



An Energy Efficiency Workshop & Exposition
Palm Springs, California

A Sustainable Facility for a Sustainable Agency

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NOAA's Mission

To describe and predict changes in the Earth's environment, and conserve and wisely manage the Nation's coastal and marine resources



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2



Need for the Project

- Inadequate facility to support legislatively mandated fisheries management
- Relieve overcrowding and accommodate approved project growth
- Interrelated functions need to be consolidated to optimize performance
- Not compliant with ADA or UFAS requirements or current building codes

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3



Site Constraints



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4



Initial Concept Design



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5



Organizational Challenges

- Management's unfamiliarity with various Executive Orders, design concepts, etc.
- Concerns regarding increased project costs with limited, if any, benefits
- No funding to support/evaluate initiatives (*except at DOC level*)
- Misperceptions about lack of quality control if implemented

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6



Design Phase Objectives

- Definition of “World Class Facility” & how it can be accomplished within the established budget
- Degree of incorporating Sustainable Design, i.e., LEED Building Gold™ rating
- Development & implementation of an energy budget for design
- Degree of specifying Energy Star® equipment and materials

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7



HLRP Team



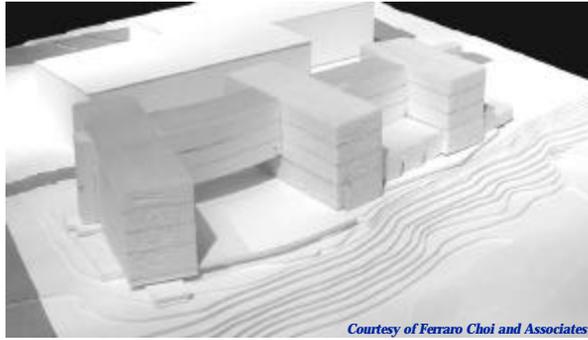
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8



Concept Modeling



Courtesy of Ferraro Choi and Associates

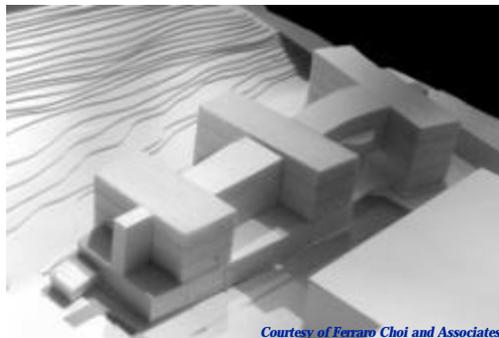
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9



Concept Modeling



Courtesy of Ferraro Choi and Associates

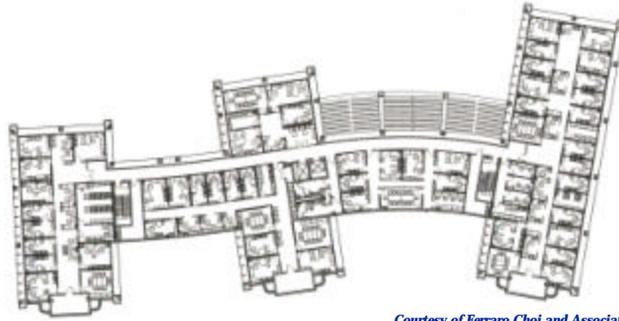
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10



Typical Floor Plan Concept



Courtesy of Ferraro Choi and Associates

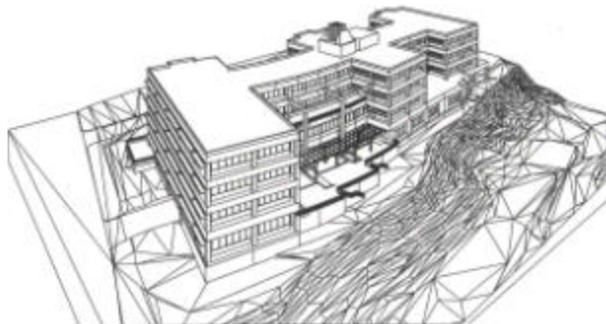
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11



Envelope Development – East



Courtesy of Ferraro Choi and Associates

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12



Envelope Development – East



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13



Final Design – East



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14



100% Synergy of Design

Electrical

- One Voltage System
- Daylighting
- Lumen Package
- Appliance Loads

Air Conditioning

- Radiant Cooling
- Higher Chilled Water Temperatures
- Dessicant Dehumidification
- Solar Regeneration
- 100% Outside Air
- Energy Recovery

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15



Electrical Engineering

- Ambient/Task Lighting
- International Lighting Standards
- Lighting Control
- Lumen/Lamp Package
- Single Voltage System
- Modular Wiring

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16



Daylight Modeling



Courtesy of Lincoln Scott

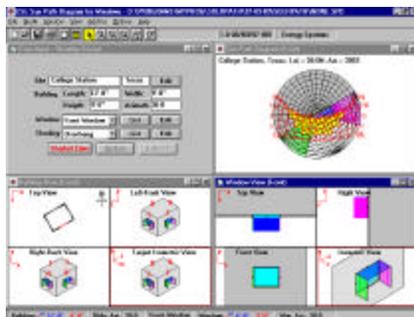
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17



Solar Orientation



- Graphical representation of the solar path and its relation to the orientation of a window or shading device

- SolrPath: Windows based program developed by the Energy Systems Laboratory at Texas A&M University

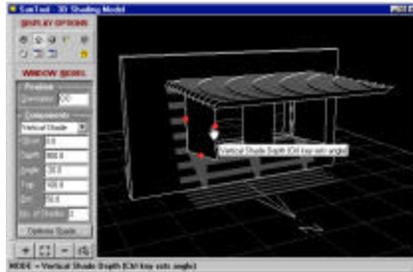
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18



Shade Modeling



- Interactive shading design
- Accurately size and position overhangs, shading devices and louvers easily
- Suntrace: Windows based program (now *The Solar Tool*) developed by Dr. Andrew Marsh

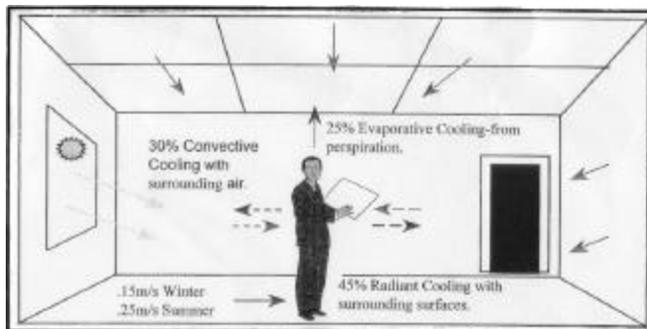
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19



Thermal Comfort



Courtesy of Lincoln Scott

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20



Thermal Comfort



- Predicted Mean Vote (PMV): thermal scale that calculates the Predicted Percentage of Dissatisfied people (PPD)
- Originally developed by Dr. P. Ole Fanger and later adopted as an ISO standard
- PMVTool: Windows based program (now *The Psycho Tool*) developed by Dr. Andrew Marsh

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21



Why Radiant Cooling?

- No draughts – even in rooms with high heat gains
- Radiant heat exchange reduces the degree of convective cooling
- Improved air quality (i.e., 100% outside air)
- Highest possible human comfort = Improved productivity
- Reduced noise levels in occupied spaces
- Substantially reduced maintenance requirements due to absence of moving parts

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22



Typical Chilled Ceiling Tile



- Control cooling loads by the use of water instead of air
- Works on principles of both radiation and convection
- More cost effective, clean, and natural indoor climate

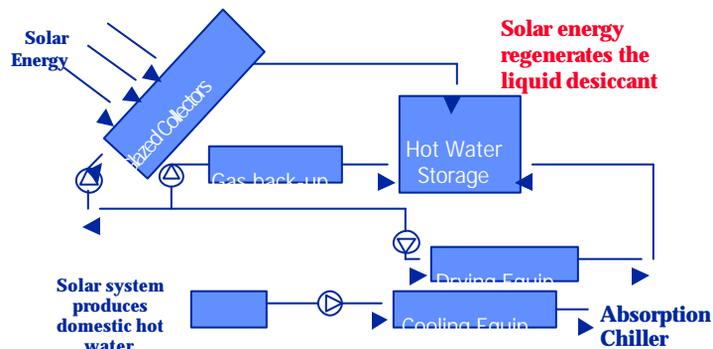
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23



Dessicant Dehumidification



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24



Why is it important to low energy design?

- It allows the use of waste heat or solar energy.
- It allows dehumidification without the wastes of energy employed by conventional systems.
- It separates relative humidity from temperature and a higher thermal comfort can be achieved.
- When used effectively, it can result in significant energy and cost savings.

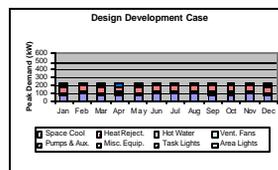
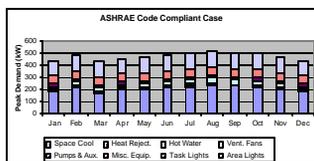
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25



DOE-2.2 Results



- ASHRAE – 1,156,000 kWh/yr
- Design – 504,000 kWh/yr
- Percent Savings = 44%

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26



Results



- FY 2002 Federal Energy Saver Showcase Award
- Progressing towards the LEED Building Gold™ rating
 - 1st federal laboratory
 - 1st facility in Hawaii
- Progressing towards Energy Star® building designation
- Potential energy rebates from HECO

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27



Lessons Learned



- Every project needs a champion
- Clearly communicate the goals & objectives and obtain sponsor's approval
- Many obstacles and challenges to overcome – both externally & internally
- Delayed gratification – aesthetically appealing, energy efficient facility

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28