o Energy cost priority (in \$/sf-yr):

Nonsolar building:

\$Heat	= 0.109
\$Cool	= 0.021
\$Lite	= 0.130
\$Othr	= 0.000

Solar, direct gain	Solar, daylighting
\$Heat = 0.088	\$Heat = 0.127
	\$Lite = 0.023
	\$Cool = 0.020

Direct gain savings =  $0.109 - 0.088 = 0.021$

Daylighting savings =  $0.109 - 0.127 = -0.018$

Net \$Heat savings =  $0.109 - (0.021 - 0.018) = 0.106$

Combined Solar Energy Costs:

\$Heat	= 0.106
\$Lite	= 0.023
\$Cool	= 0.020
\$Othr	= 0.000
\$Tot	= 0.149 \$/sf-yr

Energy cost savings (1987 dollars) are approximately 43% in the passive solar building. Total energy costs would be \$1,300 for the conventional nonsolar building as compared with \$745 for the passive solar building.

No net savings are achieved in heating energy costs; however, this is an improvement over the performance characteristics of most daylighting systems when used alone. Lighting energy costs are reduced 82% and cooling costs remain unchanged. The cooling energy costs are to ventilate the building using an HV system.

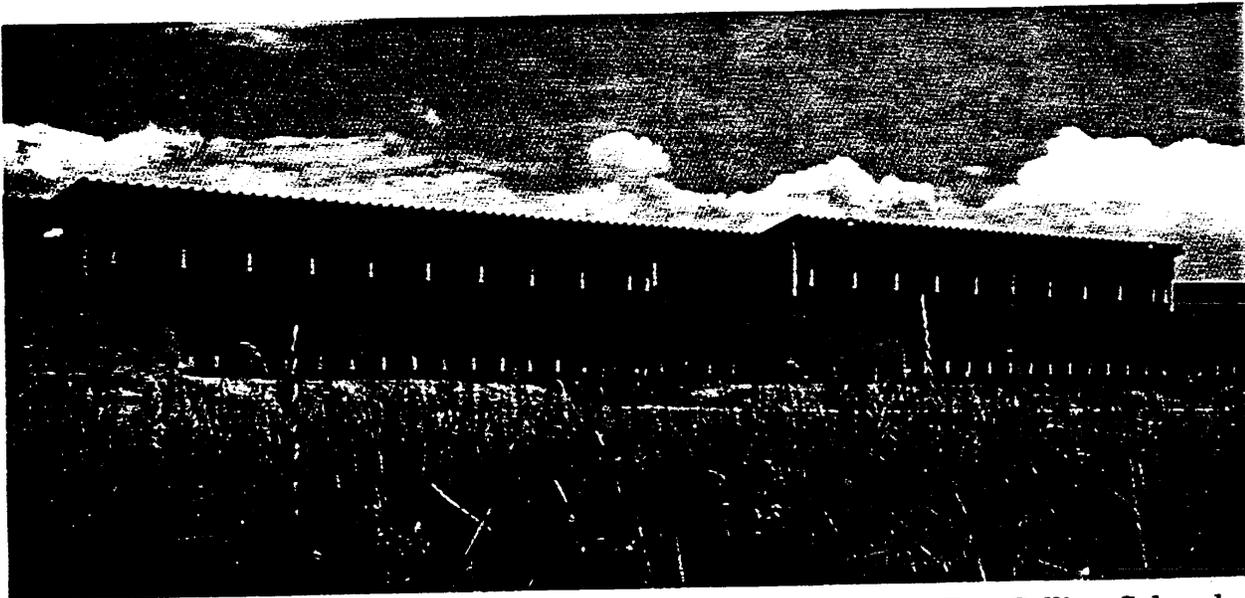
**Step 9**

The HV equipment comparisons are as follows:

- o Heating Plant:

Nonsolar = 85,000 Btu/hr      Solar = 85,000 Btu/hr

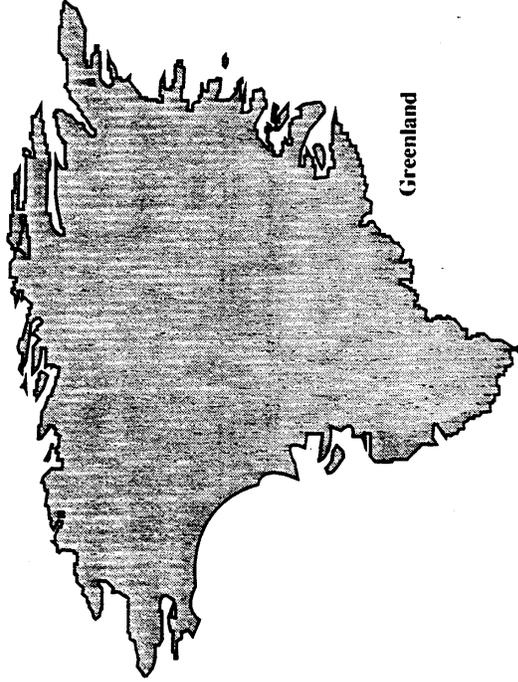
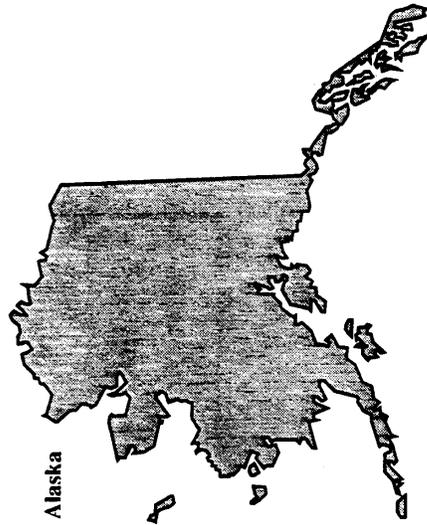
The detailed calculations shown in this section can provide justification for the use of passive solar systems in the proposed warehouse.



**Figure 5-5: McCaffrey Warehouse, Fort Collins, Colorado**

# CLIMATE REGION 1

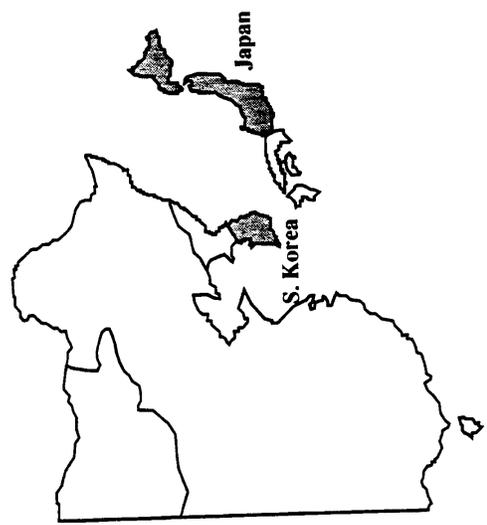
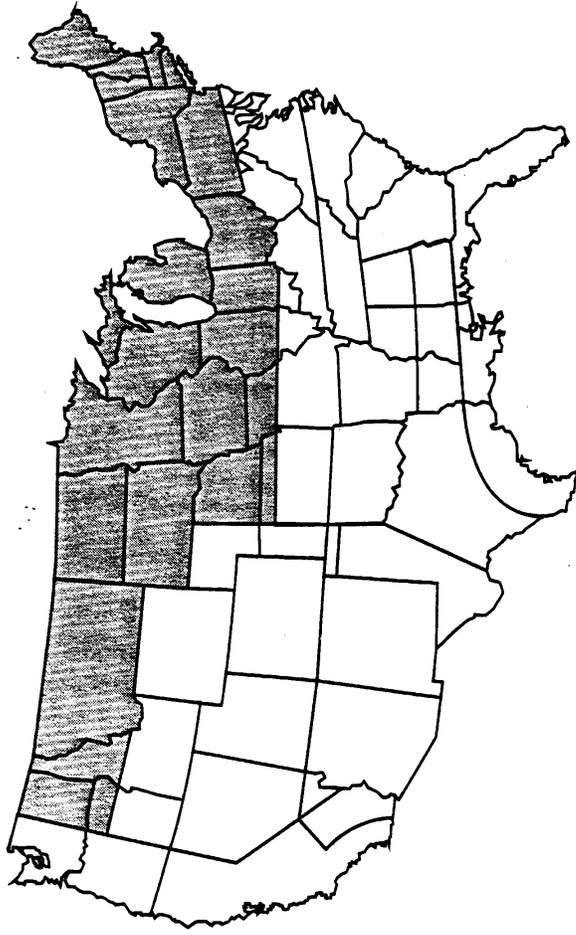
# Appendix A



Climate Characteristics	U.S. Air Force Bases
HDD (Range) 7,000 to 21,000	CLEAR
CDD (Range) 0 to 50	EIELSON
LEH (Range) 0 to 100	ELMENDORF KING SALMON
RAD (Range) 0.35 to 0.50	SHEMYA SONDRESTROM THULE

# Appendix A

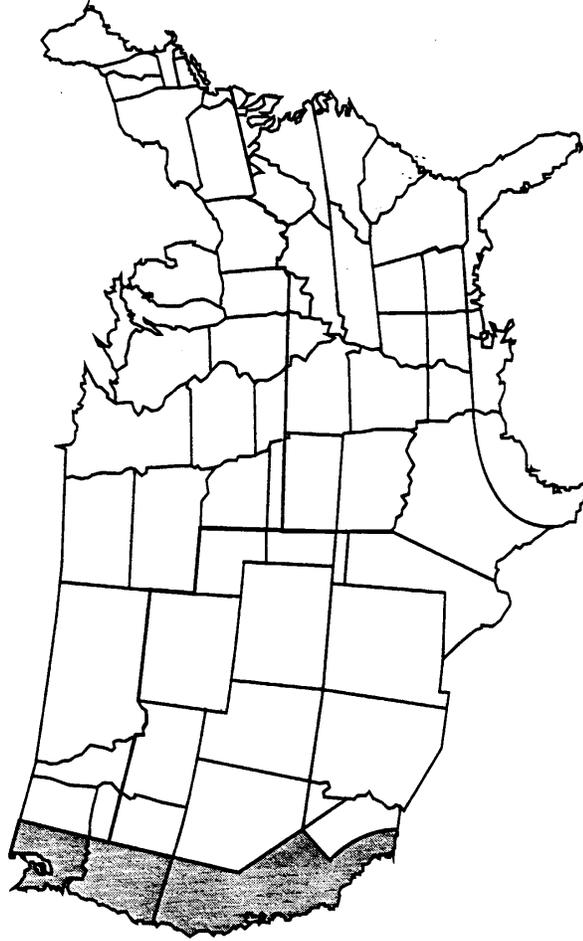
## CLIMATE REGION 2



Climate Characteristics		U.S. Air Force Bases	
HDD (Range)	4,750 to 11,000	CHANUTE	OTIS
CDD (Range)	500 to 1250	ELLSWORTH	PEASE
LEH (Range)	2,500 to 10,000	FAIRCHILD	PLATTSBURGH
RAD (Range)	0.40 to 0.60	GRAND FORKS	WILLOW GROVE
		GRIFFISS	WRIGHT-PATERSON
		GRISSOM	WURTSMITH
		HANSCOM	YOKOTA
		K. I. SAWYER	
			OSAN
			MCGUIRE
			MINOT
			MISAWA
			OFFUTT
			OSAN
			KUNSAN
			LORING
			MALMSTROM

# CLIMATE REGION 3

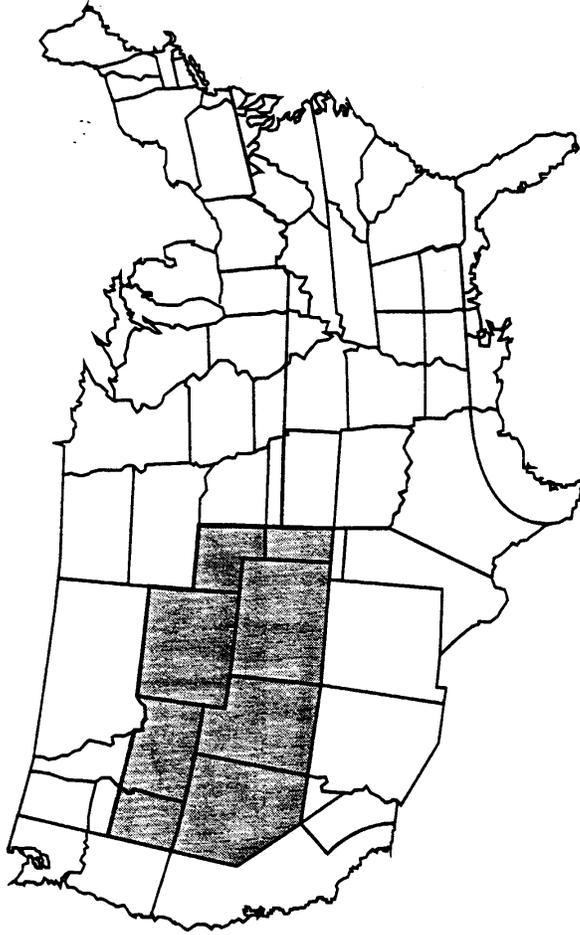
# Appendix A



Climate Characteristics	U.S. Air Force Bases
HDD (Range) 1,250 to 6,000	BEALE CASTLE GEORGE MARCH MATHER
CDD (Range) 0 to 2,250	NORTON ONIZUKA TRAVIS
LEH (Range) 0 to 3,000	VANDENBERG
RAD (Range) 0.40 to 0.70	MCCLELLAN MCCHORD

# CLIMATE REGION 4

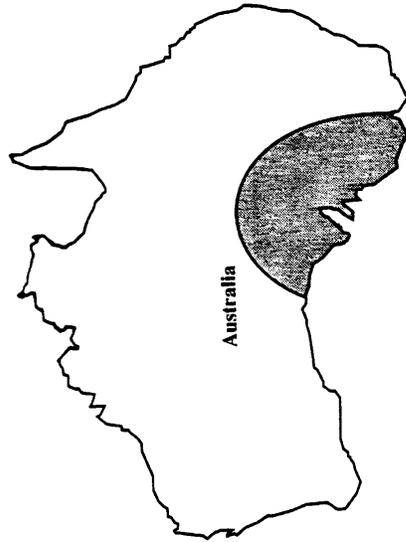
# Appendix A



Climate Characteristics	U.S. Air Force Bases
HDD (Range) 4,500 to 10,000	FALCON PETERSEN
CDD (Range) 0 to 1,500	F.E. WARREN USAF ACADEMY
LEH (Range) 0 to 1,000	HILL INDIAN SPRINGS
RAD (Range) 0.50 to 0.70	LOWRY MOUNTAIN HOME NELLIS

# Appendix A

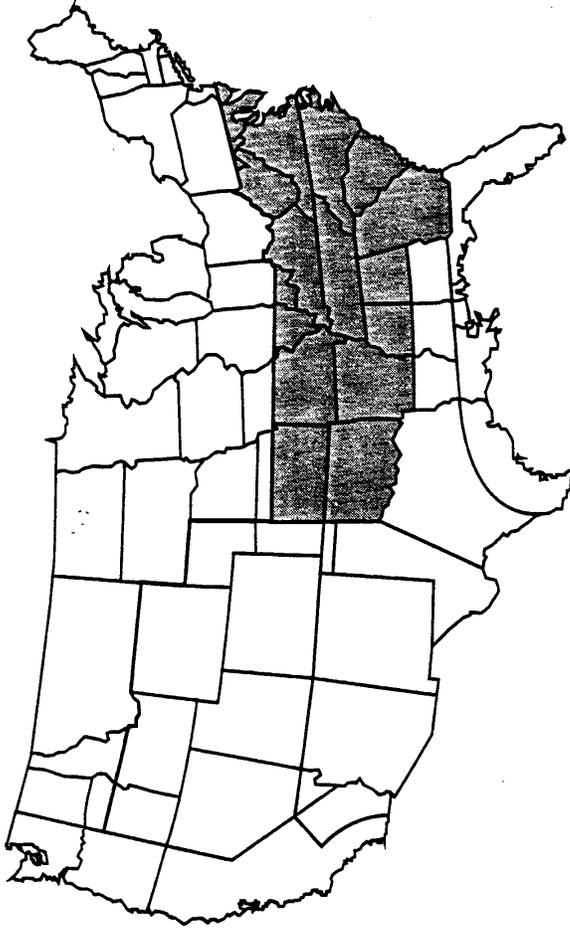
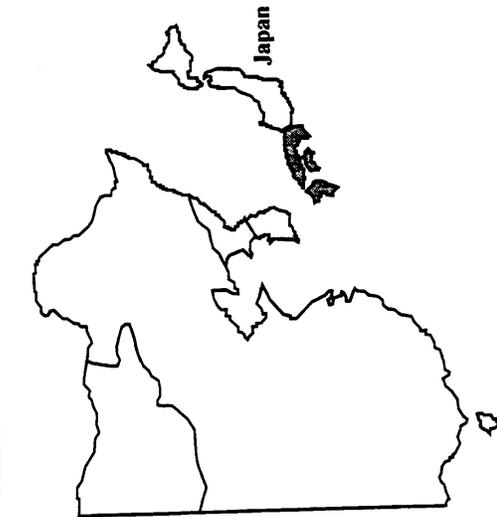
## CLIMATE REGION 5



Climate Characteristics	U.S. Air Force Bases
HDD (Range) 1,000 to 6,000	CANNON WILLIAMS
CDD (Range) 250 to 2,250	DAVIS-MONTHAN WOOMERA
LEH (Range) 5,000 to 15,000	EDWARDS HOLLOWMAN
RAD (Range) 0.60 to 0.75	KIRTLAND LUKE REESE

# CLIMATE REGION 6

# Appendix A



Climate Characteristics		U.S. Air Force Bases			
<b>HDD (Range)</b>	1,750 to 5,000	ALTUS	EAKER	SEYMOUR JOHNSON	
<b>CDD (Range)</b>	650 to 2,500	ANDREWS	LANGLEY	SHAW	
<b>LEH (Range)</b>	10,000 to 20,000	ARNOLD	LITTLE ROCK	TINKER	
<b>RAD (Range)</b>	0.45 to 0.60	BOLLING	MCCONNELL	WHITEMAN	
		CHARLESTON	POPE	WHITEMAN	
		DOBBINS	ROBINS	SHAW	
		DOVER	SCOTT	WHITEMAN	

# Appendix A

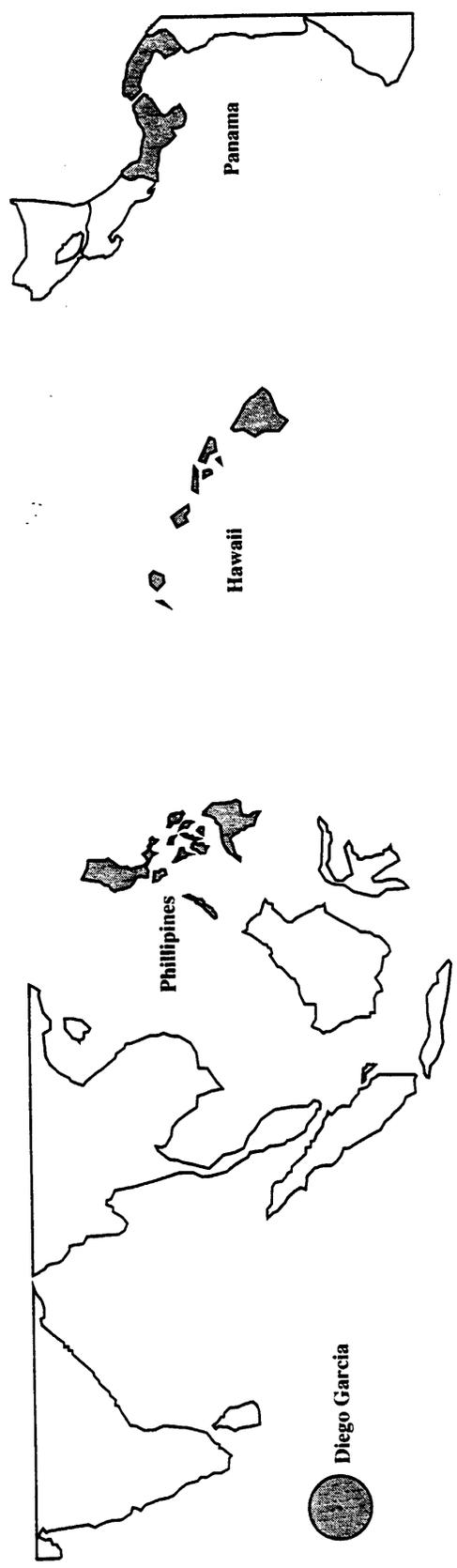
## CLIMATE REGION 7



Climate Characteristics		U.S. Air Force Bases	
HDD (Range)	1,500 to 4,000	BERGSTROM	KELLY
CDD (Range)	1,750 to 3,500	BROOKS	LACKLAND
LEH (Range)	15,000 to 27,500	CARSWELL	LAUGHLIN
RAD (Range)	0.45 to 0.60	COLUMBUS	MAXWELL
		DYESS	RANDOLPH
		GOODFELLOW	SHEPPARD
		GUNTER	VANCE

# Appendix A

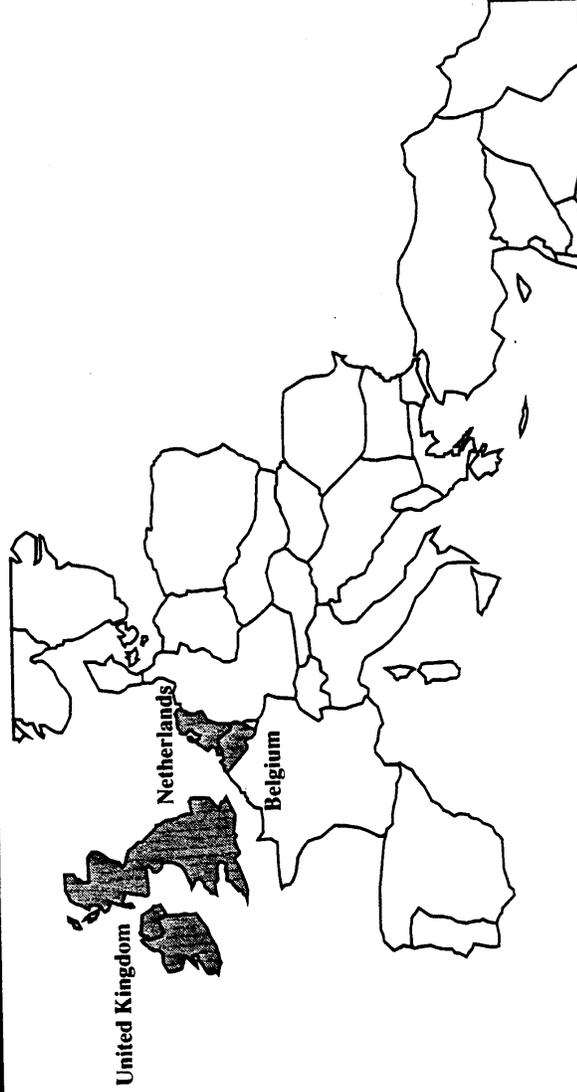
## CLIMATE REGION 8



Climate Characteristics		U.S. Air Force Bases	
HDD (Range)	0	ANDERSON	
CDD (Range)	2,500 to 5,000	ASCENSION (EQUATORIAL ATLANTIC OCEAN - Not Shown)	
LEH (Range)	17,500 to 30,000	CLARK	
		DIEGO GARCIA	
		HICKAM	
		HOWARD	
		WHEELER	
RAD (Range)	0.40 to 0.60		

# Appendix A

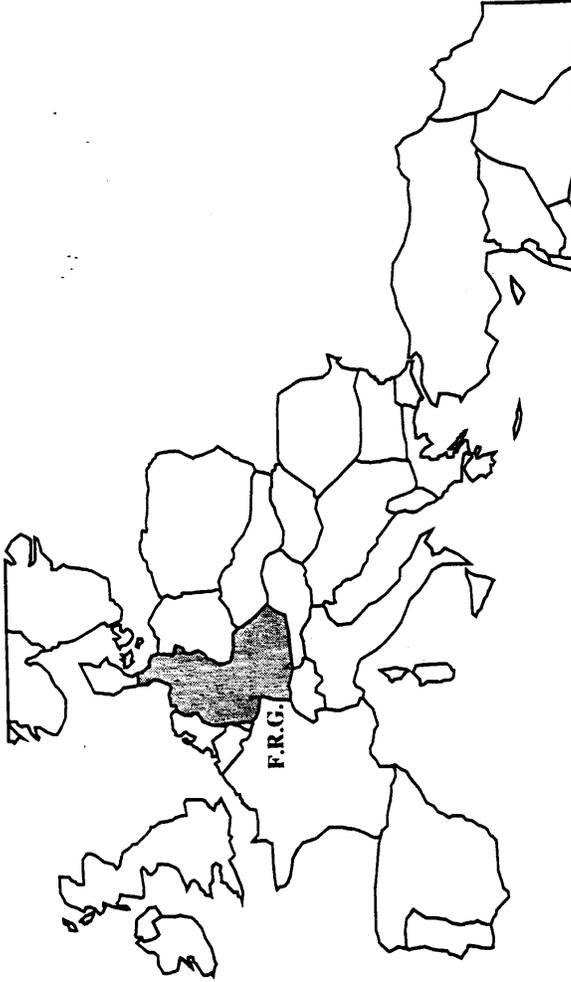
## CLIMATE REGION 9



Climate Characteristics		U.S. Air Force Bases	
HDD (Range)	1,500 to 4,000	ABINGDON	GREENHAM COMMON
CDD (Range)	0 to 500	ALCONBURY	HIGH WYCOMBE
LEH (Range)	0 to 500	BENTWATERS	LAKENHEATH
RAD (Range)	0.40 to 0.55	CHICKSANDS	MILDENHALL
		C.N.A. (SOESTERBURG)	MOLESWORTH
		CROUGHTON	SCULTHORPE
		FLORENNES	UPPER HEYFORD
			WETHERSFIELD
			WOODBIDGE

# Appendix A

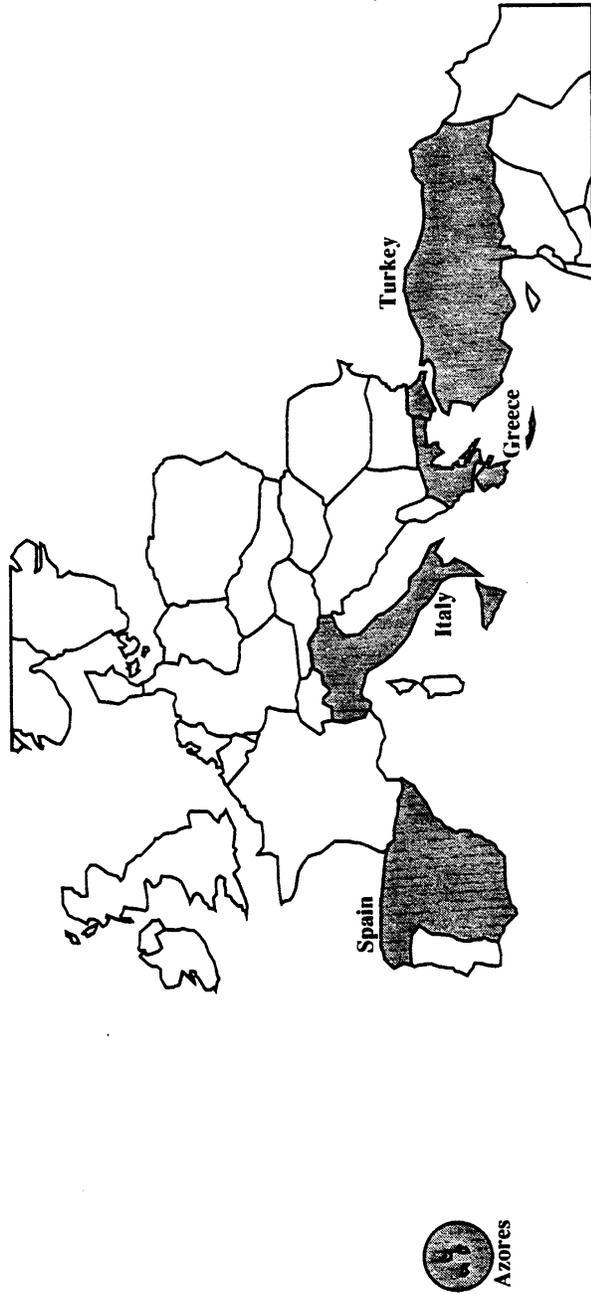
## CLIMATE REGION 10



Climate Characteristics		U.S. Air Force Bases	
HDD (Range)	4,000 to 7,500	BITBURG	RHINE ORDINANCE
CDD (Range)	0 to 1,000	HAHN	SEMBACH
LEH (Range)	500 to 2,000	HESSISCH-OLDENDORF	SPANGDAHLEM
RAD (Range)	0.40 to 0.55	KAPAUN	VOGELWEH
		LANDSTUHL	WERSCHEIM
		RAMSTEIN	
		RHEIN MAIN	

# CLIMATE REGION 11

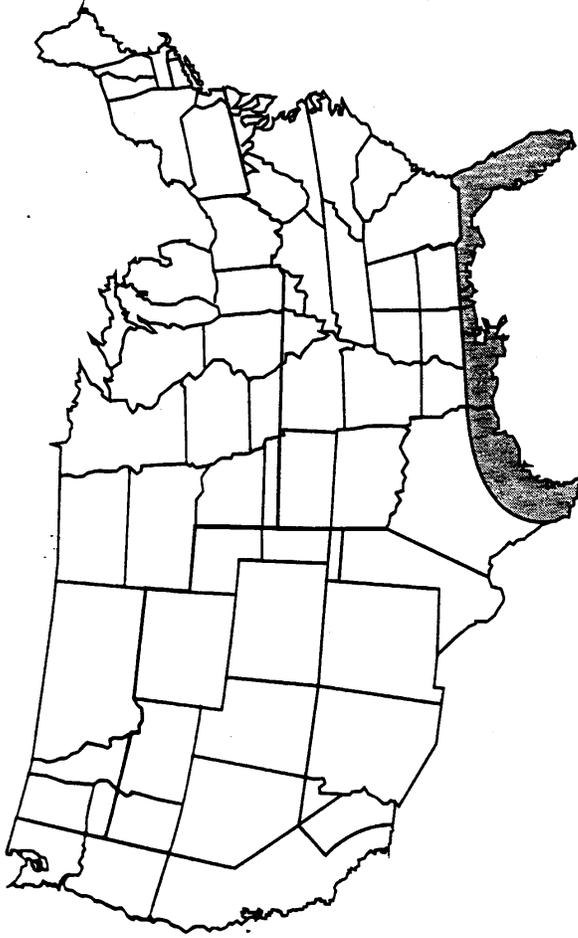
# Appendix A



Climate Characteristics		U.S. Air Force Bases	
HDD (Range)	2,000 to 6,500	ANKARA	IZMIR
CDD (Range)	1,000 to 2,500	AVIANO	LAJES FIELD
LEH (Range)	1,000 to 7,500	COMISO	SAN VITO
RAD (Range)	0.45 to 0.60	CRETONE	TORREJON
		HELLENIKON	ZARAGOZA
		INCIRLIK	
		IRAKLION	

# CLIMATE REGION 12

# Appendix A



Climate Characteristics	U.S. Air Force Bases
HDD (Range) 0 to 1,750	BARKSDALE MACDILL
CDD (Range) 2,250 to 4,500	EGLIN MOODY
LEH (Range) 15,000 to 27,500	ENGLAND PATRICK
RAD (Range) 0.45 to 0.55	HOMESTEAD HURLBURT KADENA KEESLER TYNDALL

# Index

Building Code	USAF Category Code	Building Description
A,B,C,D	100-000	C31 FACILITY
I,J,K,L	111-000	ACFT OPS/MAINT FACILITY
A,B,C	120-000	POL OPS FACILITY
A,B	121-111	PETROLEUM OPS BUILDING
NC	121-120	QUICK-TURN FACILITY
G	130-142	FIRE STATION
A,B,C	130-833	CENTRAL SECURITY CONTROL
A,B,C	130-835	SP OPERATIONS
D	131-111	TELECOMM CENTER
D	131-118	DIGITAL FACILITY
D	131-132	SATCOM GROUND TERMINAL
D	131-134	AIR COMM FACILITY
D	131-136	MR COMM RELAY FACILITY
D	131-138	RECEIVER/TRANSMITTER FACILITY
D	131-139	MICROWAVE RELAY STATION
D	131-143	RADAR FACILITY
NC	134-XXX	REMOTE CONTROL AND GROUND CONTROL FAC
NC	134-375	RAPCON
A,B,C	140-000	COMMAND POST
A,B,C	140-453	MOBILITY READINESS FACILITY
A,B,C	140-454	ORDINANCE CONTROL
NC	140-459	CREW READINESS/COMBAT CONTROL FAC
A,B,C	140-461	USAF COMMAND POST
A,B,C	140-753	SQ OPERATIONS
A,B,C	140-763	INTEGRATION SUP FAC
A,B,C	140-764	INTEGRATION SUP FAC
A,B	141-000	COMMAND POST
R	141-132	STORAGE FACILITY
G	141-165	EXPLOSIVE ORDINANCE DISPOSAL
J	141-181	AIRCRAFT SHELTER
J	141-182	AIRCRAFT SHELTER
R	141-185	STORAGE FACILITY
D	141-383	AUDIO-VISUAL FACILITY
NC	141-389	TV PRODUCTION FACILITY
A,B	141-451	COMPUTER FACILITY
A,B,C	141-453	BASE OPERATIONS
D	141-454	MOBILITY READINESS FACILITY
A,B	141-455	ORDINANCE CONTROL

## BUILDING TYPE CATEGORY LIST

<b>A</b>	Administration, < 5000 SF	<b>K</b>	Maintenance Facility, with HVAC
<b>B</b>	Administration, > 5000 SF	<b>L</b>	Maintenance Facility, Low-Bay
<b>C</b>	Administration, Multistory	<b>M</b>	Auditorium, Cinema, Theatre
<b>D</b>	Administration, Computer Facility	<b>N</b>	Training Facility, School, < 5000 SF
<b>E</b>	Dining or Food Service Facility	<b>O</b>	Training Facility, School, > 5000 SF
<b>F</b>	Dormitory	<b>P</b>	Training Facility, Multistory
<b>G</b>	Fire Station	<b>Q</b>	Gymnasium
<b>H</b>	Industrial Facility	<b>R</b>	Warehouse, Storage Facility
<b>I</b>	Maintenance Facility, < 5000 SF	<b>NC</b>	No current building type category
<b>J</b>	Maintenance Facility, High-Bay		

# Index

Building Code	USAF Category Code	Building Description
NC	141-626	CONTROL TOWER
NC	141-629	WEATHER OBSERVATION FACILITY
NC	141-743	BASE PHOTO LAB
NC	141-745	COMBAT TARGET CTR
NC	141-747	PPIF FACILITY
NC	141-748	PASSENGER TERMINALS
A,B,C,D	141-750	TECH OPERATIONS FAC
NC	141-766	CHEMICAL LABORATORY
R	141-782	MR FREIGHT TERMINAL
R	141-783	MR FREIGHT TERMINAL PART (ONLY)
NC	141-784	MR PASSENGER TERMINALS
NC	149-962	TRAFFIC CONTROL TOWER
D	171-152	COMBAT MANEUV INSTRU FACILITY
N,O,P	171-158	BAND CTR
N,O,P	171-211	FLYING TRAINING CLASSROOM
D	171-212	FLIGHT SIMULATOR TRAINING
N,O,P	171-213	FLIGHT TRAINING UNIT
N,O,P	171-214	PHYSIOLOGICAL TRAINING
A,B,C	171-356	HISTORICAL RESEARCH CENTER
A,B,C	171-445	SQUAD OPS FACILITY
R	171-472	RANGE SUPPLY AND EQUIPMENT STORAGE
L,R	171-473	RANGE TARGET STORAGE AND REPAIR
NC	171-475	INDOOR SMALL-ARMS RANGE
NC	171-476	SMALL-ARMS MARKSMANSHIP TRAINING
D	171-611	SCIENTIFIC FACILITY
N,O,P	171-618	FIELD TRAINING FACILITY
A,B,C,D	171-620	COMBAT LOGISTICS SUPPORT FACILITY
D	171-621	TECH TRAINING FACILITY
N,O,P	171-623	TECH TRAINING LAB/SHOP
N,O,P	171-623	AVIONICS ACADEMIC CLASSROOMS
NC	171-625	LIQ FUELS TRAINING FAC
J	171-625	HIGH-BAY TECH TRAINING FAC
N,O,P	171-712	TARGET INTELLIGENCE TRAINING
D	171-810	RADAR BOMB-SCORE FACILITY
N,O,P	171-813	SAFETY EDUCATION FACILITY
N,O,P	171-815	NCO PME CENTER
N,O,P	171-851	LEADERSHIP DEV COMPLEX
N,O,P	171-873	AERIAL PORT

## BUILDING TYPE CATEGORY LIST

<b>A</b>	Administration, < 5000 SF	<b>K</b>	Maintenance Facility, with HVAC
<b>B</b>	Administration, > 5000 SF	<b>L</b>	Maintenance Facility, Low-Bay
<b>C</b>	Administration, Multistory	<b>M</b>	Auditorium, Cinema, Theatre
<b>D</b>	Administration, Computer Facility	<b>N</b>	Training Facility, School, < 5000 SF
<b>E</b>	Dining or Food Service Facility	<b>O</b>	Training Facility, School, > 5000 SF
<b>F</b>	Dormitory	<b>P</b>	Training Facility, Multistory
<b>G</b>	Fire Station	<b>Q</b>	Gymnasium
<b>H</b>	Industrial Facility	<b>R</b>	Warehouse, Storage Facility
<b>I</b>	Maintenance Facility, < 5000 SF	<b>NC</b>	No current building type category
<b>J</b>	Maintenance Facility, High-Bay		

# Index

Building Code	USAF Category Code	Building Description
N,O,P	171-875	MUNITIONS LOAD-REW TRAINING FAC
NC	179-475	SMALL ARMS TRAINING
I,J,K,L	200-000	ACFT MAINTENANCE & MGMT FAC
I,J,K,L,R	210-000	MUNI MAINTENANCE/STORAGE FAC
I,K,L	210-000	MUNITIONS MAINT FAC
L	211-XXX	LOW-BAY INSTRU/ELECT EQUIP MAINT SHOP
I,J,K,L	211-000	MAINTENANCE COMPLEX
J	211-111	HANGAR
NC	211-111	FUEL SYSTEMS MAINT DOCK
NC	211-133	FUEL ACCESSORIES TEST FACILITY
I,K,L,R	211-147	AIRCRAFT WEAPONS CAL SHELTER
I,J,L	211-152	ACFT MAINTENANCE
NC	211-152	LOW-BAY
J	211-152	MAINTENANCE HANGAR
NC	211-153	NDI LAB
I,J,K,L	211-154	MAINTENANCE COMPLEX
J	211-154	HIGH-BAY FACILITY
I,J,K,L	211-157	GENERAL PURPOSE/NDI/ACFT ORG MAINT SHOP
J	211-159	CORROSION CONTROL FAC
J	211-159	CORROSION CONTROL FACILITY
I,J,K	211-179	FUEL SYSTEMS MAINT FACILITY
NC	211-179	FUEL SYST MAINT FACILITY
NC	211-183	SOUND-SUPPRESSOR SUP FAC
NC	211-193	SOUND-SUPPRESSOR SUP FAC
NC	211-254	CONSOLIDATED FUEL CONTROL FACILITY
NC	211-271	DEPOT INSTRUMENT OH SHOP
I,J,K,L	211-271	DEPOT INSTN OVERHAUL SHOP
R	212-213	MUNITIONS MAINT AND STORAGE
L,R	212-213	MUNITIONS MAINTENANCE/STORAGE
I,J,K,L	212-216	MISSILE MAINTENANCE SHOP
I,J,K,L	213-XXX	TACTICAL MISSILE/GUIDE WEAPON MAINT SHOP
I,J,K,L	213-636	MARINE MAINT SHOP
NC	214-425	VEHICLE MAINTENANCE FACILITY
I,J,K,L	214-425	VEHICLE MAINT SHOP
R	214-425	VEHICLE OPERATION HEATED-PARKING SHED
R	214-426	VEHICLE OPERATION HEATED-PARKING SHED
R	214-428	VEHICLE OPERATION HEATED-PARKING SHED
I,J,K,L	214-467	VEHICLE OPERATION HEATED-PARKING SHED

## BUILDING TYPE CATEGORY LIST

<b>A</b>	Administration, < 5000 SF	<b>K</b>	Maintenance Facility, with HVAC
<b>B</b>	Administration, > 5000 SF	<b>L</b>	Maintenance Facility, Low-Bay
<b>C</b>	Administration, Multistory	<b>M</b>	Auditorium, Cinema, Theatre
<b>D</b>	Administration, Computer Facility	<b>N</b>	Training Facility, School, < 5000 SF
<b>E</b>	Dining or Food Service Facility	<b>O</b>	Training Facility, School, > 5000 SF
<b>F</b>	Dormitory	<b>P</b>	Training Facility, Multistory
<b>G</b>	Fire Station	<b>Q</b>	Gymnasium
<b>H</b>	Industrial Facility	<b>R</b>	Warehouse, Storage Facility
<b>I</b>	Maintenance Facility, < 5000 SF	<b>NC</b>	No current building type category

# Index

Building Code	USAF Category Code	Building Description
I,J,K,L	215-XXX	WEAPONS & MUNITIONS MAINT SHOP
I,J,K,L	216-642	AMMO MAINT SHOP
I,J,K,L	217-000	VEHICLE MAINT FAC
NC	217-000	MAINT/STORAGE AND VEH PARKING FAC
K	217-712	AVIONICS REPAIR FAC
I,J,K,L	217-713	AIRCRAFT EQM POD SHOP
I,J,L,R	217-713	POD SHOP AND STORAGE
K	217-713	HAVAIDS COMM MAINT SHOP
I,J,K,L	217-735	ENGINEERING TEST FAC
I,J,K,L	217-812	EW MAINT FAC
I,J,K,L	218-712	SPECIAL EQUIPMENT SHOP
A,B,C,D	218-712	ACFT SUP EQUIP FAC
L	217-762	HVACAIDS COMM MAINT SHOP
I,J,K,L	218-852	PARACHUTE-EGRESS FACILITY
NC	218-868	PRECISION MEASUREMENT LAB
I,J,K,L	219-000	BCE COMPLEX
R	219-422	STORAGE FACILITY
I,J,K,L	219-900	BCE MAINT COMPLEX
I,J,K,L	219-940	BCE MAINT COMPLEX
I,J,K,L	219-943	BCE MAINT SHOP
I,J,K,L	219-944	BCE MAINT SHOP
R	219-946	STORAGE FACILITY
R	219-947	STORAGE FACILITY
H	220-XXX	PRODUCTION
D	310-916	COMPUTER SERVICE CTR
NC	310-921	BIOCOMMUNICATIONS LAB
NC	310-922	OPTICAL SYS LAB
NC	310-926	MICROWAVE LAB
A,B,C,D	311-173	ACFT SYS ENG FAC
I,J,K,L	311-174	TEST & EVALUATION FAC
I,J,K,L	315-236	GUIDED WEAPON & EVAL FAC
I,J,K,L	317-311	ELECT TEC/RESEARCH LAB
I,J,K,L	317-315	SYS MGT ENG FAC
I,J,K,L	317-932	AVIONICS RESEARCH LAB
I,J,K,L	318-612	ACFT FIRE PROT/EXPL RES FAC
R	318-612	PROPANE LAB STORAGE
I,J,K,L	319-946	HAZARDOUS-MATTER EVAL FAC
NC	319-951	TEST TRACK FACILITY

## BUILDING TYPE CATEGORY LIST

<b>A</b>	Administration, < 5000 SF	<b>K</b>	Maintenance Facility, with HVAC
<b>B</b>	Administration, > 5000 SF	<b>L</b>	Maintenance Facility, Low-Bay
<b>C</b>	Administration, Multistory	<b>M</b>	Auditorium, Cinema, Theatre
<b>D</b>	Administration, Computer Facility	<b>N</b>	Training Facility, School, < 5000 SF
<b>E</b>	Dining or Food Service Facility	<b>O</b>	Training Facility, School, > 5000 SF
<b>F</b>	Dormitory	<b>P</b>	Training Facility, Multistory
<b>G</b>	Fire Station	<b>Q</b>	Gymnasium
<b>H</b>	Industrial Facility	<b>R</b>	Warehouse, Storage Facility
<b>I</b>	Maintenance Facility, < 5000 SF	<b>NC</b>	No current building type category
<b>J</b>	Maintenance Facility, High-Bay		

# Index

Building Code	USAF Category Code	Building Description
A,B,C	400-000	COMMAND POST, SUPPORT
NC	411-135	HYDRANT FUEL SYSTEM AND STORAGE
R	411-628	TOOLING SHED
R	422-250	OPS/MUNITIONS STORAGE FAC
R	422-258	MUNITIONS STORAGE FACILITY
R	422-264	MUNITIONS STORAGE IGLOOS
R	422-275	MUNITIONS PRELOAD COMPLEX
R	441-758	DEPOT WAREHOUSE
R	442-000	RRR EQUIPMENT STORAGE
NC	442-257	BASE HAZARDOUS-MATERIAL STORAGE
NC	442-275	ANCILLARY EXPLOSIVE COMPLEX
NC	442-515	MEDICAL STORAGE
NC	442-628	BASE HAZARDOUS-MATERIAL STORAGE
NC	442-750	RESOURCE MANAGEMENT COMPLEX
J,R	442-758	AIRCRAFT WAREHOUSE/RRR EQUIP STORAGE
R	442-765	TROOP SUBSISTENCE WAREHOUSE
R	442-768	FORMS/PUBLICATIONS WAREHOUSE
R	442-769	HOUSING SUPPLY/STORAGE FACILITY
NC	510-XXX	HOSPITAL BUILDING
NC	510-001	DENTAL CLINIC
NC	510-411	DISPENSARIES
NC	510-713	MEDICAL LOGISTICS FACILITY
NC	530-XXX	LABORATORIES
NC	540-243	DENTAL CLINIC
NC	550-XXX	DISPENSARIES
A,B,C	610-000	CONSOLIDATED SUPPORT CENTER/LOG FAC
A,B,C,I	610-100	ACFT MAINTENANCE MGMT FAC
A,B,C	610-111	AREA DEFENSE OFFICE
A,B,C	610-112	LAW OFFICE
A,B,C	610-119	FAMILY-HOUSING MGMT OFFICE
A,B,C	610-121	VOA
A,B,C	610-122	BSA
A,B,C	610-127	BASE ENGINEERING ADMIN
A,B,C	610-128	BASE PERSONNEL OFFICE
A,B,C	610-129	WEAPONS SYS MUNITIONS MGMT FAC
A,B,C	610-142	TRAFFIC MGMT FAC

BUILDING TYPE CATEGORY LIST			
<b>A</b> Administration, < 5000 SF <b>B</b> Administration, > 5000 SF <b>C</b> Administration, Multistory <b>D</b> Administration, Computer Facility <b>E</b> Dining or Food Service Facility <b>F</b> Dormitory <b>G</b> Fire Station <b>H</b> Industrial Facility <b>I</b> Maintenance Facility, < 5000 SF <b>J</b> Maintenance Facility, High-Bay	<b>K</b> Maintenance Facility, with HVAC <b>L</b> Maintenance Facility, Low-Bay <b>M</b> Auditorium, Cinema, Theatre <b>N</b> Training Facility, School, < 5000 SF <b>O</b> Training Facility, School, > 5000 SF <b>P</b> Training Facility, Multistory <b>Q</b> Gymnasium <b>R</b> Warehouse, Storage Facility <b>NC</b> No current building type category		

# Index

Building Code	USAF Category Code	Building Description
F	610-241	ORDERLY ROOM, DORMATORY
A,B,C	610-243	AEROMED EVAC AIRLIFT SQ/ACB FAC
A,B,C	610-249	WING HEADQUARTERS
D	610-281	COMPUTER FACILITY
A,B,C	610-282	SUPPORT OFFICE
A,B,C	610-284	RECRUITING GROUP FAC
A,B,C	610-285	COMBAT CONTROL OFFICE
A,B,C	610-286	AIR DIV HEADQUARTERS
N,O,P	610-287	INSTRUCTIONAL FAC
A,B,C	610-675	SUPPORT CENTER
D	610-711	COMPUTER FACILITY
A,B,C	610-915	OSA BUILDING
F	720-000	UPH
E,F	721-215	DINING HALL IN DORMITORY
F	721-311	RECRUITS DORMITORY
F	721-312	AIRMEN PERMANENT PARTY/PCS-STUDENT DORM
F	721-315	VISITING AIRMEN QUARTERS DORM
E	722-351	AIRMEN DETACHED DINING HALL
E	722-356	OFFICERS DINING HALL
NC	723-XXX	KITCHEN
F	724-415	UOPH
F	724-417	TRANSIENT BILLETING
F	730-XXX	CONFINEMENT FACILITY (STOCKADE)
G	730-142	FIRE STATION/CRASH RESCUE OFFICE
NC	730-182	BREAD BAKERY
NC	730-186	PASTRY BAKERY
N,O,P	730-441	EDUCATION CENTER
NC	730-443	POST OFFICE
NC	730-717	CLOTHING STORE
NC	730-771	CHAPEL
N,O,P	730-772	RELIGIOUS EDUCATION CENTER
N,O	730-772	CHAPEL CENTER
N,O	730-773	CHAPEL CENTER
N,O	730-774	HOSPITAL CHAPEL
E	730-781	DEPENDENT BOARDING SCHOOL DINING HALL
NC	730-782	DEPENDENT ELEMENTARY SCHOOL
F	730-782	DEPENDENT BOARDING FACILITY
NC	730-785	DEPENDENT HIGH SCHOOL

## BUILDING TYPE CATEGORY LIST

<b>A</b>	Administration, < 5000 SF	<b>K</b>	Maintenance Facility, with HVAC
<b>B</b>	Administration, > 5000 SF	<b>L</b>	Maintenance Facility, Low-Bay
<b>C</b>	Administration, Multistory	<b>M</b>	Auditorium, Cinema, Theatre
<b>D</b>	Administration, Computer Facility	<b>N</b>	Training Facility, School, < 5000 SF
<b>E</b>	Dining or Food Service Facility	<b>O</b>	Training Facility, School, > 5000 SF
<b>F</b>	Dormitory	<b>P</b>	Training Facility, Multistory
<b>G</b>	Fire Station	<b>Q</b>	Gymnasium
<b>H</b>	Industrial Facility	<b>R</b>	Warehouse, Storage Facility
<b>I</b>	Maintenance Facility, < 5000 SF	<b>NC</b>	No current building type category
<b>J</b>	Maintenance Facility, High-Bay		

# Index

Building Code	USAF Category Code	Building Description
NC	730-821	MATERIAL PROCESSING DEPOT
A,B,C	730-832	SECURITY POLICE CONTROL & IDENT
A,B,C	730-833	SP CENTRAL CONTROL
A,B,C	730-835	SP CENTRAL OP
NC	730-836	RESERVE FIRE TRAINING FAC
D	730-838	MASTER SURVEILLANCE & CONTROL FAC
A	730-839	GUARD HOUSE
NC	730-842	SECURITY POLICE KENNEL SUPPORT
A,B,C	740-000	CONSOLIDATED PERSONNEL SUP CTR
A,B,C	740-155	CREDIT UNIONS
A,B,C	740-153	BRANCH BANKS
A,B,C	740-171	RED CROSS OFFICE
A,B,C	740-253	FAMILY SERVICES CENTER
NC	740-255	THRIFT SHOP
NC	740-266	STORE
K	740-266	COMMISSARY STORE
K	740-269	BASE PACKAGE STORE
E	740-315	ROD AND GUN CLUB
E	740-316	RECREATION CENTER
E	740-317	AERO CLUB
NC	740-379	BX AMUSEMENT TR
E	740-381	BX CAFETERIA AND SNACK BAR
NC	740-382	BRANCH BASE EXCHANGE
I,J,K,L	740-385	BX MAINT SHOP
A,B,C	740-386	BX ADMIN
NC	740-388	BASE EXCHANGE
K	740-389	SERVICE OUTLET
F	740-443	TLF
E	740-615	CONSOLIDATED OPEN MESS
E	740-617	OFFICERS CLUB
E	740-618	NCO CLUB
E	740-62X	AIRMEN OPEN MESS
E	740-732	RESTAURANT
E	740-735	BASE RESTAURANT
N,O	740-644	ARTS & CRAFTS CTR
L	740-665	AUTO HOBBY SHOP

## BUILDING TYPE CATEGORY LIST

<b>A</b>	Administration, < 5000 SF	<b>K</b>	Maintenance Facility, with HVAC
<b>B</b>	Administration, > 5000 SF	<b>L</b>	Maintenance Facility, Low-Bay
<b>C</b>	Administration, Multistory	<b>M</b>	Auditorium, Cinema, Theatre
<b>D</b>	Administration, Computer Facility	<b>N</b>	Training Facility, School, < 5000 SF
<b>E</b>	Dining or Food Service Facility	<b>O</b>	Training Facility, School, > 5000 SF
<b>F</b>	Dormitory	<b>P</b>	Training Facility, Multistory
<b>G</b>	Fire Station	<b>Q</b>	Gymnasium
<b>H</b>	Industrial Facility	<b>R</b>	Warehouse, Storage Facility
<b>I</b>	Maintenance Facility, < 5000 SF	<b>NC</b>	No current building type category
<b>J</b>	Maintenance Facility, High-Bay		

# Index

Building Code	USAF Category Code	Building Description
F	740-666	RECREATION SITE LODGING
NC	740-668	MISCELLANEOUS RECREATION BLDG
A,B,C	740-669'	COMPOSITE RECREATION BLDG
Q	740-673	FIELD HOUSE
Q	740-674	GYMNASIUM
A,B,C	740-675	LIBRARY
NC	740-677	INDOOR SWIMMING POOL
R	740-733	STORAGE FACILITY
M	740-873	BASE THEATRE
NC	740-883	YOUTH CLUB
N,O,P	740-884	CHILD CARE CENTER
NC	760-XXX	MUSEUMS AND MEMORIALS
H	890-XXX	OTHER

## BUILDING TYPE CATEGORY LIST

<b>A</b> Administration, < 5000 SF <b>B</b> Administration, > 5000 SF <b>C</b> Administration, Multistory <b>D</b> Administration, Computer Facility <b>E</b> Dining or Food Service Facility <b>F</b> Dormitory <b>G</b> Fire Station <b>H</b> Industrial Facility <b>I</b> Maintenance Facility, < 5000 SF <b>J</b> Maintenance Facility, High-Bay	<b>K</b> Maintenance Facility, with HVAC <b>L</b> Maintenance Facility, Low-Bay <b>M</b> Auditorium, Cinema, Theatre <b>N</b> Training Facility, School, < 5000 SF <b>O</b> Training Facility, School, > 5000 SF <b>P</b> Training Facility, Multistory <b>Q</b> Gymnasium <b>R</b> Warehouse, Storage Facility <b>NC</b> No current building type category
---	---

REGION 1	Energy Use Priority					Energy Use (KBTu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
									
<b>A</b> Admin, <5000 sf						165	155	7.0	4.0
<b>B</b> Admin, >5000 sf						120	115	6.0	3.0
<b>C</b> Admin, Multistory						85	75	6.0	4.0
<b>D</b> Admin, Comp. Fac.						205	190	11.0	8.0
<b>E</b> Dining Facility						320	300	5.0	2.5
<b>F</b> Dormitory						75	65	3.5	2.0
<b>G</b> Fire Station						190	180	4.0	2.5
<b>H</b> Industrial Facility						95	90	4.0	3.0
<b>I</b> Main., <5000 sf						120	100	2.5	2.0
<b>J</b> Main., High-Bay						150	125	3.5	2.5
<b>K</b> Main., HVAC						90	80	5.0	3.0
<b>L</b> Main., Low-Bay						75	70	3.0	2.0
<b>M</b> Auditorium						150	140	5.0	3.0
<b>N</b> Training, <5000 sf						165	155	7.0	4.0
<b>O</b> Training, >5000 sf						120	115	6.0	3.0
<b>P</b> Training, Multistory						85	75	6.0	4.0
<b>Q</b> Gymnasium						205	175	2.5	2.0
<b>R</b> Warehouse						80	70	1.5	1.0

  
Heating

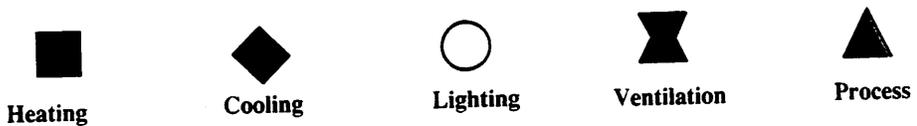
  
Cooling

  
Lighting

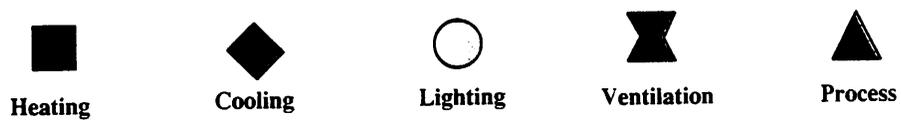
  
Ventilation

  
Process

REGION 2	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
<b>A</b> Admin, <5000 sf						90	70	9.0	5.0
<b>B</b> Admin, >5000 sf						70	50	7.5	4.0
<b>C</b> Admin, Multistory						65	45	7.0	4.5
<b>D</b> Admin, Comp. Fac.						145	120	13.0	8.5
<b>E</b> Dining Facility						150	130	7.0	4.5
<b>F</b> Dormitory						45	35	4.5	3.0
<b>G</b> Fire Station						80	65	4.0	2.0
<b>H</b> Industrial Facility						55	40	4.0	3.0
<b>I</b> Main., <5000 sf						35	25	2.0	1.3
<b>J</b> Main., High-Bay						60	40	3.5	2.0
<b>K</b> Main., HVAC						55	45	5.5	4.0
<b>L</b> Main., Low-Bay						40	25	3.0	1.7
<b>M</b> Auditorium						70	60	7.0	6.0
<b>N</b> Training, <5000 sf						90	70	9.0	5.0
<b>O</b> Training, >5000 sf						70	50	7.5	4.0
<b>P</b> Training, Multistory						65	45	2.0	1.0
<b>Q</b> Gymnasium						70	60	2.0	1.0
<b>R</b> Warehouse						25	20	1.0	0.5



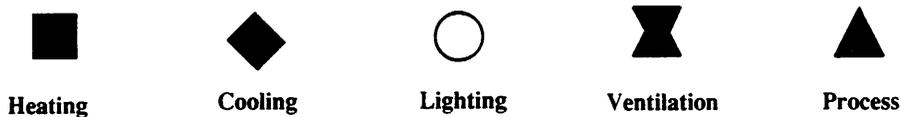
REGION 3	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
<b>A</b> Admin, <5000 sf						75	50	9.0	5.5
<b>B</b> Admin, >5000 sf						65	40	7.0	4.5
<b>C</b> Admin, Multistory						60	40	7.0	5.0
<b>D</b> Admin, Comp. Fac.						140	100	12.5	9.5
<b>E</b> Dining Facility						105	80	6.5	4.0
<b>F</b> Dormitory						40	30	4.0	3.0
<b>G</b> Fire Station						45	30	3.5	2.0
<b>H</b> Industrial Facility						45	30	4.0	2.5
<b>I</b> Main., <5000 sf						25	15	2.0	1.0
<b>J</b> Main., High-Bay						45	25	3.5	2.0
<b>K</b> Main., HVAC						50	35	5.5	4.0
<b>L</b> Main., Low-Bay						35	15	3.0	1.7
<b>M</b> Auditorium						50	40	6.5	5.0
<b>N</b> Training, <5000 sf						75	50	9.0	5.5
<b>O</b> Training, >5000 sf						65	40	7.0	4.5
<b>P</b> Training, Multistory						60	40	7.0	5.0
<b>Q</b> Gymnasium						45	25	2.0	1.0
<b>R</b> Warehouse						15	10	1.0	0.5



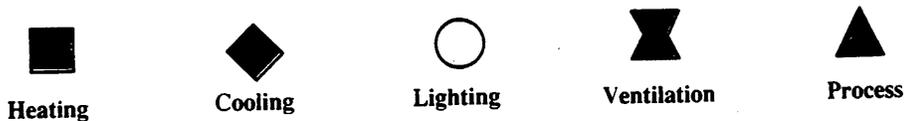
REGION 4	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
A Admin, <5000 sf	○	■	◆	⊗	▲	80	60	8.5	4.5
B Admin, >5000 sf	○	■	◆	▲	⊗	65	45	6.5	4.0
C Admin, Multistory	○	◆	■	▲	⊗	80	45	6.5	4.5
D Admin, Comp. Fac.	▲	○	◆	■	⊗	135	115	11.5	9.0
E Dining Facility	■	○	▲	◆	⊗	125	110	5.5	3.0
F Dormitory	○	◆	⊗	■	▲	40	30	4.0	2.5
G Fire Station	■	○	⊗	▲	◆	65	50	3.5	2.0
H Industrial Facility	▲	○	■	⊗		50	40	4.0	2.5
I Main.. <5000 sf	■	○	▲	⊗		35	25	2.0	1.2
J Main.. High-Bay	○	■	▲	⊗		55	40	3.5	2.2
K Main.. HVAC	○	▲	■	◆	⊗	55	40	5.0	3.5
L Main.. Low-Bay	○	▲	■	⊗		40	25	3.0	2.0
M Auditorium	■	○	◆	▲	⊗	60	50	5.5	4.5
N Training. <5000 sf	○	■	◆	⊗	▲	80	60	8.5	4.5
O Training. >5000 sf	○	■	◆	▲	⊗	65	45	6.5	4.0
P Training. Multistory	○	◆	■	▲	⊗	60	45	6.5	4.5
Q Gymnasium	○	■	⊗			65	50	2.0	1.2
R Warehouse	■	○	⊗			25	15	1.0	0.5



REGION 5	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
	◆	○	⊗	■	▲				
<b>A</b> Admin, <5000 sf	◆	○	⊗	■	▲	90	55	9.5	5.5
<b>B</b> Admin, >5000 sf	◆	○	▲	⊗	■	75	45	7.5	5.5
<b>C</b> Admin, Multistory	◆	○	▲	⊗	■	70	50	7.5	5.5
<b>D</b> Admin, Comp. Fac.	◆	▲	○	⊗	■	155	120	13.0	10.0
<b>E</b> Dining Facility	◆	▲	⊗	○	■	135	85	11.0	5.0
<b>F</b> Dormitory	◆	○	⊗	▲	■	55	45	4.5	3.0
<b>G</b> Fire Station	◆	○	⊗	▲	■	50	35	3.5	2.0
<b>H</b> Industrial Facility	▲	○	⊗	■		45	30	4.0	2.5
<b>I</b> Main., <5000 sf	○	▲	⊗	■		20	12	2.0	1.0
<b>J</b> Main., High-Bay	○	▲	■	⊗		40	20	3.5	2.0
<b>K</b> Main., HVAC	○	◆	▲	⊗	■	55	40	6.0	4.5
<b>L</b> Main., Low-Bay	○	▲	⊗	■		35	15	3.0	1.5
<b>M</b> Auditorium	◆	○	⊗	▲	■	65	55	7.5	6.5
<b>N</b> Training, <5000 sf	◆	○	⊗	■	▲	90	55	9.5	5.5
<b>O</b> Training, >5000 sf	◆	○	▲	⊗	■	75	45	7.5	5.5
<b>P</b> Training, Multistory	◆	○	▲	⊗	■	70	50	7.5	5.5
<b>Q</b> Gymnasium	○	⊗	■			70	50	7.5	5.0
<b>R</b> Warehouse	○	■	⊗			10	7	1.0	0.5



REGION 6	Energy Use Priority					Energy Use (KBTu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
									
<b>A</b> Admin, <5000 sf						85	55	9.5	5.5
<b>B</b> Admin, >5000 sf						70	45	7.5	4.5
<b>C</b> Admin, Multistory						65	45	7.0	5.0
<b>D</b> Admin, Comp. Fac.						150	120	13.0	10.0
<b>E</b> Dining Facility						130	105	7.0	4.5
<b>F</b> Dormitory						50	40	4.5	3.0
<b>G</b> Fire Station						60	50	3.5	2.0
<b>H</b> Industrial Facility						50	35	4.0	3.0
<b>I</b> Main., <5000 sf						30	20	2.0	1.2
<b>J</b> Main., High-Bay						50	35	4.0	3.0
<b>K</b> Main., HVAC						55	40	6.0	4.0
<b>L</b> Main., Low-Bay						35	20	3.0	2.0
<b>M</b> Auditorium						65	55	7.0	6.0
<b>N</b> Training, <5000 sf						85	55	9.5	5.5
<b>O</b> Training, >5000 sf						70	45	7.5	4.5
<b>P</b> Training, Multistory						65	45	7.0	5.0
<b>Q</b> Gymnasium						55	40	2.0	1.0
<b>R</b> Warehouse						20	10	1.0	0.5



REGION 7	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
									
<b>A</b> Admin, <5000 sf						90	55	9.5	5.5
<b>B</b> Admin, >5000 sf						75	45	7.5	5.0
<b>C</b> Admin, Multistory						70	50	7.0	5.0
<b>D</b> Admin, Comp. Fac.						150	120	13.0	10.0
<b>E</b> Dining Facility						120	100	7.5	5.0
<b>F</b> Dormitory						55	45	4.5	3.0
<b>G</b> Fire Station						55	40	3.5	2.0
<b>H</b> Industrial Facility						45	30	4.0	2.5
<b>I</b> Main., <5000 sf						25	15	2.0	1.0
<b>J</b> Main., High-Bay						45	25	3.5	2.0
<b>K</b> Main., HVAC						60	40	6.0	4.5
<b>L</b> Main., Low-Bay						35	20	3.0	2.0
<b>M</b> Auditorium						65	55	7.5	6.5
<b>N</b> Training, <5000 sf						90	55	9.5	5.5
<b>O</b> Training, >5000 sf						75	45	7.5	5.0
<b>P</b> Training, Multistory						70	50	7.0	5.0
<b>Q</b> Gymnasium						50	30	2.0	1.0
<b>R</b> Warehouse						15	8	1.0	0.5

  
Heating

  
Cooling

  
Lighting

  
Ventilation

  
Process

REGION 8	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
<b>A</b> Admin, <5000 sf	◆	○	⊗	▲		100	60	9.0	5.5
<b>B</b> Admin, >5000 sf	◆	○	▲	⊗		80	50	7.5	5.0
<b>C</b> Admin, Multistory	◆	○	▲	⊗		80	55	7.5	5.5
<b>D</b> Admin, Comp. Fac.	◆	▲	○	⊗		165	130	13.0	10.0
<b>E</b> Dining Facility	◆	○	▲	⊗		125	105	7.0	4.5
<b>F</b> Dormitory	◆	○	⊗	▲		70	60	4.5	3.5
<b>G</b> Fire Station	◆	○	▲	⊗		50	35	3.5	2.0
<b>H</b> Industrial Facility	▲	○	⊗			45	25	4.0	2.5
<b>I</b> Main., <5000 sf	○	▲	⊗			20	10	2.0	1.0
<b>J</b> Main., High-Bay	○	▲	⊗			40	20	3.0	1.5
<b>K</b> Main., HVAC	◆	○	▲	⊗		60	45	5.5	4.5
<b>L</b> Main., Low-Bay	○	▲	⊗			35	15	3.0	1.5
<b>M</b> Auditorium	◆	○	⊗	▲		70	60	7.0	6.0
<b>N</b> Training, <5000 sf	◆	○	⊗	▲		100	60	9.0	5.5
<b>O</b> Training, >5000 sf	◆	○	▲	⊗		80	50	7.5	5.0
<b>P</b> Training, Multistory	◆	○	▲	⊗		80	55	7.5	5.5
<b>Q</b> Gymnasium	○	⊗				80	55	7.5	5.0
<b>R</b> Warehouse	○	⊗				10	5	1.0	0.4



REGION 9	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
<b>A</b> Admin, <5000 sf						70	45	8.0	4.5
<b>B</b> Admin, >5000 sf						55	35	6.5	4.0
<b>C</b> Admin, Multistory						55	40	6.5	4.5
<b>D</b> Admin, Comp. Fac.						125	100	12.0	9.5
<b>E</b> Dining Facility						110	95	5.5	3.0
<b>F</b> Dormitory						35	25	4.5	3.0
<b>G</b> Fire Station						55	45	3.5	1.5
<b>H</b> Industrial Facility						50	35	4.0	3.0
<b>I</b> Main., <5000 sf						30	20	2.0	1.2
<b>J</b> Main., High-Bay						50	30	3.5	2.0
<b>K</b> Main., HVAC						50	35	5.0	2.5
<b>L</b> Main., Low-Bay						35	20	3.0	2.0
<b>M</b> Auditorium						50	40	5.5	4.0
<b>N</b> Training, <5000 sf						70	45	8.0	4.5
<b>O</b> Training, >5000 sf						55	35	6.5	4.0
<b>P</b> Training, Multistory						55	40	6.5	4.5
<b>Q</b> Gymnasium						55	35	6.5	4.0
<b>R</b> Warehouse						20	10	1.0	0.5

Heating

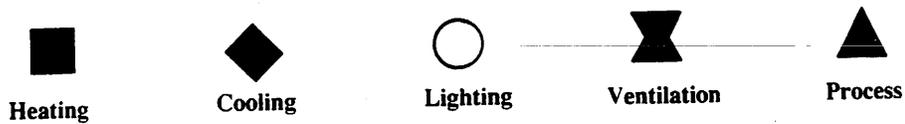
Cooling

Lighting

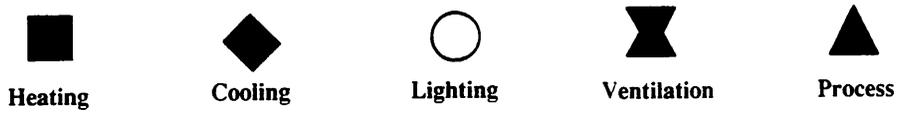
Ventilation

Process

REGION 10	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
A Admin, <5000 sf	○	■	◆	⊗	▲	70	50	8.0	4.5
B Admin, >5000 sf	○	■	◆	▲	⊗	60	40	6.5	4.0
C Admin, Multistory	○	◆	■	▲	⊗	55	40	6.5	4.0
D Admin, Comp. Fac.	▲	○	◆	■	⊗	125	100	12.0	9.5
E Dining Facility	■	○	▲	⊗	◆	110	95	5.5	3.0
F Dormitory	○	■	⊗	◆	▲	3.5	25	4.5	3.0
G Fire Station	■	○	⊗	▲	◆	55	45	3.5	1.5
H Industrial Facility	▲	○	■	⊗		50	35	4.0	3.0
I Main., <5000 sf	○	■	▲	⊗		30	20	2.0	1.2
J Main., High-Bay	○	▲	■	⊗		50	30	3.5	2.0
K Main., HVAC	○	▲	■	◆	⊗	50	35	5.0	3.5
L Main., Low-Bay	○	▲	■	⊗		35	20	3.0	2.0
M Auditorium	■	○	◆	▲	⊗	50	40	5.5	4.0
N Training, <5000 sf	○	■	◆	⊗	▲	70	45	8.0	4.5
O Training, >5000 sf	○	■	◆	▲	⊗	55	35	6.5	4.0
P Training, Multistory	○	◆	■	▲	⊗	55	40	6.5	4.5
Q Gymnasium	○	■	⊗			55	35	6.5	4.0
R Warehouse	■	○	⊗			20	10	1.0	0.5



REGION 11	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
									
<b>A</b> Admin, <5000 sf						80	50	9.0	6.0
<b>B</b> Admin, >5000 sf						70	40	7.5	5.0
<b>C</b> Admin, Multistory						65	45	7.0	5.0
<b>D</b> Admin, Comp. Fac.						145	110	13.0	10.0
<b>E</b> Dining Facility						115	90	7.0	5.0
<b>F</b> Dormitory						45	40	5.0	3.5
<b>G</b> Fire Station						50	35	3.5	2.0
<b>H</b> Industrial Facility						45	30	4.0	2.5
<b>I</b> Main., <5000 sf						25	15	2.0	1.0
<b>J</b> Main., High-Bay						45	25	3.5	2.0
<b>K</b> Main., HVAC						55	35	5.5	4.0
<b>L</b> Main., Low-Bay						35	20	3.0	1.5
<b>M</b> Auditorium						60	50	7.0	6.0
<b>N</b> Training, <5000 sf						80	50	9.0	6.0
<b>O</b> Training, >5000 sf						70	40	7.5	5.0
<b>P</b> Training, Multistory						65	45	7.0	5.0
<b>Q</b> Gymnasium						65	45	7.0	5.5
<b>R</b> Warehouse						15	8	1.0	0.5



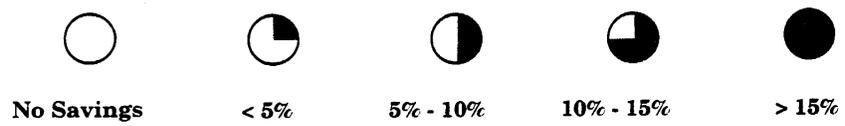
REGION 12	Energy Use Priority					Energy Use (KBtu/sf-yr)		Peak (Watts/sf)	
	1	2	3	4	5	W/O Solar	With Solar	W/O Solar	With Solar
<b>A</b> Admin, <5000 sf	◆	○	⊗	▲	■	90	50	9.5	5.5
<b>B</b> Admin, >5000 sf	◆	○	▲	⊗	■	75	45	7.5	5.0
<b>C</b> Admin, Multistory	◆	○	▲	⊗	■	70	50	7.0	5.0
<b>D</b> Admin, Comp. Fac.	◆	▲	○	⊗	■	160	120	13.0	10.0
<b>E</b> Dining Facility	◆	○	▲	⊗	■	120	90	7.5	5.0
<b>F</b> Dormitory	◆	○	⊗	▲	■	60	50	4.5	3.0
<b>G</b> Fire Station	◆	○	▲	⊗	■	50	35	3.5	2.0
<b>H</b> Industrial Facility	▲	○	⊗	■		45	30	4.0	2.5
<b>I</b> Main., <5000 sf	○	▲	■	⊗		20	10	2.0	1.0
<b>J</b> Main., High-Bay	○	▲	■	⊗		45	25	3.5	2.0
<b>K</b> Main., HVAC	◆	○	▲	⊗	■	60	40	5.5	4.0
<b>L</b> Main., Low-Bay	○	▲	⊗	■		35	20	3.0	1.5
<b>M</b> Auditorium	◆	○	⊗	▲	■	65	60	7.5	7.0
<b>N</b> Training, <5000 sf	◆	○	⊗	▲	■	90	50	9.5	5.5
<b>O</b> Training, >5000 sf	◆	○	▲	⊗	■	75	45	7.5	5.0
<b>P</b> Training, Multistory	◆	○	▲	⊗	■	70	50	7.0	5.0
<b>Q</b> Gymnasium	○	⊗	■			70	50	7.0	5.0
<b>R</b> Warehouse	○	■	⊗			10	5	1.0	.03



# Climate Region 1

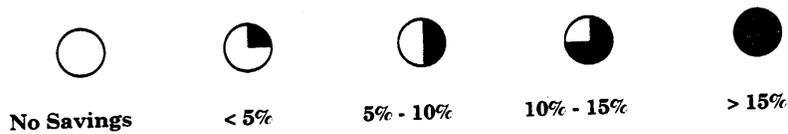
## Appendix E

REGION 1	Heat				Cool		Daylight					
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR	
<b>A</b> Admin, <5000 sf	○	○	○	○	○	◐	◑	◑	●	●	◑	◑
<b>B</b> Admin, >5000 sf	○	○	○	○	○	◐	◑	●	●	◑	●	●
<b>C</b> Admin, Multistory	○	○	○	○	○	◐	◑	●	●	●	●	●
<b>D</b> Admin, Comp. Fac.	○	○	○	○	○	◐	◑	◑	◑	◑	◑	◑
<b>E</b> Dining Facility	○	○	○	○	○	◐	◑	◑	◑	◑	○	○
<b>F</b> Dormitory	○	○	○	○	○	◐	◑	◑	○	○	○	○
<b>G</b> Fire Station	○	○	○	○	◐	◑	◑	◑	◑	◑	○	○
<b>H</b> Industrial Facility	○	○	○	○	○	○	○	◑	◑	○	○	○
<b>I</b> Maint, <5000 sf	○	○	○	○	○	○	◑	◑	◑	◑	○	○
<b>J</b> Maint, High-Bay	○	○	○	○	○	○	◑	◑	◑	◑	○	○
<b>K</b> Maint, HVAC	○	○	○	○	○	◐	◑	●	◑	◑	○	○
<b>L</b> Maint, Low-Bay	○	○	○	○	○	○	◑	●	●	◑	○	○
<b>M</b> Auditorium	○	○	○	○	○	◐	○	○	○	○	○	○
<b>N</b> Training, <5000 sf	○	○	○	○	○	◐	◑	●	●	◑	◑	◑
<b>O</b> Training, >5000 sf	○	○	○	○	○	◐	◑	●	●	◑	●	●
<b>P</b> Training, Multistory	○	○	○	○	○	◐	◑	●	●	●	●	●
<b>Q</b> Gymnasium	○	○	○	○	○	○	○	◑	◑	○	○	○
<b>R</b> Warehouse	○	○	○	○	○	○	○	◑	◑	○	○	○



Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

REGION 2	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
A Admin, <5000 sf	○	○	○	○	○	◐	◐	◐	◐	◐	◐
B Admin, >5000 sf	○	○	○	○	◐	◐	◐	◐	◐	◐	◐
C Admin, Multistory	○	○	○	○	○	○	◐	◐	◐	◐	◐
D Admin, Comp. Fac.	○	○	○	○	○	◐	◐	◐	◐	◐	◐
E Dining Facility	○	○	○	○	○	◐	◐	◐	◐	◐	○
F Dormitory	○	○	○	○	◐	○	◐	◐	◐	◐	◐
G Fire Station	○	○	○	○	○	◐	◐	◐	◐	◐	○
H Industrial Facility	○	○	○	○	○	○	○	◐	◐	◐	○
I Maint, <5000 sf	◐	◐	○	◐	○	○	◐	◐	◐	◐	○
J Maint, High-Bay	◐	○	○	◐	○	○	◐	◐	◐	◐	○
K Maint, HVAC	○	○	○	○	◐	◐	◐	◐	◐	◐	○
L Maint, Low-Bay	○	○	○	○	○	○	◐	◐	◐	◐	○
M Auditorium	○	○	○	○	○	◐	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	◐	◐	◐	◐	◐	◐
O Training, >5000 sf	○	○	○	○	◐	◐	◐	◐	◐	◐	◐
P Training, Multistory	○	○	○	○	○	○	◐	◐	◐	◐	◐
Q Gymnasium	○	○	○	○	○	○	○	◐	◐	◐	○
R Warehouse	◐	◐	◐	◐	○	○	○	◐	◐	◐	○

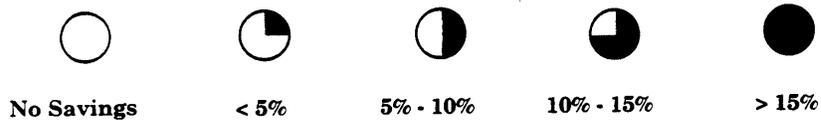


Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

# Climate Region 1

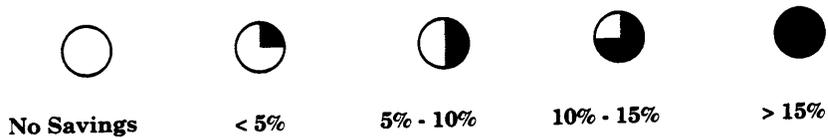
## Appendix E

REGION 3	Heat				Cool		Daylight					
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR	
A Admin, <5000 sf	○	○	○	○	○	◐	◑	●	●	●	●	●
B Admin, >5000 sf	○	○	○	○	○	○	●	●	●	●	●	●
C Admin, Multistory	○	○	○	○	○	◑	●	●	●	●	●	●
D Admin, Comp. Fac.	○	○	○	○	○	◑	◑	●	●	◑	◑	◑
E Dining Facility	○	○	○	○	○	◐	●	●	●	◑	○	○
F Dormitory	○	○	○	○	○	◐	◑	◑	○	○	○	○
G Fire Station	○	○	○	○	◑	◑	●	●	●	●	○	○
H Industrial Facility	○	○	○	○	○	○	○	●	●	●	○	○
I Maint, <5000 sf	○	○	○	○	○	○	●	●	●	●	○	○
J Maint, High-Bay	◑	○	○	○	○	○	●	●	●	●	○	○
K Maint, HVAC	○	○	○	○	○	◑	◑	●	●	●	○	○
L Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○	○
M Auditorium	○	○	○	○	○	◐	○	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	◐	◑	●	●	●	●	●
O Training, >5000 sf	○	○	○	○	○	○	●	●	●	●	●	●
P Training, Multistory	○	○	○	○	○	◑	●	●	●	●	●	●
Q Gymnasium	○	○	○	○	○	○	○	●	●	●	○	○
R Warehouse	◑	◑	◑	○	○	○	○	●	●	●	○	○



Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

REGION 4	Heat				Cool		Daylight					
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR	
A Admin, <5000 sf	○	○	○	○	○	◐	◐	●	●	●	●	●
B Admin, >5000 sf	○	○	○	○	○	○	●	●	●	●	●	●
C Admin, Multistory	○	○	○	○	◐	◐	●	●	●	●	●	●
D Admin, Comp. Fac.	○	○	○	○	○	○	◐	●	●	◐	◐	○
E Dining Facility	○	○	○	○	○	◐	●	●	●	◐	○	○
F Dormitory	○	○	○	○	○	○	◐	◐	◐	◐	○	○
G Fire Station	○	○	○	○	◐	◐	●	●	●	●	○	○
H Industrial Facility	○	○	○	○	○	○	○	●	●	●	○	○
I Maint, <5000 sf	◐	◐	○	◐	○	○	●	●	●	●	○	○
J Maint, High-Bay	◐	◐	○	◐	○	○	●	●	●	●	○	○
K Maint, HVAC	○	○	○	○	◐	○	◐	●	●	●	○	○
L Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○	○
M Auditorium	○	○	○	○	○	○	○	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	◐	◐	●	●	●	●	●
O Training, >5000 sf	○	○	○	○	○	○	●	●	●	●	●	●
P Training, Multistory	○	○	○	○	◐	◐	●	●	●	●	●	●
Q Gymnasium	○	○	○	○	○	○	○	●	●	●	○	○
R Warehouse	◐	◐	◐	◐	○	○	○	●	●	●	○	○

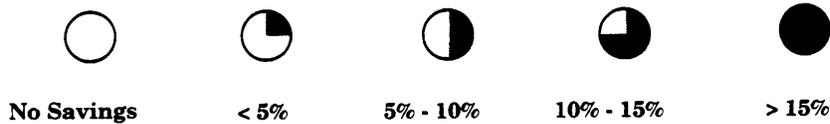


Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

# Climate Region 1

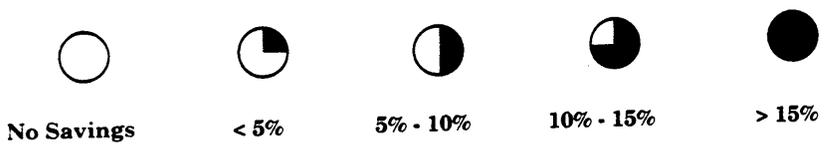
## Appendix E

REGION 5	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
<b>A</b> Admin, <5000 sf	○	○	○	○	○	◐	◐	●	●	●	●
<b>B</b> Admin, >5000 sf	○	○	○	○	○	◐	●	●	●	●	●
<b>C</b> Admin, Multistory	○	○	○	○	○	◐	●	●	●	●	●
<b>D</b> Admin, Comp. Fac.	○	○	○	○	◐	◐	◐	●	●	◐	◐
<b>E</b> Dining Facility	○	○	○	○	○	◐	◐	●	●	◐	○
<b>F</b> Dormitory	○	○	○	○	◐	◐	◐	○	○	○	○
<b>G</b> Fire Station	○	○	○	○	◐	◐	●	●	●	●	○
<b>H</b> Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
<b>I</b> Maint, <5000 sf	◐	○	○	○	○	○	●	●	●	●	○
<b>J</b> Maint, High-Bay	◐	○	○	○	○	○	●	●	●	●	○
<b>K</b> Maint, HVAC	○	○	○	○	◐	◐	◐	●	○	●	○
<b>L</b> Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
<b>M</b> Auditorium	○	○	○	○	○	◐	○	○	○	○	○
<b>N</b> Training, <5000 sf	○	○	○	○	○	◐	◐	●	●	●	●
<b>O</b> Training, >5000 sf	○	○	○	○	○	◐	●	●	●	●	●
<b>P</b> Training, Multistory	○	○	○	○	○	◐	●	●	●	●	●
<b>Q</b> Gymnasium	○	○	○	○	○	○	○	●	●	●	○
<b>R</b> Warehouse	◐	○	○	◐	○	○	○	●	●	●	○



Heat	Cool	Daylight
<b>D+S</b> = Direct Gain with Storage	<b>NMV</b> = Night Mechanical Ventilation	<b>WIN</b> = Window(s)
<b>IND</b> = Indirect Gain	<b>NVN</b> = Natural Ventilation	<b>SKY</b> = Skylights
<b>DG</b> = Direct Gain		<b>SAW</b> = Sawtooth
<b>SUN</b> = Sunspace		<b>MON</b> = Monitor
		<b>ATR</b> = Atrium

REGION6	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
A Admin, <5000 sf	○	○	○	○	○	○	◐	●	●	●	●
B Admin, >5000 sf	○	○	○	○	○	○	◐	●	●	●	●
C Admin, Multistory	○	○	○	○	◐	○	●	●	●	●	●
D Admin, Comp. Fac.	○	○	○	○	◐	◐	◐	●	●	◐	◐
E Dining Facility	○	○	○	○	○	○	◐	●	●	◐	○
F Dormitory	○	○	○	○	◐	○	◐	◐	◐	◐	○
G Fire Station	○	○	○	○	◐	◐	●	●	●	●	○
H Industrial Facility	○	○	○	○	○	○	○	◐	◐	◐	○
I Maint, <5000 sf	○	○	○	○	○	○	●	●	●	●	○
J Maint. High-Bay	◐	◐	○	○	○	○	●	●	●	●	○
K Maint. HVAC	○	○	○	○	◐	○	◐	●	●	●	○
L Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
M Auditorium	○	○	○	○	◐	○	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	○	◐	●	●	●	●
O Training, >5000 sf	○	○	○	○	○	○	●	●	●	●	●
P Training, Multistory	○	○	○	○	◐	○	●	●	●	●	●
Q Gymnasium	◐	○	○	○	○	○	○	●	●	●	○
R Warehouse	◐	○	◐	○	○	○	○	●	●	●	○

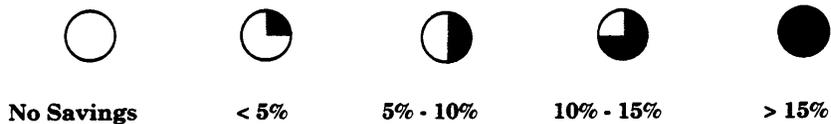


Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

# Climate Region 1

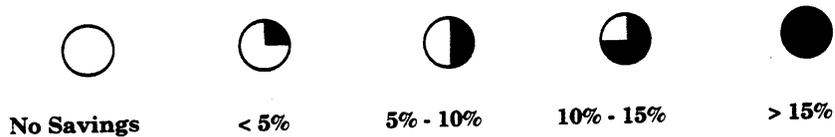
## Appendix E

REGION7	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
<b>A</b> Admin, <5000 sf	○	○	○	○	◐	◐	◐	●	●	●	●
<b>B</b> Admin, >5000 sf	○	○	○	○	◐	◐	●	●	●	●	●
<b>C</b> Admin, Multistory	○	○	○	○	◐	◐	●	●	●	●	●
<b>D</b> Admin, Comp. Fac.	○	○	○	○	◐	◐	◐	●	●	◐	◐
<b>E</b> Dining Facility	○	○	○	○	○	◐	◐	●	●	◐	○
<b>F</b> Dormitory	○	○	○	○	◐	◐	◐	○	○	○	○
<b>G</b> Fire Station	○	○	○	○	○	◐	●	●	●	●	○
<b>H</b> Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
<b>I</b> Maint, <5000 sf	○	○	○	○	○	○	●	●	●	●	○
<b>J</b> Maint, High-Bay	◐	○	○	○	○	○	●	●	●	●	○
<b>K</b> Maint, HVAC	○	○	○	○	◐	◐	◐	●	●	●	○
<b>L</b> Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
<b>M</b> Auditorium	○	○	○	○	◐	◐	○	○	○	○	○
<b>N</b> Training, <5000 sf	○	○	○	○	◐	◐	◐	●	●	●	●
<b>O</b> Training, >5000 sf	○	○	○	○	◐	◐	●	●	●	●	●
<b>P</b> Training, Multistory	○	○	○	○	◐	◐	●	●	●	●	●
<b>Q</b> Gymnasium	○	○	○	○	○	○	○	●	●	●	○
<b>R</b> Warehouse	◐	○	◐	○	○	○	○	●	●	●	○



Heat	Cool	Daylight
<b>D+S</b> = Direct Gain with Storage	<b>NMV</b> = Night Mechanical Ventilation	<b>WIN</b> = Window(s)
<b>IND</b> = Indirect Gain	<b>NVN</b> = Natural Ventilation	<b>SKY</b> = Skylights
<b>DG</b> = Direct Gain		<b>SAW</b> = Sawtooth
<b>SUN</b> = Sunspace		<b>MON</b> = Monitor
		<b>ATR</b> = Atrium

REGION 8	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
A Admin, <5000 sf	○	○	○	○	○	○	●	●	●	●	●
B Admin, >5000 sf	○	○	○	○	○	○	●	●	●	●	●
C Admin, Multistory	○	○	○	○	○	○	●	●	●	●	●
D Admin, Comp. Fac.	○	○	○	○	◐	○	◐	●	●	◐	◐
E Dining Facility	○	○	○	○	○	○	◐	●	●	●	○
F Dormitory	○	○	○	○	◐	○	◐	○	○	○	○
G Fire Station	○	○	○	○	◐	◐	●	●	●	●	○
H Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
I Maint, <5000 sf	○	○	○	○	○	○	●	●	●	●	○
J Maint, High-Bay	○	○	○	○	○	○	●	●	●	●	○
K Maint, HVAC	○	○	○	○	◐	○	◐	●	○	○	○
L Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
M Auditorium	○	○	○	○	○	○	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	○	●	●	●	●	●
O Training, >5000 sf	○	○	○	○	○	○	●	●	●	●	●
P Training, Multistory	○	○	○	○	○	○	●	●	●	●	●
Q Gymnasium	○	○	○	○	○	○	○	●	●	●	○
R Warehouse	○	○	○	○	○	○	○	●	●	●	○



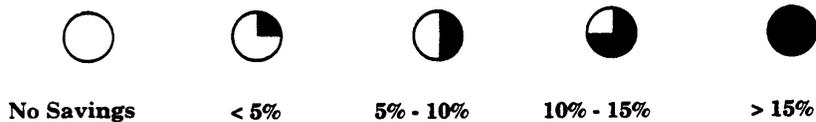
Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

oo

# Climate Region 1

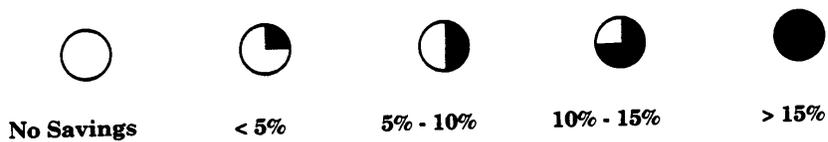
## Appendix E

REGION9	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
<b>A</b> Admin, <5000 sf	○	○	○	○	○	○	●	●	●	●	●
<b>B</b> Admin, >5000 sf	○	○	○	○	○	○	●	●	●	●	●
<b>C</b> Admin, Multistory	○	○	○	○	○	○	●	●	●	●	●
<b>D</b> Admin, Comp. Fac.	○	○	○	○	○	○	◐	●	●	◐	●
<b>E</b> Dining Facility	○	○	○	○	○	○	◑	●	●	◑	○
<b>F</b> Dormitory	○	○	○	○	○	○	◑	◑	○	○	○
<b>G</b> Fire Station	○	○	○	○	○	◑	◑	◑	●	◑	○
<b>H</b> Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
<b>I</b> Maint, <5000 sf	◑	○	○	○	○	○	◑	●	●	●	○
<b>J</b> Maint, High-Bay	○	○	○	○	○	○	●	●	●	●	○
<b>K</b> Maint, HVAC	○	○	○	○	○	○	◑	●	●	●	○
<b>L</b> Maint, Low-Bay	○	○	○	○	○	○	◑	●	●	●	○
<b>M</b> Auditorium	○	○	○	○	○	○	○	○	○	○	○
<b>N</b> Training, <5000 sf	○	○	○	○	○	○	●	●	●	●	●
<b>O</b> Training, >5000 sf	○	○	○	○	○	○	●	●	●	●	●
<b>P</b> Training, Multistory	○	○	○	○	○	○	●	●	●	●	●
<b>Q</b> Gymnasium	○	○	○	○	○	○	○	●	●	●	○
<b>R</b> Warehouse	◐	○	◐	○	○	○	○	●	●	●	○



Heat	Cool	Daylight
<b>D+S</b> = Direct Gain with Storage	<b>NMV</b> = Night Mechanical Ventilation	<b>WIN</b> = Window(s)
<b>IND</b> = Indirect Gain	<b>NVN</b> = Natural Ventilation	<b>SKY</b> = Skylights
<b>DG</b> = Direct Gain		<b>SAW</b> = Sawtooth
<b>SUN</b> = Sunspace		<b>MON</b> = Monitor
		<b>ATR</b> = Atrium

REGION 10	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
A Admin, <5000 sf	○	○	○	○	○	◐	●	●	●	●	●
B Admin, >5000 sf	○	○	○	○	○	◐	●	●	●	●	●
C Admin, Multistory	○	○	○	○	○	◐	◐	●	●	●	●
D Admin, Comp. Fac.	○	○	○	○	○	◐	◐	●	●	◐	◐
E Dining Facility	○	○	○	○	○	◐	◐	●	◐	◐	○
F Dormitory	○	○	○	○	○	◐	◐	○	○	○	○
G Fire Station	○	○	○	○	○	◐	◐	◐	◐	◐	○
H Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
I Maint, <5000 sf	○	○	○	○	○	○	◐	●	●	●	○
J Maint, High-Bay	○	○	○	○	○	○	●	●	●	●	○
K Maint, HVAC	○	○	○	○	○	◐	◐	●	●	●	○
L Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
M Auditorium	○	○	○	○	○	◐	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	◐	●	●	●	●	●
O Training, >5000 sf	○	○	○	○	○	◐	◐	●	●	●	●
P Training, Multistory	○	○	○	○	○	◐	●	●	●	●	●
Q Gymnasium	○	○	○	○	○	○	○	●	●	●	○
R Warehouse	◐	○	◐	○	○	○	○	●	●	●	○



Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

# Climate Region 1

## Appendix E

<b>REGION 11</b>	<b>Heat</b>				<b>Cool</b>		<b>Daylight</b>				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
<b>A</b> Admin, <5000 sf	○	○	○	○	◐	○	●	●	●	●	●
<b>B</b> Admin, >5000 sf	○	○	○	○	◐	○	●	●	●	●	●
<b>C</b> Admin, Multistory	○	○	○	○	◐	○	●	●	●	●	●
<b>D</b> Admin, Comp. Fac.	○	○	○	○	◐	○	◐	●	●	◐	◐
<b>E</b> Dining Facility	○	○	○	○	○	○	◐	●	●	●	○
<b>F</b> Dormitory	○	○	○	○	◐	○	◐	○	○	○	○
<b>G</b> Fire Station	○	○	○	○	◐	◐	●	●	●	●	○
<b>H</b> Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
<b>I</b> Maint, <5000 sf	○	○	○	○	○	○	◐	●	●	●	○
<b>J</b> Maint, High-Bay	◐	○	○	○	○	○	●	●	●	●	○
<b>K</b> Maint, HVAC	○	○	○	○	◐	○	◐	●	●	●	○
<b>L</b> Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
<b>M</b> Auditorium	○	○	○	○	◐	○	○	○	○	○	○
<b>N</b> Training, <5000 sf	○	○	○	○	◐	○	●	●	●	●	●
<b>O</b> Training, >5000 sf	○	○	○	○	◐	○	●	●	●	●	●
<b>P</b> Training, Multistory	○	○	○	○	◐	○	●	●	●	●	●
<b>Q</b> Gymnasium	○	○	○	○	○	○	○	●	●	●	○
<b>R</b> Warehouse	◐	○	◐	○	○	○	○	●	●	●	○



No Savings



< 5%



5% - 10%



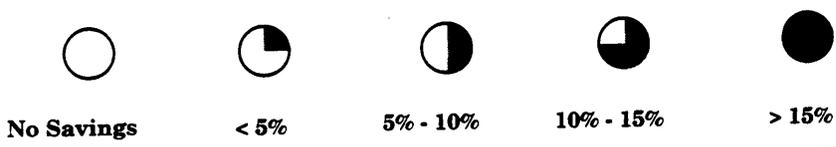
10% - 15%



> 15%

<b>Heat</b>	<b>Cool</b>	<b>Daylight</b>
<b>D+S</b> = Direct Gain with Storage	<b>NMV</b> = Night Mechanical Ventilation	<b>WIN</b> = Window(s)
<b>IND</b> = Indirect Gain	<b>NVN</b> = Natural Ventilation	<b>SKY</b> = Skylights
<b>DG</b> = Direct Gain		<b>SAW</b> = Sawtooth
<b>SUN</b> = Sunspace		<b>MON</b> = Monitor
		<b>ATR</b> = Atrium

REGION 12	Heat				Cool		Daylight				
	D+S	IND	DG	SUN	NMV	NVN	WIN	SKY	SAW	MON	ATR
A Admin, <5000 sf	○	○	○	○	○	◐	●	●	●	●	●
B Admin, >5000 sf	○	○	○	○	○	◐	●	●	●	●	●
C Admin, Multistory	○	○	○	○	○	◐	●	●	●	●	●
D Admin, Comp. Fac.	○	○	○	○	○	◐	◐	●	●	◐	◐
E Dining Facility	○	○	○	○	○	◐	◐	●	●	●	○
F Dormitory	○	○	○	○	○	○	◐	◐	◐	◐	◐
G Fire Station	○	○	○	○	○	◐	●	●	●	●	○
H Industrial Facility	○	○	○	○	○	○	○	●	●	●	○
I Maint, <5000 sf	○	○	○	○	○	○	●	●	●	●	○
J Maint, High-Bay	○	○	○	○	○	○	●	●	●	●	○
K Maint, HVAC	○	○	○	○	○	◐	◐	●	●	●	○
L Maint, Low-Bay	○	○	○	○	○	○	●	●	●	●	○
M Auditorium	○	○	○	○	○	◐	○	○	○	○	○
N Training, <5000 sf	○	○	○	○	○	◐	●	●	●	●	●
O Training, >5000 sf	○	○	○	○	○	◐	●	●	●	●	●
P Training, Multistory	○	○	○	○	○	◐	●	●	●	●	●
Q Gymnasium	○	○	○	○	○	○	○	●	●	●	○
R Warehouse	○	○	○	○	○	○	○	●	●	●	○



Heat	Cool	Daylight
D+S = Direct Gain with Storage	NMV = Night Mechanical Ventilation	WIN = Window(s)
IND = Indirect Gain	NVN = Natural Ventilation	SKY = Skylights
DG = Direct Gain		SAW = Sawtooth
SUN = Sunspace		MON = Monitor
		ATR = Atrium

# Climate Region 1

## Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					Hea (Bt)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	
<b>A ADMIN &lt;5000 SF</b>	<b>162,058</b>	<b>70.2%</b>	<b>3.0%</b>	<b>17.6%</b>	<b>6.0%</b>	<b>3.2%</b>	<b>\$2.15</b>	<b>39.2%</b>	<b>11.5%</b>	<b>41.8%</b>	<b>7.5%</b>	<b>64</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	161,157	70.6%	2.5%	17.7%	6.1%	3.2%	\$2.12	39.8%	10.3%	42.4%	7.6%	64
(L) Windows	162,862	74.3%	2.7%	13.3%	6.6%	3.1%	\$1.99	45.7%	11.9%	34.3%	8.1%	70
(L) Skylights	163,416	82.0%	1.5%	8.4%	5.0%	3.1%	\$1.67	56.7%	7.6%	26.0%	9.6%	52
(L) Sawtooth Ap	156,687	80.4%	1.5%	8.1%	6.8%	3.3%	\$1.67	57.2%	9.4%	23.8%	9.7%	69
(L) Monitor Ap.	171,179	79.8%	1.7%	8.8%	6.8%	3.0%	\$1.85	55.7%	10.0%	25.6%	8.7%	74
(L) Atrium	183,256	81.5%	2.4%	7.9%	5.5%	2.8%	\$1.89	56.2%	11.4%	23.9%	8.5%	64
<b>B ADMIN &gt;5000 SF</b>	<b>116,253</b>	<b>62.0%</b>	<b>3.5%</b>	<b>24.7%</b>	<b>5.5%</b>	<b>4.4%</b>	<b>\$1.79</b>	<b>29.6%</b>	<b>11.0%</b>	<b>50.4%</b>	<b>9.0%</b>	<b>43</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	115,844	62.2%	3.2%	24.8%	5.5%	4.4%	\$1.78	29.8%	10.4%	50.8%	9.1%	43
(L) Windows	114,288	67.0%	2.5%	20.1%	6.0%	4.5%	\$1.61	35.3%	9.8%	44.9%	10.0%	46
(L) Skylights	119,740	77.1%	1.7%	11.9%	5.0%	4.3%	\$1.37	47.7%	8.0%	32.5%	11.7%	38
(L) Sawtooth Ap	121,650	78.7%	2.1%	8.2%	6.9%	4.2%	\$1.35	53.3%	11.4%	23.2%	12.0%	56
(L) Monitor Ap.	132,577	76.0%	2.2%	11.2%	6.7%	3.9%	\$1.56	48.5%	11.1%	30.1%	10.4%	59
(L) Atrium	120,722	74.5%	2.2%	13.0%	6.0%	4.2%	\$1.47	45.3%	10.0%	33.6%	11.0%	43
<b>C ADMIN, MULTISTORY</b>	<b>81,268</b>	<b>46.5%</b>	<b>6.0%</b>	<b>35.3%</b>	<b>5.9%</b>	<b>6.3%</b>	<b>\$1.58</b>	<b>18.1%</b>	<b>14.4%</b>	<b>57.2%</b>	<b>10.2%</b>	<b>29</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	80,865	46.7%	5.6%	35.5%	5.9%	6.3%	\$1.56	18.3%	13.7%	57.7%	10.3%	29
(L) Windows	79,654	54.1%	5.0%	28.8%	5.6%	6.4%	\$1.39	23.1%	13.2%	52.0%	11.6%	32
(L) Skylights	81,349	58.9%	4.6%	24.5%	5.7%	6.3%	\$1.32	26.8%	13.3%	47.7%	12.3%	29
(L) Sawtooth Ap	79,681	60.4%	4.9%	22.1%	6.1%	6.4%	\$1.26	28.5%	14.6%	44.1%	12.8%	35
(L) Monitor Ap.	83,481	59.9%	5.0%	22.8%	6.1%	6.1%	\$1.33	28.1%	14.6%	45.1%	12.1%	36
(L) Atrium	84,579	60.9%	4.6%	21.8%	6.7%	6.1%	\$1.33	29.6%	14.5%	43.7%	12.2%	32

BUILDING DESC	ENERGY USE						ENERGY COST					Heat (B)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	
<b>D ADMIN, COMP FAC</b>	<b>201,937</b>	<b>48.1%</b>	<b>4.2%</b>	<b>16.2%</b>	<b>5.8%</b>	<b>25.7%</b>	<b>\$3.83</b>	<b>18.5%</b>	<b>12.1%</b>	<b>26.8%</b>	<b>42.5%</b>	<b>60</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	201,962	48.3%	4.0%	16.2%	5.8%	25.7%	\$3.82	18.7%	11.8%	26.9%	42.6%	60
(L) Windows	202,365	51.2%	4.7%	13.3%	5.2%	25.6%	\$3.68	20.4%	12.2%	23.0%	44.3%	62
(L) Skylights	203,023	57.7%	3.0%	8.0%	5.7%	25.5%	\$3.35	25.2%	10.8%	15.3%	48.7%	54
(L) Sawtooth Ap	205,938	59.9%	3.4%	5.4%	6.1%	25.2%	\$3.28	27.6%	12.0%	10.7%	49.7%	72
(L) Monitor Ap.	214,763	57.4%	3.7%	8.7%	6.0%	24.1%	\$3.56	25.4%	12.1%	16.6%	45.8%	74
(L) Atrium	206,002	56.4%	3.3%	8.5%	6.6%	25.2%	\$3.47	25.0%	12.0%	16.0%	47.0%	62
<b>E DINING FACILITY</b>	<b>316,734</b>	<b>73.0%</b>	<b>0.9%</b>	<b>9.9%</b>	<b>6.2%</b>	<b>9.9%</b>	<b>\$3.24</b>	<b>53.2%</b>	<b>8.3%</b>	<b>30.6%</b>	<b>7.9%</b>	<b>121</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	315,482	73.3%	0.5%	10.0%	6.3%	9.9%	\$3.20	53.9%	7.2%	31.0%	8.0%	121
(L) Windows	323,382	75.8%	0.9%	7.1%	6.6%	9.7%	\$3.09	59.4%	9.0%	23.3%	8.2%	134
(L) Skylights	314,979	77.8%	0.5%	5.6%	6.1%	9.9%	\$2.82	64.5%	6.7%	19.8%	9.0%	121
(L) Sawtooth Ap	332,072	77.6%	0.8%	5.5%	6.7%	9.4%	\$3.04	63.8%	8.8%	19.0%	8.4%	131
(L) Monitor Ap.	344,213	77.2%	0.9%	6.1%	6.8%	9.1%	\$3.21	62.4%	9.3%	20.4%	7.9%	141
(L) Atrium												
<b>F DORMITORY</b>	<b>73,139</b>	<b>63.8%</b>	<b>3.2%</b>	<b>20.2%</b>	<b>7.3%</b>	<b>5.5%</b>	<b>\$1.09</b>	<b>32.3%</b>	<b>13.4%</b>	<b>42.6%</b>	<b>11.7%</b>	<b>27</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	72,445	64.5%	2.2%	20.4%	7.3%	5.6%	\$1.07	32.9%	11.6%	43.5%	11.9%	27
(L) Windows	74,894	66.7%	3.0%	17.0%	7.8%	5.4%	\$1.06	35.9%	14.3%	37.8%	12.0%	30
(L) Skylights	81,413	70.5%	3.0%	15.0%	6.5%	5.0%	\$1.07	38.6%	13.7%	35.8%	11.9%	27
(L) Sawtooth Ap												
(L) Monitor Ap.												
(L) Atrium												

# Climate Region 1

## Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					Heat (Btu)
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QSite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	
<b>G FIRE STATION</b>	<b>189,956</b>	<b>73.5%</b>	<b>0.7%</b>	<b>8.4%</b>	<b>14.6%</b>	<b>2.9%</b>	<b>\$2.36</b>	<b>65.4%</b>	<b>6.1%</b>	<b>21.2%</b>	<b>7.3%</b>	<b>204</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent	189,793	73.6%	0.7%	8.4%	14.5%	2.9%	\$2.35	64.0%	7.5%	21.3%	7.3%	204
(C) Natural Vent	188,813	74.0%	0.1%	8.4%	14.7%	2.9%	\$2.32	66.4%	4.7%	21.5%	7.4%	204
(L) Windows	192,752	75.8%	0.7%	5.9%	14.9%	2.8%	\$2.28	70.7%	6.2%	15.6%	7.5%	208
(L) Skylights	186,906	75.0%	0.5%	5.9%	15.7%	2.9%	\$2.25	70.4%	6.5%	15.5%	7.6%	197
(L) Sawtooth Ap	206,517	78.4%	0.4%	5.1%	13.5%	2.6%	\$2.30	73.7%	4.6%	14.3%	7.4%	219
(L) Monitor Ap.												
(L) Atrium												
<b>H INDUSTRIAL FAC</b>	<b>92,238</b>	<b>48.0%</b>	<b>0.0%</b>	<b>21.5%</b>	<b>5.2%</b>	<b>25.3%</b>	<b>\$1.75</b>	<b>19.1%</b>	<b>3.5%</b>	<b>35.6%</b>	<b>41.9%</b>	<b>36</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent												
(L) Windows												
(L) Skylights	98,815	62.0%	0.0%	9.7%	4.7%	23.6%	\$1.52	28.8%	3.1%	19.8%	48.3%	34
(L) Sawtooth Ap	119,315	66.6%	0.0%	6.2%	7.7%	19.6%	\$1.69	36.2%	6.7%	13.7%	43.4%	65
(L) Monitor Ap.												
(L) Atrium												
<b>I MAINTENANCE, &lt;5000</b>	<b>115,932</b>	<b>78.9%</b>	<b>0.0%</b>	<b>9.8%</b>	<b>6.9%</b>	<b>4.4%</b>	<b>\$1.28</b>	<b>53.4%</b>	<b>6.1%</b>	<b>28.0%</b>	<b>12.5%</b>	<b>57</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent												
(L) Windows	114,954	80.6%	0.0%	8.0%	7.0%	4.4%	\$1.21	57.2%	5.9%	23.8%	13.1%	57
(L) Skylights	122,212	86.0%	0.0%	4.5%	5.4%	4.1%	\$1.12	66.4%	4.0%	15.4%	14.2%	46
(L) Sawtooth Ap	118,705	84.1%	0.0%	4.2%	7.4%	4.3%	\$1.14	66.1%	6.3%	13.7%	13.9%	62
(L) Monitor Ap.	129,063	84.1%	0.0%	4.6%	7.4%	3.9%	\$1.25	65.8%	6.4%	15.1%	12.8%	66
(L) Atrium												

BUILDING DESC	ENERGY USE						ENERGY COST					H
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu)
<b>J MAINT, HIGH-BAY</b>	<b>150,970</b>	<b>69.7%</b>	<b>0.0%</b>	<b>16.2%</b>	<b>6.4%</b>	<b>7.7%</b>	<b>\$2.02</b>	<b>39.1%</b>	<b>4.6%</b>	<b>38.1%</b>	<b>18.2%</b>	<b>67</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent												
(L) Windows	154,453	74.7%	0.0%	10.8%	6.9%	7.6%	\$1.87	46.8%	5.4%	28.1%	19.7%	74
(L) Skylights	159,331	79.8%	0.0%	7.4%	5.5%	7.3%	\$1.72	53.4%	3.5%	21.7%	21.4%	60
(L) Sawtooth Ap	171,304	80.0%	0.0%	5.3%	7.9%	6.8%	\$1.84	57.4%	7.0%	15.6%	20.0%	91
(L) Monitor Ap.	177,180	79.1%	0.0%	6.7%	7.6%	6.6%	\$1.94	55.4%	6.4%	19.2%	18.9%	91
(L) Atrium												
<b>K MAINT, AIR COND</b>	<b>90,486</b>	<b>57.8%</b>	<b>2.5%</b>	<b>21.9%</b>	<b>4.8%</b>	<b>12.9%</b>	<b>\$1.49</b>	<b>25.4%</b>	<b>8.1%</b>	<b>41.9%</b>	<b>24.6%</b>	<b>31</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	90,134	58.1%	2.1%	22.0%	4.8%	12.9%	\$1.48	25.6%	7.4%	42.2%	24.8%	31
(L) Windows	93,185	63.1%	2.3%	16.8%	5.3%	12.5%	\$1.41	30.4%	8.6%	34.9%	26.1%	35
(L) Skylights	97,220	72.2%	1.5%	9.8%	4.5%	12.0%	\$1.24	39.6%	6.5%	24.3%	29.6%	30
(L) Sawtooth Ap	105,524	73.6%	2.1%	7.0%	6.3%	11.1%	\$1.31	43.8%	10.4%	17.7%	28.1%	45
(L) Monitor Ap.	109,075	72.3%	2.1%	8.8%	6.1%	10.7%	\$1.39	41.9%	10.0%	21.7%	26.5%	45
(L) Atrium												
<b>L MAINT, LOW-BAY</b>	<b>71,770</b>	<b>50.9%</b>	<b>0.0%</b>	<b>27.6%</b>	<b>5.2%</b>	<b>16.3%</b>	<b>\$1.31</b>	<b>21.0%</b>	<b>3.4%</b>	<b>47.6%</b>	<b>28.0%</b>	<b>29</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent												
(L) Windows	72,839	56.8%	0.0%	21.4%	5.8%	16.0%	\$1.22	25.6%	4.1%	40.2%	30.1%	32
(L) Skylights	73,361	66.0%	0.0%	13.0%	5.0%	15.9%	\$1.05	33.4%	3.1%	28.6%	34.9%	28
(L) Sawtooth Ap	78,731	68.7%	0.0%	9.4%	7.1%	14.8%	\$1.07	38.3%	5.9%	21.6%	34.2%	42
(L) Monitor Ap.	81,967	67.3%	0.0%	11.7%	6.9%	14.2%	\$1.15	36.5%	5.4%	26.2%	31.9%	42
(L) Atrium												

# Climate Region 1

## Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					Hea (Btu)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	
<b>M AUDITORIUM</b>	<b>146,718</b>	<b>78.0%</b>	<b>1.9%</b>	<b>9.9%</b>	<b>6.8%</b>	<b>3.4%</b>	<b>\$1.65</b>	<b>52.4%</b>	<b>10.3%</b>	<b>27.8%</b>	<b>9.5%</b>	<b>67</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	145,903	78.4%	1.4%	10.0%	6.8%	3.4%	\$1.62	53.3%	8.8%	28.2%	9.7%	67
(L) Windows												
(L) Skylights												
(L) Sawtooth Ap												
(L) Monitor Ap.												
(L) Atrium												
<b>N TRAINING &lt;5000 SF</b>	<b>162,058</b>	<b>70.2%</b>	<b>3.0%</b>	<b>17.6%</b>	<b>6.0%</b>	<b>3.2%</b>	<b>\$2.15</b>	<b>39.2%</b>	<b>11.5%</b>	<b>41.8%</b>	<b>7.5%</b>	<b>64</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	161,157	70.6%	2.5%	17.7%	6.1%	3.2%	\$2.12	39.8%	10.3%	42.4%	7.6%	64
(L) Windows	162,862	74.3%	2.7%	13.3%	6.6%	3.1%	\$1.99	45.7%	11.9%	34.3%	8.1%	70
(L) Skylights	163,416	82.0%	1.5%	8.4%	5.0%	3.1%	\$1.67	56.7%	7.6%	26.0%	9.6%	52
(L) Sawtooth Ap	156,687	80.4%	1.5%	8.1%	6.8%	3.3%	\$1.67	57.2%	9.4%	23.8%	9.7%	69
(L) Monitor Ap.	171,179	79.8%	1.7%	8.8%	6.8%	3.0%	\$1.85	55.7%	10.0%	25.6%	8.7%	74
(L) Atrium	183,256	81.5%	2.4%	7.9%	5.5%	2.8%	\$1.89	56.2%	11.4%	23.9%	8.5%	64
<b>O TRAINING &gt;5000</b>	<b>116,253</b>	<b>62.0%</b>	<b>3.5%</b>	<b>24.7%</b>	<b>5.5%</b>	<b>4.4%</b>	<b>\$1.79</b>	<b>29.6%</b>	<b>11.0%</b>	<b>50.4%</b>	<b>9.0%</b>	<b>43</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	115,844	62.2%	3.2%	24.8%	5.5%	4.4%	\$1.78	29.8%	10.4%	50.8%	9.1%	43
(L) Windows	114,288	67.0%	2.5%	20.1%	6.0%	4.5%	\$1.61	35.3%	9.8%	44.9%	10.0%	46
(L) Skylights	119,740	77.1%	1.7%	11.9%	5.0%	4.3%	\$1.37	47.7%	8.0%	32.5%	11.7%	38
(L) Sawtooth Ap	121,650	78.7%	2.1%	8.2%	6.9%	4.2%	\$1.35	53.3%	11.4%	23.2%	12.0%	56
(L) Monitor Ap.	132,577	76.0%	2.2%	11.2%	6.7%	3.9%	\$1.56	48.5%	11.1%	30.1%	10.4%	59
(L) Atrium	120,722	74.5%	2.2%	13.0%	6.0%	4.2%	\$1.47	45.3%	10.0%	33.6%	11.0%	43

BUILDING DESC	ENERGY USE						ENERGY COST					Heat (Btu)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	
<b>P TRAINING, MULTI STORY</b>	<b>81,268</b>	<b>46.5%</b>	<b>6.0%</b>	<b>35.3%</b>	<b>5.9%</b>	<b>6.3%</b>	<b>\$1.58</b>	<b>18.1%</b>	<b>14.4%</b>	<b>57.2%</b>	<b>10.2%</b>	<b>29</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent	80,865	46.7%	5.6%	35.5%	5.9%	6.3%	\$1.56	18.3%	13.7%	57.7%	10.3%	29
(L) Windows	79,654	54.1%	5.0%	28.8%	5.6%	6.4%	\$1.39	23.1%	13.2%	52.0%	11.6%	32
(L) Skylights	81,349	58.9%	4.6%	24.5%	5.7%	6.3%	\$1.32	26.8%	13.3%	47.7%	12.3%	29
(L) Sawtooth Ap	79,681	60.4%	4.9%	22.1%	6.1%	6.4%	\$1.26	28.5%	14.6%	44.1%	12.8%	35
(L) Monitor Ap.	83,481	59.9%	5.0%	22.8%	6.1%	6.1%	\$1.33	28.1%	14.6%	45.1%	12.1%	36
(L) Atrium	84,579	60.9%	4.6%	21.8%	6.7%	6.1%	\$1.33	29.6%	14.5%	43.7%	12.2%	32
<b>Q TRAINING, GYM</b>	<b>203,662</b>	<b>75.3%</b>	<b>0.0%</b>	<b>17.5%</b>	<b>7.2%</b>	<b>0.0%</b>	<b>\$2.43</b>	<b>47.2%</b>	<b>6.8%</b>	<b>46.0%</b>	<b>0.0%</b>	<b>92</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent												
(L) Windows	229,830	84.4%	0.0%	9.5%	6.2%	0.0%	\$2.20	63.0%	6.0%	31.0%	0.0%	87
(L) Skylights	233,184	83.6%	0.0%	8.0%	8.3%	0.0%	\$2.28	64.6%	9.5%	25.9%	0.0%	118
(L) Sawtooth Ap												
(L) Monitor Ap.												
(L) Atrium												
<b>R WAREHOUSE</b>	<b>77,886</b>	<b>85.3%</b>	<b>0.0%</b>	<b>9.1%</b>	<b>5.6%</b>	<b>0.0%</b>	<b>\$0.73</b>	<b>66.7%</b>	<b>2.6%</b>	<b>30.7%</b>	<b>0.0%</b>	<b>32</b>
(H) Direct Gain + St												
(H) Indirect Gain												
(H) Direct Gain												
(H) Sunspace												
(C) Night Mech Vent												
(C) Natural Vent												
(L) Windows	83,168	90.6%	0.0%	4.1%	5.3%	0.0%	\$0.66	81.2%	2.5%	16.2%	0.0%	32
(L) Skylights	88,363	90.0%	0.0%	3.0%	7.0%	0.0%	\$0.72	81.9%	6.6%	11.5%	0.0%	45
(L) Sawtooth Ap												
(L) Monitor Ap.												
(L) Atrium												

# Climate Region 2

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>87,635</b>	<b>29.0%</b>	<b>24.2%</b>	<b>32.6%</b>	<b>8.4%</b>	<b>5.8%</b>	<b>\$1.56</b>	<b>11.4%</b>	<b>49.0%</b>	<b>33.0%</b>	<b>6.6%</b>	<b>37</b>	<b>46</b>	<b>8.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	84,509	30.0%	21.4%	33.8%	8.7%	6.0%	\$1.53	11.6%	47.9%	33.8%	6.7%	37	46	8.9
(L) Windows	79,906	36.3%	26.0%	23.3%	8.0%	6.4%	\$1.36	14.7%	53.5%	24.2%	7.6%	40	40	6.9
(L) Skylights	69,920	53.6%	18.6%	11.6%	8.9%	7.3%	\$1.03	24.9%	50.2%	14.9%	10.0%	30	38	5.3
(L) Sawtooth Ap	65,917	50.3%	21.4%	12.6%	7.9%	7.7%	\$1.02	22.0%	52.7%	15.2%	10.1%	39	29	5.0
(L) Monitor Ap.	72,461	48.5%	22.7%	13.9%	7.8%	7.0%	\$1.10	21.6%	54.2%	14.9%	9.3%	43	31	5.3
(L) Atrium	81,420	46.6%	26.3%	10.7%	10.1%	6.3%	\$1.28	20.7%	58.9%	12.3%	8.1%	37	50	6.9
<b>B ADMIN &gt;5000 SF</b>	<b>70,708</b>	<b>22.7%</b>	<b>22.2%</b>	<b>40.6%</b>	<b>7.3%</b>	<b>7.3%</b>	<b>\$1.29</b>	<b>8.7%</b>	<b>43.2%</b>	<b>40.1%</b>	<b>8.0%</b>	<b>25</b>	<b>34</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	70,519	23.0%	21.3%	40.7%	7.7%	7.3%	\$1.28	8.8%	43.0%	40.1%	8.0%	25	34	7.0
(C) Natural Vent	68,633	23.4%	19.9%	41.8%	7.5%	7.5%	\$1.25	8.9%	41.6%	41.2%	8.2%	25	34	7.3
(L) Windows	62,015	30.0%	21.6%	34.0%	6.2%	8.3%	\$1.02	12.4%	43.3%	34.2%	10.1%	26	23	4.9
(L) Skylights	55,356	46.6%	19.7%	15.7%	8.8%	9.3%	\$0.86	20.5%	49.3%	18.2%	11.9%	22	31	4.3
(L) Sawtooth Ap	53,916	45.9%	25.2%	11.1%	8.3%	9.5%	\$0.92	18.3%	54.9%	15.6%	11.2%	32	26	4.8
(L) Monitor Ap.	60,025	42.0%	25.2%	16.4%	7.8%	8.5%	\$0.97	17.7%	54.8%	16.9%	10.6%	34	27	4.8
(L) Atrium	57,750	39.5%	23.8%	19.1%	8.8%	8.9%	\$0.92	17.2%	53.1%	18.5%	11.2%	25	33	4.6
<b>C ADMIN, MULTISTORY</b>	<b>61,970</b>	<b>12.8%</b>	<b>25.5%</b>	<b>46.3%</b>	<b>7.2%</b>	<b>8.3%</b>	<b>\$1.23</b>	<b>4.5%</b>	<b>44.1%</b>	<b>43.1%</b>	<b>8.4%</b>	<b>17</b>	<b>31</b>	<b>6.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	53,559	18.2%	27.1%	39.4%	5.8%	9.6%	\$0.95	7.1%	44.4%	37.7%	10.9%	18	21	4.7
(L) Skylights	50,505	21.7%	27.1%	33.2%	7.8%	10.2%	\$0.94	8.1%	50.0%	31.0%	10.9%	17	27	4.9
(L) Sawtooth Ap	48,322	23.2%	28.9%	30.0%	7.3%	10.6%	\$0.93	8.3%	50.4%	30.2%	11.1%	20	24	4.8
(L) Monitor Ap.	50,396	23.1%	28.7%	30.9%	7.2%	10.2%	\$0.95	8.4%	50.8%	30.0%	10.8%	21	24	4.9
(L) Atrium	51,895	22.4%	30.4%	28.6%	8.7%	9.9%	\$0.96	8.5%	55.3%	25.4%	10.7%	18	31	5.0



# Climate Region 2

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>144,634</b>	<b>14.9%</b>	<b>19.5%</b>	<b>22.6%</b>	<b>7.1%</b>	<b>35.8%</b>	<b>\$2.44</b>	<b>6.1%</b>	<b>35.8%</b>	<b>22.0%</b>	<b>36.1%</b>	<b>35</b>	<b>50</b>	<b>12.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	141,762	15.3%	17.8%	23.1%	7.3%	36.6%	\$2.39	6.3%	34.5%	22.4%	36.8%	35	50	12.6
(L) Windows	136,883	18.4%	19.5%	18.3%	6.0%	37.9%	\$2.22	7.7%	36.0%	16.7%	39.7%	36	40	10.6
(L) Skylights	128,817	26.4%	17.6%	7.8%	7.9%	40.2%	\$2.01	11.5%	36.6%	8.2%	43.8%	32	48	9.9
(L) Sawtooth Ap	126,819	26.0%	20.0%	5.2%	7.9%	40.9%	\$2.09	10.8%	40.1%	7.0%	42.2%	42	43	10.0
(L) Monitor Ap.	134,320	23.3%	20.3%	10.3%	7.5%	38.6%	\$2.15	9.9%	40.6%	8.6%	40.9%	43	45	10.2
(L) Atrium	131,848	22.4%	20.6%	9.2%	8.4%	39.3%	\$2.12	9.6%	40.6%	8.3%	41.5%	36	53	10.4
<b>E DINING FACILITY</b>	<b>149,723</b>	<b>38.2%</b>	<b>12.0%</b>	<b>21.0%</b>	<b>7.9%</b>	<b>20.9%</b>	<b>\$1.64</b>	<b>24.1%</b>	<b>37.6%</b>	<b>24.9%</b>	<b>13.4%</b>	<b>72</b>	<b>39</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	147,220	38.8%	10.5%	21.4%	8.0%	21.3%	\$1.62	24.4%	36.9%	25.2%	13.5%	72	39	7.1
(L) Windows	142,360	43.2%	13.0%	13.2%	8.5%	22.0%	\$1.45	29.2%	44.4%	11.3%	15.1%	76	39	5.8
(L) Skylights	138,676	51.7%	8.4%	9.6%	7.7%	22.6%	\$1.27	38.5%	36.1%	8.2%	17.2%	69	32	4.5
(L) Sawtooth Ap	142,603	47.3%	12.2%	10.4%	8.1%	22.0%	\$1.43	32.2%	44.7%	7.8%	15.3%	79	34	4.9
(L) Monitor Ap.	147,890	45.9%	12.9%	11.8%	8.2%	21.2%	\$1.49	31.2%	45.7%	8.4%	14.7%	82	35	5.0
(L) Atrium														
<b>F DORMITORY</b>	<b>45,678</b>	<b>15.7%</b>	<b>30.9%</b>	<b>32.3%</b>	<b>12.2%</b>	<b>8.9%</b>	<b>\$0.74</b>	<b>7.2%</b>	<b>42.2%</b>	<b>37.3%</b>	<b>13.2%</b>	<b>16</b>	<b>23</b>	<b>4.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	44,596	17.0%	28.6%	33.1%	12.2%	9.1%	\$0.73	7.7%	41.4%	37.6%	13.3%	16	23	4.2
(C) Natural Vent														
(L) Windows	44,242	19.6%	32.1%	28.5%	10.6%	9.2%	\$0.61	10.1%	50.5%	23.6%	15.8%	17	19	3.2
(L) Skylights	47,160	23.9%	30.8%	25.6%	11.2%	8.6%	\$0.62	13.0%	52.3%	19.1%	15.6%	16	22	3.2
(L) Sawtooth Ap	45,324	22.0%	32.6%	26.2%	10.3%	8.9%	\$0.63	11.1%	54.9%	18.6%	15.4%	19	19	3.3
(L) Monitor Ap.	46,867	22.5%	32.4%	26.3%	10.1%	8.6%	\$0.65	11.5%	55.0%	18.5%	15.0%	20	19	3.3
(L) Atrium	51,379	24.6%	32.9%	22.4%	12.3%	7.9%	\$0.67	13.5%	59.0%	13.1%	14.4%	17	26	3.6



# Climate Region 2

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>G FIRE STATION</b>	<b>76,596</b>	<b>45.7%</b>	<b>10.2%</b>	<b>20.7%</b>	<b>16.3%</b>	<b>7.1%</b>	<b>\$0.89</b>	<b>29.3%</b>	<b>32.8%</b>	<b>31.5%</b>	<b>6.4%</b>	<b>112</b>	<b>16</b>	<b>3.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	71,915	48.6%	4.4%	22.1%	17.3%	7.6%	\$0.83	31.4%	28.0%	33.8%	6.8%	112	16	3.6
(L) Windows	71,639	51.6%	10.1%	14.3%	16.4%	7.6%	\$0.74	37.2%	44.3%	10.9%	7.6%	115	13	2.5
(L) Skylights	72,924	54.5%	7.7%	13.6%	16.8%	7.5%	\$0.71	42.2%	38.6%	11.2%	8.0%	109	10	2.2
(L) Sawtooth Ap	69,500	56.0%	7.4%	13.7%	15.1%	7.8%	\$0.69	41.7%	38.8%	11.2%	8.2%	121	9	2.2
(L) Monitor Ap.	74,388	55.8%	8.1%	13.9%	14.9%	7.3%	\$0.74	41.1%	40.3%	11.0%	7.6%	124	10	2.3
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>51,184</b>	<b>11.3%</b>	<b>0.0%</b>	<b>38.8%</b>	<b>4.3%</b>	<b>45.6%</b>	<b>\$0.86</b>	<b>4.7%</b>	<b>3.3%</b>	<b>42.1%</b>	<b>49.9%</b>	<b>20</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	40,936	24.1%	0.0%	13.7%	5.1%	57.1%	\$0.58	11.6%	4.2%	11.0%	73.2%	18	0	2.7
(L) Sawtooth Ap	45,006	28.9%	0.0%	10.2%	9.1%	51.9%	\$0.63	14.3%	8.2%	9.3%	68.2%	36	0	2.8
(L) Monitor Ap.	45,589	23.1%	0.0%	18.3%	7.5%	51.2%	\$0.62	11.7%	6.9%	12.7%	68.8%	30	0	2.8
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>35,247</b>	<b>43.5%</b>	<b>0.0%</b>	<b>32.1%</b>	<b>10.1%</b>	<b>14.4%</b>	<b>\$0.49</b>	<b>21.6%</b>	<b>8.3%</b>	<b>49.2%</b>	<b>20.9%</b>	<b>30</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St	33,742	41.5%	0.0%	33.5%	9.9%	15.0%	\$0.48	20.0%	8.4%	50.3%	21.3%	29	0	1.9
(H) Indirect Gain	33,737	40.3%	0.0%	33.5%	11.2%	15.0%	\$0.48	19.6%	8.8%	50.3%	21.3%	29	0	1.9
(H) Direct Gain														
(H) Sunspace	32,993	37.2%	0.0%	34.3%	13.1%	15.3%	\$0.48	18.2%	9.3%	50.9%	21.6%	29	0	1.9
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	32,932	48.9%	0.0%	24.9%	10.8%	15.4%	\$0.41	27.1%	9.8%	38.2%	24.9%	30	0	1.6
(L) Skylights	33,651	66.7%	0.0%	9.5%	8.7%	15.0%	\$0.33	46.5%	9.5%	12.6%	31.4%	24	0	1.1
(L) Sawtooth Ap	30,375	59.7%	0.0%	10.8%	12.8%	16.7%	\$0.31	40.1%	13.8%	13.3%	32.7%	33	0	1.1
(L) Monitor Ap.	32,551	59.2%	0.0%	12.2%	13.0%	15.6%	\$0.33	40.7%	14.3%	13.8%	31.2%	35	0	1.1
(L) Atrium														



# Climate Region 2

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>58,022</b>	<b>30.1%</b>	<b>0.0%</b>	<b>42.3%</b>	<b>7.5%</b>	<b>20.1%</b>	<b>\$0.83</b>	<b>14.6%</b>	<b>5.9%</b>	<b>53.8%</b>	<b>25.7%</b>	<b>36</b>	<b>0</b>	<b>3.3</b>
(H) Direct Gain + St	56,523	29.0%	0.0%	43.4%	7.0%	20.7%	\$0.82	13.7%	5.8%	54.5%	26.0%	35	0	3.3
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace	54,637	22.7%	0.0%	44.9%	11.0%	21.4%	\$0.81	11.0%	7.1%	55.4%	26.5%	35	0	3.3
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	49,523	39.8%	0.0%	26.9%	9.8%	23.6%	\$0.60	22.8%	9.1%	32.6%	35.5%	40	0	2.4
(L) Skylights	48,705	53.6%	0.0%	14.3%	8.2%	24.0%	\$0.51	34.8%	8.2%	15.5%	41.6%	33	0	1.9
(L) Sawtooth Ap	47,779	50.9%	0.0%	11.8%	12.8%	24.4%	\$0.52	32.4%	13.0%	13.8%	40.8%	50	0	2.0
(L) Monitor Ap.	50,097	48.9%	0.0%	15.5%	12.2%	23.3%	\$0.54	31.9%	12.6%	15.6%	39.8%	50	0	2.0
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>55,918</b>	<b>21.1%</b>	<b>17.1%</b>	<b>35.5%</b>	<b>5.5%</b>	<b>20.9%</b>	<b>\$1.01</b>	<b>8.0%</b>	<b>35.1%</b>	<b>35.7%</b>	<b>21.2%</b>	<b>18</b>	<b>21</b>	<b>5.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	55,741	21.5%	16.1%	35.6%	5.9%	20.9%	\$1.00	8.1%	34.8%	35.8%	21.2%	18	21	5.4
(C) Natural Vent	54,783	21.5%	15.4%	36.2%	5.7%	21.3%	\$0.99	8.1%	34.0%	36.3%	21.5%	18	21	5.4
(L) Windows	51,811	25.8%	19.5%	26.5%	5.7%	22.5%	\$0.89	10.2%	40.7%	25.0%	24.1%	20	20	4.5
(L) Skylights	47,297	39.6%	16.6%	11.9%	7.2%	24.7%	\$0.74	17.4%	44.9%	8.7%	29.0%	17	22	4.0
(L) Sawtooth Ap	50,055	37.5%	23.5%	9.1%	6.6%	23.3%	\$0.83	15.3%	51.9%	7.1%	25.8%	26	22	4.0
(L) Monitor Ap.	51,966	36.2%	22.9%	12.1%	6.3%	22.4%	\$0.83	15.3%	50.7%	8.2%	25.8%	26	22	3.9
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>37,699</b>	<b>11.9%</b>	<b>0.0%</b>	<b>52.6%</b>	<b>4.6%</b>	<b>30.9%</b>	<b>\$0.63</b>	<b>5.0%</b>	<b>3.5%</b>	<b>57.5%</b>	<b>34.0%</b>	<b>15</b>	<b>0</b>	<b>2.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	32,550	16.2%	0.0%	42.1%	5.9%	35.8%	\$0.50	7.4%	5.0%	44.7%	43.0%	17	0	2.3
(L) Skylights	27,510	31.1%	0.0%	20.4%	6.1%	42.4%	\$0.36	16.5%	5.5%	18.0%	60.0%	15	0	1.7
(L) Sawtooth Ap	26,909	30.3%	0.0%	17.0%	9.4%	43.3%	\$0.36	15.7%	8.8%	16.2%	59.3%	23	0	1.7
(L) Monitor Ap.	28,665	28.5%	0.0%	22.0%	8.8%	40.7%	\$0.37	15.3%	8.6%	18.3%	57.8%	23	0	1.7
(L) Atrium														



# Climate Region 2

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Blu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool
<b>M AUDITORIUM</b>	<b>68,663</b>	<b>40.5%</b>	<b>22.1%</b>	<b>21.2%</b>	<b>8.9%</b>	<b>7.3%</b>	<b>\$1.14</b>	<b>17.0%</b>	<b>50.8%</b>	<b>23.1%</b>	<b>9.0%</b>	<b>38</b>	<b>39</b>	<b>6.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	66,239	42.0%	19.2%	22.0%	9.2%	7.6%	\$1.10	17.6%	49.3%	23.9%	9.3%	38	39	6.8
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>87,635</b>	<b>29.0%</b>	<b>24.2%</b>	<b>32.6%</b>	<b>8.4%</b>	<b>5.8%</b>	<b>\$1.56</b>	<b>11.4%</b>	<b>49.0%</b>	<b>33.0%</b>	<b>6.6%</b>	<b>37</b>	<b>46</b>	<b>8.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	84,509	30.0%	21.4%	33.8%	8.7%	6.0%	\$1.53	11.6%	47.9%	33.8%	6.7%	37	46	8.9
(L) Windows	79,906	36.3%	26.0%	23.3%	8.0%	6.4%	\$1.36	14.7%	53.5%	24.2%	7.6%	40	40	6.9
(L) Skylights	69,920	53.6%	18.6%	11.6%	8.9%	7.3%	\$1.03	24.9%	50.2%	14.9%	10.0%	30	38	5.3
(L) Sawtooth Ap	65,917	50.3%	21.4%	12.6%	7.9%	7.7%	\$1.02	22.0%	52.7%	15.2%	10.1%	39	29	5.0
(L) Monitor Ap.	72,461	48.5%	22.7%	13.9%	7.8%	7.0%	\$1.10	21.6%	54.2%	14.9%	9.3%	43	31	5.3
(L) Atrium	81,420	46.6%	26.3%	10.7%	10.1%	6.3%	\$1.28	20.7%	58.9%	12.3%	8.1%	37	50	6.9
<b>O TRAINING &gt;5000</b>	<b>70,708</b>	<b>22.7%</b>	<b>22.2%</b>	<b>40.6%</b>	<b>7.3%</b>	<b>7.3%</b>	<b>\$1.29</b>	<b>8.7%</b>	<b>43.2%</b>	<b>40.1%</b>	<b>8.0%</b>	<b>25</b>	<b>34</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	70,519	23.0%	21.3%	40.7%	7.7%	7.3%	\$1.28	8.8%	43.0%	40.1%	8.0%	25	34	7.0
(C) Natural Vent	68,633	23.4%	19.9%	41.8%	7.5%	7.5%	\$1.25	8.9%	41.6%	41.2%	8.2%	25	34	7.3
(L) Windows	62,015	30.0%	21.6%	34.0%	6.2%	8.3%	\$1.02	12.4%	43.3%	34.2%	10.1%	26	23	4.9
(L) Skylights	55,356	46.6%	19.7%	15.7%	8.8%	9.3%	\$0.86	20.5%	49.3%	18.2%	11.9%	22	31	4.3
(L) Sawtooth Ap	53,916	45.9%	25.2%	11.1%	8.3%	9.5%	\$0.92	18.3%	54.9%	15.6%	11.2%	32	26	4.8
(L) Monitor Ap.	60,025	42.0%	25.2%	16.4%	7.8%	8.5%	\$0.97	17.7%	54.8%	16.9%	10.6%	34	27	4.8
(L) Atrium	57,750	39.5%	23.8%	19.1%	8.8%	8.9%	\$0.92	17.2%	53.1%	18.5%	11.2%	25	33	4.6



# Climate Region 2

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>P TRAINING, MULTI STORY</b>	<b>61,970</b>	<b>12.8%</b>	<b>25.5%</b>	<b>46.3%</b>	<b>7.2%</b>	<b>8.3%</b>	<b>\$1.23</b>	<b>4.5%</b>	<b>44.1%</b>	<b>43.1%</b>	<b>8.4%</b>	<b>17</b>	<b>31</b>	<b>6.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	53,559	18.2%	27.1%	39.4%	5.8%	9.6%	\$0.95	7.1%	44.4%	37.7%	10.9%	18	21	4.7
(L) Skylights	50,505	21.7%	27.1%	33.2%	7.8%	10.2%	\$0.94	8.1%	50.0%	31.0%	10.9%	17	27	4.9
(L) Sawtooth Ap	48,322	23.2%	28.9%	30.0%	7.3%	10.6%	\$0.93	8.3%	50.4%	30.2%	11.1%	20	24	4.8
(L) Monitor Ap.	50,396	23.1%	28.7%	30.9%	7.2%	10.2%	\$0.95	8.4%	50.8%	30.0%	10.8%	21	24	4.9
(L) Atrium	51,895	22.4%	30.4%	28.6%	8.7%	9.9%	\$0.96	8.5%	55.3%	25.4%	10.7%	18	31	5.0
<b>Q TRAINING, GYM</b>	<b>70,845</b>	<b>39.2%</b>	<b>0.0%</b>	<b>50.2%</b>	<b>10.6%</b>	<b>0.0%</b>	<b>\$0.71</b>	<b>27.0%</b>	<b>10.4%</b>	<b>62.6%</b>	<b>0.0%</b>	<b>50</b>	<b>0</b>	<b>2.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	68,534	64.8%	0.0%	24.7%	10.5%	0.0%	\$0.49	61.0%	13.7%	25.4%	0.0%	47	0	0.9
(L) Sawtooth Ap	62,392	59.3%	0.0%	24.9%	15.8%	0.0%	\$0.47	54.6%	20.4%	25.0%	0.0%	65	0	1.0
(L) Monitor Ap.	66,607	57.8%	0.0%	26.8%	15.4%	0.0%	\$0.50	53.8%	20.0%	26.2%	0.0%	67	0	1.0
(L) Atrium														
<b>R WAREHOUSE</b>	<b>25,127</b>	<b>63.9%</b>	<b>0.0%</b>	<b>28.2%</b>	<b>7.9%</b>	<b>0.0%</b>	<b>\$0.26</b>	<b>41.9%</b>	<b>8.1%</b>	<b>50.1%</b>	<b>0.0%</b>	<b>17</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	21,258	58.1%	0.0%	33.3%	8.6%	0.0%	\$0.24	36.7%	7.9%	55.4%	0.0%	16	0	0.7
(H) Indirect Gain	21,637	57.1%	0.0%	32.7%	10.1%	0.0%	\$0.24	35.6%	9.5%	55.0%	0.0%	16	0	0.7
(H) Direct Gain	21,584	58.4%	0.0%	32.8%	8.8%	0.0%	\$0.24	36.5%	8.6%	54.9%	0.0%	17	0	0.7
(H) Sunspace	21,193	54.0%	0.0%	33.4%	12.5%	0.0%	\$0.23	34.1%	10.2%	55.7%	0.0%	16	0	0.7
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	23,252	82.8%	0.0%	8.6%	8.6%	0.0%	\$0.17	74.9%	11.8%	13.3%	0.0%	17	0	0.3
(L) Sawtooth Ap	19,970	77.8%	0.0%	8.2%	14.1%	0.0%	\$0.16	66.8%	19.9%	13.2%	0.0%	24	0	0.4
(L) Monitor Ap.	21,127	76.0%	0.0%	10.7%	13.4%	0.0%	\$0.17	66.3%	19.0%	14.7%	0.0%	24	0	0.4
(L) Atrium														



# Climate Region 3

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>74,573</b>	<b>12.4%</b>	<b>33.9%</b>	<b>38.3%</b>	<b>8.6%</b>	<b>6.8%</b>	<b>\$0.98</b>	<b>5.9%</b>	<b>49.6%</b>	<b>37.4%</b>	<b>7.1%</b>	<b>22</b>	<b>46</b>	<b>8.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	71,392	12.9%	30.9%	40.0%	9.0%	7.2%	\$0.93	6.2%	47.1%	39.3%	7.4%	22	46	8.7
(L) Windows	64,265	15.9%	39.2%	28.3%	8.6%	7.9%	\$0.84	7.4%	56.1%	28.3%	8.2%	24	40	7.1
(L) Skylights	47,011	25.9%	36.4%	15.4%	11.4%	10.9%	\$0.60	12.8%	57.5%	18.2%	11.5%	18	38	5.5
(L) Sawtooth Ap	45,921	26.7%	36.4%	16.8%	8.9%	11.1%	\$0.59	12.2%	56.7%	19.3%	11.7%	24	29	5.2
(L) Monitor Ap.	51,289	25.4%	38.2%	17.8%	8.7%	10.0%	\$0.65	11.8%	58.2%	19.3%	10.7%	26	31	5.7
(L) Atrium	59,942	20.6%	45.8%	13.1%	11.9%	8.5%	\$0.77	10.3%	65.8%	14.9%	9.0%	22	50	6.9
<b>B ADMIN &gt;5000 SF</b>	<b>62,000</b>	<b>8.5%</b>	<b>29.6%</b>	<b>46.3%</b>	<b>7.4%</b>	<b>8.3%</b>	<b>\$0.82</b>	<b>4.0%</b>	<b>42.8%</b>	<b>44.8%</b>	<b>8.5%</b>	<b>15</b>	<b>34</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	52,002	11.4%	32.4%	40.1%	6.3%	9.9%	\$0.66	5.4%	44.8%	39.5%	10.4%	16	24	5.1
(L) Skylights	38,722	20.0%	36.3%	19.4%	11.1%	13.2%	\$0.51	9.5%	55.3%	21.8%	13.5%	13	31	4.5
(L) Sawtooth Ap	39,295	21.6%	41.7%	14.4%	9.2%	13.1%	\$0.54	9.2%	59.8%	18.0%	12.9%	19	26	5.0
(L) Monitor Ap.	44,687	19.4%	40.6%	20.1%	8.5%	11.5%	\$0.59	8.6%	58.3%	21.2%	11.8%	20	27	5.1
(L) Atrium	43,901	15.7%	38.8%	23.6%	10.2%	11.7%	\$0.57	7.5%	56.7%	23.7%	12.1%	15	33	4.8
<b>C ADMIN, MULTISTORY</b>	<b>59,554</b>	<b>4.5%</b>	<b>31.8%</b>	<b>48.2%</b>	<b>6.9%</b>	<b>8.6%</b>	<b>\$0.81</b>	<b>2.0%</b>	<b>43.4%</b>	<b>46.0%</b>	<b>8.6%</b>	<b>10</b>	<b>31</b>	<b>6.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	57,641	4.7%	29.5%	49.8%	7.2%	8.9%	\$0.78	2.1%	41.5%	47.6%	8.9%	10	31	6.6
(L) Windows	49,809	6.6%	35.6%	41.9%	5.6%	10.3%	\$0.65	3.0%	45.3%	41.0%	10.7%	11	21	4.9
(L) Skylights	45,366	7.6%	37.2%	36.0%	7.9%	11.3%	\$0.62	3.4%	50.7%	34.7%	11.2%	10	27	5.1
(L) Sawtooth Ap	43,352	8.4%	39.7%	32.6%	7.5%	11.8%	\$0.60	3.6%	52.2%	32.6%	11.5%	12	24	5.2
(L) Monitor Ap.	45,067	8.6%	39.5%	33.3%	7.3%	11.4%	\$0.62	3.7%	52.1%	33.0%	11.2%	12	24	5.3
(L) Atrium	46,771	7.6%	41.9%	30.7%	8.8%	11.0%	\$0.64	3.4%	56.5%	29.3%	10.9%	11	31	5.3

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>D ADMIN, COMPUTER FAC</b>	<b>134,427</b>	<b>4.9%</b>	<b>24.9%</b>	<b>24.3%</b>	<b>7.3%</b>	<b>38.6%</b>	<b>\$1.68</b>	<b>2.4%</b>	<b>35.6%</b>	<b>23.7%</b>	<b>38.3%</b>	<b>21</b>	<b>51</b>	<b>12.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent							\$1.65	2.5%	34.2%	24.2%	39.1%	21	51	12.3
(C) Natural Vent	131,892	5.0%	23.5%	24.8%	7.4%	39.3%	\$1.54	3.0%	36.2%	19.1%	41.7%	21	41	10.6
(L) Windows	124,685	6.0%	26.3%	19.9%	6.2%	41.6%	\$1.35	4.5%	38.9%	9.0%	47.6%	19	48	9.9
(L) Skylights	107,842	9.0%	25.8%	8.0%	9.1%	48.1%	\$1.37	4.4%	41.3%	7.4%	46.9%	25	43	10.2
(L) Sawtooth Ap	107,854	9.4%	28.4%	5.9%	8.3%	48.1%	\$1.45	4.0%	40.7%	11.0%	44.2%	26	45	10.3
(L) Monitor Ap.	117,122	8.4%	28.3%	11.4%	7.7%	44.3%	\$1.44	3.5%	41.9%	10.0%	44.6%	21	53	10.4
(L) Atrium	114,821	7.1%	28.6%	9.9%	9.3%	45.2%								
<b>E DINING FACILITY</b>	<b>103,560</b>	<b>11.7%</b>	<b>19.3%</b>	<b>30.4%</b>	<b>8.3%</b>	<b>30.3%</b>	<b>\$0.98</b>	<b>8.9%</b>	<b>37.5%</b>	<b>35.3%</b>	<b>18.3%</b>	<b>38</b>	<b>39</b>	<b>6.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent							\$0.93	9.4%	34.4%	37.0%	19.2%	38	39	6.3
(C) Natural Vent	99,979	12.1%	16.4%	31.5%	8.6%	31.3%	\$0.83	11.5%	45.8%	21.2%	21.6%	40	39	5.2
(L) Windows	92,338	14.4%	22.8%	19.5%	9.5%	33.9%	\$0.68	17.8%	38.2%	17.6%	26.4%	37	33	4.2
(L) Skylights	82,424	21.4%	16.3%	15.1%	9.2%	38.0%	\$0.79	13.6%	47.1%	16.7%	22.6%	42	34	4.8
(L) Sawtooth Ap	88,955	17.9%	22.1%	15.8%	9.0%	35.2%	\$0.84	13.1%	47.4%	18.2%	21.3%	44	35	4.9
(L) Monitor Ap.	94,046	17.2%	23.0%	17.7%	8.9%	33.3%								
(L) Atrium														
<b>F DORMITORY</b>	<b>38,866</b>	<b>1.3%</b>	<b>35.9%</b>	<b>38.0%</b>	<b>14.3%</b>	<b>10.4%</b>	<b>\$0.49</b>	<b>0.8%</b>	<b>48.0%</b>	<b>38.9%</b>	<b>12.2%</b>	<b>9</b>	<b>23</b>	<b>4.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent							\$0.45	0.9%	43.6%	42.2%	13.3%	9	23	4.2
(C) Natural Vent	35,031	1.5%	28.9%	42.2%	15.9%	11.6%	\$0.44	1.5%	54.3%	30.4%	13.8%	10	19	3.1
(L) Windows	36,523	2.6%	39.5%	33.9%	12.9%	11.1%	\$0.45	2.3%	57.7%	26.6%	13.3%	9	22	3.1
(L) Skylights	38,265	3.9%	40.9%	30.8%	13.8%	10.6%								
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														

# Climate Region 3

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>G FIRE STATION</b>	<b>45,065</b>	<b>20.2%</b>	<b>18.7%</b>	<b>35.2%</b>	<b>13.8%</b>	<b>12.1%</b>	<b>\$0.48</b>	<b>11.1%</b>	<b>35.9%</b>	<b>41.7%</b>	<b>11.4%</b>	<b>55</b>	<b>16</b>	<b>3.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	43,868	20.8%	16.8%	36.2%	13.9%	12.4%	\$0.47	11.2%	33.9%	43.1%	11.8%	55	16	3.0
(C) Natural Vent	41,045	22.2%	10.7%	38.7%	15.2%	13.2%	\$0.44	12.2%	29.3%	45.9%	12.5%	55	16	3.1
(L) Windows	38,258	24.8%	21.1%	25.6%	14.4%	14.2%	\$0.39	14.5%	47.4%	24.1%	14.0%	57	13	2.2
(L) Skylights	39,084	32.0%	15.9%	24.4%	13.8%	13.9%	\$0.38	19.7%	41.0%	24.6%	14.6%	54	10	2.0
(L) Sawtooth Ap	33,681	26.2%	15.9%	27.2%	14.5%	16.1%	\$0.33	16.6%	40.1%	26.8%	16.4%	60	9	1.8
(L) Monitor Ap.	36,828	26.2%	17.5%	27.0%	14.5%	14.8%	\$0.37	16.8%	42.4%	25.9%	14.8%	62	10	2.0
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>44,778</b>	<b>1.1%</b>	<b>0.0%</b>	<b>44.3%</b>	<b>2.5%</b>	<b>52.2%</b>	<b>\$0.57</b>	<b>0.7%</b>	<b>1.9%</b>	<b>44.6%</b>	<b>52.7%</b>	<b>10</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	30,508	3.6%	0.0%	16.4%	3.4%	76.6%	\$0.38	2.1%	2.6%	15.6%	79.7%	10	0	2.8
(L) Sawtooth Ap	31,965	7.7%	0.0%	13.2%	6.1%	73.1%	\$0.39	4.4%	4.7%	13.5%	77.5%	18	0	2.8
(L) Monitor Ap.	34,235	5.0%	0.0%	22.0%	4.8%	68.2%	\$0.41	3.0%	3.8%	19.5%	73.6%	15	0	2.8
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>21,432</b>	<b>15.6%</b>	<b>0.0%</b>	<b>52.8%</b>	<b>8.0%</b>	<b>23.6%</b>	<b>\$0.26</b>	<b>8.4%</b>	<b>5.7%</b>	<b>59.9%</b>	<b>26.0%</b>	<b>16</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	18,301	19.0%	0.0%	44.0%	9.3%	27.7%	\$0.22	10.7%	7.0%	50.5%	31.9%	16	0	1.5
(L) Skylights	13,797	32.3%	0.0%	20.8%	10.2%	36.7%	\$0.14	20.3%	7.0%	25.1%	47.6%	13	0	1.1
(L) Sawtooth Ap	14,280	30.0%	0.0%	21.4%	13.1%	35.5%	\$0.15	18.8%	10.5%	25.2%	45.6%	17	0	1.1
(L) Monitor Ap.	15,310	30.1%	0.0%	23.6%	13.2%	33.1%	\$0.16	19.5%	10.5%	26.7%	43.3%	19	0	1.1
(L) Atrium														



# Climate Region 3

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>42,339</b>	<b>9.6%</b>	<b>0.0%</b>	<b>57.9%</b>	<b>4.9%</b>	<b>27.6%</b>	<b>\$0.51</b>	<b>5.2%</b>	<b>3.6%</b>	<b>61.7%</b>	<b>29.4%</b>	<b>19</b>	<b>0</b>	<b>3.2</b>
(H) Direct Gain + St	40,462	5.7%	0.0%	60.6%	4.8%	28.9%	\$0.50	3.3%	3.6%	63.0%	30.1%	18	0	3.2
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	31,190	14.3%	0.0%	40.9%	7.3%	37.4%	\$0.35	8.3%	5.7%	43.6%	42.4%	21	0	2.4
(L) Skylights	24,899	20.6%	0.0%	24.9%	7.7%	46.9%	\$0.27	12.7%	5.2%	26.8%	55.3%	18	0	2.0
(L) Sawtooth Ap	25,693	23.3%	0.0%	20.3%	11.0%	45.4%	\$0.28	14.1%	8.7%	23.3%	53.9%	26	0	2.1
(L) Monitor Ap.	27,436	21.4%	0.0%	25.8%	10.3%	42.6%	\$0.29	13.2%	8.3%	27.3%	51.2%	26	0	2.1
(L) Atrium														
<b>K MAINT AIR COND</b>	<b>48,156</b>	<b>6.7%</b>	<b>22.0%</b>	<b>41.2%</b>	<b>5.9%</b>	<b>24.2%</b>	<b>\$0.64</b>	<b>3.1%</b>	<b>33.5%</b>	<b>39.9%</b>	<b>23.5%</b>	<b>11</b>	<b>21</b>	<b>5.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	46,817	6.9%	19.8%	42.4%	6.1%	24.9%	\$0.62	3.2%	31.4%	41.2%	24.3%	11	21	5.3
(L) Windows	43,065	8.7%	26.8%	31.2%	6.2%	27.1%	\$0.56	3.9%	39.9%	29.5%	26.6%	12	20	4.5
(L) Skylights	34,353	14.4%	28.2%	14.6%	8.9%	34.0%	\$0.44	7.1%	45.8%	13.3%	33.9%	10	23	4.0
(L) Sawtooth Ap	38,397	14.7%	36.4%	11.0%	7.6%	30.4%	\$0.51	6.3%	54.0%	10.3%	29.4%	15	22	4.3
(L) Monitor Ap.	39,801	14.2%	34.9%	14.4%	7.3%	29.3%	\$0.51	6.3%	51.8%	12.6%	29.2%	15	22	4.2
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>32,664</b>	<b>1.0%</b>	<b>0.0%</b>	<b>60.7%</b>	<b>2.6%</b>	<b>35.7%</b>	<b>\$0.42</b>	<b>0.6%</b>	<b>2.1%</b>	<b>61.2%</b>	<b>36.1%</b>	<b>8</b>	<b>0</b>	<b>2.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	26,386	1.4%	0.0%	50.8%	3.6%	44.2%	\$0.33	0.9%	3.0%	50.5%	45.6%	9	0	2.3
(L) Skylights	18,253	4.2%	0.0%	27.4%	4.5%	63.9%	\$0.22	2.6%	3.2%	26.5%	67.7%	8	0	1.8
(L) Sawtooth Ap	17,996	4.9%	0.0%	23.5%	6.8%	64.8%	\$0.22	2.9%	5.6%	23.6%	67.9%	11	0	1.8
(L) Monitor Ap.	19,550	4.8%	0.0%	29.3%	6.3%	59.7%	\$0.23	2.9%	5.2%	27.7%	64.2%	11	0	1.8
(L) Atrium														



# Climate Region 3

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	OProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>M AUDITORIUM</b>	<b>50,245</b>	<b>17.7%</b>	<b>32.6%</b>	<b>28.9%</b>	<b>10.7%</b>	<b>10.0%</b>	<b>\$0.65</b>	<b>8.5%</b>	<b>52.2%</b>	<b>28.7%</b>	<b>10.5%</b>	<b>23</b>	<b>39</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	47,737	18.6%	29.1%	30.5%	11.3%	10.5%	\$0.61	9.0%	49.6%	30.3%	11.1%	23	39	6.4
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap.														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>74,573</b>	<b>12.4%</b>	<b>33.9%</b>	<b>38.3%</b>	<b>8.6%</b>	<b>6.8%</b>	<b>\$0.98</b>	<b>5.9%</b>	<b>49.6%</b>	<b>37.4%</b>	<b>7.1%</b>	<b>22</b>	<b>46</b>	<b>8.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	71,392	12.9%	30.9%	40.0%	9.0%	7.2%	\$0.93	6.2%	47.1%	39.3%	7.4%	22	46	8.7
(L) Windows	64,265	15.9%	39.2%	28.3%	8.6%	7.9%	\$0.84	7.4%	56.1%	28.3%	8.2%	24	40	7.1
(L) Skylights	47,011	25.9%	36.4%	15.4%	11.4%	10.9%	\$0.60	12.8%	57.5%	18.2%	11.5%	18	38	5.5
(L) Sawtooth Ap.	45,921	26.7%	36.4%	16.8%	8.9%	11.1%	\$0.59	12.2%	56.7%	19.3%	11.7%	24	29	5.2
(L) Monitor Ap.	51,289	25.4%	38.2%	17.8%	8.7%	10.0%	\$0.65	11.8%	58.2%	19.3%	10.7%	26	31	5.7
(L) Atrium	59,942	20.6%	45.8%	13.1%	11.9%	8.5%	\$0.77	10.3%	65.8%	14.9%	9.0%	22	50	6.9
<b>O TRAINING &gt;5000</b>	<b>62,000</b>	<b>8.5%</b>	<b>29.6%</b>	<b>46.3%</b>	<b>7.4%</b>	<b>8.3%</b>	<b>\$0.82</b>	<b>4.0%</b>	<b>42.8%</b>	<b>44.8%</b>	<b>8.5%</b>	<b>15</b>	<b>34</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	52,002	11.4%	32.4%	40.1%	6.3%	9.9%	\$0.66	5.4%	44.8%	39.5%	10.4%	16	24	5.1
(L) Skylights	38,722	20.0%	36.3%	19.4%	11.1%	13.2%	\$0.51	9.5%	55.3%	21.8%	13.5%	13	31	4.5
(L) Sawtooth Ap.	39,295	21.6%	41.7%	14.4%	9.2%	13.1%	\$0.54	9.2%	59.8%	18.0%	12.9%	19	26	5.0
(L) Monitor Ap.	44,687	19.4%	40.6%	20.1%	8.5%	11.5%	\$0.59	8.6%	58.3%	21.2%	11.8%	20	27	5.1
(L) Atrium	43,901	15.7%	38.8%	23.6%	10.2%	11.7%	\$0.57	7.5%	56.7%	23.7%	12.1%	15	33	4.8



# Climate Region 3

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>P TRAINING, MULTI STORY</b>	<b>59,554</b>	<b>4.5%</b>	<b>31.8%</b>	<b>48.2%</b>	<b>6.9%</b>	<b>8.6%</b>	<b>\$0.81</b>	<b>2.0%</b>	<b>43.4%</b>	<b>46.0%</b>	<b>8.6%</b>	<b>10</b>	<b>31</b>	<b>6.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	57,641	4.7%	29.5%	49.8%	7.2%	8.9%	\$0.78	2.1%	41.5%	47.6%	8.9%	10	31	6.6
(L) Windows	49,809	6.6%	35.6%	41.9%	5.6%	10.3%	\$0.65	3.0%	45.3%	41.0%	10.7%	11	21	4.9
(L) Skylights	45,366	7.6%	37.2%	36.0%	7.9%	11.3%	\$0.62	3.4%	50.7%	34.7%	11.2%	10	27	5.1
(L) Sawtooth Ap	43,352	8.4%	39.7%	32.6%	7.5%	11.8%	\$0.60	3.6%	52.2%	32.6%	11.5%	12	24	5.2
(L) Monitor Ap.	45,067	8.6%	39.5%	33.3%	7.3%	11.4%	\$0.62	3.7%	52.1%	33.0%	11.2%	12	24	5.3
(L) Atrium	46,771	7.6%	41.9%	30.7%	8.8%	11.0%	\$0.64	3.4%	56.5%	29.3%	10.9%	11	31	5.3
<b>Q TRAINING, GYM</b>	<b>44,718</b>	<b>12.0%</b>	<b>0.0%</b>	<b>79.6%</b>	<b>8.5%</b>	<b>0.0%</b>	<b>\$0.45</b>	<b>8.4%</b>	<b>6.6%</b>	<b>85.0%</b>	<b>0.0%</b>	<b>25</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	27,729	28.9%	0.0%	58.0%	13.0%	0.0%	\$0.23	25.1%	8.8%	66.1%	0.0%	24	0	0.9
(L) Sawtooth Ap	28,282	29.7%	0.0%	53.2%	17.1%	0.0%	\$0.24	24.9%	15.2%	59.9%	0.0%	33	0	0.9
(L) Monitor Ap.	30,717	28.2%	0.0%	55.4%	16.4%	0.0%	\$0.26	23.5%	14.8%	61.7%	0.0%	34	0	1.0
(L) Atrium														
<b>R WAREHOUSE</b>	<b>11,517</b>	<b>30.0%</b>	<b>0.0%</b>	<b>61.5%</b>	<b>8.4%</b>	<b>0.0%</b>	<b>\$0.12</b>	<b>18.6%</b>	<b>5.5%</b>	<b>75.9%</b>	<b>0.0%</b>	<b>9</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	9,818	18.4%	0.0%	72.2%	9.4%	0.0%	\$0.11	10.9%	7.1%	82.0%	0.0%	9	0	0.7
(H) Indirect Gain	10,114	17.0%	0.0%	70.1%	13.0%	0.0%	\$0.11	11.2%	8.7%	80.1%	0.0%	9	0	0.7
(H) Direct Gain	10,400	22.8%	0.0%	68.1%	9.1%	0.0%	\$0.11	13.2%	7.1%	79.8%	0.0%	9	0	0.7
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	7,118	61.2%	0.0%	25.1%	13.7%	0.0%	\$0.05	49.3%	12.2%	38.5%	0.0%	9	0	0.3
(L) Sawtooth Ap	6,073	52.9%	0.0%	24.8%	22.3%	0.0%	\$0.05	40.2%	23.0%	36.8%	0.0%	13	0	0.3
(L) Monitor Ap.	6,688	49.2%	0.0%	30.6%	20.2%	0.0%	\$0.06	37.5%	20.9%	41.6%	0.0%	13	0	0.3
(L) Atrium														

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>80,036</b>	<b>28.2%</b>	<b>21.9%</b>	<b>35.7%</b>	<b>7.8%</b>	<b>6.4%</b>	<b>\$1.36</b>	<b>7.1%</b>	<b>47.7%</b>	<b>37.7%</b>	<b>7.5%</b>	<b>37</b>	<b>41</b>	<b>8.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	79,094	28.5%	21.0%	36.1%	7.9%	6.5%	\$1.35	7.2%	47.3%	38.0%	7.5%	37	41	8.2
(L) Windows	71,986	35.8%	24.2%	25.5%	7.4%	7.1%	\$1.17	9.2%	52.7%	29.4%	8.7%	40	34	6.4
(L) Skylights	59,370	52.1%	18.5%	12.1%	8.7%	8.6%	\$0.84	15.7%	50.4%	21.7%	12.2%	30	32	4.6
(L) Sawtooth Ap	56,558	49.9%	18.5%	13.6%	9.0%	9.0%	\$0.84	14.1%	51.6%	22.1%	12.2%	39	24	4.5
(L) Monitor Ap.	63,302	48.8%	19.6%	14.8%	8.8%	8.1%	\$0.91	14.2%	53.1%	21.5%	11.2%	42	26	4.8
(L) Atrium	71,391	45.6%	26.0%	11.1%	10.1%	7.2%	\$1.10	12.8%	60.9%	17.0%	9.3%	37	44	6.5
<b>B ADMIN &gt;5000 SF</b>	<b>64,904</b>	<b>21.1%</b>	<b>20.1%</b>	<b>44.2%</b>	<b>6.7%</b>	<b>7.9%</b>	<b>\$1.14</b>	<b>5.1%</b>	<b>40.8%</b>	<b>45.1%</b>	<b>8.9%</b>	<b>25</b>	<b>29</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	56,217	28.1%	19.7%	37.2%	5.9%	9.1%	\$0.90	7.3%	40.7%	40.7%	11.3%	26	19	4.6
(L) Skylights	46,870	45.0%	19.5%	15.9%	8.7%	10.9%	\$0.72	12.4%	47.9%	25.5%	14.2%	22	27	4.0
(L) Sawtooth Ap	46,472	45.3%	23.3%	11.7%	8.7%	11.0%	\$0.76	11.4%	52.7%	22.5%	13.4%	32	22	4.4
(L) Monitor Ap.	52,803	42.0%	22.5%	17.5%	8.2%	9.7%	\$0.82	11.2%	52.7%	23.7%	12.4%	34	23	4.5
(L) Atrium	50,126	37.4%	22.9%	20.7%	8.8%	10.2%	\$0.80	10.0%	51.9%	25.3%	12.8%	25	29	4.3
<b>C ADMIN, MULTISTORY</b>	<b>58,464</b>	<b>11.8%</b>	<b>23.6%</b>	<b>49.1%</b>	<b>6.8%</b>	<b>8.8%</b>	<b>\$1.14</b>	<b>2.6%</b>	<b>41.8%</b>	<b>46.6%</b>	<b>9.0%</b>	<b>17</b>	<b>28</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	58,357	12.3%	22.7%	49.1%	7.1%	8.8%	\$1.13	2.7%	41.7%	46.6%	9.0%	17	28	6.4
(C) Natural Vent	57,961	11.9%	23.0%	49.5%	6.8%	8.8%	\$1.13	2.6%	41.6%	46.7%	9.0%	17	28	6.6
(L) Windows	50,184	17.1%	25.7%	41.6%	5.3%	10.2%	\$0.88	4.1%	41.5%	42.8%	11.6%	18	18	4.5
(L) Skylights	46,404	20.4%	25.9%	35.3%	7.3%	11.1%	\$0.87	4.6%	47.5%	36.1%	11.8%	17	24	4.7
(L) Sawtooth Ap	44,284	21.8%	27.8%	31.9%	6.9%	11.6%	\$0.85	4.7%	47.8%	35.4%	12.1%	20	21	4.7
(L) Monitor Ap.	46,396	22.0%	27.4%	32.8%	6.7%	11.1%	\$0.87	4.9%	48.0%	35.3%	11.8%	21	22	4.8
(L) Atrium	47,549	21.4%	29.2%	30.2%	8.4%	10.8%	\$0.89	4.9%	52.9%	30.6%	11.5%	18	28	5.0

# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>135,267</b>	<b>12.8%</b>	<b>18.0%</b>	<b>24.2%</b>	<b>6.7%</b>	<b>38.3%</b>	<b>\$2.26</b>	<b>3.3%</b>	<b>33.9%</b>	<b>23.8%</b>	<b>39.0%</b>	<b>35</b>	<b>44</b>	<b>11.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	128,140	15.4%	19.0%	19.4%	5.8%	40.5%	\$2.06	4.0%	34.2%	19.0%	42.8%	36	34	9.8
(L) Skylights	115,824	23.2%	16.9%	7.4%	7.9%	44.8%	\$1.83	6.2%	35.2%	10.4%	48.2%	32	41	9.0
(L) Sawtooth Ap	115,513	23.1%	18.7%	5.3%	8.0%	44.9%	\$1.88	6.0%	37.8%	9.3%	46.8%	42	36	9.4
(L) Monitor Ap.	124,032	20.9%	18.8%	11.0%	7.5%	41.8%	\$1.97	5.6%	38.5%	11.2%	44.7%	43	38	9.5
(L) Atrium	120,415	19.7%	19.2%	9.5%	8.6%	43.1%	\$1.95	5.3%	38.9%	10.6%	45.2%	36	46	9.8
<b>E DINING FACILITY</b>	<b>124,015</b>	<b>30.9%</b>	<b>10.1%</b>	<b>25.4%</b>	<b>8.3%</b>	<b>25.3%</b>	<b>\$1.20</b>	<b>14.3%</b>	<b>38.7%</b>	<b>34.9%</b>	<b>12.1%</b>	<b>72</b>	<b>31</b>	<b>5.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	123,262	31.1%	9.5%	25.5%	8.4%	25.4%	\$1.19	14.4%	38.3%	35.1%	12.2%	72	31	5.8
(L) Windows	116,194	36.5%	11.3%	15.8%	9.4%	27.0%	\$1.02	18.6%	48.6%	18.5%	14.3%	76	31	4.5
(L) Skylights	111,658	44.8%	7.1%	11.1%	8.9%	28.1%	\$0.81	27.3%	39.3%	15.5%	17.9%	69	24	3.2
(L) Sawtooth Ap	115,510	40.6%	10.4%	11.9%	10.0%	27.1%	\$1.00	20.9%	51.1%	13.4%	14.6%	79	26	3.9
(L) Monitor Ap.	122,068	39.8%	10.9%	13.7%	9.9%	25.7%	\$1.05	20.5%	51.3%	14.4%	13.8%	82	27	4.0
(L) Atrium														
<b>F DORMITORY</b>	<b>36,894</b>	<b>11.4%</b>	<b>24.1%</b>	<b>40.0%</b>	<b>13.5%</b>	<b>11.0%</b>	<b>\$0.63</b>	<b>3.1%</b>	<b>38.6%</b>	<b>43.2%</b>	<b>15.0%</b>	<b>16</b>	<b>20</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	35,688	15.6%	26.8%	34.6%	11.6%	11.3%	\$0.54	4.6%	48.0%	29.7%	17.8%	17	17	2.8
(L) Skylights	37,820	18.3%	27.5%	31.1%	12.4%	10.7%	\$0.55	5.6%	52.7%	24.5%	17.2%	16	19	2.8
(L) Sawtooth Ap	36,924	18.7%	27.9%	31.3%	11.1%	11.0%	\$0.56	5.3%	53.7%	24.0%	17.1%	19	17	2.9
(L) Monitor Ap.	38,426	19.5%	27.8%	31.4%	10.8%	10.5%	\$0.57	5.6%	53.8%	23.9%	16.6%	20	17	3.0
(L) Atrium														



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/st)
<b>G FIRE STATION</b>	<b>61,635</b>	<b>39.0%</b>	<b>8.5%</b>	<b>25.7%</b>	<b>18.0%</b>	<b>8.8%</b>	<b>\$0.71</b>	<b>16.3%</b>	<b>36.1%</b>	<b>39.3%</b>	<b>8.3%</b>	<b>112</b>	<b>14</b>	<b>3.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	61,033	39.3%	7.7%	26.0%	18.0%	8.9%	\$0.70	16.3%	35.4%	39.9%	8.4%	112	14	3.3
(C) Natural Vent	59,401	40.4%	5.1%	26.7%	18.6%	9.2%	\$0.67	17.3%	32.4%	41.6%	8.8%	112	14	3.5
(L) Windows	56,350	45.3%	9.3%	17.4%	18.4%	9.6%	\$0.60	21.8%	51.4%	16.9%	9.9%	115	11	2.4
(L) Skylights	58,733	48.3%	6.9%	16.2%	19.3%	9.3%	\$0.57	25.8%	46.5%	17.3%	10.4%	109	8	2.2
(L) Sawtooth Ap	52,904	48.0%	6.6%	17.2%	17.9%	10.3%	\$0.53	24.9%	45.7%	18.2%	11.2%	121	8	2.1
(L) Monitor Ap.	58,762	49.0%	7.2%	17.0%	17.6%	9.3%	\$0.58	25.4%	46.8%	17.6%	10.2%	124	9	2.2
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>49,678</b>	<b>8.7%</b>	<b>0.0%</b>	<b>40.0%</b>	<b>4.3%</b>	<b>47.0%</b>	<b>\$0.83</b>	<b>2.3%</b>	<b>3.4%</b>	<b>43.2%</b>	<b>51.1%</b>	<b>20</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	37,962	20.0%	0.0%	13.1%	5.4%	61.5%	\$0.57	5.9%	4.3%	14.6%	75.2%	18	0	2.9
(L) Sawtooth Ap	42,974	26.8%	0.0%	9.6%	9.3%	54.3%	\$0.60	8.4%	8.3%	12.8%	70.5%	36	0	3.0
(L) Monitor Ap.	43,390	21.0%	0.0%	17.5%	7.6%	53.8%	\$0.61	6.5%	7.1%	16.3%	70.1%	30	0	3.0
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>32,155</b>	<b>38.4%</b>	<b>0.0%</b>	<b>35.2%</b>	<b>10.6%</b>	<b>15.7%</b>	<b>\$0.44</b>	<b>12.5%</b>	<b>9.4%</b>	<b>54.8%</b>	<b>23.3%</b>	<b>30</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St	29,585	33.7%	0.0%	38.3%	10.9%	17.1%	\$0.43	10.3%	9.6%	56.2%	23.9%	29	0	1.9
(H) Indirect Gain	29,405	31.7%	0.0%	38.5%	12.6%	17.2%	\$0.43	9.9%	10.1%	56.1%	23.9%	29	0	1.9
(H) Direct Gain														
(H) Sunspace	28,245	26.9%	0.0%	40.1%	15.1%	17.9%	\$0.42	8.3%	11.1%	56.6%	24.1%	29	0	1.9
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	29,576	43.9%	0.0%	27.4%	11.6%	17.1%	\$0.36	15.9%	11.2%	44.9%	28.1%	30	0	1.6
(L) Skylights	27,940	61.6%	0.0%	10.2%	10.1%	18.1%	\$0.26	28.7%	11.3%	21.0%	39.0%	24	0	1.2
(L) Sawtooth Ap	26,623	55.5%	0.0%	11.5%	13.9%	19.0%	\$0.27	24.5%	16.3%	21.0%	38.2%	33	0	1.3
(L) Monitor Ap.	29,036	55.8%	0.0%	12.8%	14.0%	17.4%	\$0.28	25.5%	16.8%	21.4%	36.3%	35	0	1.3
(L) Atrium														



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>55,088</b>	<b>26.8%</b>	<b>0.0%</b>	<b>44.5%</b>	<b>7.5%</b>	<b>21.2%</b>	<b>\$0.77</b>	<b>8.4%</b>	<b>6.4%</b>	<b>57.7%</b>	<b>27.5%</b>	<b>36</b>	<b>0</b>	<b>3.3</b>
(H) Direct Gain + St	51,567	22.4%	0.0%	47.6%	7.4%	22.6%	\$0.76	6.8%	6.2%	58.9%	28.1%	35	0	3.3
(H) Indirect Gain	51,229	20.1%	0.0%	47.9%	9.3%	22.8%	\$0.76	6.4%	6.8%	58.8%	28.1%	35	0	3.3
(H) Direct Gain														
(H) Sunspace	49,043	14.0%	0.0%	50.0%	12.2%	23.8%	\$0.75	4.5%	8.1%	59.2%	28.3%	35	0	3.3
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	45,894	36.2%	0.0%	28.3%	10.1%	25.4%	\$0.55	13.1%	9.9%	38.5%	38.4%	40	0	2.6
(L) Skylights	42,149	48.7%	0.0%	14.6%	9.0%	27.7%	\$0.45	20.2%	9.0%	23.0%	47.8%	33	0	2.2
(L) Sawtooth Ap	44,217	48.7%	0.0%	11.5%	13.4%	26.4%	\$0.47	20.1%	14.5%	20.4%	45.1%	50	0	2.3
(L) Monitor Ap.	46,450	46.6%	0.0%	15.5%	12.7%	25.1%	\$0.49	19.7%	14.0%	22.5%	43.8%	50	0	2.3
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>51,085</b>	<b>18.6%</b>	<b>14.8%</b>	<b>38.8%</b>	<b>5.0%</b>	<b>22.8%</b>	<b>\$0.90</b>	<b>4.4%</b>	<b>32.3%</b>	<b>39.8%</b>	<b>23.6%</b>	<b>18</b>	<b>18</b>	<b>5.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	51,131	19.1%	14.0%	38.8%	5.2%	22.8%	\$0.89	4.5%	31.5%	40.2%	23.8%	18	18	4.9
(C) Natural Vent														
(L) Windows	46,881	23.5%	17.6%	28.9%	5.1%	24.9%	\$0.79	5.7%	38.3%	29.2%	26.8%	20	17	4.1
(L) Skylights	40,517	36.1%	16.0%	12.3%	6.9%	28.8%	\$0.62	9.9%	42.6%	13.3%	34.2%	17	19	3.6
(L) Sawtooth Ap	44,036	35.3%	21.9%	9.4%	7.0%	26.5%	\$0.71	8.9%	50.4%	10.9%	29.9%	26	19	3.8
(L) Monitor Ap.	45,967	34.6%	20.6%	12.7%	6.8%	25.4%	\$0.72	9.1%	49.0%	12.3%	29.7%	26	18	3.7
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>36,316</b>	<b>8.6%</b>	<b>0.0%</b>	<b>54.6%</b>	<b>4.7%</b>	<b>32.1%</b>	<b>\$0.61</b>	<b>2.4%</b>	<b>3.6%</b>	<b>59.0%</b>	<b>35.0%</b>	<b>15</b>	<b>0</b>	<b>2.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	30,786	12.1%	0.0%	43.8%	6.2%	37.9%	\$0.49	3.4%	5.2%	47.6%	43.8%	17	0	2.4
(L) Skylights	24,362	25.0%	0.0%	20.4%	6.7%	47.9%	\$0.34	8.0%	5.6%	24.2%	62.2%	15	0	1.9
(L) Sawtooth Ap	24,522	25.5%	0.0%	16.8%	10.1%	47.6%	\$0.35	7.8%	9.3%	22.1%	60.8%	23	0	2.0
(L) Monitor Ap.	26,452	24.5%	0.0%	22.0%	9.4%	44.1%	\$0.36	7.8%	9.0%	24.3%	58.9%	23	0	2.0
(L) Atrium														



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>M AUDITORIUM</b>	<b>57,354</b>	<b>39.0%</b>	<b>18.7%</b>	<b>25.4%</b>	<b>8.2%</b>	<b>8.7%</b>	<b>\$0.88</b>	<b>10.8%</b>	<b>47.9%</b>	<b>29.8%</b>	<b>11.5%</b>	<b>38</b>	<b>31</b>	<b>5.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>80,036</b>	<b>28.2%</b>	<b>21.9%</b>	<b>35.7%</b>	<b>7.8%</b>	<b>6.4%</b>	<b>\$1.36</b>	<b>7.1%</b>	<b>47.7%</b>	<b>37.7%</b>	<b>7.5%</b>	<b>37</b>	<b>41</b>	<b>8.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	79,094	28.5%	21.0%	36.1%	7.9%	6.5%	\$1.35	7.2%	47.3%	38.0%	7.5%	37	41	8.2
(L) Windows	71,986	35.8%	24.2%	25.5%	7.4%	7.1%	\$1.17	9.2%	52.7%	29.4%	8.7%	40	34	6.4
(L) Skylights	59,370	52.1%	18.5%	12.1%	8.7%	8.6%	\$0.84	15.7%	50.4%	21.7%	12.2%	30	32	4.6
(L) Sawtooth Ap	56,558	49.9%	18.5%	13.6%	9.0%	9.0%	\$0.84	14.1%	51.6%	22.1%	12.2%	39	24	4.5
(L) Monitor Ap.	63,302	48.8%	19.6%	14.8%	8.8%	8.1%	\$0.91	14.2%	53.1%	21.5%	11.2%	42	26	4.8
(L) Atrium	71,391	45.6%	26.0%	11.1%	10.1%	7.2%	\$1.10	12.8%	60.9%	17.0%	9.3%	37	44	6.5
<b>O TRAINING &gt;5000</b>	<b>64,904</b>	<b>21.1%</b>	<b>20.1%</b>	<b>44.2%</b>	<b>6.7%</b>	<b>7.9%</b>	<b>\$1.14</b>	<b>5.1%</b>	<b>40.8%</b>	<b>45.1%</b>	<b>8.9%</b>	<b>25</b>	<b>29</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	56,217	28.1%	19.7%	37.2%	5.9%	9.1%	\$0.90	7.3%	40.7%	40.7%	11.3%	26	19	4.6
(L) Skylights	46,870	45.0%	19.5%	15.9%	8.7%	10.9%	\$0.72	12.4%	47.9%	25.5%	14.2%	22	27	4.0
(L) Sawtooth Ap	46,472	45.3%	23.3%	11.7%	8.7%	11.0%	\$0.76	11.4%	52.7%	22.5%	13.4%	32	22	4.4
(L) Monitor Ap.	52,803	42.0%	22.5%	17.5%	8.2%	9.7%	\$0.82	11.2%	52.7%	23.7%	12.4%	34	23	4.5
(L) Atrium	50,126	37.4%	22.9%	20.7%	8.8%	10.2%	\$0.80	10.0%	51.9%	25.3%	12.8%	25	29	4.3



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QSite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>P TRAINING, MULTI STORY</b>	<b>58,464</b>	<b>11.8%</b>	<b>23.6%</b>	<b>49.1%</b>	<b>6.8%</b>	<b>8.8%</b>	<b>\$1.14</b>	<b>2.6%</b>	<b>41.8%</b>	<b>46.6%</b>	<b>9.0%</b>	<b>17</b>	<b>28</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace							\$1.13	2.7%	41.7%	46.6%	9.0%	17	28	6.4
(C) Night Mech Vent	58,357	12.3%	22.7%	49.1%	7.1%	8.8%	\$1.13	2.6%	41.6%	46.7%	9.0%	17	28	6.6
(C) Natural Vent	57,961	11.9%	23.0%	49.5%	6.8%	8.8%	\$1.13	2.6%	41.6%	46.7%	9.0%	17	28	6.6
(L) Windows	50,184	17.1%	25.7%	41.6%	5.3%	10.2%	\$0.88	4.1%	41.5%	42.8%	11.6%	18	18	4.5
(L) Skylights	46,404	20.4%	25.9%	35.3%	7.3%	11.1%	\$0.87	4.6%	47.5%	36.1%	11.8%	17	24	4.7
(L) Sawtooth Ap	44,284	21.8%	27.8%	31.9%	6.9%	11.6%	\$0.85	4.7%	47.8%	35.4%	12.1%	20	21	4.7
(L) Monitor Ap.	46,396	22.0%	27.4%	32.8%	6.7%	11.1%	\$0.87	4.9%	48.0%	35.3%	11.8%	21	22	4.8
(L) Atrium	47,549	21.4%	29.2%	30.2%	8.4%	10.8%	\$0.89	4.9%	52.9%	30.6%	11.5%	18	28	5.0
<b>Q TRAINING, GYM</b>	<b>62,330</b>	<b>30.9%</b>	<b>0.0%</b>	<b>57.1%</b>	<b>12.0%</b>	<b>0.0%</b>	<b>\$0.62</b>	<b>14.1%</b>	<b>12.3%</b>	<b>73.6%</b>	<b>0.0%</b>	<b>50</b>	<b>0</b>	<b>2.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.36	38.8%	18.6%	42.6%	0.0%	47	0	1.1
(L) Skylights	54,263	57.2%	0.0%	29.6%	13.2%	0.0%	\$0.37	34.5%	26.6%	39.0%	0.0%	65	0	1.2
(L) Sawtooth Ap	53,105	53.4%	0.0%	28.1%	18.5%	0.0%	\$0.40	34.2%	25.7%	40.0%	0.0%	67	0	1.3
(L) Monitor Ap.	57,320	52.2%	0.0%	29.9%	17.8%	0.0%								
(L) Atrium														
<b>R WAREHOUSE</b>	<b>21,667</b>	<b>58.4%</b>	<b>0.0%</b>	<b>32.7%</b>	<b>8.9%</b>	<b>0.0%</b>	<b>\$0.20</b>	<b>27.2%</b>	<b>9.4%</b>	<b>63.4%</b>	<b>0.0%</b>	<b>17</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	16,955	47.6%	0.0%	41.8%	10.6%	0.0%	\$0.19	19.1%	11.2%	69.6%	0.0%	17	0	0.7
(H) Indirect Gain	17,136	46.3%	0.0%	41.3%	12.4%	0.0%	\$0.19	19.2%	11.7%	69.1%	0.0%	17	0	0.7
(H) Direct Gain	17,991	50.4%	0.0%	39.4%	10.3%	0.0%	\$0.19	20.5%	11.3%	68.1%	0.0%	17	0	0.7
(H) Sunspace	15,444	36.9%	0.0%	45.9%	17.3%	0.0%	\$0.18	15.4%	13.5%	71.0%	0.0%	16	0	0.7
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.11	56.2%	17.3%	26.4%	0.0%	17	0	0.4
(L) Skylights	18,563	80.0%	0.0%	9.6%	10.4%	0.0%	\$0.11	46.4%	28.4%	25.3%	0.0%	24	0	0.5
(L) Sawtooth Ap	15,859	73.7%	0.0%	9.3%	17.0%	0.0%	\$0.11	47.0%	26.0%	27.0%	0.0%	24	0	0.5
(L) Monitor Ap.	17,222	72.1%	0.0%	12.1%	15.8%	0.0%								
(L) Atrium														



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>88,660</b>	<b>5.8%</b>	<b>48.7%</b>	<b>32.2%</b>	<b>7.5%</b>	<b>5.8%</b>	<b>\$1.23</b>	<b>2.8%</b>	<b>58.6%</b>	<b>32.7%</b>	<b>6.0%</b>	<b>21</b>	<b>49</b>	<b>9.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	84,319	6.1%	46.1%	33.9%	7.9%	6.1%	\$1.18	2.9%	56.8%	34.1%	6.3%	21	49	9.3
(L) Windows	77,015	7.6%	55.0%	23.3%	7.5%	6.6%	\$1.06	3.5%	65.5%	24.1%	7.0%	23	43	7.6
(L) Skylights	54,978	12.0%	56.7%	11.9%	10.1%	9.3%	\$0.75	5.9%	70.8%	13.5%	9.9%	18	41	6.5
(L) Sawtooth Ap	54,387	12.5%	56.5%	13.7%	8.0%	9.4%	\$0.74	5.6%	69.3%	15.1%	10.0%	23	32	5.8
(L) Monitor Ap.	60,101	12.3%	57.3%	14.1%	7.8%	8.5%	\$0.81	5.6%	70.0%	15.3%	9.1%	25	34	6.2
(L) Atrium	73,247	9.6%	63.6%	9.9%	9.8%	7.0%	\$1.00	4.7%	77.0%	10.9%	7.4%	21	53	7.8
<b>B ADMIN &gt;5000 SF</b>	<b>72,962</b>	<b>3.8%</b>	<b>43.2%</b>	<b>39.3%</b>	<b>6.6%</b>	<b>7.0%</b>	<b>\$1.02</b>	<b>1.8%</b>	<b>51.4%</b>	<b>39.5%</b>	<b>7.3%</b>	<b>14</b>	<b>36</b>	<b>7.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	70,054	4.0%	40.9%	40.9%	6.9%	7.3%	\$0.99	1.9%	49.7%	40.9%	7.5%	14	36	7.5
(L) Windows	60,088	5.5%	45.7%	34.5%	5.8%	8.5%	\$0.83	2.5%	53.6%	34.9%	9.0%	15	26	5.5
(L) Skylights	46,192	8.8%	55.7%	14.7%	9.7%	11.1%	\$0.64	4.2%	68.1%	16.2%	11.5%	13	34	5.6
(L) Sawtooth Ap	48,193	9.9%	60.1%	11.3%	8.0%	10.6%	\$0.67	4.3%	71.5%	13.1%	11.0%	18	29	5.4
(L) Monitor Ap.	53,363	9.1%	58.1%	15.7%	7.5%	9.6%	\$0.74	4.0%	69.1%	16.8%	10.1%	19	30	5.6
(L) Atrium	53,615	6.9%	56.1%	18.6%	8.8%	9.6%	\$0.74	3.3%	67.7%	19.1%	10.0%	14	35	5.9
<b>C ADMIN, MULTISTORY</b>	<b>69,879</b>	<b>2.1%</b>	<b>43.4%</b>	<b>41.0%</b>	<b>6.2%</b>	<b>7.3%</b>	<b>\$0.99</b>	<b>0.9%</b>	<b>50.6%</b>	<b>41.0%</b>	<b>7.5%</b>	<b>10</b>	<b>33</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	67,114	2.1%	41.0%	42.7%	6.4%	7.6%	\$0.96	1.0%	48.9%	42.4%	7.7%	10	33	7.1
(L) Windows	56,877	3.2%	46.0%	36.5%	5.3%	9.0%	\$0.79	1.4%	52.5%	36.7%	9.4%	10	23	5.2
(L) Skylights	54,485	3.4%	50.8%	29.5%	6.9%	9.4%	\$0.77	1.5%	59.1%	29.7%	9.6%	10	28	5.5
(L) Sawtooth Ap	51,893	3.9%	52.8%	26.8%	6.6%	9.9%	\$0.74	1.7%	60.7%	27.6%	10.0%	11	26	5.5
(L) Monitor Ap.	53,638	4.0%	52.4%	27.6%	6.4%	9.6%	\$0.76	1.7%	60.3%	28.2%	9.8%	12	26	5.6
(L) Atrium	57,415	3.4%	55.6%	24.5%	7.5%	8.9%	\$0.81	1.5%	64.7%	24.6%	9.2%	10	33	5.9

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>153,058</b>	<b>2.4%</b>	<b>35.6%</b>	<b>21.4%</b>	<b>6.8%</b>	<b>33.9%</b>	<b>\$2.10</b>	<b>1.1%</b>	<b>43.0%</b>	<b>21.5%</b>	<b>34.3%</b>	<b>20</b>	<b>55</b>	<b>12.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	151,603	2.5%	34.8%	21.6%	6.9%	34.2%	\$2.08	1.2%	42.5%	21.7%	34.6%	20	55	12.6
(C) Natural Vent	148,247	2.5%	33.5%	22.0%	7.0%	35.0%	\$2.04	1.2%	41.5%	22.1%	35.3%	20	55	12.6
(L) Windows	140,131	3.0%	36.4%	17.6%	5.9%	37.0%	\$1.92	1.4%	43.4%	17.6%	37.6%	20	45	11.2
(L) Skylights	122,708	4.1%	38.8%	6.3%	8.4%	42.3%	\$1.68	2.0%	48.1%	6.9%	43.0%	18	52	10.2
(L) Sawtooth Ap	124,251	4.6%	41.1%	4.9%	7.6%	41.7%	\$1.71	2.1%	50.1%	5.6%	42.1%	24	47	10.9
(L) Monitor Ap.	133,365	4.2%	40.5%	9.3%	7.2%	38.9%	\$1.82	1.9%	49.1%	9.4%	39.6%	25	49	11.0
(L) Atrium	133,981	3.4%	41.3%	8.2%	8.4%	38.7%	\$1.83	1.7%	50.7%	8.3%	39.3%	20	57	11.0
<b>E DINING FACILITY</b>	<b>115,243</b>	<b>5.8%</b>	<b>31.7%</b>	<b>27.3%</b>	<b>7.9%</b>	<b>27.2%</b>	<b>\$1.26</b>	<b>4.3%</b>	<b>47.9%</b>	<b>33.0%</b>	<b>14.8%</b>	<b>36</b>	<b>44</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	110,600	6.1%	28.9%	28.5%	8.3%	28.3%	\$1.20	4.5%	45.5%	34.5%	15.5%	36	44	6.9
(L) Windows	103,745	7.1%	36.9%	16.9%	8.9%	30.2%	\$1.09	5.4%	57.4%	20.1%	17.1%	38	44	5.7
(L) Skylights	86,379	9.9%	30.7%	13.8%	9.4%	36.3%	\$0.85	8.0%	52.7%	17.4%	21.9%	35	37	5.1
(L) Sawtooth Ap	99,166	9.0%	37.2%	13.6%	8.6%	31.6%	\$1.03	6.6%	59.2%	16.1%	18.1%	40	39	5.4
(L) Monitor Ap.	104,816	8.7%	37.6%	15.5%	8.4%	29.9%	\$1.10	6.3%	58.8%	18.0%	16.9%	42	40	5.5
(L) Atrium														
<b>F DORMITORY</b>	<b>53,575</b>	<b>0.5%</b>	<b>53.4%</b>	<b>27.6%</b>	<b>11.0%</b>	<b>7.6%</b>	<b>\$0.73</b>	<b>0.3%</b>	<b>62.4%</b>	<b>28.8%</b>	<b>8.5%</b>	<b>9</b>	<b>24</b>	<b>4.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	52,707	0.7%	52.6%	28.0%	11.0%	7.7%	\$0.72	0.4%	61.8%	29.3%	8.6%	9	24	4.2
(C) Natural Vent	48,441	0.5%	48.5%	30.5%	12.2%	8.4%	\$0.67	0.3%	59.2%	31.3%	9.2%	9	24	5.0
(L) Windows	50,685	0.9%	56.9%	24.2%	10.0%	8.0%	\$0.67	0.5%	66.7%	23.7%	9.1%	10	21	3.4
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														

# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/st)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool
<b>G FIRE STATION</b>	<b>46,997</b>	<b>7.3%</b>	<b>35.5%</b>	<b>33.8%</b>	<b>11.9%</b>	<b>11.6%</b>	<b>\$0.60</b>	<b>3.8%</b>	<b>47.9%</b>	<b>36.8%</b>	<b>11.4%</b>	<b>52</b>	<b>17</b>	<b>3.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	45,196	7.6%	33.3%	35.1%	12.0%	12.0%	\$0.59	3.8%	46.6%	37.9%	11.7%	52	17	3.3
(C) Natural Vent	42,374	8.1%	28.5%	37.4%	13.2%	12.8%	\$0.54	4.3%	41.9%	41.1%	12.7%	52	17	3.3
(L) Windows	39,589	9.3%	40.6%	24.2%	12.2%	13.7%	\$0.50	5.0%	57.1%	24.0%	13.9%	53	14	2.3
(L) Skylights	37,392	14.5%	34.8%	24.9%	11.3%	14.5%	\$0.45	7.6%	51.5%	25.7%	15.2%	50	11	2.1
(L) Sawtooth Ap	34,007	10.7%	34.5%	26.3%	12.5%	16.0%	\$0.42	6.1%	50.8%	26.7%	16.4%	56	10	1.9
(L) Monitor Ap.	37,487	11.1%	36.1%	25.9%	12.4%	14.5%	\$0.46	6.3%	52.7%	26.1%	14.9%	57	11	2.2
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>44,363</b>	<b>0.3%</b>	<b>0.0%</b>	<b>44.7%</b>	<b>2.3%</b>	<b>52.6%</b>	<b>\$0.62</b>	<b>0.3%</b>	<b>1.7%</b>	<b>45.0%</b>	<b>53.0%</b>	<b>10</b>	<b>0</b>	<b>3.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	29,211	1.2%	0.0%	15.5%	3.3%	80.0%	\$0.41	0.9%	2.2%	15.4%	81.4%	9	0	2.8
(L) Sawtooth Ap	30,178	3.6%	0.0%	13.0%	6.0%	77.4%	\$0.42	2.5%	4.7%	13.3%	79.5%	17	0	2.8
(L) Monitor Ap.	32,831	2.0%	0.0%	22.2%	4.7%	71.1%	\$0.45	1.4%	4.0%	21.1%	73.5%	14	0	2.8
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>19,580</b>	<b>8.1%</b>	<b>0.0%</b>	<b>57.8%</b>	<b>8.2%</b>	<b>25.9%</b>	<b>\$0.27</b>	<b>5.1%</b>	<b>5.5%</b>	<b>62.1%</b>	<b>27.3%</b>	<b>15</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St	18,642	3.8%	0.0%	60.7%	8.3%	27.2%	\$0.26	2.7%	5.5%	63.7%	28.0%	14	0	1.8
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	16,377	10.5%	0.0%	48.8%	9.8%	30.9%	\$0.22	7.0%	6.3%	53.0%	33.6%	15	0	1.5
(L) Skylights	11,296	20.4%	0.0%	23.0%	11.8%	44.8%	\$0.14	13.2%	6.4%	27.0%	53.3%	12	0	1.1
(L) Sawtooth Ap	11,986	18.5%	0.0%	24.6%	14.7%	42.2%	\$0.15	11.9%	11.7%	27.4%	48.9%	16	0	1.1
(L) Monitor Ap.	12,848	19.7%	0.0%	26.1%	14.8%	39.4%	\$0.16	12.6%	11.9%	29.1%	46.5%	18	0	1.1
(L) Atrium														



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/st)
<b>J MAINT, HI-BAY</b>	<b>40,147</b>	<b>5.0%</b>	<b>0.0%</b>	<b>61.1%</b>	<b>4.9%</b>	<b>29.1%</b>	<b>\$0.55</b>	<b>3.0%</b>	<b>3.6%</b>	<b>63.2%</b>	<b>30.1%</b>	<b>18</b>	<b>0</b>	<b>3.2</b>
(H) Direct Gain + St	38,768	1.9%	0.0%	63.3%	4.7%	30.1%	\$0.54	1.6%	3.7%	64.2%	30.6%	17	0	3.2
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	28,726	8.3%	0.0%	43.6%	7.4%	40.6%	\$0.38	5.0%	5.8%	45.6%	43.6%	20	0	2.4
(L) Skylights	21,784	12.5%	0.0%	25.8%	8.2%	53.6%	\$0.28	7.9%	5.6%	27.6%	58.9%	17	0	2.0
(L) Sawtooth Ap	22,824	16.1%	0.0%	21.3%	11.5%	51.2%	\$0.29	9.7%	9.2%	23.8%	57.4%	24	0	2.1
(L) Monitor Ap.	24,468	14.6%	0.0%	26.9%	10.7%	47.7%	\$0.31	8.8%	8.6%	28.9%	53.7%	24	0	2.1
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>55,881</b>	<b>2.8%</b>	<b>35.4%</b>	<b>35.5%</b>	<b>5.5%</b>	<b>20.9%</b>	<b>\$0.79</b>	<b>1.3%</b>	<b>42.3%</b>	<b>35.5%</b>	<b>20.9%</b>	<b>10</b>	<b>23</b>	<b>5.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	55,396	3.0%	34.1%	35.8%	6.1%	21.1%	\$0.78	1.4%	41.6%	35.9%	21.1%	10	23	5.7
(C) Natural Vent	53,777	2.9%	32.9%	36.9%	5.7%	21.7%	\$0.76	1.3%	40.4%	36.7%	21.6%	10	23	5.7
(L) Windows	50,833	3.6%	41.6%	26.2%	5.7%	22.9%	\$0.71	1.6%	49.2%	26.0%	23.2%	11	22	4.9
(L) Skylights	40,611	6.0%	46.2%	11.2%	7.9%	28.7%	\$0.57	2.8%	57.2%	11.0%	29.0%	10	24	4.4
(L) Sawtooth Ap														
(L) Monitor Ap.	47,654	6.3%	51.5%	11.2%	6.5%	24.5%	\$0.66	2.7%	61.3%	10.9%	25.1%	15	24	4.5
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>32,373</b>	<b>0.2%</b>	<b>0.0%</b>	<b>61.3%</b>	<b>2.5%</b>	<b>36.0%</b>	<b>\$0.45</b>	<b>0.2%</b>	<b>1.9%</b>	<b>61.6%</b>	<b>36.3%</b>	<b>7</b>	<b>0</b>	<b>2.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	25,904	0.3%	0.0%	51.2%	3.4%	45.0%	\$0.36	0.4%	2.3%	51.4%	45.9%	8	0	2.3
(L) Skylights	17,171	1.2%	0.0%	26.4%	4.5%	67.9%	\$0.24	1.1%	2.8%	26.4%	69.7%	7	0	1.8
(L) Sawtooth Ap	16,987	1.5%	0.0%	23.1%	6.8%	68.7%	\$0.24	1.1%	5.5%	23.4%	70.0%	11	0	1.8
(L) Monitor Ap.	18,405	1.4%	0.0%	28.9%	6.3%	63.4%	\$0.25	1.2%	4.6%	28.6%	65.6%	11	0	1.8
(L) Atrium														



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>M AUDITORIUM</b>	<b>61,129</b>	<b>7.7%</b>	<b>50.8%</b>	<b>23.8%</b>	<b>9.6%</b>	<b>8.2%</b>	<b>\$0.84</b>	<b>3.6%</b>	<b>63.4%</b>	<b>24.3%</b>	<b>8.6%</b>	<b>22</b>	<b>44</b>	<b>7.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	57,640	8.1%	47.8%	25.2%	10.1%	8.7%	\$0.80	3.8%	61.5%	25.6%	9.1%	22	44	7.2
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>88,660</b>	<b>5.8%</b>	<b>48.7%</b>	<b>32.2%</b>	<b>7.5%</b>	<b>5.8%</b>	<b>\$1.23</b>	<b>2.8%</b>	<b>58.6%</b>	<b>32.7%</b>	<b>6.0%</b>	<b>21</b>	<b>49</b>	<b>9.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	84,319	6.1%	46.1%	33.9%	7.9%	6.1%	\$1.18	2.9%	56.8%	34.1%	6.3%	21	49	9.3
(L) Windows	77,015	7.6%	55.0%	23.3%	7.5%	6.6%	\$1.06	3.5%	65.5%	24.1%	7.0%	23	43	7.6
(L) Skylights	54,978	12.0%	56.7%	11.9%	10.1%	9.3%	\$0.75	5.9%	70.8%	13.5%	9.9%	18	41	6.5
(L) Sawtooth Ap	54,387	12.5%	56.5%	13.7%	8.0%	9.4%	\$0.74	5.6%	69.3%	15.1%	10.0%	23	32	5.8
(L) Monitor Ap.	60,101	12.3%	57.3%	14.1%	7.8%	8.5%	\$0.81	5.6%	70.0%	15.3%	9.1%	25	34	6.2
(L) Atrium	73,247	9.6%	63.6%	9.9%	9.8%	7.0%	\$1.00	4.7%	77.0%	10.9%	7.4%	21	53	7.8
<b>O TRAINING &gt;5000</b>	<b>72,962</b>	<b>3.8%</b>	<b>43.2%</b>	<b>39.3%</b>	<b>6.6%</b>	<b>7.0%</b>	<b>\$1.02</b>	<b>1.8%</b>	<b>51.4%</b>	<b>39.5%</b>	<b>7.3%</b>	<b>14</b>	<b>36</b>	<b>7.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	70,054	4.0%	40.9%	40.9%	6.9%	7.3%	\$0.99	1.9%	49.7%	40.9%	7.5%	14	36	7.5
(L) Windows	60,088	5.5%	45.7%	34.5%	5.8%	8.5%	\$0.83	2.5%	53.6%	34.9%	9.0%	15	26	5.5
(L) Skylights	46,192	8.8%	55.7%	14.7%	9.7%	11.1%	\$0.64	4.2%	68.1%	16.2%	11.5%	13	34	5.6
(L) Sawtooth Ap	48,193	9.9%	60.1%	11.3%	8.0%	10.6%	\$0.67	4.3%	71.5%	13.1%	11.0%	18	29	5.4
(L) Monitor Ap.	53,363	9.1%	58.1%	15.7%	7.5%	9.6%	\$0.74	4.0%	69.1%	16.8%	10.1%	19	30	5.6
(L) Atrium	53,615	6.9%	56.1%	18.6%	8.8%	9.6%	\$0.74	3.3%	67.7%	19.1%	10.0%	14	35	5.9



# Climate Region 5

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>P TRAINING, MULTI STORY</b>	<b>69,879</b>	<b>2.1%</b>	<b>43.4%</b>	<b>41.0%</b>	<b>6.2%</b>	<b>7.3%</b>	<b>\$0.99</b>	<b>0.9%</b>	<b>50.6%</b>	<b>41.0%</b>	<b>7.5%</b>	<b>10</b>	<b>33</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	67,114	2.1%	41.0%	42.7%	6.4%	7.6%	\$0.96	1.0%	48.9%	42.4%	7.7%	10	33	7.1
(L) Windows	56,877	3.2%	46.0%	36.5%	5.3%	9.0%	\$0.79	1.4%	52.5%	36.7%	9.4%	10	23	5.2
(L) Skylights	54,485	3.4%	50.8%	29.5%	6.9%	9.4%	\$0.77	1.5%	59.1%	29.7%	9.6%	10	28	5.5
(L) Sawtooth Ap	51,893	3.9%	52.8%	26.8%	6.6%	9.9%	\$0.74	1.7%	60.7%	27.6%	10.0%	11	26	5.5
(L) Monitor Ap.	53,638	4.0%	52.4%	27.6%	6.4%	9.6%	\$0.76	1.7%	60.3%	28.2%	9.8%	12	26	5.6
(L) Atrium	57,415	3.4%	55.6%	24.5%	7.5%	8.9%	\$0.81	1.5%	64.7%	24.6%	9.2%	10	33	5.9
<b>Q TRAINING, GYM</b>	<b>42,022</b>	<b>6.9%</b>	<b>0.0%</b>	<b>84.7%</b>	<b>8.4%</b>	<b>0.0%</b>	<b>\$0.52</b>	<b>5.4%</b>	<b>5.6%</b>	<b>89.0%</b>	<b>0.0%</b>	<b>24</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	23,514	19.7%	0.0%	65.9%	14.3%	0.0%	\$0.26	15.3%	10.8%	73.9%	0.0%	23	0	0.9
(L) Sawtooth Ap	24,550	21.9%	0.0%	59.7%	18.4%	0.0%	\$0.27	16.4%	15.8%	67.7%	0.0%	30	0	0.9
(L) Monitor Ap.	26,724	20.7%	0.0%	61.8%	17.5%	0.0%	\$0.29	15.5%	15.1%	69.4%	0.0%	31	0	0.9
(L) Atrium														
<b>R WAREHOUSE</b>	<b>9,283</b>	<b>13.8%</b>	<b>0.0%</b>	<b>76.3%</b>	<b>9.8%</b>	<b>0.0%</b>	<b>\$0.12</b>	<b>9.0%</b>	<b>6.9%</b>	<b>84.1%</b>	<b>0.0%</b>	<b>8</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	8,394	5.1%	0.0%	84.4%	10.5%	0.0%	\$0.11	3.7%	7.9%	88.4%	0.0%	8	0	0.7
(H) Indirect Gain														
(H) Direct Gain	8,723	8.6%	0.0%	81.2%	10.2%	0.0%	\$0.11	5.8%	6.5%	87.7%	0.0%	8	0	0.7
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	4,192	39.6%	0.0%	38.7%	21.8%	0.0%	\$0.04	30.3%	16.9%	52.9%	0.0%	8	0	0.3
(L) Sawtooth Ap	3,946	32.4%	0.0%	35.5%	32.1%	0.0%	\$0.04	25.0%	28.2%	46.8%	0.0%	12	0	0.3
(L) Monitor Ap.	4,534	30.1%	0.0%	42.0%	27.9%	0.0%	\$0.05	22.4%	24.7%	52.9%	0.0%	12	0	0.3
(L) Atrium														



# Climate Region 6

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>85,124</b>	<b>16.9%</b>	<b>35.0%</b>	<b>33.6%</b>	<b>8.5%</b>	<b>6.0%</b>	<b>\$1.70</b>	<b>4.4%</b>	<b>55.4%</b>	<b>33.6%</b>	<b>6.5%</b>	<b>33</b>	<b>49</b>	<b>9.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	75,063	21.5%	38.8%	24.6%	8.4%	6.8%	\$1.46	5.5%	61.5%	25.4%	7.6%	35	43	7.6
(L) Skylights	59,235	33.4%	34.4%	13.3%	10.3%	8.6%	\$1.05	9.8%	62.6%	17.0%	10.6%	27	41	5.8
(L) Sawtooth Ap	57,756	32.6%	36.1%	14.2%	8.3%	8.8%	\$1.06	8.6%	63.7%	17.2%	10.5%	36	32	5.9
(L) Monitor Ap.	63,593	31.3%	37.3%	15.3%	8.1%	8.0%	\$1.14	8.4%	64.8%	17.2%	9.7%	39	34	6.2
(L) Atrium	71,985	27.6%	42.6%	11.7%	11.1%	7.1%	\$1.34	7.9%	70.2%	13.7%	8.2%	33	53	7.3
<b>B ADMIN &gt;5000 SF</b>	<b>69,682</b>	<b>12.4%</b>	<b>31.7%</b>	<b>41.2%</b>	<b>7.4%</b>	<b>7.4%</b>	<b>\$1.41</b>	<b>3.2%</b>	<b>48.4%</b>	<b>40.5%</b>	<b>7.8%</b>	<b>22</b>	<b>36</b>	<b>7.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	58,929	16.8%	32.5%	35.6%	6.4%	8.7%	\$1.13	4.3%	50.2%	35.6%	9.8%	23	26	5.4
(L) Skylights	48,625	27.1%	34.9%	17.5%	9.9%	10.5%	\$0.91	7.5%	60.0%	20.3%	12.2%	20	34	4.7
(L) Sawtooth Ap	48,357	28.5%	40.4%	12.0%	8.5%	10.6%	\$0.96	6.8%	65.3%	16.4%	11.5%	29	29	5.5
(L) Monitor Ap.	54,267	25.6%	39.5%	17.6%	7.9%	9.5%	\$1.03	6.4%	63.9%	18.9%	10.7%	30	30	5.5
(L) Atrium	52,701	22.1%	38.2%	20.5%	9.5%	9.7%	\$1.00	6.0%	62.0%	20.8%	11.1%	22	35	5.1
<b>C ADMIN, MULTISTORY</b>	<b>64,209</b>	<b>7.0%</b>	<b>33.4%</b>	<b>44.7%</b>	<b>7.0%</b>	<b>8.0%</b>	<b>\$1.37</b>	<b>1.7%</b>	<b>47.7%</b>	<b>42.6%</b>	<b>8.1%</b>	<b>15</b>	<b>33</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	63,701	7.3%	32.1%	45.0%	7.5%	8.1%	\$1.36	1.7%	47.3%	42.9%	8.1%	15	33	6.9
(L) Windows	53,937	10.0%	35.8%	38.8%	5.8%	9.5%	\$1.08	2.5%	49.2%	38.0%	10.3%	16	23	5.1
(L) Skylights	50,561	11.6%	37.6%	32.9%	7.7%	10.1%	\$1.05	2.8%	54.9%	31.8%	10.5%	15	28	5.3
(L) Sawtooth Ap	48,254	12.7%	39.5%	29.8%	7.4%	10.6%	\$1.03	2.9%	56.2%	30.2%	10.7%	18	26	5.4
(L) Monitor Ap.	50,233	12.7%	39.3%	30.7%	7.2%	10.2%	\$1.05	2.9%	56.0%	30.5%	10.5%	18	26	5.5
(L) Atrium	52,119	11.9%	41.5%	28.1%	8.6%	9.8%	\$1.08	2.9%	60.2%	26.6%	10.3%	16	33	5.5

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>145,776</b>	<b>7.4%</b>	<b>27.2%</b>	<b>22.4%</b>	<b>7.3%</b>	<b>35.6%</b>	<b>\$2.79</b>	<b>2.0%</b>	<b>40.2%</b>	<b>22.0%</b>	<b>35.7%</b>	<b>30</b>	<b>54</b>	<b>12.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	144,738	7.7%	26.5%	22.6%	7.4%	35.8%	\$2.77	2.1%	39.9%	22.1%	35.9%	30	54	12.9
(C) Natural Vent	142,022	7.7%	25.3%	23.0%	7.5%	36.5%	\$2.76	2.1%	39.7%	22.2%	36.1%	30	54	12.9
(L) Windows	135,398	9.2%	27.7%	18.4%	6.3%	38.3%	\$2.54	2.5%	40.8%	17.5%	39.3%	32	44	11.1
(L) Skylights	122,524	13.7%	27.3%	8.0%	8.7%	42.3%	\$2.24	3.8%	43.0%	8.8%	44.4%	28	52	10.3
(L) Sawtooth Ap	121,186	14.2%	29.6%	5.4%	8.0%	42.8%	\$2.31	3.7%	46.2%	7.1%	43.0%	37	47	10.9
(L) Monitor Ap.	130,237	12.5%	29.5%	10.5%	7.6%	39.8%	\$2.42	3.3%	45.8%	9.8%	41.1%	38	49	11.2
(L) Atrium	128,245	11.1%	30.1%	9.3%	9.0%	40.4%	\$2.40	3.1%	46.3%	9.1%	41.4%	32	56	11.0
<b>E DINING FACILITY</b>	<b>126,196</b>	<b>19.4%</b>	<b>22.0%</b>	<b>24.9%</b>	<b>8.9%</b>	<b>24.8%</b>	<b>\$1.61</b>	<b>8.5%</b>	<b>50.2%</b>	<b>31.4%</b>	<b>10.0%</b>	<b>59</b>	<b>44</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	116,141	22.8%	24.4%	16.0%	9.8%	27.0%	\$1.39	10.5%	60.4%	17.6%	11.5%	62	44	6.0
(L) Skylights	107,540	30.4%	18.8%	12.3%	9.4%	29.1%	\$1.14	15.3%	55.7%	14.8%	14.1%	57	37	4.8
(L) Sawtooth Ap	113,821	26.5%	23.6%	12.9%	9.4%	27.5%	\$1.34	12.0%	62.3%	13.7%	12.0%	66	39	5.5
(L) Monitor Ap.	118,767	25.4%	24.3%	14.5%	9.4%	26.4%	\$1.42	11.3%	62.6%	14.8%	11.3%	69	40	5.6
(L) Atrium														
<b>F DORMITORY</b>	<b>48,375</b>	<b>5.4%</b>	<b>43.5%</b>	<b>30.5%</b>	<b>12.2%</b>	<b>8.4%</b>	<b>\$0.89</b>	<b>1.8%</b>	<b>53.2%</b>	<b>33.8%</b>	<b>11.2%</b>	<b>14</b>	<b>24</b>	<b>4.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	46,316	6.0%	41.0%	31.9%	12.4%	8.7%	\$0.87	1.9%	51.9%	34.7%	11.4%	14	24	4.1
(C) Natural Vent														
(L) Windows	46,154	7.4%	45.7%	27.3%	10.9%	8.8%	\$0.78	2.4%	60.0%	24.8%	12.8%	15	21	3.2
(L) Skylights	47,742	8.8%	45.8%	25.2%	11.7%	8.5%	\$0.78	3.1%	62.4%	21.8%	12.7%	14	23	3.2
(L) Sawtooth Ap	47,002	9.1%	46.5%	25.2%	10.6%	8.6%	\$0.79	2.8%	63.3%	21.3%	12.6%	17	20	3.4
(L) Monitor Ap.	48,350	9.5%	46.3%	25.4%	10.5%	8.4%	\$0.81	3.0%	63.4%	21.3%	12.3%	17	21	3.5
(L) Atrium														

# Climate Region 6

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>G FIRE STATION</b>	<b>58,890</b>	<b>29.3%</b>	<b>19.4%</b>	<b>26.9%</b>	<b>15.2%</b>	<b>9.2%</b>	<b>\$0.84</b>	<b>11.2%</b>	<b>42.2%</b>	<b>37.4%</b>	<b>9.1%</b>	<b>90</b>	<b>17</b>	<b>3.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	57,157	30.2%	17.1%	27.8%	15.4%	9.5%	\$0.82	11.3%	41.2%	38.2%	9.3%	90	17	3.5
(C) Natural Vent	53,588	32.2%	11.4%	29.6%	16.7%	10.1%	\$0.77	12.3%	36.8%	41.0%	10.0%	90	17	3.8
(L) Windows	52,305	34.7%	20.0%	19.2%	15.7%	10.4%	\$0.68	15.5%	54.3%	19.0%	11.2%	92	14	2.5
(L) Skylights	52,919	39.5%	16.0%	18.7%	15.6%	10.3%	\$0.63	19.2%	48.4%	20.3%	12.1%	88	11	2.2
(L) Sawtooth Ap	48,344	37.9%	16.0%	19.3%	15.6%	11.2%	\$0.60	18.3%	48.5%	20.5%	12.7%	97	10	2.1
(L) Monitor Ap.	51,958	37.6%	16.8%	19.7%	15.5%	10.5%	\$0.66	17.8%	50.5%	20.1%	11.6%	100	11	2.3
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>47,394</b>	<b>4.9%</b>	<b>0.0%</b>	<b>41.9%</b>	<b>3.9%</b>	<b>49.3%</b>	<b>\$0.91</b>	<b>1.4%</b>	<b>3.2%</b>	<b>43.7%</b>	<b>51.7%</b>	<b>17</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	34,419	11.1%	0.0%	15.9%	5.2%	67.9%	\$0.61	3.6%	3.9%	15.2%	77.3%	16	0	2.8
(L) Sawtooth Ap	37,060	16.2%	0.0%	11.9%	8.9%	63.0%	\$0.63	5.1%	7.6%	12.9%	74.4%	30	0	2.9
(L) Monitor Ap.	39,267	12.1%	0.0%	21.4%	7.1%	59.5%	\$0.66	3.8%	6.4%	18.5%	71.4%	26	0	2.9
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>26,384</b>	<b>26.9%</b>	<b>0.0%</b>	<b>42.9%</b>	<b>11.0%</b>	<b>19.2%</b>	<b>\$0.44</b>	<b>8.7%</b>	<b>8.9%</b>	<b>57.6%</b>	<b>24.8%</b>	<b>26</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	23,524	31.5%	0.0%	34.6%	12.3%	21.5%	\$0.36	11.0%	10.8%	47.9%	30.3%	26	0	1.6
(L) Skylights	20,408	48.0%	0.0%	15.3%	11.9%	24.8%	\$0.25	20.5%	12.0%	23.3%	44.3%	22	0	1.1
(L) Sawtooth Ap	20,220	43.1%	0.0%	16.1%	15.8%	25.0%	\$0.26	18.1%	16.4%	22.9%	42.6%	29	0	1.2
(L) Monitor Ap.	21,574	42.7%	0.0%	17.8%	15.9%	23.5%	\$0.27	18.1%	17.2%	24.1%	40.6%	31	0	1.2
(L) Atrium														



# Climate Region 6

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>48,235</b>	<b>17.5%</b>	<b>0.0%</b>	<b>50.8%</b>	<b>7.5%</b>	<b>24.2%</b>	<b>\$0.83</b>	<b>5.5%</b>	<b>6.0%</b>	<b>59.9%</b>	<b>28.6%</b>	<b>32</b>	<b>0</b>	<b>3.3</b>
(H) Direct Gain + St	46,072	14.3%	0.0%	53.2%	7.2%	25.3%	\$0.81	4.4%	5.8%	60.8%	29.0%	30	0	3.3
(H) Indirect Gain	46,450	12.8%	0.0%	52.8%	9.3%	25.1%	\$0.82	4.3%	6.8%	60.2%	28.7%	30	0	3.3
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	37,969	24.4%	0.0%	34.5%	10.4%	30.8%	\$0.58	8.5%	9.4%	41.3%	40.8%	35	0	2.5
(L) Skylights	33,068	34.2%	0.0%	20.5%	10.0%	35.3%	\$0.45	13.3%	9.1%	25.4%	52.2%	30	0	2.1
(L) Sawtooth Ap	33,615	34.5%	0.0%	16.2%	14.6%	34.7%	\$0.47	13.3%	14.4%	21.7%	50.6%	43	0	2.1
(L) Monitor Ap.	35,598	32.3%	0.0%	21.1%	13.8%	32.8%	\$0.49	12.7%	13.8%	25.1%	48.4%	43	0	2.1
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>54,718</b>	<b>11.5%</b>	<b>25.2%</b>	<b>36.2%</b>	<b>5.8%</b>	<b>21.3%</b>	<b>\$1.11</b>	<b>2.8%</b>	<b>39.8%</b>	<b>36.0%</b>	<b>21.3%</b>	<b>16</b>	<b>23</b>	<b>5.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	54,293	11.8%	23.9%	36.5%	6.3%	21.5%	\$1.10	2.9%	39.2%	36.4%	21.5%	16	23	5.7
(C) Natural Vent														
(L) Windows	49,973	14.1%	29.1%	27.4%	6.0%	23.3%	\$0.98	3.5%	45.9%	26.5%	24.1%	18	22	4.8
(L) Skylights	42,128	22.3%	29.0%	13.0%	8.1%	27.7%	\$0.79	6.1%	52.6%	11.7%	29.7%	16	24	4.2
(L) Sawtooth Ap	46,052	21.7%	36.2%	9.6%	7.2%	25.3%	\$0.89	5.3%	59.2%	9.2%	26.4%	23	24	4.6
(L) Monitor Ap.	47,835	20.9%	35.1%	12.7%	6.9%	24.4%	\$0.90	5.2%	57.6%	11.0%	26.2%	23	23	4.5
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>34,616</b>	<b>4.8%</b>	<b>0.0%</b>	<b>57.3%</b>	<b>4.2%</b>	<b>33.7%</b>	<b>\$0.67</b>	<b>1.4%</b>	<b>3.3%</b>	<b>59.8%</b>	<b>35.4%</b>	<b>14</b>	<b>0</b>	<b>2.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	28,830	6.7%	0.0%	47.3%	5.6%	40.5%	\$0.53	2.1%	4.6%	48.8%	44.5%	15	0	2.3
(L) Skylights	21,607	14.1%	0.0%	25.3%	6.5%	54.0%	\$0.36	4.9%	5.1%	25.4%	64.6%	13	0	1.8
(L) Sawtooth Ap	21,497	15.6%	0.0%	20.5%	9.7%	54.3%	\$0.37	4.9%	8.5%	22.3%	64.3%	19	0	1.8
(L) Monitor Ap.	23,194	14.5%	0.0%	26.2%	9.0%	50.3%	\$0.38	4.8%	8.1%	25.7%	61.4%	19	0	1.8
(L) Atrium														

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD (w/sf)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	
<b>M AUDITORIUM</b>	<b>62,804</b>	<b>23.1%</b>	<b>35.8%</b>	<b>23.2%</b>	<b>10.0%</b>	<b>8.0%</b>	<b>\$1.21</b>	<b>6.4%</b>	<b>60.5%</b>	<b>24.1%</b>	<b>9.0%</b>	<b>34</b>	<b>44</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	62,436	23.5%	34.4%	23.3%	10.8%	8.0%	\$1.20	6.5%	60.2%	24.2%	9.1%	34	44	7.1
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>85,124</b>	<b>16.9%</b>	<b>35.0%</b>	<b>33.6%</b>	<b>8.5%</b>	<b>6.0%</b>	<b>\$1.70</b>	<b>4.4%</b>	<b>55.4%</b>	<b>33.6%</b>	<b>6.5%</b>	<b>33</b>	<b>49</b>	<b>9.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	75,063	21.5%	38.8%	24.6%	8.4%	6.8%	\$1.46	5.5%	61.5%	25.4%	7.6%	35	43	7.6
(L) Skylights	59,235	33.4%	34.4%	13.3%	10.3%	8.6%	\$1.05	9.8%	62.6%	17.0%	10.6%	27	41	5.8
(L) Sawtooth Ap	57,756	32.6%	36.1%	14.2%	8.3%	8.8%	\$1.06	8.6%	63.7%	17.2%	10.5%	36	32	5.9
(L) Monitor Ap.	63,593	31.3%	37.3%	15.3%	8.1%	8.0%	\$1.14	8.4%	64.8%	17.2%	9.7%	39	34	6.2
(L) Atrium	71,985	27.6%	42.6%	11.7%	11.1%	7.1%	\$1.34	7.9%	70.2%	13.7%	8.2%	33	53	7.3
<b>O TRAINING &gt;5000</b>	<b>69,682</b>	<b>12.4%</b>	<b>31.7%</b>	<b>41.2%</b>	<b>7.4%</b>	<b>7.4%</b>	<b>\$1.41</b>	<b>3.2%</b>	<b>48.4%</b>	<b>40.5%</b>	<b>7.8%</b>	<b>22</b>	<b>36</b>	<b>7.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	58,929	16.8%	32.5%	35.6%	6.4%	8.7%	\$1.13	4.3%	50.2%	35.6%	9.8%	23	26	5.4
(L) Skylights	48,625	27.1%	34.9%	17.5%	9.9%	10.5%	\$0.91	7.5%	60.0%	20.3%	12.2%	20	34	4.7
(L) Sawtooth Ap	48,357	28.5%	40.4%	12.0%	8.5%	10.6%	\$0.96	6.8%	65.3%	16.4%	11.5%	29	29	5.5
(L) Monitor Ap.	54,267	25.6%	39.5%	17.6%	7.9%	9.5%	\$1.03	6.4%	63.9%	18.9%	10.7%	30	30	5.5
(L) Atrium	52,701	22.1%	38.2%	20.5%	9.5%	9.7%	\$1.00	6.0%	62.0%	20.8%	11.1%	22	35	5.1

# Climate Region 6

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QHea (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>P TRAINING, MULTISTORY</b>	<b>64,209</b>	<b>7.0%</b>	<b>33.4%</b>	<b>44.7%</b>	<b>7.0%</b>	<b>8.0%</b>	<b>\$1.37</b>	<b>1.7%</b>	<b>47.7%</b>	<b>42.6%</b>	<b>8.1%</b>	<b>15</b>	<b>33</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	63,701	7.3%	32.1%	45.0%	7.5%	8.1%	\$1.36	1.7%	47.3%	42.9%	8.1%	15	33	6.9
(C) Natural Vent														
(L) Windows	53,937	10.0%	35.8%	38.8%	5.8%	9.5%	\$1.08	2.5%	49.2%	38.0%	10.3%	16	23	5.1
(L) Skylights	50,561	11.6%	37.6%	32.9%	7.7%	10.1%	\$1.05	2.8%	54.9%	31.8%	10.5%	15	28	5.3
(L) Sawtooth Ap	48,254	12.7%	39.5%	29.8%	7.4%	10.6%	\$1.03	2.9%	56.2%	30.2%	10.7%	18	26	5.4
(L) Monitor Ap.	50,233	12.7%	39.3%	30.7%	7.2%	10.2%	\$1.05	2.9%	56.0%	30.5%	10.5%	18	26	5.5
(L) Atrium	52,119	11.9%	41.5%	28.1%	8.6%	9.8%	\$1.08	2.9%	60.2%	26.6%	10.3%	16	33	5.5
<b>Q TRAINING, GYM</b>	<b>53,519</b>	<b>21.8%</b>	<b>0.0%</b>	<b>66.5%</b>	<b>11.8%</b>	<b>0.0%</b>	<b>\$0.70</b>	<b>9.2%</b>	<b>11.1%</b>	<b>79.7%</b>	<b>0.0%</b>	<b>42</b>	<b>0</b>	<b>2.0</b>
(H) Direct Gain + St	52,040	19.9%	0.0%	68.4%	11.7%	0.0%	\$0.69	8.3%	11.0%	80.6%	0.0%	41	0	2.0
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	41,170	44.6%	0.0%	40.8%	14.6%	0.0%	\$0.37	26.1%	18.2%	55.7%	0.0%	40	0	1.0
(L) Sawtooth Ap	39,448	40.6%	0.0%	38.8%	20.5%	0.0%	\$0.38	23.1%	26.2%	50.7%	0.0%	54	0	1.1
(L) Monitor Ap.	42,606	39.1%	0.0%	41.2%	19.7%	0.0%	\$0.41	22.3%	25.2%	52.5%	0.0%	56	0	1.1
(L) Atrium														
<b>R WAREHOUSE</b>	<b>16,204</b>	<b>45.9%</b>	<b>0.0%</b>	<b>43.7%</b>	<b>10.4%</b>	<b>0.0%</b>	<b>\$0.20</b>	<b>19.3%</b>	<b>9.5%</b>	<b>71.1%</b>	<b>0.0%</b>	<b>15</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	14,049	38.2%	0.0%	50.4%	11.3%	0.0%	\$0.19	15.1%	10.3%	74.6%	0.0%	15	0	0.7
(H) Indirect Gain														
(H) Direct Gain	14,320	39.2%	0.0%	49.5%	11.3%	0.0%	\$0.19	15.2%	10.7%	74.1%	0.0%	15	0	0.7
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	12,532	71.0%	0.0%	15.6%	13.4%	0.0%	\$0.10	46.5%	19.3%	34.2%	0.0%	15	0	0.4
(L) Sawtooth Ap	10,925	64.5%	0.0%	14.4%	21.1%	0.0%	\$0.10	38.4%	31.3%	30.3%	0.0%	21	0	0.4
(L) Monitor Ap.	11,696	61.7%	0.0%	18.6%	19.8%	0.0%	\$0.10	36.9%	28.9%	34.2%	0.0%	21	0	0.4
(L) Atrium														



# Climate Region 7

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/st)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>86,538</b>	<b>9.5%</b>	<b>43.5%</b>	<b>33.0%</b>	<b>8.1%</b>	<b>5.9%</b>	<b>\$1.74</b>	<b>4.0%</b>	<b>55.5%</b>	<b>34.2%</b>	<b>6.3%</b>	<b>29</b>	<b>50</b>	<b>9.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	86,385	9.6%	42.5%	33.1%	9.0%	5.9%	\$1.73	4.1%	55.4%	34.2%	6.3%	29	50	9.3
(C) Natural Vent	82,442	10.0%	40.7%	34.6%	8.5%	6.2%	\$1.68	4.2%	53.9%	35.4%	6.5%	29	50	9.3
(L) Windows	75,301	12.4%	48.4%	24.3%	8.0%	6.8%	\$1.48	5.1%	61.8%	25.8%	7.3%	31	43	7.7
(L) Skylights	55,603	20.1%	46.9%	13.3%	10.6%	9.2%	\$1.05	9.1%	65.0%	15.5%	10.4%	24	41	6.1
(L) Sawtooth Ap	54,802	19.5%	48.0%	14.7%	8.4%	9.3%	\$1.04	7.9%	64.8%	16.8%	10.5%	31	32	5.8
(L) Monitor Ap.	60,438	19.1%	48.8%	15.5%	8.2%	8.5%	\$1.14	7.7%	65.3%	17.3%	9.6%	34	34	6.1
(L) Atrium	70,958	16.1%	54.6%	11.4%	10.8%	7.2%	\$1.37	7.2%	72.2%	12.7%	7.9%	29	53	7.7
<b>B ADMIN &gt;5000 SF</b>	<b>71,835</b>	<b>6.7%</b>	<b>39.3%</b>	<b>39.9%</b>	<b>6.9%</b>	<b>7.1%</b>	<b>\$1.46</b>	<b>2.8%</b>	<b>49.0%</b>	<b>40.8%</b>	<b>7.5%</b>	<b>19</b>	<b>36</b>	<b>7.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	71,330	6.8%	38.0%	40.2%	7.8%	7.2%	\$1.45	2.8%	48.6%	41.1%	7.5%	19	36	7.3
(C) Natural Vent	68,648	7.0%	36.5%	41.8%	7.3%	7.5%	\$1.41	2.8%	47.3%	42.1%	7.7%	19	36	7.6
(L) Windows	59,125	9.4%	40.3%	35.4%	6.2%	8.7%	\$1.17	3.7%	50.3%	36.7%	9.3%	20	26	5.5
(L) Skylights	46,697	15.6%	46.6%	16.8%	10.0%	11.0%	\$0.91	6.7%	62.6%	18.7%	12.0%	17	34	5.1
(L) Sawtooth Ap	47,074	16.6%	51.9%	12.2%	8.5%	10.9%	\$0.92	6.3%	67.5%	14.4%	11.8%	25	29	5.4
(L) Monitor Ap.	53,019	15.1%	50.1%	17.3%	7.8%	9.7%	\$1.03	5.8%	64.7%	18.9%	10.6%	26	30	5.5
(L) Atrium	52,544	12.3%	48.6%	20.1%	9.3%	9.8%	\$1.04	5.1%	63.3%	21.1%	10.5%	19	35	5.3
<b>C ADMIN, MULTISTORY</b>	<b>67,819</b>	<b>3.7%</b>	<b>40.0%</b>	<b>42.3%</b>	<b>6.5%</b>	<b>7.6%</b>	<b>\$1.41</b>	<b>1.4%</b>	<b>48.4%</b>	<b>42.5%</b>	<b>7.7%</b>	<b>13</b>	<b>33</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	67,127	3.7%	38.7%	42.7%	7.2%	7.6%	\$1.40	1.5%	47.8%	42.9%	7.8%	13	33	6.9
(C) Natural Vent	64,482	3.8%	36.9%	44.5%	6.8%	8.0%	\$1.36	1.5%	46.4%	44.1%	8.0%	13	33	7.3
(L) Windows	55,259	5.5%	41.8%	37.9%	5.6%	9.3%	\$1.12	2.1%	49.7%	38.5%	9.7%	14	23	5.2
(L) Skylights	52,784	6.2%	45.7%	31.2%	7.2%	9.7%	\$1.08	2.4%	55.9%	31.7%	10.1%	13	28	5.4
(L) Sawtooth Ap	50,061	6.9%	47.4%	28.5%	7.0%	10.2%	\$1.03	2.6%	57.4%	29.5%	10.6%	15	26	5.4
(L) Monitor Ap.	52,012	6.9%	47.0%	29.4%	6.8%	9.9%	\$1.07	2.6%	56.9%	30.2%	10.2%	16	26	5.5
(L) Atrium	54,785	6.3%	49.9%	26.4%	8.0%	9.4%	\$1.12	2.5%	61.1%	26.7%	9.7%	14	33	5.6

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>D ADMIN, COMP FAC</b>	<b>150,807</b>	<b>4.0%</b>	<b>33.0%</b>	<b>21.7%</b>	<b>7.0%</b>	<b>34.4%</b>	<b>\$3.04</b>	<b>1.7%</b>	<b>41.4%</b>	<b>21.9%</b>	<b>35.0%</b>	<b>26</b>	<b>55</b>	<b>13.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	149,206	4.1%	32.1%	21.9%	7.2%	34.7%	\$3.01	1.7%	40.8%	22.2%	35.4%	26	55	13.0
(C) Natural Vent	144,789	4.2%	30.1%	22.6%	7.3%	35.8%	\$2.94	1.7%	39.4%	22.7%	36.2%	26	55	13.0
(L) Windows	138,531	5.0%	33.4%	18.0%	6.1%	37.4%	\$2.77	2.0%	41.4%	18.1%	38.5%	27	45	11.4
(L) Skylights	123,265	7.6%	34.5%	7.3%	8.6%	42.1%	\$2.43	3.2%	45.2%	7.8%	43.8%	24	52	10.6
(L) Sawtooth Ap	122,345	7.9%	36.6%	5.2%	7.9%	42.4%	\$2.43	3.1%	47.2%	5.9%	43.7%	32	47	11.1
(L) Monitor Ap.	132,172	7.0%	36.2%	10.2%	7.4%	39.2%	\$2.62	2.8%	46.2%	10.3%	40.7%	33	49	11.1
(L) Atrium	131,620	6.0%	37.1%	8.8%	8.7%	39.4%	\$2.62	2.5%	47.9%	9.0%	40.6%	27	57	11.2
<b>E DINING FACILITY</b>	<b>120,611</b>	<b>11.1%</b>	<b>28.2%</b>	<b>26.1%</b>	<b>8.6%</b>	<b>26.0%</b>	<b>\$1.85</b>	<b>7.0%</b>	<b>47.2%</b>	<b>33.4%</b>	<b>12.4%</b>	<b>50</b>	<b>44</b>	<b>7.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	117,442	11.4%	26.3%	26.8%	8.9%	26.7%	\$1.81	7.2%	46.2%	34.0%	12.6%	50	44	7.6
(L) Windows	109,495	13.3%	31.8%	16.7%	9.6%	28.6%	\$1.60	8.6%	55.8%	21.3%	14.3%	53	44	6.3
(L) Skylights	96,896	19.0%	25.9%	13.1%	9.7%	32.3%	\$1.29	13.0%	51.1%	18.2%	17.7%	49	37	5.0
(L) Sawtooth Ap	105,408	16.0%	31.3%	13.6%	9.4%	29.7%	\$1.50	10.1%	56.9%	17.7%	15.3%	56	39	5.5
(L) Monitor Ap.	110,515	15.1%	31.9%	15.4%	9.3%	28.3%	\$1.60	9.4%	56.9%	19.4%	14.3%	58	40	5.7
(L) Atrium														
<b>F DORMITORY</b>	<b>52,572</b>	<b>2.3%</b>	<b>50.7%</b>	<b>28.1%</b>	<b>11.2%</b>	<b>7.7%</b>	<b>\$1.05</b>	<b>1.0%</b>	<b>61.0%</b>	<b>29.4%</b>	<b>8.6%</b>	<b>12</b>	<b>24</b>	<b>4.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	50,413	2.6%	48.7%	29.3%	11.4%	8.0%	\$1.01	1.1%	59.5%	30.5%	8.9%	12	24	4.2
(C) Natural Vent	49,405	2.4%	47.5%	29.9%	12.0%	8.2%	\$1.02	1.1%	59.8%	30.3%	8.8%	12	24	5.0
(L) Windows	49,719	3.4%	53.2%	25.1%	10.2%	8.1%	\$0.97	1.5%	64.3%	24.9%	9.3%	13	21	3.4
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														

# Climate Region 7

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool
<b>G FIRE STATION</b>	<b>53,119</b>	<b>19.2%</b>	<b>27.3%</b>	<b>29.9%</b>	<b>13.4%</b>	<b>10.2%</b>	<b>\$0.93</b>	<b>8.7%</b>	<b>45.0%</b>	<b>35.3%</b>	<b>11.1%</b>	<b>75</b>	<b>17</b>	<b>3.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	47,538	21.4%	18.8%	33.4%	15.0%	11.4%	\$0.83	9.8%	38.0%	39.7%	12.5%	75	17	3.7
(L) Windows	45,760	23.3%	29.3%	21.6%	14.0%	11.9%	\$0.77	11.7%	50.8%	24.0%	13.5%	77	14	2.5
(L) Skylights	44,549	27.6%	24.8%	21.6%	13.8%	12.2%	\$0.71	14.4%	45.8%	25.3%	14.5%	73	11	2.2
(L) Sawtooth Ap	40,972	25.9%	24.4%	22.3%	14.1%	13.3%	\$0.67	14.1%	45.2%	25.3%	15.3%	81	10	2.1
(L) Monitor Ap.	44,098	25.3%	25.6%	22.7%	14.1%	12.3%	\$0.73	13.7%	46.6%	25.6%	14.2%	83	11	2.2
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>45,882</b>	<b>2.5%</b>	<b>0.0%</b>	<b>43.3%</b>	<b>3.4%</b>	<b>50.9%</b>	<b>\$0.94</b>	<b>1.1%</b>	<b>2.9%</b>	<b>44.1%</b>	<b>51.9%</b>	<b>14</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	31,937	6.2%	0.0%	16.1%	4.6%	73.1%	\$0.63	2.8%	3.7%	16.3%	77.2%	14	0	2.8
(L) Sawtooth Ap	33,684	10.0%	0.0%	12.7%	8.0%	69.3%	\$0.65	4.5%	6.9%	13.4%	75.2%	25	0	2.8
(L) Monitor Ap.	36,225	7.1%	0.0%	22.1%	6.3%	64.5%	\$0.70	3.1%	5.6%	21.9%	69.4%	21	0	2.8
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>22,695</b>	<b>17.3%</b>	<b>0.0%</b>	<b>49.9%</b>	<b>10.5%</b>	<b>22.3%</b>	<b>\$0.42</b>	<b>8.1%</b>	<b>8.6%</b>	<b>57.8%</b>	<b>25.5%</b>	<b>22</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	19,654	20.8%	0.0%	41.3%	12.2%	25.8%	\$0.35	10.2%	10.3%	48.9%	30.6%	22	0	1.5
(L) Skylights	15,248	34.5%	0.0%	19.2%	13.1%	33.2%	\$0.24	19.4%	9.4%	25.4%	45.8%	18	0	1.1
(L) Sawtooth Ap	15,717	30.7%	0.0%	20.4%	16.7%	32.2%	\$0.25	17.0%	15.1%	25.5%	42.5%	24	0	1.1
(L) Monitor Ap.	16,731	30.6%	0.0%	22.2%	16.9%	30.3%	\$0.26	16.8%	14.5%	27.9%	40.8%	26	0	1.2
(L) Atrium														



# Climate Region 7

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>43,682</b>	<b>10.4%</b>	<b>0.0%</b>	<b>56.1%</b>	<b>6.7%</b>	<b>26.7%</b>	<b>\$0.84</b>	<b>4.6%</b>	<b>5.6%</b>	<b>60.8%</b>	<b>29.0%</b>	<b>27</b>	<b>0</b>	<b>3.3</b>
(H) Direct Gain + St	42,294	8.0%	0.0%	58.0%	6.4%	27.6%	\$0.83	3.6%	5.3%	61.6%	29.4%	25	0	3.3
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	32,918	15.3%	0.0%	39.5%	9.7%	35.5%	\$0.60	7.1%	8.5%	43.8%	40.5%	29	0	2.4
(L) Skylights	26,714	22.5%	0.0%	23.8%	10.0%	43.7%	\$0.46	11.6%	7.8%	27.6%	53.0%	25	0	2.0
(L) Sawtooth Ap	27,469	23.9%	0.0%	19.2%	14.4%	42.5%	\$0.46	12.0%	12.2%	23.2%	52.6%	36	0	2.1
(L) Monitor Ap.	29,321	22.0%	0.0%	24.7%	13.5%	39.8%	\$0.50	10.9%	12.4%	28.3%	48.4%	36	0	2.1
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>55,806</b>	<b>6.0%</b>	<b>32.0%</b>	<b>35.5%</b>	<b>5.6%</b>	<b>20.9%</b>	<b>\$1.14</b>	<b>2.3%</b>	<b>40.1%</b>	<b>36.2%</b>	<b>21.3%</b>	<b>14</b>	<b>23</b>	<b>5.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	55,231	6.1%	30.6%	35.9%	6.3%	21.1%	\$1.13	2.3%	39.5%	36.6%	21.6%	14	23	5.7
(C) Natural Vent	54,013	6.2%	29.7%	36.7%	5.8%	21.6%	\$1.11	2.4%	38.7%	37.1%	21.8%	14	23	5.7
(L) Windows	50,594	7.5%	36.7%	26.9%	5.8%	23.1%	\$1.02	2.8%	45.9%	27.4%	23.9%	16	22	4.9
(L) Skylights	41,057	12.3%	38.6%	12.5%	8.1%	28.4%	\$0.81	5.2%	52.0%	12.7%	30.1%	14	24	4.5
(L) Sawtooth Ap	45,619	12.4%	45.6%	9.4%	7.1%	25.6%	\$0.90	4.6%	58.7%	9.7%	27.1%	20	24	4.5
(L) Monitor Ap.	47,210	11.9%	44.2%	12.4%	6.8%	24.7%	\$0.92	4.4%	56.8%	12.5%	26.3%	20	24	4.5
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>33,480</b>	<b>2.3%</b>	<b>0.0%</b>	<b>59.2%</b>	<b>3.6%</b>	<b>34.8%</b>	<b>\$0.68</b>	<b>1.1%</b>	<b>3.1%</b>	<b>60.3%</b>	<b>35.5%</b>	<b>11</b>	<b>0</b>	<b>2.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	27,485	3.4%	0.0%	49.3%	4.9%	42.4%	\$0.55	1.6%	4.2%	50.2%	44.0%	12	0	2.3
(L) Skylights	19,533	8.0%	0.0%	26.3%	6.0%	59.7%	\$0.38	4.0%	4.7%	27.1%	64.3%	11	0	1.8
(L) Sawtooth Ap	19,486	9.4%	0.0%	21.9%	8.9%	59.9%	\$0.38	4.0%	8.1%	23.1%	64.8%	16	0	1.8
(L) Monitor Ap.	21,068	8.6%	0.0%	27.8%	8.2%	55.4%	\$0.40	3.8%	7.5%	28.5%	60.2%	16	0	1.8
(L) Atrium														

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD (w/sf)	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)		Cool (Btu/hr/sf)
<b>M AUDITORIUM</b>	<b>62,612</b>	<b>12.7%</b>	<b>46.3%</b>	<b>23.2%</b>	<b>9.8%</b>	<b>8.0%</b>	<b>\$1.24</b>	<b>5.5%</b>	<b>61.4%</b>	<b>24.4%</b>	<b>8.6%</b>	<b>29</b>	<b>44</b>	<b>7.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	62,209	12.9%	44.8%	23.4%	10.9%	8.0%	\$1.23	5.6%	61.0%	24.7%	8.7%	29	44	7.3
(C) Natural Vent	59,784	13.3%	43.7%	24.3%	10.2%	8.4%	\$1.20	5.7%	60.3%	25.2%	8.9%	29	44	7.5
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>86,538</b>	<b>9.5%</b>	<b>43.5%</b>	<b>33.0%</b>	<b>8.1%</b>	<b>5.9%</b>	<b>\$1.74</b>	<b>4.0%</b>	<b>55.5%</b>	<b>34.2%</b>	<b>6.3%</b>	<b>29</b>	<b>50</b>	<b>9.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	86,385	9.6%	42.5%	33.1%	9.0%	5.9%	\$1.73	4.1%	55.4%	34.2%	6.3%	29	50	9.3
(C) Natural Vent	82,442	10.0%	40.7%	34.6%	8.5%	6.2%	\$1.68	4.2%	53.9%	35.4%	6.5%	29	50	9.3
(L) Windows	75,301	12.4%	48.4%	24.3%	8.0%	6.8%	\$1.48	5.1%	61.8%	25.8%	7.3%	31	43	7.7
(L) Skylights	55,603	20.1%	46.9%	13.3%	10.6%	9.2%	\$1.05	9.1%	65.0%	15.5%	10.4%	24	41	6.1
(L) Sawtooth Ap	54,802	19.5%	48.0%	14.7%	8.4%	9.3%	\$1.04	7.9%	64.8%	16.8%	10.5%	31	32	5.8
(L) Monitor Ap.	60,438	19.1%	48.8%	15.5%	8.2%	8.5%	\$1.14	7.7%	65.3%	17.3%	9.6%	34	34	6.1
(L) Atrium	70,958	16.1%	54.6%	11.4%	10.8%	7.2%	\$1.37	7.2%	72.2%	12.7%	7.9%	29	53	7.7
<b>O TRAINING &gt;5000</b>	<b>71,835</b>	<b>6.7%</b>	<b>39.3%</b>	<b>39.9%</b>	<b>6.9%</b>	<b>7.1%</b>	<b>\$1.46</b>	<b>2.8%</b>	<b>49.0%</b>	<b>40.8%</b>	<b>7.5%</b>	<b>19</b>	<b>36</b>	<b>7.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	71,330	6.8%	38.0%	40.2%	7.8%	7.2%	\$1.45	2.8%	48.6%	41.1%	7.5%	19	36	7.3
(C) Natural Vent	68,648	7.0%	36.5%	41.8%	7.3%	7.5%	\$1.41	2.8%	47.3%	42.1%	7.7%	19	36	7.6
(L) Windows	59,125	9.4%	40.3%	35.4%	6.2%	8.7%	\$1.17	3.7%	50.3%	36.7%	9.3%	20	26	5.5
(L) Skylights	46,697	15.6%	46.6%	16.8%	10.0%	11.0%	\$0.91	6.7%	62.6%	18.7%	12.0%	17	34	5.1
(L) Sawtooth Ap	47,074	16.6%	51.9%	12.2%	8.5%	10.9%	\$0.92	6.3%	67.5%	14.4%	11.8%	25	29	5.4
(L) Monitor Ap.	53,019	15.1%	50.1%	17.3%	7.8%	9.7%	\$1.03	5.8%	64.7%	18.9%	10.6%	26	30	5.5
(L) Atrium	52,544	12.3%	48.6%	20.1%	9.3%	9.8%	\$1.04	5.1%	63.3%	21.1%	10.5%	19	35	5.3

# Climate Region 7

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>P TRAINING, MULTISTORY</b>	<b>67,819</b>	<b>3.7%</b>	<b>40.0%</b>	<b>42.3%</b>	<b>6.5%</b>	<b>7.6%</b>	<b>\$1.41</b>	<b>1.4%</b>	<b>48.4%</b>	<b>42.5%</b>	<b>7.7%</b>	<b>13</b>	<b>33</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace							\$1.40	1.5%	47.8%	42.9%	7.8%	13	33	6.9
(C) Night Mech Vent	67,127	3.7%	38.7%	42.7%	7.2%	7.6%	\$1.36	1.5%	46.4%	44.1%	8.0%	13	33	7.3
(C) Natural Vent	64,482	3.8%	36.9%	44.5%	6.8%	8.0%	\$1.12	2.1%	49.7%	38.5%	9.7%	14	23	5.2
(L) Windows	55,259	5.5%	41.8%	37.9%	5.6%	9.3%	\$1.08	2.4%	55.9%	31.7%	10.1%	13	28	5.4
(L) Skylights	52,784	6.2%	45.7%	31.2%	7.2%	9.7%	\$1.03	2.6%	57.4%	29.5%	10.6%	15	26	5.4
(L) Sawtooth Ap	50,061	6.9%	47.4%	28.5%	7.0%	10.2%	\$1.07	2.6%	56.9%	30.2%	10.2%	16	26	5.5
(L) Monitor Ap.	52,012	6.9%	47.0%	29.4%	6.8%	9.9%	\$1.12	2.5%	61.1%	26.7%	9.7%	14	33	5.6
(L) Atrium	54,785	6.3%	49.9%	26.4%	8.0%	9.4%								
<b>Q TRAINING, GYM</b>	<b>47,254</b>	<b>13.6%</b>	<b>0.0%</b>	<b>75.3%</b>	<b>11.1%</b>	<b>0.0%</b>	<b>\$0.83</b>	<b>7.3%</b>	<b>9.5%</b>	<b>83.2%</b>	<b>0.0%</b>	<b>35</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.44	20.1%	11.9%	68.0%	0.0%	33	0	0.9
(L) Skylights	31,258	32.0%	0.0%	52.1%	16.0%	0.0%	\$0.45	18.2%	20.3%	61.5%	0.0%	45	0	1.0
(L) Sawtooth Ap	31,137	30.0%	0.0%	48.5%	21.4%	0.0%	\$0.50	17.0%	19.4%	63.6%	0.0%	46	0	1.0
(L) Monitor Ap.	33,807	28.6%	0.0%	50.9%	20.5%	0.0%								
(L) Atrium														
<b>R WAREHOUSE</b>	<b>12,586</b>	<b>32.7%</b>	<b>0.0%</b>	<b>56.3%</b>	<b>11.0%</b>	<b>0.0%</b>	<b>\$0.20</b>	<b>17.8%</b>	<b>8.3%</b>	<b>73.9%</b>	<b>0.0%</b>	<b>13</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St							\$0.19	12.4%	9.8%	77.9%	0.0%	12	0	0.7
(H) Indirect Gain														
(H) Direct Gain	11,310	25.5%	0.0%	62.6%	11.8%	0.0%	\$0.19	13.0%	9.9%	77.1%	0.0%	12	0	0.7
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.09	42.8%	18.0%	39.2%	0.0%	13	0	0.3
(L) Skylights	8,115	60.3%	0.0%	22.6%	17.0%	0.0%	\$0.09	36.2%	29.9%	34.0%	0.0%	18	0	0.4
(L) Sawtooth Ap	7,230	52.6%	0.0%	21.1%	26.3%	0.0%	\$0.10	33.4%	26.2%	40.4%	0.0%	18	0	0.4
(L) Monitor Ap.	7,878	49.3%	0.0%	26.6%	24.1%	0.0%								
(L) Atrium														

BUILDING DESC	ENERGY USE					ENERGY COST					HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>98,010</b>	<b>0.0%</b>	<b>59.4%</b>	<b>29.1%</b>	<b>6.3%</b>	<b>5.2%</b>	<b>\$1.72</b>	<b>0.0%</b>	<b>66.3%</b>	<b>28.4%</b>	<b>5.3%</b>	<b>5</b>	<b>46</b>	<b>8.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$1.44	0.0%	73.1%	20.6%	6.4%	5	40	7.5
(L) Windows	84,153	0.0%	67.2%	20.4%	6.2%	6.1%	\$1.05	0.0%	79.9%	11.4%	8.7%	4	38	6.5
(L) Skylights	57,900	0.0%	71.5%	11.0%	8.7%	8.8%	\$0.99	0.0%	78.6%	12.1%	9.3%	5	29	5.6
(L) Sawtooth Ap	57,354	0.0%	73.2%	11.1%	6.8%	8.9%	\$1.07	0.0%	79.3%	12.1%	8.6%	6	31	5.9
(L) Monitor Ap.	62,719	0.0%	73.7%	11.6%	6.6%	8.1%	\$1.40	0.0%	84.7%	8.7%	6.6%	5	50	7.7
(L) Atrium	79,798	0.0%	77.1%	8.3%	8.2%	6.4%								
<b>B ADMIN &gt;5000 SF</b>	<b>79,853</b>	<b>0.0%</b>	<b>52.1%</b>	<b>35.9%</b>	<b>5.6%</b>	<b>6.4%</b>	<b>\$1.38</b>	<b>0.0%</b>	<b>58.1%</b>	<b>35.2%</b>	<b>6.6%</b>	<b>3</b>	<b>34</b>	<b>7.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$1.06	0.0%	59.7%	31.7%	8.6%	3	24	5.4
(L) Windows	63,235	0.0%	54.6%	32.3%	4.9%	8.1%	\$0.88	0.0%	76.0%	13.6%	10.4%	3	31	5.3
(L) Skylights	49,464	0.0%	68.2%	13.1%	8.4%	10.4%	\$0.91	0.0%	78.5%	11.5%	10.1%	4	26	5.2
(L) Sawtooth Ap	52,921	0.0%	74.1%	9.6%	6.6%	9.7%	\$0.97	0.0%	77.2%	13.3%	9.5%	4	27	5.3
(L) Monitor Ap.	57,211	0.0%	72.1%	12.7%	6.3%	9.0%	\$1.01	0.0%	75.4%	15.4%	9.1%	3	33	5.6
(L) Atrium	58,682	0.0%	67.6%	16.3%	7.4%	8.7%								
<b>C ADMIN, MULTISTORY</b>	<b>76,965</b>	<b>0.0%</b>	<b>50.7%</b>	<b>37.3%</b>	<b>5.4%</b>	<b>6.7%</b>	<b>\$1.34</b>	<b>0.0%</b>	<b>56.4%</b>	<b>36.8%</b>	<b>6.8%</b>	<b>2</b>	<b>31</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$1.02	0.0%	57.6%	33.4%	9.0%	2	21	5.2
(L) Windows	60,915	0.0%	53.4%	33.6%	4.6%	8.4%	\$1.04	0.0%	65.4%	25.7%	8.8%	2	27	5.7
(L) Skylights	60,324	0.0%	59.4%	26.2%	5.9%	8.5%	\$0.99	0.0%	66.4%	24.4%	9.3%	3	24	5.4
(L) Sawtooth Ap	57,569	0.0%	62.2%	23.3%	5.6%	8.9%	\$1.01	0.0%	66.2%	24.7%	9.1%	3	25	5.4
(L) Monitor Ap.	59,084	0.0%	62.0%	23.9%	5.5%	8.7%	\$1.09	0.0%	70.7%	20.8%	8.4%	2	31	5.8
(L) Atrium	63,746	0.0%	64.0%	21.5%	6.4%	8.0%								

# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/st-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>162,058</b>	<b>0.0%</b>	<b>41.9%</b>	<b>20.2%</b>	<b>6.0%</b>	<b>32.0%</b>	<b>\$2.68</b>	<b>0.0%</b>	<b>48.0%</b>	<b>19.9%</b>	<b>32.1%</b>	<b>5</b>	<b>51</b>	<b>12.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	161,075	0.0%	41.5%	20.3%	6.0%	32.2%	\$2.67	0.0%	47.8%	20.0%	32.2%	5	51	12.6
(C) Natural Vent														
(L) Windows	146,228	0.0%	42.7%	16.7%	5.2%	35.5%	\$2.39	0.0%	48.1%	16.0%	35.9%	5	41	11.1
(L) Skylights	127,283	0.0%	45.9%	5.8%	7.6%	40.7%	\$2.13	0.0%	53.5%	6.2%	40.3%	5	48	10.8
(L) Sawtooth Ap	130,528	0.0%	49.3%	4.3%	6.7%	39.7%	\$2.18	0.0%	55.6%	5.1%	39.4%	6	44	11.0
(L) Monitor Ap.	137,996	0.0%	48.7%	7.3%	6.4%	37.6%	\$2.28	0.0%	55.2%	7.1%	37.7%	6	45	11.1
(L) Atrium	141,696	0.0%	48.6%	7.4%	7.4%	36.6%	\$2.34	0.0%	56.2%	7.1%	36.7%	5	53	11.4
<b>E DINING FACILITY</b>	<b>125,177</b>	<b>0.0%</b>	<b>42.6%</b>	<b>25.1%</b>	<b>7.3%</b>	<b>25.0%</b>	<b>\$1.50</b>	<b>0.0%</b>	<b>66.0%</b>	<b>31.0%</b>	<b>3.0%</b>	<b>4</b>	<b>39</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	112,397	0.0%	49.6%	14.4%	8.1%	27.9%	\$1.30	0.0%	80.1%	16.4%	3.5%	5	39	6.0
(L) Skylights	93,143	0.0%	45.0%	12.7%	8.7%	33.6%	\$0.98	0.0%	80.2%	15.2%	4.7%	4	33	4.5
(L) Sawtooth Ap	106,638	0.0%	50.7%	12.1%	7.8%	29.4%	\$1.19	0.0%	82.6%	13.6%	3.8%	5	34	5.3
(L) Monitor Ap.	112,392	0.0%	50.9%	13.6%	7.5%	27.9%	\$1.27	0.0%	81.5%	14.9%	3.6%	5	35	5.4
(L) Atrium														
<b>F DORMITORY</b>	<b>67,680</b>	<b>0.0%</b>	<b>63.9%</b>	<b>21.8%</b>	<b>8.2%</b>	<b>6.0%</b>	<b>\$1.04</b>	<b>0.0%</b>	<b>67.7%</b>	<b>24.7%</b>	<b>7.7%</b>	<b>2</b>	<b>23</b>	<b>4.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	65,759	0.0%	63.1%	22.5%	8.2%	6.2%	\$1.01	0.0%	66.9%	25.2%	7.9%	2	23	4.1
(C) Natural Vent														
(L) Windows	64,421	0.0%	67.4%	19.0%	7.3%	6.3%	\$0.96	0.0%	73.7%	18.0%	8.3%	2	19	3.6
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/st-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>G FIRE STATION</b>	<b>49,646</b>	<b>0.0%</b>	<b>46.4%</b>	<b>32.0%</b>	<b>10.7%</b>	<b>11.0%</b>	<b>\$0.77</b>	<b>0.0%</b>	<b>55.7%</b>	<b>34.7%</b>	<b>9.6%</b>	<b>1</b>	<b>16</b>	<b>3.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace							\$0.75	0.0%	54.6%	35.6%	9.8%	1	16	3.4
(C) Night Mech Vent	47,483	0.0%	44.3%	33.4%	10.8%	11.4%	\$0.69	0.0%	50.7%	38.6%	10.7%	1	16	3.4
(C) Natural Vent	42,882	0.0%	38.0%	37.0%	12.3%	12.7%	\$0.62	0.0%	68.8%	19.1%	12.0%	2	13	2.5
(L) Windows	41,344	0.0%	53.4%	22.5%	10.9%	13.1%	\$0.54	0.0%	64.6%	21.6%	13.8%	1	10	2.2
(L) Skylights	36,441	0.0%	49.6%	25.1%	10.4%	14.9%	\$0.52	0.0%	64.3%	21.5%	14.2%	1	10	2.2
(L) Sawtooth Ap	35,262	0.0%	49.1%	25.0%	10.5%	15.4%	\$0.56	0.0%	65.4%	21.3%	13.3%	2	10	2.3
(L) Monitor Ap.	37,824	0.0%	50.3%	24.9%	10.5%	14.4%								
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>43,303</b>	<b>0.0%</b>	<b>0.0%</b>	<b>45.8%</b>	<b>0.2%</b>	<b>53.9%</b>	<b>\$0.74</b>	<b>0.0%</b>	<b>0.1%</b>	<b>45.8%</b>	<b>54.1%</b>	<b>0</b>	<b>0</b>	<b>3.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	27,886	0.0%	0.0%	15.9%	0.3%	83.8%	\$0.47	0.0%	0.1%	14.1%	85.8%	0	0	2.5
(L) Sawtooth Ap	27,145	0.0%	0.0%	13.6%	0.4%	86.0%	\$0.46	0.0%	0.1%	12.5%	87.4%	0	0	2.5
(L) Monitor Ap.	29,750	0.0%	0.0%	21.2%	0.3%	78.5%	\$0.49	0.0%	0.1%	17.8%	82.1%	0	0	2.5
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>16,641</b>	<b>0.0%</b>	<b>0.0%</b>	<b>68.0%</b>	<b>1.6%</b>	<b>30.4%</b>	<b>\$0.30</b>	<b>0.0%</b>	<b>0.3%</b>	<b>69.5%</b>	<b>30.2%</b>	<b>0</b>	<b>0</b>	<b>1.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	13,050	0.0%	0.0%	59.2%	2.0%	38.8%	\$0.23	0.0%	0.5%	60.0%	39.5%	0	0	1.4
(L) Skylights	7,849	0.0%	0.0%	32.2%	3.3%	64.5%	\$0.13	0.0%	0.8%	30.1%	69.2%	0	0	0.9
(L) Sawtooth Ap	7,863	0.0%	0.0%	32.3%	3.3%	64.4%	\$0.13	0.0%	0.8%	30.1%	69.1%	0	0	0.9
(L) Monitor Ap.	8,204	0.0%	0.0%	35.1%	3.2%	61.7%	\$0.14	0.0%	0.8%	32.1%	67.2%	0	0	0.9
(L) Atrium														



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>36,296</b>	<b>0.0%</b>	<b>0.0%</b>	<b>67.6%</b>	<b>0.3%</b>	<b>32.2%</b>	<b>\$0.62</b>	<b>0.0%</b>	<b>0.1%</b>	<b>67.7%</b>	<b>32.3%</b>	<b>0</b>	<b>0</b>	<b>3.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	23,414	0.0%	0.0%	49.7%	0.4%	49.9%	\$0.39	0.0%	0.1%	48.4%	51.5%	0	0	2.1
(L) Skylights	17,251	0.0%	0.0%	31.7%	0.6%	67.7%	\$0.28	0.0%	0.1%	28.8%	71.0%	0	0	1.6
(L) Sawtooth Ap	16,337	0.0%	0.0%	27.9%	0.6%	71.5%	\$0.27	0.0%	0.1%	26.1%	73.7%	0	0	1.6
(L) Monitor Ap.	17,538	0.0%	0.0%	32.9%	0.6%	66.6%	\$0.29	0.0%	0.1%	29.7%	70.2%	0	0	1.6
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>59,854</b>	<b>0.0%</b>	<b>42.7%</b>	<b>33.1%</b>	<b>4.7%</b>	<b>19.5%</b>	<b>\$1.05</b>	<b>0.0%</b>	<b>48.5%</b>	<b>32.4%</b>	<b>19.1%</b>	<b>2</b>	<b>21</b>	<b>5.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	59,518	0.0%	41.9%	33.3%	5.2%	19.6%	\$1.04	0.0%	48.3%	32.5%	19.2%	2	21	5.5
(C) Natural Vent														
(L) Windows	55,460	0.0%	50.9%	23.3%	4.8%	21.0%	\$0.94	0.0%	56.1%	22.6%	21.2%	3	20	4.7
(L) Skylights	43,510	0.0%	56.2%	10.2%	6.9%	26.8%	\$0.77	0.0%	65.6%	8.5%	25.9%	2	23	4.4
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>31,590</b>	<b>0.0%</b>	<b>0.0%</b>	<b>62.8%</b>	<b>0.3%</b>	<b>36.9%</b>	<b>\$0.54</b>	<b>0.0%</b>	<b>0.1%</b>	<b>62.8%</b>	<b>37.1%</b>	<b>0</b>	<b>0</b>	<b>2.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	24,576	0.0%	0.0%	52.1%	0.4%	47.5%	\$0.41	0.0%	0.1%	51.4%	48.5%	0	0	2.1
(L) Skylights	16,190	0.0%	0.0%	27.4%	0.6%	72.0%	\$0.27	0.0%	0.2%	24.7%	75.2%	0	0	1.5
(L) Sawtooth Ap	15,452	0.0%	0.0%	23.9%	0.6%	75.5%	\$0.26	0.0%	0.2%	22.2%	77.6%	0	0	1.5
(L) Monitor Ap.	16,423	0.0%	0.0%	28.4%	0.6%	71.0%	\$0.27	0.0%	0.1%	25.4%	74.4%	0	0	1.5
(L) Atrium														



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>M AUDITORIUM</b>	<b>67,126</b>	<b>0.0%</b>	<b>63.1%</b>	<b>21.7%</b>	<b>7.8%</b>	<b>7.5%</b>	<b>\$1.19</b>	<b>0.0%</b>	<b>71.6%</b>	<b>20.8%</b>	<b>7.6%</b>	<b>5</b>	<b>40</b>	<b>6.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>98,010</b>	<b>0.0%</b>	<b>59.4%</b>	<b>29.1%</b>	<b>6.3%</b>	<b>5.2%</b>	<b>\$1.72</b>	<b>0.0%</b>	<b>66.3%</b>	<b>28.4%</b>	<b>5.3%</b>	<b>5</b>	<b>46</b>	<b>8.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	84,153	0.0%	67.2%	20.4%	6.2%	6.1%	\$1.44	0.0%	73.1%	20.6%	6.4%	5	40	7.5
(L) Skylights	57,900	0.0%	71.5%	11.0%	8.7%	8.8%	\$1.05	0.0%	79.9%	11.4%	8.7%	4	38	6.5
(L) Sawtooth Ap	57,354	0.0%	73.2%	11.1%	6.8%	8.9%	\$0.99	0.0%	78.6%	12.1%	9.3%	5	29	5.6
(L) Monitor Ap.	62,719	0.0%	73.7%	11.6%	6.6%	8.1%	\$1.07	0.0%	79.3%	12.1%	8.6%	6	31	5.9
(L) Atrium	79,798	0.0%	77.1%	8.3%	8.2%	6.4%	\$1.40	0.0%	84.7%	8.7%	6.6%	5	50	7.7
<b>O TRAINING &gt;5000</b>	<b>79,853</b>	<b>0.0%</b>	<b>52.1%</b>	<b>35.9%</b>	<b>5.6%</b>	<b>6.4%</b>	<b>\$1.38</b>	<b>0.0%</b>	<b>58.1%</b>	<b>35.2%</b>	<b>6.6%</b>	<b>3</b>	<b>34</b>	<b>7.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	63,235	0.0%	54.6%	32.3%	4.9%	8.1%	\$1.06	0.0%	59.7%	31.7%	8.6%	3	24	5.4
(L) Skylights	49,464	0.0%	68.2%	13.1%	8.4%	10.4%	\$0.88	0.0%	76.0%	13.6%	10.4%	3	31	5.3
(L) Sawtooth Ap	52,921	0.0%	74.1%	9.6%	6.6%	9.7%	\$0.91	0.0%	78.5%	11.5%	10.1%	4	26	5.2
(L) Monitor Ap.	57,211	0.0%	72.1%	12.7%	6.3%	9.0%	\$0.97	0.0%	77.2%	13.3%	9.5%	4	27	5.3
(L) Atrium	58,682	0.0%	67.6%	16.3%	7.4%	8.7%	\$1.01	0.0%	75.4%	15.4%	9.1%	3	33	5.6



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>P TRAINING, MULTISTORY</b>	<b>76,965</b>	<b>0.0%</b>	<b>50.7%</b>	<b>37.3%</b>	<b>5.4%</b>	<b>6.7%</b>	<b>\$1.34</b>	<b>0.0%</b>	<b>56.4%</b>	<b>36.8%</b>	<b>6.8%</b>	<b>2</b>	<b>31</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	60,915	0.0%	53.4%	33.6%	4.6%	8.4%	\$1.02	0.0%	57.6%	33.4%	9.0%	2	21	5.2
(L) Skylights	60,324	0.0%	59.4%	26.2%	5.9%	8.5%	\$1.04	0.0%	65.4%	25.7%	8.8%	2	27	5.7
(L) Sawtooth Ap	57,569	0.0%	62.2%	23.3%	5.6%	8.9%	\$0.99	0.0%	66.4%	24.4%	9.3%	3	24	5.4
(L) Monitor Ap.	59,084	0.0%	62.0%	23.9%	5.5%	8.7%	\$1.01	0.0%	66.2%	24.7%	9.1%	3	25	5.4
(L) Atrium	63,746	0.0%	64.0%	21.5%	6.4%	8.0%	\$1.09	0.0%	70.7%	20.8%	8.4%	2	31	5.8
<b>Q TRAINING, GYM</b>	<b>37,772</b>	<b>0.0%</b>	<b>0.0%</b>	<b>94.2%</b>	<b>5.8%</b>	<b>0.0%</b>	<b>\$0.53</b>	<b>0.0%</b>	<b>1.2%</b>	<b>98.8%</b>	<b>0.0%</b>	<b>0</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	17,543	0.0%	0.0%	87.5%	12.5%	0.0%	\$0.20	0.0%	3.3%	96.7%	0.0%	0	0	0.6
(L) Sawtooth Ap	16,577	0.0%	0.0%	86.8%	13.2%	0.0%	\$0.19	0.0%	3.5%	96.5%	0.0%	0	0	0.6
(L) Monitor Ap.	17,843	0.0%	0.0%	87.7%	12.3%	0.0%	\$0.20	0.0%	3.3%	96.7%	0.0%	0	0	0.6
(L) Atrium														
<b>R WAREHOUSE</b>	<b>7,094</b>	<b>0.0%</b>	<b>0.0%</b>	<b>99.9%</b>	<b>0.1%</b>	<b>0.0%</b>	<b>\$0.12</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100.0%</b>	<b>0.0%</b>	<b>0</b>	<b>0</b>	<b>0.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	1,592	0.0%	0.0%	99.5%	0.5%	0.0%	\$0.02	0.0%	0.1%	99.9%	0.0%	0	0	0.2
(L) Sawtooth Ap	1,327	0.0%	0.0%	99.3%	0.7%	0.0%	\$0.02	0.0%	0.2%	99.8%	0.0%	0	0	0.2
(L) Monitor Ap.	1,673	0.0%	0.0%	99.5%	0.5%	0.0%	\$0.02	0.0%	0.1%	99.9%	0.0%	0	0	0.2
(L) Atrium														

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>66,236</b>	<b>23.8%</b>	<b>16.7%</b>	<b>43.1%</b>	<b>8.6%</b>	<b>7.7%</b>	<b>\$0.80</b>	<b>13.6%</b>	<b>26.4%</b>	<b>51.0%</b>	<b>9.1%</b>	<b>24</b>	<b>38</b>	<b>7.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	58,332	30.4%	18.3%	34.3%	8.2%	8.8%	\$0.67	17.4%	29.0%	42.7%	10.9%	26	31	6.1
(L) Skylights	48,034	44.6%	10.8%	24.4%	9.6%	10.6%	\$0.49	29.8%	21.0%	34.3%	15.0%	20	29	4.7
(L) Sawtooth Ap	45,906	45.8%	13.9%	22.0%	7.1%	11.1%	\$0.46	27.9%	24.9%	31.3%	15.8%	26	21	4.4
(L) Monitor Ap.	51,131	43.6%	15.6%	23.9%	7.0%	10.0%	\$0.53	26.1%	26.8%	33.2%	13.9%	28	23	4.6
(L) Atrium	54,640	39.8%	17.2%	21.6%	12.0%	9.3%	\$0.58	27.0%	31.3%	29.1%	12.6%	24	41	6.0
<b>B ADMIN &gt;5000 SF</b>	<b>55,929</b>	<b>16.8%</b>	<b>15.6%</b>	<b>51.3%</b>	<b>7.1%</b>	<b>9.2%</b>	<b>\$0.71</b>	<b>9.0%</b>	<b>23.1%</b>	<b>57.5%</b>	<b>10.3%</b>	<b>16</b>	<b>27</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	48,119	22.3%	15.9%	45.3%	5.8%	10.7%	\$0.59	11.8%	22.8%	52.9%	12.4%	17	17	4.2
(L) Skylights	39,442	36.0%	11.1%	30.7%	9.3%	13.0%	\$0.43	22.2%	20.9%	39.9%	16.9%	14	25	3.9
(L) Sawtooth Ap	37,773	41.5%	17.5%	19.5%	8.0%	13.6%	\$0.40	24.4%	30.4%	26.7%	18.5%	21	20	4.3
(L) Monitor Ap.	43,646	35.9%	17.7%	27.5%	7.2%	11.8%	\$0.48	20.1%	28.8%	35.8%	15.3%	22	21	4.3
(L) Atrium	41,480	30.8%	15.0%	32.6%	9.3%	12.4%	\$0.48	18.2%	25.7%	40.7%	15.4%	16	26	4.1
<b>C ADMIN, MULTISTORY</b>	<b>51,741</b>	<b>9.1%</b>	<b>18.4%</b>	<b>55.4%</b>	<b>7.2%</b>	<b>9.9%</b>	<b>\$0.70</b>	<b>4.7%</b>	<b>25.9%</b>	<b>58.9%</b>	<b>10.5%</b>	<b>11</b>	<b>27</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	44,312	12.9%	20.9%	49.2%	5.4%	11.6%	\$0.58	6.5%	27.2%	53.7%	12.6%	12	17	4.2
(L) Skylights	40,447	15.2%	18.6%	45.7%	7.8%	12.7%	\$0.52	8.0%	27.3%	50.7%	14.1%	11	22	4.5
(L) Sawtooth Ap	38,545	17.0%	21.4%	41.0%	7.3%	13.3%	\$0.49	8.7%	30.3%	46.0%	14.9%	13	20	4.4
(L) Monitor Ap.	40,652	16.8%	21.6%	42.0%	7.0%	12.6%	\$0.52	8.5%	30.2%	47.1%	14.1%	14	20	4.5
(L) Atrium	40,243	16.3%	20.3%	41.4%	9.3%	12.7%	\$0.52	8.8%	30.7%	46.3%	14.2%	12	27	4.7

# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf/yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>122,650</b>	<b>9.8%</b>	<b>14.6%</b>	<b>26.6%</b>	<b>6.7%</b>	<b>42.3%</b>	<b>\$1.64</b>	<b>4.8%</b>	<b>21.6%</b>	<b>28.5%</b>	<b>45.1%</b>	<b>23</b>	<b>40</b>	<b>11.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	117,374	12.2%	16.5%	22.0%	5.2%	44.2%	\$1.55	5.8%	22.4%	23.8%	47.9%	24	30	9.5
(L) Skylights	104,747	17.8%	11.7%	13.3%	7.7%	49.5%	\$1.33	9.0%	20.1%	15.0%	55.9%	21	38	9.1
(L) Sawtooth Ap	101,570	18.9%	14.4%	8.1%	7.7%	51.0%	\$1.28	9.6%	23.1%	9.2%	58.1%	28	33	9.5
(L) Monitor Ap.	110,274	16.5%	15.1%	14.5%	6.9%	47.0%	\$1.41	8.2%	23.0%	16.2%	52.6%	28	34	9.6
(L) Atrium	106,567	15.0%	13.6%	14.3%	8.5%	48.7%	\$1.38	7.7%	22.6%	15.9%	53.8%	24	42	9.6
<b>E DINING FACILITY</b>	<b>106,272</b>	<b>26.5%</b>	<b>7.6%</b>	<b>29.6%</b>	<b>6.8%</b>	<b>29.5%</b>	<b>\$0.99</b>	<b>20.6%</b>	<b>15.1%</b>	<b>45.4%</b>	<b>18.9%</b>	<b>44</b>	<b>27</b>	<b>5.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	99,562	32.0%	8.3%	20.8%	7.4%	31.5%	\$0.87	25.4%	18.8%	34.1%	21.6%	46	26	4.0
(L) Skylights	95,837	39.1%	4.4%	17.3%	6.5%	32.7%	\$0.76	34.0%	9.9%	31.3%	24.8%	42	20	2.9
(L) Sawtooth Ap	99,204	36.6%	8.0%	16.9%	7.0%	31.6%	\$0.82	29.5%	18.6%	29.1%	22.8%	49	21	3.5
(L) Monitor Ap.	103,865	35.8%	8.6%	18.4%	7.0%	30.2%	\$0.88	27.9%	19.8%	31.0%	21.3%	51	22	3.6
(L) Atrium														
<b>F DORMITORY</b>	<b>31,329</b>	<b>10.3%</b>	<b>14.7%</b>	<b>47.2%</b>	<b>14.9%</b>	<b>12.9%</b>	<b>\$0.42</b>	<b>7.9%</b>	<b>27.7%</b>	<b>50.5%</b>	<b>13.8%</b>	<b>10</b>	<b>19</b>	<b>4.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	30,612	14.7%	17.9%	41.7%	12.5%	13.2%	\$0.40	9.7%	29.7%	46.0%	14.6%	11	16	3.0
(L) Skylights	31,834	18.5%	16.3%	38.7%	13.8%	12.7%	\$0.40	12.6%	29.0%	43.9%	14.4%	10	18	3.1
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>G FIRE STATION</b>	<b>54,354</b>	<b>41.4%</b>	<b>3.4%</b>	<b>29.2%</b>	<b>16.0%</b>	<b>10.0%</b>	<b>\$0.57</b>	<b>29.9%</b>	<b>16.3%</b>	<b>40.0%</b>	<b>13.7%</b>	<b>66</b>	<b>14</b>	<b>3.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	53,113	42.4%	1.2%	29.9%	16.4%	10.2%	\$0.55	30.9%	13.6%	41.3%	14.2%	66	14	3.3
(L) Windows	49,367	47.1%	4.1%	21.6%	16.2%	11.0%	\$0.49	38.4%	14.6%	31.1%	15.9%	67	11	2.0
(L) Skylights	51,727	50.2%	2.9%	20.8%	15.6%	10.5%	\$0.50	41.5%	12.3%	30.7%	15.6%	64	8	1.6
(L) Sawtooth Ap	47,631	50.2%	2.7%	20.9%	14.8%	11.4%	\$0.46	42.3%	9.7%	31.0%	16.9%	71	7	1.6
(L) Monitor Ap.	51,569	50.4%	3.2%	21.2%	14.6%	10.5%	\$0.50	41.7%	11.1%	31.5%	15.7%	73	8	1.8
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>46,260</b>	<b>3.9%</b>	<b>0.0%</b>	<b>42.9%</b>	<b>2.7%</b>	<b>50.5%</b>	<b>\$0.65</b>	<b>2.0%</b>	<b>2.2%</b>	<b>44.0%</b>	<b>51.8%</b>	<b>12</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	35,526	8.0%	0.0%	23.0%	3.3%	65.7%	\$0.48	4.2%	2.3%	24.2%	69.3%	11	0	2.9
(L) Sawtooth Ap	36,456	14.3%	0.0%	15.4%	6.2%	64.1%	\$0.47	7.4%	5.0%	17.0%	70.6%	21	0	2.9
(L) Monitor Ap.	39,553	10.0%	0.0%	26.2%	4.8%	59.0%	\$0.53	4.9%	4.0%	28.0%	63.1%	18	0	2.9
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>25,247</b>	<b>27.3%</b>	<b>0.0%</b>	<b>44.8%</b>	<b>7.8%</b>	<b>20.1%</b>	<b>\$0.30</b>	<b>16.1%</b>	<b>5.2%</b>	<b>54.4%</b>	<b>24.3%</b>	<b>18</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St	24,687	26.0%	0.0%	45.8%	7.7%	20.5%	\$0.29	14.9%	5.5%	55.1%	24.6%	17	0	1.8
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	22,792	31.4%	0.0%	37.8%	8.6%	22.2%	\$0.26	19.3%	5.6%	47.3%	27.8%	18	0	1.5
(L) Skylights	20,525	44.9%	0.0%	22.6%	7.8%	24.7%	\$0.21	29.2%	4.3%	31.8%	34.7%	15	0	1.2
(L) Sawtooth Ap	19,529	42.5%	0.0%	20.6%	11.0%	25.9%	\$0.20	28.4%	7.6%	28.3%	35.7%	20	0	1.2
(L) Monitor Ap.	21,091	42.0%	0.0%	23.0%	11.0%	24.0%	\$0.22	27.9%	7.6%	31.6%	32.9%	21	0	1.2
(L) Atrium														



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>46,187</b>	<b>16.4%</b>	<b>0.0%</b>	<b>53.1%</b>	<b>5.2%</b>	<b>25.3%</b>	<b>\$0.59</b>	<b>8.8%</b>	<b>3.5%</b>	<b>59.4%</b>	<b>28.3%</b>	<b>22</b>	<b>0</b>	<b>3.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	37,304	22.0%	0.0%	39.6%	7.1%	31.3%	\$0.46	12.5%	5.0%	46.1%	36.5%	24	0	2.5
(L) Skylights	33,537	28.6%	0.0%	30.1%	6.5%	34.8%	\$0.39	17.0%	3.4%	36.9%	42.7%	20	0	2.1
(L) Sawtooth Ap	32,518	32.5%	0.0%	21.4%	10.3%	35.9%	\$0.37	19.8%	7.8%	27.0%	45.4%	30	0	2.2
(L) Monitor Ap.	34,894	29.8%	0.0%	27.2%	9.6%	33.5%	\$0.40	18.1%	6.9%	33.6%	41.4%	30	0	2.2
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>45,732</b>	<b>14.5%</b>	<b>11.6%</b>	<b>43.4%</b>	<b>5.0%</b>	<b>25.5%</b>	<b>\$0.59</b>	<b>7.2%</b>	<b>16.8%</b>	<b>47.8%</b>	<b>28.1%</b>	<b>12</b>	<b>16</b>	<b>4.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	41,287	18.3%	12.9%	35.4%	5.1%	28.3%	\$0.52	8.9%	18.9%	40.1%	32.0%	13	15	3.9
(L) Skylights	35,190	27.2%	9.3%	23.2%	7.1%	33.1%	\$0.42	15.5%	16.2%	28.1%	40.2%	11	18	3.4
(L) Sawtooth Ap	37,087	30.7%	16.2%	15.2%	6.5%	31.5%	\$0.43	16.3%	25.6%	18.9%	39.2%	17	17	3.6
(L) Monitor Ap.	39,101	28.8%	15.6%	19.6%	6.1%	29.8%	\$0.46	15.1%	24.2%	24.1%	36.6%	17	17	3.6
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>33,658</b>	<b>3.5%</b>	<b>0.0%</b>	<b>58.9%</b>	<b>2.9%</b>	<b>34.7%</b>	<b>\$0.47</b>	<b>1.8%</b>	<b>2.4%</b>	<b>60.3%</b>	<b>35.5%</b>	<b>9</b>	<b>0</b>	<b>2.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	28,879	5.3%	0.0%	50.5%	3.8%	40.4%	\$0.40	2.7%	3.2%	52.3%	41.8%	10	0	2.3
(L) Skylights	23,039	9.9%	0.0%	35.4%	4.1%	50.6%	\$0.31	5.6%	2.6%	37.8%	54.1%	9	0	1.9
(L) Sawtooth Ap	21,668	13.6%	0.0%	25.9%	6.6%	53.8%	\$0.28	7.2%	5.4%	28.4%	59.0%	13	0	1.9
(L) Monitor Ap.	23,702	12.4%	0.0%	32.3%	6.0%	49.2%	\$0.31	6.6%	4.8%	35.1%	53.5%	13	0	1.9
(L) Atrium														



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE					ENERGY COST				HVAC		PEAK LOAD		
	Bldg Btu/sf/yr	QHeat (%)	QCool (%)	QHea (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>M AUDITORIUM</b>	<b>48,124</b>	<b>35.1%</b>	<b>15.9%</b>	<b>30.2%</b>	<b>8.4%</b>	<b>10.4%</b>	<b>\$0.53</b>	<b>20.9%</b>	<b>26.6%</b>	<b>39.1%</b>	<b>13.4%</b>	<b>25</b>	<b>27</b>	<b>5.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>66,236</b>	<b>23.8%</b>	<b>16.7%</b>	<b>43.1%</b>	<b>8.6%</b>	<b>7.7%</b>	<b>\$0.80</b>	<b>13.6%</b>	<b>26.4%</b>	<b>51.0%</b>	<b>9.1%</b>	<b>24</b>	<b>38</b>	<b>7.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	58,332	30.4%	18.3%	34.3%	8.2%	8.8%	\$0.67	17.4%	29.0%	42.7%	10.9%	26	31	6.1
(L) Skylights	48,034	44.6%	10.8%	24.4%	9.6%	10.6%	\$0.49	29.8%	21.0%	34.3%	15.0%	20	29	4.7
(L) Sawtooth Ap	45,906	45.8%	13.9%	22.0%	7.1%	11.1%	\$0.46	27.9%	24.9%	31.3%	15.8%	26	21	4.4
(L) Monitor Ap.	51,131	43.6%	15.6%	23.9%	7.0%	10.0%	\$0.53	26.1%	26.8%	33.2%	13.9%	28	23	4.6
(L) Atrium	54,640	39.8%	17.2%	21.6%	12.0%	9.3%	\$0.58	27.0%	31.3%	29.1%	12.6%	24	41	6.0
<b>O TRAINING &gt;5000</b>	<b>55,929</b>	<b>16.8%</b>	<b>15.6%</b>	<b>51.3%</b>	<b>7.1%</b>	<b>9.2%</b>	<b>\$0.71</b>	<b>9.0%</b>	<b>23.1%</b>	<b>57.5%</b>	<b>10.3%</b>	<b>16</b>	<b>27</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	48,119	22.3%	15.9%	45.3%	5.8%	10.7%	\$0.59	11.8%	22.8%	52.9%	12.4%	17	17	4.2
(L) Skylights	39,442	36.0%	11.1%	30.7%	9.3%	13.0%	\$0.43	22.2%	20.9%	39.9%	16.9%	14	25	3.9
(L) Sawtooth Ap	37,773	41.5%	17.5%	19.5%	8.0%	13.6%	\$0.40	24.4%	30.4%	26.7%	18.5%	21	20	4.3
(L) Monitor Ap.	43,646	35.9%	17.7%	27.5%	7.2%	11.8%	\$0.48	20.1%	28.8%	35.8%	15.3%	22	21	4.3
(L) Atrium	41,480	30.8%	15.0%	32.6%	9.3%	12.4%	\$0.48	18.2%	25.7%	40.7%	15.4%	16	26	4.1



# Climate Region 9

# Appendix E

BUILDING DESC	ENERGY USE					ENERGY COST					HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>P TRAINING, MULTISTORY</b>	<b>51,741</b>	<b>9.1%</b>	<b>18.4%</b>	<b>55.4%</b>	<b>7.2%</b>	<b>9.9%</b>	<b>\$0.70</b>	<b>4.7%</b>	<b>25.9%</b>	<b>58.9%</b>	<b>10.5%</b>	<b>11</b>	<b>27</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	44,312	12.9%	20.9%	49.2%	5.4%	11.6%	\$0.58	6.5%	27.2%	53.7%	12.6%	12	17	4.2
(L) Skylights	40,447	15.2%	18.6%	45.7%	7.8%	12.7%	\$0.52	8.0%	27.3%	50.7%	14.1%	11	22	4.5
(L) Sawtooth Ap	38,545	17.0%	21.4%	41.0%	7.3%	13.3%	\$0.49	8.7%	30.3%	46.0%	14.9%	13	20	4.4
(L) Monitor Ap.	40,652	16.8%	21.6%	42.0%	7.0%	12.6%	\$0.52	8.5%	30.2%	47.1%	14.1%	14	20	4.5
(L) Atrium	40,243	16.3%	20.3%	41.4%	9.3%	12.7%	\$0.52	8.8%	30.7%	46.3%	14.2%	12	27	4.7
<b>Q TRAINING, GYM</b>	<b>50,346</b>	<b>20.6%</b>	<b>0.0%</b>	<b>70.7%</b>	<b>8.7%</b>	<b>0.0%</b>	<b>\$0.62</b>	<b>12.5%</b>	<b>6.0%</b>	<b>81.5%</b>	<b>0.0%</b>	<b>30</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	41,582	40.9%	0.0%	49.1%	10.0%	0.0%	\$0.44	27.2%	6.1%	66.6%	0.0%	28	0	1.0
(L) Sawtooth Ap	39,042	42.1%	0.0%	43.5%	14.5%	0.0%	\$0.41	29.0%	11.4%	59.7%	0.0%	38	0	1.1
(L) Monitor Ap.	42,483	40.0%	0.0%	46.3%	13.8%	0.0%	\$0.45	27.0%	10.7%	62.3%	0.0%	39	0	1.1
(L) Atrium														
<b>R WAREHOUSE</b>	<b>16,645</b>	<b>50.7%</b>	<b>0.0%</b>	<b>42.6%</b>	<b>6.7%</b>	<b>0.0%</b>	<b>\$0.16</b>	<b>34.3%</b>	<b>2.4%</b>	<b>63.3%</b>	<b>0.0%</b>	<b>10</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	14,926	45.4%	0.0%	47.5%	7.1%	0.0%	\$0.15	28.6%	4.3%	67.1%	0.0%	10	0	0.7
(H) Indirect Gain														
(H) Direct Gain	14,662	44.3%	0.0%	48.3%	7.3%	0.0%	\$0.15	27.8%	4.6%	67.7%	0.0%	10	0	0.7
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	14,389	72.0%	0.0%	20.3%	7.8%	0.0%	\$0.11	58.9%	3.3%	37.8%	0.0%	10	0	0.4
(L) Sawtooth Ap	11,933	70.0%	0.0%	16.8%	13.1%	0.0%	\$0.09	58.9%	10.4%	30.7%	0.0%	14	0	0.4
(L) Monitor Ap.	12,944	66.7%	0.0%	21.2%	12.1%	0.0%	\$0.11	53.5%	9.3%	37.2%	0.0%	14	0	0.4
(L) Atrium														



# Climate Region 10

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>70,702</b>	<b>28.7%</b>	<b>14.5%</b>	<b>40.4%</b>	<b>9.1%</b>	<b>7.2%</b>	<b>\$1.12</b>	<b>18.2%</b>	<b>24.1%</b>	<b>48.9%</b>	<b>8.8%</b>	<b>32</b>	<b>41</b>	<b>7.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	69,460	29.3%	13.0%	41.1%	9.3%	7.4%	\$1.09	18.6%	22.4%	50.0%	8.9%	32	41	7.9
(L) Windows	63,418	35.9%	16.2%	31.3%	8.6%	8.1%	\$0.95	23.1%	26.7%	39.9%	10.3%	35	35	6.3
(L) Skylights	54,903	49.5%	10.1%	21.5%	9.6%	9.3%	\$0.74	36.0%	20.0%	30.7%	13.3%	26	33	4.6
(L) Sawtooth Ap	53,241	51.1%	11.6%	19.3%	8.4%	9.6%	\$0.70	35.9%	22.3%	27.9%	13.9%	35	24	4.6
(L) Monitor Ap.	57,906	48.9%	13.3%	20.4%	8.5%	8.8%	\$0.78	33.9%	24.5%	29.1%	12.6%	37	26	4.8
(L) Atrium	62,320	45.1%	16.1%	18.8%	11.8%	8.2%	\$0.87	33.2%	29.6%	25.9%	11.3%	32	45	6.3
<b>B ADMIN &gt;5000 SF</b>	<b>58,587</b>	<b>21.1%</b>	<b>13.6%</b>	<b>49.0%</b>	<b>7.6%</b>	<b>8.8%</b>	<b>\$0.98</b>	<b>12.5%</b>	<b>21.3%</b>	<b>56.1%</b>	<b>10.0%</b>	<b>22</b>	<b>30</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	58,030	21.3%	12.7%	49.4%	7.7%	8.8%	\$0.97	12.7%	20.4%	56.8%	10.1%	22	30	6.4
(L) Windows	52,120	27.6%	14.5%	41.7%	6.3%	9.8%	\$0.83	16.3%	21.8%	50.1%	11.8%	23	20	4.4
(L) Skylights	44,548	41.0%	10.5%	27.7%	9.3%	11.5%	\$0.64	27.6%	20.2%	36.9%	15.3%	19	27	4.1
(L) Sawtooth Ap	42,892	47.5%	15.0%	16.6%	8.9%	12.0%	\$0.58	32.3%	27.6%	23.3%	16.8%	28	22	4.5
(L) Monitor Ap.	48,428	41.4%	15.5%	24.2%	8.3%	10.6%	\$0.69	26.7%	26.8%	32.3%	14.1%	30	23	4.4
(L) Atrium	46,102	36.4%	13.8%	29.3%	9.4%	11.1%	\$0.69	23.7%	24.4%	37.6%	14.3%	22	29	4.2
<b>C ADMIN, MULTISTORY</b>	<b>52,813</b>	<b>11.7%</b>	<b>16.6%</b>	<b>54.3%</b>	<b>7.6%</b>	<b>9.7%</b>	<b>\$0.94</b>	<b>6.5%</b>	<b>24.6%</b>	<b>58.5%</b>	<b>10.5%</b>	<b>15</b>	<b>29</b>	<b>6.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	52,183	11.9%	15.6%	55.0%	7.7%	9.8%	\$0.93	6.6%	23.6%	59.2%	10.6%	15	29	6.4
(L) Windows	46,828	16.1%	20.8%	46.4%	5.7%	11.0%	\$0.81	9.0%	27.4%	51.5%	12.1%	16	19	4.3
(L) Skylights	42,554	19.2%	17.2%	43.4%	8.1%	12.1%	\$0.72	11.1%	26.1%	49.1%	13.6%	15	24	4.7
(L) Sawtooth Ap	40,481	21.3%	19.5%	38.9%	7.7%	12.7%	\$0.68	12.1%	28.7%	44.6%	14.5%	18	22	4.5
(L) Monitor Ap.	42,469	20.8%	19.7%	40.0%	7.5%	12.1%	\$0.71	11.8%	28.6%	45.8%	13.8%	18	22	4.6
(L) Atrium	42,708	20.4%	19.1%	39.0%	9.5%	12.0%	\$0.72	12.2%	29.7%	44.5%	13.7%	16	28	4.8

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>125,586</b>	<b>12.7%</b>	<b>12.8%</b>	<b>26.0%</b>	<b>7.2%</b>	<b>41.3%</b>	<b>\$2.22</b>	<b>6.9%</b>	<b>20.2%</b>	<b>28.2%</b>	<b>44.7%</b>	<b>30</b>	<b>44</b>	<b>11.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	125,331	12.8%	12.5%	26.1%	7.2%	41.4%	\$2.21	7.0%	19.9%	28.3%	44.9%	30	44	11.6
(L) Windows	121,128	15.7%	14.4%	21.2%	5.8%	42.8%	\$2.10	8.3%	20.9%	23.5%	47.3%	31	34	9.8
(L) Skylights	110,556	21.6%	10.6%	12.8%	8.1%	46.9%	\$1.84	12.0%	19.3%	14.7%	54.0%	27	42	9.1
(L) Sawtooth Ap	108,396	23.8%	12.7%	7.4%	8.3%	47.8%	\$1.78	13.5%	22.0%	8.6%	55.9%	37	37	9.5
(L) Monitor Ap.	116,004	20.7%	13.3%	13.6%	7.7%	44.7%	\$1.94	11.5%	21.8%	15.6%	51.1%	38	39	9.8
(L) Atrium	112,293	19.0%	12.4%	13.5%	8.9%	46.2%	\$1.90	10.7%	21.8%	15.3%	52.2%	31	46	9.7
<b>E DINING FACILITY</b>	<b>117,480</b>	<b>32.7%</b>	<b>5.7%</b>	<b>26.8%</b>	<b>8.1%</b>	<b>26.7%</b>	<b>\$1.48</b>	<b>26.2%</b>	<b>14.5%</b>	<b>40.9%</b>	<b>18.4%</b>	<b>61</b>	<b>32</b>	<b>5.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	116,347	33.0%	4.8%	27.1%	8.2%	26.9%	\$1.45	26.6%	13.2%	41.5%	18.7%	61	32	5.4
(L) Windows	111,703	38.7%	6.4%	18.2%	8.7%	28.0%	\$1.31	32.6%	16.9%	29.7%	20.8%	64	31	4.4
(L) Skylights	108,911	44.9%	3.5%	15.1%	7.7%	28.8%	\$1.19	39.8%	10.9%	26.4%	22.9%	59	25	3.1
(L) Sawtooth Ap	113,558	43.0%	6.1%	14.8%	8.5%	27.6%	\$1.28	37.0%	16.6%	25.1%	21.3%	67	27	3.9
(L) Monitor Ap.	117,894	41.9%	6.8%	16.1%	8.6%	26.6%	\$1.36	35.3%	17.7%	26.9%	20.1%	70	28	4.1
(L) Atrium														
<b>F DORMITORY</b>	<b>33,862</b>	<b>16.5%</b>	<b>13.1%</b>	<b>43.6%</b>	<b>14.9%</b>	<b>12.0%</b>	<b>\$0.58</b>	<b>12.1%</b>	<b>26.1%</b>	<b>48.5%</b>	<b>13.3%</b>	<b>14</b>	<b>21</b>	<b>3.6</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	33,020	16.9%	10.9%	44.7%	15.2%	12.3%	\$0.57	12.5%	24.0%	49.8%	13.7%	14	21	3.5
(L) Windows	32,855	20.8%	15.4%	38.7%	12.7%	12.3%	\$0.55	13.9%	27.7%	44.3%	14.1%	15	17	2.6
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														



BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>G FIRE STATION</b>	<b>62,697</b>	<b>43.2%</b>	<b>4.2%</b>	<b>25.3%</b>	<b>18.6%</b>	<b>8.7%</b>	<b>\$0.88</b>	<b>38.3%</b>	<b>15.2%</b>	<b>34.6%</b>	<b>11.9%</b>	<b>94</b>	<b>15</b>	<b>3.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	60,835	44.5%	1.3%	26.1%	19.1%	8.9%	\$0.84	39.9%	11.6%	36.1%	12.4%	94	15	2.9
(L) Windows	57,885	48.8%	4.6%	18.3%	18.9%	9.4%	\$0.77	45.6%	14.7%	26.2%	13.5%	96	11	2.1
(L) Skylights	59,949	51.1%	3.2%	17.9%	18.7%	9.1%	\$0.79	50.2%	10.7%	26.0%	13.2%	91	9	1.8
(L) Sawtooth Ap	58,211	53.1%	2.9%	17.0%	17.6%	9.3%	\$0.76	51.2%	9.9%	25.1%	13.8%	101	8	1.8
(L) Monitor Ap.	61,676	52.8%	3.5%	17.6%	17.3%	8.8%	\$0.80	49.1%	12.1%	25.9%	13.0%	104	9	2.1
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>48,226</b>	<b>6.6%</b>	<b>0.0%</b>	<b>41.2%</b>	<b>3.8%</b>	<b>48.4%</b>	<b>\$0.89</b>	<b>3.6%</b>	<b>3.1%</b>	<b>42.9%</b>	<b>50.5%</b>	<b>17</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	38,238	13.0%	0.0%	21.4%	4.5%	61.1%	\$0.67	7.3%	3.1%	23.3%	66.3%	16	0	3.0
(L) Sawtooth Ap	40,298	19.9%	0.0%	13.9%	8.2%	58.0%	\$0.68	11.9%	6.4%	15.8%	65.9%	30	0	3.1
(L) Monitor Ap.	43,056	14.9%	0.0%	24.4%	6.4%	54.2%	\$0.75	8.2%	5.3%	26.9%	59.6%	25	0	3.1
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>29,526</b>	<b>34.8%</b>	<b>0.0%</b>	<b>38.3%</b>	<b>9.8%</b>	<b>17.2%</b>	<b>\$0.45</b>	<b>22.9%</b>	<b>6.7%</b>	<b>48.6%</b>	<b>21.7%</b>	<b>26</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	27,112	39.1%	0.0%	31.6%	10.6%	18.7%	\$0.40	26.9%	7.2%	41.4%	24.5%	26	0	1.6
(L) Skylights	25,856	53.2%	0.0%	18.1%	9.1%	19.6%	\$0.34	39.7%	4.6%	26.8%	28.9%	21	0	1.3
(L) Sawtooth Ap	24,634	50.1%	0.0%	16.5%	12.8%	20.6%	\$0.33	38.0%	8.8%	23.8%	29.5%	28	0	1.3
(L) Monitor Ap.	26,243	49.8%	0.0%	17.9%	13.1%	19.3%	\$0.35	37.3%	9.5%	25.6%	27.6%	30	0	1.3
(L) Atrium														

# Climate Region 10

Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Blu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>51,054</b>	<b>22.1%</b>	<b>0.0%</b>	<b>48.0%</b>	<b>7.0%</b>	<b>22.9%</b>	<b>\$0.85</b>	<b>13.6%</b>	<b>4.5%</b>	<b>55.5%</b>	<b>26.4%</b>	<b>31</b>	<b>0</b>	<b>3.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	42,519	29.0%	0.0%	34.3%	9.3%	27.5%	\$0.67	18.7%	6.3%	41.6%	33.3%	35	0	2.6
(L) Skylights	39,706	36.9%	0.0%	25.5%	8.2%	29.4%	\$0.59	25.2%	4.1%	32.9%	37.9%	28	0	2.3
(L) Sawtooth Ap	38,960	39.5%	0.0%	17.8%	12.8%	30.0%	\$0.57	28.1%	9.1%	23.4%	39.4%	43	0	2.4
(L) Monitor Ap.	41,104	37.0%	0.0%	22.5%	12.1%	28.4%	\$0.61	25.8%	8.6%	29.0%	36.6%	43	0	2.4
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>47,659</b>	<b>18.6%</b>	<b>9.9%</b>	<b>41.6%</b>	<b>5.5%</b>	<b>24.5%</b>	<b>\$0.81</b>	<b>10.1%</b>	<b>15.5%</b>	<b>46.9%</b>	<b>27.6%</b>	<b>15</b>	<b>18</b>	<b>4.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	47,267	18.7%	9.1%	41.9%	5.5%	24.7%	\$0.80	10.2%	14.7%	47.3%	27.8%	15	18	5.0
(L) Windows	43,749	23.1%	11.3%	33.4%	5.6%	26.7%	\$0.72	12.6%	17.6%	38.8%	31.0%	17	17	4.1
(L) Skylights	38,630	32.6%	8.6%	21.2%	7.4%	30.2%	\$0.59	20.3%	15.6%	26.4%	37.6%	15	20	3.2
(L) Sawtooth Ap	40,622	36.2%	14.4%	13.8%	6.9%	28.7%	\$0.61	22.0%	23.6%	17.7%	36.8%	23	19	3.8
(L) Monitor Ap.	42,355	34.1%	14.2%	17.6%	6.5%	27.5%	\$0.64	20.2%	22.8%	22.2%	34.7%	23	19	3.6
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>35,138</b>	<b>6.3%</b>	<b>0.0%</b>	<b>56.4%</b>	<b>4.0%</b>	<b>33.2%</b>	<b>\$0.65</b>	<b>3.6%</b>	<b>3.2%</b>	<b>58.7%</b>	<b>34.5%</b>	<b>13</b>	<b>0</b>	<b>2.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	30,595	9.0%	0.0%	47.6%	5.2%	38.1%	\$0.55	5.2%	4.1%	50.4%	40.3%	15	0	2.4
(L) Skylights	25,183	15.7%	0.0%	32.5%	5.4%	46.3%	\$0.44	9.6%	3.3%	36.0%	51.2%	13	0	2.0
(L) Sawtooth Ap	24,276	20.3%	0.0%	23.1%	8.5%	48.0%	\$0.41	12.6%	6.2%	26.3%	54.8%	19	0	2.0
(L) Monitor Ap.	26,046	18.6%	0.0%	28.7%	8.0%	44.8%	\$0.44	11.4%	5.8%	32.3%	50.5%	19	0	2.0
(L) Atrium														





# Climate Region 10

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>M AUDITORIUM</b>	<b>52,313</b>	<b>41.0%</b>	<b>12.4%</b>	<b>27.8%</b>	<b>9.3%</b>	<b>9.6%</b>	<b>\$0.75</b>	<b>27.5%</b>	<b>22.7%</b>	<b>37.0%</b>	<b>12.7%</b>	<b>33</b>	<b>32</b>	<b>5.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	51,491	41.7%	11.0%	28.2%	9.4%	9.7%	\$0.74	28.1%	21.1%	37.8%	13.0%	33	32	5.4
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>70,702</b>	<b>28.7%</b>	<b>14.5%</b>	<b>40.4%</b>	<b>9.1%</b>	<b>7.2%</b>	<b>\$1.12</b>	<b>18.2%</b>	<b>24.1%</b>	<b>48.9%</b>	<b>8.8%</b>	<b>32</b>	<b>41</b>	<b>7.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	69,460	29.3%	13.0%	41.1%	9.3%	7.4%	\$1.09	18.6%	22.4%	50.0%	8.9%	32	41	7.9
(L) Windows	63,418	35.9%	16.2%	31.3%	8.6%	8.1%	\$0.95	23.1%	26.7%	39.9%	10.3%	35	35	6.3
(L) Skylights	54,903	49.5%	10.1%	21.5%	9.6%	9.3%	\$0.74	36.0%	20.0%	30.7%	13.3%	26	33	4.6
(L) Sawtooth Ap	53,241	51.1%	11.6%	19.3%	8.4%	9.6%	\$0.70	35.9%	22.3%	27.9%	13.9%	35	24	4.6
(L) Monitor Ap.	57,906	48.9%	13.3%	20.4%	8.5%	8.8%	\$0.78	33.9%	24.5%	29.1%	12.6%	37	26	4.8
(L) Atrium	62,320	45.1%	16.1%	18.8%	11.8%	8.2%	\$0.87	33.2%	29.6%	25.9%	11.3%	32	45	6.3
<b>O TRAINING &gt;5000</b>	<b>58,587</b>	<b>21.1%</b>	<b>13.6%</b>	<b>49.0%</b>	<b>7.6%</b>	<b>8.8%</b>	<b>\$0.98</b>	<b>12.5%</b>	<b>21.3%</b>	<b>56.1%</b>	<b>10.0%</b>	<b>22</b>	<b>30</b>	<b>6.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	58,030	21.3%	12.7%	49.4%	7.7%	8.8%	\$0.97	12.7%	20.4%	56.8%	10.1%	22	30	6.4
(L) Windows	52,120	27.6%	14.5%	41.7%	6.3%	9.8%	\$0.83	16.3%	21.8%	50.1%	11.8%	23	20	4.4
(L) Skylights	44,548	41.0%	10.5%	27.7%	9.3%	11.5%	\$0.64	27.6%	20.2%	36.9%	15.3%	19	27	4.1
(L) Sawtooth Ap	42,892	47.5%	15.0%	16.6%	8.9%	12.0%	\$0.58	32.3%	27.6%	23.3%	16.8%	28	22	4.5
(L) Monitor Ap.	48,428	41.4%	15.5%	24.2%	8.3%	10.6%	\$0.69	26.7%	26.8%	32.3%	14.1%	30	23	4.4
(L) Atrium	46,102	36.4%	13.8%	29.3%	9.4%	11.1%	\$0.69	23.7%	24.4%	37.6%	14.3%	22	29	

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>144,634</b>	<b>14.9%</b>	<b>19.5%</b>	<b>22.6%</b>	<b>7.1%</b>	<b>35.8%</b>	<b>\$2.44</b>	<b>6.1%</b>	<b>35.8%</b>	<b>22.0%</b>	<b>36.1%</b>	<b>35</b>	<b>50</b>	<b>12.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	141,762	15.3%	17.8%	23.1%	7.3%	36.6%	\$2.39	6.3%	34.5%	22.4%	36.8%	35	50	12.6
(L) Windows	136,883	18.4%	19.5%	18.3%	6.0%	37.9%	\$2.22	7.7%	36.0%	16.7%	39.7%	36	40	10.6
(L) Skylights	128,817	26.4%	17.6%	7.8%	7.9%	40.2%	\$2.01	11.5%	36.6%	8.2%	43.8%	32	48	9.9
(L) Sawtooth Ap	126,819	26.0%	20.0%	5.2%	7.9%	40.9%	\$2.09	10.8%	40.1%	7.0%	42.2%	42	43	10.0
(L) Monitor Ap.	134,320	23.3%	20.3%	10.3%	7.5%	38.6%	\$2.15	9.9%	40.6%	8.6%	40.9%	43	45	10.2
(L) Atrium	131,848	22.4%	20.6%	9.2%	8.4%	39.3%	\$2.12	9.6%	40.6%	8.3%	41.5%	36	53	10.4
<b>E DINING FACILITY</b>	<b>149,723</b>	<b>38.2%</b>	<b>12.0%</b>	<b>21.0%</b>	<b>7.9%</b>	<b>20.9%</b>	<b>\$1.64</b>	<b>24.1%</b>	<b>37.6%</b>	<b>24.9%</b>	<b>13.4%</b>	<b>72</b>	<b>39</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	147,220	38.8%	10.5%	21.4%	8.0%	21.3%	\$1.62	24.4%	36.9%	25.2%	13.5%	72	39	7.1
(L) Windows	142,360	43.2%	13.0%	13.2%	8.5%	22.0%	\$1.45	29.2%	44.4%	11.3%	15.1%	76	39	5.8
(L) Skylights	138,676	51.7%	8.4%	9.6%	7.7%	22.6%	\$1.27	38.5%	36.1%	8.2%	17.2%	69	32	4.5
(L) Sawtooth Ap	142,603	47.3%	12.2%	10.4%	8.1%	22.0%	\$1.43	32.2%	44.7%	7.8%	15.3%	79	34	4.9
(L) Monitor Ap.	147,890	45.9%	12.9%	11.8%	8.2%	21.2%	\$1.49	31.2%	45.7%	8.4%	14.7%	82	35	5.0
(L) Atrium														
<b>F DORMITORY</b>	<b>45,678</b>	<b>15.7%</b>	<b>30.9%</b>	<b>32.3%</b>	<b>12.2%</b>	<b>8.9%</b>	<b>\$0.74</b>	<b>7.2%</b>	<b>42.2%</b>	<b>37.3%</b>	<b>13.2%</b>	<b>16</b>	<b>23</b>	<b>4.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	44,596	17.0%	28.6%	33.1%	12.2%	9.1%	\$0.73	7.7%	41.4%	37.6%	13.3%	16	23	4.2
(C) Natural Vent														
(L) Windows	44,242	19.6%	32.1%	28.5%	10.6%	9.2%	\$0.61	10.1%	50.5%	23.6%	15.8%	17	19	3.2
(L) Skylights	47,160	23.9%	30.8%	25.6%	11.2%	8.6%	\$0.62	13.0%	52.3%	19.1%	15.6%	16	22	3.2
(L) Sawtooth Ap	45,324	22.0%	32.6%	26.2%	10.3%	8.9%	\$0.63	11.1%	54.9%	18.6%	15.4%	19	19	3.3
(L) Monitor Ap.	46,867	22.5%	32.4%	26.3%	10.1%	8.6%	\$0.65	11.5%	55.0%	18.5%	15.0%	20	19	3.3
(L) Atrium	51,379	24.6%	32.9%	22.4%	12.3%	7.9%	\$0.67	13.5%	59.0%	13.1%	14.4%	17	26	3.6

# Climate Region 10

Appendix E



# Climate Region 11

# Appendix E

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>80,212</b>	<b>11.3%</b>	<b>38.8%</b>	<b>35.6%</b>	<b>8.0%</b>	<b>6.4%</b>	<b>\$1.37</b>	<b>5.7%</b>	<b>49.0%</b>	<b>38.5%</b>	<b>6.9%</b>	<b>22</b>	<b>46</b>	<b>8.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	80,248	11.9%	37.5%	35.6%	8.7%	6.4%	\$1.36	5.9%	48.5%	38.7%	6.9%	22	46	8.9
(C) Natural Vent														
(L) Windows	69,130	14.5%	43.1%	27.1%	8.0%	7.4%	\$1.15	7.1%	54.7%	30.0%	8.2%	23	39	7.2
(L) Skylights	51,378	22.5%	42.4%	14.8%	10.4%	9.9%	\$0.80	12.7%	58.2%	17.4%	11.7%	18	37	6.2
(L) Sawtooth Ap	50,019	23.7%	41.3%	16.6%	8.1%	10.2%	\$0.78	11.7%	56.3%	19.8%	12.1%	24	29	5.5
(L) Monitor Ap.	55,644	22.7%	42.0%	18.3%	7.9%	9.2%	\$0.87	11.2%	56.4%	21.5%	10.8%	25	31	5.7
(L) Atrium	65,025	18.3%	49.9%	13.1%	10.9%	7.9%	\$1.05	10.0%	66.1%	14.9%	9.0%	22	49	7.8
<b>B ADMIN &gt;5000 SF</b>	<b>66,669</b>	<b>7.8%</b>	<b>34.7%</b>	<b>43.0%</b>	<b>6.9%</b>	<b>7.7%</b>	<b>\$1.16</b>	<b>3.8%</b>	<b>42.7%</b>	<b>45.4%</b>	<b>8.1%</b>	<b>14</b>	<b>33</b>	<b>7.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	66,340	8.4%	33.1%	43.2%	7.5%	7.7%	\$1.15	4.1%	41.9%	45.8%	8.2%	14	33	7.2
(C) Natural Vent														
(L) Windows	55,026	10.7%	35.8%	38.4%	5.9%	9.3%	\$0.94	5.0%	43.7%	41.3%	10.0%	15	23	5.2
(L) Skylights	42,830	17.2%	42.0%	18.9%	10.0%	12.0%	\$0.70	9.2%	55.9%	21.3%	13.5%	13	31	5.4
(L) Sawtooth Ap	42,834	19.3%	46.3%	14.0%	8.4%	12.0%	\$0.69	9.1%	61.0%	16.1%	13.7%	19	26	5.3
(L) Monitor Ap.	48,584	17.5%	43.7%	20.5%	7.7%	10.6%	\$0.79	8.2%	56.6%	23.3%	11.9%	20	27	5.2
(L) Atrium	48,035	14.0%	43.5%	22.5%	9.3%	10.7%	\$0.80	7.1%	56.3%	24.8%	11.8%	14	33	5.5
<b>C ADMIN, MULTISTORY</b>	<b>62,918</b>	<b>4.2%</b>	<b>35.5%</b>	<b>45.6%</b>	<b>6.6%</b>	<b>8.2%</b>	<b>\$1.13</b>	<b>2.0%</b>	<b>42.7%</b>	<b>46.9%</b>	<b>8.4%</b>	<b>10</b>	<b>31</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	62,361	4.8%	33.7%	46.0%	7.2%	8.2%	\$1.11	2.2%	41.7%	47.5%	8.5%	10	31	7.0
(C) Natural Vent														
(L) Windows	51,954	6.3%	37.9%	40.6%	5.4%	9.9%	\$0.92	2.8%	44.5%	42.4%	10.3%	11	21	4.9
(L) Skylights	48,450	7.0%	40.8%	34.4%	7.3%	10.6%	\$0.85	3.3%	49.6%	36.0%	11.1%	10	27	5.4
(L) Sawtooth Ap	46,384	7.8%	42.9%	31.3%	6.9%	11.1%	\$0.81	3.5%	51.8%	33.0%	11.7%	12	24	5.2
(L) Monitor Ap.	48,297	7.9%	42.3%	32.4%	6.8%	10.6%	\$0.84	3.6%	51.1%	34.2%	11.2%	12	24	5.2
(L) Atrium	49,779	7.0%	44.8%	29.6%	8.3%	10.3%	\$0.87	3.3%	54.8%	31.0%	10.8%	11	31	5.7

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>D ADMIN, COMP FAC</b>	<b>142,204</b>	<b>4.5%</b>	<b>29.2%</b>	<b>23.0%</b>	<b>6.8%</b>	<b>36.5%</b>	<b>\$2.54</b>	<b>2.1%</b>	<b>36.6%</b>	<b>23.7%</b>	<b>37.6%</b>	<b>20</b>	<b>50</b>	<b>12.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	141,175	4.9%	28.3%	23.2%	6.9%	36.7%	\$2.52	2.3%	35.7%	23.9%	38.0%	20	50	12.9
(C) Natural Vent														
(L) Windows	131,775	5.5%	30.3%	19.0%	5.8%	39.3%	\$2.34	2.5%	36.8%	19.8%	40.9%	21	40	10.9
(L) Skylights	115,172	8.1%	30.4%	8.0%	8.4%	45.0%	\$2.01	4.0%	39.9%	8.5%	47.6%	18	48	11.1
(L) Sawtooth Ap	113,999	8.6%	32.3%	5.8%	7.7%	45.5%	\$1.98	4.0%	41.6%	6.2%	48.3%	25	43	10.7
(L) Monitor Ap.	124,074	7.7%	31.8%	11.5%	7.2%	41.8%	\$2.17	3.5%	40.3%	12.1%	44.1%	25	44	10.9
(L) Atrium	122,300	6.5%	32.7%	9.7%	8.7%	42.4%	\$2.16	3.2%	42.4%	10.2%	44.3%	21	52	11.6
<b>E DINING FACILITY</b>	<b>114,209</b>	<b>10.8%</b>	<b>26.8%</b>	<b>27.6%</b>	<b>7.4%</b>	<b>27.4%</b>	<b>\$1.59</b>	<b>7.9%</b>	<b>41.0%</b>	<b>36.6%</b>	<b>14.5%</b>	<b>37</b>	<b>39</b>	<b>6.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	103,345	13.0%	30.1%	18.3%	8.3%	30.3%	\$1.37	9.9%	47.9%	25.4%	16.8%	39	38	5.6
(L) Skylights	91,963	18.9%	25.1%	13.9%	8.1%	34.1%	\$1.12	15.4%	43.0%	21.1%	20.6%	36	32	4.5
(L) Sawtooth Ap	99,108	16.4%	29.2%	14.9%	7.9%	31.6%	\$1.26	12.1%	48.0%	21.6%	18.3%	41	34	5.0
(L) Monitor Ap.	103,814	15.8%	29.4%	16.7%	7.9%	30.2%	\$1.34	11.7%	47.4%	23.8%	17.1%	43	35	5.1
(L) Atrium														
<b>F DORMITORY</b>	<b>44,374</b>	<b>1.5%</b>	<b>43.7%</b>	<b>33.3%</b>	<b>12.4%</b>	<b>9.1%</b>	<b>\$0.81</b>	<b>1.0%</b>	<b>56.2%</b>	<b>33.6%</b>	<b>9.2%</b>	<b>9</b>	<b>23</b>	<b>4.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	42,315	2.9%	40.0%	34.9%	12.6%	9.6%	\$0.76	1.6%	53.1%	35.6%	9.8%	9	23	4.8
(C) Natural Vent														
(L) Windows	41,592	2.4%	46.5%	30.1%	11.2%	9.7%	\$0.75	1.3%	58.2%	30.6%	9.9%	10	19	3.4
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														



BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD (w/sf)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	
<b>G FIRE STATION</b>	<b>49,223</b>	<b>21.1%</b>	<b>23.0%</b>	<b>32.2%</b>	<b>12.7%</b>	<b>11.0%</b>	<b>\$0.77</b>	<b>10.0%</b>	<b>39.2%</b>	<b>37.9%</b>	<b>13.0%</b>	<b>54</b>	<b>16</b>	<b>3.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	47,521	21.8%	20.5%	33.4%	12.9%	11.4%	\$0.75	10.2%	37.3%	39.1%	13.4%	54	16	3.4
(C) Natural Vent	44,010	23.6%	13.8%	36.1%	14.2%	12.4%	\$0.68	11.4%	30.5%	43.2%	14.8%	54	16	3.9
(L) Windows	41,947	25.5%	24.4%	24.0%	13.1%	13.0%	\$0.63	13.2%	41.7%	29.3%	15.8%	55	13	2.2
(L) Skylights	42,101	31.1%	20.0%	23.2%	12.8%	12.9%	\$0.61	17.0%	36.9%	29.6%	16.4%	52	10	2.1
(L) Sawtooth Ap	37,128	26.8%	20.2%	25.3%	13.0%	14.6%	\$0.56	16.2%	34.6%	31.2%	18.0%	58	9	1.8
(L) Monitor Ap.	40,502	27.1%	21.0%	25.4%	13.1%	13.4%	\$0.60	16.3%	35.7%	31.3%	16.6%	59	10	2.0
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>44,808</b>	<b>1.2%</b>	<b>0.0%</b>	<b>44.3%</b>	<b>2.4%</b>	<b>52.1%</b>	<b>\$0.82</b>	<b>0.9%</b>	<b>1.9%</b>	<b>44.7%</b>	<b>52.5%</b>	<b>10</b>	<b>0</b>	<b>3.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows														
(L) Skylights	30,764	3.7%	0.0%	17.2%	3.2%	75.9%	\$0.55	2.1%	2.4%	17.6%	77.8%	9	0	2.8
(L) Sawtooth Ap	32,167	7.3%	0.0%	14.3%	5.8%	72.6%	\$0.56	4.2%	4.0%	15.1%	76.7%	17	0	2.8
(L) Monitor Ap.	35,064	4.9%	0.0%	23.9%	4.5%	66.6%	\$0.62	2.8%	3.6%	24.8%	68.9%	15	0	2.8
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>21,329</b>	<b>15.5%</b>	<b>0.0%</b>	<b>53.1%</b>	<b>7.7%</b>	<b>23.7%</b>	<b>\$0.35</b>	<b>8.5%</b>	<b>5.1%</b>	<b>59.8%</b>	<b>26.7%</b>	<b>15</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	18,384	18.7%	0.0%	44.8%	9.0%	27.5%	\$0.30	10.8%	6.4%	51.2%	31.6%	15	0	1.5
(L) Skylights	13,838	31.7%	0.0%	21.8%	9.9%	36.6%	\$0.20	20.2%	5.5%	27.7%	46.6%	13	0	1.1
(L) Sawtooth Ap	14,398	29.4%	0.0%	22.9%	12.5%	35.2%	\$0.21	18.2%	9.4%	28.6%	43.8%	17	0	1.1
(L) Monitor Ap.	15,656	29.5%	0.0%	25.7%	12.5%	32.3%	\$0.23	17.8%	9.8%	32.1%	40.2%	18	0	1.1
(L) Atrium														



BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool (Btu/hr/sf)	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>42,271</b>	<b>9.6%</b>	<b>0.0%</b>	<b>58.0%</b>	<b>4.8%</b>	<b>27.6%</b>	<b>\$0.73</b>	<b>5.3%</b>	<b>3.2%</b>	<b>62.0%</b>	<b>29.5%</b>	<b>19</b>	<b>0</b>	<b>3.2</b>
(H) Direct Gain + St	40,392	5.7%	0.0%	60.7%	4.7%	28.9%	\$0.72	3.2%	3.6%	63.1%	30.1%	18	0	3.2
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$0.53	7.5%	4.8%	46.9%	40.9%	20	0	2.4
(L) Windows	31,717	14.0%	0.0%	42.2%	7.0%	36.8%	\$0.40	12.0%	4.3%	30.0%	53.7%	17	0	2.0
(L) Skylights	25,142	20.3%	0.0%	26.0%	7.3%	46.4%	\$0.41	13.4%	8.0%	25.7%	52.9%	25	0	2.0
(L) Sawtooth Ap	26,120	23.1%	0.0%	21.7%	10.5%	44.7%	\$0.45	11.7%	7.7%	32.4%	48.2%	25	0	2.0
(L) Monitor Ap.	28,198	21.0%	0.0%	27.9%	9.7%	41.4%								
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>51,604</b>	<b>6.4%</b>	<b>27.1%</b>	<b>38.4%</b>	<b>5.5%</b>	<b>22.6%</b>	<b>\$0.91</b>	<b>3.0%</b>	<b>33.3%</b>	<b>40.1%</b>	<b>23.6%</b>	<b>10</b>	<b>21</b>	<b>5.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace							\$0.90	3.3%	32.0%	40.7%	24.0%	10	21	5.4
(C) Night Mech Vent	51,189	7.3%	25.2%	38.7%	6.0%	22.8%	\$0.81	3.6%	38.5%	31.3%	26.5%	11	20	4.6
(C) Natural Vent							\$0.63	6.8%	44.0%	15.4%	33.9%	10	22	4.0
(L) Windows	46,491	8.2%	31.4%	29.6%	5.7%	25.1%	\$0.63	6.8%	44.0%	15.4%	33.9%	10	22	4.0
(L) Skylights	37,693	13.1%	33.9%	14.0%	8.0%	30.9%	\$0.70	6.1%	50.9%	12.1%	30.8%	15	22	4.5
(L) Sawtooth Ap	41,718	13.8%	40.3%	11.0%	7.0%	28.0%	\$0.73	6.0%	48.3%	16.1%	29.6%	15	21	4.2
(L) Monitor Ap.	43,270	13.4%	38.3%	14.7%	6.6%	27.0%								
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>32,678</b>	<b>1.1%</b>	<b>0.0%</b>	<b>60.7%</b>	<b>2.5%</b>	<b>35.7%</b>	<b>\$0.60</b>	<b>0.8%</b>	<b>2.1%</b>	<b>61.1%</b>	<b>36.0%</b>	<b>8</b>	<b>0</b>	<b>2.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$0.49	1.1%	2.9%	51.9%	44.1%	8	0	2.3
(L) Windows	26,718	1.6%	0.0%	51.3%	3.4%	43.7%	\$0.33	2.7%	3.2%	29.3%	64.8%	7	0	1.7
(L) Skylights	18,525	4.3%	0.0%	28.5%	4.3%	63.0%	\$0.33	3.0%	5.5%	25.8%	65.7%	11	0	1.8
(L) Sawtooth Ap	18,389	5.2%	0.0%	24.9%	6.5%	63.4%	\$0.36	2.8%	5.0%	32.5%	59.7%	11	0	1.8
(L) Monitor Ap.	20,213	5.0%	0.0%	31.4%	5.9%	57.7%								
(L) Atrium														



BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>M AUDITORIUM</b>	<b>57,326</b>	<b>15.5%</b>	<b>41.1%</b>	<b>25.4%</b>	<b>9.3%</b>	<b>8.7%</b>	<b>\$0.95</b>	<b>8.0%</b>	<b>53.9%</b>	<b>28.3%</b>	<b>9.7%</b>	<b>22</b>	<b>39</b>	<b>6.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	57,092	16.7%	38.8%	25.5%	10.2%	8.8%	\$0.94	8.5%	52.9%	28.7%	9.9%	22	39	6.8
(C) Natural Vent														
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>80,212</b>	<b>11.3%</b>	<b>38.8%</b>	<b>35.6%</b>	<b>8.0%</b>	<b>6.4%</b>	<b>\$1.37</b>	<b>5.7%</b>	<b>49.0%</b>	<b>38.5%</b>	<b>6.9%</b>	<b>22</b>	<b>46</b>	<b>8.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	80,248	11.9%	37.5%	35.6%	8.7%	6.4%	\$1.36	5.9%	48.5%	38.7%	6.9%	22	46	8.9
(C) Natural Vent														
(L) Windows	69,130	14.5%	43.1%	27.1%	8.0%	7.4%	\$1.15	7.1%	54.7%	30.0%	8.2%	23	39	7.2
(L) Skylights	51,378	22.5%	42.4%	14.8%	10.4%	9.9%	\$0.80	12.7%	58.2%	17.4%	11.7%	18	37	6.2
(L) Sawtooth Ap	50,019	23.7%	41.3%	16.6%	8.1%	10.2%	\$0.78	11.7%	56.3%	19.8%	12.1%	24	29	5.5
(L) Monitor Ap.	55,644	22.7%	42.0%	18.3%	7.9%	9.2%	\$0.87	11.2%	56.4%	21.5%	10.8%	25	31	5.7
(L) Atrium	65,025	18.3%	49.9%	13.1%	10.9%	7.9%	\$1.05	10.0%	66.1%	14.9%	9.0%	22	49	7.8
<b>O TRAINING &gt;5000</b>	<b>66,669</b>	<b>7.8%</b>	<b>34.7%</b>	<b>43.0%</b>	<b>6.9%</b>	<b>7.7%</b>	<b>\$1.16</b>	<b>3.8%</b>	<b>42.7%</b>	<b>45.4%</b>	<b>8.1%</b>	<b>14</b>	<b>33</b>	<b>7.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	66,340	8.4%	33.1%	43.2%	7.5%	7.7%	\$1.15	4.1%	41.9%	45.8%	8.2%	14	33	7.2
(C) Natural Vent														
(L) Windows	55,026	10.7%	35.8%	38.4%	5.9%	9.3%	\$0.94	5.0%	43.7%	41.3%	10.0%	15	23	5.2
(L) Skylights	42,830	17.2%	42.0%	18.9%	10.0%	12.0%	\$0.70	9.2%	55.9%	21.3%	13.5%	13	31	5.4
(L) Sawtooth Ap	42,834	19.3%	46.3%	14.0%	8.4%	12.0%	\$0.69	9.1%	61.0%	16.1%	13.7%	19	26	5.3
(L) Monitor Ap.	48,584	17.5%	43.7%	20.5%	7.7%	10.6%	\$0.79	8.2%	56.6%	23.3%	11.9%	20	27	5.2
(L) Atrium	48,035	14.0%	43.5%	22.5%	9.3%	10.7%	\$0.80	7.1%	56.3%	24.8%	11.8%	14	33	5.5



BUILDING DESC	ENERGY USE					ENERGY COST				HVAC		PEAK LOAD (w/sf)		
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)		Heat (Btu/hr/sf)	Cool
<b>P TRAINING, MULTISTORY</b>	<b>62,918</b>	<b>4.2%</b>	<b>35.5%</b>	<b>45.6%</b>	<b>6.6%</b>	<b>8.2%</b>	<b>\$1.13</b>	<b>2.0%</b>	<b>42.7%</b>	<b>46.9%</b>	<b>8.4%</b>	<b>10</b>	<b>31</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent	62,361	4.8%	33.7%	46.0%	7.2%	8.2%	\$1.11	2.2%	41.7%	47.5%	8.5%	10	31	7.0
(C) Natural Vent							\$0.92	2.8%	44.5%	42.4%	10.3%	11	21	4.9
(L) Windows	51,954	6.3%	37.9%	40.6%	5.4%	9.9%	\$0.85	3.3%	49.6%	36.0%	11.1%	10	27	5.4
(L) Skylights	48,450	7.0%	40.8%	34.4%	7.3%	10.6%	\$0.81	3.5%	51.8%	33.0%	11.7%	12	24	5.2
(L) Sawtooth Ap	46,384	7.8%	42.9%	31.3%	6.9%	11.1%	\$0.84	3.6%	51.1%	34.2%	11.2%	12	24	5.2
(L) Monitor Ap.	48,297	7.9%	42.3%	32.4%	6.8%	10.6%	\$0.87	3.3%	54.8%	31.0%	10.8%	11	31	5.7
(L) Atrium	49,779	7.0%	44.8%	29.6%	8.3%	10.3%								
<b>Q TRAINING, GYM</b>	<b>44,542</b>	<b>11.9%</b>	<b>0.0%</b>	<b>79.9%</b>	<b>8.2%</b>	<b>0.0%</b>	<b>\$0.75</b>	<b>7.7%</b>	<b>4.9%</b>	<b>87.5%</b>	<b>0.0%</b>	<b>25</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.41	19.6%	5.7%	74.7%	0.0%	23	0	0.9
(L) Skylights	27,943	28.7%	0.0%	58.8%	12.5%	0.0%	\$0.42	19.5%	11.8%	68.7%	0.0%	31	0	0.9
(L) Sawtooth Ap	28,618	29.4%	0.0%	54.3%	16.3%	0.0%	\$0.47	17.6%	12.7%	69.7%	0.0%	33	0	0.9
(L) Monitor Ap.	31,423	27.8%	0.0%	56.8%	15.4%	0.0%								
(L) Atrium														
<b>R WAREHOUSE</b>	<b>11,539</b>	<b>30.5%</b>	<b>0.0%</b>	<b>61.4%</b>	<b>8.1%</b>	<b>0.0%</b>	<b>\$0.17</b>	<b>18.2%</b>	<b>4.8%</b>	<b>77.1%</b>	<b>0.0%</b>	<b>9</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St	9,831	18.8%	0.0%	72.1%	9.1%	0.0%	\$0.16	11.0%	6.6%	82.4%	0.0%	8	0	0.7
(H) Indirect Gain														
(H) Direct Gain	10,287	22.3%	0.0%	68.9%	8.8%	0.0%	\$0.16	12.8%	6.2%	81.0%	0.0%	8	0	0.7
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.08	46.3%	9.4%	44.3%	0.0%	9	0	0.3
(L) Skylights	7,145	60.5%	0.0%	26.4%	13.1%	0.0%	\$0.07	40.0%	18.1%	41.9%	0.0%	12	0	0.3
(L) Sawtooth Ap	6,177	52.4%	0.0%	26.5%	21.1%	0.0%	\$0.08	35.6%	14.9%	49.5%	0.0%	12	0	0.3
(L) Monitor Ap.	6,934	48.5%	0.0%	32.7%	18.8%	0.0%								
(L) Atrium														

# Energy Cost Savings

## Appendix D

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>A ADMIN &lt;5000 SF</b>	<b>87,799</b>	<b>4.8%</b>	<b>49.6%</b>	<b>32.5%</b>	<b>7.3%</b>	<b>5.8%</b>	<b>\$2.19</b>	<b>1.2%</b>	<b>61.5%</b>	<b>31.3%</b>	<b>6.0%</b>	<b>25</b>	<b>47</b>	<b>9.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	83,867	5.0%	47.2%	34.1%	7.7%	6.1%	\$2.16	1.2%	60.8%	31.9%	6.1%	25	47	9.1
(L) Windows	75,282	6.2%	55.2%	24.4%	7.4%	6.8%	\$1.84	1.5%	67.4%	24.0%	7.1%	26	41	7.5
(L) Skylights	53,872	9.7%	57.5%	13.4%	9.9%	9.5%	\$1.36	2.4%	73.5%	14.4%	9.7%	21	39	6.2
(L) Sawtooth Ap	53,258	10.7%	56.7%	15.3%	7.8%	9.6%	\$1.30	2.4%	71.4%	16.0%	10.1%	27	30	5.7
(L) Monitor Ap.	58,615	10.3%	57.2%	16.3%	7.6%	8.7%	\$1.40	2.4%	72.1%	16.2%	9.3%	29	32	6.0
(L) Atrium	70,261	7.8%	63.5%	11.4%	10.0%	7.3%	\$1.75	2.0%	78.8%	11.7%	7.5%	25	51	7.8
<b>B ADMIN &gt;5000 SF</b>	<b>73,435</b>	<b>3.3%</b>	<b>44.4%</b>	<b>39.1%</b>	<b>6.3%</b>	<b>7.0%</b>	<b>\$1.82</b>	<b>0.8%</b>	<b>54.1%</b>	<b>37.8%</b>	<b>7.2%</b>	<b>16</b>	<b>35</b>	<b>7.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	70,216	3.4%	41.8%	40.9%	6.6%	7.3%	\$1.79	0.8%	53.4%	38.5%	7.3%	16	35	7.4
(L) Windows	58,679	4.6%	45.3%	35.7%	5.6%	8.7%	\$1.40	1.1%	55.0%	34.5%	9.4%	17	24	5.4
(L) Skylights	46,315	7.2%	55.7%	16.6%	9.3%	11.1%	\$1.17	1.8%	69.7%	17.2%	11.2%	15	32	5.4
(L) Sawtooth Ap	46,399	8.7%	60.0%	12.4%	7.9%	11.1%	\$1.18	1.8%	72.2%	14.7%	11.2%	21	27	5.3
(L) Monitor Ap.	52,408	7.9%	57.2%	17.8%	7.3%	9.8%	\$1.27	1.8%	70.2%	17.7%	10.3%	22	28	5.3
(L) Atrium	52,760	5.9%	56.0%	19.8%	8.5%	9.7%	\$1.30	1.4%	69.9%	18.5%	10.1%	16	34	5.5
<b>C ADMIN, MULTISTORY</b>	<b>70,364</b>	<b>1.9%</b>	<b>44.1%</b>	<b>40.8%</b>	<b>6.0%</b>	<b>7.3%</b>	<b>\$1.77</b>	<b>0.4%</b>	<b>52.5%</b>	<b>39.6%</b>	<b>7.4%</b>	<b>11</b>	<b>32</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	66,979	2.0%	41.3%	42.8%	6.3%	7.7%	\$1.73	0.4%	51.5%	40.5%	7.6%	11	32	7.1
(L) Windows	55,845	2.9%	45.3%	37.5%	5.2%	9.2%	\$1.34	0.7%	53.1%	36.5%	9.8%	12	22	5.1
(L) Skylights	54,408	3.1%	50.7%	30.1%	6.7%	9.4%	\$1.36	0.7%	60.6%	29.0%	9.7%	11	27	5.6
(L) Sawtooth Ap	51,555	3.5%	52.3%	27.8%	6.4%	9.9%	\$1.30	0.8%	61.0%	28.1%	10.1%	13	25	5.3
(L) Monitor Ap.	53,502	3.5%	51.9%	28.7%	6.2%	9.6%	\$1.33	0.8%	60.8%	28.5%	9.9%	13	25	5.4
(L) Atrium	56,537	3.1%	54.9%	25.5%	7.4%	9.1%	\$1.40	0.7%	65.9%	24.1%	9.4%	12	32	5.6

# Energy Cost Savings

## Appendix D

BUILDING DESC	ENERGY USE						ENERGY COST					HVAC		PEAK LOAD (w/sf)
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	
<b>D ADMIN, COMP FAC</b>	<b>154,719</b>	<b>1.9%</b>	<b>37.0%</b>	<b>21.1%</b>	<b>6.4%</b>	<b>33.5%</b>	<b>\$3.59</b>	<b>0.5%</b>	<b>45.2%</b>	<b>20.8%</b>	<b>33.5%</b>	<b>22</b>	<b>52</b>	<b>13.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	148,728	2.0%	34.4%	22.0%	6.7%	34.9%	\$3.52	0.5%	44.1%	21.2%	34.2%	22	52	13.0
(L) Windows	141,198	2.4%	37.7%	17.6%	5.6%	36.7%	\$3.22	0.6%	45.3%	16.8%	37.4%	23	42	11.2
(L) Skylights	124,039	3.3%	39.8%	7.1%	8.0%	41.8%	\$2.88	0.9%	49.8%	7.5%	41.8%	21	50	10.6
(L) Sawtooth Ap	122,997	3.8%	41.4%	5.2%	7.4%	42.2%	\$2.91	0.9%	51.3%	6.3%	41.5%	27	45	10.9
(L) Monitor Ap.	133,649	3.4%	40.7%	10.3%	6.8%	38.8%	\$3.07	0.9%	50.6%	9.4%	39.2%	28	46	11.0
(L) Atrium	133,675	2.7%	41.8%	8.6%	8.1%	38.8%	\$3.10	0.7%	52.2%	8.2%	38.9%	23	54	11.2
<b>E DINING FACILITY</b>	<b>117,648</b>	<b>4.3%</b>	<b>34.8%</b>	<b>26.8%</b>	<b>7.5%</b>	<b>26.6%</b>	<b>\$2.04</b>	<b>2.1%</b>	<b>58.0%</b>	<b>31.0%</b>	<b>8.9%</b>	<b>39</b>	<b>41</b>	<b>7.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	105,505	5.2%	39.2%	17.4%	8.5%	29.7%	\$1.75	2.6%	69.1%	17.9%	10.3%	41	41	5.9
(L) Skylights	89,667	7.5%	34.9%	13.9%	8.7%	34.9%	\$1.37	4.0%	67.8%	15.1%	13.2%	38	34	4.8
(L) Sawtooth Ap	100,188	6.6%	39.2%	14.6%	8.3%	31.3%	\$1.62	3.2%	71.0%	14.6%	11.1%	44	36	5.3
(L) Monitor Ap.	105,419	6.4%	39.5%	16.2%	8.2%	29.7%	\$1.72	3.2%	70.3%	15.9%	10.6%	46	37	5.3
(L) Atrium														
<b>F DORMITORY</b>	<b>56,616</b>	<b>0.9%</b>	<b>55.9%</b>	<b>26.1%</b>	<b>10.0%</b>	<b>7.2%</b>	<b>\$1.25</b>	<b>0.2%</b>	<b>61.5%</b>	<b>29.0%</b>	<b>9.3%</b>	<b>10</b>	<b>23</b>	<b>4.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	53,110	1.3%	58.5%	23.4%	9.1%	7.6%	\$1.10	0.4%	67.3%	21.7%	10.5%	11	20	3.4
(L) Skylights	54,916	1.7%	59.3%	21.8%	9.8%	7.4%	\$1.12	0.5%	69.9%	19.2%	10.4%	10	22	3.3
(L) Sawtooth Ap	53,691	2.0%	59.7%	21.8%	8.9%	7.5%	\$1.12	0.6%	70.2%	18.9%	10.4%	12	20	3.3
(L) Monitor Ap.	54,928	2.1%	59.5%	22.2%	8.8%	7.4%	\$1.14	0.6%	70.2%	19.1%	10.2%	13	20	3.4
(L) Atrium	60,202	2.1%	61.5%	19.0%	10.7%	6.7%	\$1.23	0.6%	74.7%	15.2%	9.5%	11	26	3.7

# Energy Cost Savings

## Appendix D

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/st-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/st)	Cool	(w/st)
<b>G FIRE STATION</b>	<b>47,386</b>	<b>8.0%</b>	<b>35.1%</b>	<b>33.5%</b>	<b>12.0%</b>	<b>11.5%</b>	<b>\$0.98</b>	<b>2.3%</b>	<b>49.0%</b>	<b>38.6%</b>	<b>10.1%</b>	<b>56</b>	<b>16</b>	<b>3.3</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace												56	16	3.8
(C) Night Mech Vent							\$0.89	2.5%	43.8%	42.6%	11.1%	57	13	2.4
(C) Natural Vent	41,478	9.1%	25.9%	38.3%	13.7%	13.1%	\$0.77	3.1%	62.7%	21.3%	12.9%	54	10	2.1
(L) Windows	39,339	10.0%	38.7%	25.0%	12.5%	13.8%	\$0.69	4.0%	58.4%	23.2%	14.4%	61	10	1.9
(L) Skylights	36,588	12.6%	34.7%	26.0%	11.8%	14.9%	\$0.66	4.4%	57.2%	23.4%	15.1%	62	11	2.1
(L) Sawtooth Ap	34,972	13.1%	33.1%	25.9%	12.4%	15.5%	\$0.71	4.3%	58.6%	23.3%	13.8%			
(L) Monitor Ap.	37,859	13.1%	33.9%	26.4%	12.3%	14.4%								
(L) Atrium														
<b>H INDUSTRIAL FAC</b>	<b>44,869</b>	<b>0.9%</b>	<b>0.0%</b>	<b>44.2%</b>	<b>2.8%</b>	<b>52.1%</b>	<b>\$1.07</b>	<b>0.5%</b>	<b>2.2%</b>	<b>44.6%</b>	<b>52.7%</b>	<b>12</b>	<b>0</b>	<b>3.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$0.70	1.0%	3.2%	14.7%	81.1%	11	0	2.6
(L) Windows	30,378	2.6%	0.0%	16.5%	4.0%	76.9%	\$0.71	1.8%	5.2%	13.0%	79.9%	20	0	2.7
(L) Skylights	31,455	5.3%	0.0%	13.7%	6.7%	74.2%	\$0.76	1.3%	4.3%	19.7%	74.8%	17	0	2.7
(L) Sawtooth Ap	34,670	3.5%	0.0%	23.8%	5.3%	67.4%								
(L) Monitor Ap.														
(L) Atrium														
<b>I MAINTENANCE, &lt;5000</b>	<b>20,231</b>	<b>9.6%</b>	<b>0.0%</b>	<b>55.9%</b>	<b>9.4%</b>	<b>25.0%</b>	<b>\$0.48</b>	<b>2.9%</b>	<b>6.4%</b>	<b>63.3%</b>	<b>27.4%</b>	<b>18</b>	<b>0</b>	<b>1.8</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent							\$0.38	3.7%	8.1%	53.9%	34.3%	18	0	1.5
(L) Windows	17,126	11.8%	0.0%	47.5%	11.1%	29.6%	\$0.23	6.7%	10.1%	27.0%	56.2%	15	0	1.0
(L) Skylights	11,906	19.9%	0.0%	24.1%	13.5%	42.5%	\$0.25	6.6%	14.6%	27.0%	51.8%	20	0	1.0
(L) Sawtooth Ap	12,882	19.3%	0.0%	25.0%	16.4%	39.3%	\$0.26	6.5%	15.1%	28.9%	49.5%	21	0	1.0
(L) Monitor Ap.	13,720	19.0%	0.0%	27.6%	16.5%	36.9%								
(L) Atrium														



# Energy Cost Savings

## Appendix D

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>J MAINT, HI-BAY</b>	<b>41,117</b>	<b>6.0%</b>	<b>0.0%</b>	<b>59.6%</b>	<b>5.9%</b>	<b>28.4%</b>	<b>\$0.93</b>	<b>1.8%</b>	<b>4.0%</b>	<b>63.8%</b>	<b>30.4%</b>	<b>23</b>	<b>0</b>	<b>3.2</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	29,989	8.8%	0.0%	43.5%	8.7%	38.9%	\$0.63	2.6%	7.5%	45.2%	44.7%	24	0	2.3
(L) Skylights	23,114	12.8%	0.0%	26.8%	9.8%	50.5%	\$0.46	4.3%	7.1%	27.4%	61.1%	21	0	1.9
(L) Sawtooth Ap	23,577	14.3%	0.0%	22.6%	13.5%	49.5%	\$0.48	4.5%	12.1%	24.0%	59.4%	30	0	1.9
(L) Monitor Ap.	25,558	13.0%	0.0%	28.9%	12.5%	45.7%	\$0.50	4.1%	11.5%	28.4%	56.0%	30	0	1.9
(L) Atrium														
<b>K MAINT, AIR COND</b>	<b>56,638</b>	<b>2.9%</b>	<b>36.3%</b>	<b>35.0%</b>	<b>5.1%</b>	<b>20.6%</b>	<b>\$1.40</b>	<b>0.7%</b>	<b>44.9%</b>	<b>34.2%</b>	<b>20.2%</b>	<b>12</b>	<b>22</b>	<b>5.5</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	54,877	3.0%	34.3%	36.1%	5.3%	21.3%	\$1.38	0.7%	44.3%	34.6%	20.4%	12	22	5.5
(L) Windows	51,027	3.7%	41.3%	26.8%	5.4%	22.9%	\$1.23	0.8%	50.9%	25.3%	23.0%	13	21	4.8
(L) Skylights	40,727	5.8%	45.7%	12.3%	7.5%	28.6%	\$1.00	1.4%	60.2%	10.2%	28.2%	12	23	4.2
(L) Sawtooth Ap	45,274	6.4%	51.7%	9.5%	6.6%	25.8%	\$1.10	1.4%	64.5%	8.4%	25.7%	17	23	4.4
(L) Monitor Ap.	46,806	6.1%	49.9%	12.7%	6.3%	24.9%	\$1.11	1.3%	62.8%	10.4%	25.4%	17	22	4.4
(L) Atrium														
<b>L MAINT, LOW-BAY</b>	<b>32,681</b>	<b>0.7%</b>	<b>0.0%</b>	<b>60.7%</b>	<b>3.0%</b>	<b>35.7%</b>	<b>\$0.78</b>	<b>0.3%</b>	<b>2.4%</b>	<b>61.1%</b>	<b>36.1%</b>	<b>9</b>	<b>0</b>	<b>2.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows	26,516	1.0%	0.0%	51.1%	4.0%	44.0%	\$0.62	0.4%	3.4%	50.3%	45.9%	10	0	2.2
(L) Skylights	18,110	2.7%	0.0%	27.7%	5.2%	64.4%	\$0.41	1.1%	4.4%	25.1%	69.4%	9	0	1.6
(L) Sawtooth Ap	18,031	3.9%	0.0%	23.9%	7.5%	64.7%	\$0.41	1.4%	6.5%	22.7%	69.4%	13	0	1.7
(L) Monitor Ap.	19,684	3.6%	0.0%	30.3%	6.9%	59.3%	\$0.43	1.3%	6.2%	26.9%	65.6%	13	0	1.7
(L) Atrium														



# Energy Cost Savings

## Appendix D

BUILDING DESC	ENERGY USE					ENERGY COST					HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>M AUDITORIUM</b>	<b>62,799</b>	<b>6.1%</b>	<b>54.0%</b>	<b>23.2%</b>	<b>8.7%</b>	<b>8.0%</b>	<b>\$1.58</b>	<b>1.5%</b>	<b>68.1%</b>	<b>22.2%</b>	<b>8.2%</b>	<b>25</b>	<b>41</b>	<b>7.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	60,104	6.4%	51.9%	24.2%	9.1%	8.3%	\$1.57	1.5%	68.0%	22.3%	8.3%	25	41	7.1
(L) Windows														
(L) Skylights														
(L) Sawtooth Ap														
(L) Monitor Ap.														
(L) Atrium														
<b>N TRAINING &lt;5000 SF</b>	<b>87,799</b>	<b>4.8%</b>	<b>49.6%</b>	<b>32.5%</b>	<b>7.3%</b>	<b>5.8%</b>	<b>\$2.19</b>	<b>1.2%</b>	<b>61.5%</b>	<b>31.3%</b>	<b>6.0%</b>	<b>25</b>	<b>47</b>	<b>9.1</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	83,867	5.0%	47.2%	34.1%	7.7%	6.1%	\$2.16	1.2%	60.8%	31.9%	6.1%	25	47	9.1
(L) Windows	75,282	6.2%	55.2%	24.4%	7.4%	6.8%	\$1.84	1.5%	67.4%	24.0%	7.1%	26	41	7.5
(L) Skylights	53,872	9.7%	57.5%	13.4%	9.9%	9.5%	\$1.36	2.4%	73.5%	14.4%	9.7%	21	39	6.2
(L) Sawtooth Ap	53,258	10.7%	56.7%	15.3%	7.8%	9.6%	\$1.30	2.4%	71.4%	16.0%	10.1%	27	30	5.7
(L) Monitor Ap.	58,615	10.3%	57.2%	16.3%	7.6%	8.7%	\$1.40	2.4%	72.1%	16.2%	9.3%	29	32	6.0
(L) Atrium	70,261	7.8%	63.5%	11.4%	10.0%	7.3%	\$1.75	2.0%	78.8%	11.7%	7.5%	25	51	7.8
<b>O TRAINING &gt;5000</b>	<b>73,435</b>	<b>3.3%</b>	<b>44.4%</b>	<b>39.1%</b>	<b>6.3%</b>	<b>7.0%</b>	<b>\$1.82</b>	<b>0.8%</b>	<b>54.1%</b>	<b>37.8%</b>	<b>7.2%</b>	<b>16</b>	<b>35</b>	<b>7.4</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent	70,216	3.4%	41.8%	40.9%	6.6%	7.3%	\$1.79	0.8%	53.4%	38.5%	7.3%	16	35	7.4
(L) Windows	58,679	4.6%	45.3%	35.7%	5.6%	8.7%	\$1.40	1.1%	55.0%	34.5%	9.4%	17	24	5.4
(L) Skylights	46,315	7.2%	55.7%	16.6%	9.3%	11.1%	\$1.17	1.8%	69.7%	17.2%	11.2%	15	32	5.4
(L) Sawtooth Ap	46,399	8.7%	60.0%	12.4%	7.9%	11.1%	\$1.18	1.8%	72.2%	14.7%	11.2%	21	27	5.3
(L) Monitor Ap.	52,408	7.9%	57.2%	17.8%	7.3%	9.8%	\$1.27	1.8%	70.2%	17.7%	10.3%	22	28	5.3
(L) Atrium	52,760	5.9%	56.0%	19.8%	8.5%	9.7%	\$1.30	1.4%	69.9%	18.5%	10.1%	16	34	5.5



# Energy Cost Savings

## Appendix D

BUILDING DESC	ENERGY USE						ENERGY COST				HVAC		PEAK LOAD	
	Bldg Btu/sf-yr	QHeat (%)	QCool (%)	QLite (%)	QVent (%)	QProc (%)	Bldg \$/sf	\$Heat (%)	\$Cool (%)	\$Lite (%)	\$Othr (%)	Heat (Btu/hr/sf)	Cool	(w/sf)
<b>P TRAINING, MULTISTORY</b>	<b>70,364</b>	<b>1.9%</b>	<b>44.1%</b>	<b>40.8%</b>	<b>6.0%</b>	<b>7.3%</b>	<b>\$1.77</b>	<b>0.4%</b>	<b>52.5%</b>	<b>39.6%</b>	<b>7.4%</b>	<b>11</b>	<b>32</b>	<b>7.0</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent							\$1.73	0.4%	51.5%	40.5%	7.6%	11	32	7.1
(C) Natural Vent	66,979	2.0%	41.3%	42.8%	6.3%	7.7%	\$1.34	0.7%	53.1%	36.5%	9.8%	12	22	5.1
(L) Windows	55,845	2.9%	45.3%	37.5%	5.2%	9.2%	\$1.36	0.7%	60.6%	29.0%	9.7%	11	27	5.6
(L) Skylights	54,408	3.1%	50.7%	30.1%	6.7%	9.4%	\$1.30	0.8%	61.0%	28.1%	10.1%	13	25	5.3
(L) Sawtooth Ap	51,555	3.5%	52.3%	27.8%	6.4%	9.9%	\$1.33	0.8%	60.8%	28.5%	9.9%	13	25	5.4
(L) Monitor Ap.	53,502	3.5%	51.9%	28.7%	6.2%	9.6%	\$1.40	0.7%	65.9%	24.1%	9.4%	12	32	5.6
(L) Atrium	56,537	3.1%	54.9%	25.5%	7.4%	9.1%								
<b>Q TRAINING, GYM</b>	<b>42,724</b>	<b>7.1%</b>	<b>0.0%</b>	<b>83.3%</b>	<b>9.6%</b>	<b>0.0%</b>	<b>\$0.78</b>	<b>2.9%</b>	<b>6.5%</b>	<b>90.6%</b>	<b>0.0%</b>	<b>28</b>	<b>0</b>	<b>1.9</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.33	8.7%	12.6%	78.7%	0.0%	27	0	0.8
(L) Skylights	24,034	16.7%	0.0%	66.8%	16.4%	0.0%	\$0.34	8.5%	19.0%	72.4%	0.0%	35	0	0.8
(L) Sawtooth Ap	24,595	17.3%	0.0%	61.7%	21.1%	0.0%	\$0.38	7.9%	17.9%	74.1%	0.0%	36	0	0.8
(L) Monitor Ap.	27,037	16.0%	0.0%	64.1%	19.9%	0.0%								
(L) Atrium														
<b>R WAREHOUSE</b>	<b>9,936</b>	<b>17.2%</b>	<b>0.0%</b>	<b>71.3%</b>	<b>11.5%</b>	<b>0.0%</b>	<b>\$0.20</b>	<b>6.2%</b>	<b>9.4%</b>	<b>84.4%</b>	<b>0.0%</b>	<b>11</b>	<b>0</b>	<b>0.7</b>
(H) Direct Gain + St														
(H) Indirect Gain														
(H) Direct Gain														
(H) Sunspace														
(C) Night Mech Vent														
(C) Natural Vent														
(L) Windows							\$0.07	20.3%	27.1%	52.5%	0.0%	11	0	0.3
(L) Skylights	4,972	41.0%	0.0%	36.0%	23.0%	0.0%	\$0.07	17.4%	37.8%	44.8%	0.0%	14	0	0.3
(L) Sawtooth Ap	4,971	38.2%	0.0%	31.0%	30.8%	0.0%	\$0.08	16.0%	33.6%	50.4%	0.0%	14	0	0.3
(L) Monitor Ap.	5,581	34.4%	0.0%	38.2%	27.5%	0.0%								
(L) Atrium														

This index is a cross-reference for the information in the first three volumes of the Passive Solar Handbook. For each entry, the volume number is shown in parentheses, followed by the page number in that volume upon which the information is located. If the information is found in more than one volume, semicolons are used to separate volumes. For instance, for the entry **Air movement: (I) 26; (II) 5**, information about air movement is contained in Volume I on page 26 and in Volume II on page 5.

---

A-E firm: (III) 13  
    evaluation factors: (III) 14, 19  
AFRCE: (III) 6  
Air  
    movement: (I) 26; (II) 5  
    temperature: (II) 5  
ATR: see atrium  
Atrium (ATR): (I) 14, 18  
Automated electric lighting controls: (I) 19

**A**

---

Base comprehensive plan (BCP): (I) 20; (II) 1  
BCP: see base comprehensive plan  
Building  
    climate adapted: (I) 40; (II) 9  
    climate rejecting: (I) 40; (II) 9  
    conventional: (II) 14  
    elongated shape: (I) 31; (II) 6  
    energy responsive: (I) 37  
    multistory: (II) 25  
    orientation: (I) 29; (II) 4, 6  
    passive: (II) 34  
    period of operation: (II) 10  
    redesign: (I) 3  
    schedule: (II) 10  
    shape: (I) 29; (II) 4, 6  
    target energy use: (II) 14  
    type: (I) 32; (II) 13, 18, 21, 24  
    type codes (USAF): (I) 32; (II) 8, 13

**B**

---

CBD: see Commerce Business Daily  
CDD: see cooling degree day  
Climate: (I) 33  
Climate adapted building: (I) 40; (II) 9  
Climate regions: (I) 32; (II) 12, 18, 21, 33  
    special cases: (II) 23  
Climate rejecting building: (I) 40; (II) 9  
Climate variables: (I) 33

**C**

Cloudiness index: see radiation and daylight  
Collection  
    daylighting: (I) 3  
    passive solar thermal: (I) 2, 4  
Commerce Business Daily (CBD): (III) 13  
    announcement: (II) 32; (III) 1  
Comprehensive planning: (III) 2  
Control  
    daylighting: (I) 3  
    passive solar: (I) 2, 4  
Conventional building: (II) 14  
Cooling degree day (CDD): (I) 33, 35  
Cooling peak demand calculation: (II) 18  
Core daylighting: (I) 13  
Credit Union: (II) 18, 30, 42

---

**D** D+S: see direct gain plus storage  
Daylight  
    planning rules: (II) 5  
    protected zone: (II) 5  
    site planning: (II) 6  
    with passive solar heating: (II) 6  
Daylighting  
    atrium (ATR): (I) 14, 18  
    concepts: (I) 1  
    core: (I) 13  
    monitor apertures (MON): (I) 14, 17  
    sawtooth apertures (SAW): (I) 14, 16  
    sidelighting: (I) 13, 14  
    site planning: (I) 28  
    skylights (SKY): (I) 14  
    toplighting: (I) 13, 15  
    windows (WIN): (I) 14  
DD Form 1391: (II) 32; (III) 1, 16  
    five year plan: (III) 2, 16  
    Item 9: (III) 2, 3, 5, 16  
    Item 10: (III) 2, 3, 5, 16  
    Item 11: (III) 2, 4, 5, 16  
    35% design submission: (III) 2, 5  
Design agent: (III) 6  
Design guidance: (III) 6  
    Tab A: (III) 6  
    Tab B: (III) 6, 7, 16  
    Tab C: (III) 6, 7, 17  
    Tab D: (III) 6, 8, 17  
    Tab E: (III) 6, 9, 17  
    Tab F: (III) 6, 9, 17  
    Tab G: (III) 6  
    Tab H: (III) 6  
    Tab I: (III) 6  
    Tab J: (III) 6, 10, 18  
    Tab K: (III) 6

Design instructions (DI's): (III) 1, 12, 18  
Design manager: (III) 12, 13  
Detailed building energy data: (II) 17  
DG: see direct gain  
DI's: see design instructions  
Direct gain systems: (I) 5  
    direct gain (DG): (I) 5, 6  
    direct gain plus storage (D+S): (I) 5, 7  
Distribution  
    daylighting: (I) 3  
    passive solar thermal: (I) 2

---

Electric lighting: (II) 39  
    automated controls: (I) 19  
Elongated shape, building: (I) 31  
Energy costs: (I) 43; (II) 10  
    cost calculation: (II) 38  
    cost per unit of area: (II) 10  
    determine costs: (II) 37  
    vs. energy use: (I) 44  
Energy responsive buildings: (I) 37  
Energy use  
    annual energy use calculation: (II) 23  
    end use: (II) 15, 19, 21  
    end use calculation: (II) 17, 38  
    end use categories: (I) 39  
    percent energy savings calculation: (II) 36  
    priority: (II) 15, 19, 21  
    vs. energy costs: (I) 44  
Envelope loads: (I) 41; (II) 9  
    vs. internal loads: (I) 43  
Evaluation factors, A-E firms: (III) 14, 19  
Extended systems, passive heating: (I) 5

---

**E**

Five year plan: (III) 2, 16

---

**F**

HDD: see heating degree day  
Heating degree day (HDD): (I) 33, 34  
Heating, ventilating, air conditioning (HVAC) systems: (II) 24  
    analysis: (II) 40  
    plant size: (II) 41  
    with night mechanical ventilation (NMV) systems: (I) 12

**G, H**

Hours of operation: (II) 10  
HQ USAF/LEE: (III) 6  
Humidity: (I) 26  
HVAC: see heating, ventilating, air conditioning systems

---

**I** Indirect gain systems: (I) 5  
    indirect gain (IND): (I) 5, 8  
IND: see indirect gain.  
Internal loads: (I) 41; (II) 9, 10  
    energy use: (II) 10  
    occupancy characteristics: (II) 10  
    variables: (I) 42  
    vs. envelope loads: (I) 43  
Isolated gain systems: (I) 5, 9  
    sunspaces: (I) 5, 9  
Item 9: (III) 2, 3, 5, 16  
Item 10: (III) 2, 3, 5, 16  
Item 11: (III) 2, 4, 5, 16

---

**J, K, L** Latent enthalpy hour: (I) 33, 35  
LEH: see latent enthalpy hour

---

**M** MAJCOM  
    Comprehensive planning: (III) 2  
MON: see monitor aperture  
Monitor aperture (MON): (I) 14, 17  
Multistory buildings: (II) 25

---

**N** Natural ventilation (NVN): (I) 11; (II) 4  
Night mechanical ventilation (NMV): (I) 12; (II) 4  
NMV: see night mechanical ventilation  
NVN: see natural ventilation

---

**O** Operable windows: (I) 12  
Orientation, building: (I) 29; (II) 4, 6

---

**P** Passive building  
    energy use: (II) 34  
    peak demand: (II) 34  
Passive heating: (I) 4  
    direct gain systems: (I) 5

- extended systems: (I) 5
- indirect gain systems: (I) 5
- isolated gain systems: (I) 5
- prompt systems: (I) 5
- site planning: (I) 21
- Passive solar systems
  - combinations: (II) 44
  - components: (I) 2
- PDC screen: (III) 13
- Peak demand: (I) 45; (II) 16, 18, 19, 21
  - calculation: (II) 36
  - cooling: (I) 10; (II) 18
  - costs: (I) 45
  - passive building: (II) 34
- People load: (II) 10
- Period of operation: (II) 10
- Project book: (III) 1, 6, 16
- Project description: (III) 19
- Project designer: (III) 6
- Project support data: (III) 6
  - Tab L: (III) 6
  - Tab M: (III) 6, 10, 18
  - Tab N: (III) 6, 10, 18
  - Tab O: (III) 6, 11, 18
  - Tab P: (III) 6, 11, 18
- Prompt systems, passive heating: (I) 5
- Protected zone, daylighting: (I) 28

---

RAD: see radiation and daylight  
Radiation and daylight (RAD): (I) 33, 37  
Roof clerestory: (I) 16. see also sawtooth aperture

**Q, R**

---

Savings-to-investment ratio (SIR): (I) 1; (II) 1  
SAW: see sawtooth aperture  
Sawtooth aperture (SAW): (I) 14, 16; (II) 31, 39  
Schedule, building: (II) 10  
Shading: (I) 10

- coefficient: (I) 10
- daylighting: (I) 11

Shape

- building: (II) 4, 6
- elongated: (II) 6

Sidelighting: (I) 13, 14  
SIR: see savings-to-investment ratio  
Site planning

- daylighting: (I) 28
- passive cooling: (I) 25
- passive heating: (I) 21

**S**

Site selection process: (I) 20  
SKY: see skylight aperture  
Skylights (SKY): (I) 14, 15  
Solar concepts: (I) 2  
Solar envelope: (I) 21; (II) 2  
    phased development: (I) 24  
Solar gains: (I) 26  
Solar PA: see solar program amount  
Solar program amount (Solar PA): (III) 12, 18  
Solar thermal concepts: (I) 1  
Standard Form 254: (III) 14, 15  
Standard Form 255: (III) 13, 14, 15  
Steps in comprehensive process: (II) 12  
    Step 1: (II) 12  
    Step 2: (II) 13  
    Step 3: (II) 12  
    Step 4: (II) 16  
    Step 5: (II) 27  
    Step 6: (II) 27, 29  
    Step 7: (II) 34  
    Step 8: (II) 37  
    Step 9: (II) 40  
    Step 10: (III) 1  
Storage, passive solar thermal: (I) 2, 4  
SUN: see sunspaces  
Sunspaces (SUN): (I) 5, 9. see also isolated gain systems.

---

**T** Tab A: (III) 6  
Tab B: (III) 6, 7, 16  
Tab C: (III) 6, 7, 17  
Tab D: (III) 6, 8, 17  
Tab E: (III) 6, 9, 17  
Tab F: (III) 6, 9, 17  
Tab G: (III) 6  
Tab H: (III) 6  
Tab I: (III) 6  
Tab J: (III) 6, 10, 18  
Tab K: (III) 6  
Tab L: (III) 6  
Tab M: (III) 6, 10, 18  
Tab N: (III) 6, 10, 18  
Tab O: (III) 6, 11, 18  
Tab P: (III) 6, 11, 18  
Target building energy use: (II) 14  
Thirty-five percent design submission: (III) 2  
Toplighting: (I) 13, 15

---

**U** USAF building type codes: (II) 8

# Energy Cost Savings

## Appendix D

Ventilation: (II) 5

**V**

---

Warehouse: (II) 21, 32, 46

Weather: (I) 33

WIN: see windows

Windows (WIN): (I) 14; (II) 36

**W, X, Y, Z**