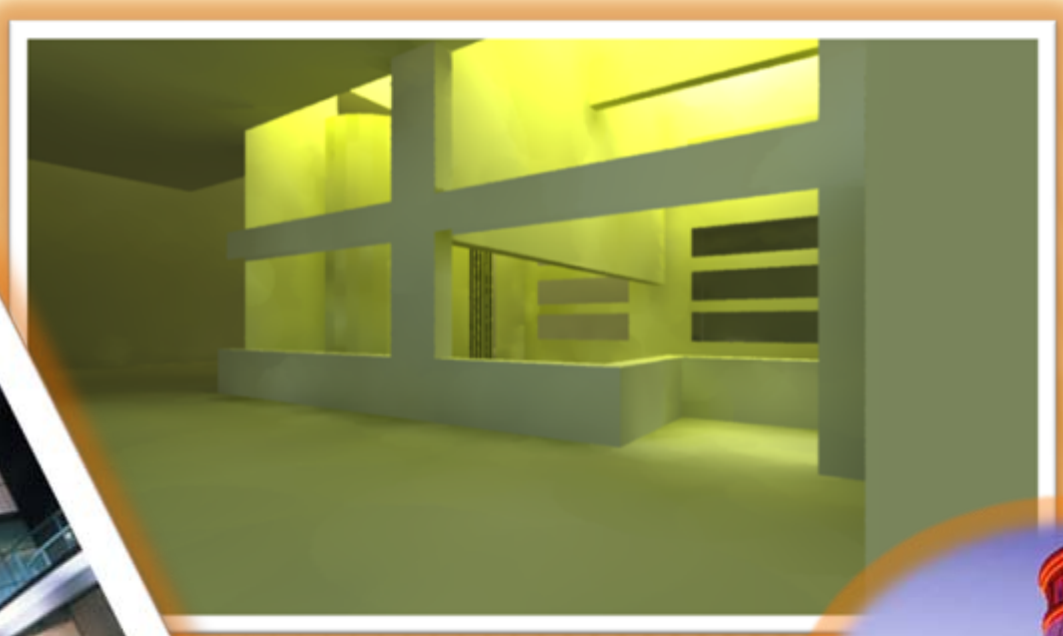
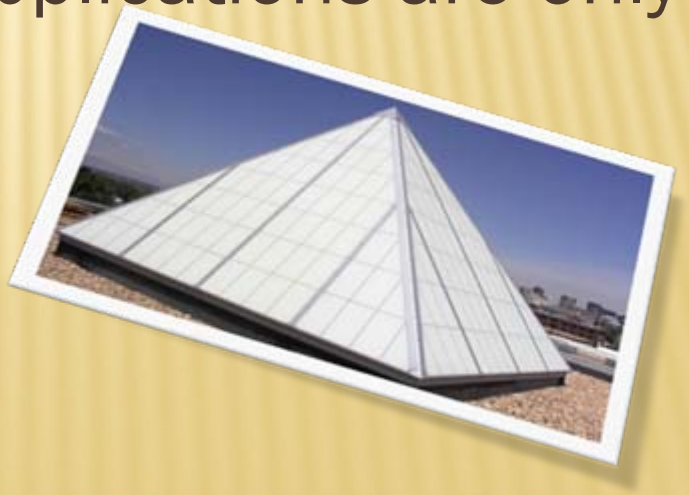


USING SIMULATION TO OPTIMIZE DESIGN

Tim Metcalfe, Daylight Modeling Group, Kalwall Corporation

WHAT IS KALWALL?

- Invented in 1955 by Robert Keller, Kalwall is the most highly insulated, diffusing, light transmitting, structural composite sandwich panel in the world!
- With an impressive strength to weight ratio(less than two pounds) Kalwall applications are only limited by your imagination.

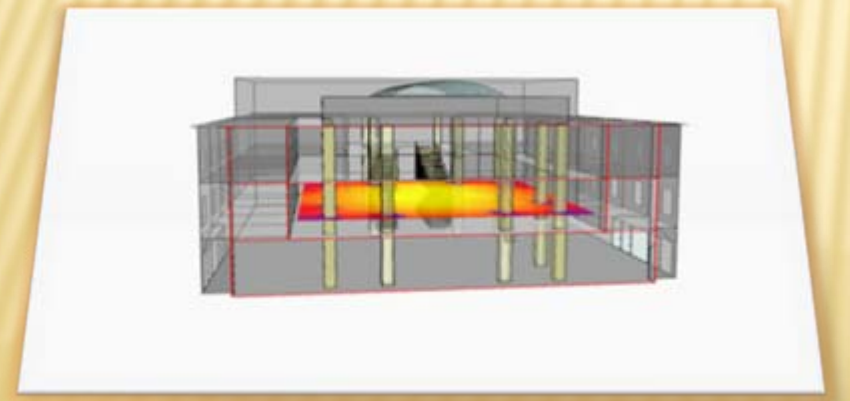


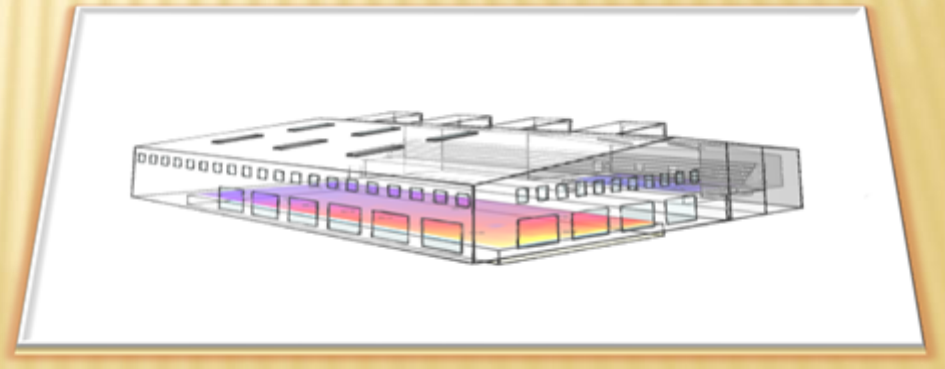
KALWALL APPLICATIONS

- Walls
- Skylights
- Ridge Roofs
- Clear span structures
- Window systems
- Canopies/walkways
- Entire structures

DAYLIGHTING PROGRAM

- Kalwall offers daylight modeling to its clients as a free service to help them achieve their design goals by optimizing their own design. Kalwall makes suggestions on the most appropriate combinations of face sheet combinations, insulating values, and translucent and vision glazing combinations.

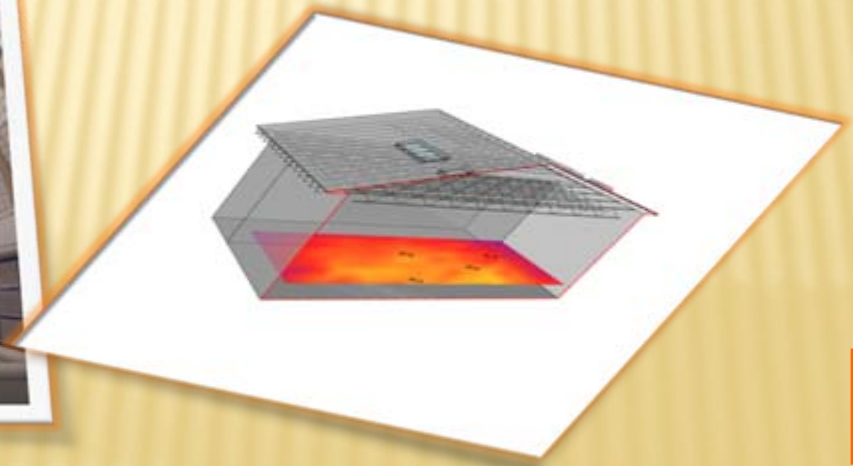




INFORMATION WORKFLOW

Clients send various types of information to us so that we can model their spaces quickly and efficiently. Types of information include:

- Daylighting form (from Kalwall Representative)
- Drawings (paper or electronic)
- 3D models(AutoCAD, Sketch up, Revit, Rhino)
- Material Properties(transmittance and reflectivity



Since 1955 Kalwall® CORPORATION

DAYLIGHTING FORM

Since 1955
Kalwall®
CORPORATION
P.O. Box 237, Manchester, NH 03105

Date: _____
www.info@daylightmodeling.com
Phone (603) 627-3861
FAX (603) 627-7905

DAYLIGHT MODELING REQUEST

Date Report is Required: _____
(Subject to work flow)

Project Name:	**Customer/Firm:**
Location:	**Address:**
Submitted by (Kalwall representative):	**Contact Person:**
Company:	**Phone:**
Phone:	**Email:**
E-Mail:	

REASON FOR DAYLIGHTING ANALYSIS:

☐ **Daylight Autonomy**
(Gives average light in space using real sky conditions and shows what percent of time this space can operate with daylight alone - no supplemental electric lighting)

Hours of Operation (i.e. 9 am - 5 pm)
_____ to _____

☐ **RADIANCE:**
(A "snapshot" of light levels at a point in time)
Date: _____
(i.e. Sept 21)
Time of Day: _____
(i.e. 12pm)
Sky Condition: _____
(i.e. Clear/Sunny or Overcast)

☐ **Select Light Transmittance:**
(For optimal design, LT may vary per elevation)

☐ **Spacing Skylights/Size Rough Opening**
(Determine needed sizes of wall or skylight)

☐ **Glare Analysis**
(Identify potential problem areas)

☐ **LEED Project**
(Does this daylight design meet or exceed daylight requirements?)

☐ **CHPS or other High Performance School**

☐ **Other**
(Be specific)

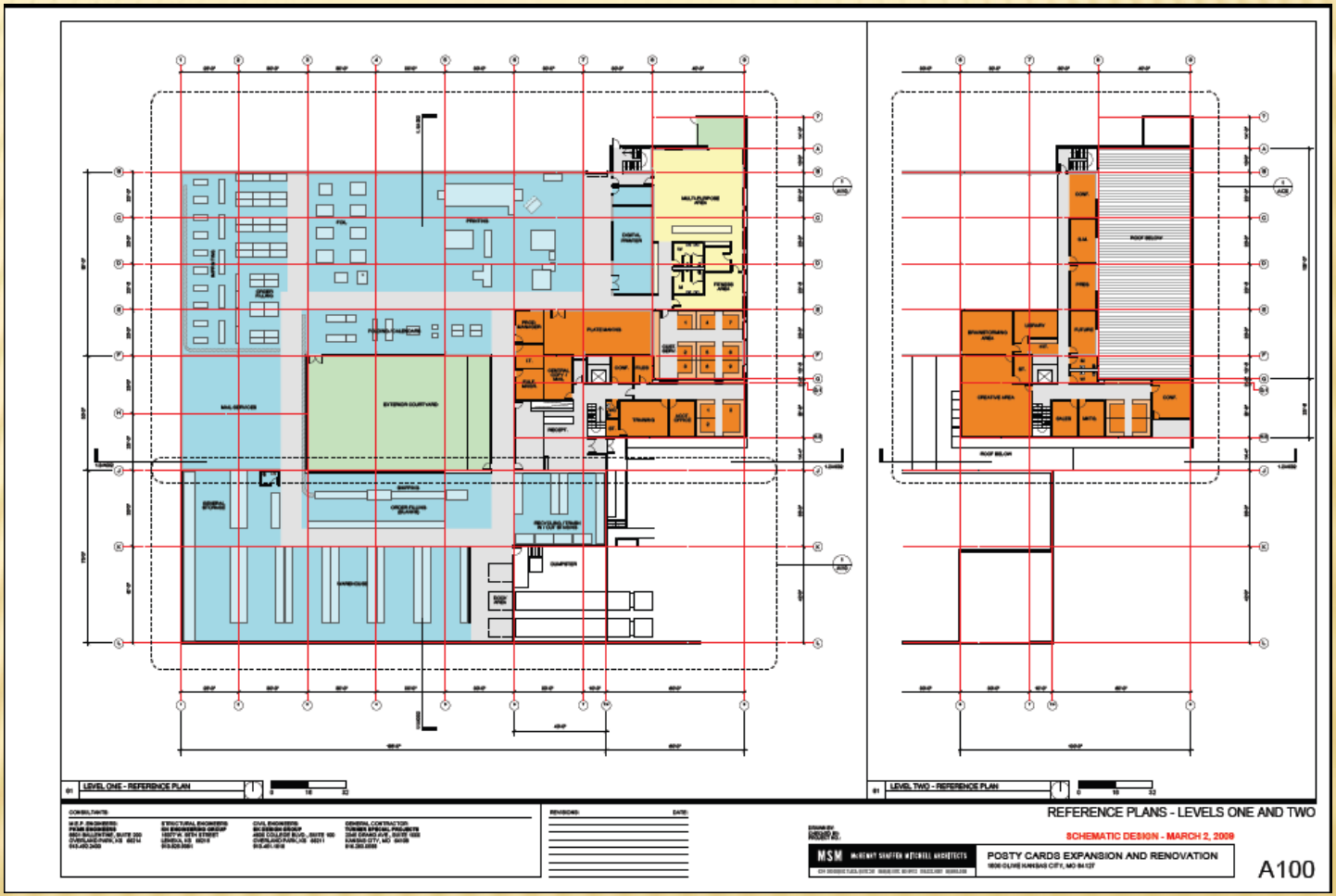
DAYLIGHT MODELING REQUEST - Page 2

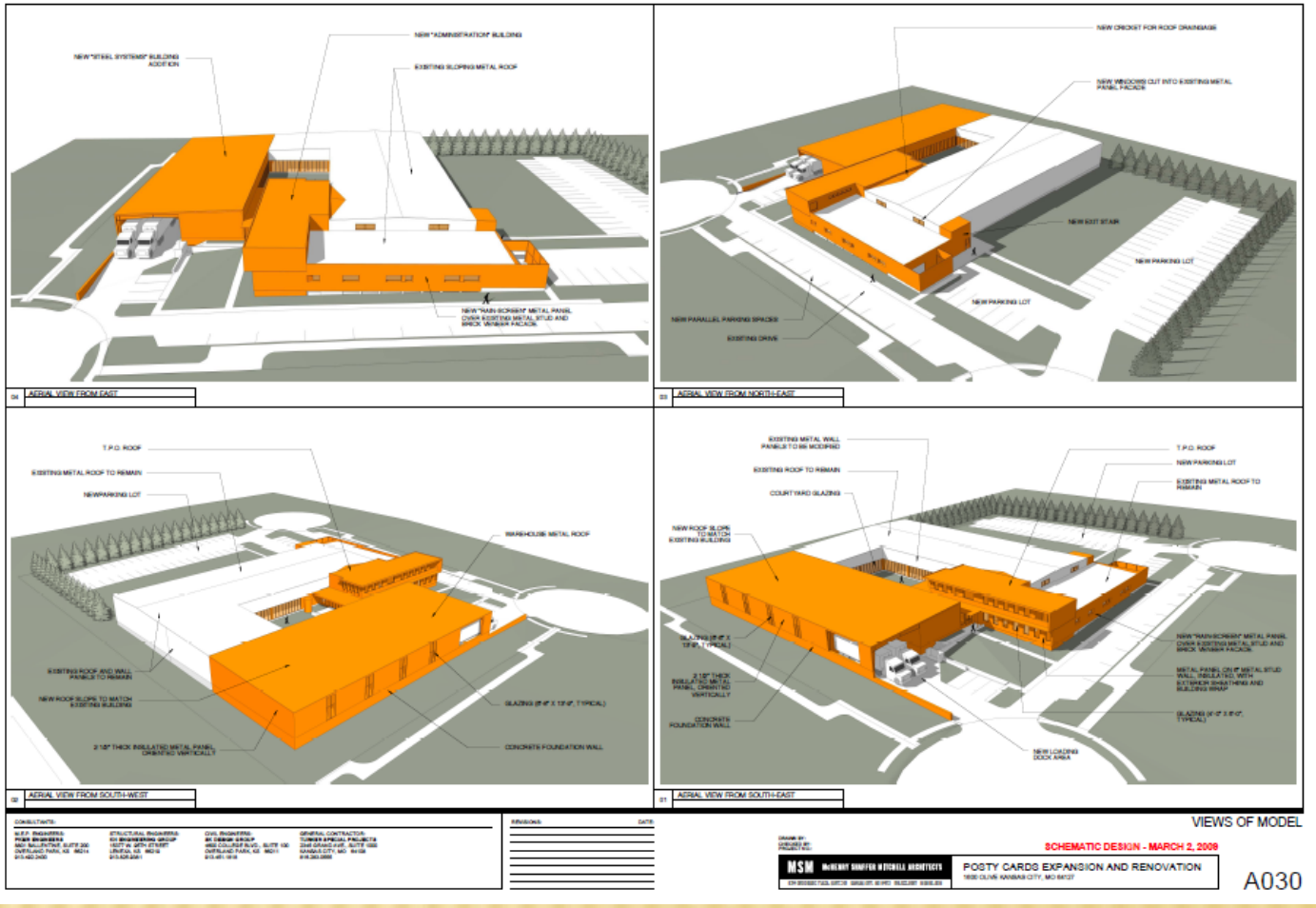
Project Name:

DAYLIGHT AREA DESCRIPTION	CHECKLIST
Space Function: (warehouse - storage, shipping & receiving)	**Elevations:** (Provide all elevations for building).
Task Illumination Desired: (What light level is wanted in the space?) _____ ☐ lux ☐ footcandles	**Plan Views:** (Indicate pitch and degree of pitch for skylights).
Task Height Above Floor: (i.e. desk height in classroom - 3 feet)	**Internal Views & Floor Plans:** (Show any walls/windows/doors/openings that cause internal light blockage, etc. for each floor level. We need the height & width of all internal openings).
Kalwall Light Transmittance: (May change for different elevations) %	**Model if Available: (.skp, .dwg, .dxf)** **Indicate North Direction:**
Glass Light Transmittance: %	**Visually highlight (identify) on building all areas of Kalwall/Glass:** (May be sent to Kalwall separately from electronic files). _____ _____
Describe Nearby Site Conditions: What is ground? (asphalt, grass, water?)	**Interior Finish:** Walls _____ (i.e. Off white, neutral, wood, color paint) Ceiling Floor
Is there any external light blockage?	**Check files before sending***
	E-mail electronic files to info@daylightmodeling.com **Include job and location in e-mail.** Due to scaling .dwg files preferred over .pdf files! Hardcopy architecturals are okay, but must be printed to scale. Mail to Kalwall attention Modeling Dept.

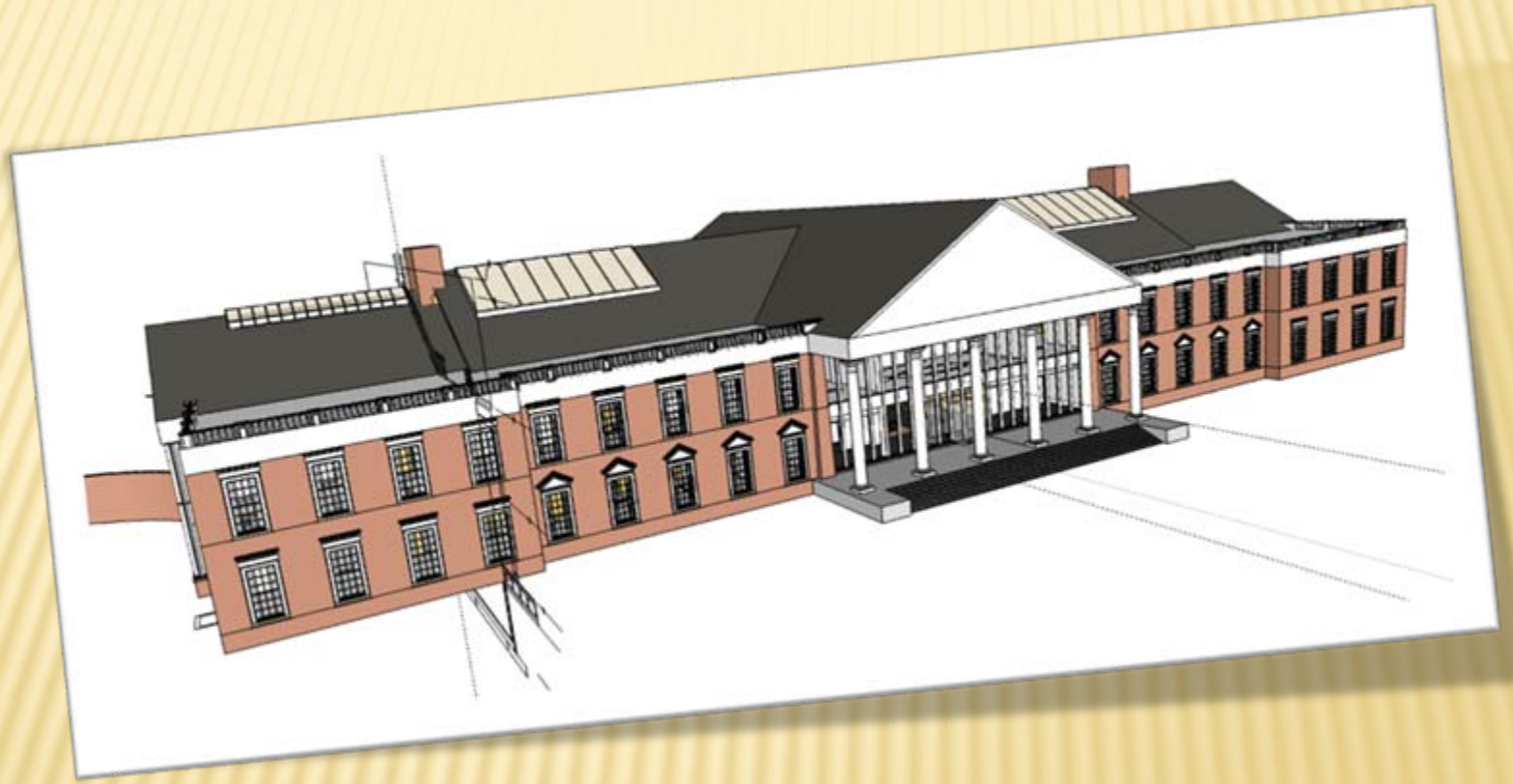
*Please verify all necessary .dwg files before forwarding. A free CAD (.dwg) viewer is downloadable from the AutoDesk @ www.autodesk.com/dwgtrueview
You need to know what you are sending!!

DRAWINGS


LEVEL ONE - REFERENCE PLAN
LEVEL TWO - REFERENCE PLAN
REFERENCE PLANS - LEVELS ONE AND TWO
SCHEMATIC DESIGN - MARCH 2, 2009
MSM
POSTY CARDS EXPANSION AND RENOVATION
A100


NEW "STEEL SYSTEMS" BUILDING ADDITION
NEW "ADMINISTRATION" BUILDING
EXISTING SLOPING METAL ROOF
NEW "RAIN SCREEN" METAL PANEL OVER EXISTING METAL STUD AND BRICK VENEER FACADE
04 AERIAL VIEW FROM EAST
NEW CRICKET FOR ROOF DRAINAGE
NEW WINDOWS CUT INTO EXISTING METAL PANEL FACADE
NEW EXIT STAIR
NEW PARKING LOT
NEW PARKING LOT
NEW PARALLEL PARKING SPACES
EXISTING DRIVE
03 AERIAL VIEW FROM NORTH-EAST
T.P.O. ROOF
EXISTING METAL ROOF TO REMAIN
NEW PARKING LOT
WAREHOUSE METAL ROOF
EXISTING ROOF AND WALL PANELS TO REMAIN
NEW ROOF SLOPE TO MATCH EXISTING BUILDING
GLAZING (6'-0" X 13'-0", TYPICAL)
2 1/2" THICK INSULATED METAL PANEL, ORIENTED VERTICALLY
CONCRETE FOUNDATION WALL
02 AERIAL VIEW FROM SOUTH-WEST
EXISTING METAL WALL PANELS TO BE MODIFIED
EXISTING ROOF TO REMAIN
COURTYARD GLAZING
T.P.O. ROOF
NEW PARKING LOT
EXISTING METAL ROOF TO REMAIN
NEW ROOF SLOPE TO MATCH EXISTING BUILDING
GLAZING (6'-0" X 13'-0", TYPICAL)
2 1/2" THICK INSULATED METAL PANEL, ORIENTED VERTICALLY
CONCRETE FOUNDATION WALL
NEW "RAIN SCREEN" METAL PANEL OVER EXISTING METAL STUD AND BRICK VENEER FACADE
METAL PANEL ON 6" METAL STUD WALL, INSULATED, WITH EXTERIOR SHEATHING AND BUILDING WRAP
GLAZING (6'-0" X 6'-0", TYPICAL)
NEW LOADING DOCK AREA
01 AERIAL VIEW FROM SOUTH-EAST
CONSULTANTS:
DIVISIONS: DATE:
VIEWS OF MODEL
SCHEMATIC DESIGN - MARCH 2, 2009
MSM McELHENY SHAFFER MITCHELL ARCHITECTS
POSTY CARDS EXPANSION AND RENOVATION
A030

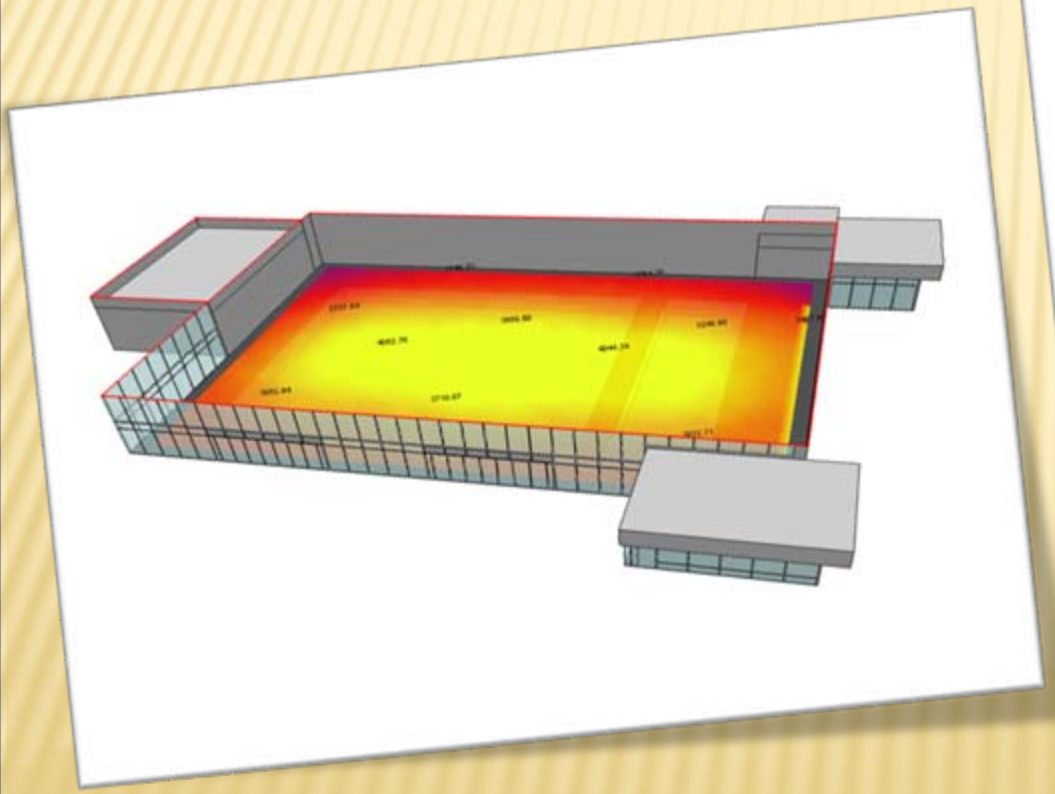
MODELS

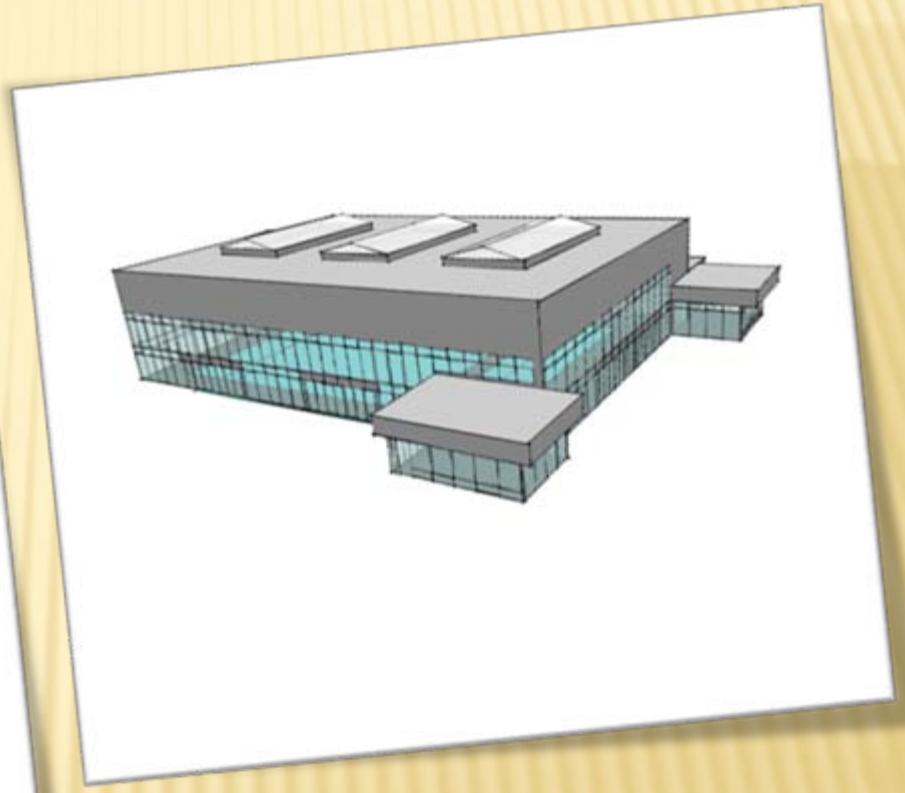


CASE STUDY #1

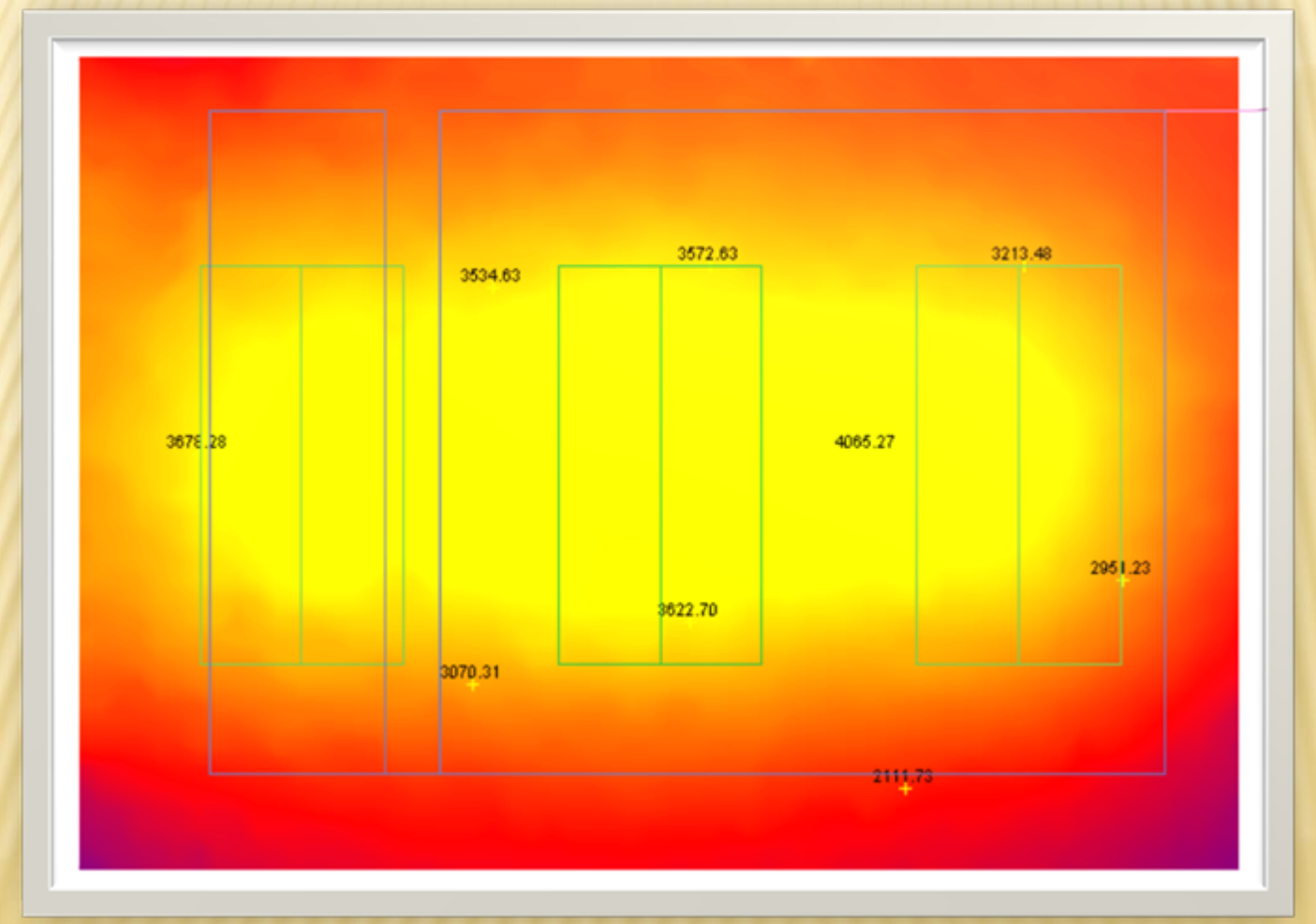
- **Hollywood Pool, Henderson, NV**
  - Natatorium- original design
    - Roof/Top-lighting -15% Kalwall
    - 3 ridge roofs 22’-0” X 45’-0”
  - Walls Vision Glazing 40% LT
    - South Elevation- 81’-0” x 20’-0”
    - West Elevation- 110’-0 x 20’-0”
    - North Elevation-42’-0” x 20’-0”

ORIGINAL DESIGN

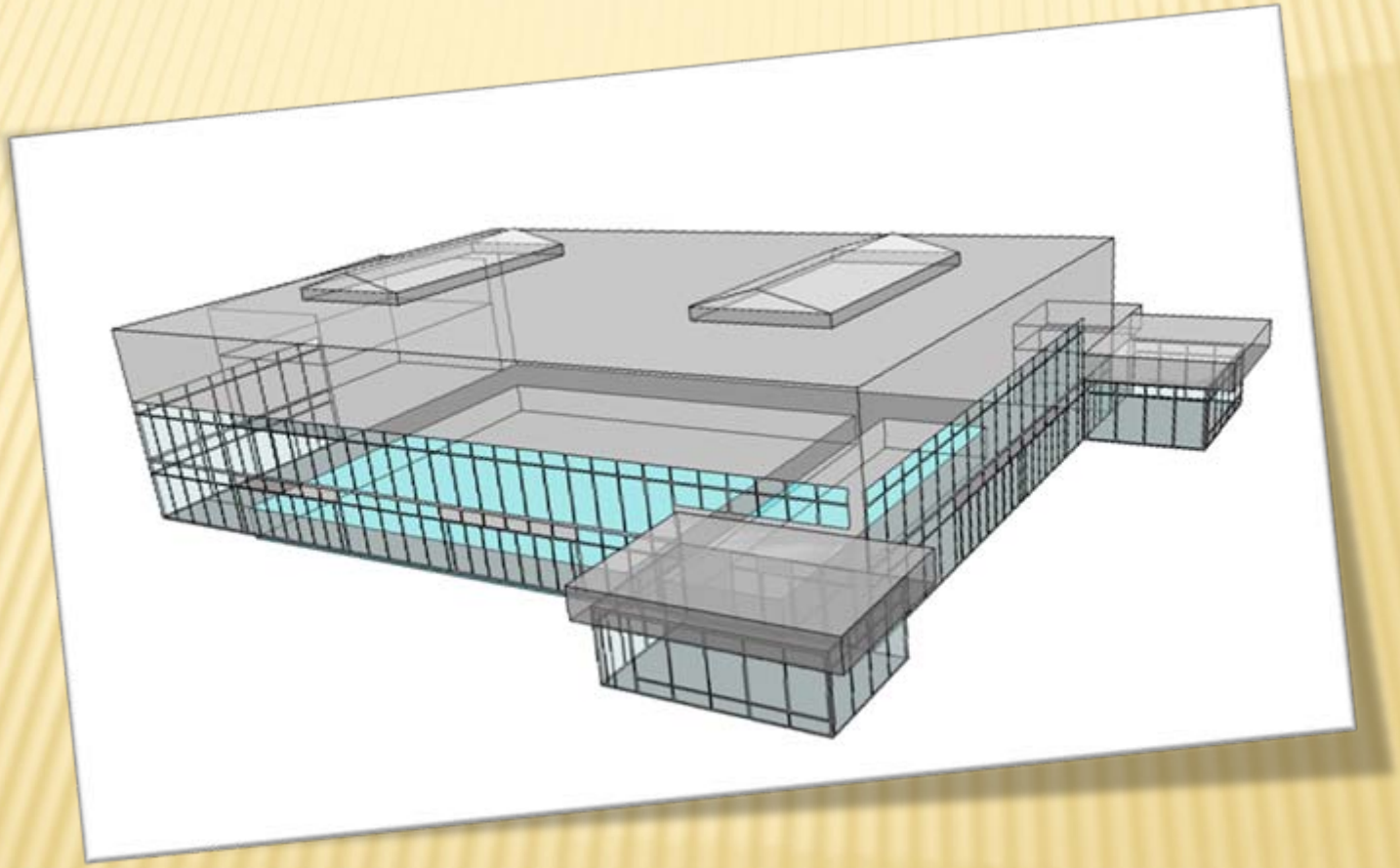




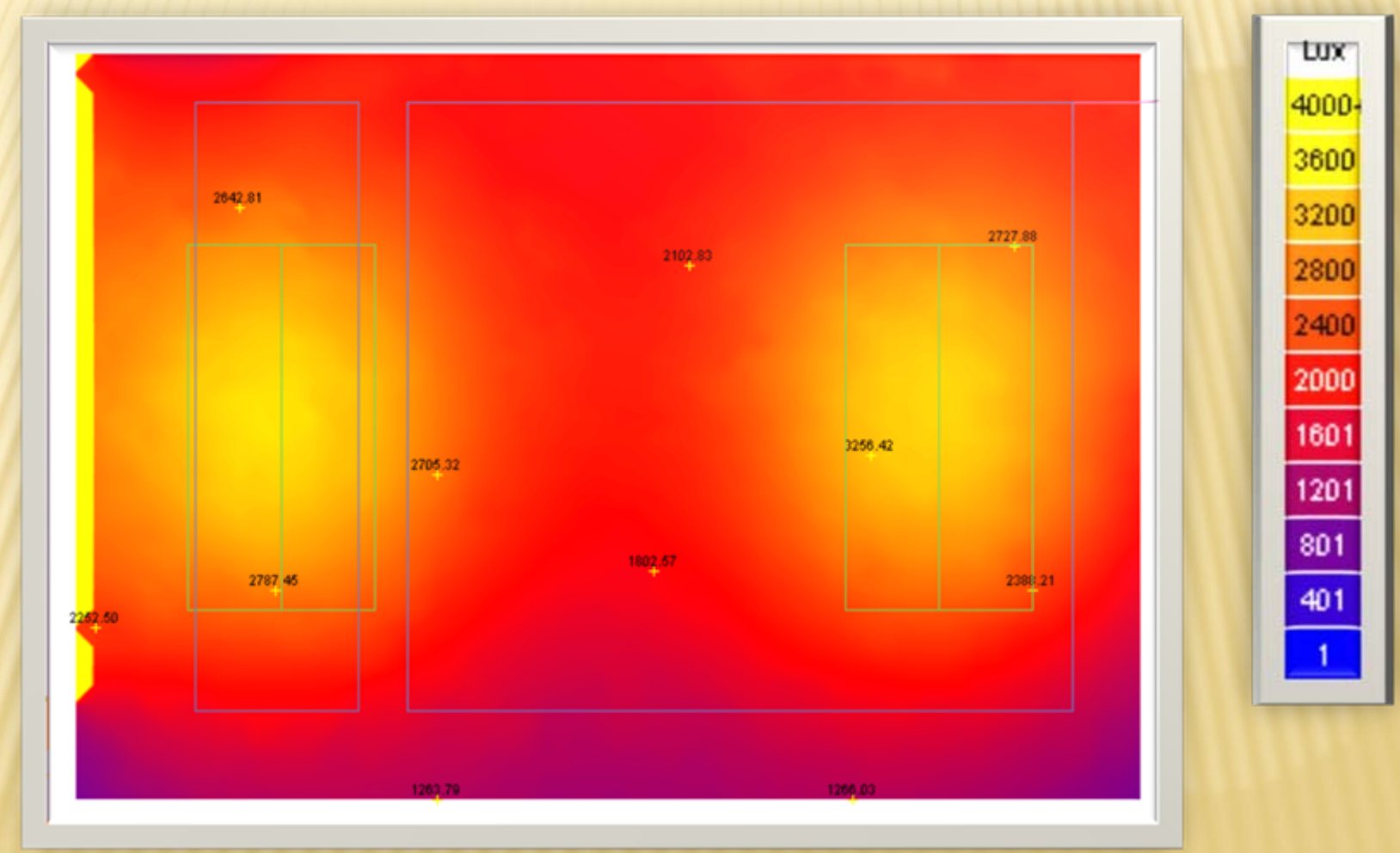
RADIANCE JUNE 21ST AT NOON



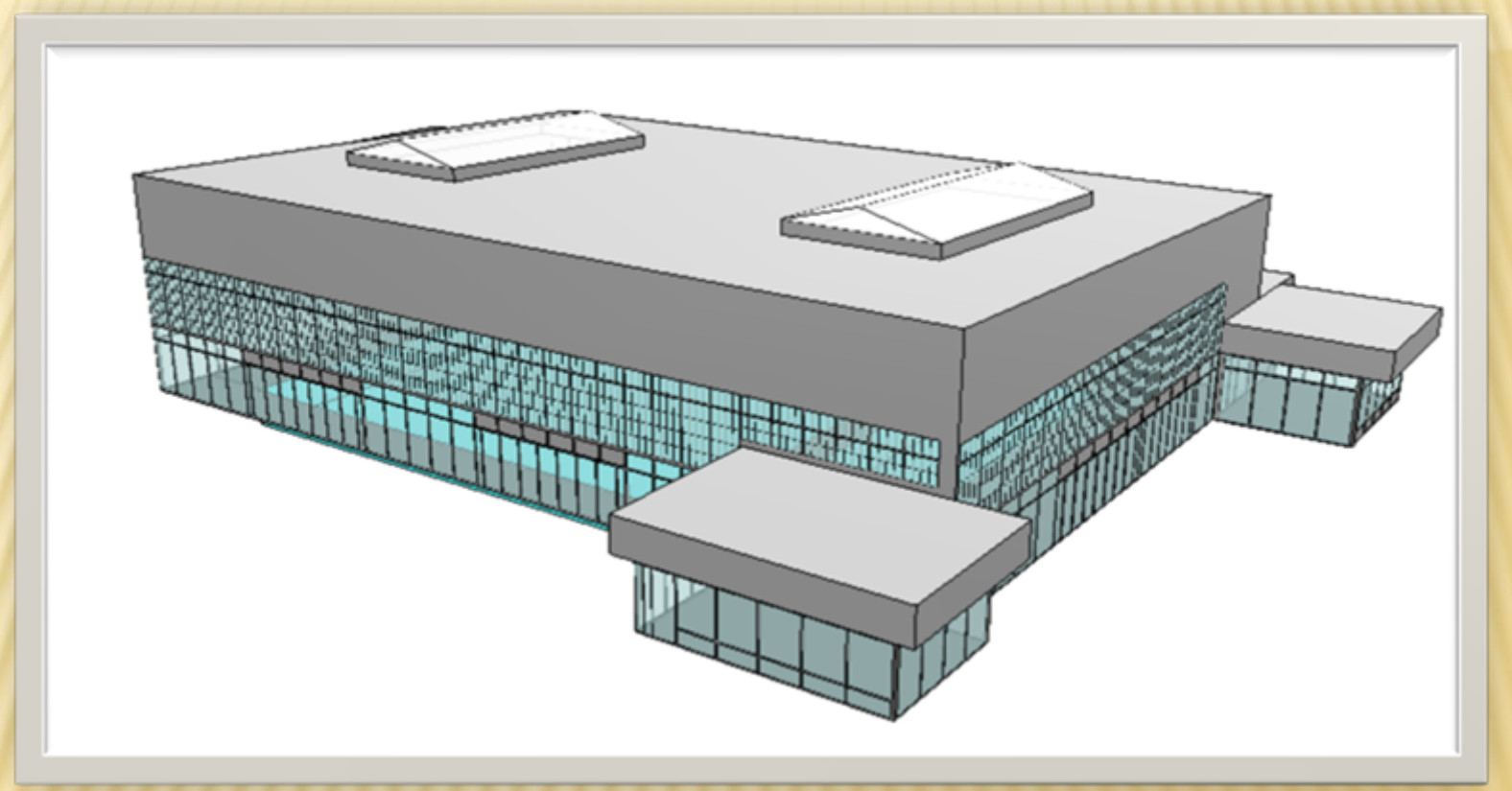
REMOVE ONE RIDGE ROOF



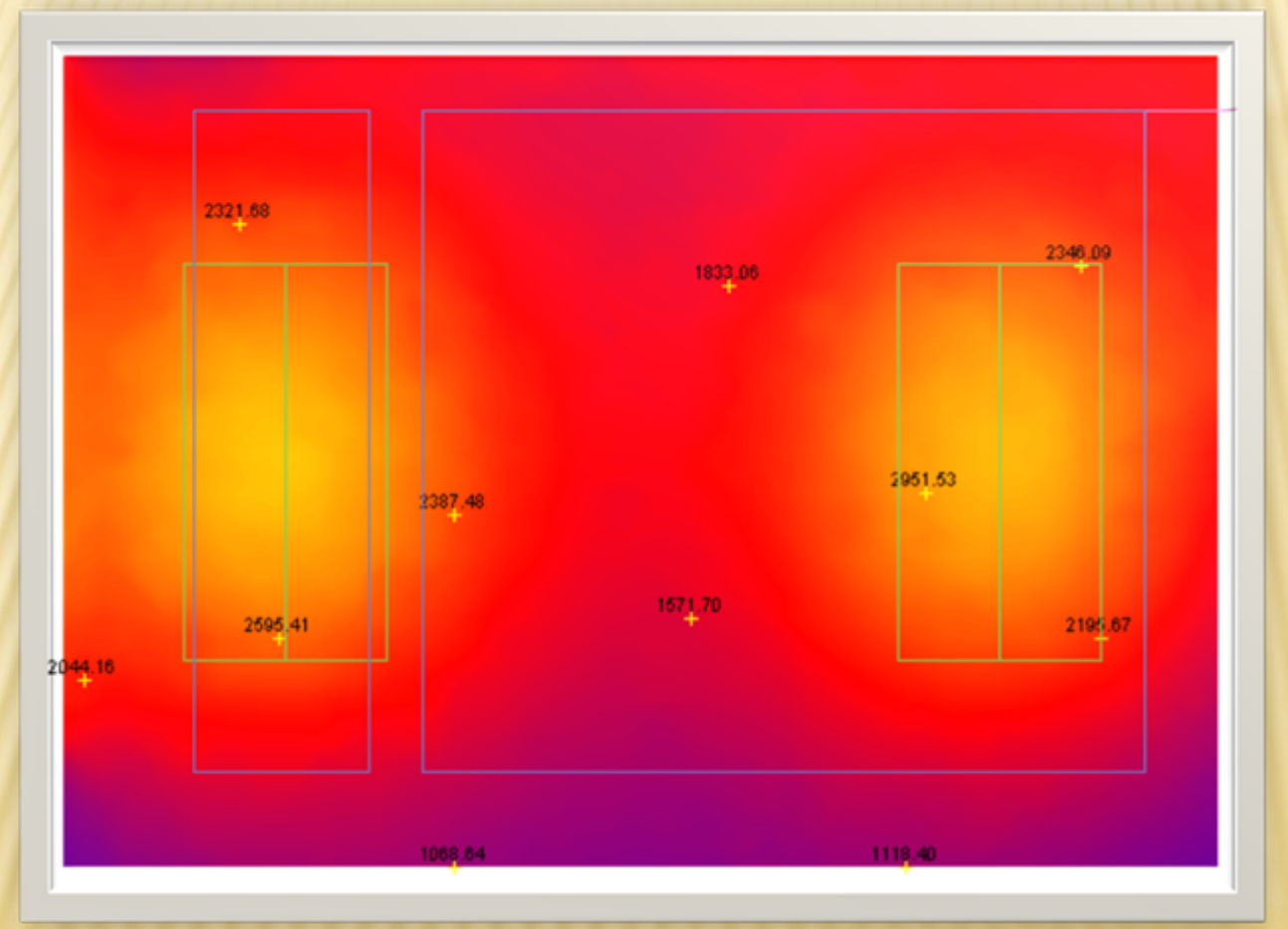
REDUCED TOPLGHTING



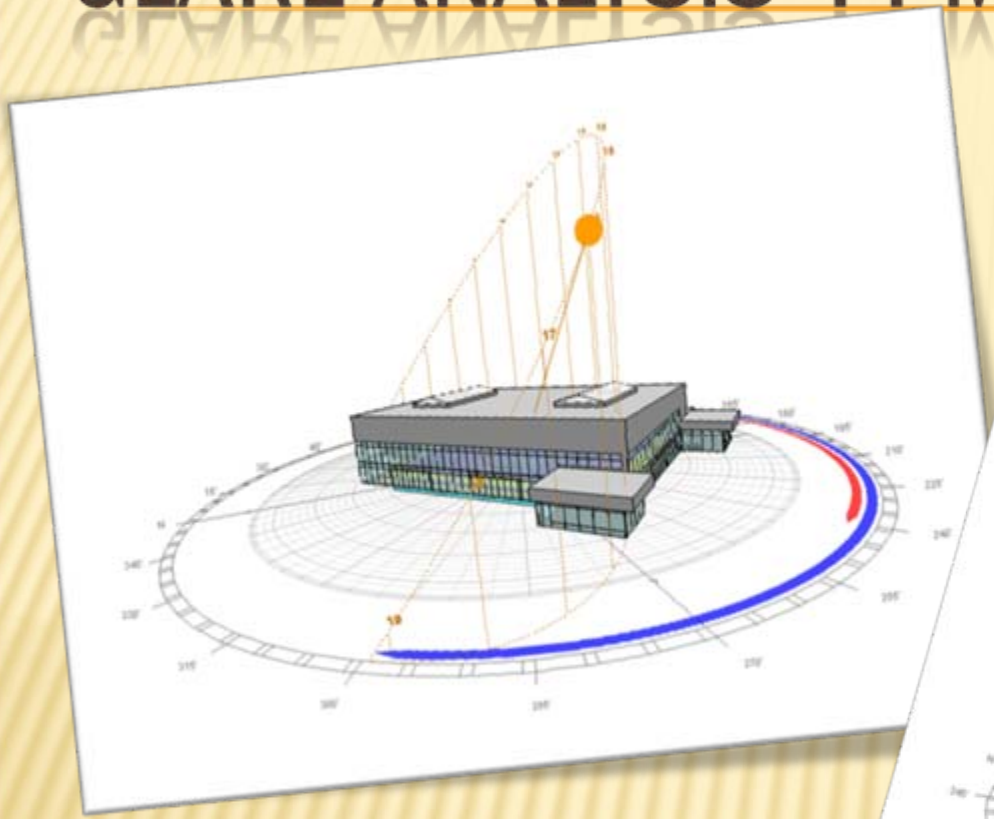
REPLACE TOP 10 FT GLAZING WITH KALWALL

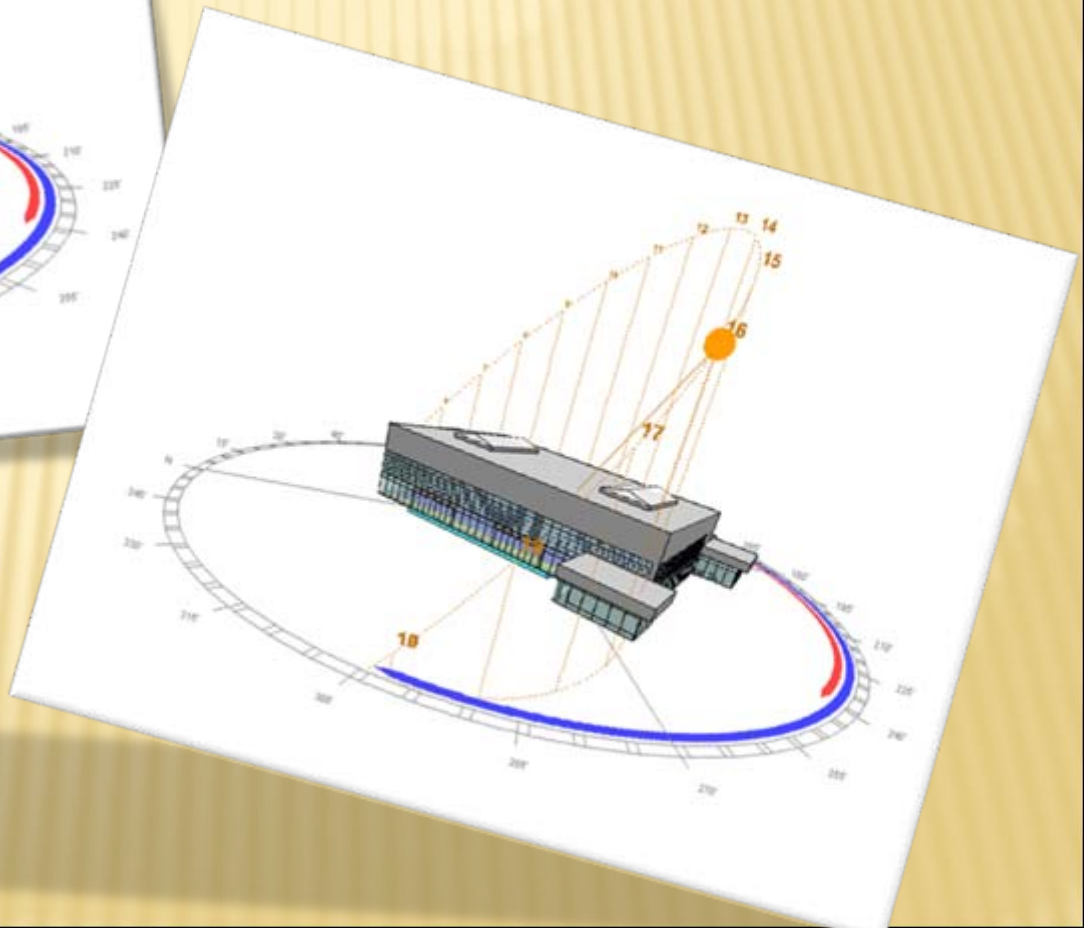


TOP 10 FT TRANSLUCENT

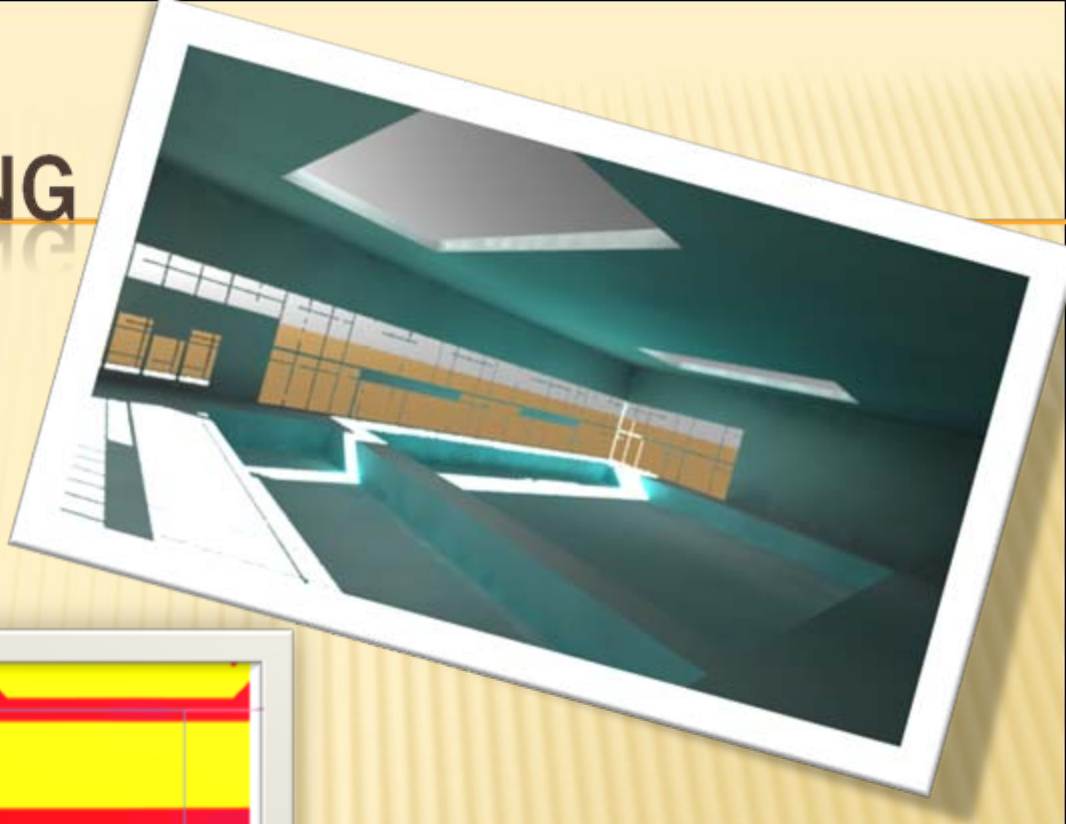


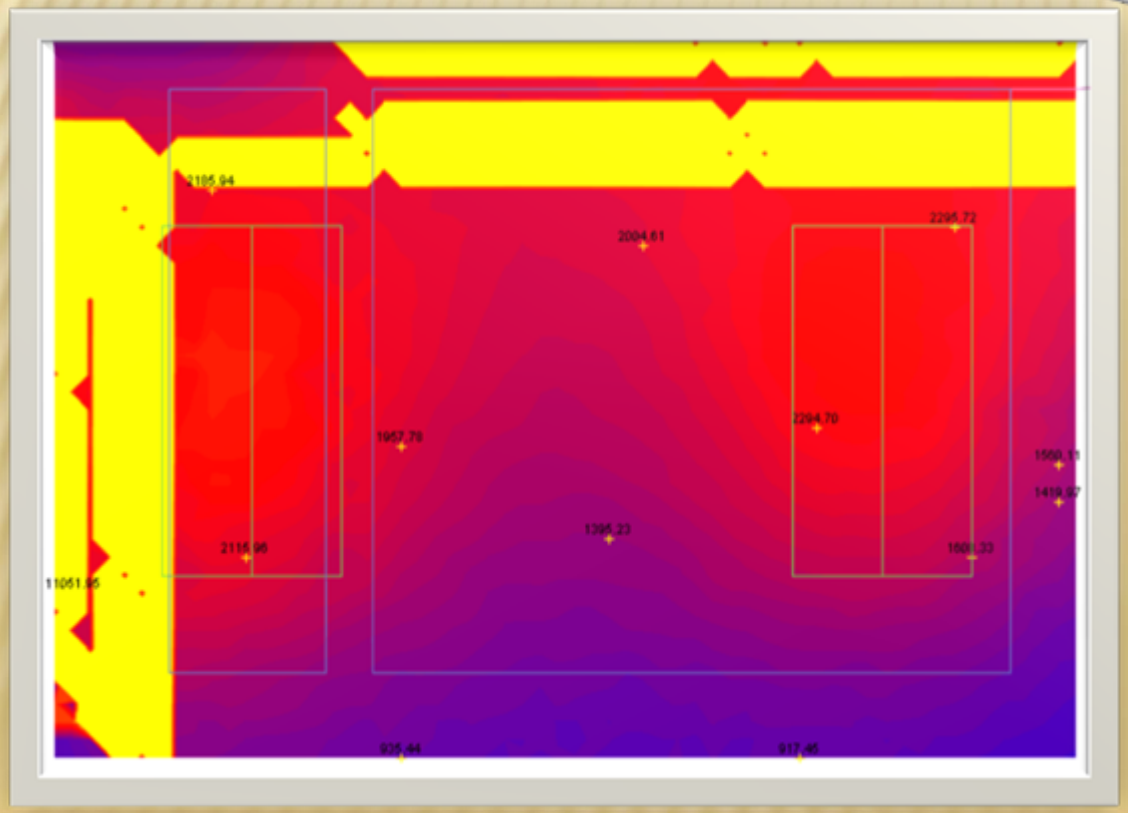
GLARE ANALYSIS 4 PM (AFTERNOON SUN)





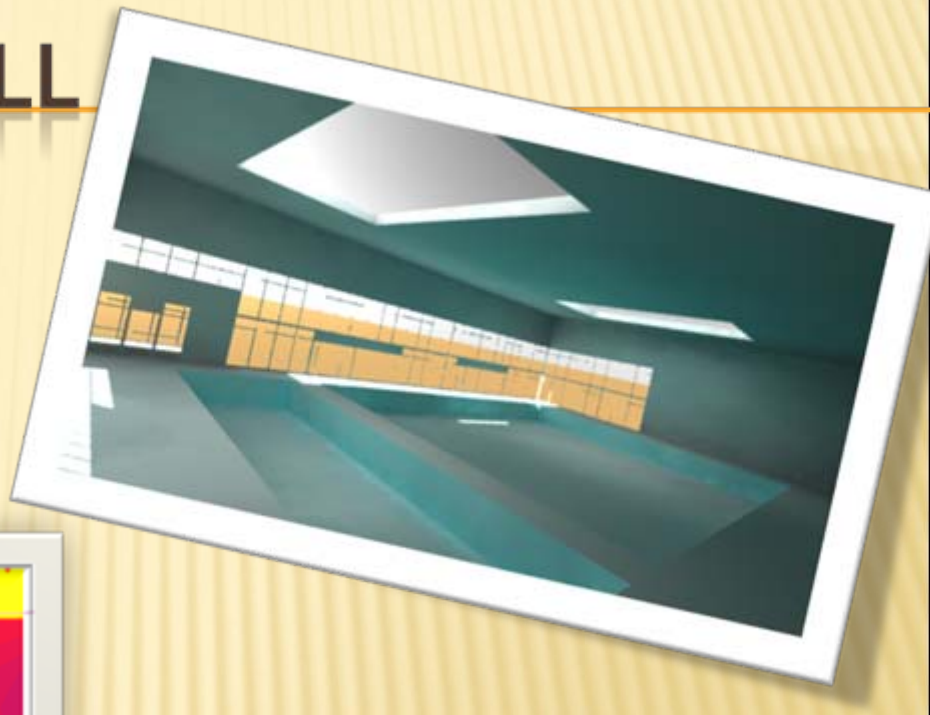
ALL VISION GLAZING

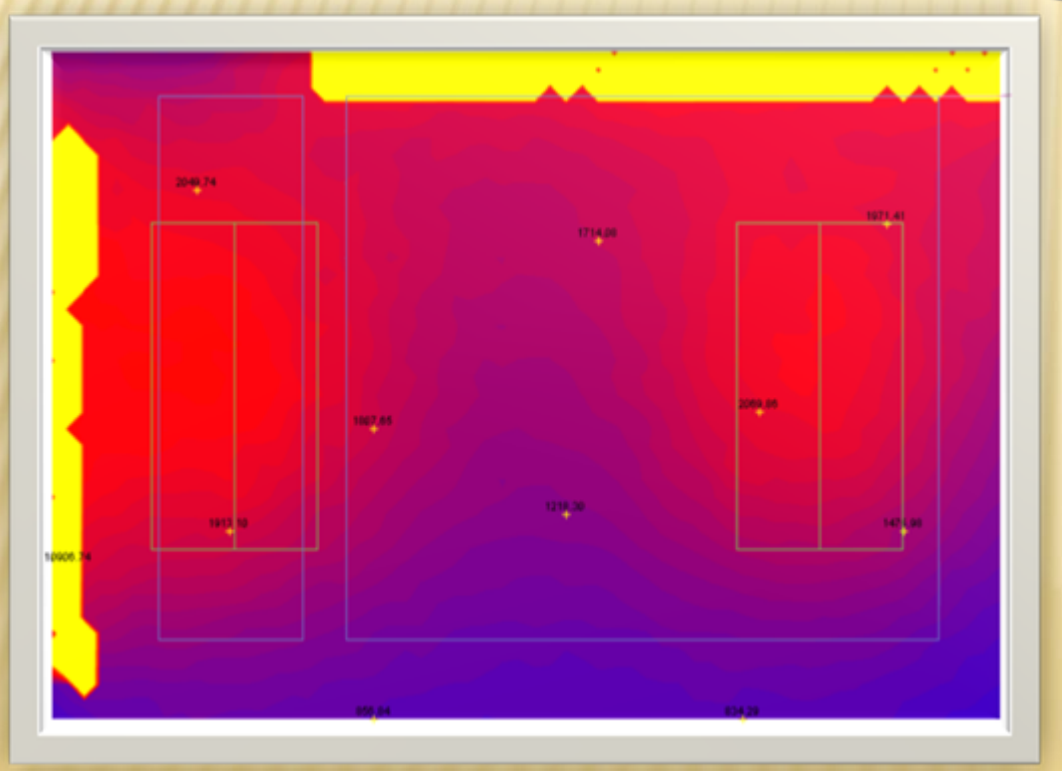




GLARE INSIDE POOL LIFE-SAFTY ISSUE.

TOP TEN FEET KALWALL



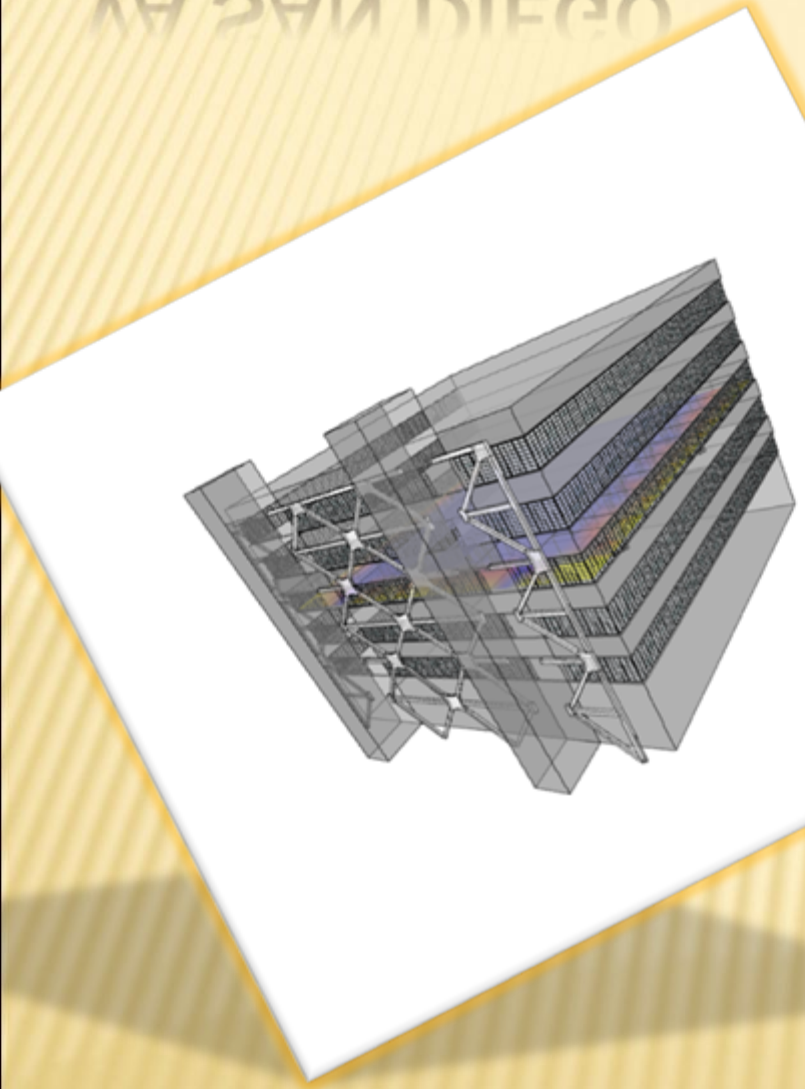


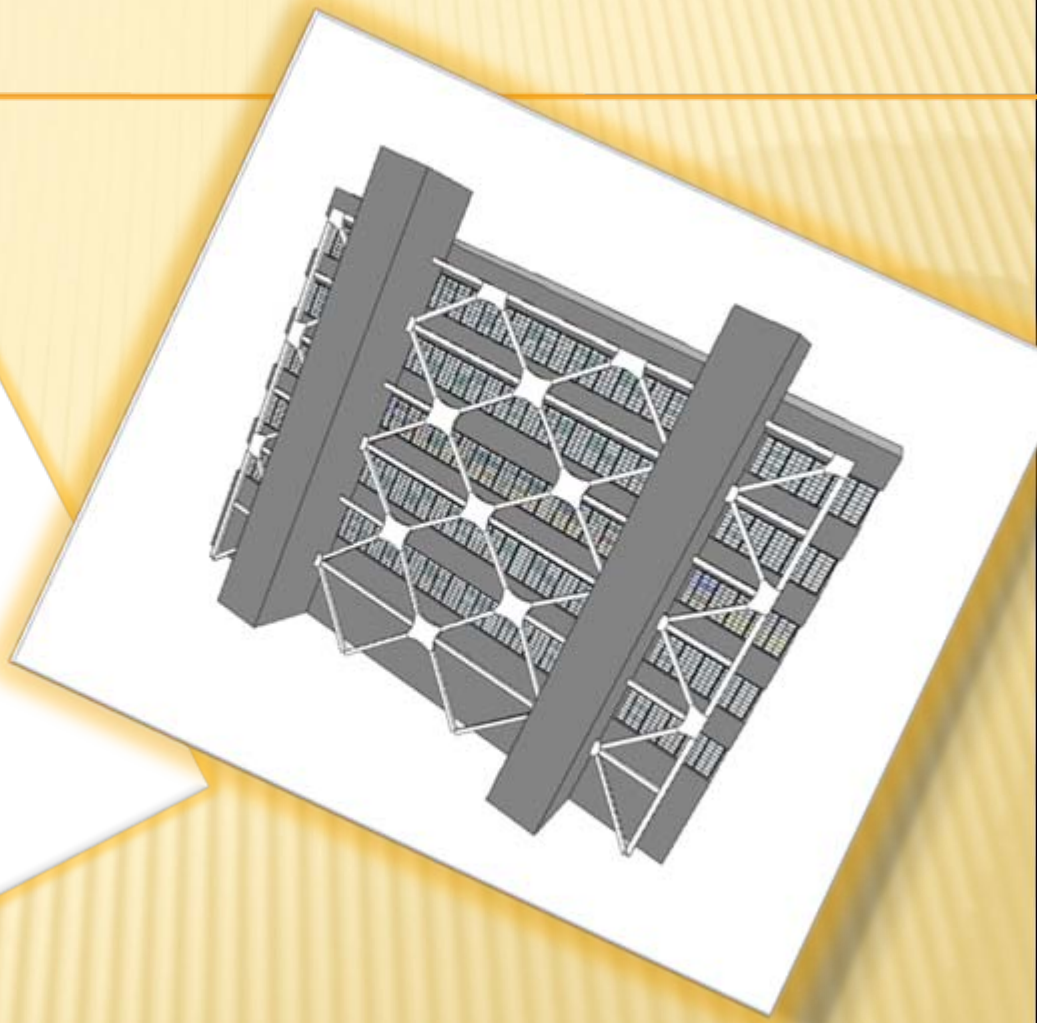
LESS GLARE IN POOL AREA. POOL DECK IS AFFECTED BUT NOT POOL ITSELF.

CONCLUSIONS

- Reduced glare
- Reduced scope on the roof/increased scope on the walls
- Built trust and increased accessibility to decision makers
- Repeat customer
- Building's daylight optimized

VA SAN DIEGO





CASE STUDY #2

- V.A. San Diego-San Diego CA

  Translucent and vision glazing combination

  Kalwall 12% LT

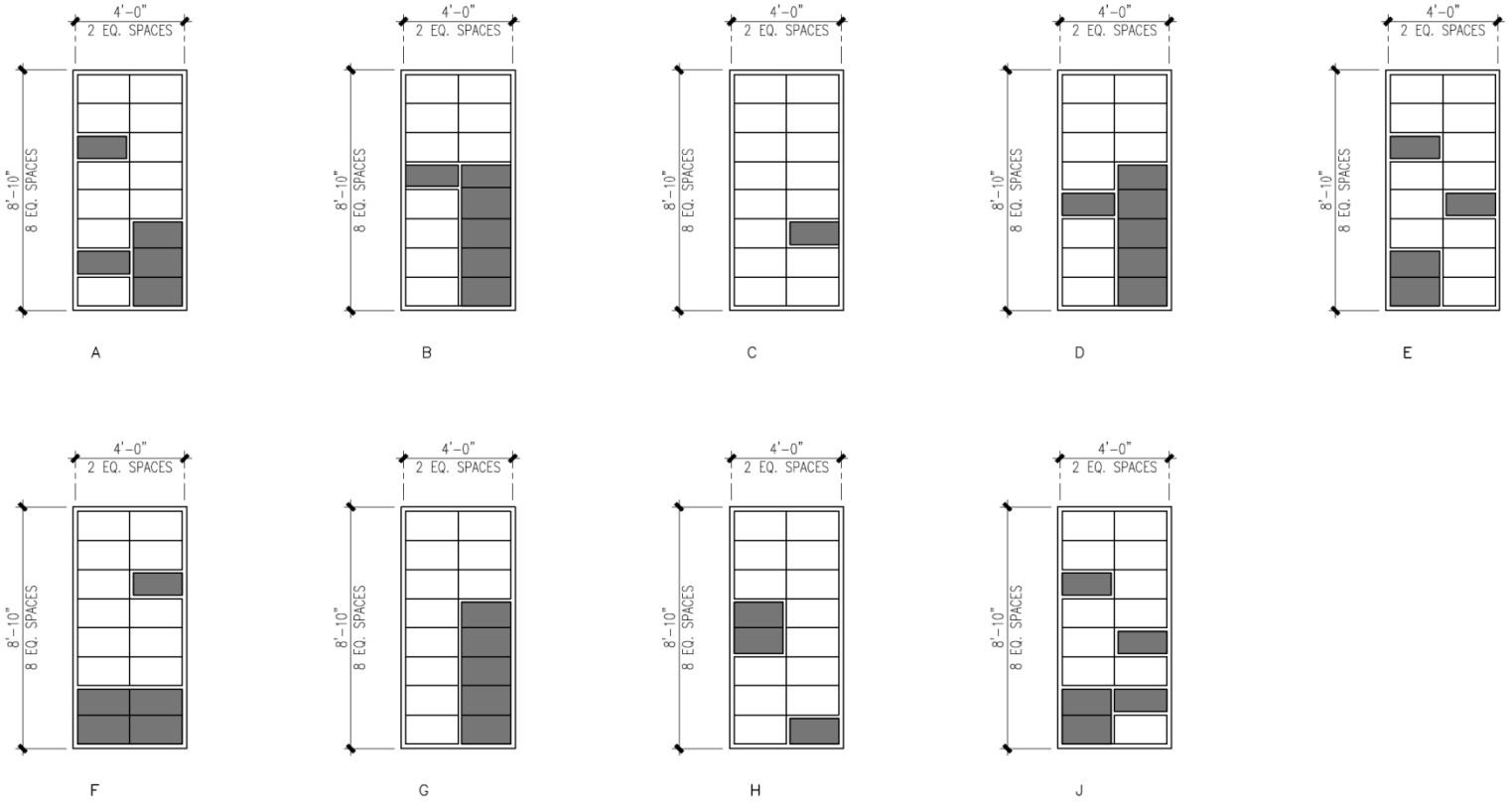
  Vision Glazing 40% LT

  South Elevation 158’-10” X 8’-10”

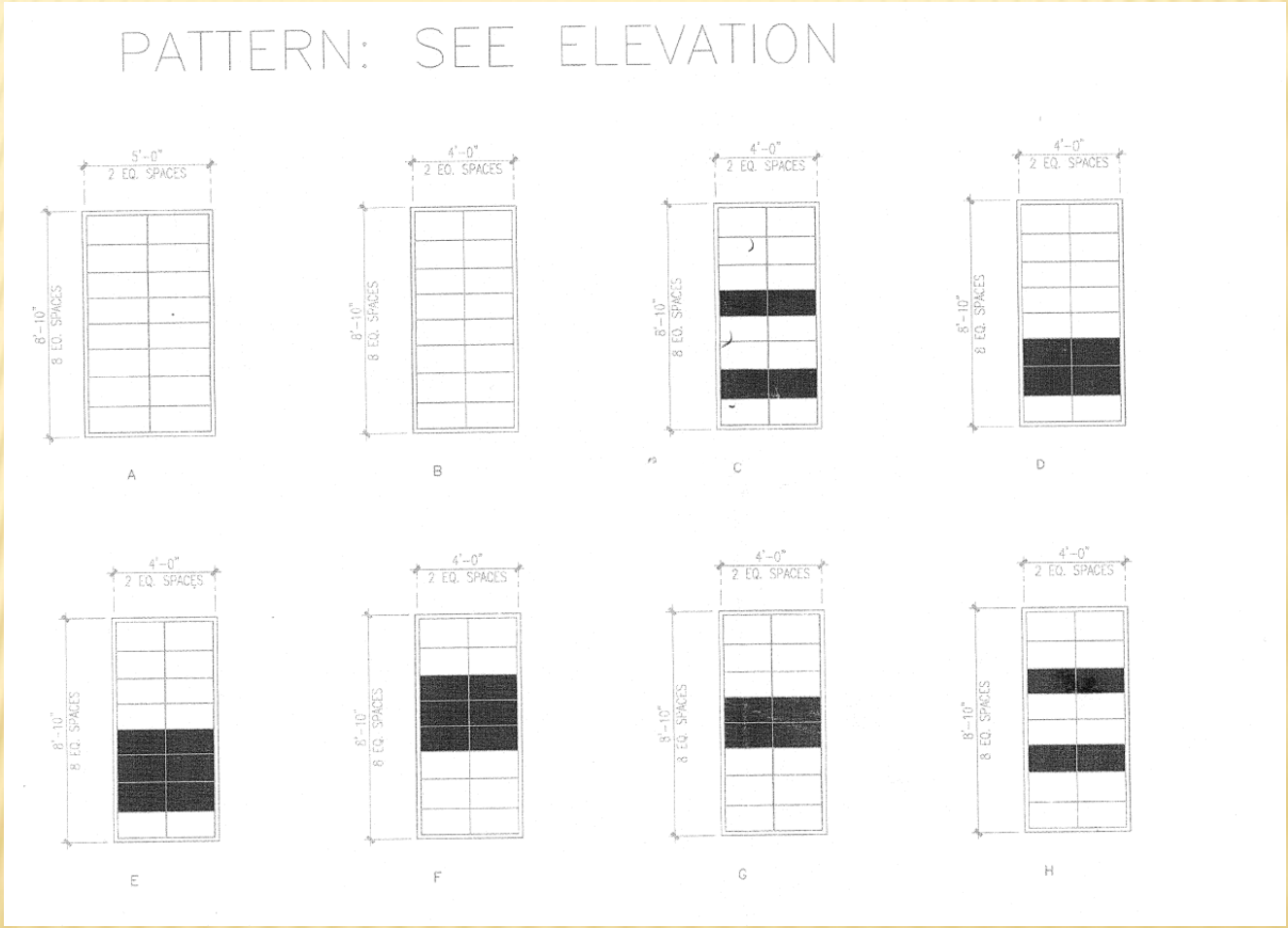
  East and West Elevation 152’-10 X 8’-10”

ORIGINAL PANEL CONFIGURATIONS

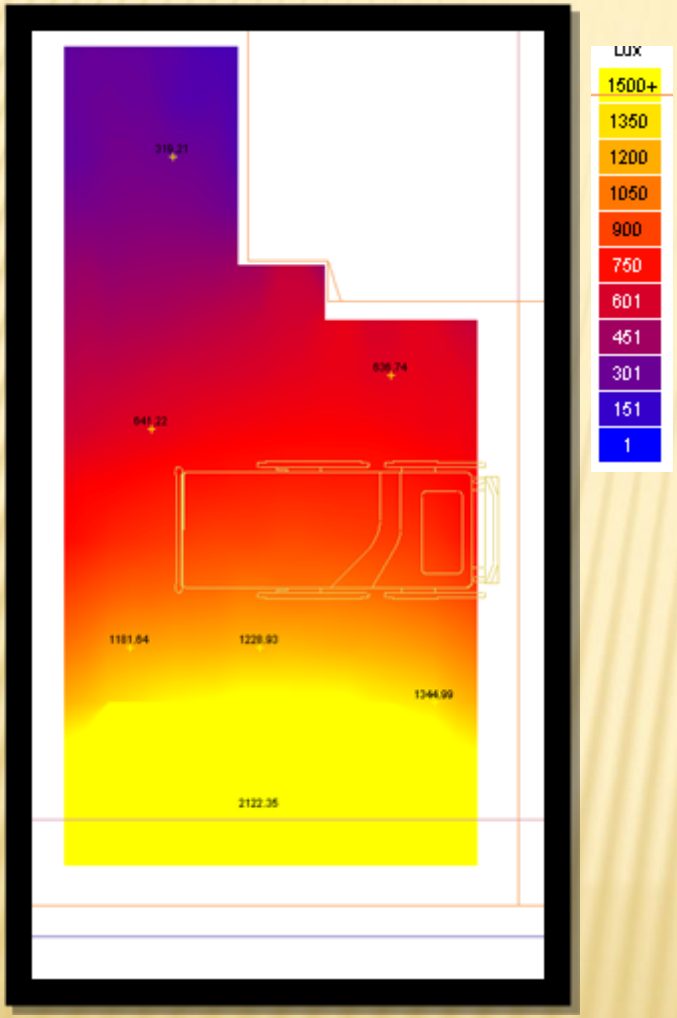
PATTERN: A,B,C,D,E,F,G,H,J,K,(REPEATING)

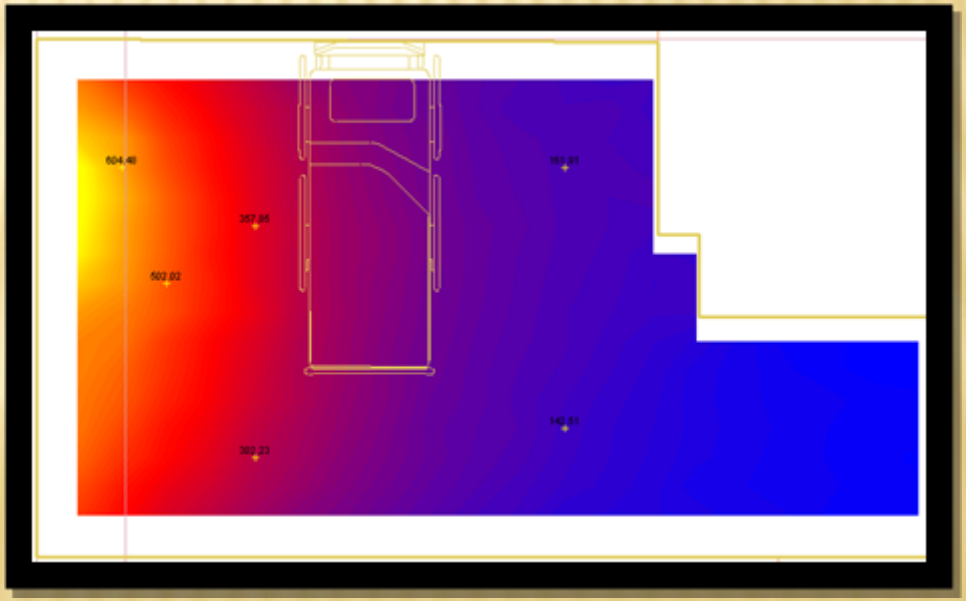


NEW PANEL CONFIGURATION

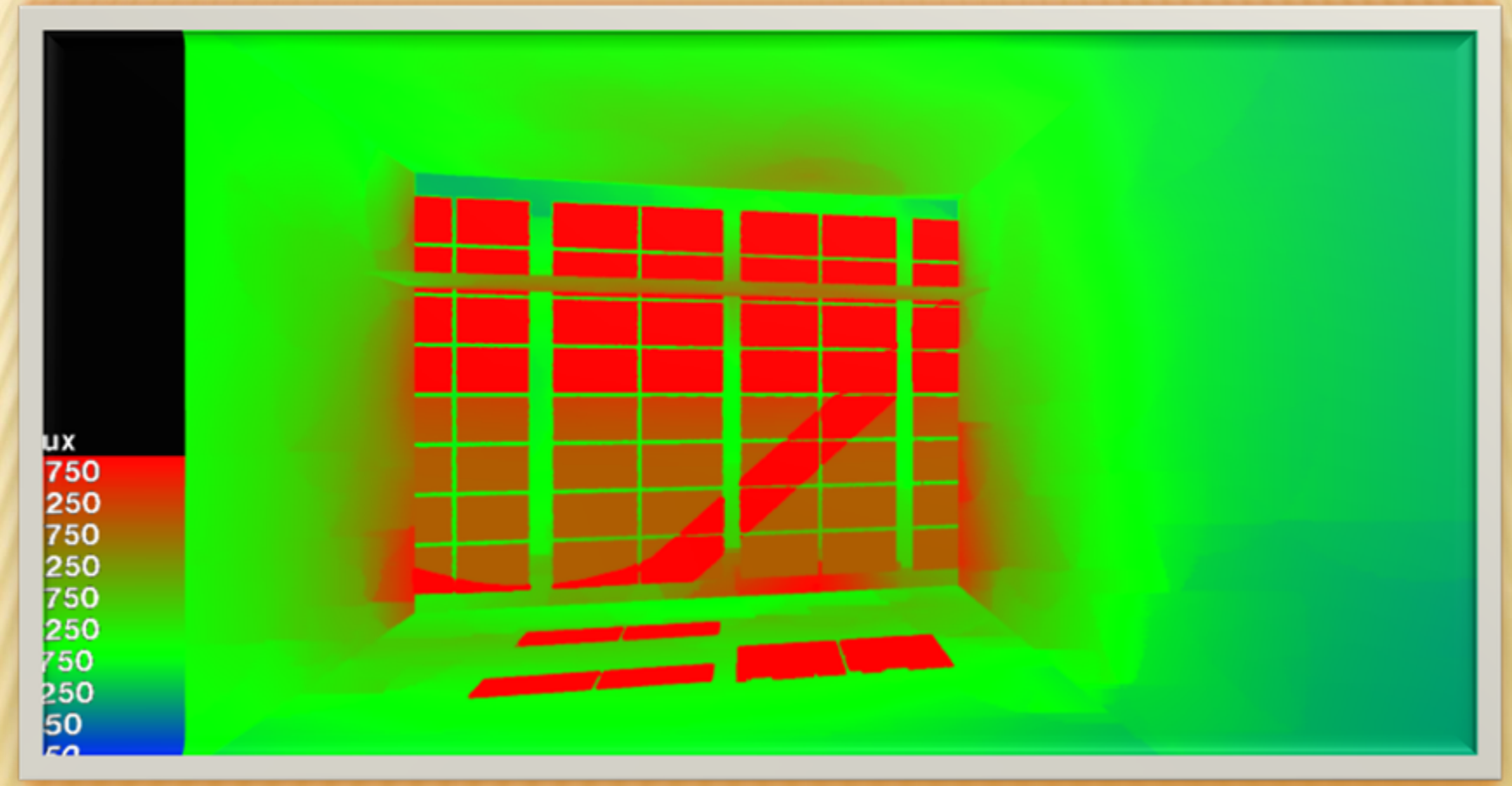


Radiance South and East examples





FALSE COLOR MAP SHOWS WHERE DIRECT BEAM THROUGH GLASS PROVIDES HIGH ILLUMINANCE IN COMPARISON WITH KALWALL



SAME PICTURE AS ABOVE (NO COLOR ASSIGN TO ILLUMINANCE VALUES) LIGHT SHELVES ARE NOT INFLUENCING THE LIGHT DISTRIBUTION OF THE TRANSLUCENT LIGHT PANELS IN THIS APPLICATION.

CONCLUSIONS

- Changed original design to usable units
- Identified glare before installation
- Increased Kalwall scope.
- Showed architect potential “user” discomfort.
- Educated Architect on translucent facade performance eliminating “light shelf” design feature.