

Daylighting

Passive Design, University of Ferrara

Lecture Three: October 4th, 2011

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The First Part

INTRODUCTION

Bologna Cathedral Celestial Calendar



A Wonderful Example of The Poetic Use of Daylight

Bologna Cathedral

Why Daylight?

- For Beauty
- For Utility
- For Energy Savings
- For Biological Need
- To mark the passage of time
- To develop an emotional connection with a place



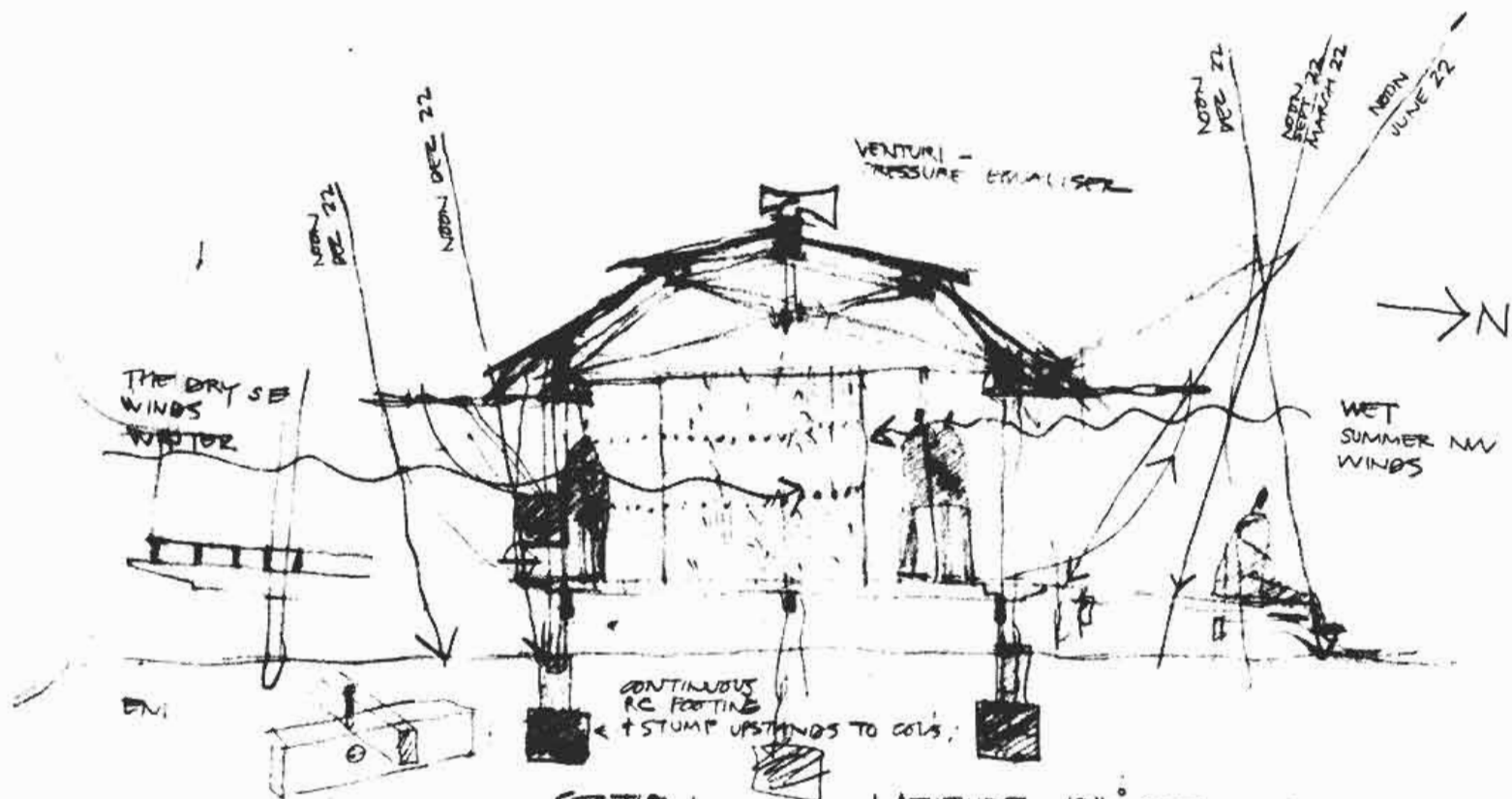
Architecture is the masterly, correct and magnificent play of masses brought together in light. Our eyes are made to see forms in light; light and shade reveal these forms; cubes, cones, spheres, cylinders or pyramids are the great primary forms which light reveals to advantage; the image of these is distinct and tangible within us without ambiguity.

*Vers une architecture [Towards a new Architecture]
(1923)*



“Any work of architecture that has been designed, any work of architecture that exists or has the potential to exist, was discovered. It wasn’t created. The central design issues of architecture are: humans and their history and culture; space; light; and how things are put together; and responsibility to the land. Good design involves an understanding of these issues and pursuing the questions they raise until you make appropriate discoveries. Architecture is a path of discovery.”

Glenn Murcutt from “Thinking Drawing / Working Drawing”



Technical Factors

- Daylight can be measured
- The metric unit used is Lux
- A good definition exists at:
<http://en.wikipedia.org/wiki/Lux>
- The light hitting a surface is called illuminance
- The light reflected by a surface is called luminance, which is also the term used to describe the human perception of brightness

- The best way to get a feel for daylight is to walk around with an illuminance meter taking measurements
- If you do this, you'll develop an intuitive understanding of light levels that is better than 95% of architects



TASK/USE	fc (Lux)
Assembly Tasks, simple	20-50 (215-538)
moderately difficult	50-100 (538-1076)
Air Terminals	10-20 (108-215)
Bank, lobby	10-20 (108-215)
teller	50-100 (538-1076)
Classroom, general	20-50 (215-538)
reading	50-100 (538-1076)
Conference Room	20-50 (215-538)
Corridor, stairs	5-10 (54-108)
Dining Hall	5-10 (54-108)
Drafting	50-100 (538-1076)
Exhibition, general	10-20 (108-215)
display	20-50 (215-538)
Hotel Rooms	20-50 (215-538)
Lobby, lounge, reception	10-20 (108-215)
Library stacks, active	20-50 (215-538)
inactive	5-10 (54-108)
Locker Rooms	10-20 (108-215)
Museum Display	20-50 (215-538)
Offices, general	10-20 (108-215)
Reading, normal	20-50 (215-538)
Restaurant Kitchen	50-100 (538-1076)
Residences, kitchens	20-50 (215-538)
living	10-20 (108-215)
bedrooms	5-10 (54-108)
Sewing	50-100 (538-1076)
Science Lab	50-100 (538-1076)
Sports, indoor	50-100 (538-1076)
Toilet Rooms	10-20 (108-215)

Recommended Lighting Levels)Lux)

Based on IES Standards

From Sun, Wind and Light

Sources



The Second Part

TYPES OF LIGHT



Ambient Light

Museum of Anthropology, Vancouver, BC
Arthur Erickson









Reflected Light

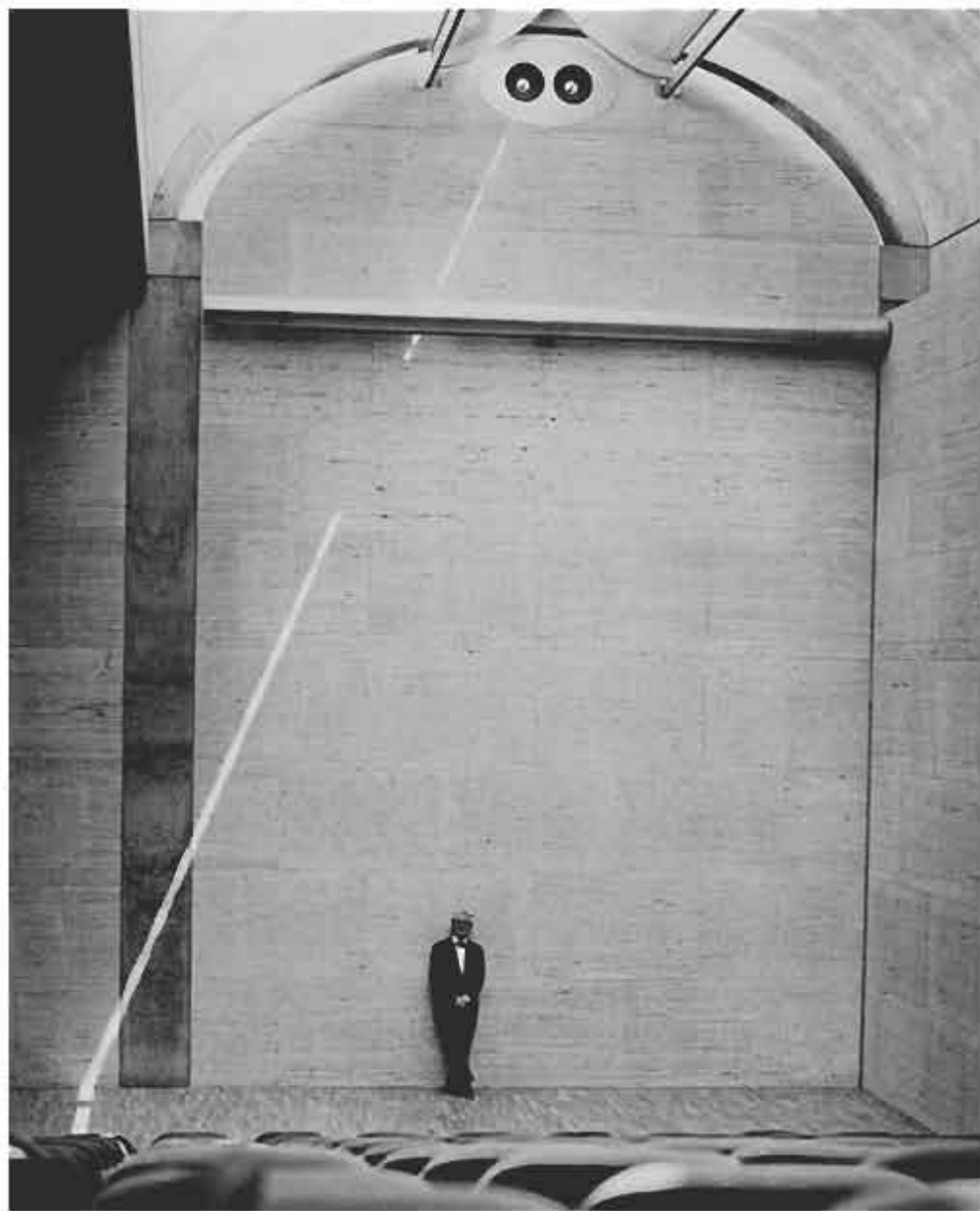
Kimbell Art Museum, Fort Worth Texas

Louis I. Kahn











Direct Light

Desert Nomad House, Tuscon, Arizona

Rick Joy Architect



1. *Living*
2. *Kitchen*
3. *Bed*
4. *Den/office*
5. *Patio*
6. *Carport*









Filtered Light

Thorncrown Chapel, Eureka Springs, Arkansas

E. Fay Jones







Raking and Dramatic Light







The Third Part

TYPES OF LIGHTING DEVICES



Skylights

Alvar Aalto



Viipuri Library



National Pensions Institute



Mount Angel Library



Clerestories

Mangey House, New South Wales
Glenn Murcutt





AUSTRALIA

55c



CORRUGATED LANDSCAPES

2009



Windows

Paintings by Johannes Vermeer











Surfaces

Schloss Charlottenburg, Berlin









Courtyards

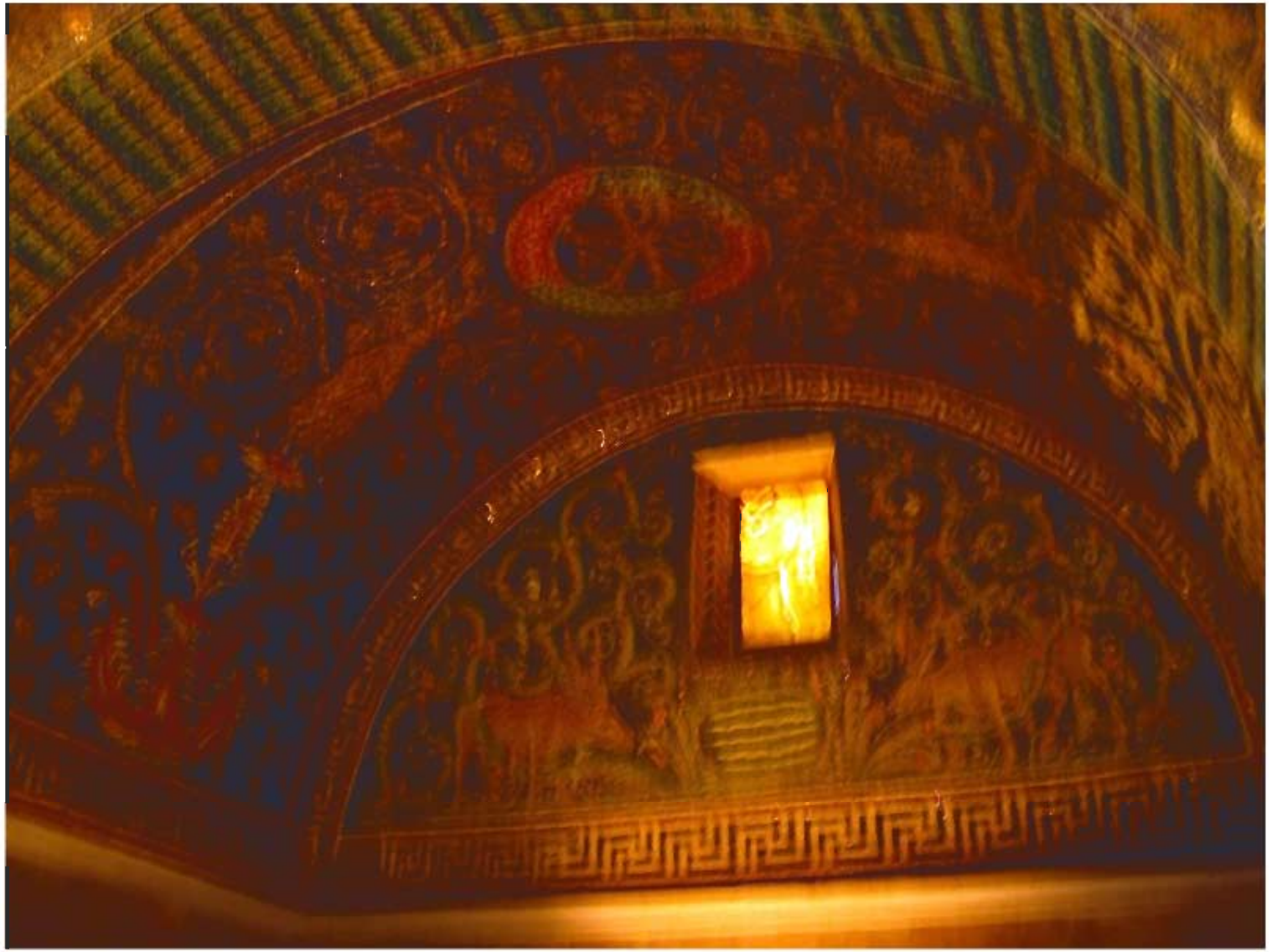
The Great Court, British Museum, London
Foster and Partners

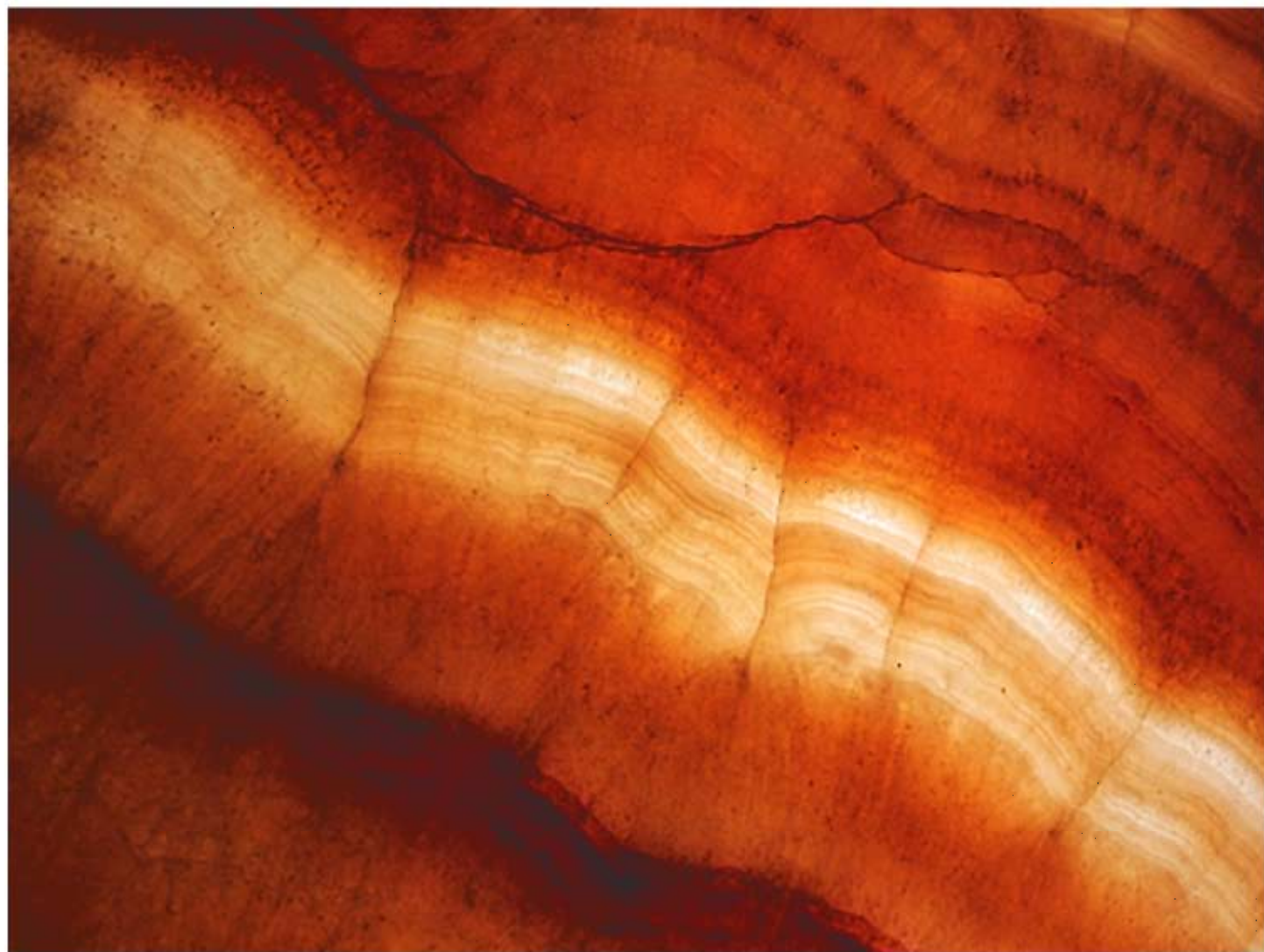




Lenses

Galla Placidia Tomb, Ravenna







Screens

Nebuta House, Aomori Japan
molo Design







photo by Team Osaka

