The Weidt Group
Energy

Collaboration
Analysis
Research

The Weidt Group:

Daylighting Design using Radiance

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Structure of this Presentation

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- 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

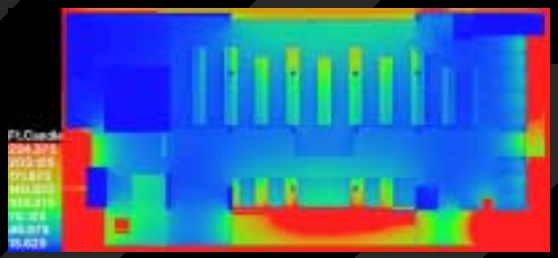
Introduction to The Weidt Group

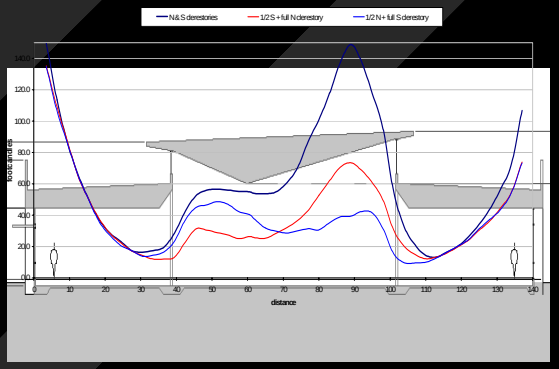
- Energy, sustainability and daylighting consulting since 1977
- Integrated daylighting and whole building energy analysis
- Software development

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

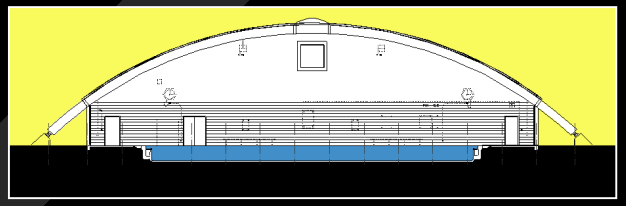
- Diverse projects with distinct tasks
- Unique output requirements
- Different project timeframes

Therefore,

- Specific analysis approach

Case Studies:
Swimming Pool, New Mexico

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

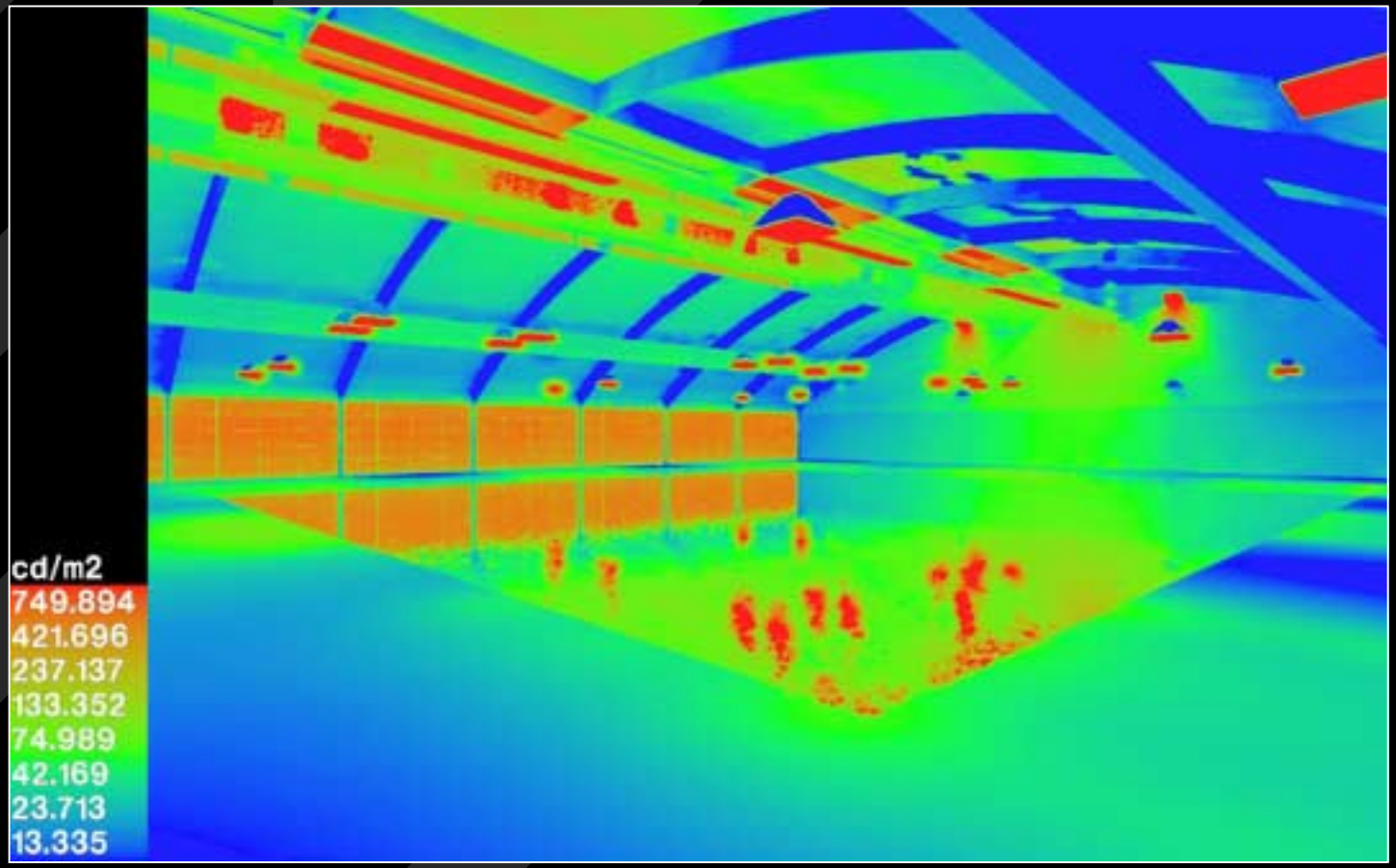


Existing

Case Studies:
Swimming Pool, New Mexico

In collaboration with The Derringer Group

Case Studies:
Swimming Pool, New Mexico



In collaboration with The Derringer Group

Case Studies:
Swimming Pool, New Mexico

Existing

Base

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

Option 1

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

Option 2

Option 3

In collaboration with The Derringer Group

Case Studies:
Swimming Pool, New Mexico

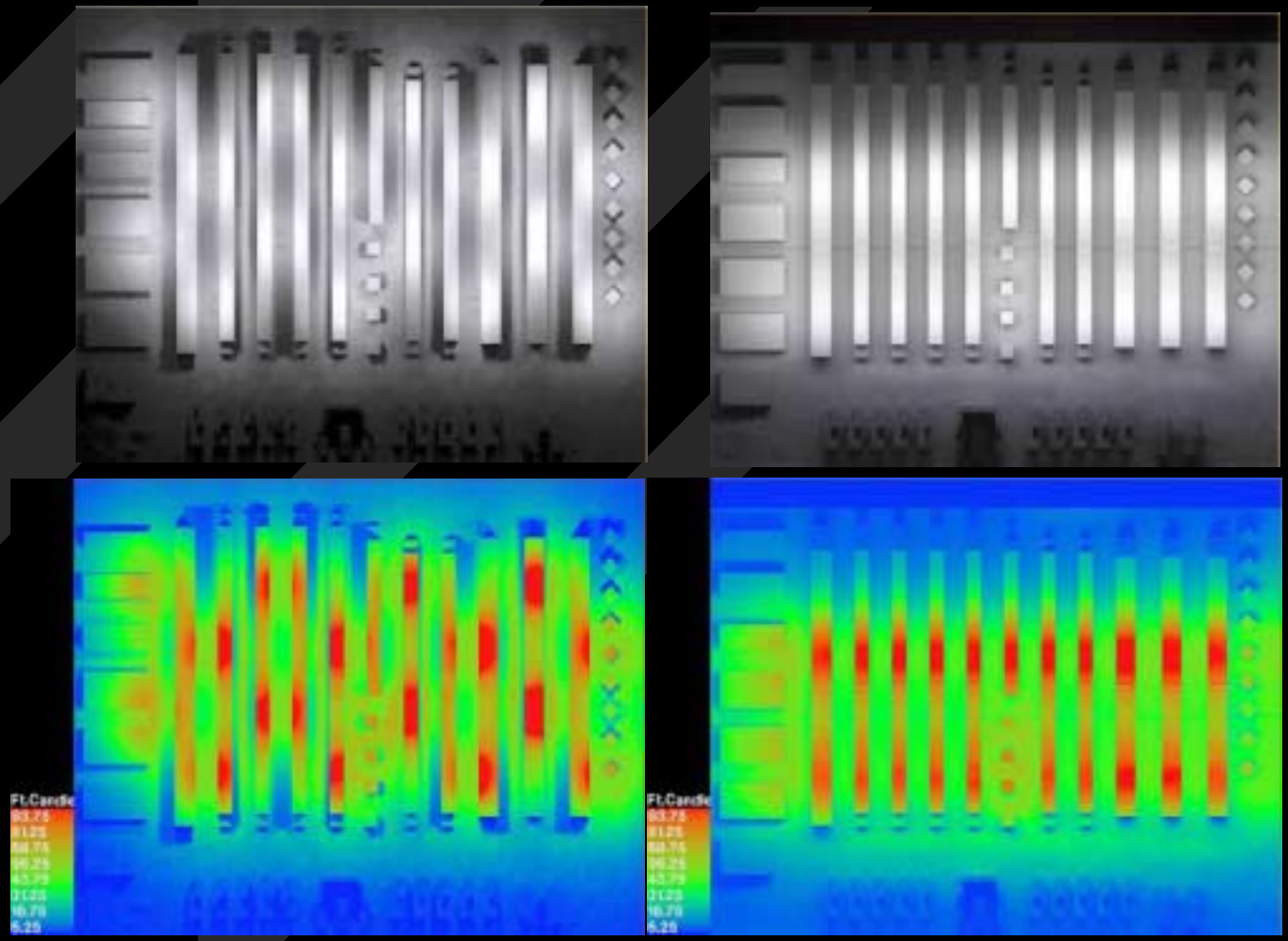
	Location	Base		Option1		Option2	
		Candela Readings	Contrast Ratios	Candela Readings	Contrast Ratios	Candela Readings	Contrast Ratios
	1. Ceiling Left	13.246	1.09	19.69	2.20	31.146	2.38
	2. Ceiling Top	17.542	1.44	29.893	3.34	49.762	3.81
	3. Upper Wall at end	11.993	1.01	13.962	1.56	22.733	1.74
	4. Lower 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
Base	**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

Luminance and contrast ratio comparison

Case Studies:
Grocery Store, Iowa

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

Case Studies:
Grocery Store, Iowa



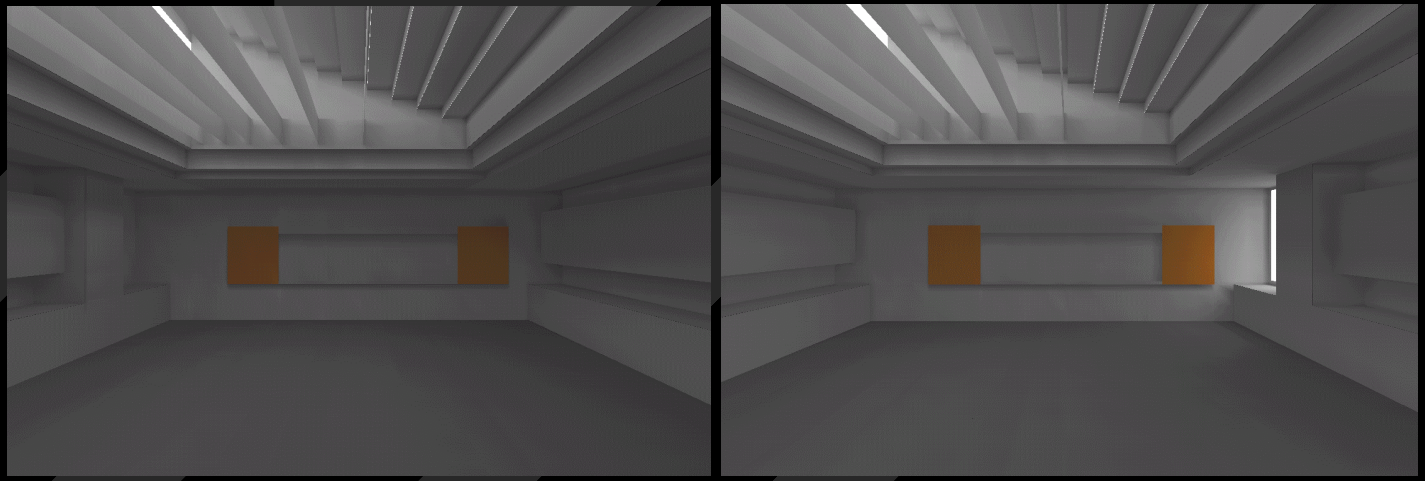
Skylights

Monitor

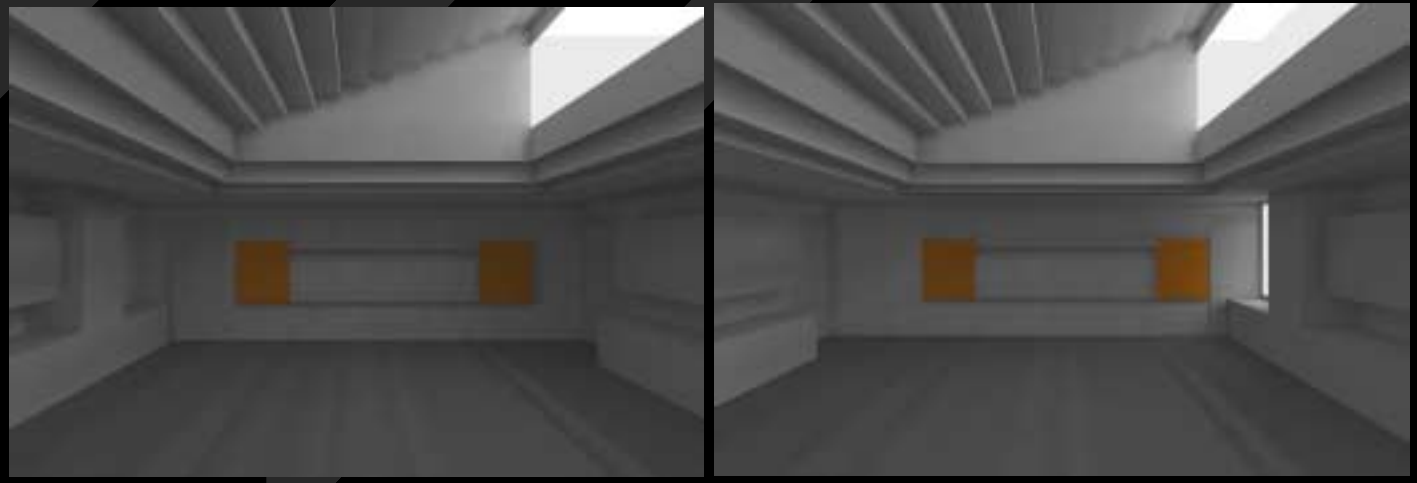
Case Studies:
Elementary School, Iowa

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

Case Studies:
Elementary School, Iowa

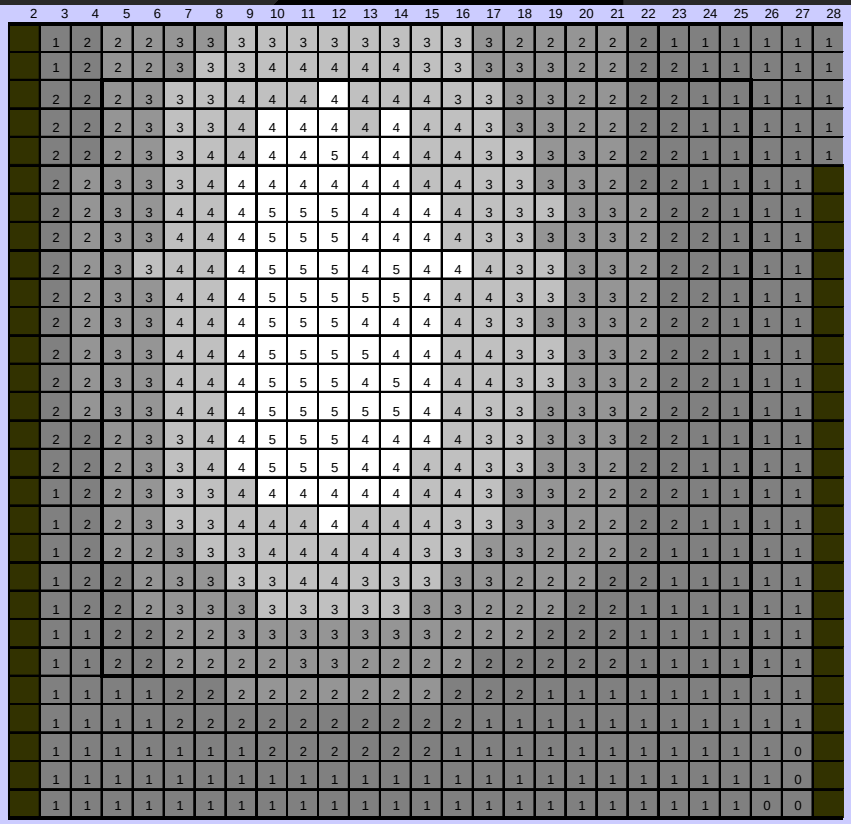


South facing monitor

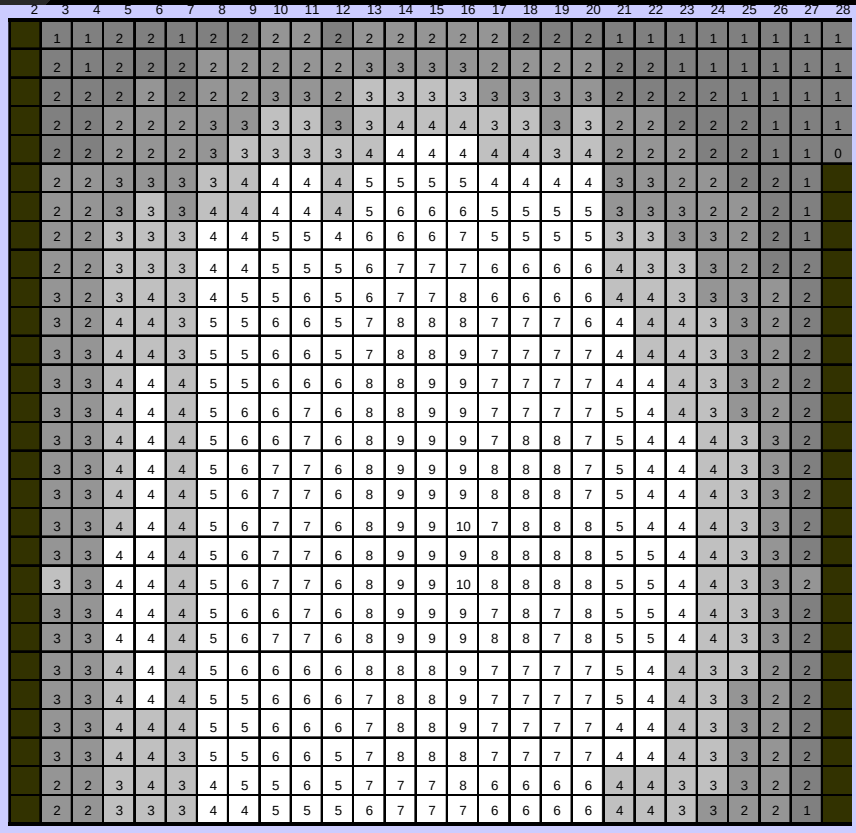


North facing monitor

Case Studies:
Elementary School, Iowa



South facing monitor



North facing monitor

Case Studies:
Elementary School, Iowa

Radiance

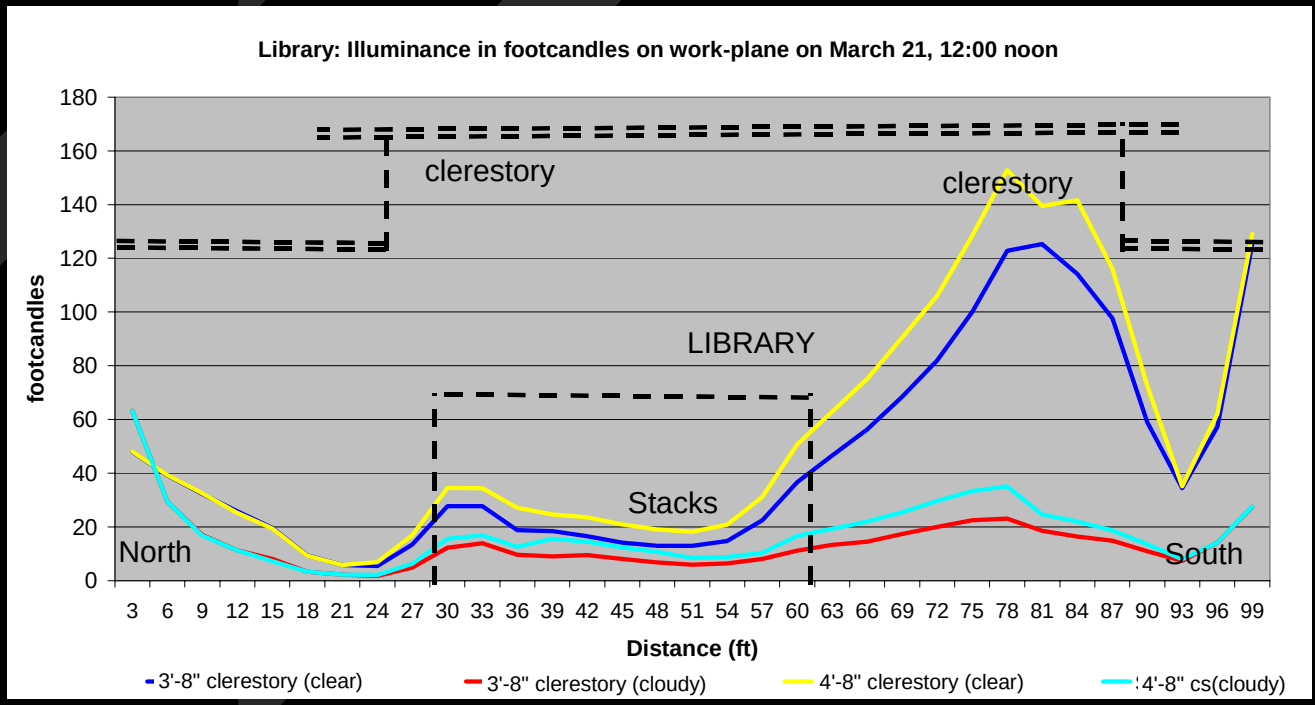
Actual building

Actual building

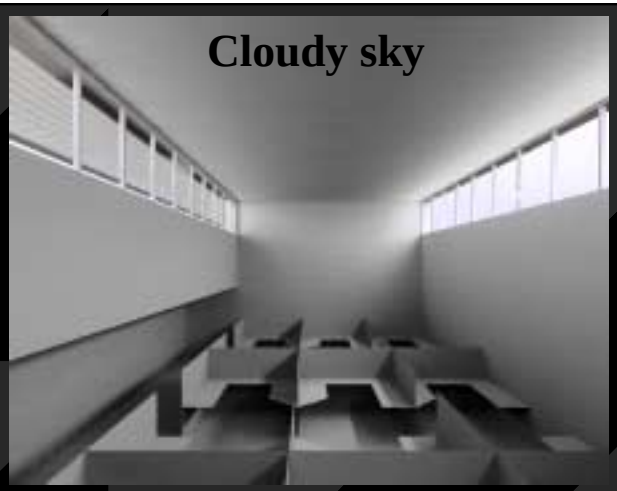
Case Studies:
Library, New Mexico

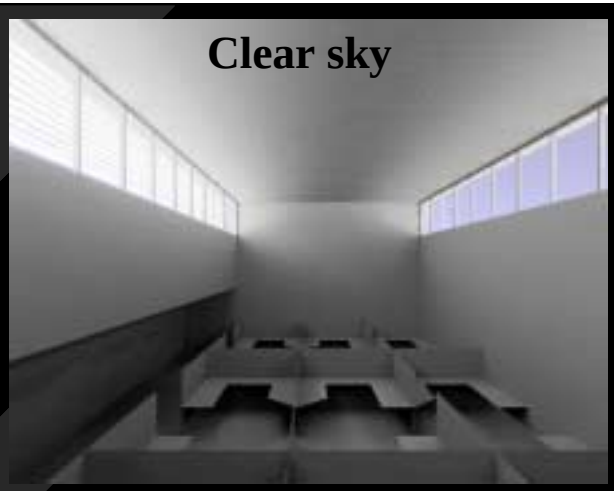
- **Optimization of clerestory configurations**
- **Illuminance in stack areas**
- **Different sky conditions**
- **Energy efficiency**

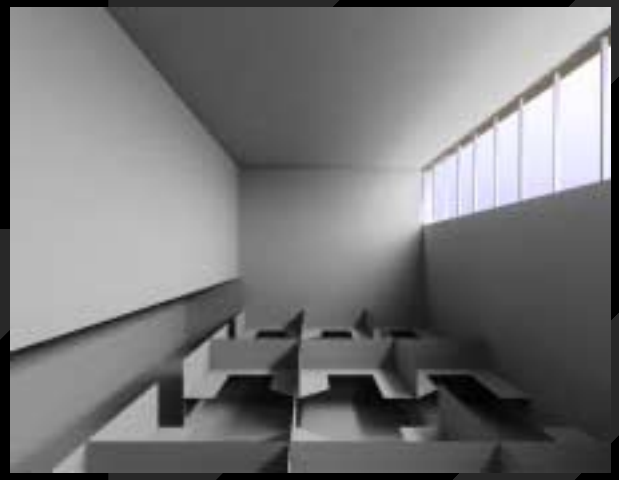
Case Studies:
Library, New Mexico

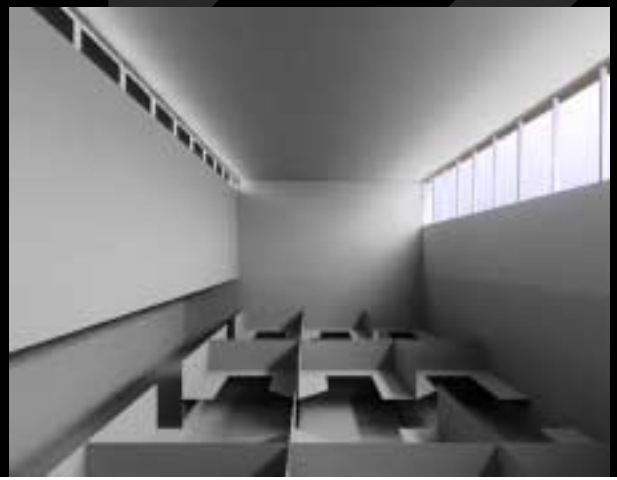


Case Studies:
Office building

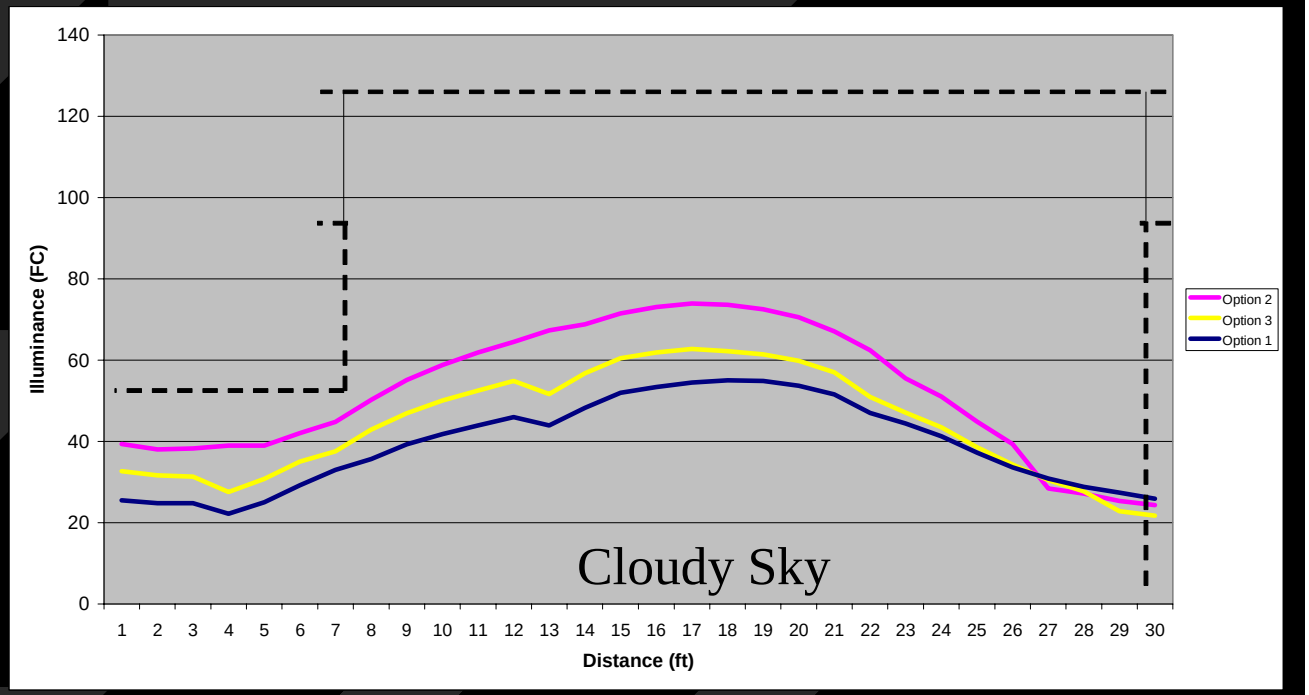


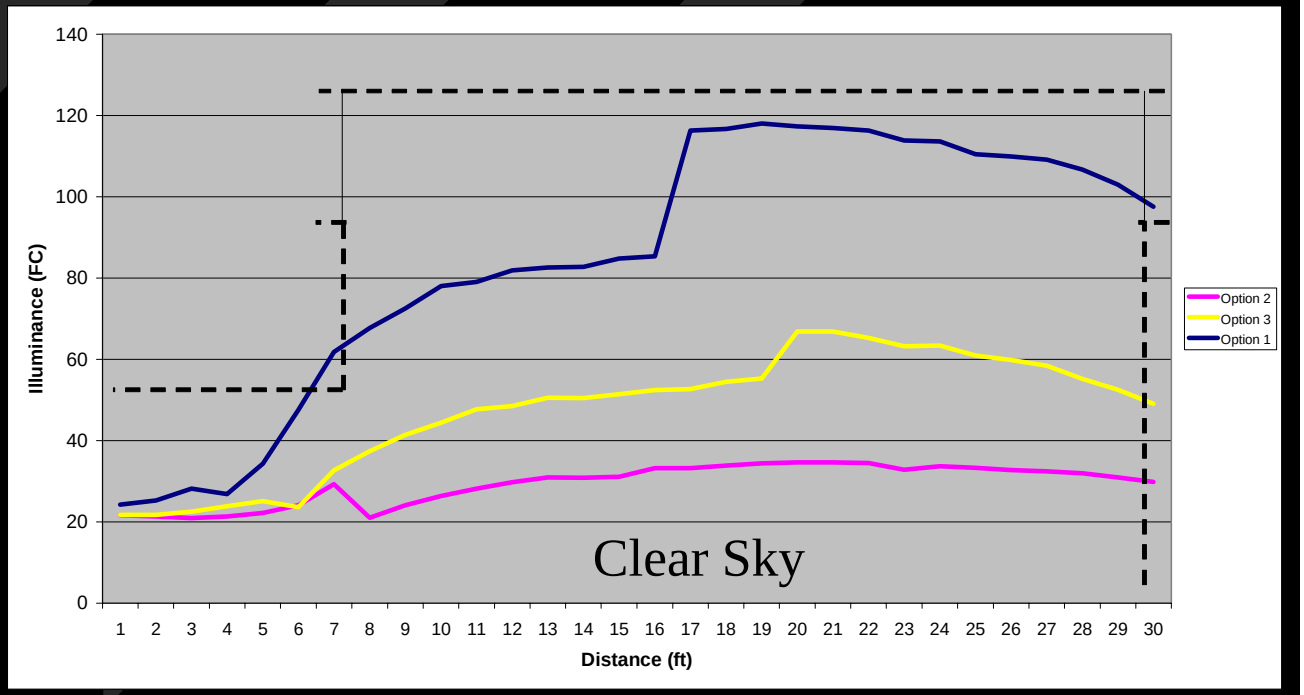




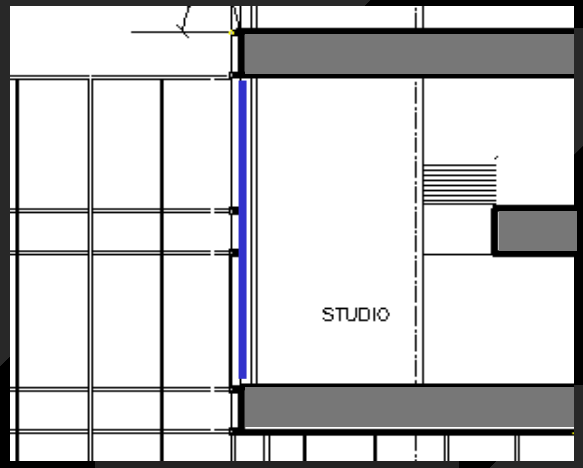


Case Studies:
Office building

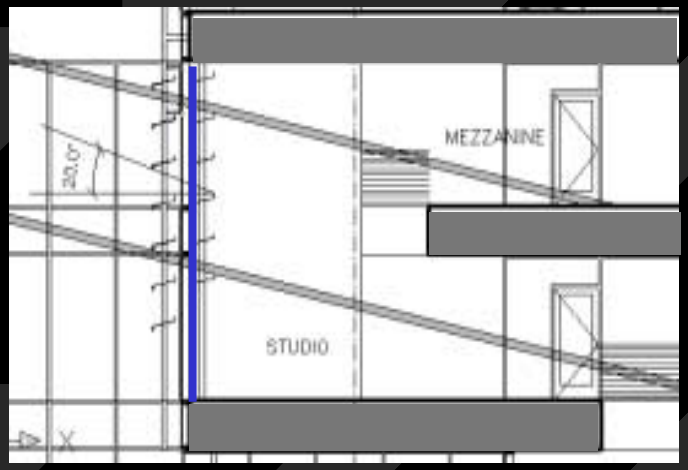




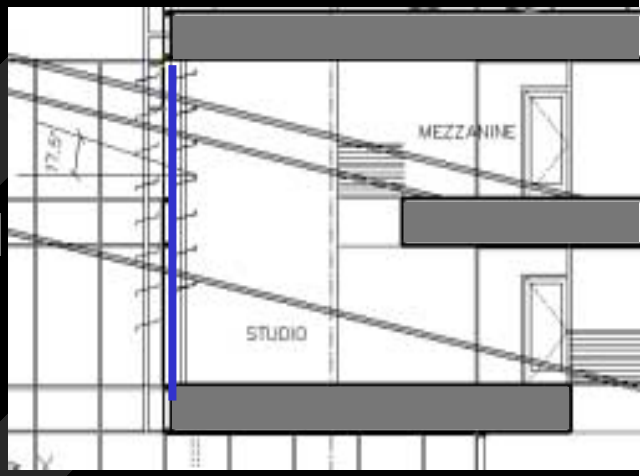
Case Studies:
Architecture Studio, New Mexico



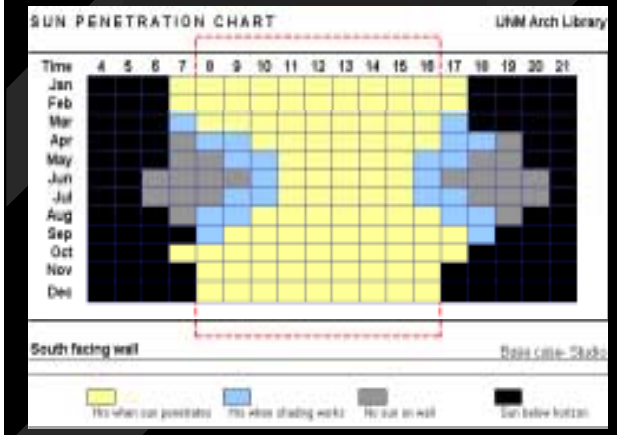
Base section

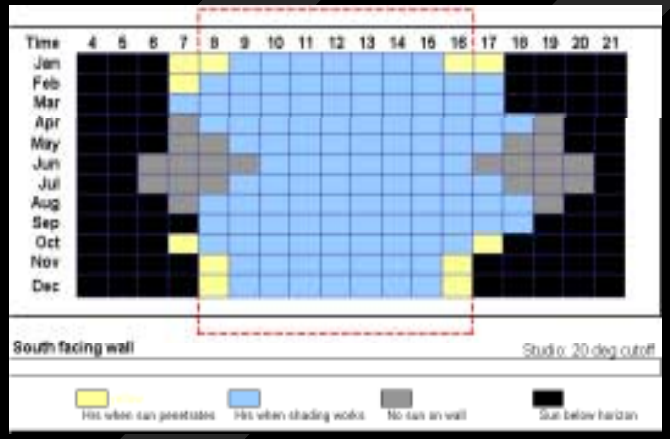


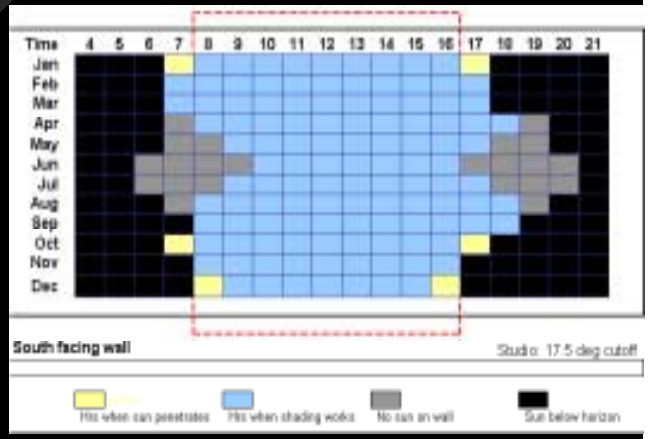
20 deg cut-off



17.5 deg cut-off







Conclusion