

# Daylighting in Museums

Radiance Workshop 2005 – 11 August 2005, 9:30 a.m.

Matt Franks – Arup Lighting

# Overview

- **Why use daylight in museums?**
- **Conservation Considerations**
- **Lighting Considerations**
- **Case Studies:**
  - Rothko Chapel, Houston, Texas
  - Seattle Art Museum

# Why Use Daylight in Museums?

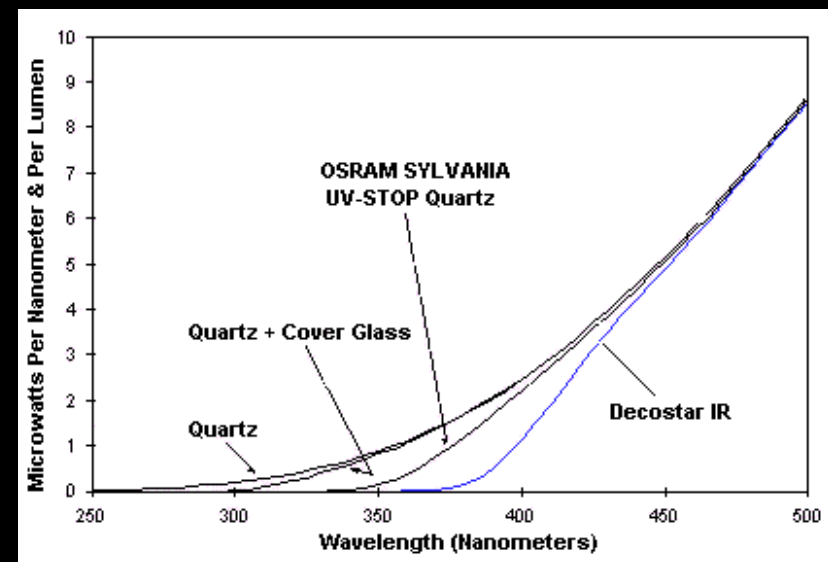
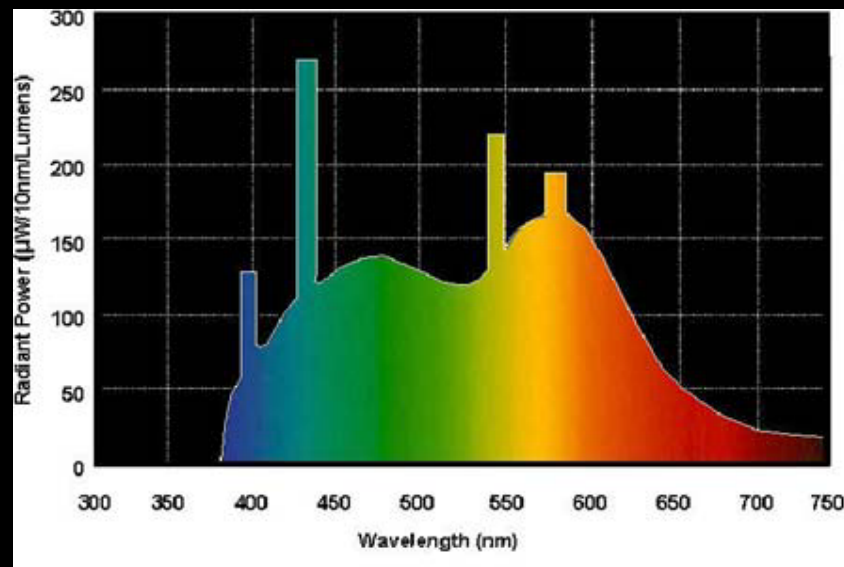
- **Better Color Rendering**
- **Fuller Spectrum**



*Foundation Beyeler, Switzerland*

# Why Use Daylight in Museums?

- Better Color Rendering
- Fuller Spectrum



# Why Use Daylight in Museums?

- **Connection to the outside**



*Tate Modern, London, UK*



*The Nasher Sculpture Center, Dallas, TX*

# Conservation Considerations

- **Exposure to sunlight**
- **Exposure to diffuse daylight**
- **Exposure to UV**

# Conservation Considerations - Direct Sunlight

- **Generally, all direct sunlight should be avoided.**
- **Shading systems can allow diffuse light and block all direct sunlight**



*High Museum of Art, Atlanta, Georgia*



*The Nasher Sculpture Center, Dallas, Texas*

# Conservation Considerations - Diffuse Daylight

<b>Works on Paper</b>	50 lux	Works on paper with colored media, Any media on a degraded support, Color photo prints and transparencies
	100 lux	Works on paper with black and white media only, Black and white photographs
<b>Paintings</b>	50 lux	Thinly covered paintings on unprimed canvas, Paintings in distemper media or gouache, miniatures
	150-200 lux	Oil and tempera paintings

Gary Thomson, *"The Museum Environment"*



# Conservation Considerations - Diffuse Daylight

<b>Objects</b>	50 lux	Objects with painted, dyed or polychromed surfaces, Upholstered furniture, Unstable glass
	200 lux	Objects made of material such as leather and wood
	1000-2000 lux	Objects made of inorganic material with unpainted surfaces such as stone, ceramic and metal

Gary Thomson, *"The Museum Environment"*

## Conservation Considerations - Diffuse Daylight

- **650,000 lux-hours maximum recommended for oil and tempera paintings and objects made of wood or leather**
- **150,000 lux-hours maximum recommended for textiles, colored works on paper, photographs**

# Conservation Considerations - Exposure to UV

- Limit by using UV filters in glazing



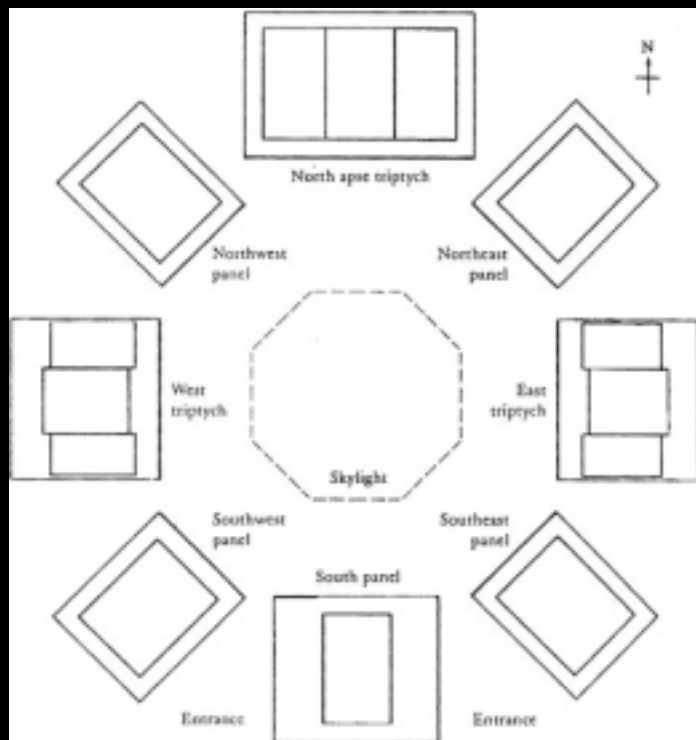
*High Museum of Art, Atlanta, Georgia*

# Lighting Design Considerations

- **Uniformity over vertical flat viewing surface - 2:1 average to minimum is ideal**
- **Uniformity for 3-D objects not as important**
- **Minimize glare by reducing reflections and bright surfaces such as unshielded lamps and windows**

# Rothko Chapel

- **Houston, Texas**
- **Commissioned design by Rothko with Philip Johnson**

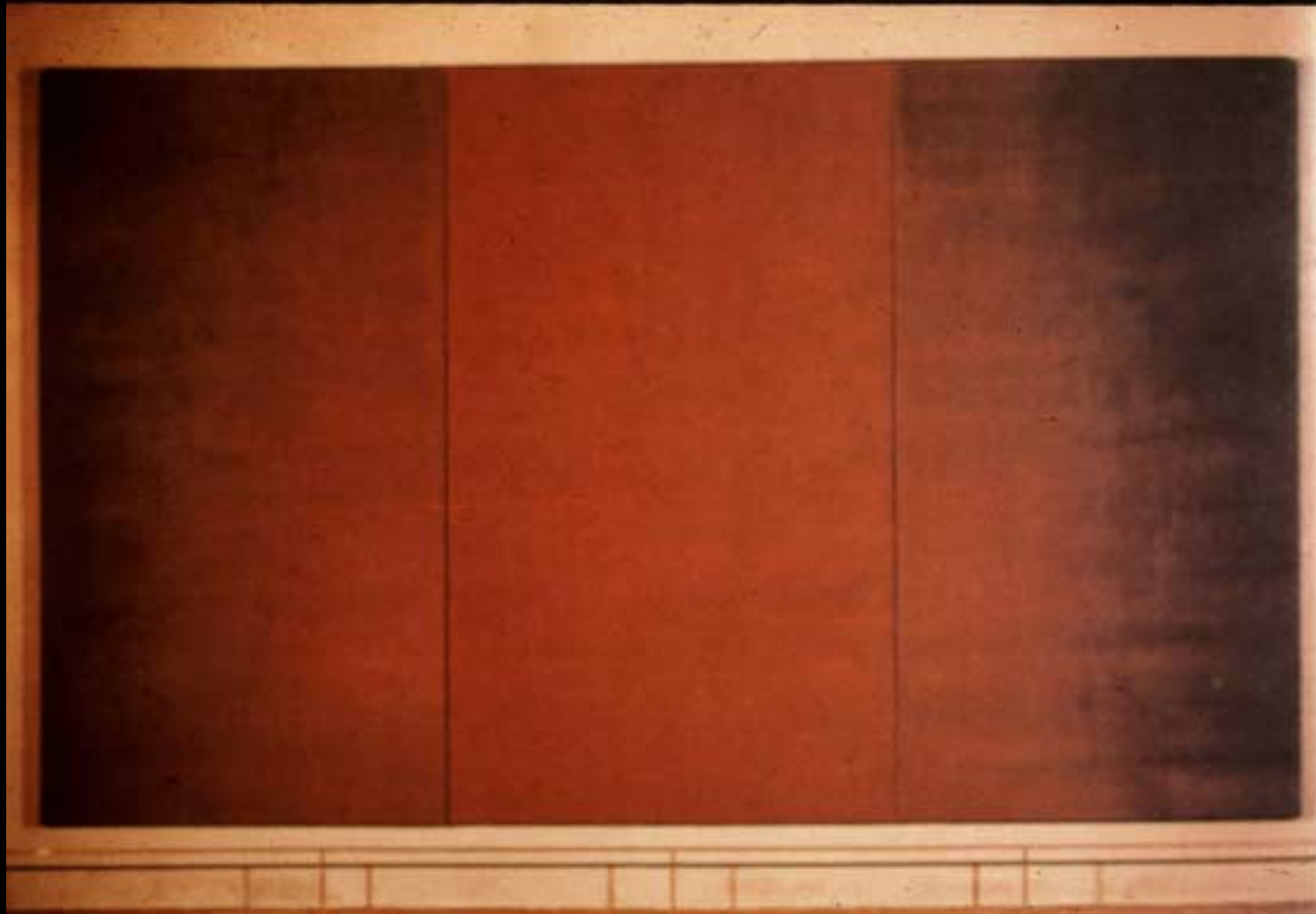


# Rothko Chapel

- **Original Design**



# Rothko Chapel



# Rothko Chapel





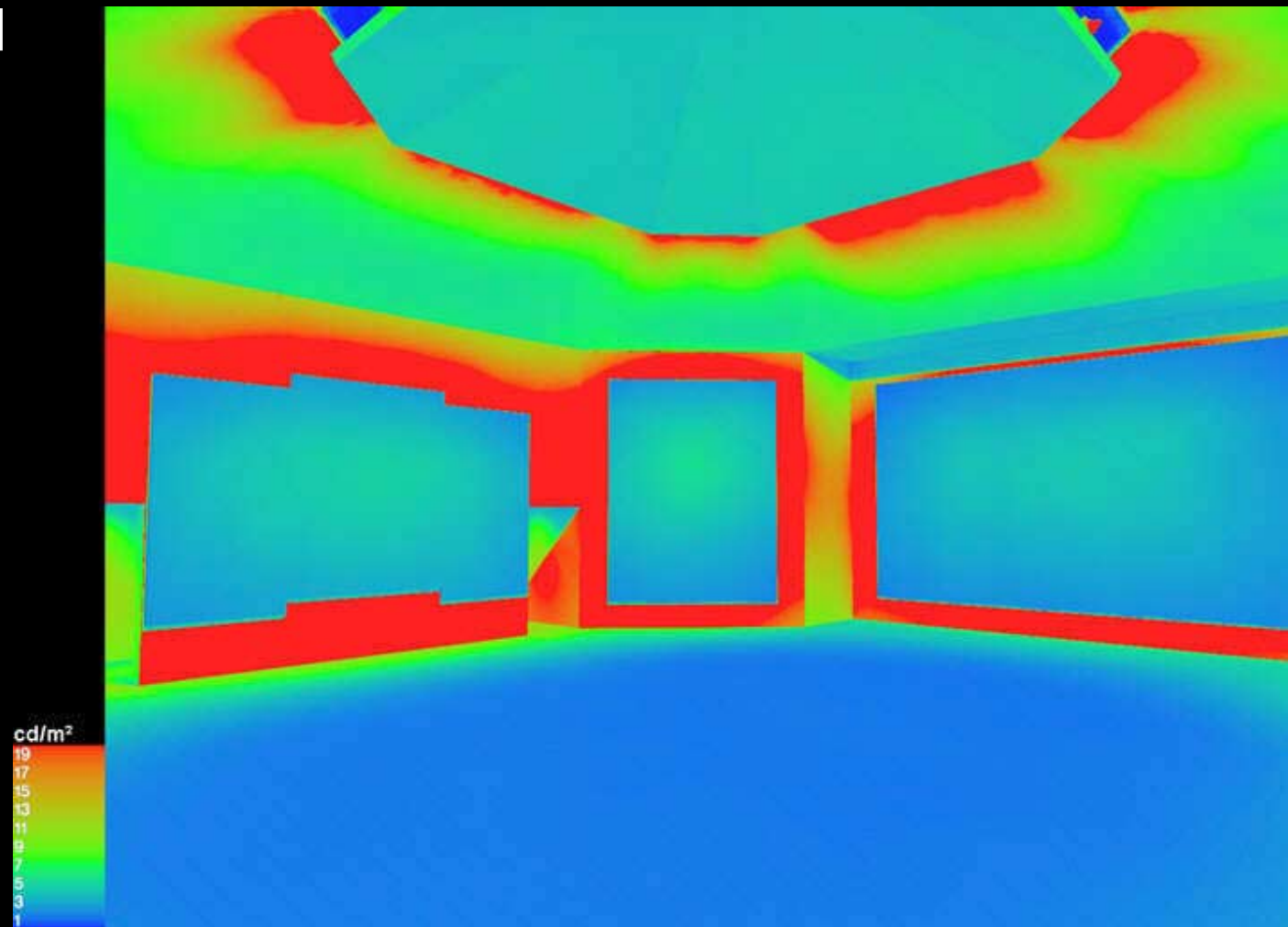
# Rothko Chapel

- **Revised Design**



# Rothko Chapel

- **Revised Design**



# Seattle Art Museum

- **Downtown Seattle, Washington**
- **Allied Works Architecture**
- **Addition to existing Venturi building, including high-rise tower**

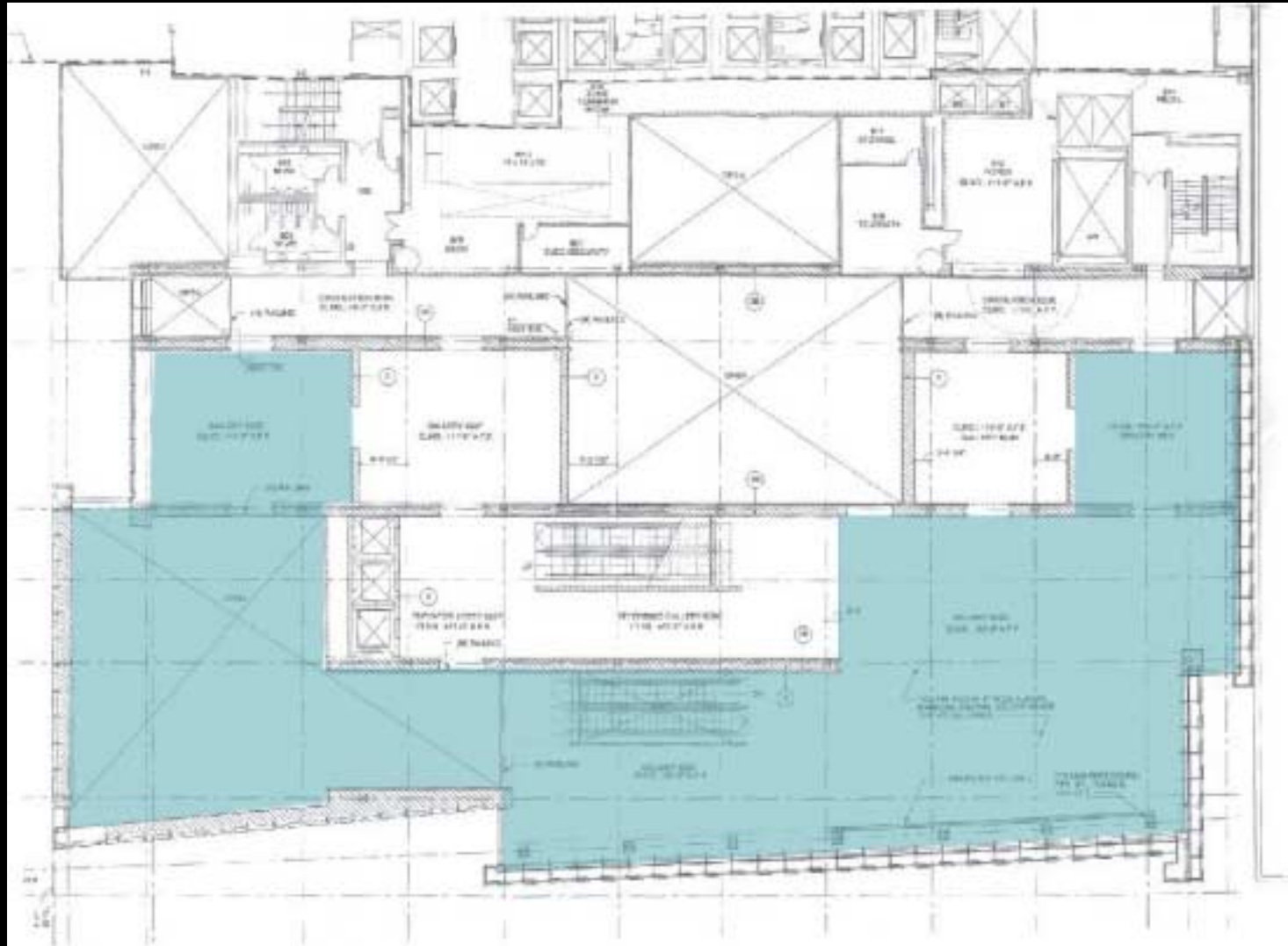


# Seattle Art Museum



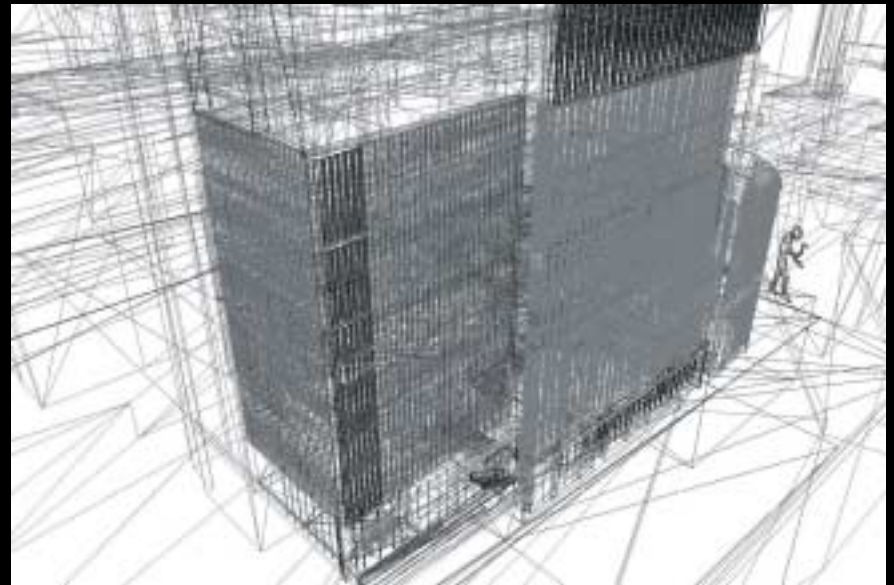
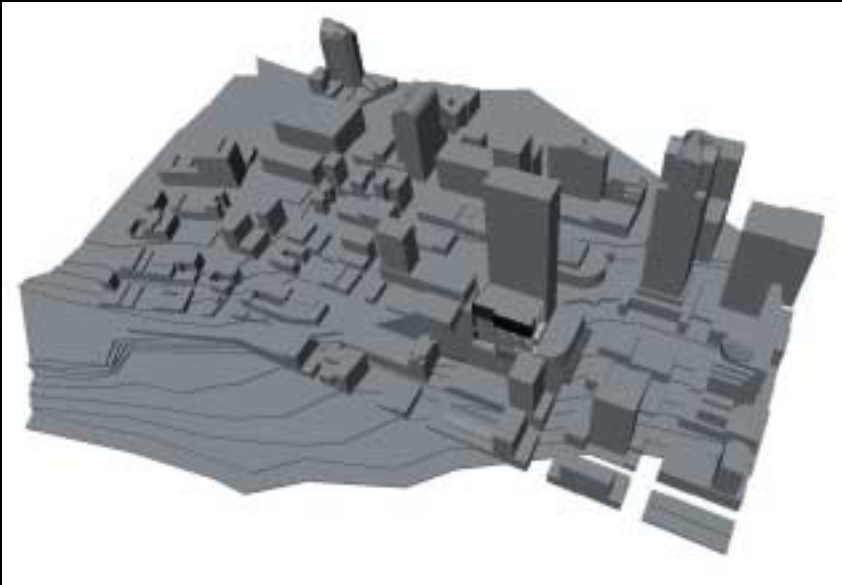


# Seattle Art Museum



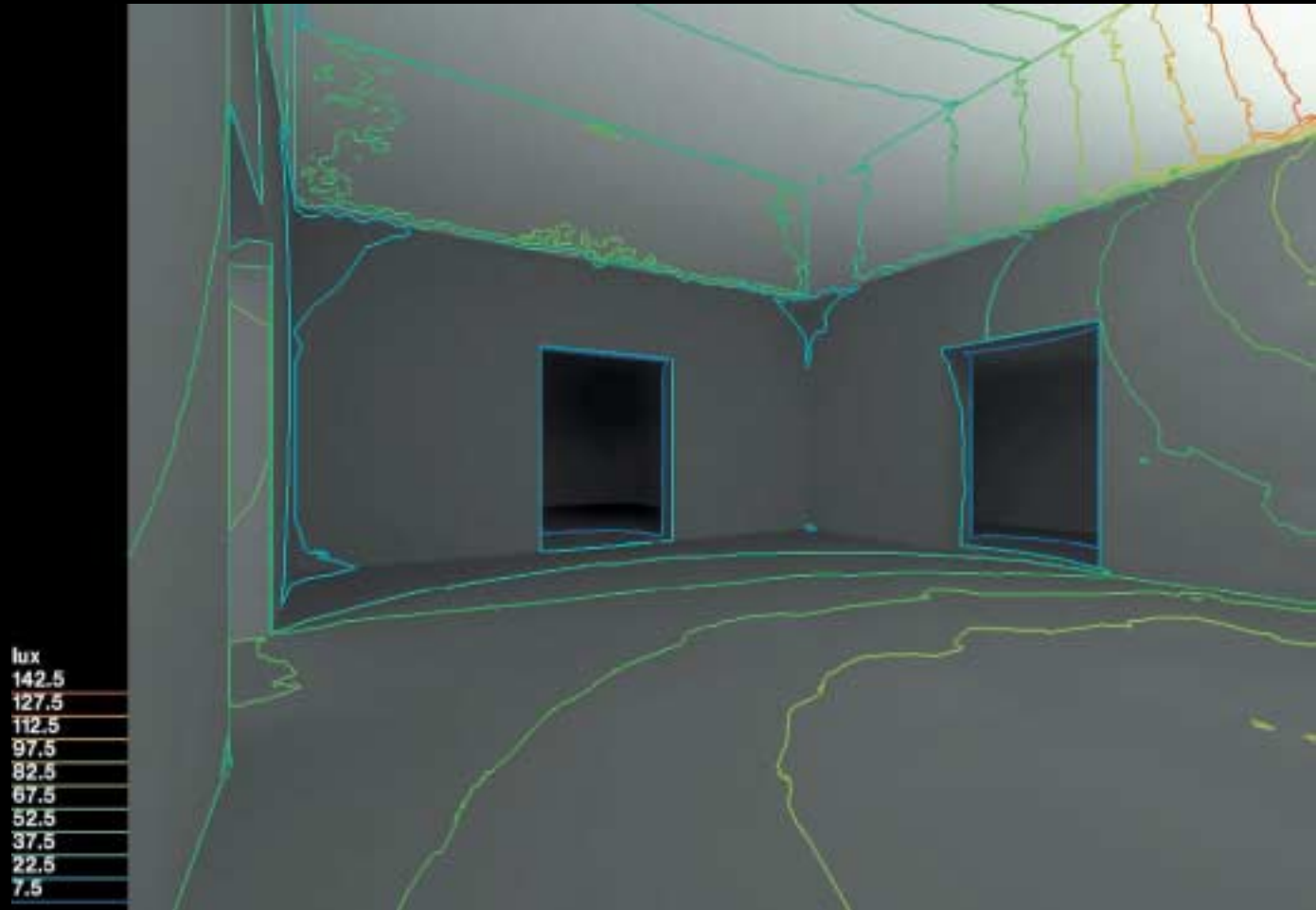
# Seattle Art Museum

- 3D model of site and building



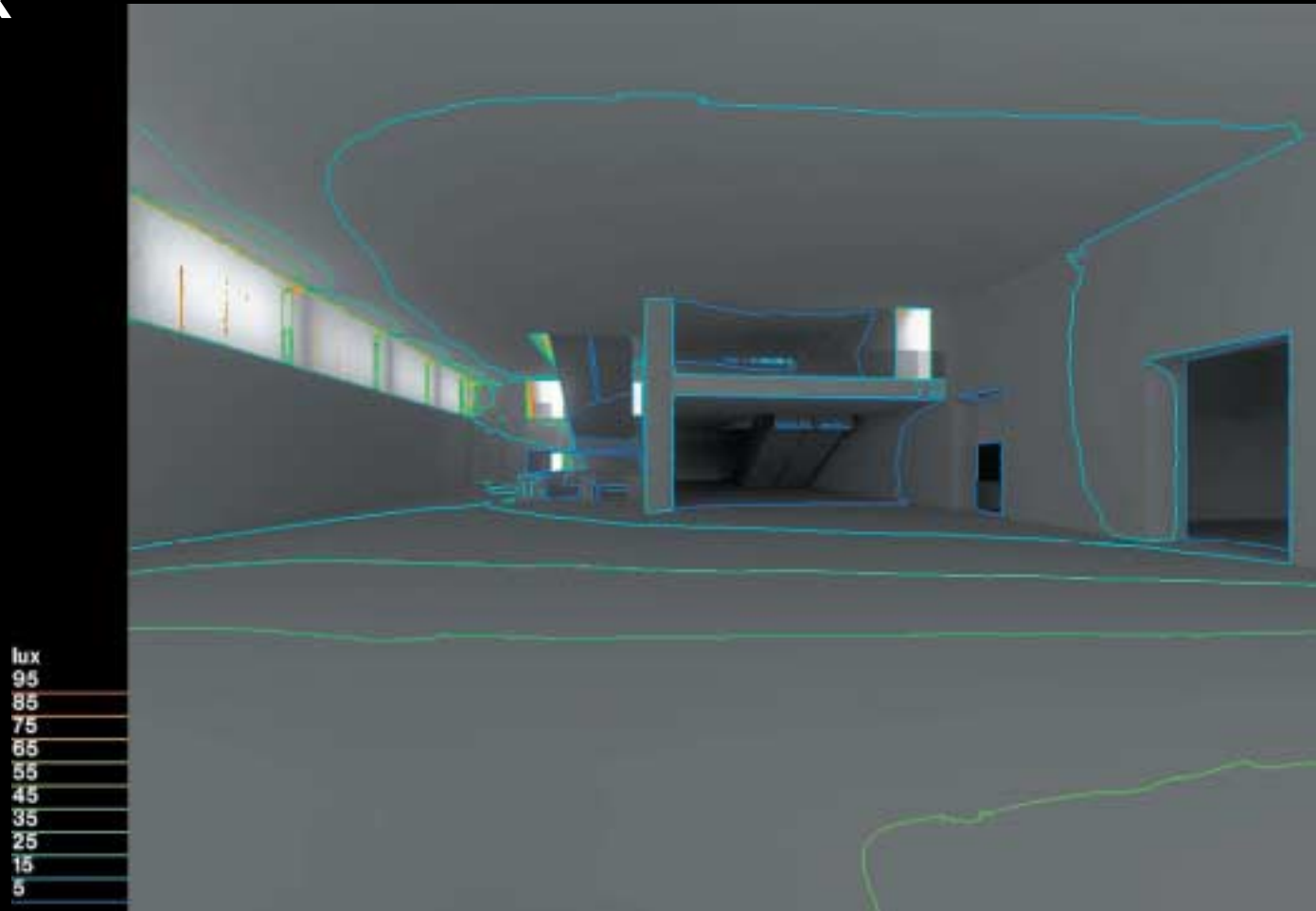
# Gallery Analysis

- **Top-lit**



# Gallery Analysis

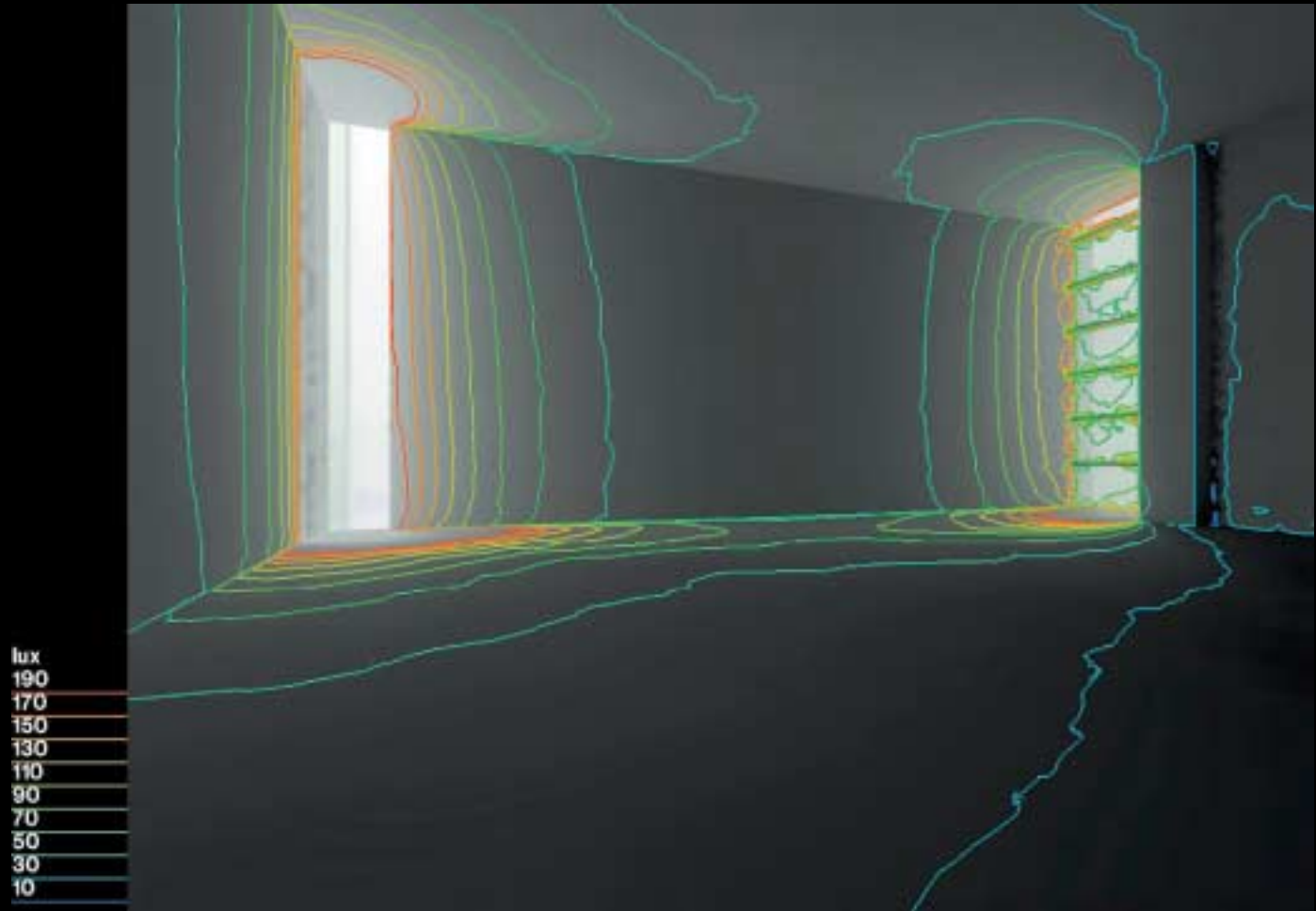
- **Lightbox**





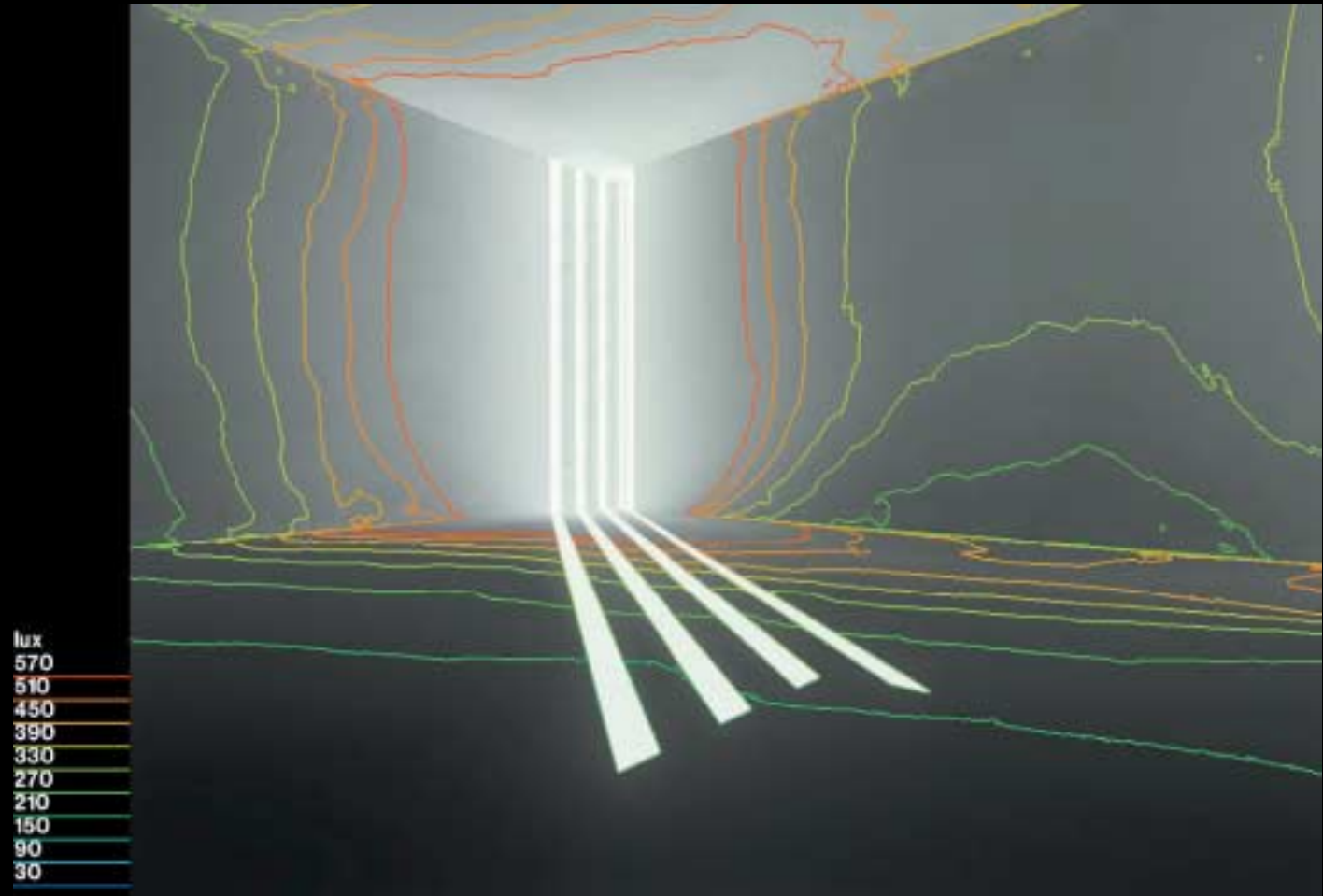
# Gallery Analysis

- **View  
gallery**



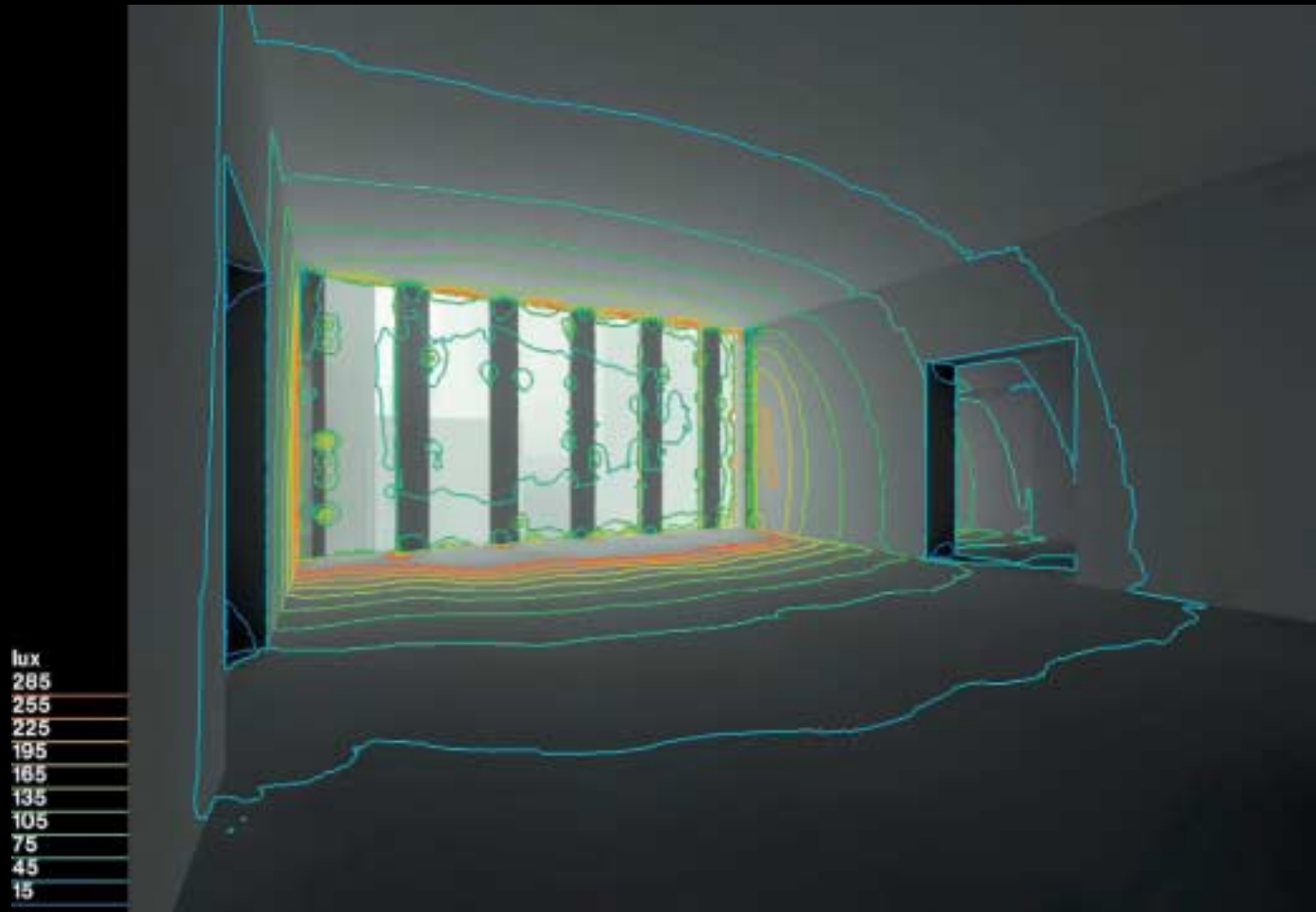
# Gallery Analysis

- **View  
gallery**



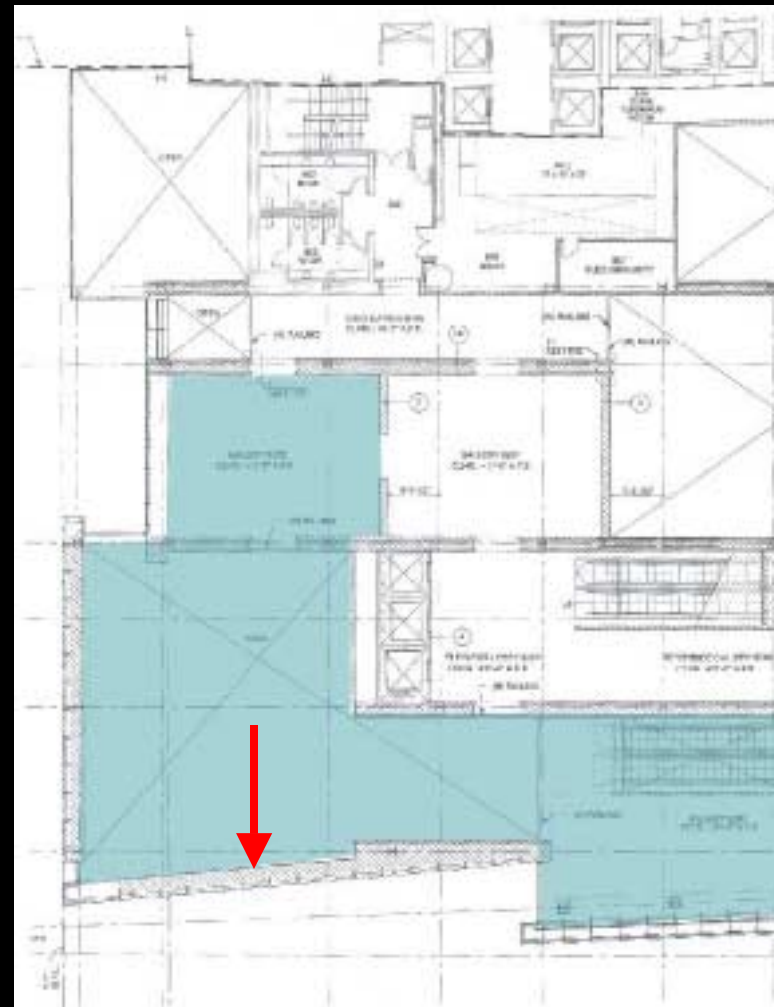
# Gallery Analysis

- **Sidelit gallery**

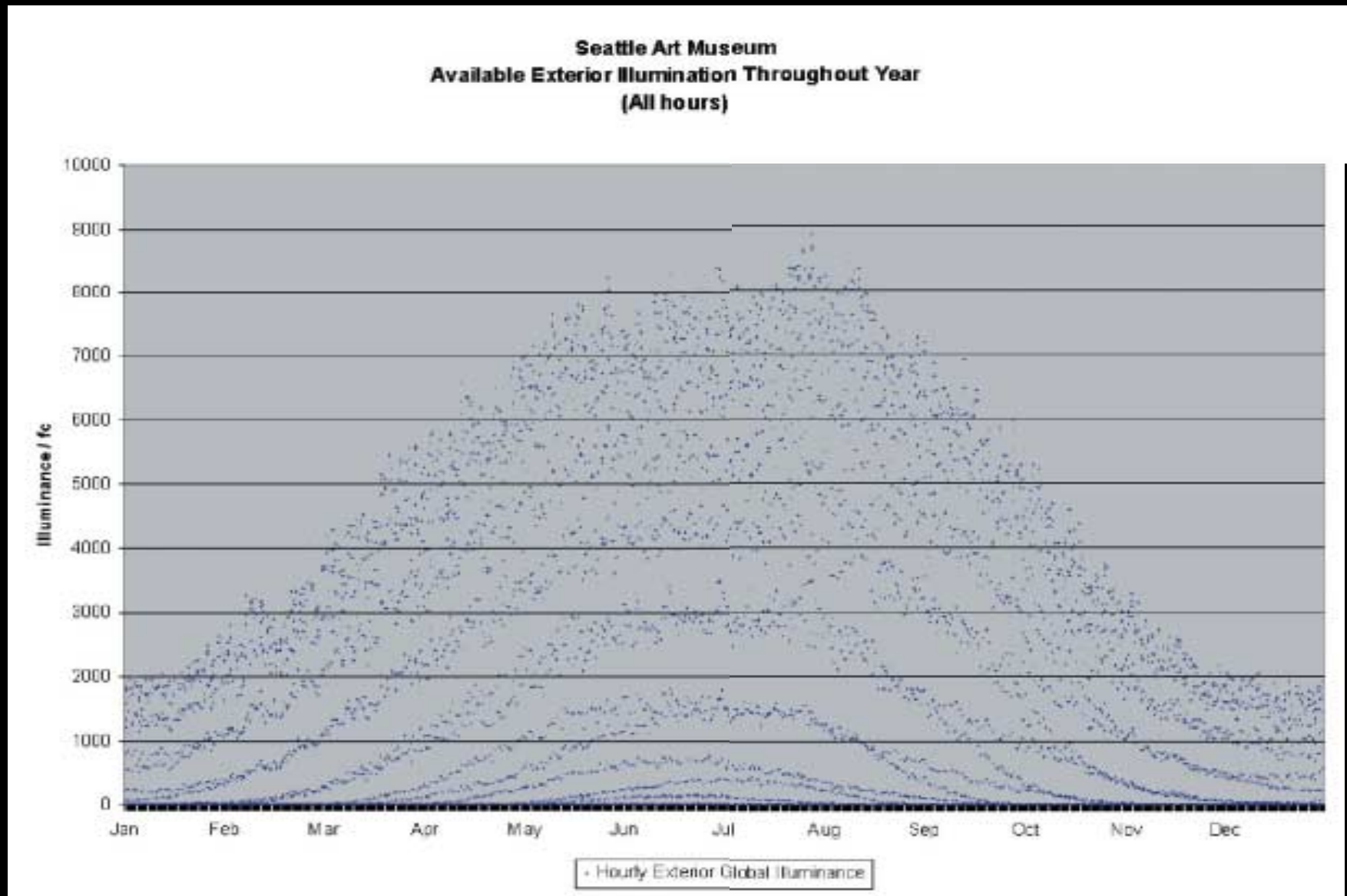


# Annual Exposure Study

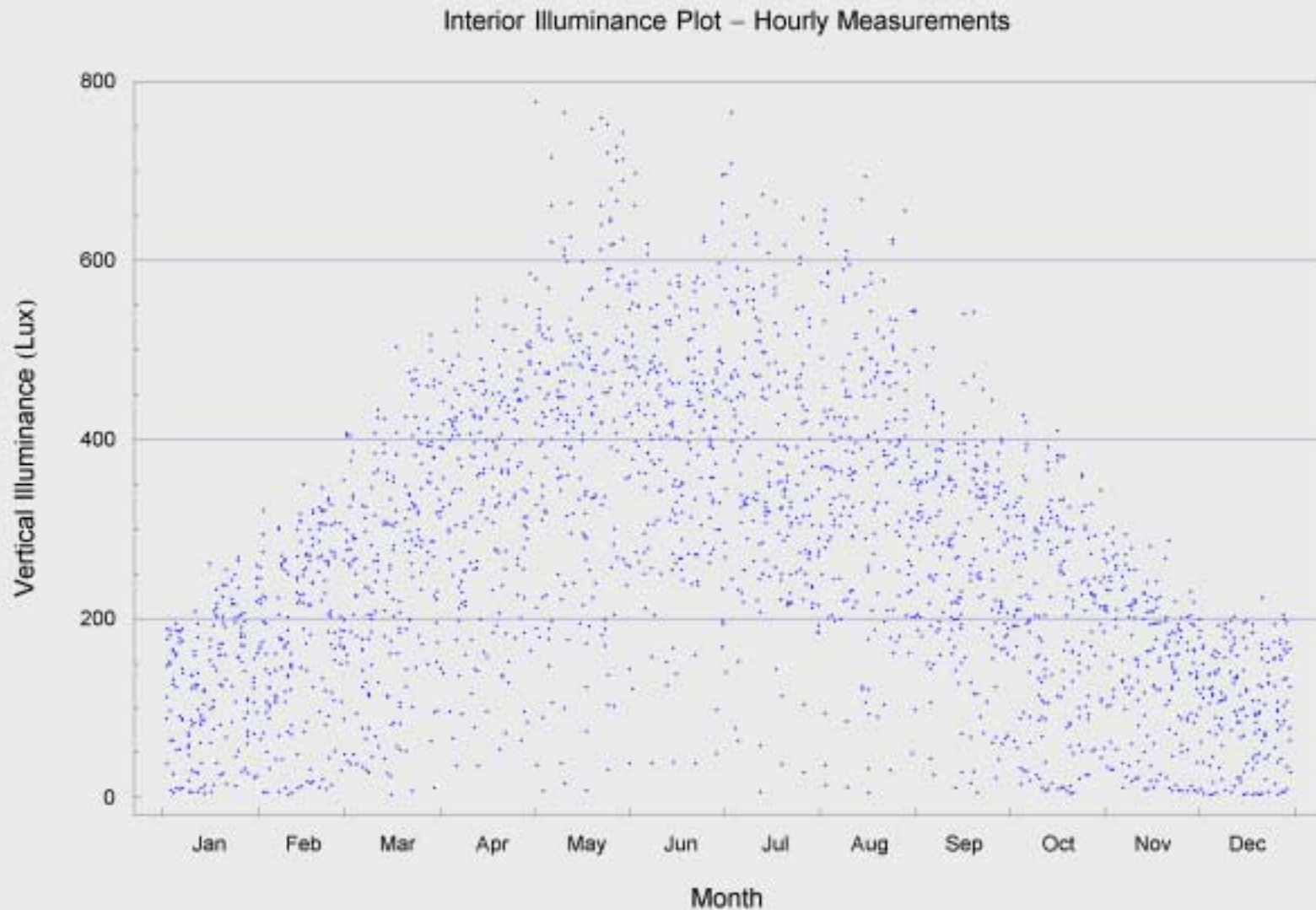
- Typical art hanging point in gallery
- Daysim add-in
- Hourly illuminance values for typical year



# Exterior Illuminance

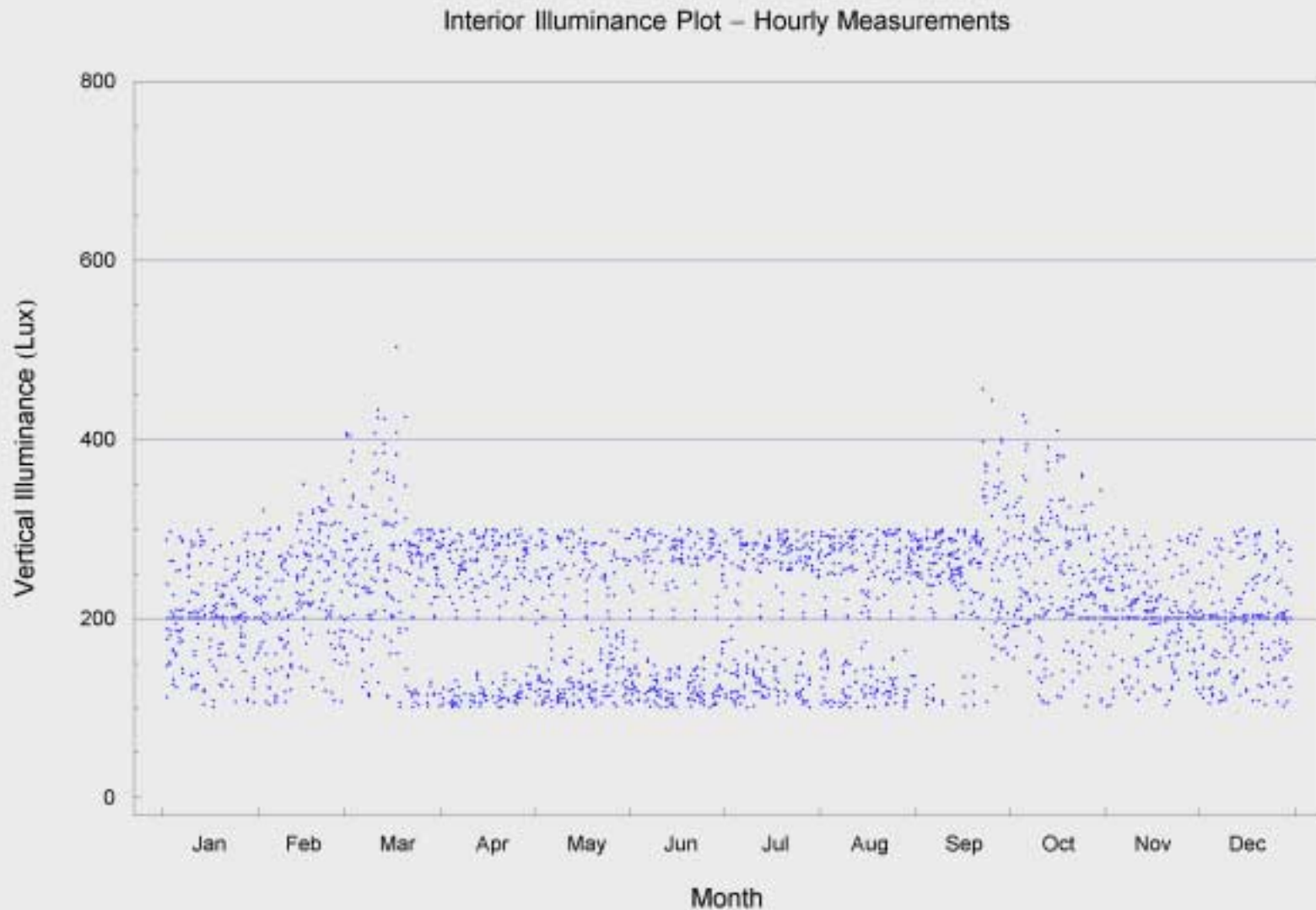


# Museum Open Hours - 1,500,000+ lux-hours

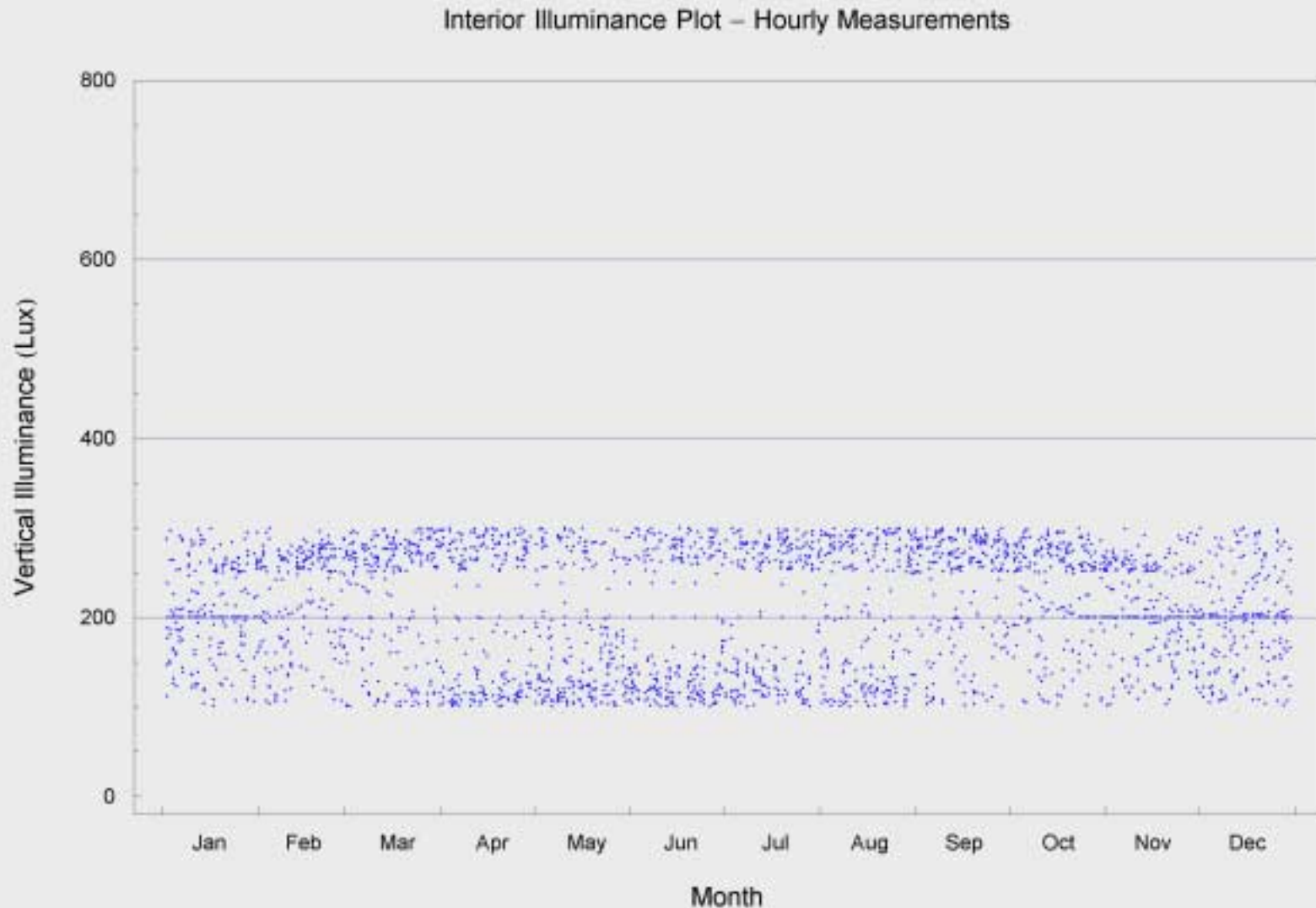




# Seasonal Shading + Switching - 569,000 lh

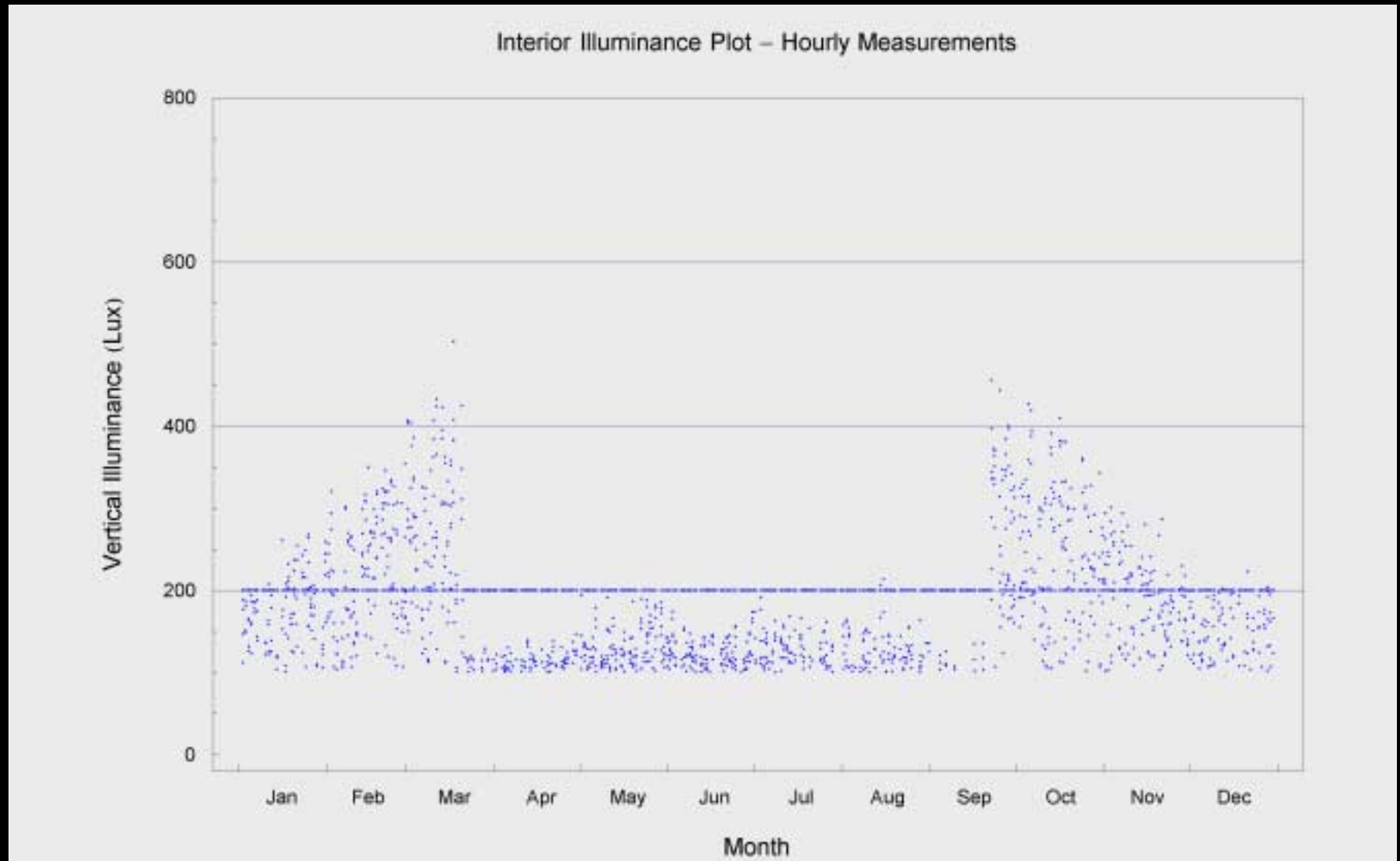


# Automatic Shading + Switching - 555,000 lh





# Seasonal Shading + Dimming - 501,000 lh



# Automatic Shading + Dimming - 464,000 Ih

