The WELL Building Standard®: Technical Challenges and Solutions

Justin Downey, Associate/Technical Director
justin.downey@rwdi.com

June 27th, 2016

What is The WELL Building Standard®?

WELL Building Standard® Certification


TD Bank – TD23
Toronto, Ontario, Canada


480 Queen Street
Brisbane, Australia


425 Park Avenue
New York, NY, USA


Macquarie – One Shelley Street
Sydney, Australia


Macquarie – 50 Martin Place
Sydney, New South Wales, Australia


The Bloc
Los Angeles, USA

CBRE Headquarters
Los Angeles, CA, USA


Fehr LLC / NGCA Offices
San Francisco, CA, USA


The Center for Sustainable Landscapes
Pittsburgh, PA, USA


Conrad N. Hilton Foundation
Agoura Hills, CA, USA

LYFE Kitchen – Tarzana
Tarzana, CA, USA


LYFE Kitchen – Dallas West Village
Dallas, TX, USA


LYFE Kitchen – Dallas Preston Center
Dallas, TX, USA


LYFE Kitchen – Plano Park
Plano, TX, USA


LYFE Kitchen – Park Meadows
Lone Tree, CO, USA


LYFE Kitchen – Clark Street
Chicago, IL, USA


85 Bluxome Street
San Francisco, CA, USA


Medical Services Centre and Residences at Collett Manor
Kelowna, British Columbia, Canada


1KFulton
Chicago, IL, USA


Shangri-La Construction Headquarters
Los Angeles, CA, USA


Kilroy Mission Bay
San Francisco, CA, USA

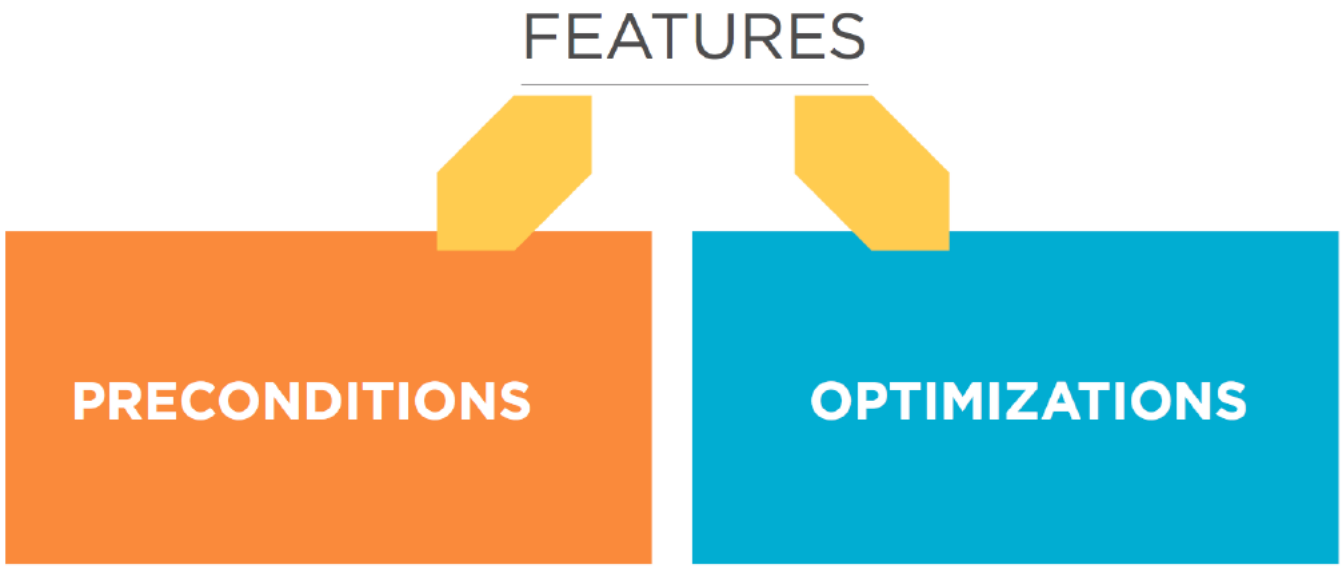

Haworth, Shanghai Head Office
Shanghai, China


NAVA Sloan's Lake Condos
Denver, CO, USA


Tryon Place
Charlotte, NC, USA


Paharpur Business Centre
New Delhi, National Capital Territory, India

WELL Building Standard® Certification

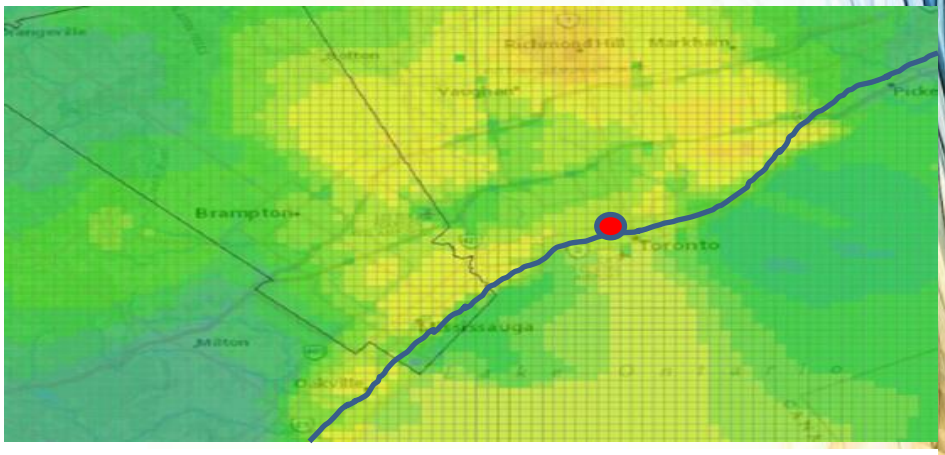


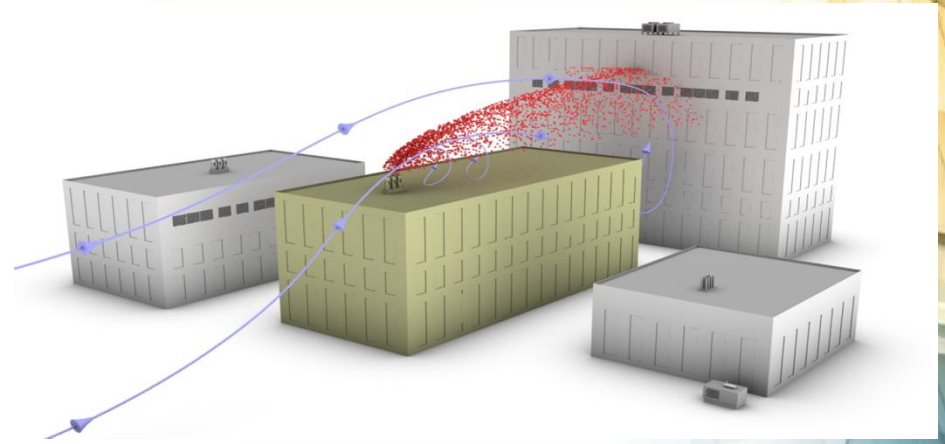
Testing Checklist

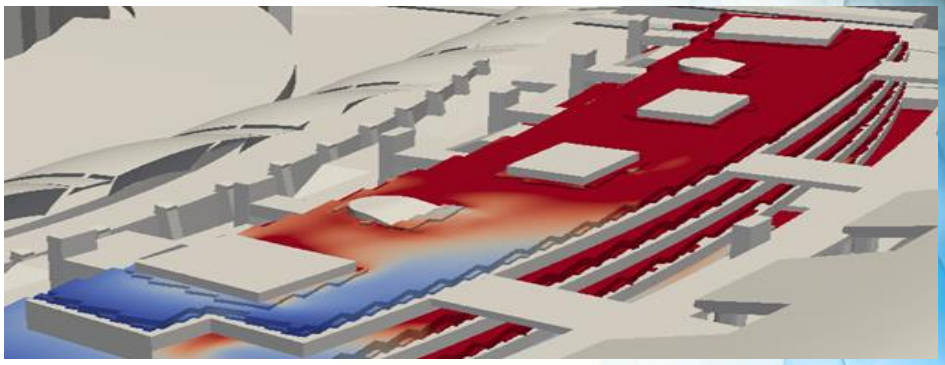
- ✓ **Air**
- ✓ **Water**
- ✓ **Light**
- ✓ **Thermal**
- ✓ **Acoustics**

Air Quality – Ambient Conditions, Outdoor Sources

- **Outdoor Air Quality**
  - CO, PM (2.5 +10), Ozone
- **Ground Radon Emissions**
- **Preconditions and Optimizations**
  - AP1 – Air quality testing *PT
  - AP5 – Air filtration
  - AP8 – Healthy entrance
  - AO14 – Infiltration management
- **Design and Construction Keys**
  - Establish ambient baseline(s)
  - Design and spec testing for envelope infiltration
  - If natural ventilation, performance simulation
  - Exhaust re-entrainment
  - Performance simulation
  - Envelope commissioning





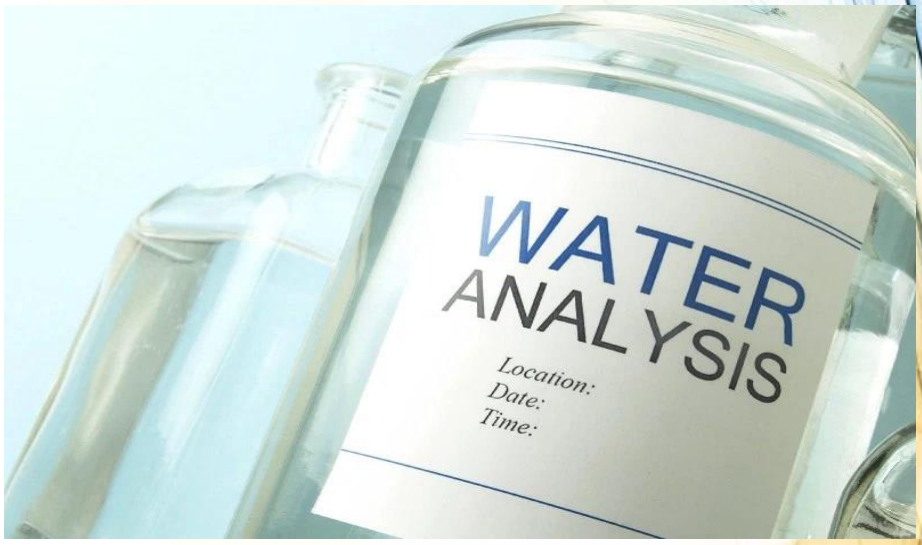


Air Quality – Indoor Sources

- **Indoor Air Quality**
  - Formaldehyde, VOC, CO, PM (2.5 +10) Ozone, Radon
- **Preconditions and Optimizations**
  - AP1 – Air quality testing *PT
  - AP3 – Ventilation effectiveness, DCV, performance verification
  - AP4 – Spec low emitting materials
  - AP5 – Air filtration
  - AP8 – Healthy entrance
  - AO21 – Displacement ventilation
- **Design and Construction Keys**
  - Interior pollutant and odour modeling and verification
  - Ventilation effectiveness simulation
  - Filtration effectiveness simulation

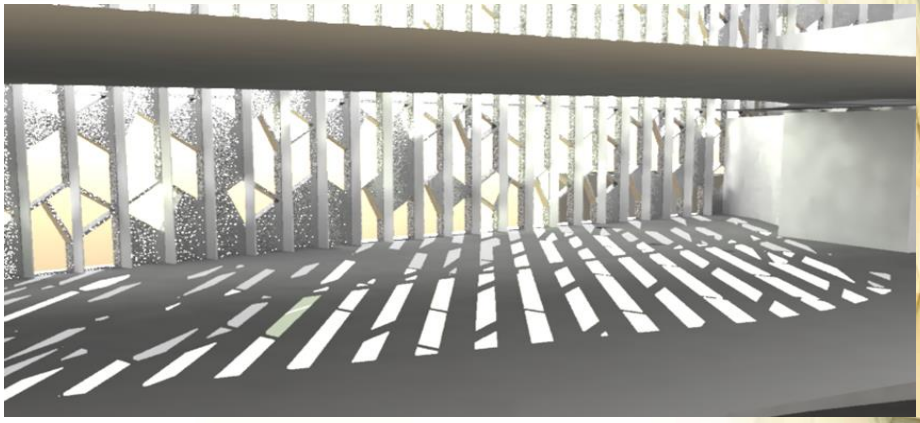
Water Quality – Sources

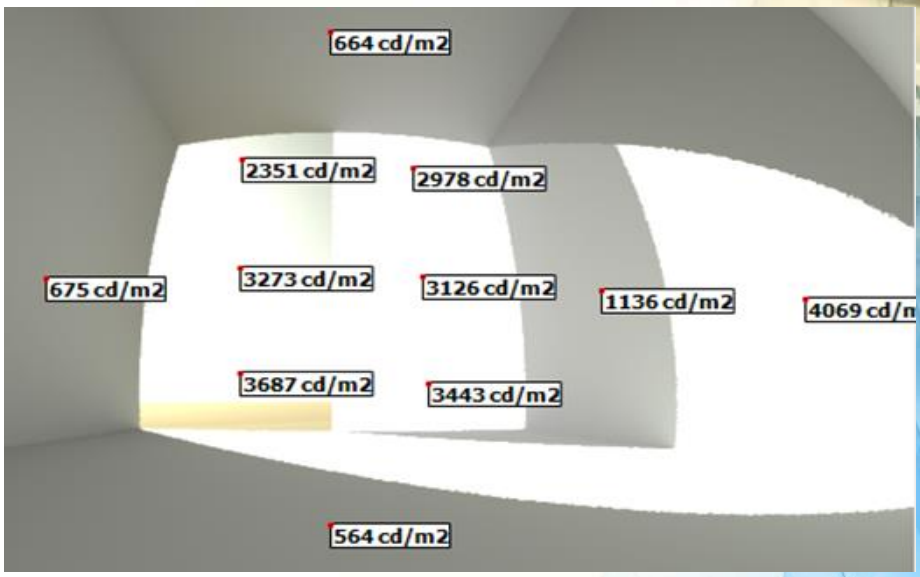
- **Water Quality**
  - Tubidity, Coliforms, Metals, Organics, Pesticides, Public Additives
- **Preconditions and Optimizations**
  - WP30 – WP 34 - Water Quality *PT
  - WO36 – Water Treatment
- **Design and Construction Keys**
  - Establish seasonal ambient baseline(s)
  - Filtration effectiveness assessment or simulation
  - Provision of MEP area and equipment for advanced filtration



Light – Natural

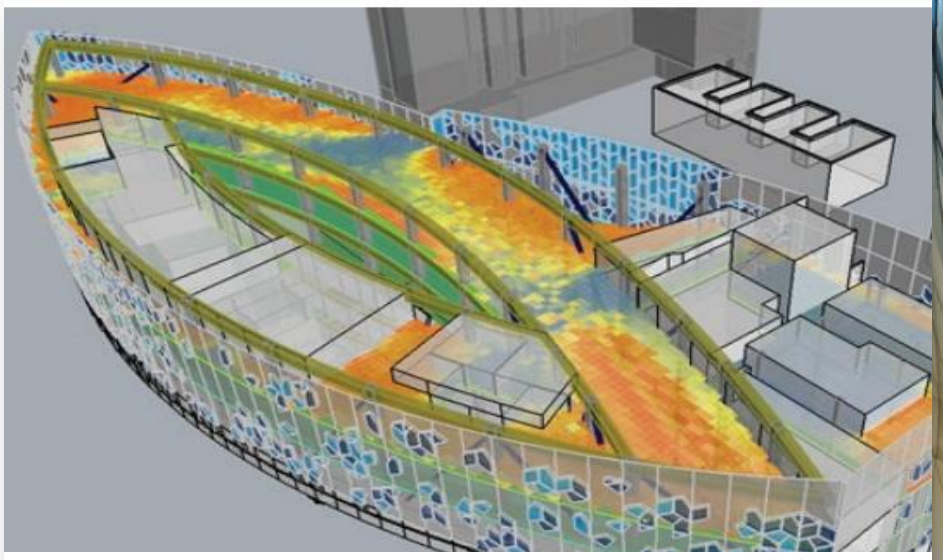
- **Light Quantity and Quality**
  - Daylighting design, ambient, task, contrast, glare, autonomy
  - Melonopic light
- **Preconditions and Optimizations**
  - LP54: Circadian Lighting *SM
  - LP56: Solar Glare Control
  - LO62: Daylight Modeling
- **Design and Construction Keys**
  - Anticipate and understand exterior conditions
  - Anticipate and understand interior conditions, reflectivity, automated shading controls
  - Simulate for daylight lux, cd/m2, melonopic light EML = 1.1, sDA and ASE

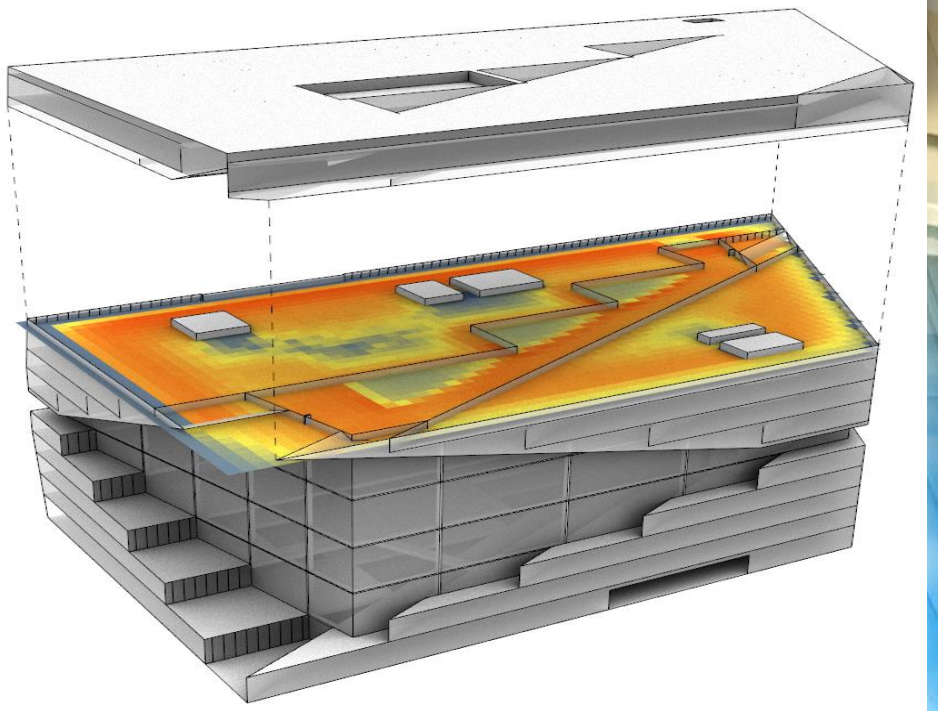




Light – Artificial

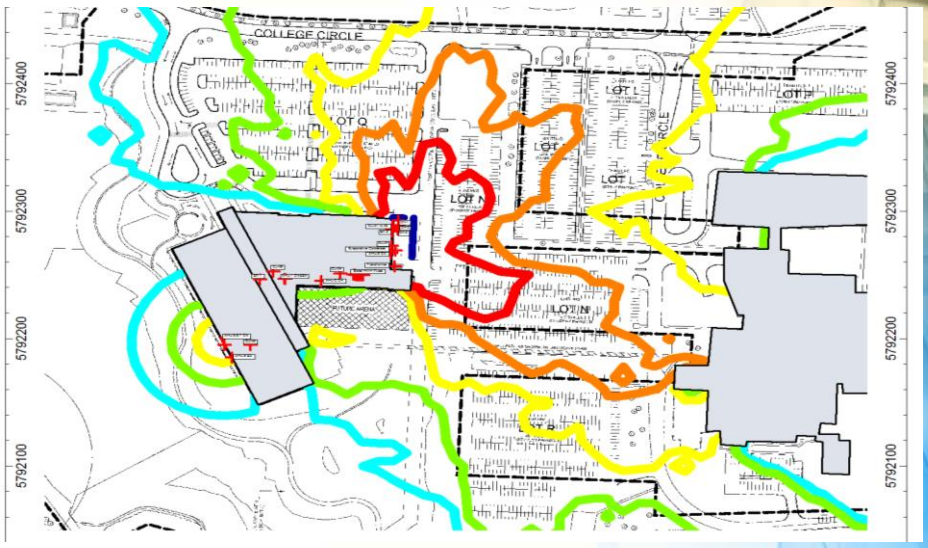
- **Light Quantity and Quality**
  - Lighting design, ambient, task, contrast, electric lighting glare
  - Melonopic light
- **Preconditions and Optimizations**
  - LP53: Visual Lighting Design *SM
  - LP54: Circadian Lighting *SM
  - LP55: Electric Light Control Glare
- **Design and Construction Keys**
  - Anticipate and understand interior conditions, reflectivity,
  - Simulate for artificial lux, cd/m2, melonopic light EML = varies by source
  - Prioritize high EML fixtures, balance with energy conservation





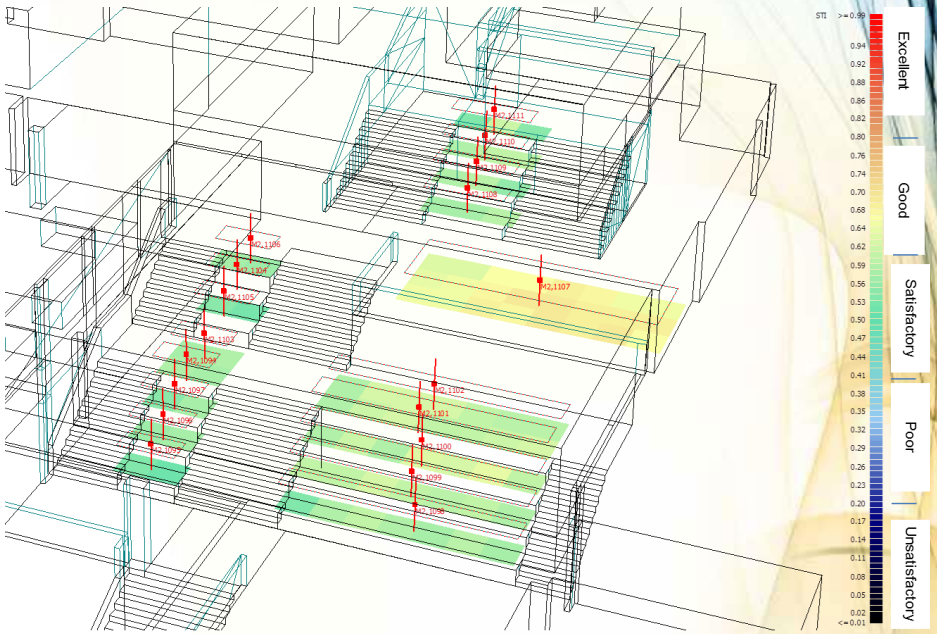
Comfort – Acoustics Noise and Vibration - Exterior

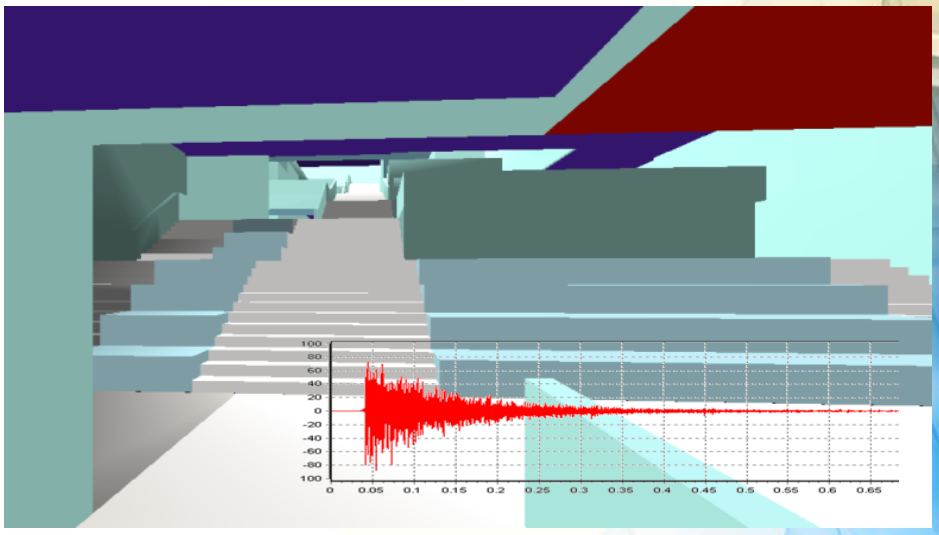
- **Sound Level and 'Quality'**
  - Noise intrusion
- **Preconditions and Optimizations**
  - CP74: Exterior Noise Intrusion *PT
- **Design and Construction Keys**
  - Establish outdoor ambient noise – including common transient noise sources
  - Model for noise intrusion
  - Anticipate that mitigating noise thru windows may influence size & style of operable windows, glazing construction, interior layout



Comfort – Acoustics Noise and Vibration - Interior

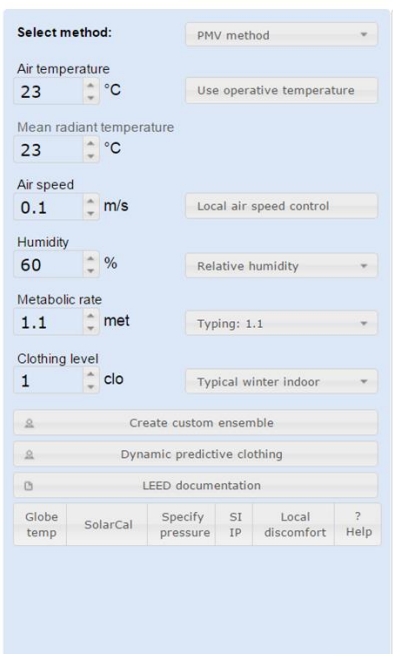
- **Sound Level and 'Quality'**
  - Background noise, reverberation/ intelligibility, sound insulation
- **Preconditions and Optimizations**
  - CP75: Internal Gen Noise*PT
  - CO78: Reverberation Time*PT
  - CO79: Sound Masking *PT
  - CO80: Sound Reducing Surfaces
  - CO81: Sound Barriers
- **Design and Construction Keys**
  - Establish/identify loud & quiet zones early in design
  - Simulate for mechanical noise, reverberation time, masking coverage, and sound insulation
  - Anticipate sound absorptive ceiling and walls finishes in offices, conference rooms & workspaces

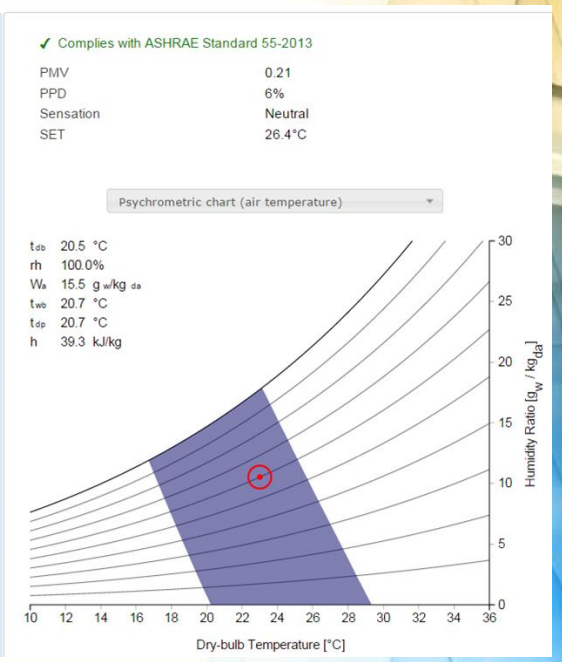




Comfort – Thermal

- **Thermal Comfort**
  - Comfort criteria, natural ventilation allowances, variation for individual preference, radiant heating & Cooling
- **Preconditions and Optimizations**
  - CP76: Thermal Comfort *SM
  - CO82: Individual Thermal Control
  - CO83: Radiant Thermal Comfort
- **Design and Construction Keys**
  - Detailed review of space use, MET, CLO, airflow (velocity), temp and RH requirements, radiant effects
  - Highly controlled and access to individualized HVAC
  - Simulate for performance verification

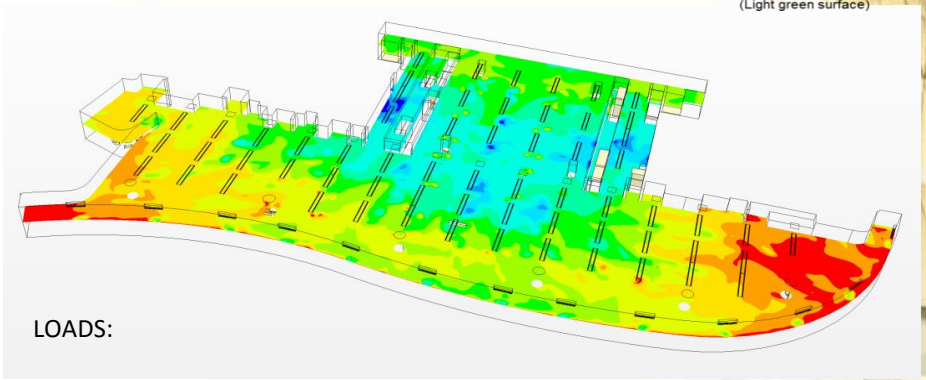




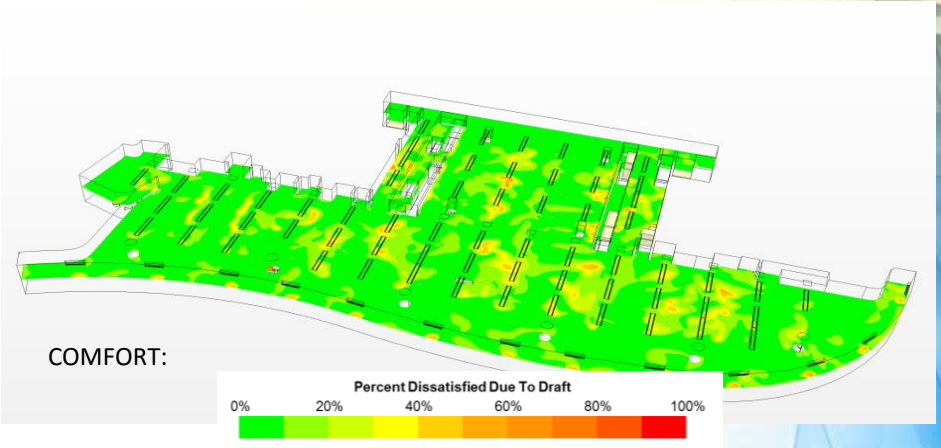
Comfort – Thermal

- **Thermal Comfort**
  - Comfort criteria, natural ventilation allowances, variation for individual preference, radiant heating & Cooling
- **Preconditions and Optimizations**
  - CP76: Thermal Comfort *SM
  - CO82: Individual Thermal Control
  - CO83: Radiant Thermal Comfort
- **Design and Construction Keys**
  - Detailed review of space use, MET, CLO, airflow (velocity), temp and RH requirements, radiant effects
  - Highly controlled and access to individualized HVAC
  - Simulate for performance verification

MODEL:



LOADS:



COMFORT:

Thank you for your time.

Questions?

justin.downey@rwdi.com

RWDI Consulting Engineers & Scientists