

De Anza ES 70 Introduction to Energy Management

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Instructor

Objectives

- Understand the outside influences that impact building envelope design including:
 - Weather & Climate
 - The Sun
 - Building Orientation
 - Building Location

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Key Considerations

- Building Envelope issues must be addressed at the earliest part of schematic design and resolved long before construction begins.
- Loads for Commercial, Industrial, & Residential Buildings all different
- Remember the Building Energy Balance

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Thermal Comfort

- Condition of mind which expresses satisfaction with the thermal environment.

ASHRAE Fundamentals 2001

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Building Orientation

- Where in the world are you? Consider:
 - Minneapolis, Minnesota
 - San José, California
 - Honolulu, Hawaii
- Where is the Sun?
 - Daylighting
 - Heat Loads
- Landscaping
- What are the Issues?

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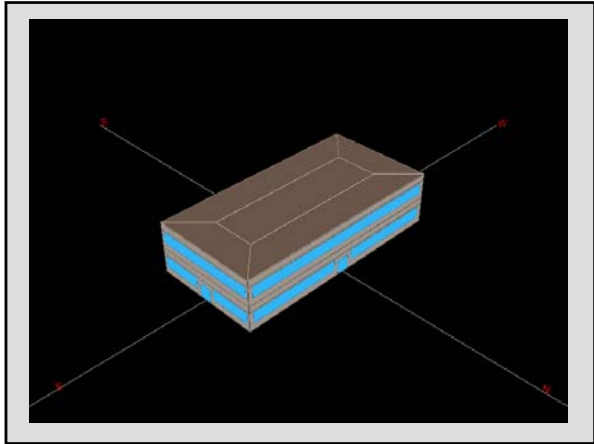
Daylighting

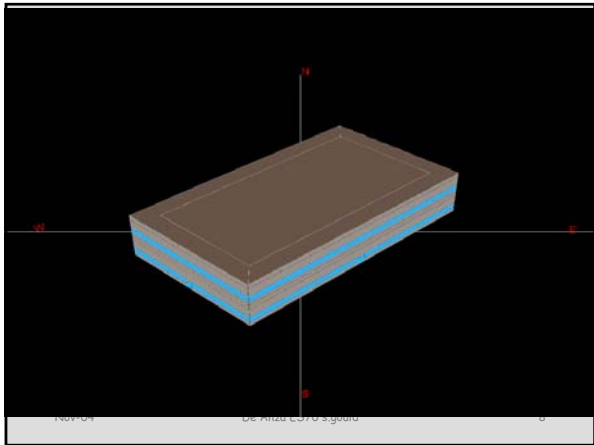
- Admit only as much light as necessary.
- Consider sky conditions and glare control.
- Daylight dimming controls can save significant amounts of energy.
- Daylighting can reduce heating loads.
- Glazing is a key ingredient.
 - Spectrally selective tints reduce heat gain but allow visible light.

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Skylight Examples

Spayed short-well skylights have better light distribution

Roof monitor Note: excellent location for photovoltaic panels

East to northwest

Deep well skylights illuminate best directly below

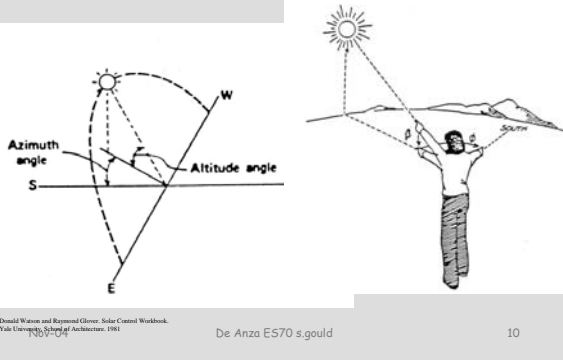
"Sawtooth" roof

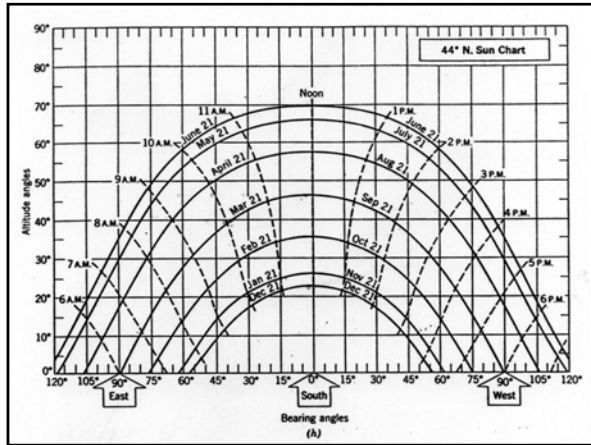
Note: excellent location for photovoltaic panels

North east to north

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Altitude Angle & Azimuth Angle





Weather

- What is the difference between climate and weather data?
- What weather data is the best to use?
 - Min, Max, Mean temperatures?
 - Humidity?
 - Degree Day data?
- Desert example

Energy and Weather Data

- 65 degree Base
- Building Balance Point
- Design Day Conditions
- Bin Method
- Ground Effects

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Degree Day Examples

City	HDD	CDD
Minneapolis	7979	680
San Jose	2387	594
Honolulu	0	4473

www.worldclimate.com

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Before There Was Mechanical Cooling....

- Passive Cooling Design
 - Operable Windows
 - Thermal Mass
 - High Ceilings
 - "Stack" effect
 - Arcades

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Energy Modeling & Economics

- eQuest - Energy Modeling
 - <http://doe2.com/equest/index.html>
 - Good for envelope changes such as glass selection or insulation options
 - Also good for complex economic analyses that may involve "whole system" performance.
- Solar Pathfinder
 - www.solarpathfinder.com

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Objectives -- Review

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