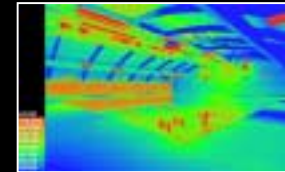




The Weidt Group
Energy

Collaboration
Analysis
Research

The Weidt Group: Daylighting Design using Radiance



Vinay Ghatti & Autif Sayyed

Annual Radiance Workshop, Montreal
August 11-12, 2005

5800 Baker Road - Minnetonka, Minnesota 55345
Phone - 952.938.1588 Facsimile 952.938.1480



Structure of this Presentation

Introduction to The Weidt Group

Daylighting Design Tools

Daylighting Projects

Building Types

Output Parameters

Challenges

Case Studies

Swimming Pool, NM

Grocery Store, IA

Architecture Studio, NM

School Classroom, IA

Library, NM

Police Station, IA

Office Building, IA

Conclusions



Introduction to The Weidt Group

- **Energy, sustainability and daylighting consulting since 1977**
- **Integrated daylighting and whole building energy analysis**
- **Software development**



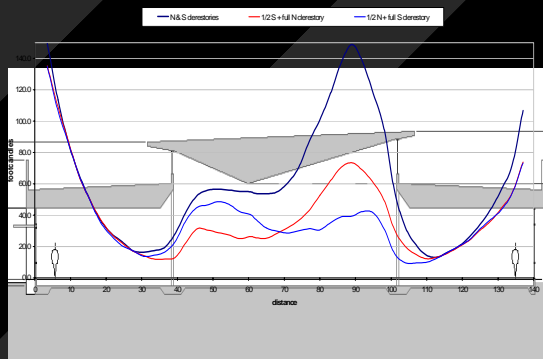
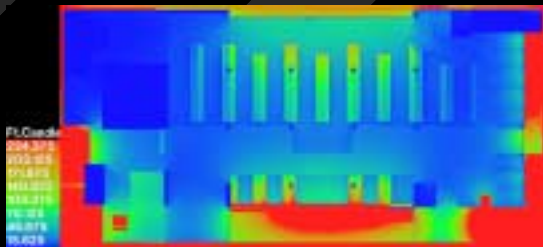
Daylighting Design Tools

- **Physical models**
- **Custom spreadsheet calculations**
- **DOE-2**
- **Lumen Micro**
- **Lumen Designer ***
- **Lightscape ***
- **Radiance**



Daylighting projects: *Building Types*

- Institutions- schools, colleges
- Offices
- Retail stores
- Recreation facilities





Daylighting Projects: *Output Parameters*

- **Illuminance**
- **Luminance**
- **Contrast issues**
- **Uniformity ratios**
- **Rendered Images**
- **Sun penetration**
- **Energy efficiency**



Daylighting Projects: *Challenges*

- **Project phase / schedules**
- **Time used for analysis**
- **Comprehension of radiance output (making it easy to understand for the clients)**



Case Studies

- **Diverse projects with distinct tasks**
- **Unique output requirements**
- **Different project timeframes**

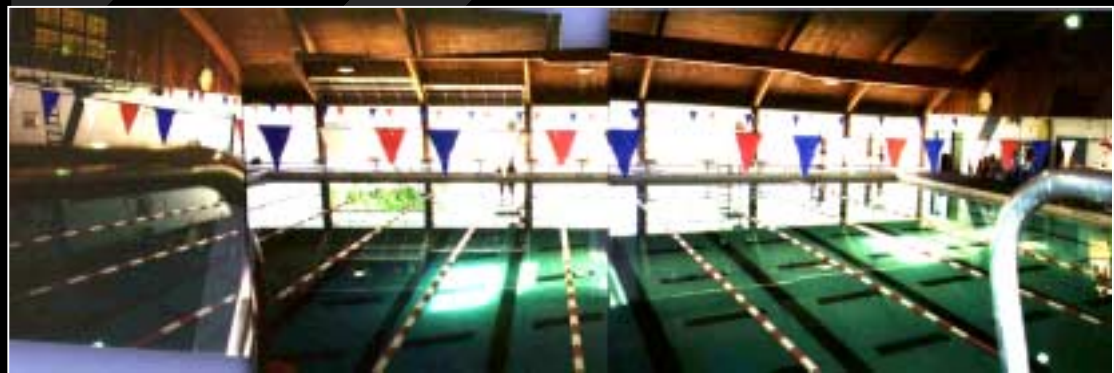
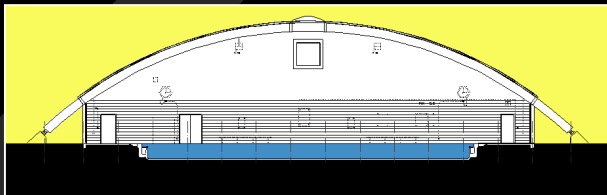
Therefore,

- **Specific analysis approach**



Case Studies: *Swimming Pool, New Mexico*

- Existing pool
- Glare and contrast issues
- Detailed luminance analysis
- Visual comparison
- Possible solutions



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Daylighting Design with Radiance
Annual Radiance Workshop 2005

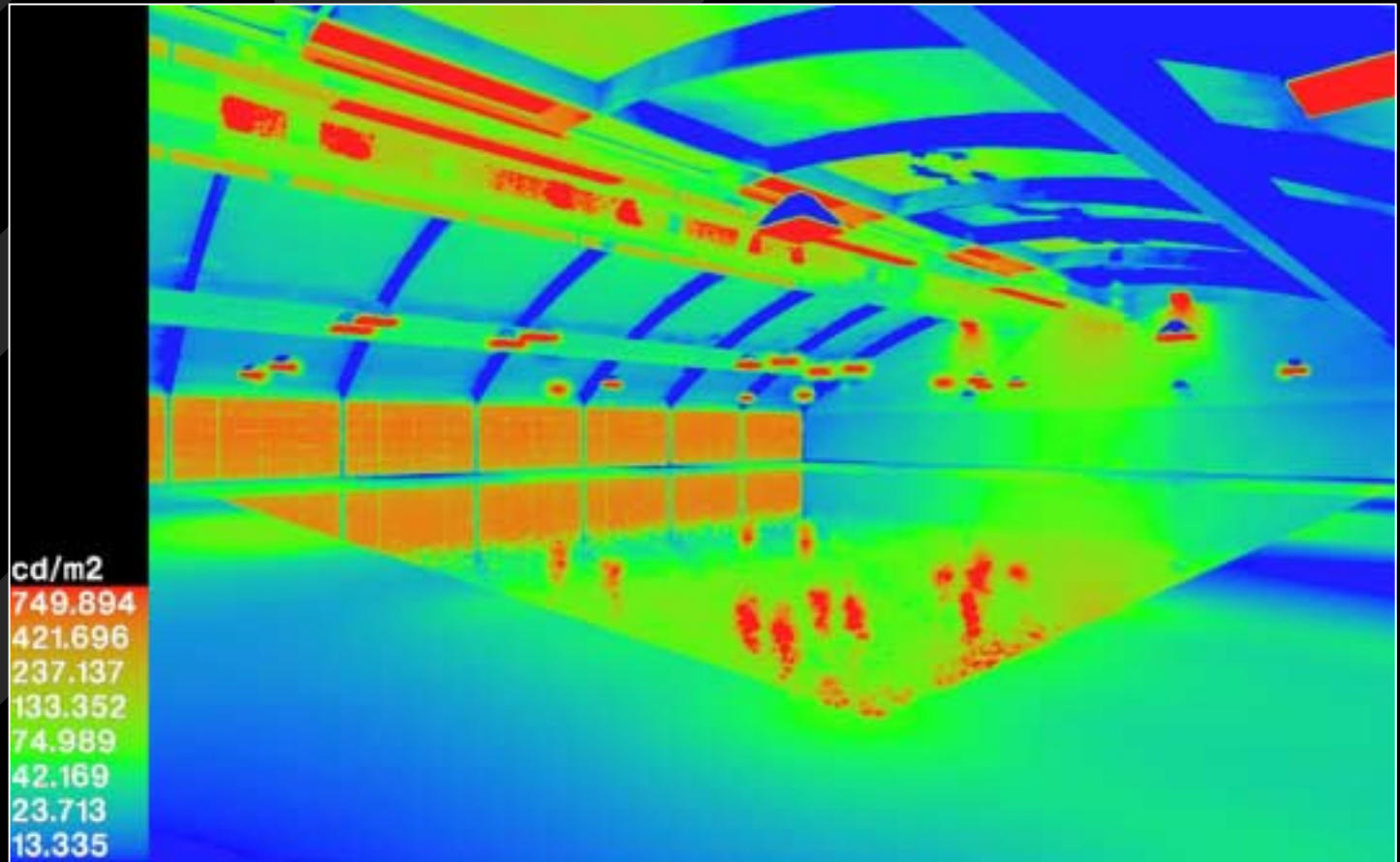


Case Studies: *Swimming Pool, New Mexico*





Case Studies: *Swimming Pool, New Mexico*





Case Studies: *Swimming Pool, New Mexico*



Existing



65% Surface Reflectance, Skylight Reflector,
External Canopy and Trees

Base

Option 1



90% Surface Reflectance, Skylight Reflector,
External Canopy and Trees, Transparent Glass

Option 2



Option 3



Case Studies: *Swimming Pool, New Mexico*

Location	Base		Option1		Option2	
	Candela Readings	Contrast Ratios	Candela Readings	Contrast Ratios	Candela Readings	Contrast Ratios
1. Ceiling Left	13.246	1.09	19.69	2.20	31.146	2.38
2. Ceiling Top	17.542	1.44	29.893	3.34	49.762	3.81
3. Upper Wall at end	11.993	1.01	13.962	1.56	22.733	1.74
4. Lower Wall at end	23.091	1.90	6.623	1.35	7.876	1.66
5. Floor Deck at right	1.253	9.71	1.074	8.33	6.265	2.09
6. Floor Deck at left	4.117	2.96	1.432	6.25	1.79	7.30
7. Pool surface right	10.024	1.21	24.344	2.72	25.955	1.99
8. Pool surface middle	12.172	1.00	8.95	1.00	13.067	1.00
9. Window right	780.261	64.10	147.854	16.52	86.457	6.62
10. Pool reflection right	767.194	63.03	128.343	14.34	93.259	7.14
11. Window left	920.239	75.60	173.63	19.40	60.323	4.62
12. Pool reflection left	757.886	62.26	133.176	14.88	58.175	4.45

Base

Luminance and contrast ratio comparison



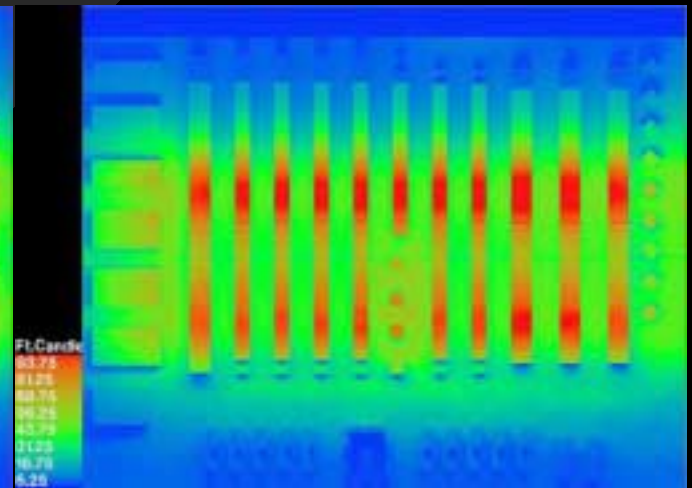
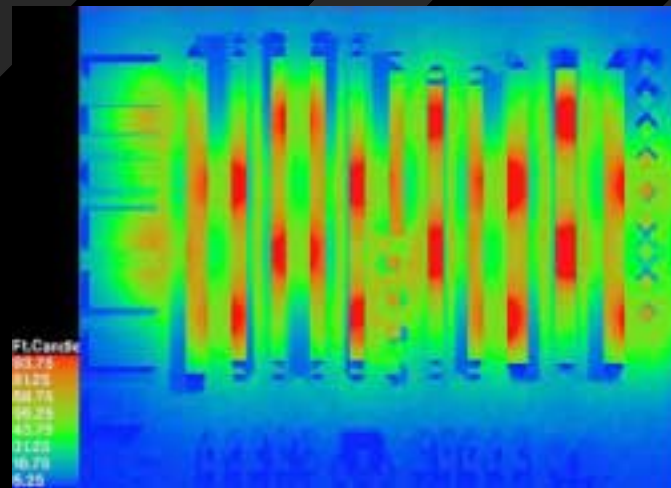
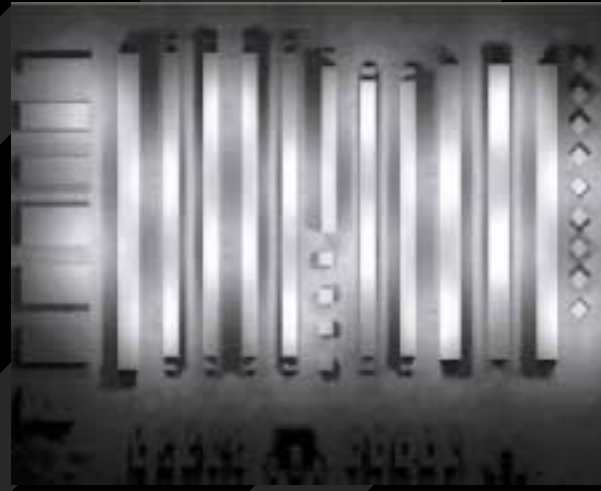
Case Studies: *Grocery Store, Iowa*

- **Prototypical buildings**
- **Bright spaces preferred**
- **Energy efficiency**
- **Uniformity & glare**





Case Studies: *Grocery Store, Iowa*



Skylights

Monitor



Case Studies: *Elementary School, Iowa*

- **Classroom spaces**
- **North vs. South monitors**
- **Uniformity & glare**
- **Energy efficiency**

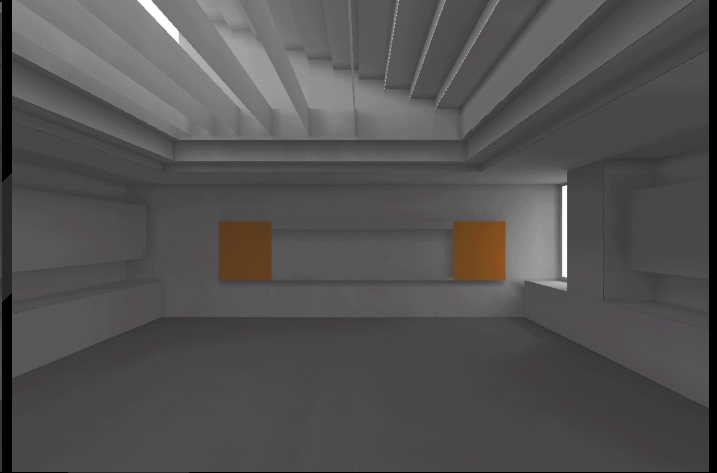




Case Studies: *Elementary School, Iowa*



South facing monitor



North facing monitor





Case Studies: *Elementary School, Iowa*

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March 21, 1200 PM cloudy sky South classroom Daylight Factor

South facing monitor

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March 21, 1200 PM cloudy sky South classroom Daylight Factor

Avg: 4.5

North facing monitor



Case Studies: *Elementary School, Iowa*



Radiance



Actual building



Actual building



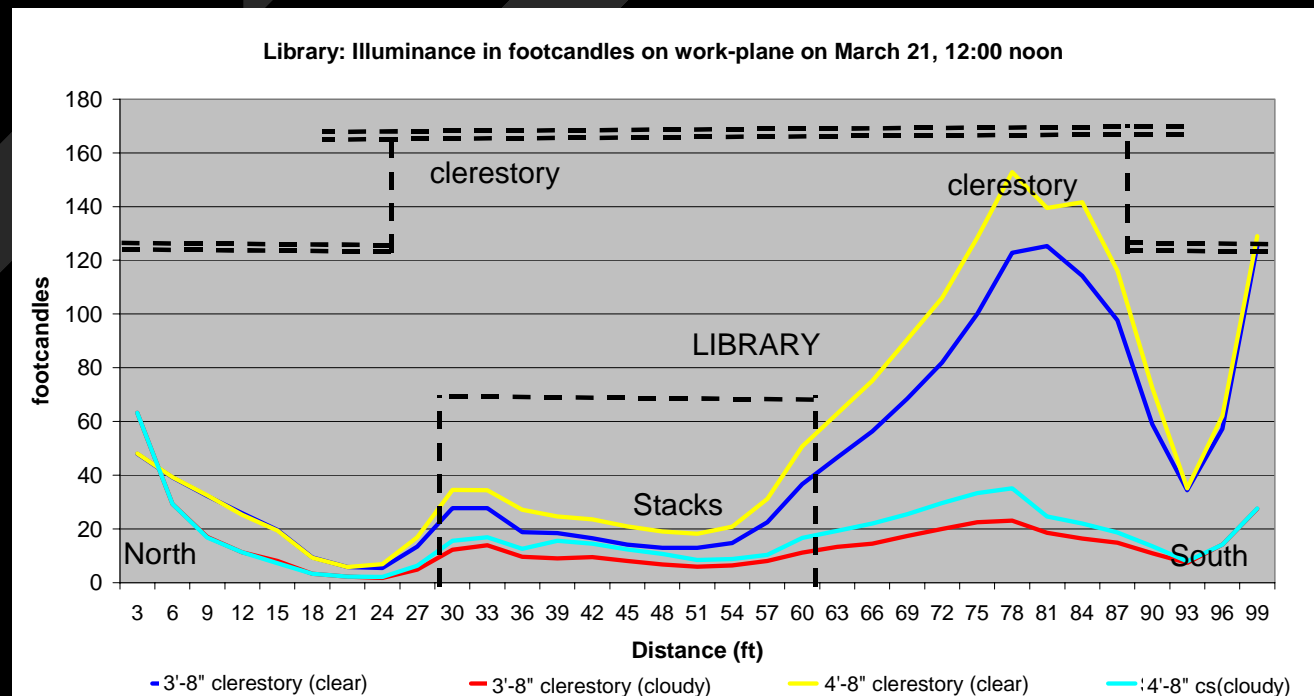
Case Studies: *Library, New Mexico*



- **Optimization of clerestory configurations**
- **Illuminance in stack areas**
- **Different sky conditions**
- **Energy efficiency**



Case Studies: *Library, New Mexico*

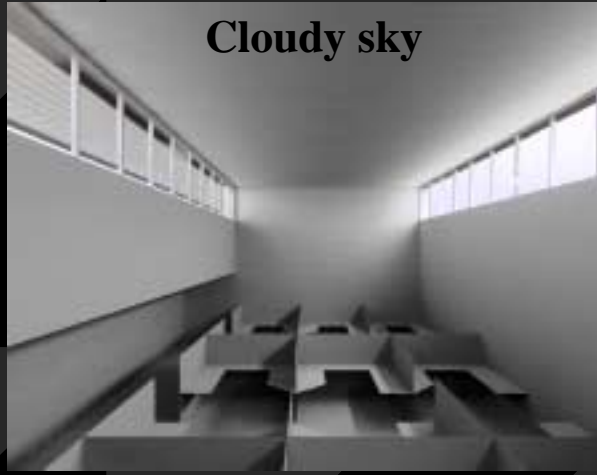


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Case Studies: *Office building*

Cloudy sky

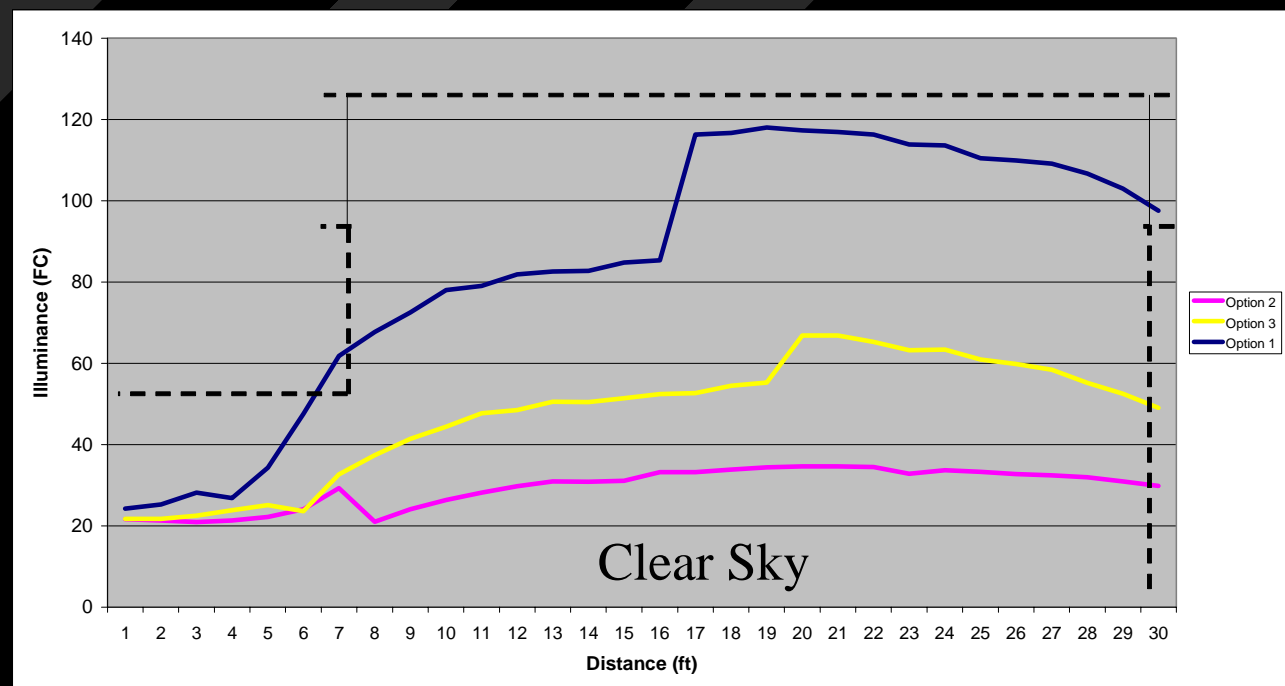
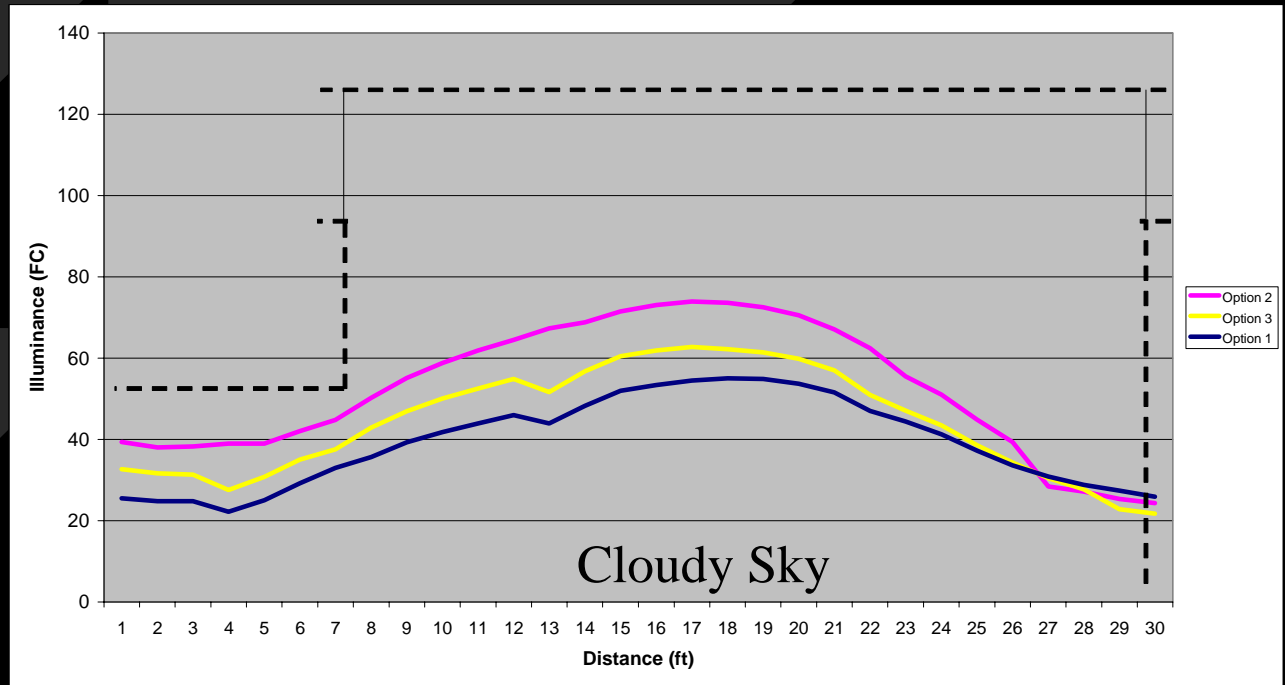


Clear sky



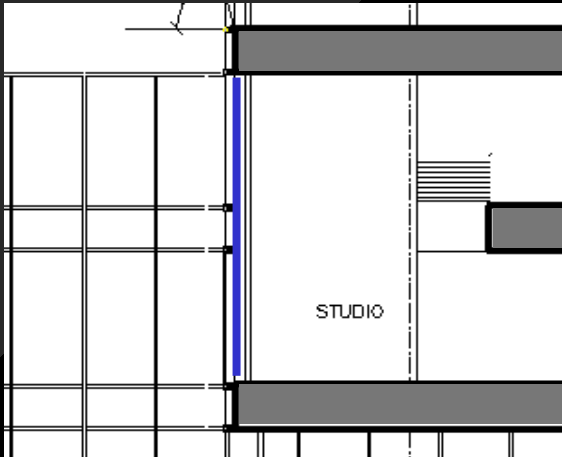


Case Studies: *Office building*

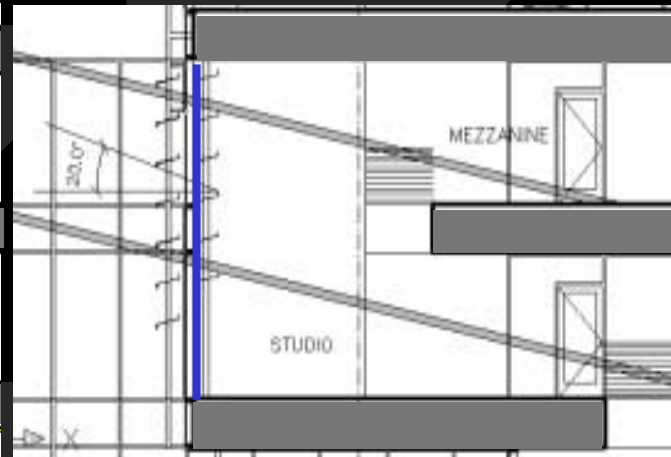




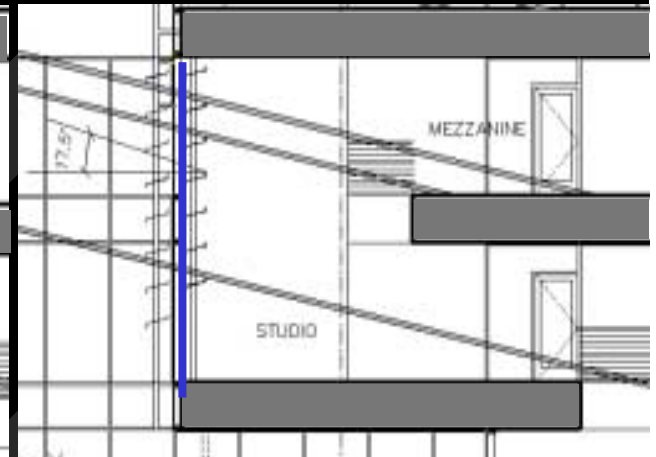
Case Studies: *Architecture Studio, New Mexico*



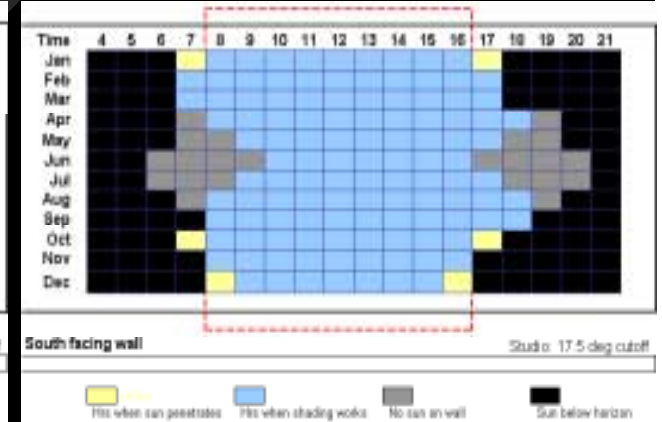
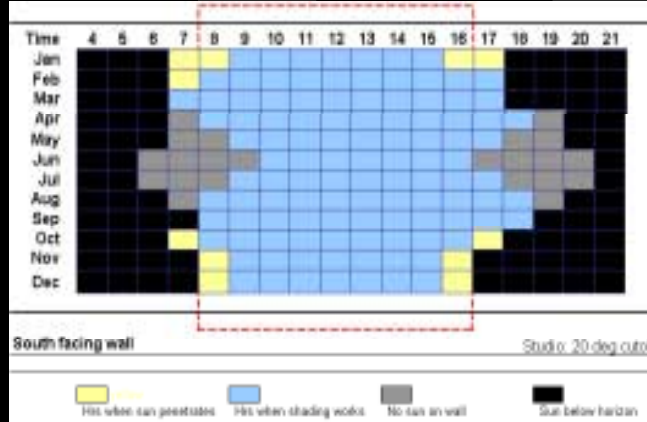
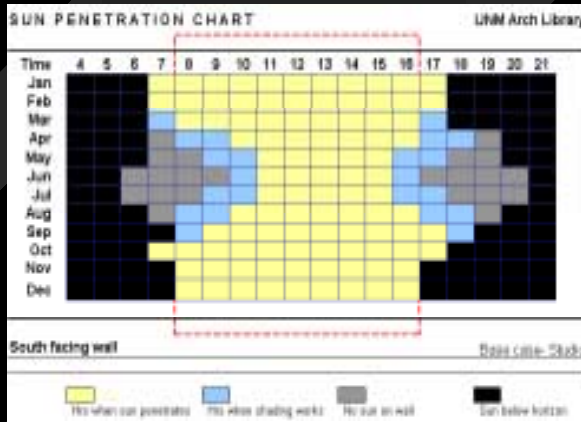
Base section



20 deg cut-off

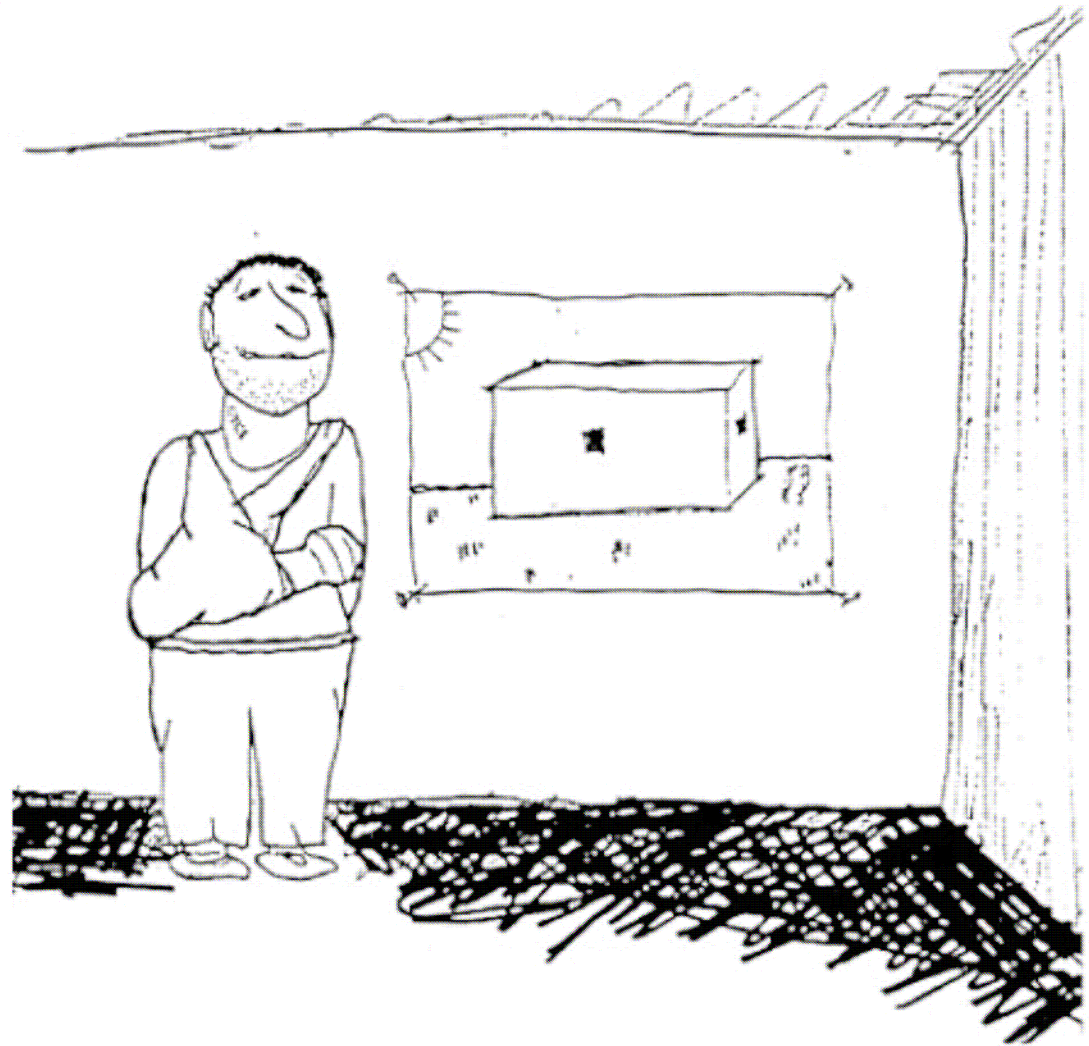


17.5 deg cut-off





Conclusion



Even though Larry got beat up pretty bad at the jury....he somehow felt good inside knowing that his project was the only one which could be evaluated by any microcomputer daylighting program.

by Tom McDougal