Master Suite Sunroom

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Requirements

- Outdoor space (Summer)
  - Sunbathing (midday)
  - Lounging (evenings)
- Indoor space (Winter / rainy days)
  - Reading room
- *Same space*
- *Feel like a room*

Requirements (specific)

- ***Privacy***
- Sufficient sun during (summer) sunbathing hours
- Comfortable (summer) evening environment
- “Nice view” – of yard *and* sky
- No “fussiness”

Assumptions

- On southern side of home
- Located in Northeast U.S. (e.g. New York)
  - Prevailing winds primarily westerly
- Line of sight
  - “downward” view into space not a problem
- Roof sloped sufficiently to not provide midday shadows
  - First approximation; refine in subsequent designs

Preliminary Design

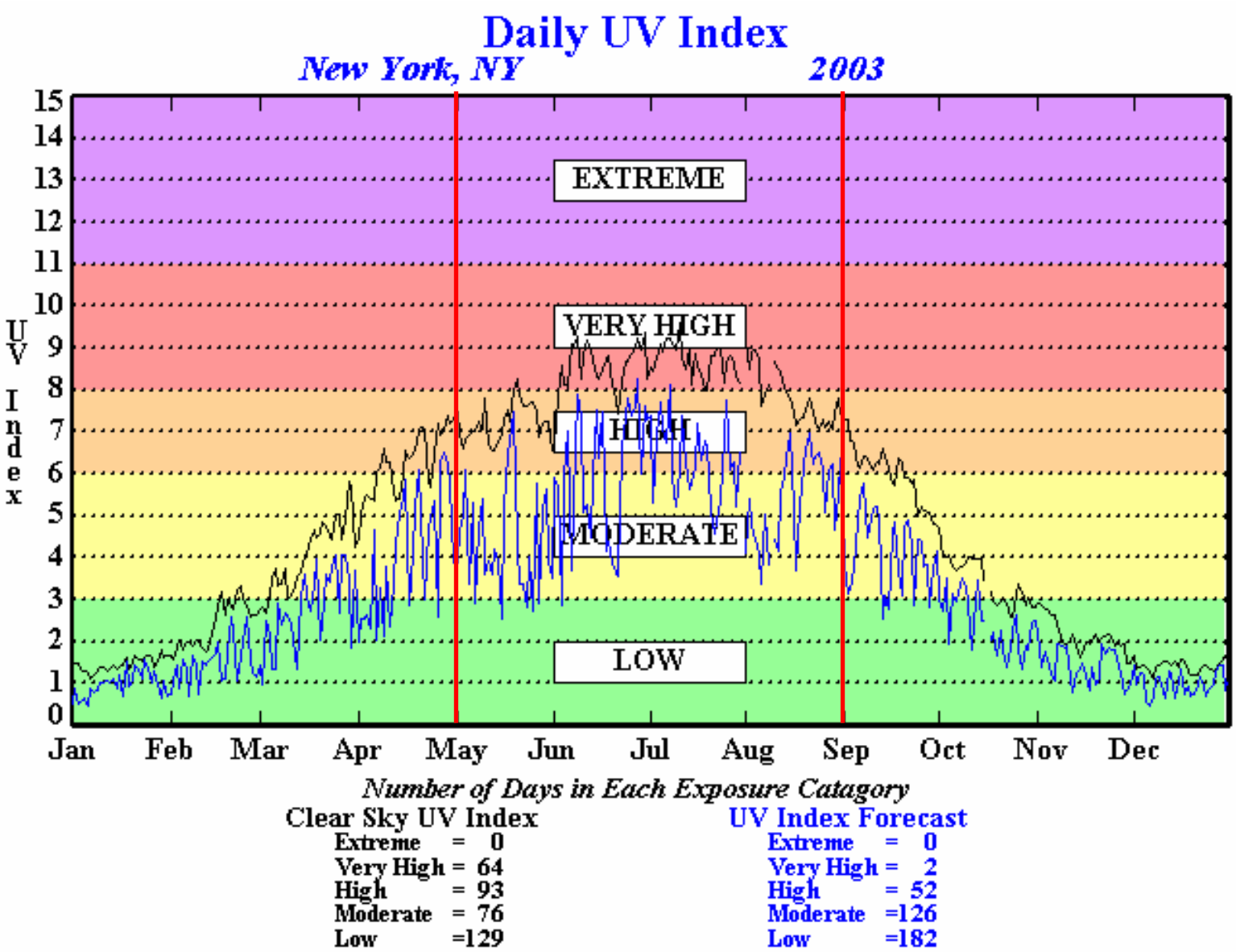
- No “fussiness”
  - → “Passive” design; minimal moving parts
- Comfortable evening atmosphere
  - → Western wall to shield sun and wind
- ***Privacy***
  - → Eastern wall (walls on 3 sides)
- Sufficient sun during sunbathing hours
  - Determines floor sizes
- “Nice view” – of yard *and* sky
  - Deal with on 2nd iteration

Early Concept Drawing

Quantified Design Requirements

- Size
  - 7’ walls
    - Privacy and “coziness”
    - Avoid cavernous feel
  - Sunbathing footprint 6’ wide
    - 2 chairs @ 2.5’ wide with 1’ clearance
- Sunbathing times
  - May – August (see next slide)
  - 10 am – 2 pm

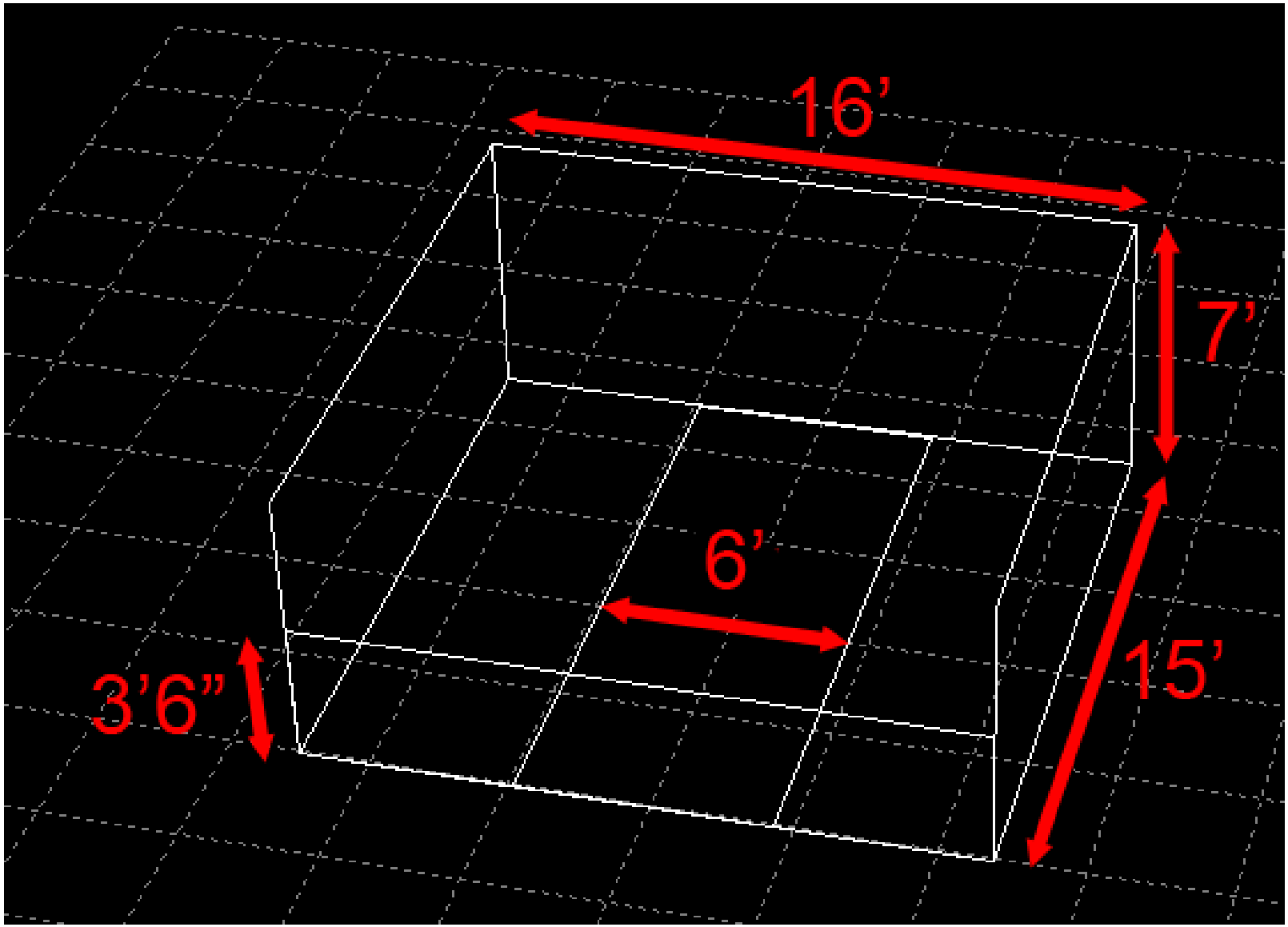
UV Index *(from National Weather Service)*



Meeting Sunbathing Req'ts

- Critical conditions are
  - End of August
  - 10am & 2pm
- Req'd width (for sunbathing)
  - For 7' walls, require ~5' for shadows
  - Results in an overall width of 16'

Schematic

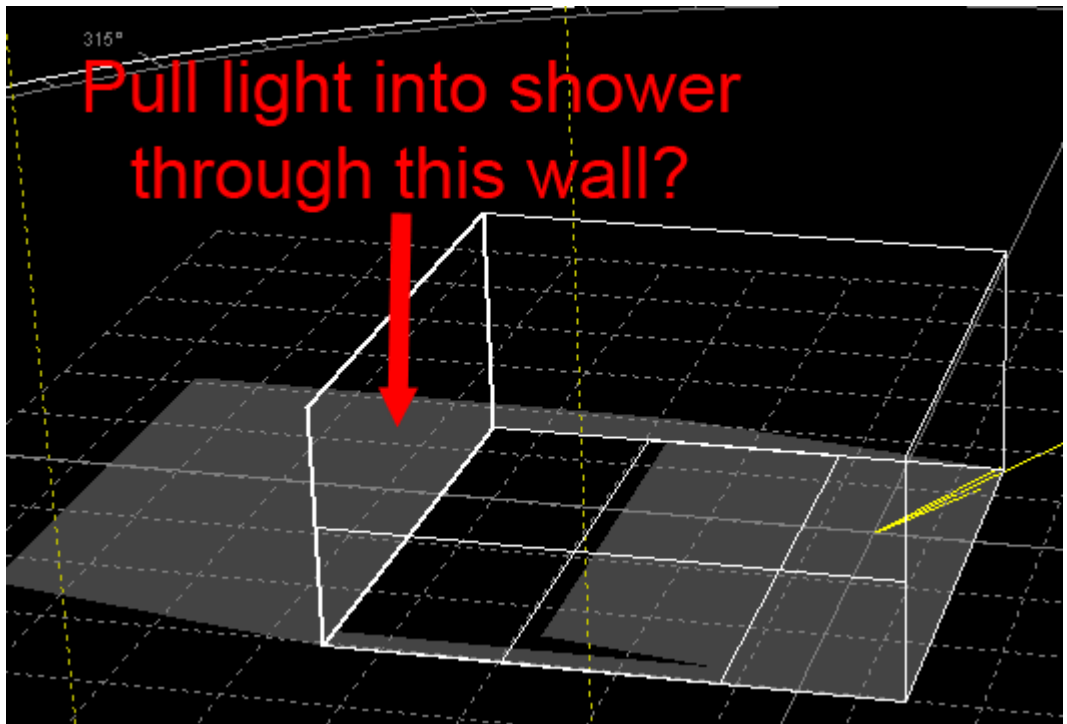


Next step?

- Other times of interest
  - 5pm to 7pm – evening lounging
  - 7am to 8am – morning shower
- (Postpone winter use design)

Summary – other times of day

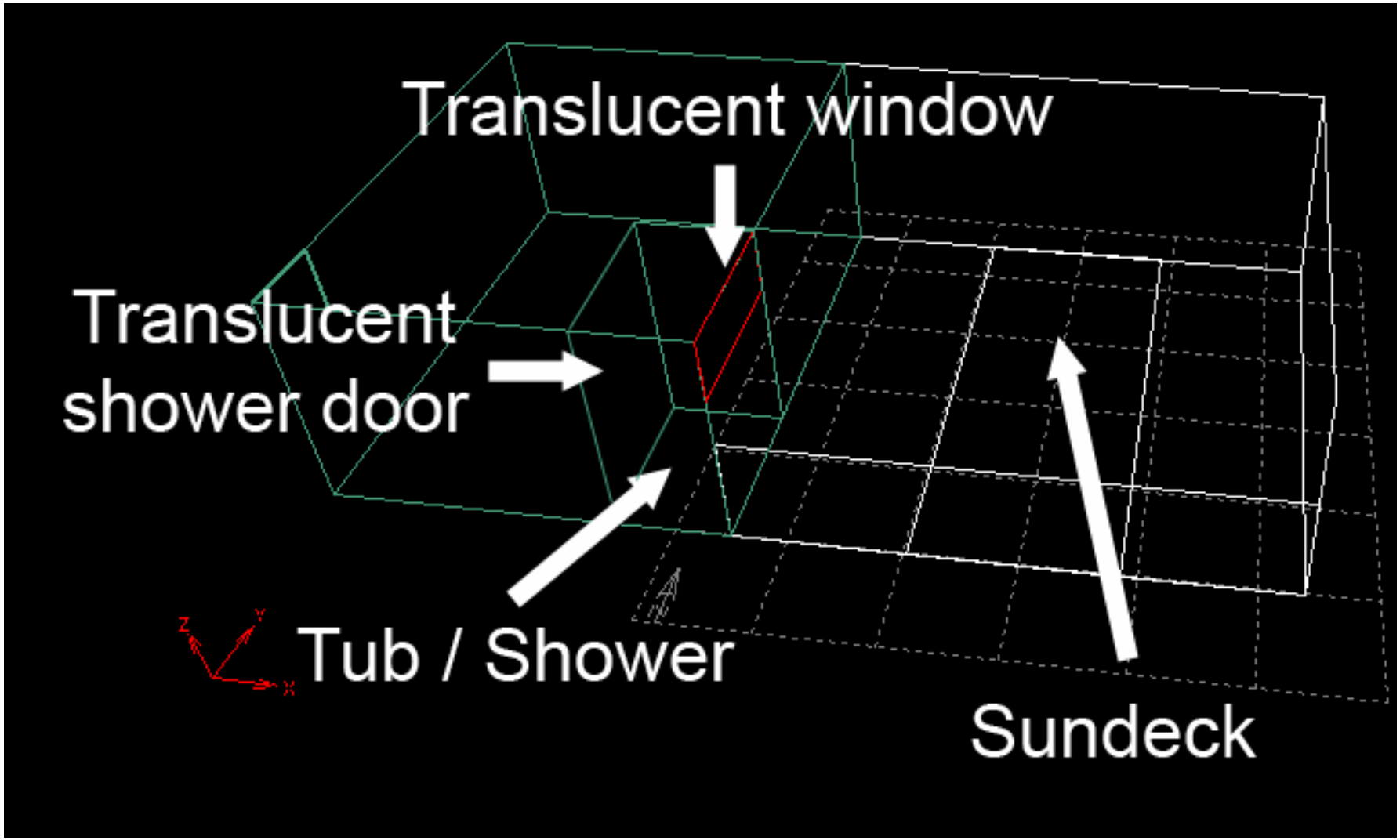
- Evening sun successfully blocked
- Way to pull in morning sun???
  - Incorporate window into shower?



Naturally Lighting the Shower

- Realistically, will require improved wall/roof design
  - Currently, sun blocked too often
- For now, focus on one day/time to assess feasibility
  - June 1 at 8 am
- Assume tub / shower is 5’x3’

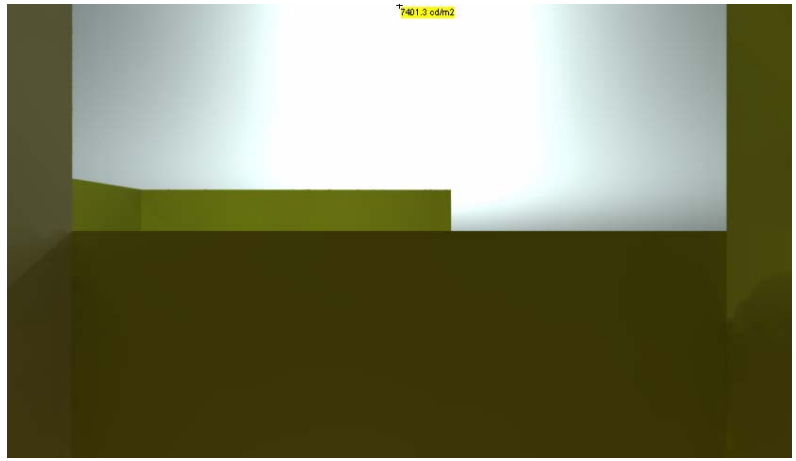
Concept 1 – Window on wall



Radiance Results – Window on Wall

From inside shower

Max ~ 7400 cd/m²

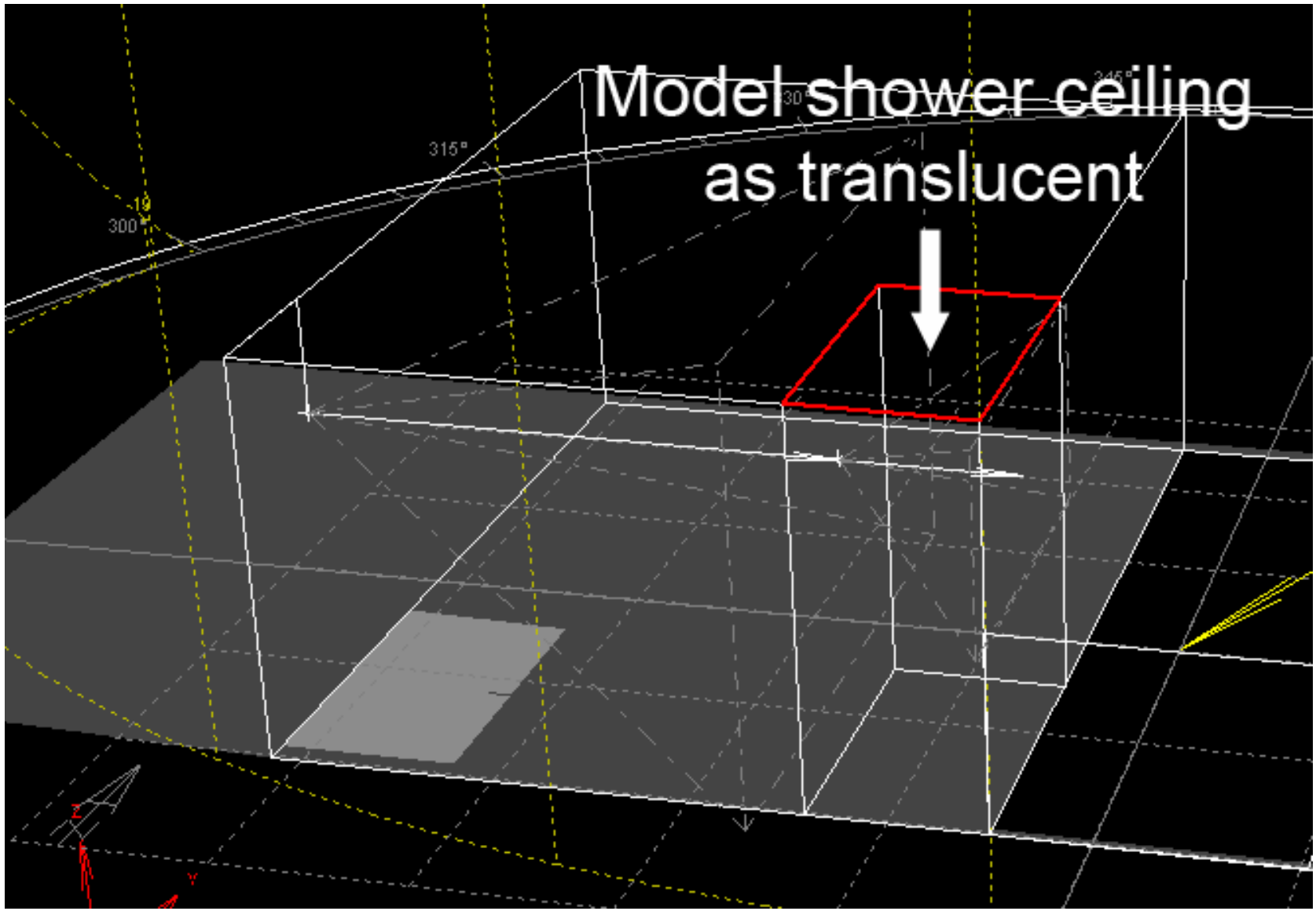


From wall opposite shower

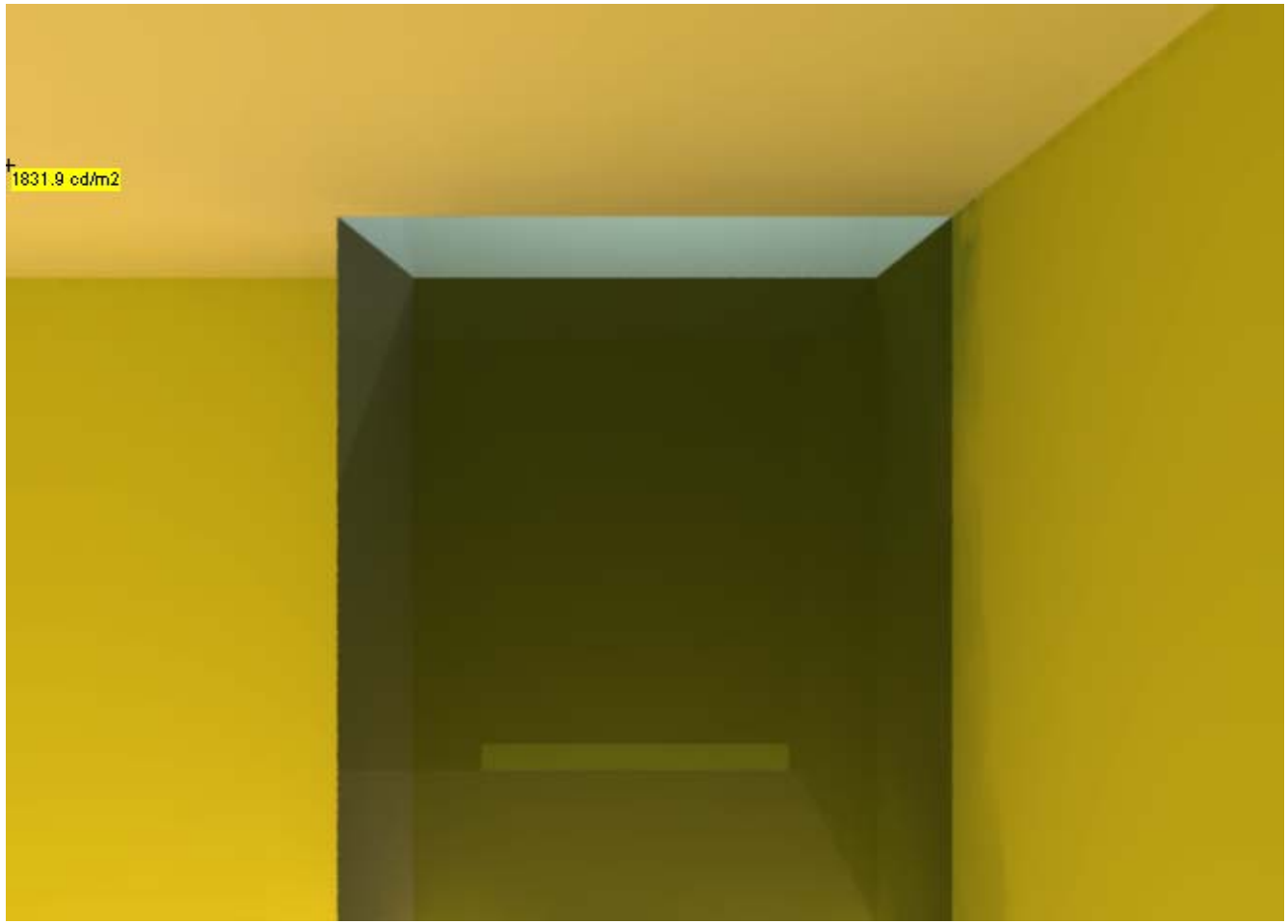
Max ~ 3100 cd/m²

GLARE or ECOTECT/Radiance problem???

Concept 2 – Light brought in from above



Radiance Results – Light from above



***View from wall opposite shower**, Max ~ 1800 cd/m2*

Radiance simulations summary

- Error somewhere???
  - Units problem???
- Nonetheless, “light from above” much more promising
  - Less glare
  - More even lighting in rest of room

Future Work

- Model sloped roof
  - Lower walls slightly
  - Narrow the deck
- Details of shower lighting
- Way to warm deck in evening without direct sunlight in face?
- Quantify skyward view requirements
- Winter use design
  - Must happen after summer use design

Acknowledgements

- Paul Harrison