Kera Lagios
Designer, Lam Partners
Developer, DIVA-for-Rhino
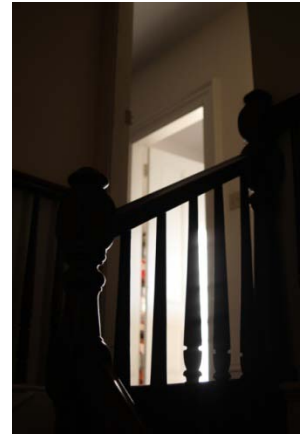
EARLY PHASE SIMULATIONS

Radiance International Workshops 2013

National Renewable Energy Lab

Golden, CO

DAY LIGHT BUILDING
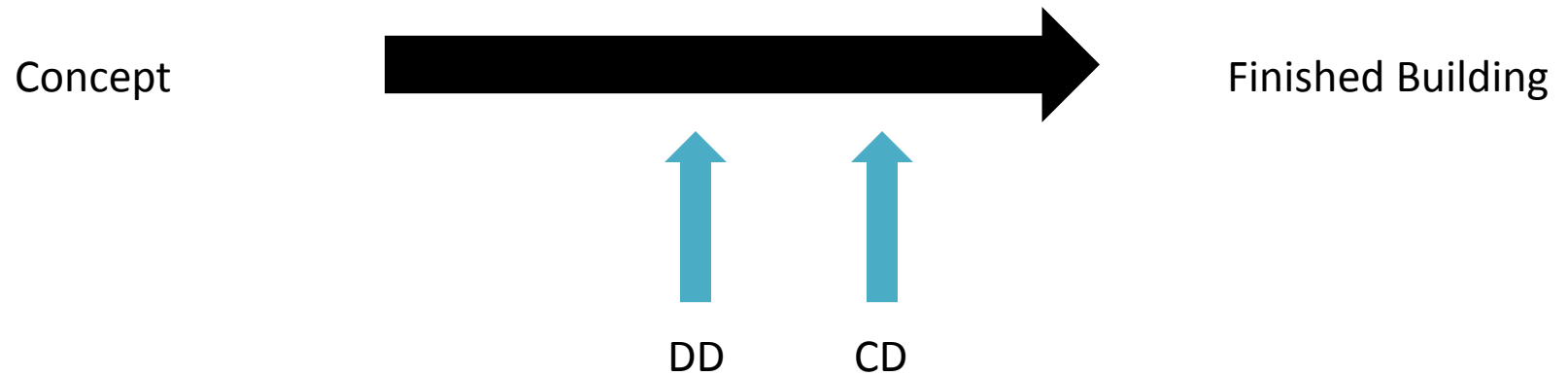
517

Oh, were it that easy...

The Importance of Observation

Where can daylighting metrics be introduced during the design process?

?

Concept →→→→→ Finished Building

Where can daylighting metrics be introduced during the design process?

Concept

Finished Building

DD   CD

Where can daylighting metrics be introduced during the design process?

Concept   Finished Building

SD

?

Definition of SKETCH

1

a : a rough drawing representing the chief features of an object or scene and often made as a preliminary study

b : a tentative draft (as for a literary work)

2

: a brief description (as of a person) or outline

3

a : a short literary composition somewhat resembling the short story and the essay but intentionally slight in treatment, discursive in style, and familiar in tone

b : a short instrumental composition usually for piano

c : a slight theatrical piece having a single scene; *especially* **:** a comic variety act

"Sketch." *Merriam-Webster.com*. Merriam-Webster, n.d. Web. 1 Aug. 2013. <http://www.merriam-webster.com/dictionary/sketch>.

Sketching

Sketching and Digital Integration

Sketching and Digital Integration

Can we use performance metrics in the earliest phases of design?

The Generic

Codes

Rules of Thumb

The Conceptual

Pre-Design

SD Phase Design

The Specific

DD Phase Designs

CD Phase Designs

Buildings

Can we use performance metrics in the earliest phases of design?

How do simulations, assumptions, expectations change as we move through the phases of design?

When during the design process are simulations the most valuable?

Which simulations should be used when?

Challenges to Early Phase Simulations

- Level of detail
- Determining acceptable assumptions
- Time constraints

Atrium Reflector Design
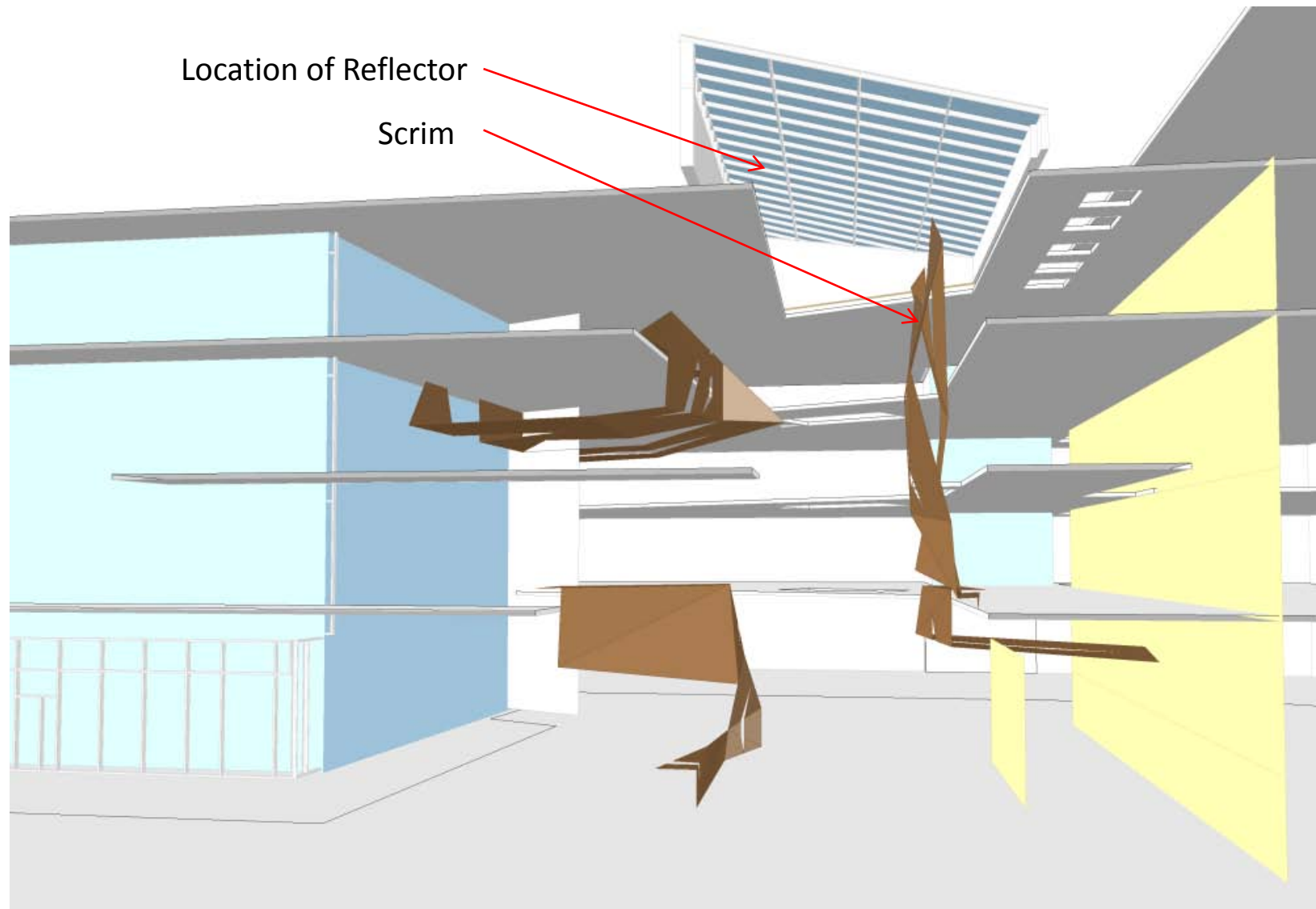
Location of Reflector

Scrim

Cutaway

Atrium Plan

Reflector

Scrim

Reflector

Scrim

Initial Results (Static Model)

9am
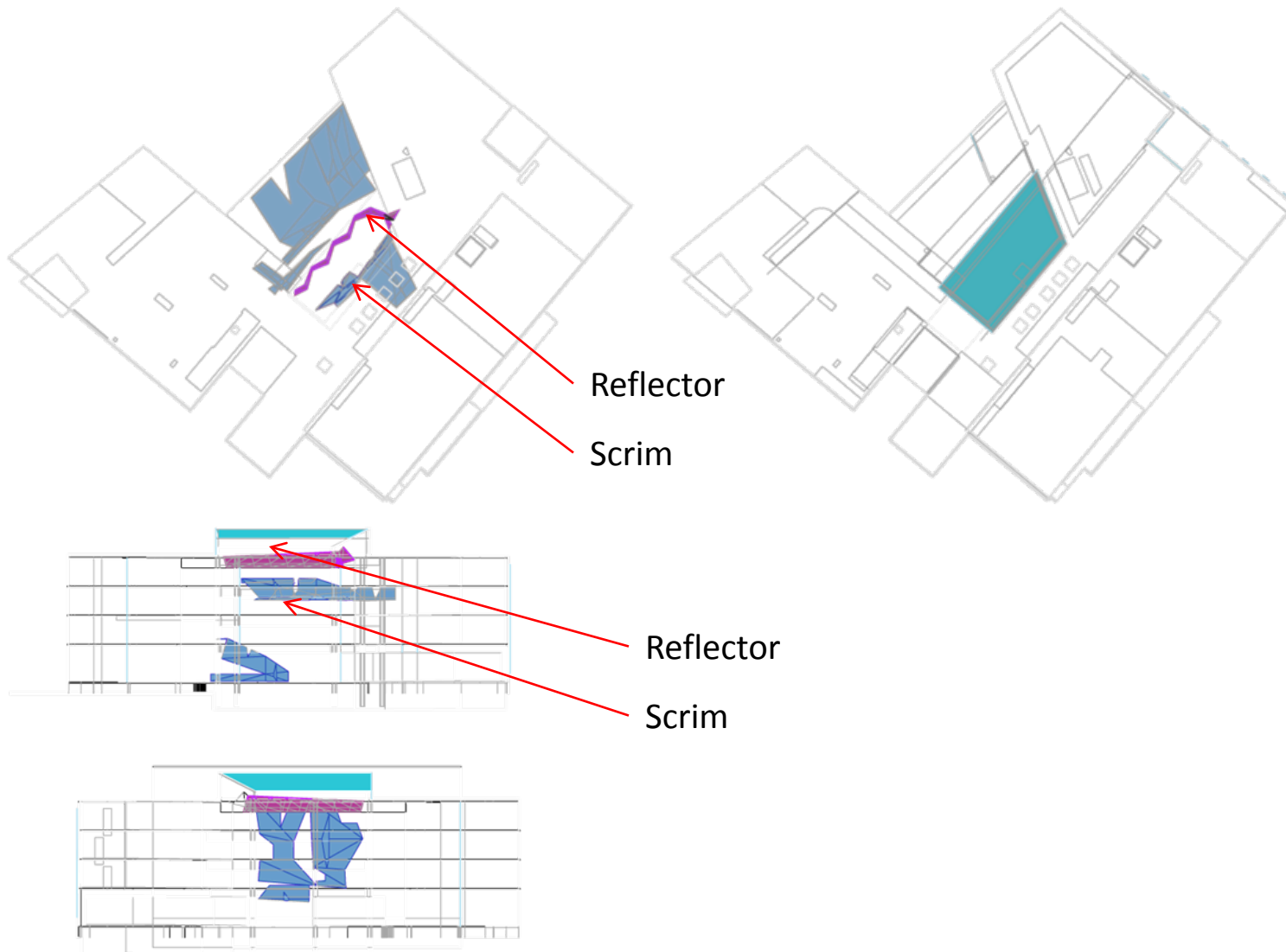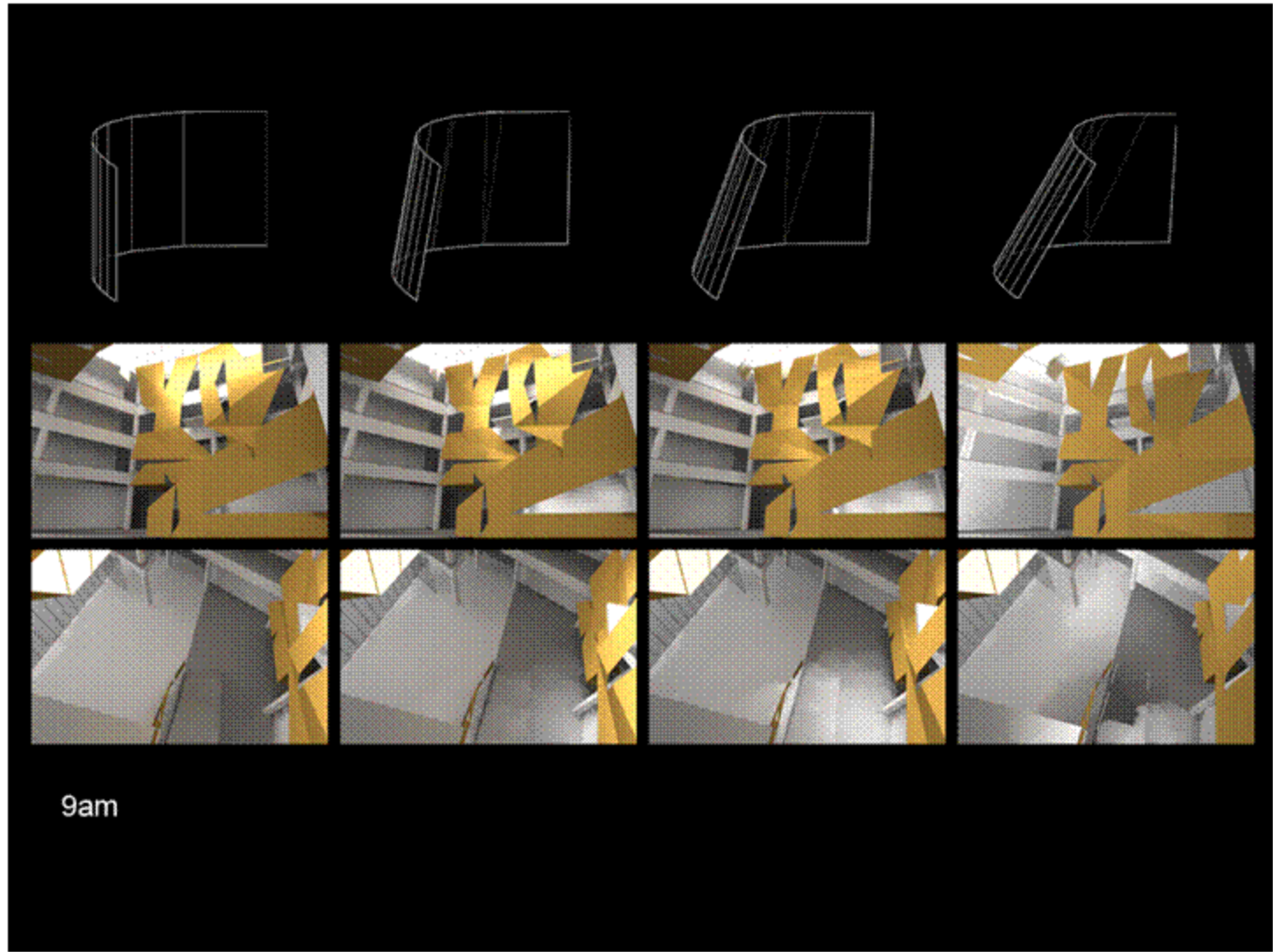
Initial Results (Static Model)
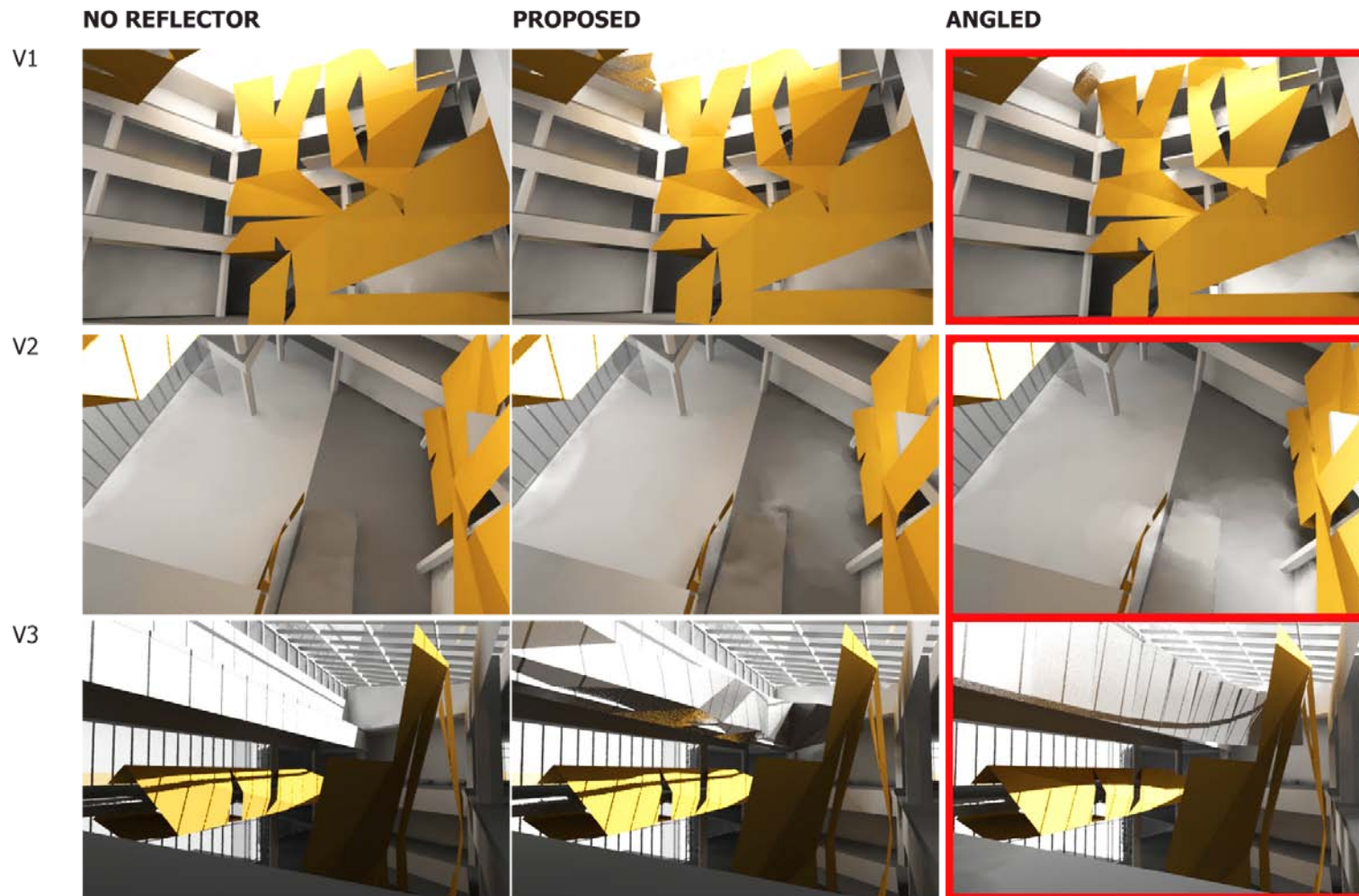
Dynamic Reflector Model
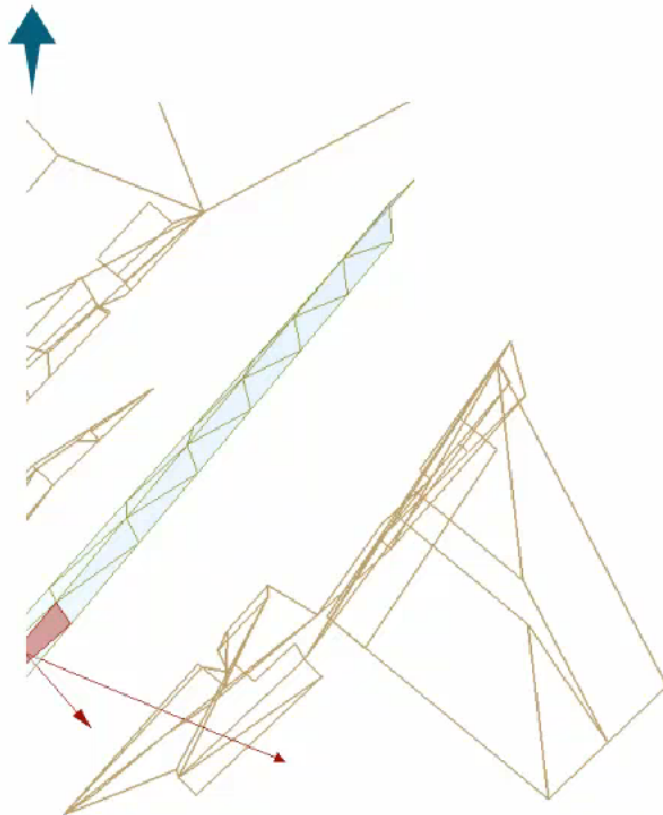
PLAN

DEC 21 9AM

UML ATRIUM REFLECTOR STUDY
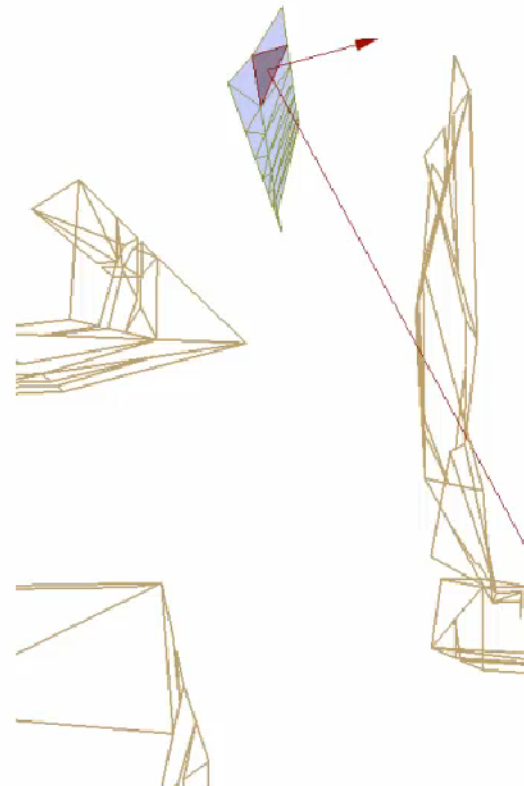
SECTION

IGCC – International Green Construction Code

Using Grasshopper to analyze the IgCC daylighting requirements.

IGCC – International Green Construction Code

Note to viewers: The IgCC information found in this presentation is for demonstration purposes only and should not be used to design from. . For the current version of the IgCC, please go to : http://www.iccsafe.org/Pages/default.aspx

IGCC – International Green Construction Code

Daylighting Requirement for 1 or 2 storey buildings

808.3 Daylit area of building spaces. In *buildings* not greater than two stories above grade, not less than 50 percent of the *net floor area* shall be located within a *daylit area*.

Effective Aperture

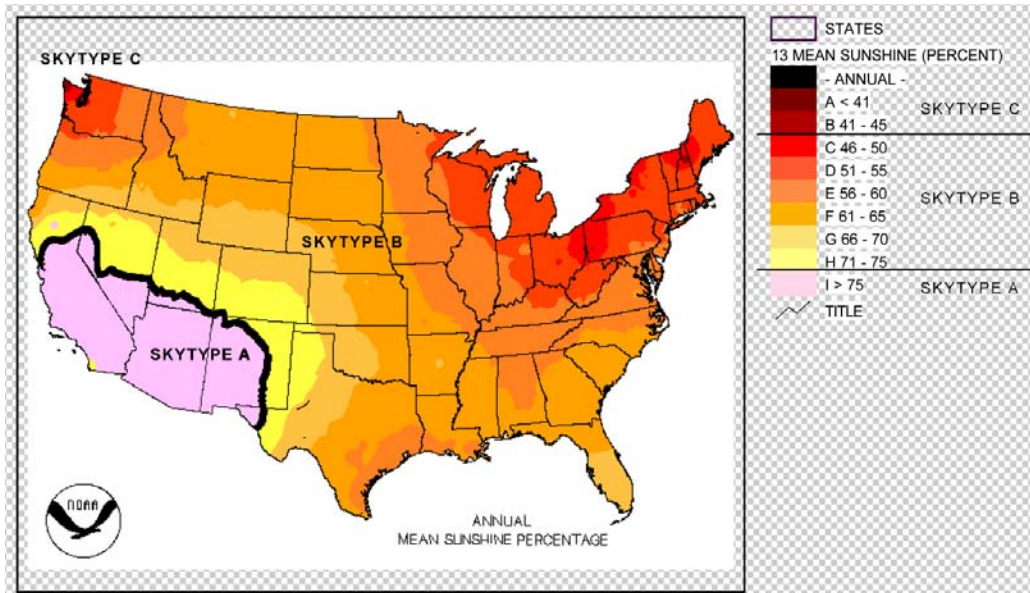| Sky Type	Minimum Effective Aperture (percentage)		
	Sidelighting from fenestration in a wall (see figure 808.3.1.1(1))	Sidelighting from rooftop monitor (see figures 808.3.1.1(2) and 808.3.1.1(3))	Toplighting (see figure 808.3.1.2)
A[a]	10.0	5.0	1.0
B[b]	12.0	6.0	1.2
C[c]	16.0	8.0	2.2

FIGURE 808.3.1.1(4)

Calculating Effective Aperture

EA = (AF x VT)/DA

EA = effective aperture
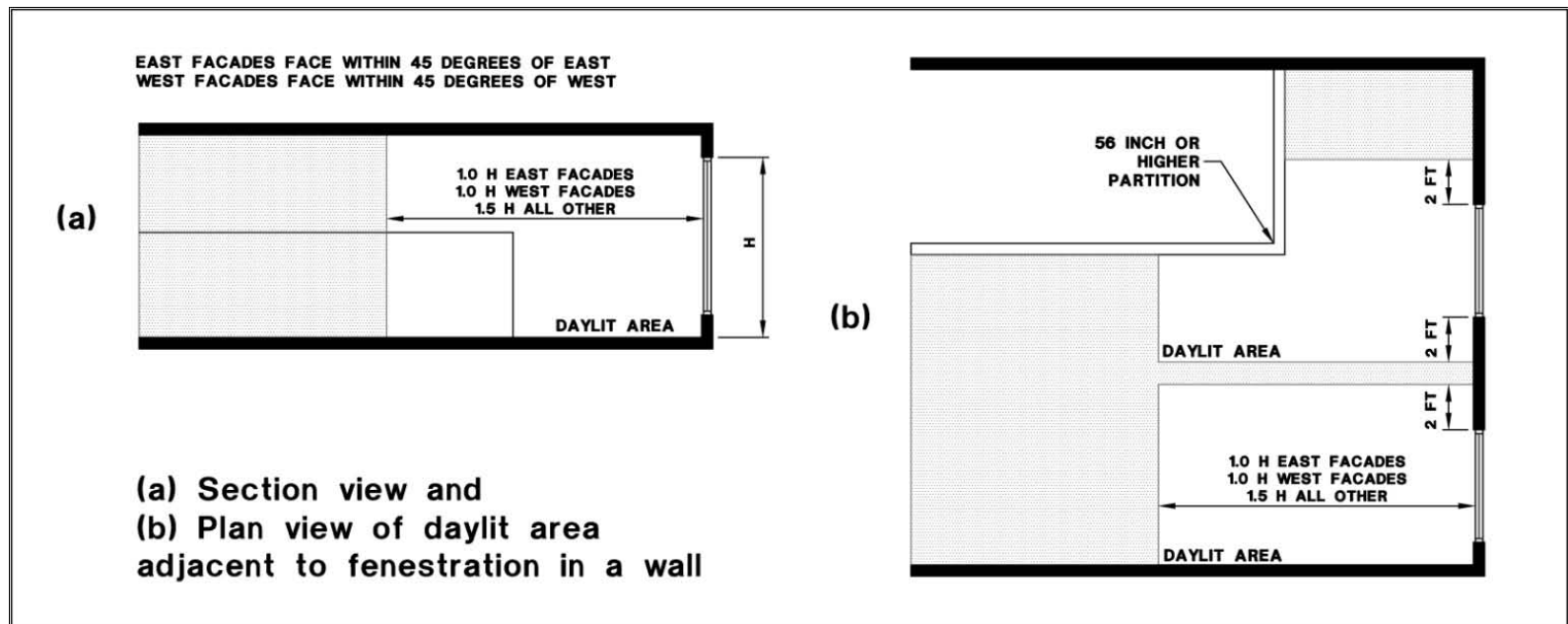AF = area of *fenestration*
VT = *visible transmittance* of the *fenestration*
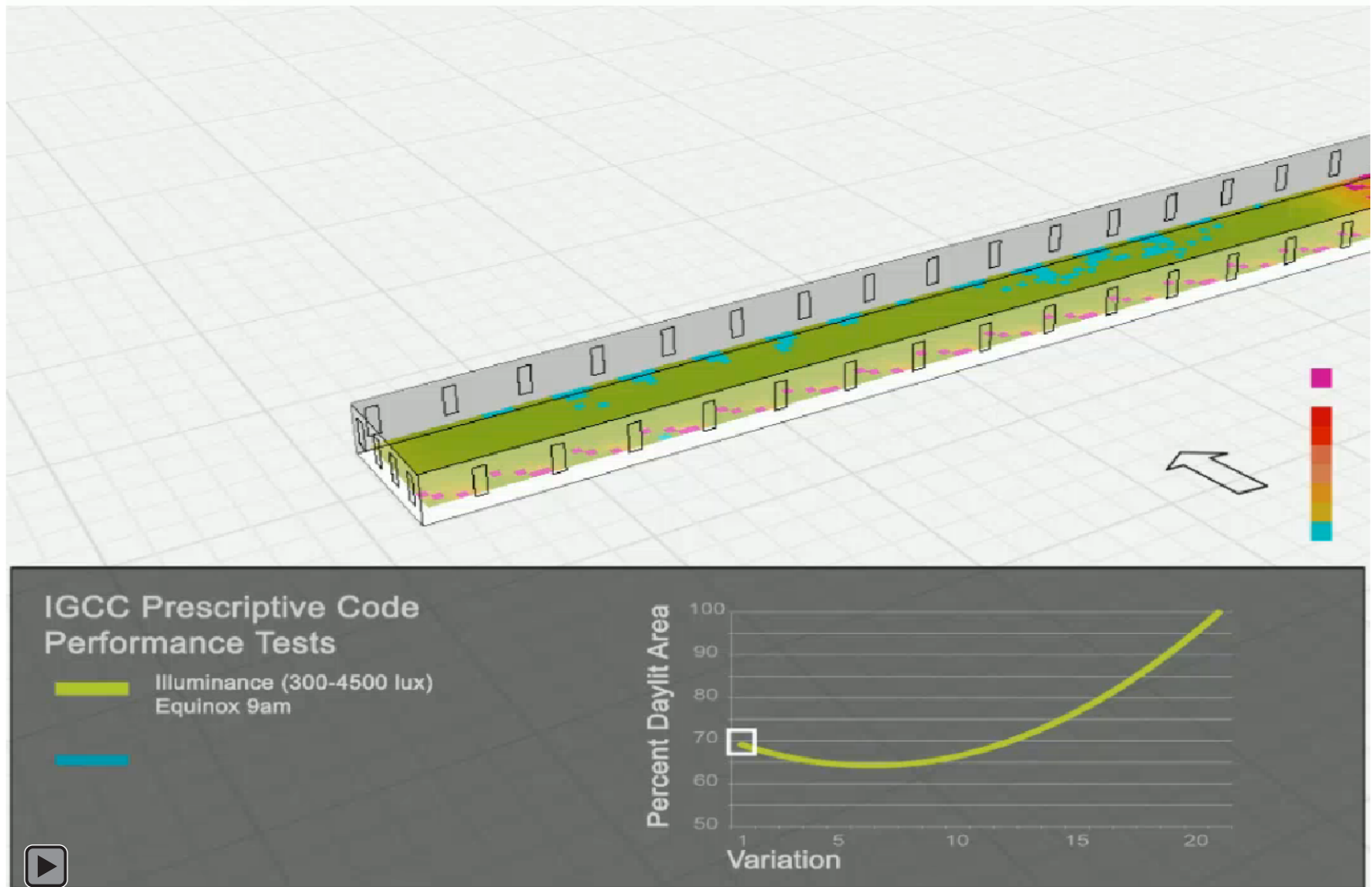DA = *daylit area*

IGCC – International Green Construction Code

Prescriptive

Where *fenestration* is located in a wall, the *daylit area* shall extend laterally to the nearest 56 inch high partition, or up to 1.0 times the height from the floor to the top of *fenestration* facing within 45 degrees of east or west or up to 1.5 times the height from the floor to the top of all other *fenestration,* whichever is less, and longitudinally from the edge of the *fenestration* to the nearest 56 inch high partition, or up to 2 feet, whichever is less*,* as indicated in Figure 808.3.1.1(1)

EAST FACADES FACE WITHIN 45 DEGREES OF EAST
WEST FACADES FACE WITHIN 45 DEGREES OF WEST

(a)

1.0 H EAST FACADES
1.0 H WEST FACADES
1.5 H ALL OTHER

H

DAYLIT AREA

(a) Section view and
(b) Plan view of daylit area
adjacent to fenestration in a wall

(b)

56 INCH OR HIGHER PARTITION

2 FT

DAYLIT AREA

2 FT

2 FT

1.0 H EAST FACADES
1.0 H WEST FACADES
1.5 H ALL OTHER

DAYLIT AREA

IgCC Initial Results Animations

Thank you