BUILDING INNOVATION
Conference

Designing for our Future - Climate Forward Design

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Learning Objectives

- Discover the importance of designing for extreme weather, including short duration high volume storms.
- Examine why future thinking codes and immediate implementation is needed to prepare society and our world for the future.
- Deeper understanding of our role in progressing things quickly as climate change outpaces our efforts.
- If electrification is our future, then understanding micro-gridding and higher efficiency micro-grids are needed now.
- How actual effort by designers, engineers, consultants, developers and all involved especially in upgrading existing building stock is needed in volume.

Presentation Outline

Basic purpose of buildings

Building types and considerations

- Existing vs. New assets

Overview of design considerations

- Climate change
- *Durability and redundancy*

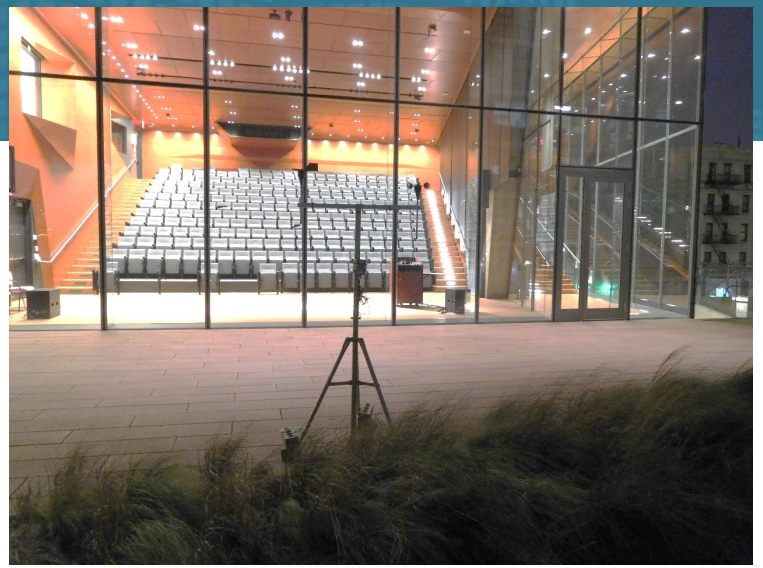
Future codes – Future Ready Needed Now

Purpose of Buildings

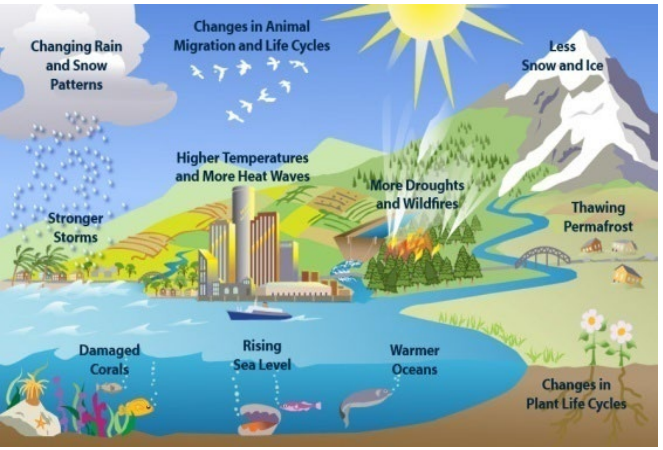
1. Provide shelter
2. Separate and protect us from outside environment
3. Life safety
4. Building science considerations
5. User experience
6. Use type
7. Minimizing impact while maintaining

Building Examples and Types – Existing Assets

Building Examples and Types – New Assets



Impact of Climate Change



Change in type of precipitation events

- Increased volume/shorter duration
- More severe storms/higher winds
- Flooding

Solar considerations

- Increased radiation
- Examine SHGC and window films

Wind, Fire and Future Considerations

Need for improved durability, redundancy, and long-term planning of your asset(s)

Asset Management Planning (AMP)

Existing building versus new construction

- **If new construction, set asset management plan at completion of construction**
- **If existing, perform condition assessment and testing to develop asset management plan**
- **Set schedule and priority:**
  - Life safety
  - Maintenance cycles
  - Ease of doing multiple tasks simultaneously
  - Capital cost planning

Code Considerations

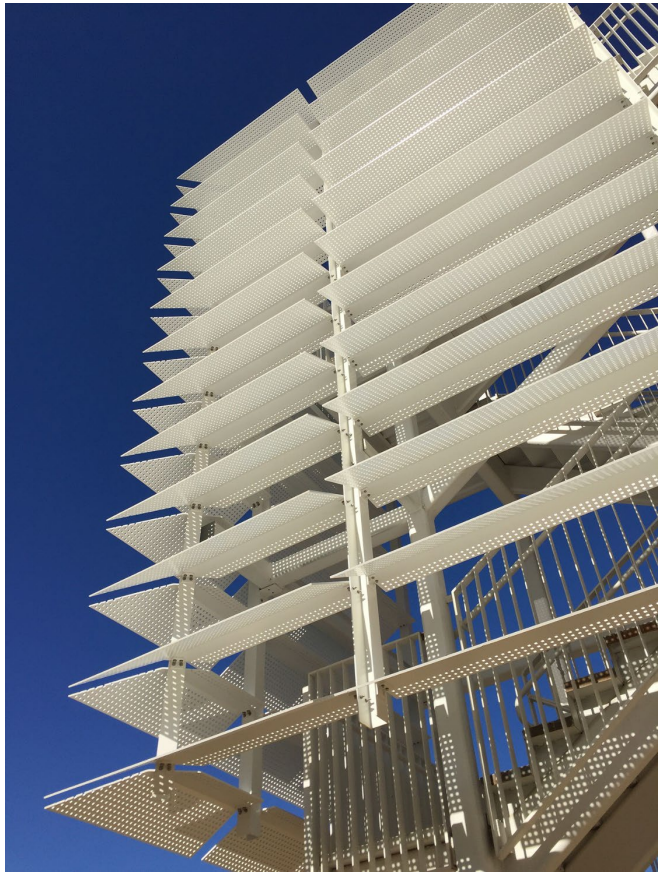
Wind Buffering

Flood Proofing

Use More Recent Data and Future Mapping for Climate Ready Codes

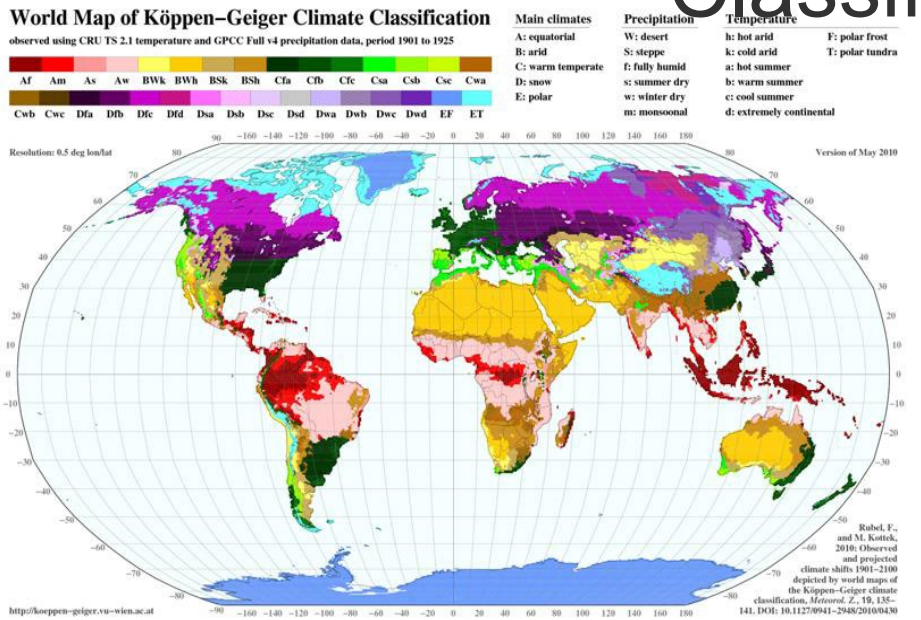
Three Storm Design

Apprenticeship programs

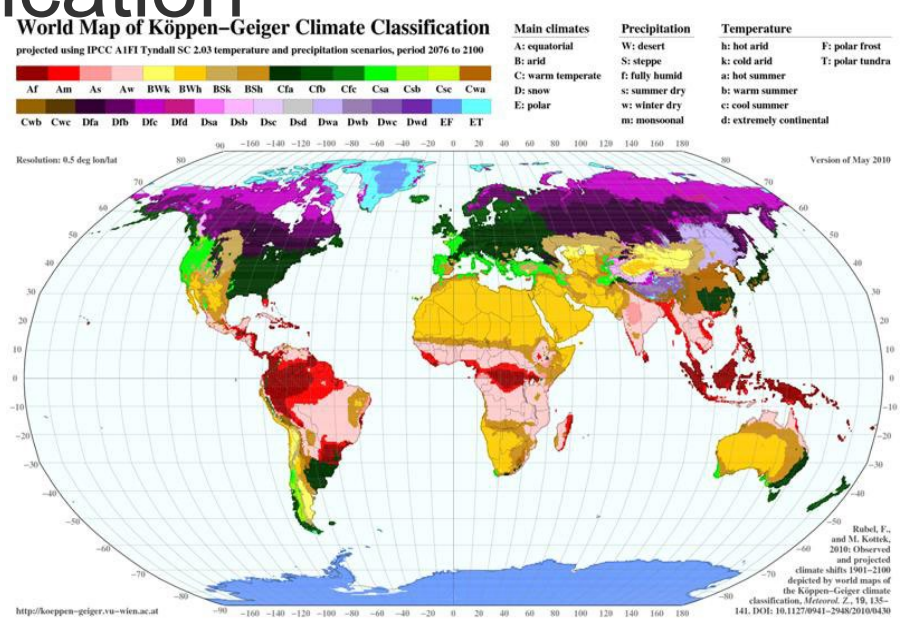


Climate Change

World Map of Köppen-Geiger Climate Classification



1901-1925

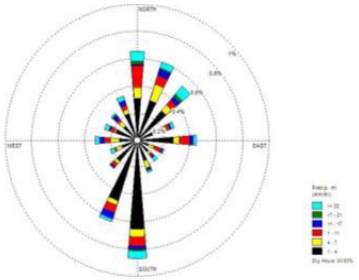


2076-2100

DC: Cfa Climate

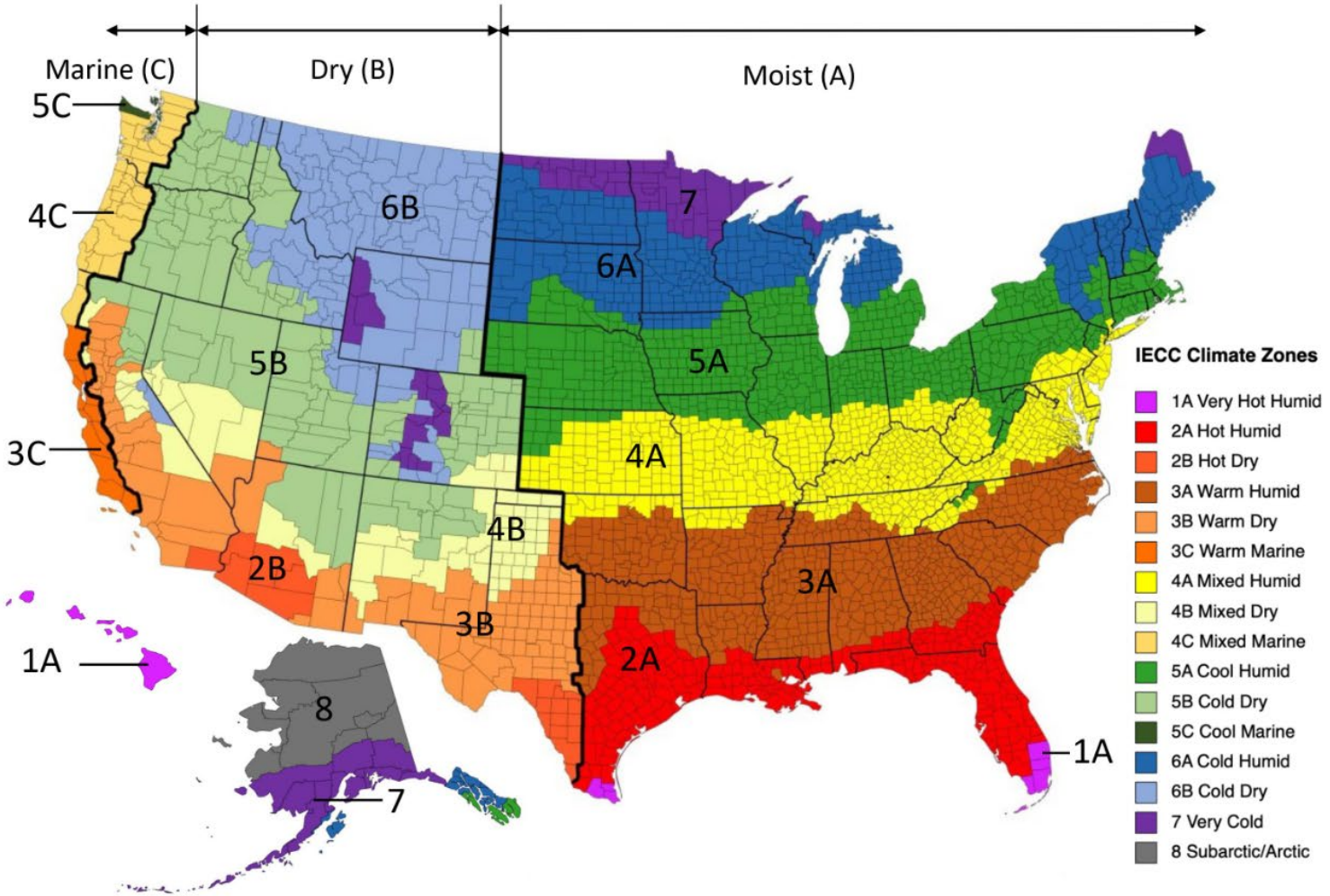
Warm Temperate, Fully Humid, Hot Summer

Importance of Climate Variation



- Review of macro and micro climate
  - Understand the climate zone
  - Rain fall volume considerations
- Micro climate specific to your site
  - Review of site topography
  - Development density
  - Neighboring existing buildings and planned future development
- Existing building versus new construction
- Orientation of building and considerations by elevation

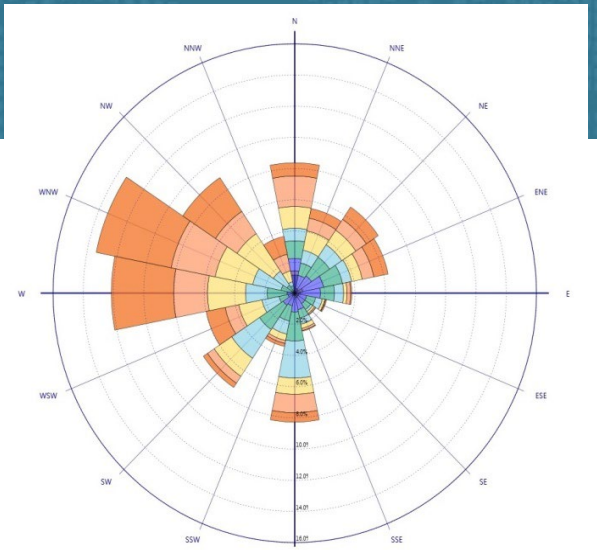
Climate Zones



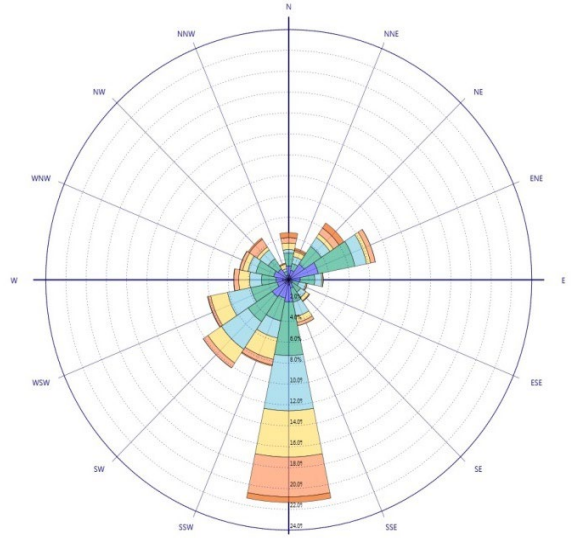
* IECC 2021 Climate Map

Seasonal Evaluation

Winter



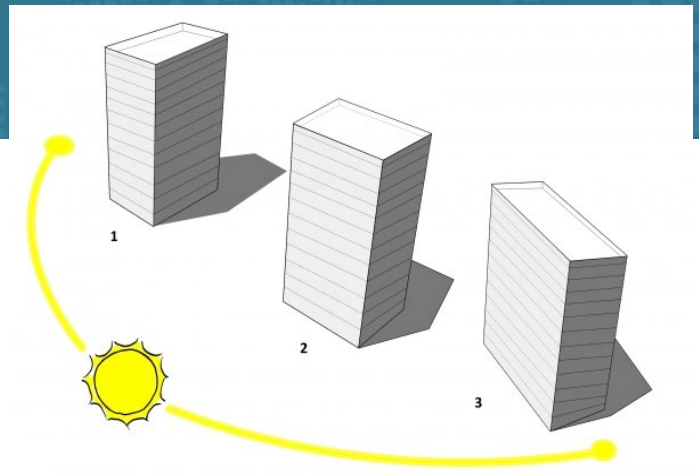
Summer



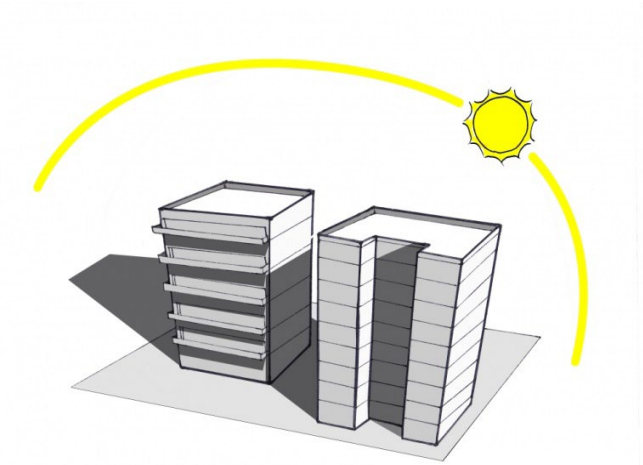
Need to understand seasonal variations:

- Short winter
- Mold count and pollen count
- Heavy rain in spring and summer
- Similar and varying heights of buildings in certain cities and affect on wind flow
- Increased building volume and weight
- Wind flow variations
- Heat gains
- Exterior humidity levels

Building Design Considerations



SOURCE: http://sustainabilityworkshop.autodesk.com/buildings/building-massing-orientation

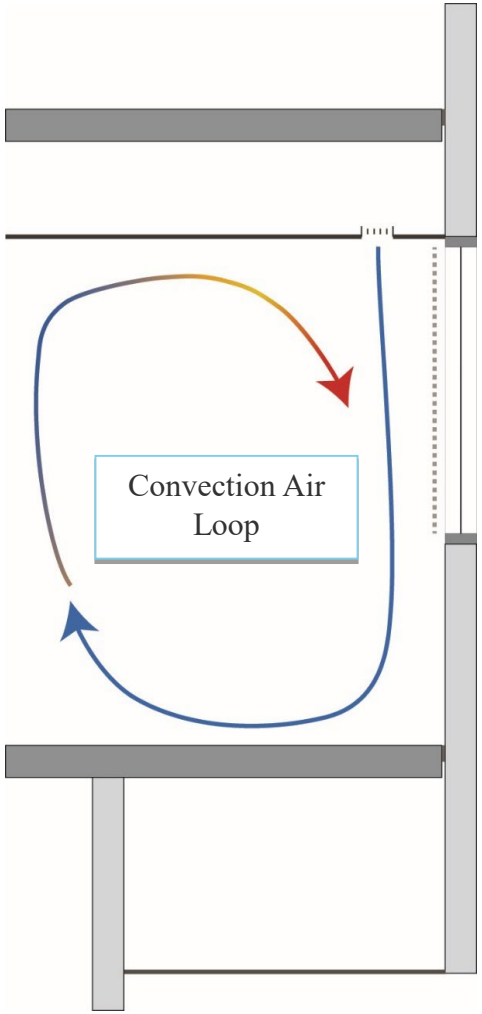


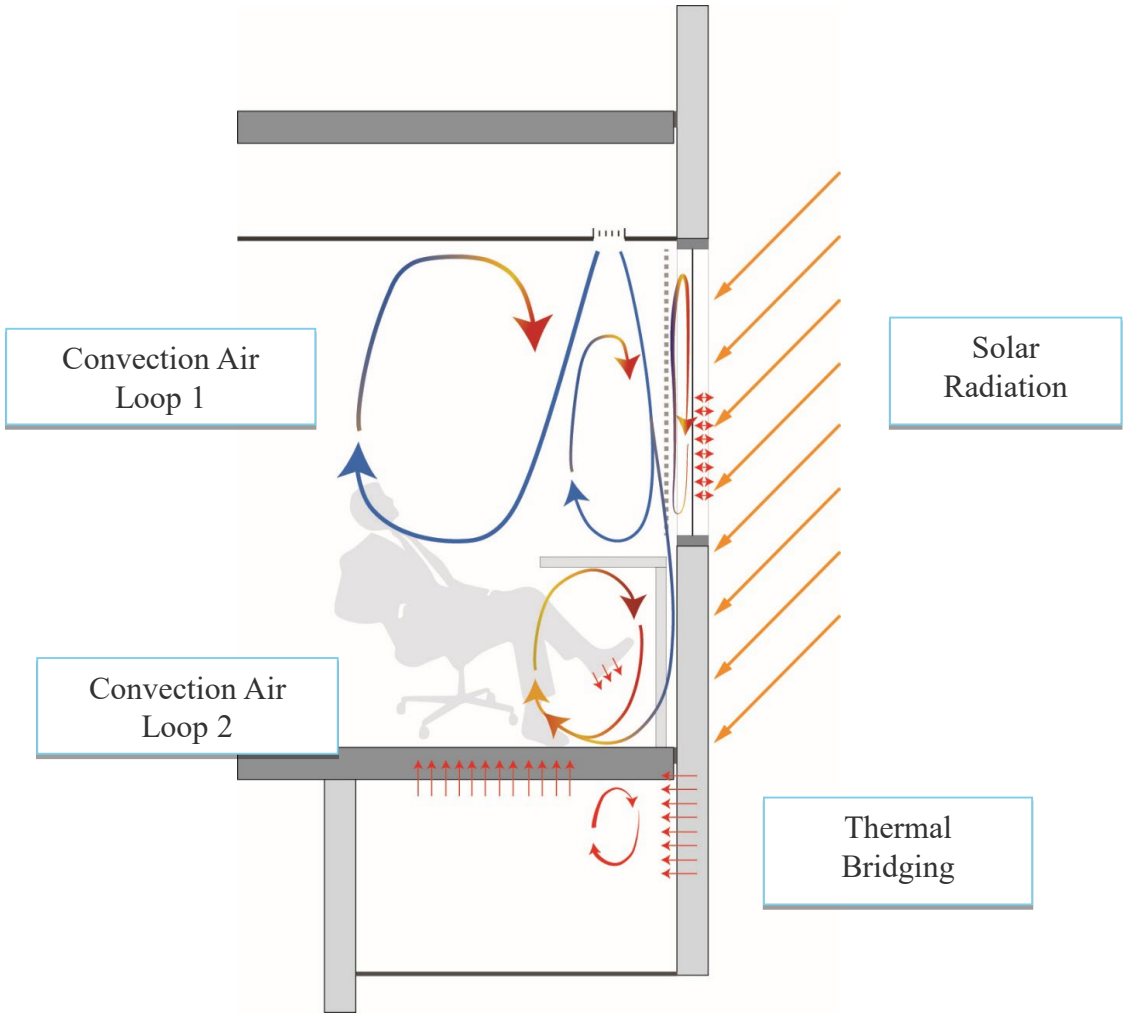
SOURCE: http://sustainabilityworkshop.autodesk.com/buildings/building-massing-orientation

- Orientation
- Floor plate – shape, depth
- Layout and type of mechanical systems
- Where are People Positioned
- Occupant comfort expectations – stretching the comfort zone

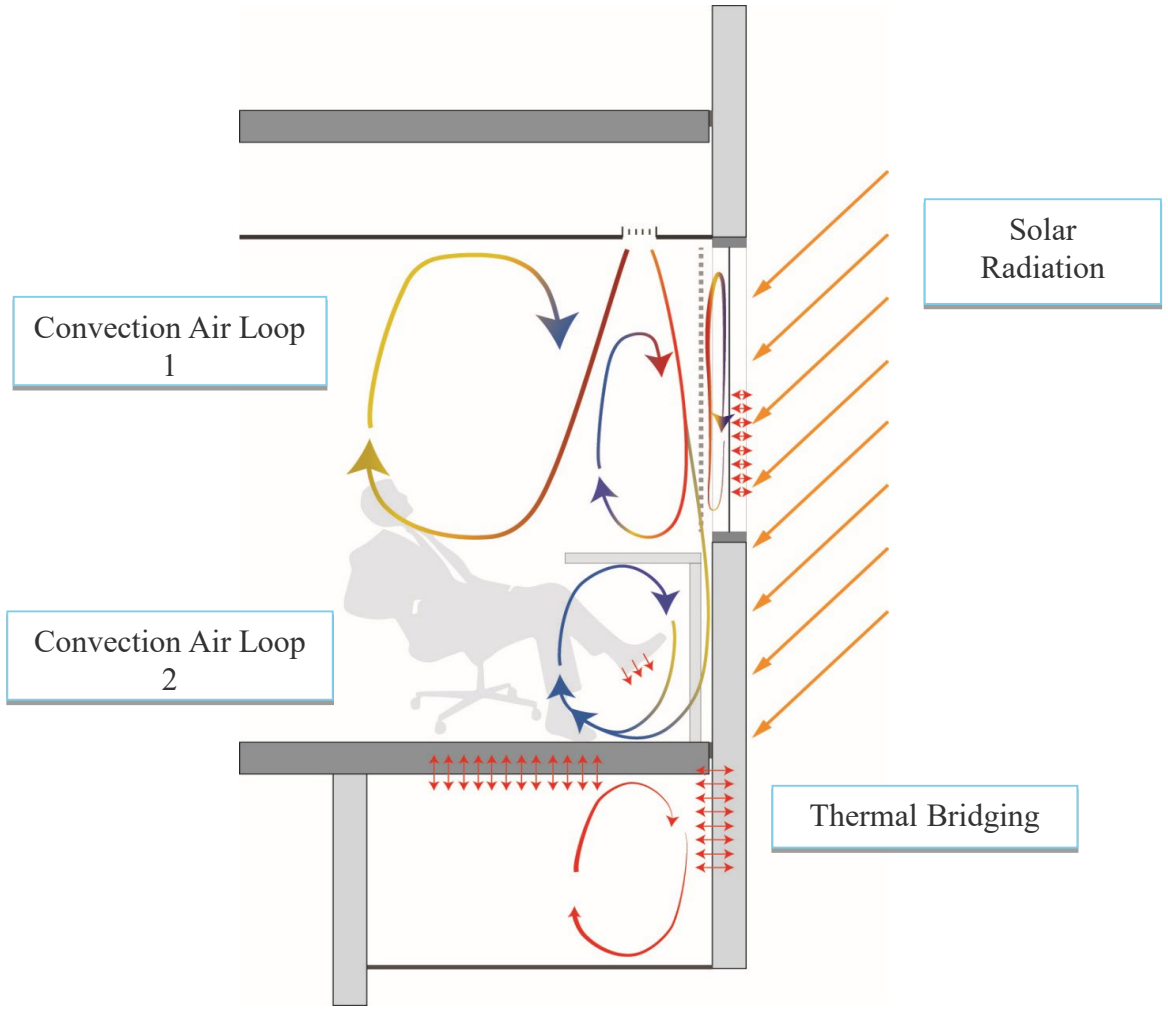
Building Design Considerations

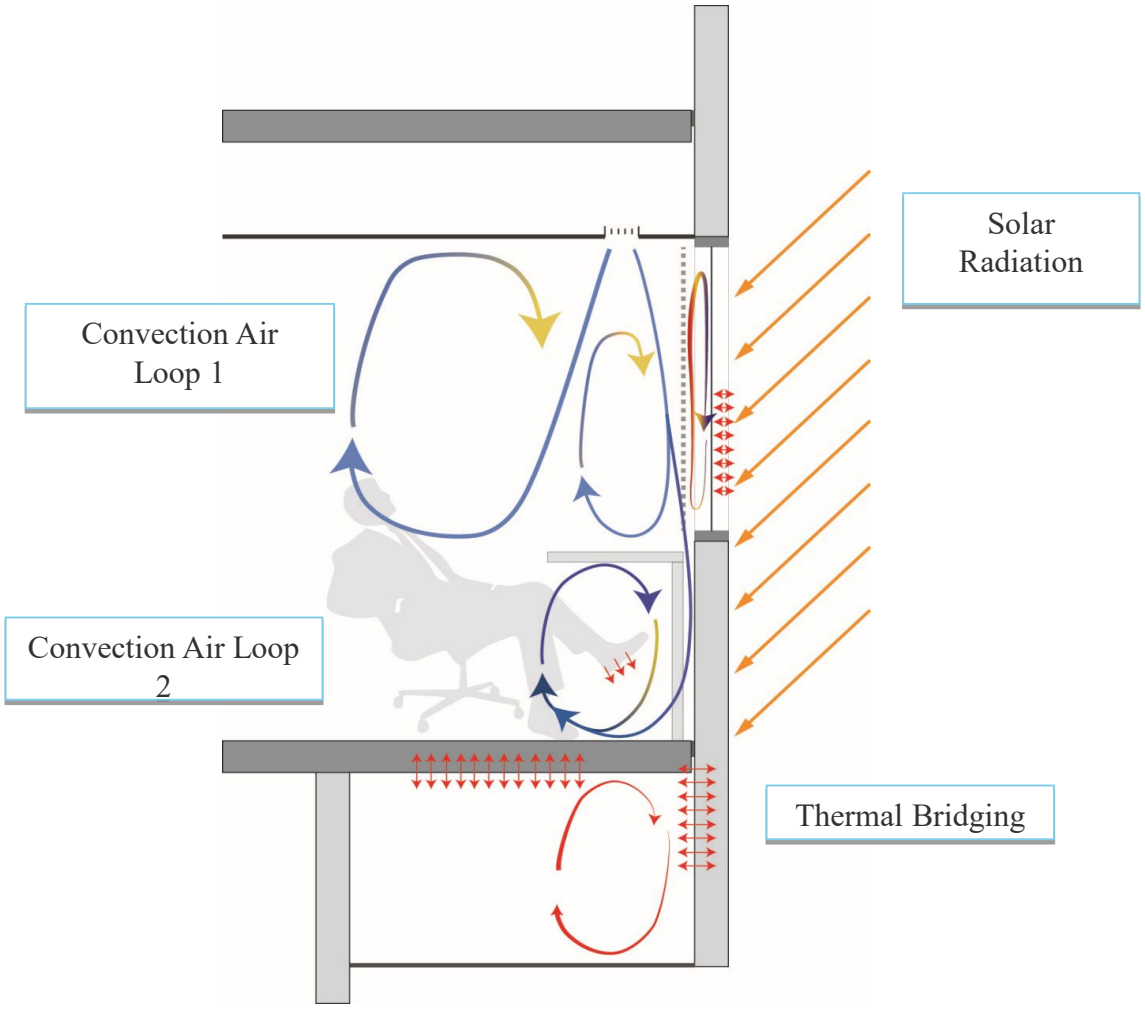
Convection Around Furnishings





Convection Around Furnishings



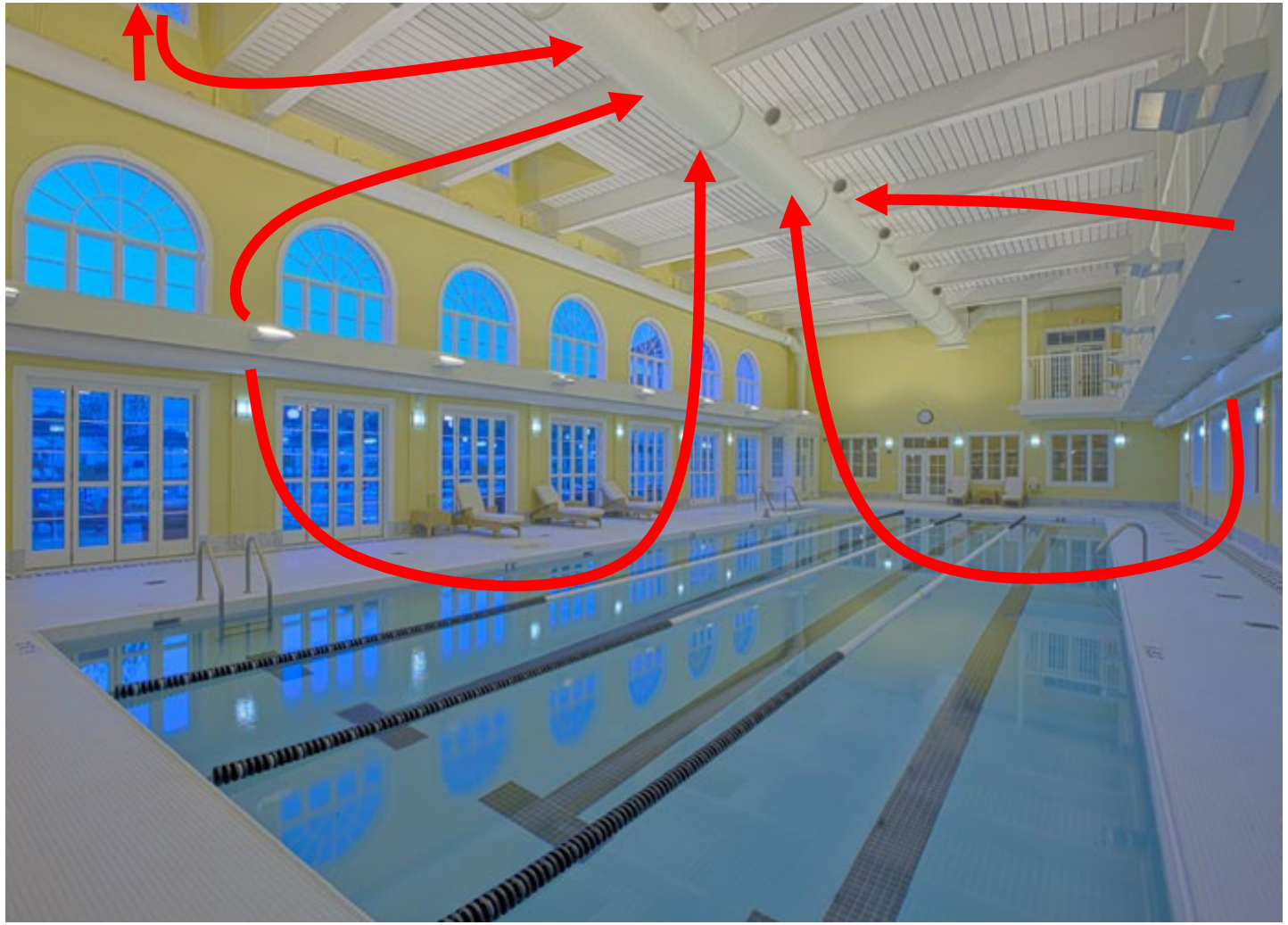


Climate Responsive Building Design

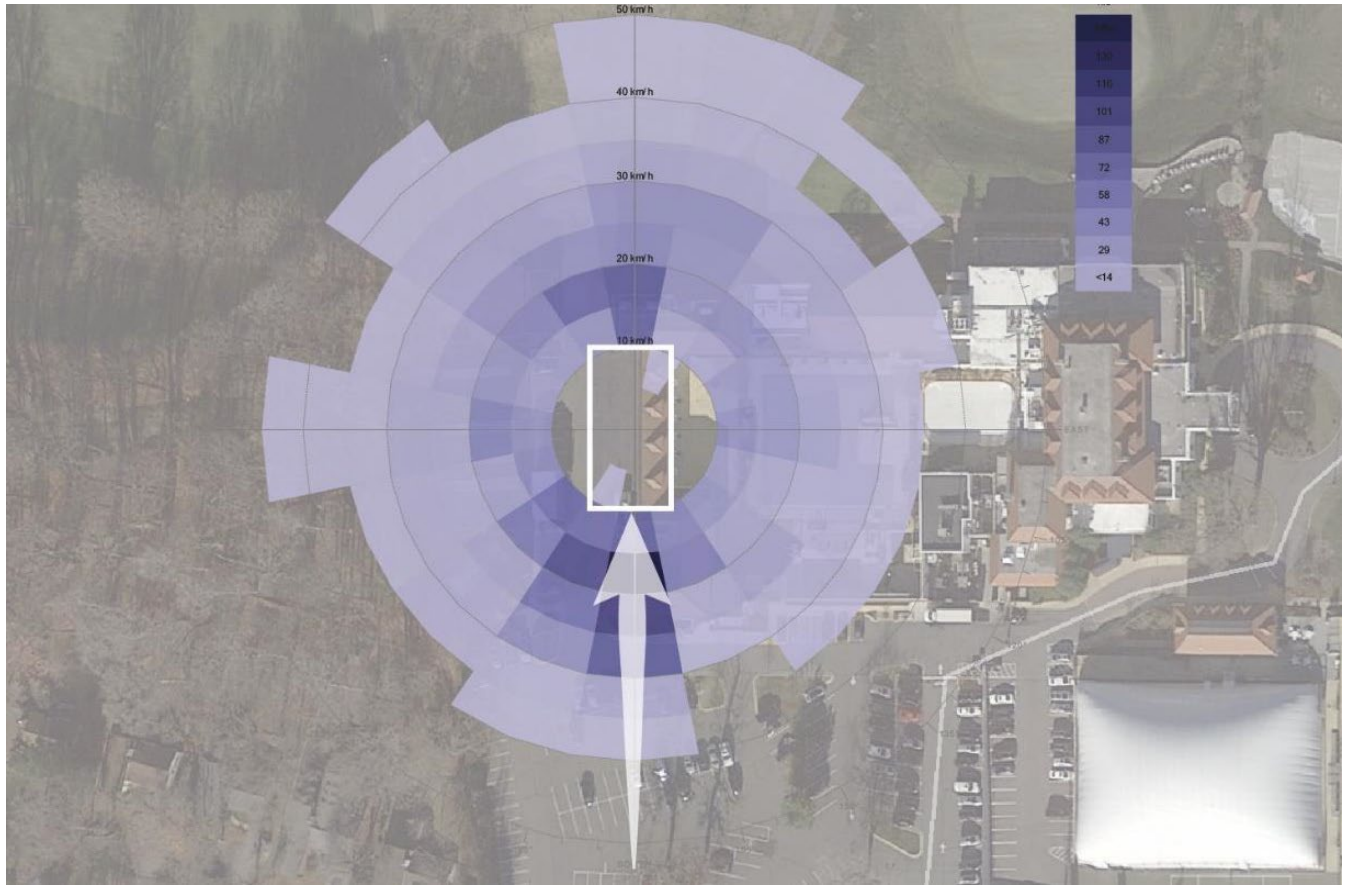
Natural Ventilation of an Indoor Pool Space

- Indoor pool is open all 12-months of year
- Outdoor pool is open Memorial Day to Labor Day
- High occupancy of outdoor pool expected late morning until before dinnertime

HVAC Operation Mode



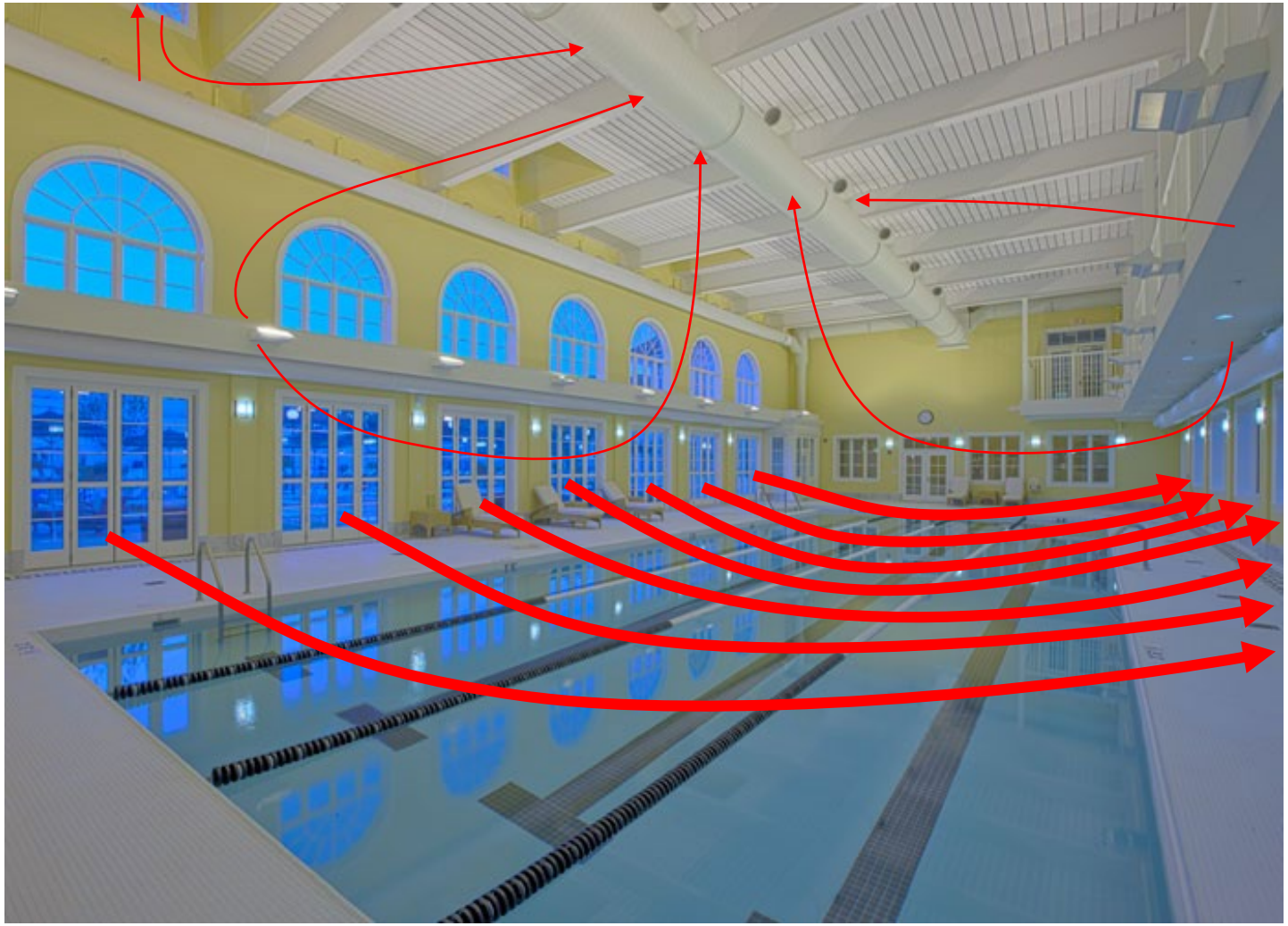
Climate Considerations – Wind Mapping



Summer Month Wind Rose

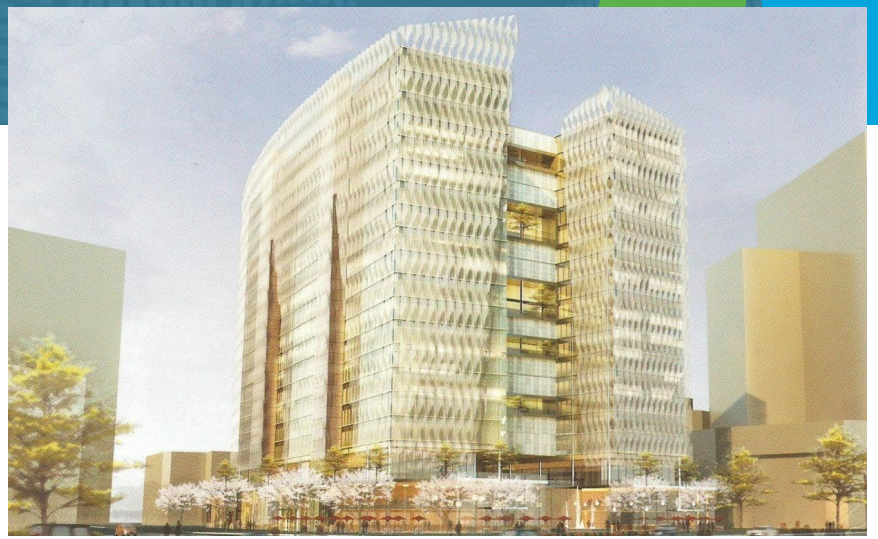
Use of Climate to Offset Energy Loads

Wind Replaces Air Handler



Climate Responsive Building Design

- Responsiveness of systems
- Controls
- How it reacts to the environment
- Floodproofing
- Increased Roof Drainage



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Questions???

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Thank you