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’
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?

Pull light into shower through this wall?
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