

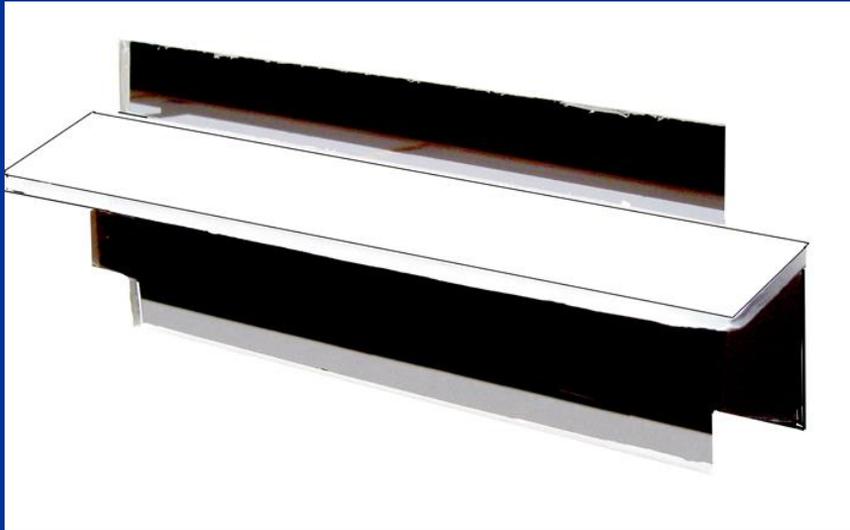
Light shelves for daylighting

**a key element of Passive Solar
Architecture**

David A. Bainbridge

Rachel Aljilani

What is a light shelf?



- A horizontal (or near horizontal) element or shelf positioned above the primary window
- Below part of the window or a second series of windows.

Why use light shelves?

- Light shelves on the equator facing wall of a building improve daylighting quality and quantity
- They increase light penetration into a building and reduce glare
- They reduce cooling costs
- And daylighting improves health and comfort, productivity, learning and sales

Exterior light shelf



SLOSG Office complex

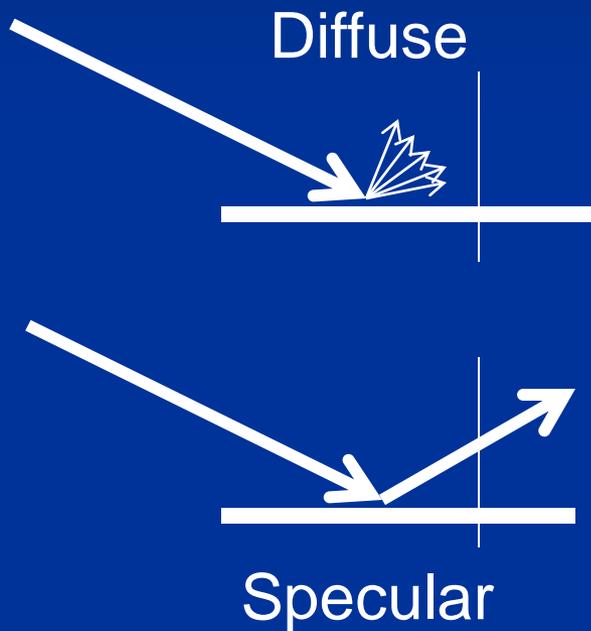
- Exterior light shelves must be robust and able to withstand wind, rain, snow and hail
- They can provide protection for windows and reduce leaks and wall moisture problems

Shade in Summer



- Exterior light shelves shade windows from higher elevation summer sun
- They bounce daylight farther into the building interior and reduce glare

Improved light penetration



- The upper surface of the light shelf is typically painted with a flat finish to provide diffuse light
- A mirror like reflector will provide more light to the ceiling but can increase glare

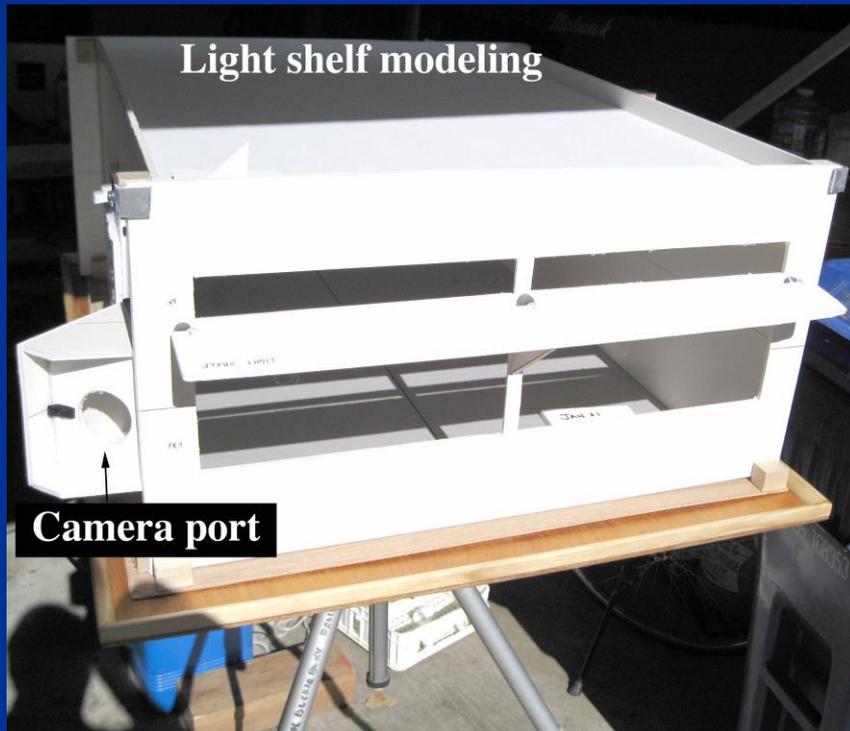
Interior light shelf



CBD Synagogue, SLOGS

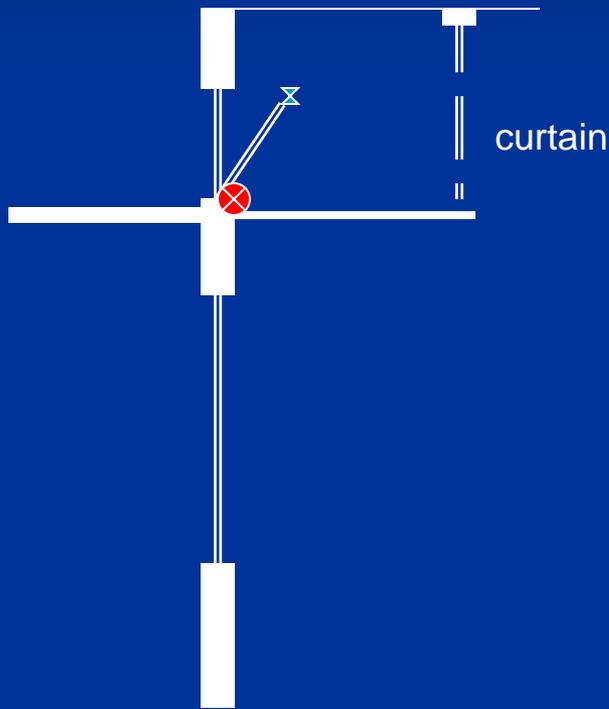
- Interior light shelves control glare and improve light penetration
- They can be lightweight
- They may be translucent to improve light quality near the window
- They can be easier to retrofit

How to design light shelves



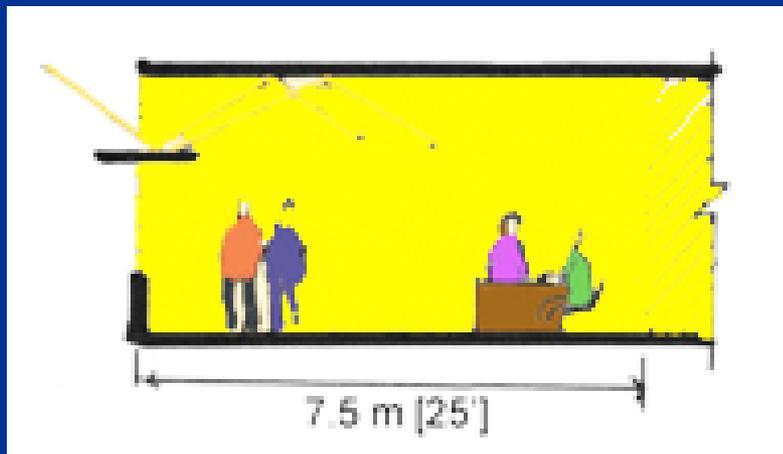
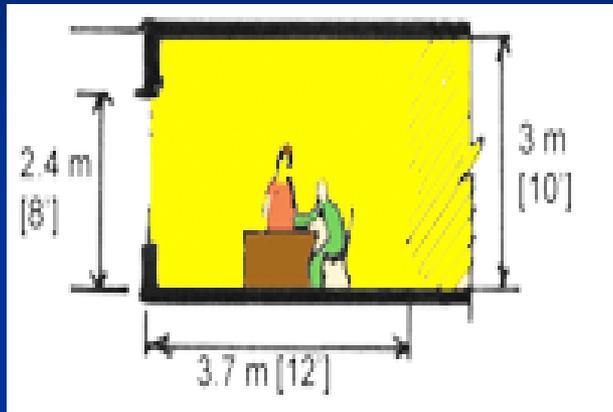
- Light shelf design is often easiest to do with physical models - as shown
- But daylighting computer models can also be used
- Exterior shelves must be weather strong

Operable windows



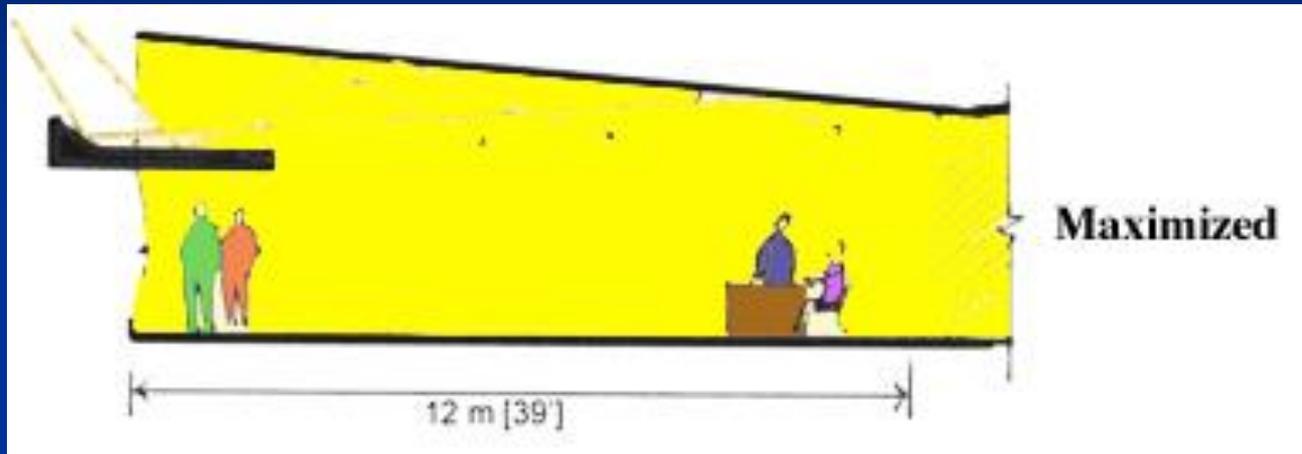
- If the windows above the light shelf are operable the controls/operators will need careful consideration
- If it is desirable to darken the room this may be done with a curtain at the edge of the light shelf

How big a benefit?



- Light shelves can double light penetration
- With a 10' ceiling the daylight can reach 25 feet

Optimized



- With a tilted ceiling and carefully designed light shelves the daylight can reach 39 feet
- Three times the distance of a window alone

Light shelf availability



Inlighten™ Light shelf by
Kawneer, an Alcoa Company

- Most light shelves are site built
- But commercial models are being developed and sold
- An excellent business opportunity

Stop unsustainable buildings!



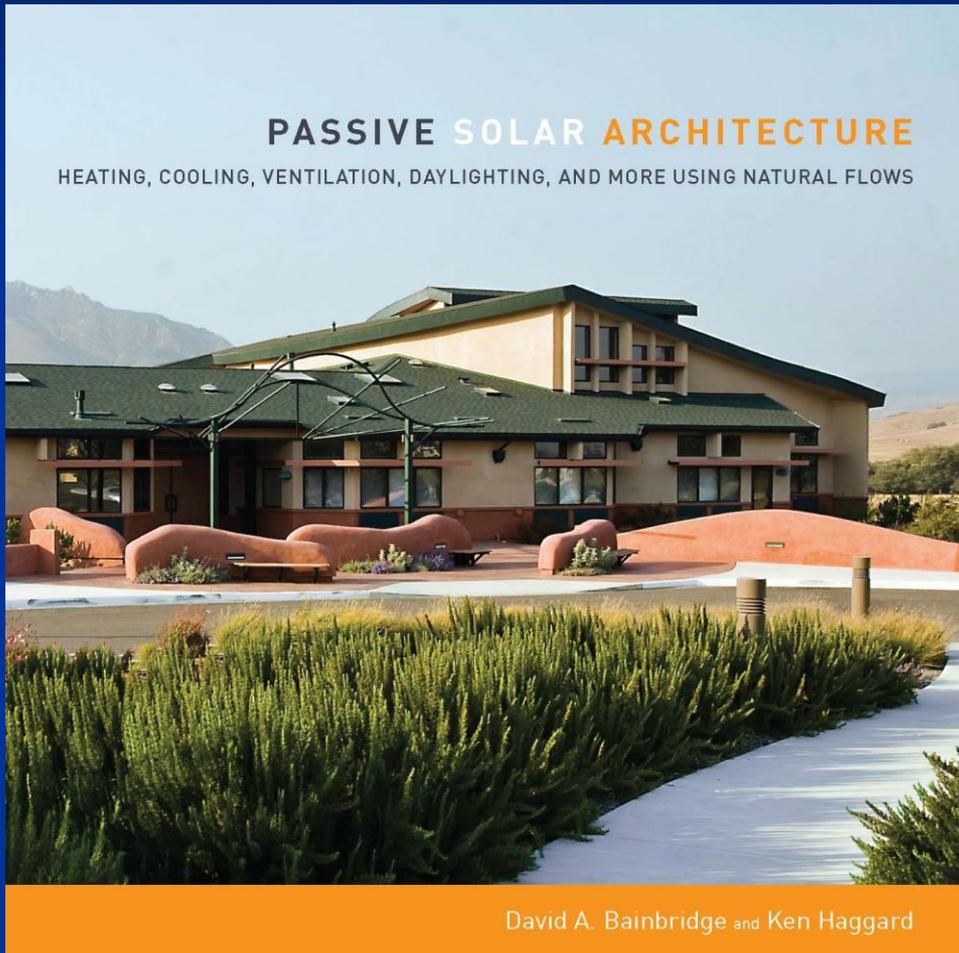
- ✓ Use light shelves on equator facing walls
- ✓ Use fins, adjustable exterior shutters, and shades on east and west walls
- ✓ Improve lighting
- ✓ Improve health
- ✓ Improve productivity
- ✓ Reduce cooling costs and GHG emissions

A building without daylighting



- *If a building looks the same on all sides it is a failed building*
- *Energy costs will be high*
- *It will be hard to keep cool in summer*
- *It will reduce worker productivity and adversely affect health*
- *It will reduce consumer activity and sales*

Resources



- 2011. *Passive Solar Architecture* by David Bainbridge and Ken Haggard with Rachel Aljilani
- 2011. *Passive Solar Lab Manual* free on line @ www.sustainabilityleader.org