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EARLY PHASE SIMULATIONS

Radiance International Workshops 2013

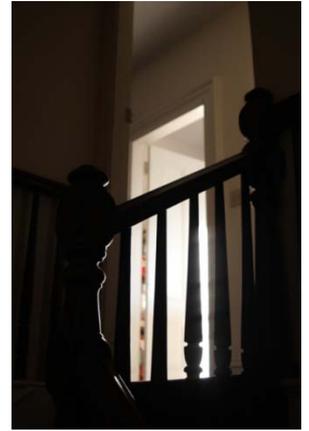
National Renewable Energy Lab

Golden, CO

DAYLIGHT BUILDING
517

Oh, were it that easy...

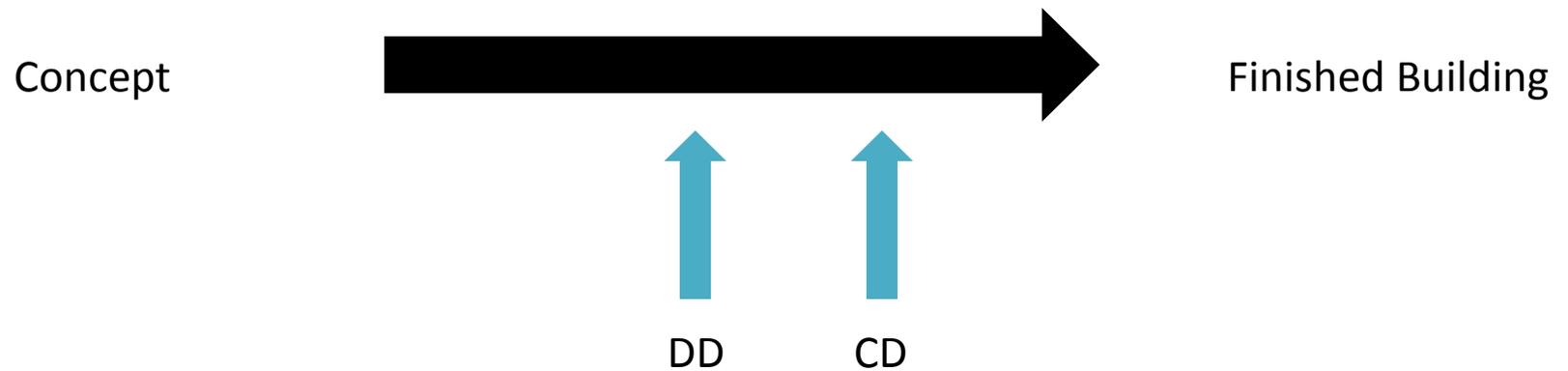
The Importance of Observation



Where can daylighting metrics be introduced during the design process?



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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

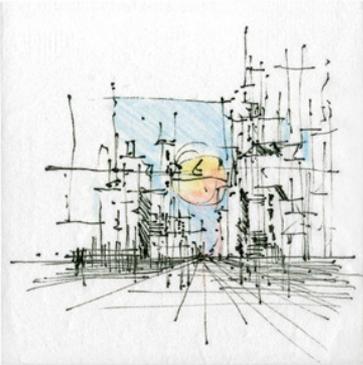
The screenshot shows a web browser window displaying the Architectural Record website. The browser's address bar shows the URL `archrecord.construction.com/call4entries/Napkin-Sketch-Contest-2013.asp`. The website header includes navigation links such as "subscribe", "free e-newsletter", "reader service", "advertise", and "FAQ". The main title "ARCHITECTURAL RECORD" is prominently displayed in orange and black. Below the title is a navigation menu with categories like "NEWS", "PROJECTS", "RESIDENTIAL", "FEATURES", "CRITIQUE", "BOOKS", "VANGUARD", "VIDEO", "PRACTICE", "TECHNOLOGY", "PRODUCTS", "COMMUNITY", "GREEN", and "CEU".

The main content area features the "Cocktail Napkin Sketch Contest 2013" section. It includes a sketch by Geoff Parker, a detailed description of the contest, and a deadline of 5:00 PM EST on June 28, 2013. The page also features an advertisement for CENTRIA REIMAGINE METAL and a "RECORD BLOGS: RECENT POSTS" section with a post titled "Design Roulette in Beijing" by pearsonc.

ARCHITECTURAL RECORD

NEWS | PROJECTS | RESIDENTIAL | FEATURES | CRITIQUE | BOOKS | VANGUARD | VIDEO | PRACTICE | TECHNOLOGY | PRODUCTS | COMMUNITY | GREEN | CEU

Cocktail Napkin Sketch Contest 2013



If you are a licensed architect or related professional who practices in the United States, you can enter this remarkable contest. All you need is a white cocktail napkin and pen to demonstrate that the art of the sketch is still alive. Two grand prize winning submissions will be published in the September issue of *Architectural Record* and winners will receive a box of napkins with their sketch printed on it. Winners and finalists will be seen in our online Cocktail Napkin Sketch Gallery.

[View Entry Form](#)

[View Complete Rules](#)

View Past Winners for [2012](#), [2011](#) and [2010](#).

Deadline is 5:00 PM EST on June 28, 2013.

Founding Sponsor

Supporting Sponsor

Drawing by Geoff Parker

REIMAGINE METAL

Design Roulette in Beijing

By: pearsonc | 7/22/2013

11:51 PM 8/1/2013

Sketching and Digital Integration

The screenshot shows a web browser window with the URL www.vectorworks.net/sketch2obim/?source=arbanner. The page features the NEMETSCHek Vectorworks logo at the top left. The main banner area has a dark background with a pencil and a sketch of a building. The text reads "VECTORWORKS: FROM SKETCH TO BIM" in large white letters. Below the text is a video player with a play button and the text "See how it's done." Below the video player is a section titled "GET INVOLVED" with the text "FOLLOW THE SKETCH TO BIM PROCESS THROUGH THE PHASES BELOW. Share your workflow issues while we create the model". Below this is a horizontal timeline with four phases, each with an icon and a progress bar:

- PHASE 1 | START HERE** (Icon: Checkmark in a square) - Project Chosen - Eco Resort - Choose which project you'd like to
- PHASE 2 | IMAGINE** (Icon: Pencil in a circle) - Sketch Chosen - Seaside Eco Resort - Choose the conceptual sketch that
- PHASE 3 | DESIGN** (Icon: Computer monitor in a circle) - Concept Chosen - Research Center - As the project progresses, choose
- PHASE 4 | CREATE** (Icon: Building in a circle) - Ends August 15th - We'll share tools to help your firm

The browser's taskbar at the bottom shows various application icons and the system tray with the date 8/1/2013 and time 11:51 PM.

Sketching and Digital Integration

The screenshot shows a web browser window displaying the Wacom website. The address bar shows the URL www.wacom.com/en/interests/design/offline-concepting-with-inking. The page features the Wacom logo and a navigation menu with links for INTERESTS, PRODUCTS, SUPPORT, COMPANY, STORE, and COMMUNITY. The main content area includes a photograph of a person using a Wacom pen to sketch a robot on a piece of paper. To the right of the image is a purple sidebar with the heading "Design" and the text: "In graphic design, a Wacom pen helps you bring out your best in a digital work environment." Below this, it says "Your creative toolbox" and "Offline Concepting with Inking". A breadcrumb trail at the bottom of the page reads: Home > Interests > Design > Offline Concepting with Inking. The Windows taskbar at the bottom shows the date and time as 11:55 PM on 8/1/2013.

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?

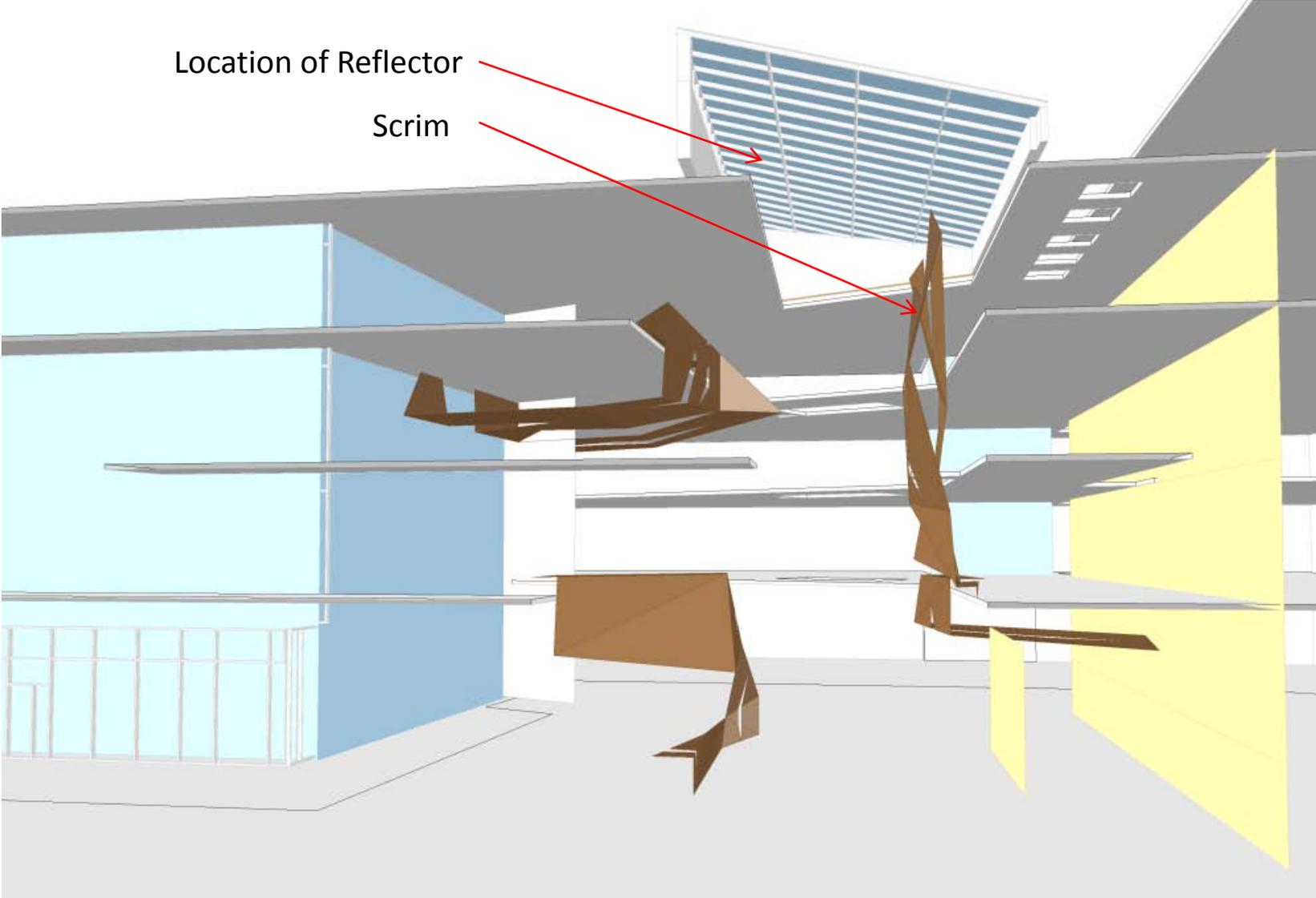
When during the design process are simulations the most valuable?

Which simulations should be used when?

Challenges to Early Phase Simulations

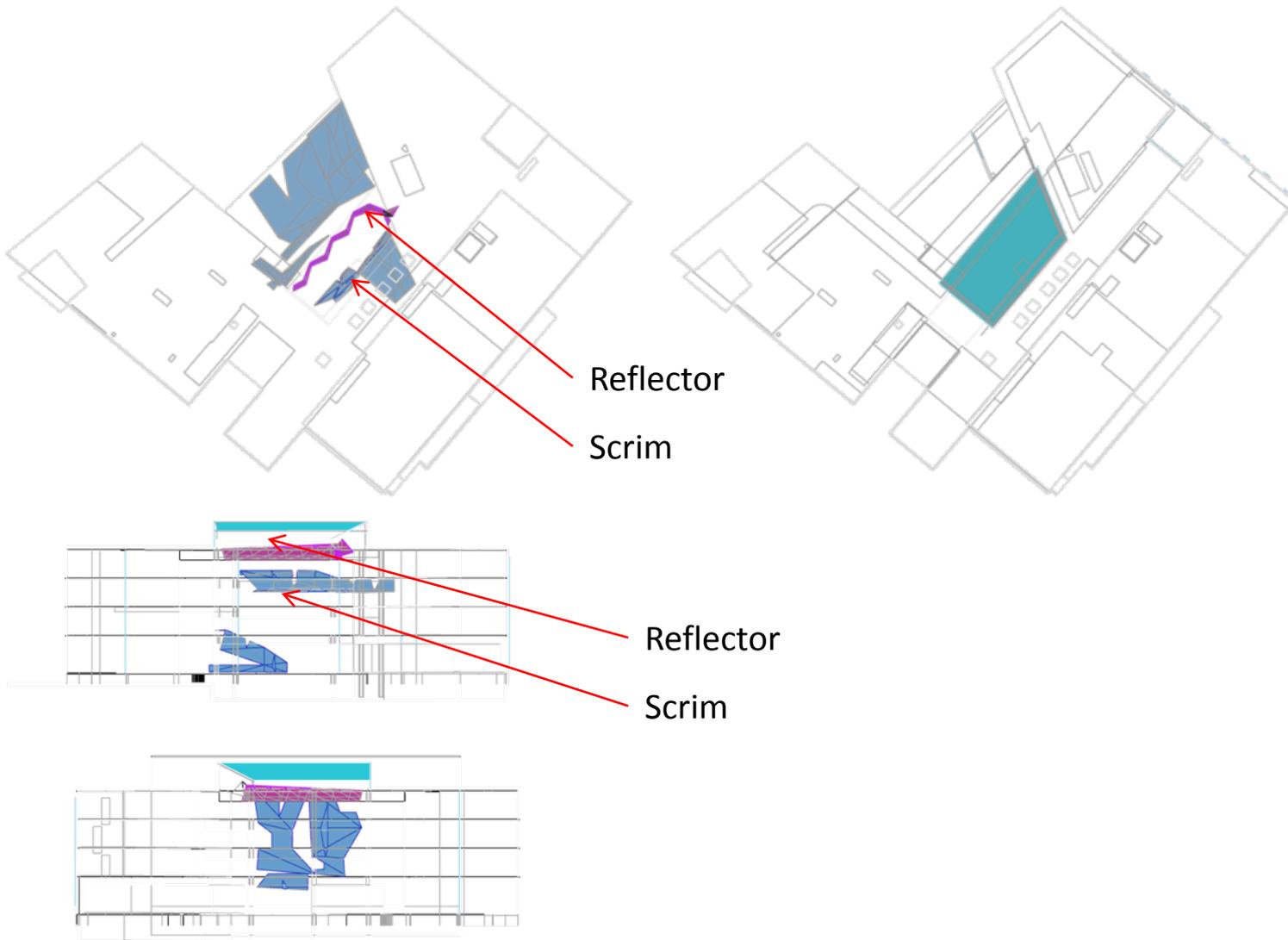
- Level of detail
- Determining acceptable assumptions
- Time constraints

Atrium Reflector Design

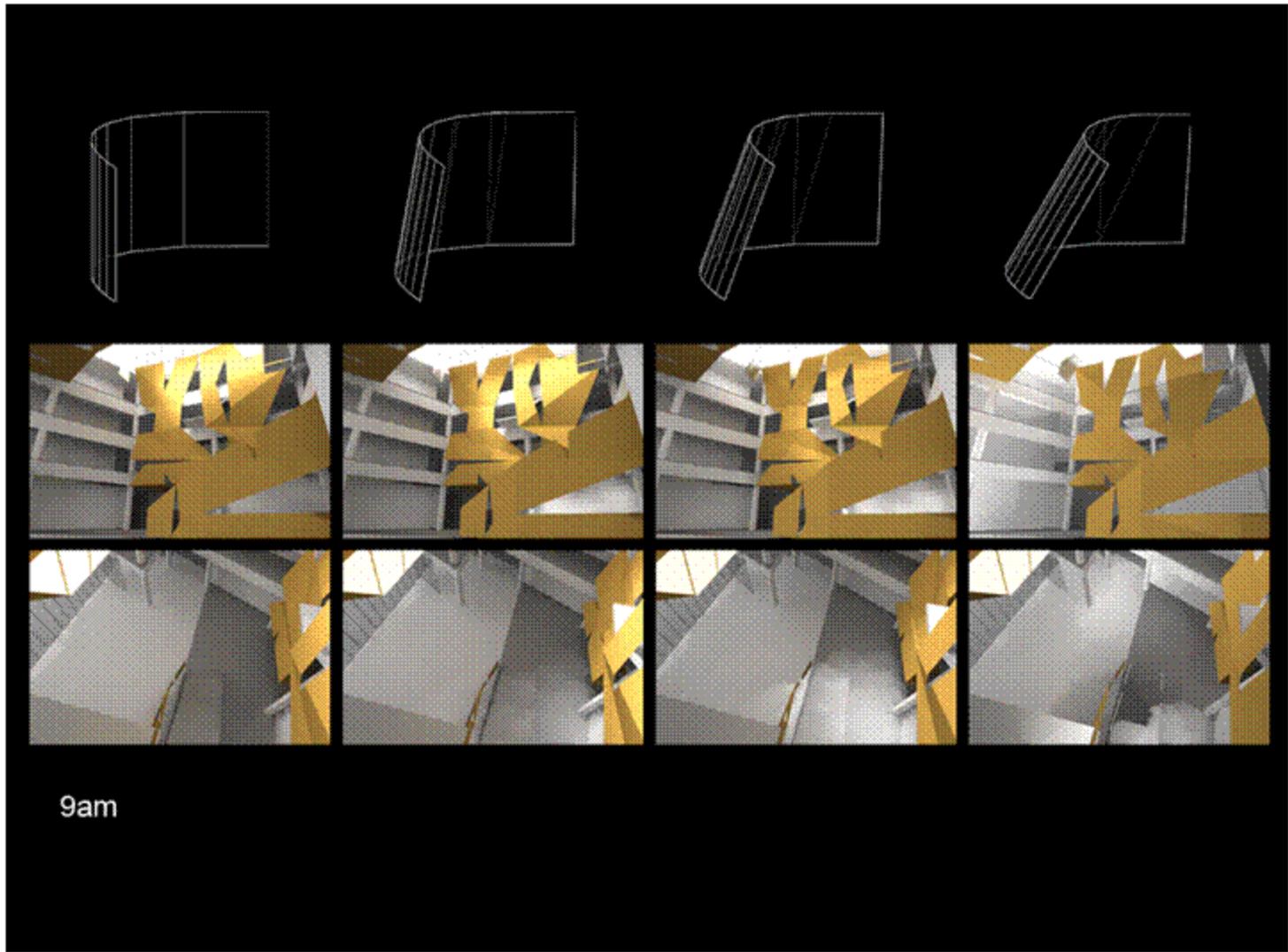


Cutaway

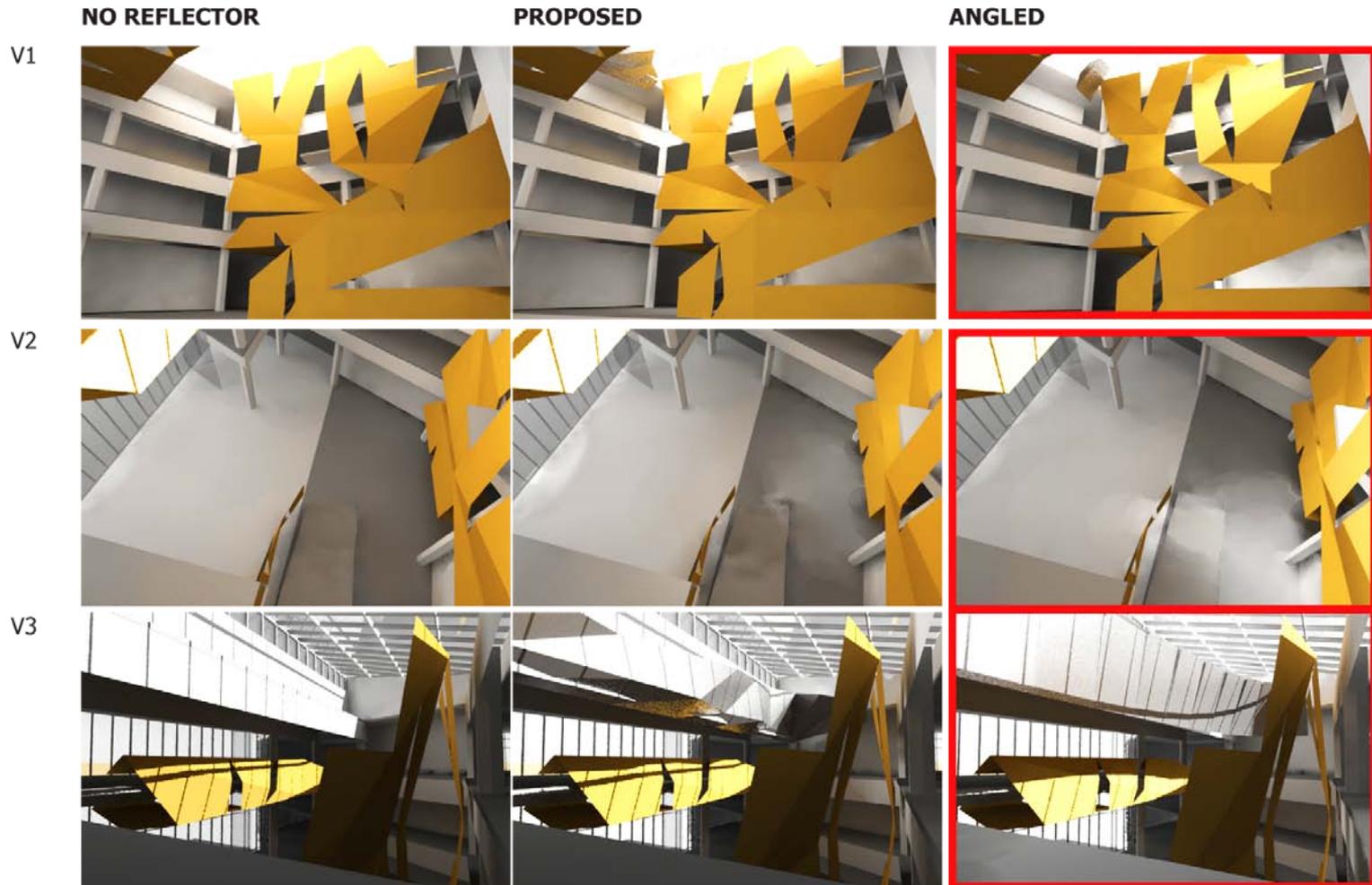
Atrium Plan



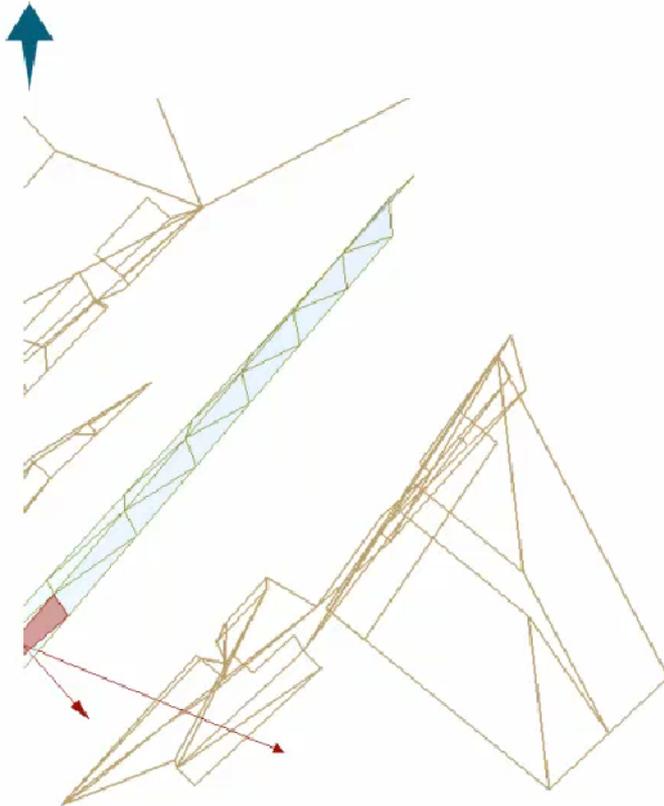
Initial Results (Static Model)



Initial Results (Static Model)



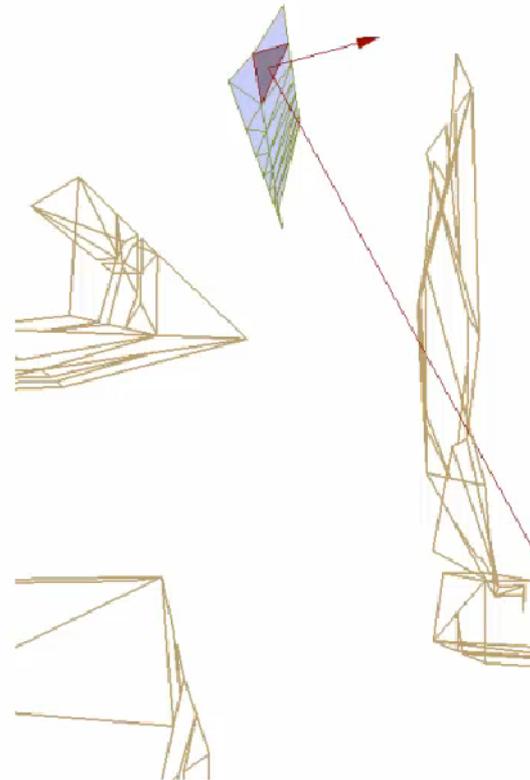
Dynamic Reflector Model



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)
<u>A^a</u>	<u>10.0</u>	<u>5.0</u>	<u>1.0</u>
<u>B^b</u>	<u>12.0</u>	<u>6.0</u>	<u>1.2</u>
<u>C^c</u>	<u>16.0</u>	<u>8.0</u>	<u>2.2</u>

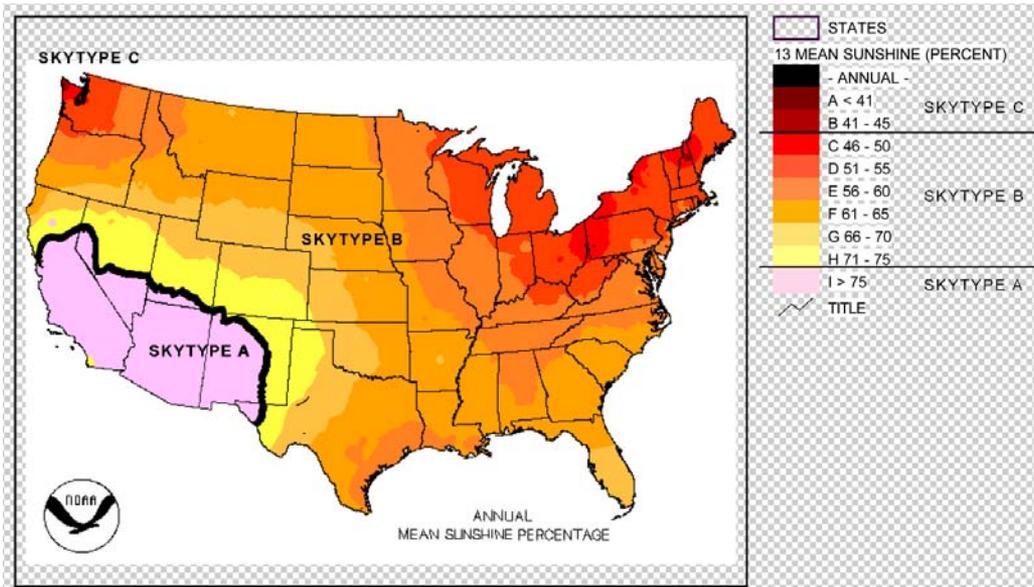


FIGURE 808.3.1.1(4)

Calculating Effective Aperture

$$EA = (AF \times VT) / DA$$

EA = effective aperture

AF = area of *fenestration*

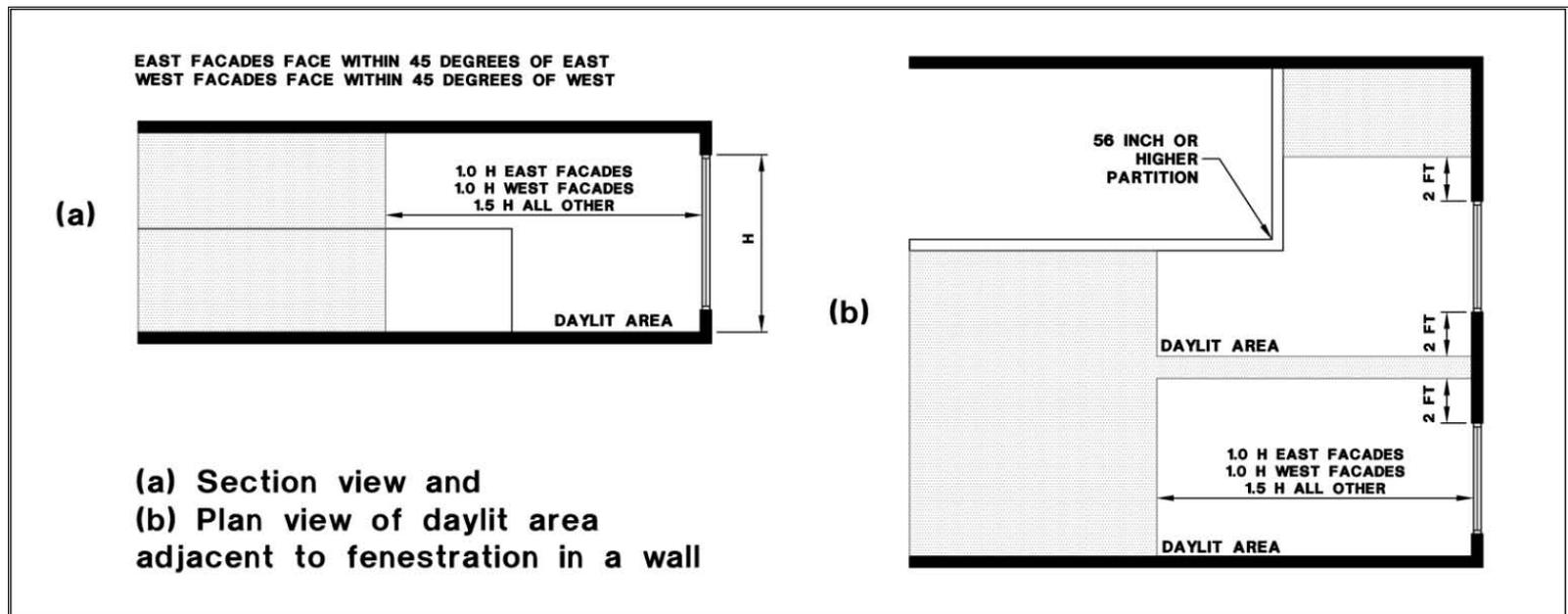
VT = *visible transmittance* of the *fenestration*

DA = *daylit area*

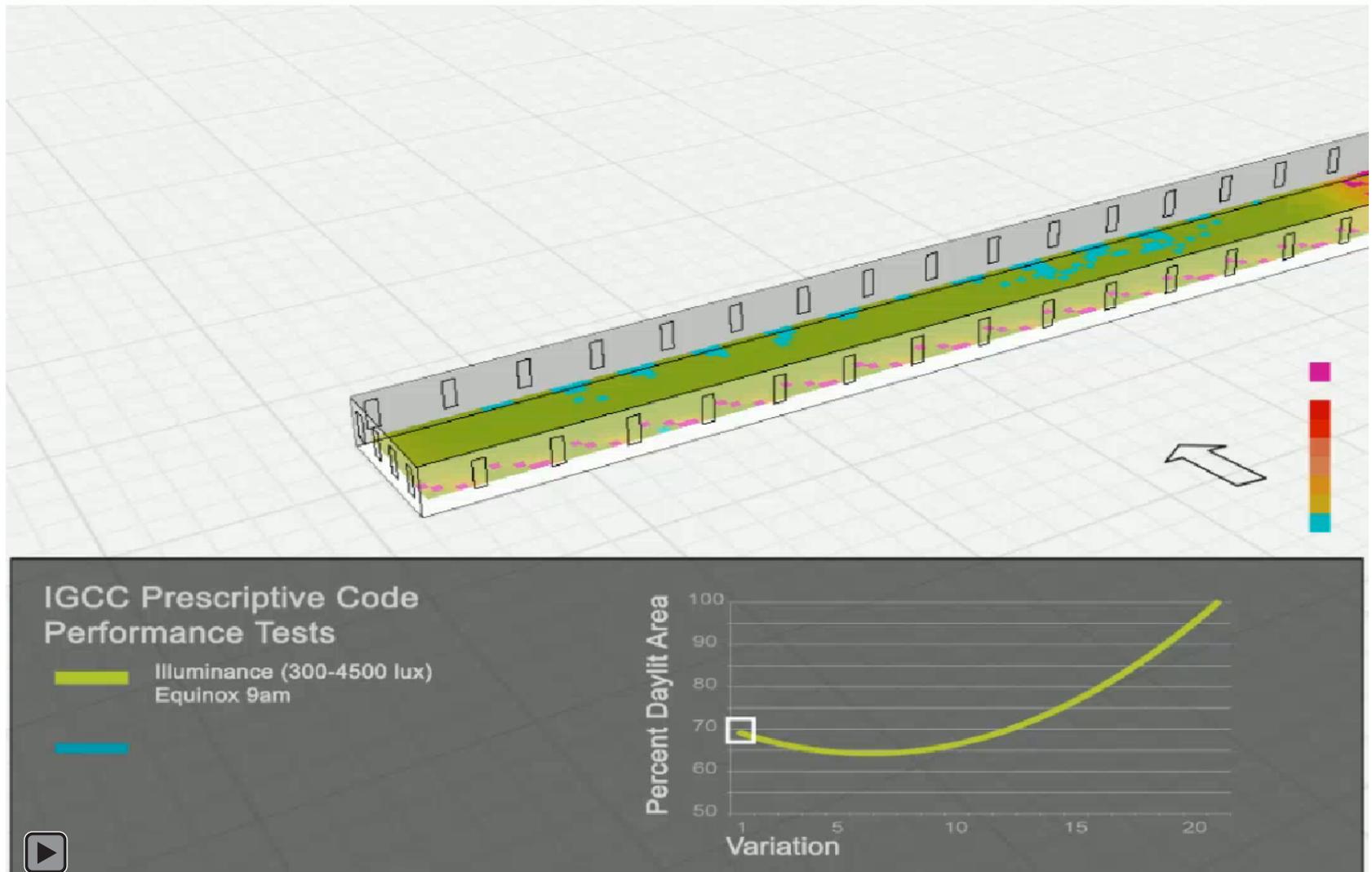
IGCC - International Green Construction Code

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)



IgCC Initial Results Animations



Thank you