UFAD SYSTEMS in MASS TIMBER BUILDINGS

Making Mass Timber Buildings Even Better

INTERNATIONAL MassTimber CONFERENCE
March 30–April 1, 2021

Markets

“The Usual Applications”

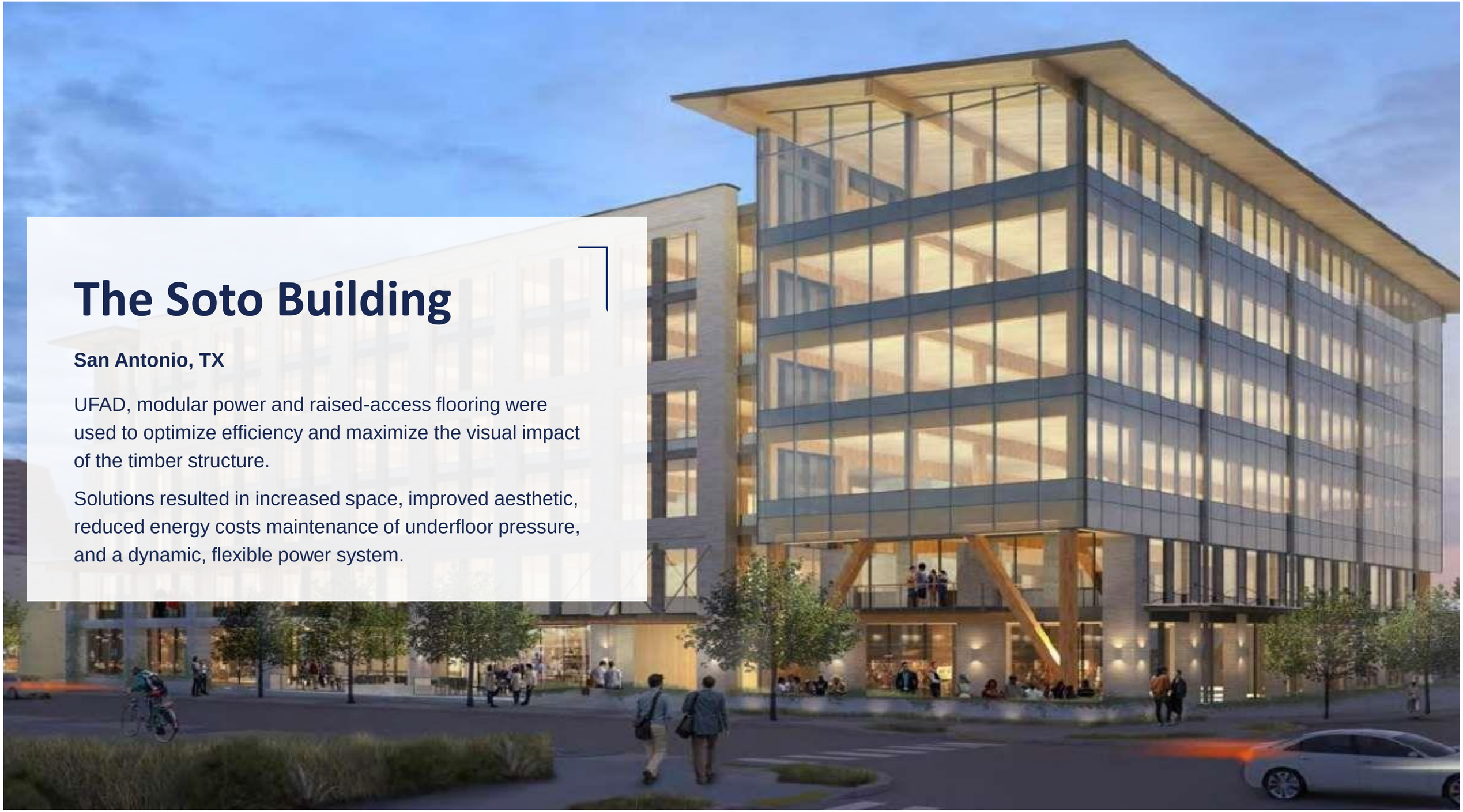
- Commercial Office
- Heritage/Retrofits
- Residential Living
- Institutional Spaces
- Casinos & Retail
- Data Centers

Now Used in Mass Timber Projects

MEC HQ

Vancouver, BC

MEC constructed its four-storey, 112,000-sq-ft state of the art head office in 2014. The building has won a number of awards for its green design, with its heavy timber structure, interior optimized for a healthy work environment, energy efficiency, and LEED Platinum certification.



The Soto Building

San Antonio, TX

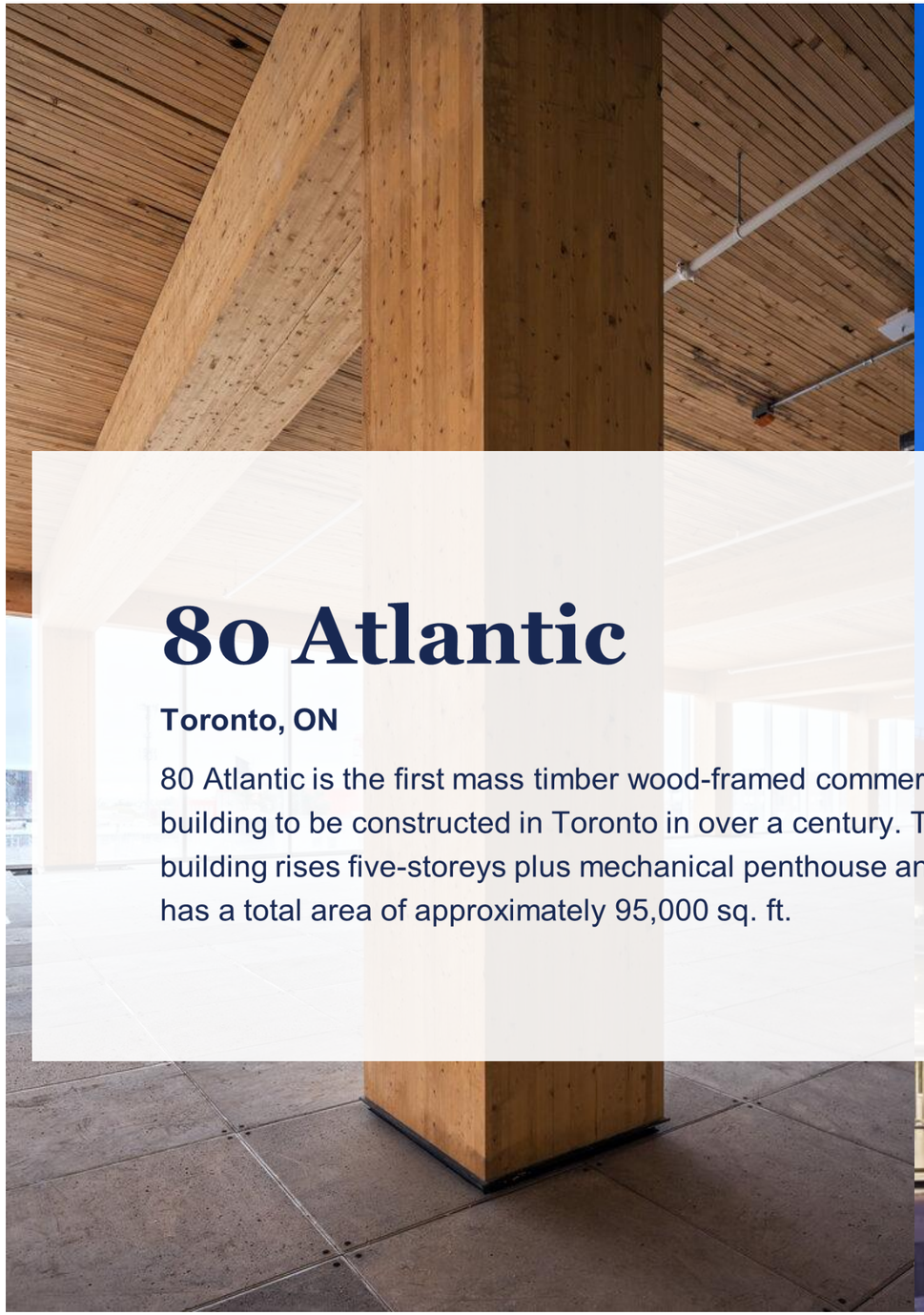
UFAD, modular power and raised-access flooring were used to optimize efficiency and maximize the visual impact of the timber structure.

Solutions resulted in increased space, improved aesthetic, reduced energy costs maintenance of underfloor pressure, and a dynamic, flexible power system.

District 56, Terminus Project

Victoria BC

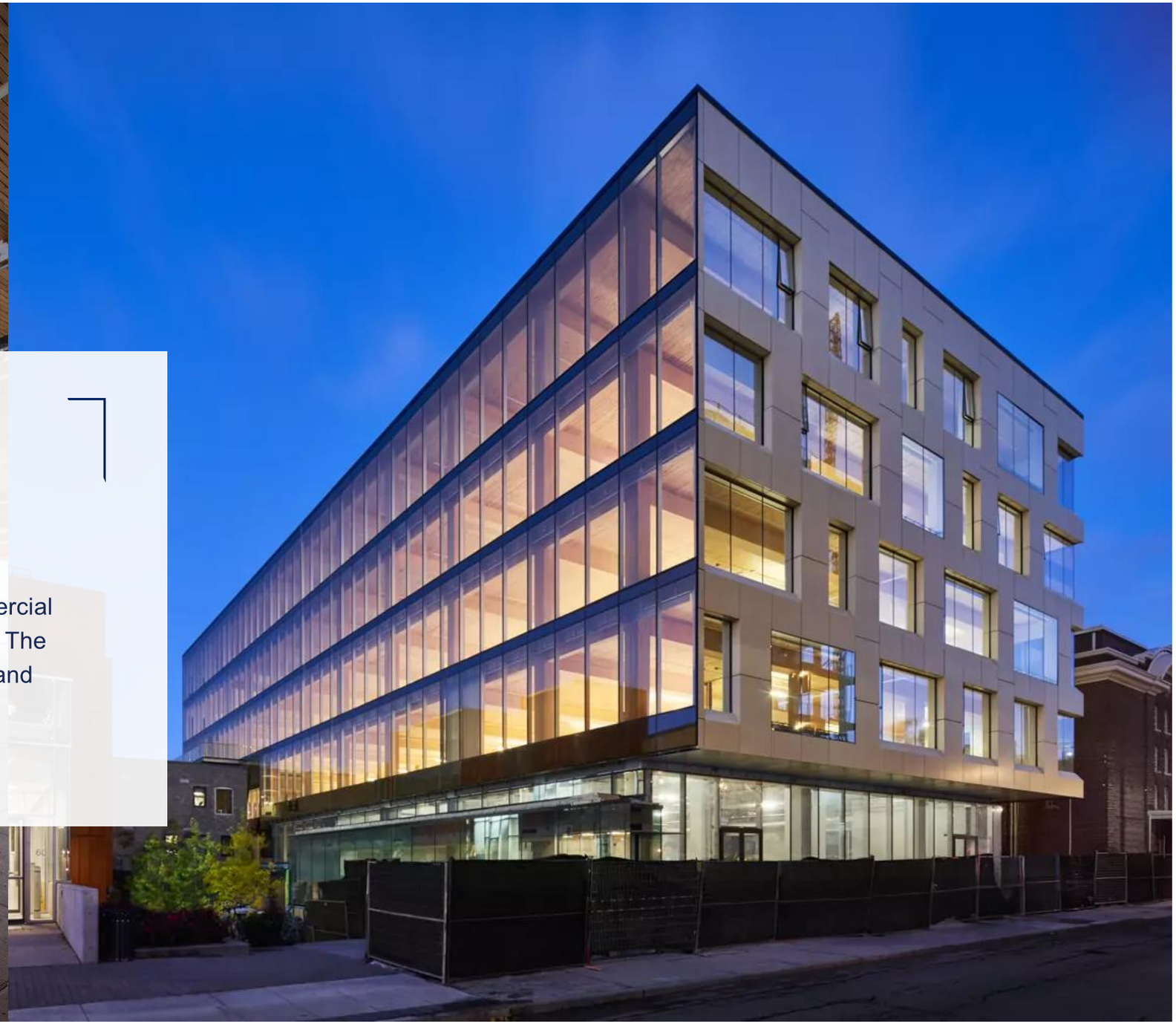
Nestled in vibrant Downtown Langford, Terminus is an eco-friendly building poised to serve as the hub connecting residents and businesses in the West Shore. Nearby and onsite amenities along with sustainable clean air and energy initiatives make Terminus the leading choice for many businesses. Terminus features flexible floor plans with space for purchase or lease ranging from 680 sq ft to 50,000 sq ft.



80 Atlantic

Toronto, ON

80 Atlantic is the first mass timber wood-framed commercial building to be constructed in Toronto in over a century. The building rises five-storeys plus mechanical penthouse and has a total area of approximately 95,000 sq. ft.



Why Choose An Underfloor MEP Approach for Mass Timber

Improves Interior Aesthetics

- Declutters the ceiling – little or no ductwork
- Most sprinklers piping & conduits can be hidden
- No overhead WiFi antenna and cable tray
- Sealed concrete floor panel compliments wood

Enhances Biophilia

Creates Noise Isolation Barrier

- Reduces airborne & impact noise between floors

Mass Damping of Slab

- Reduces vibrations of slab

Why Choose An Underfloor MEP Approach for Mass Timber

Increases Energy Efficiency

- UFAD systems are known for energy savings and indoor air quality improvements

Decreases MEP Conflicts

- No ductwork to coordinate!

Increases Leasable Square Footage

- Less total SF required for Mechanical Rooms

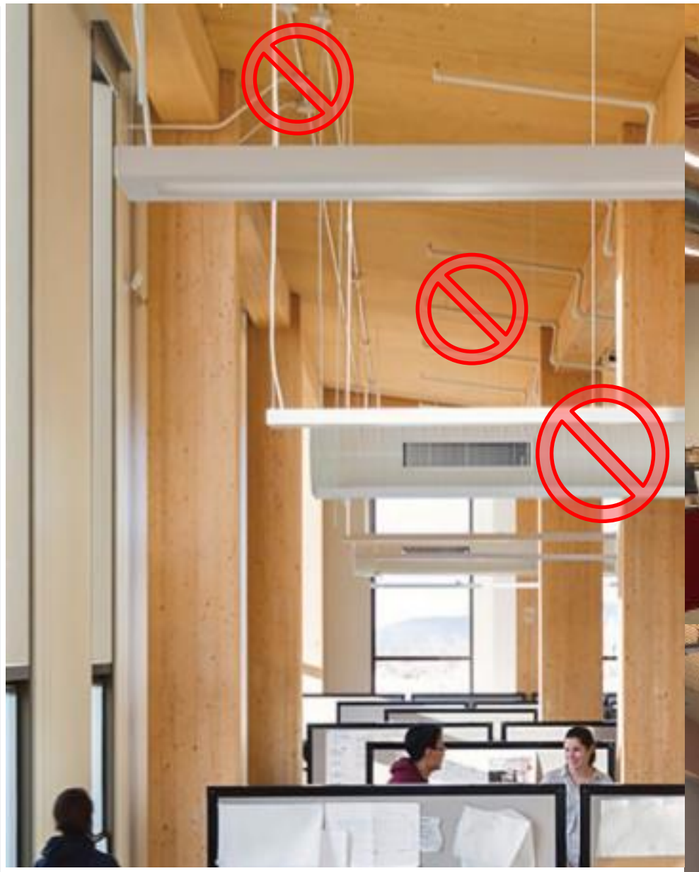
Increases Jobsite Safety & Productivity

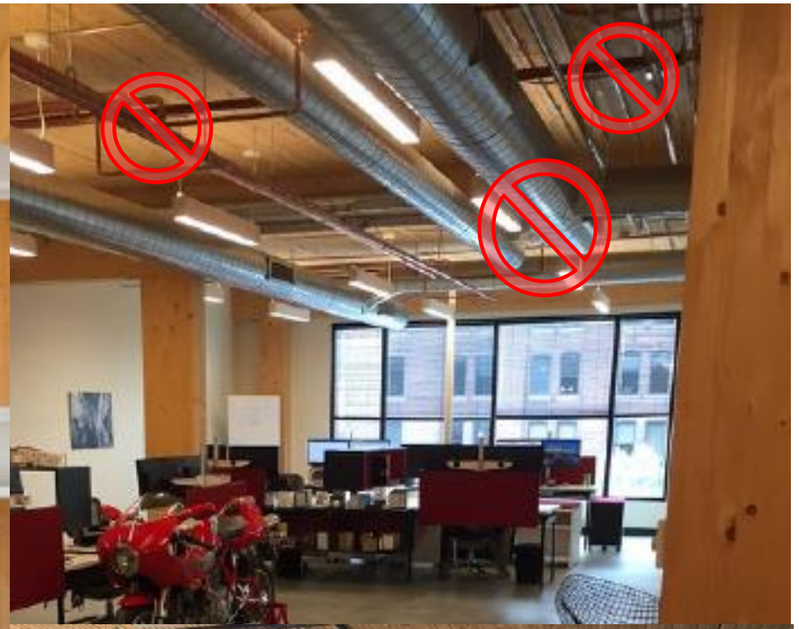
- Most MEP manhours are on “hands and knees” not ladders/scaffolding

Aesthetics

Access Floor with Underfloor Air Distribution

- Eliminates overhead ducts
- Can eliminate most overhead conduits
- Can eliminate most overhead sprinkler piping

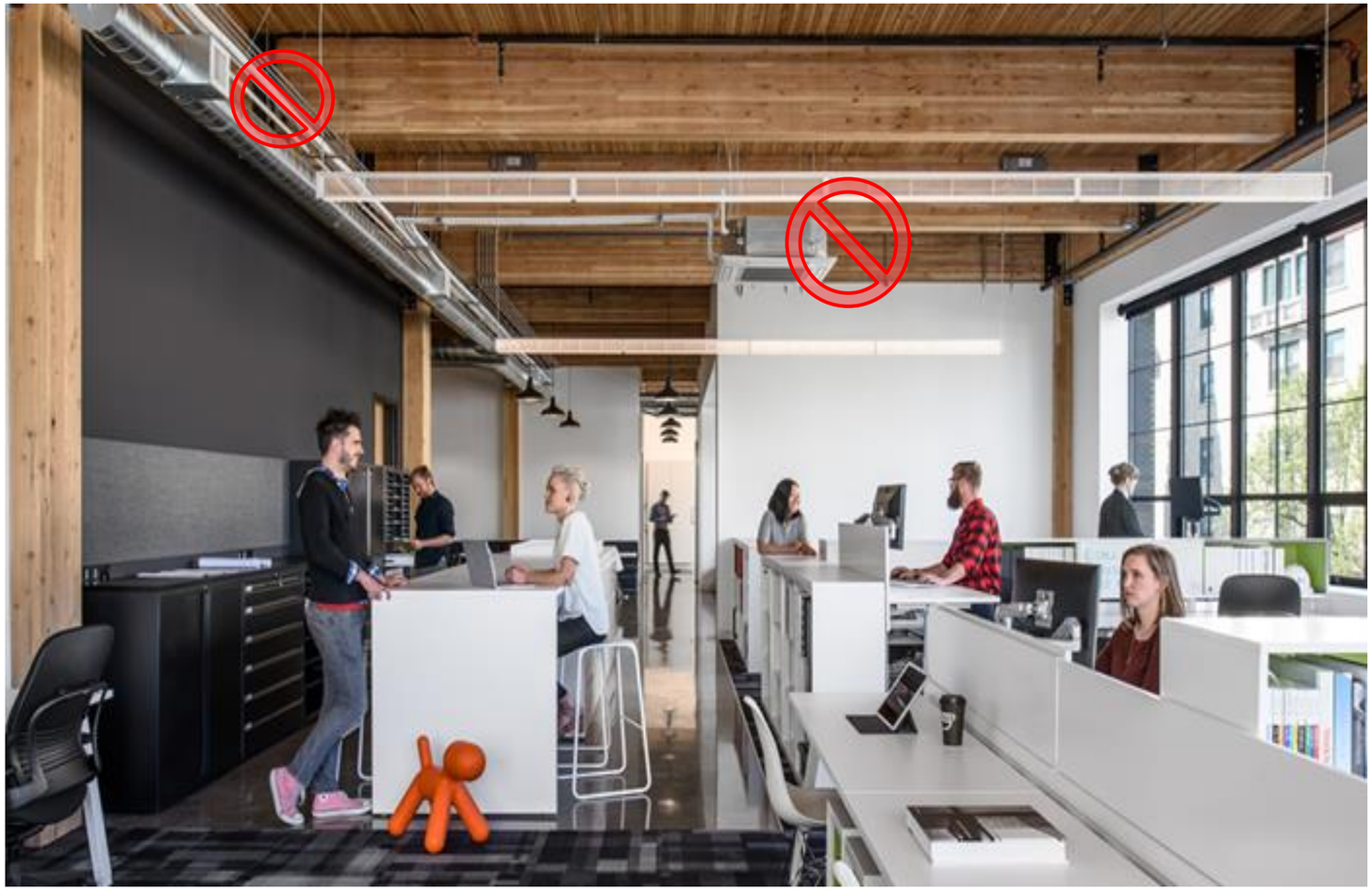




Aesthetics

Access Floor with Underfloor Air Distribution

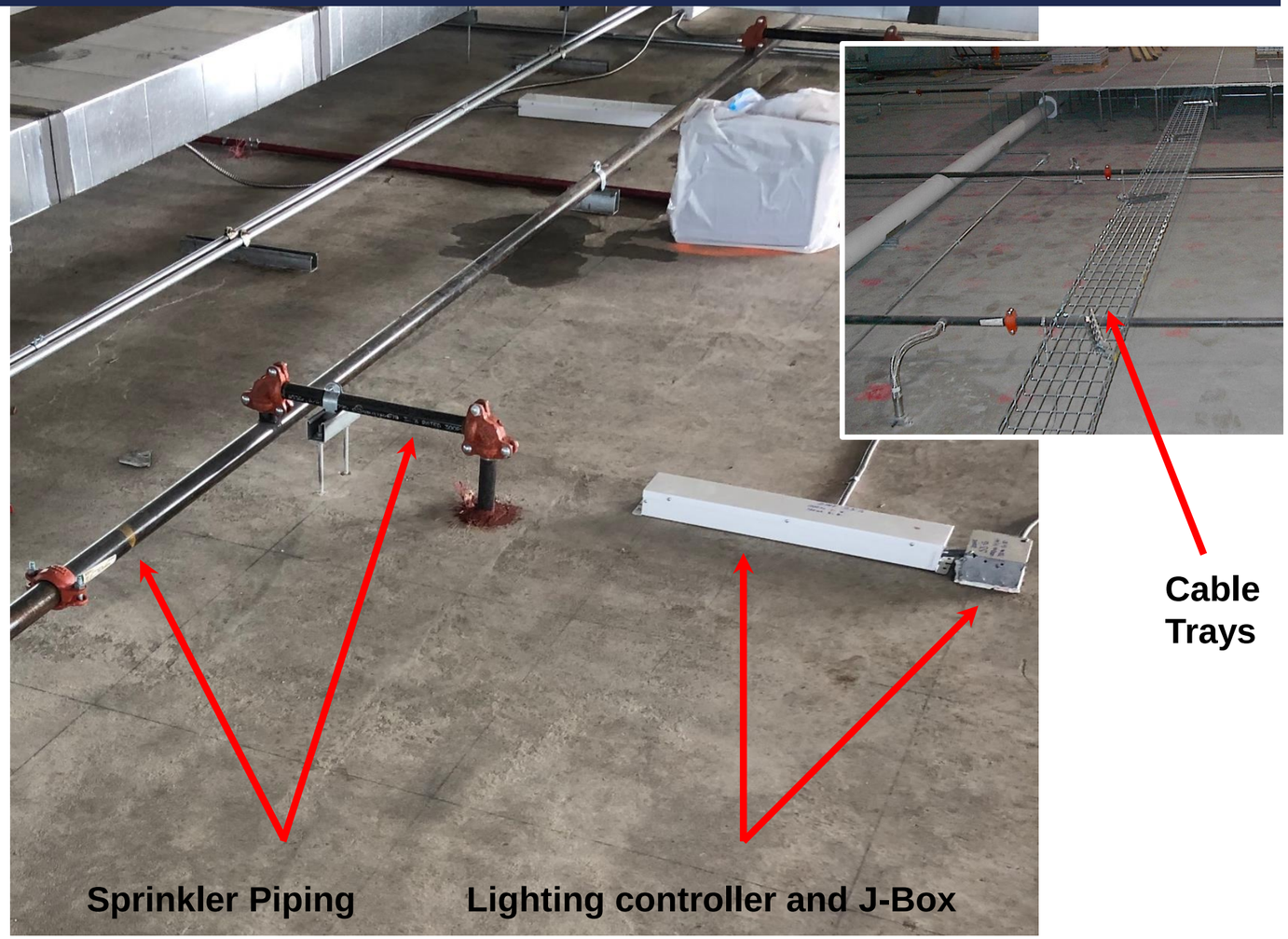
- Eliminates overhead VRF/VRV cassettes and piping
- Eliminates overhead cable tray and WiFi antenna



Aesthetics

Access Floor with Underfloor Air Distribution

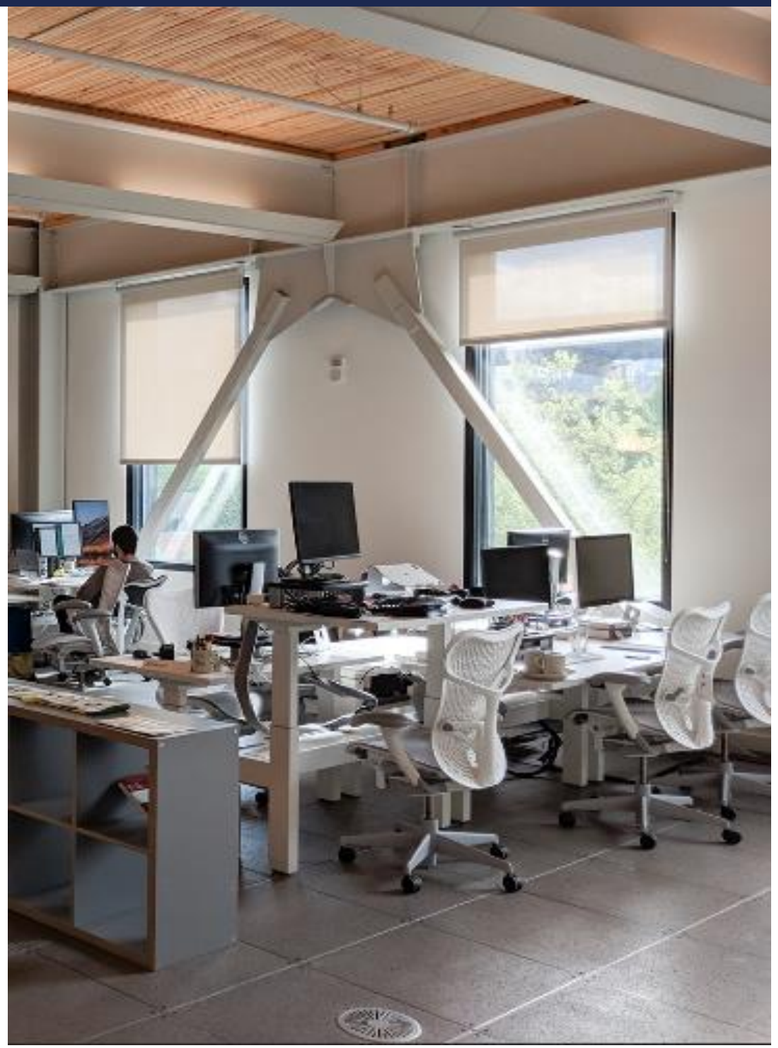
- Conduits for lighting, piping for sprinklers and cable trays are installed in the underfloor space to service the floor below



Aesthetics

Access Floor with Underfloor Air Distribution

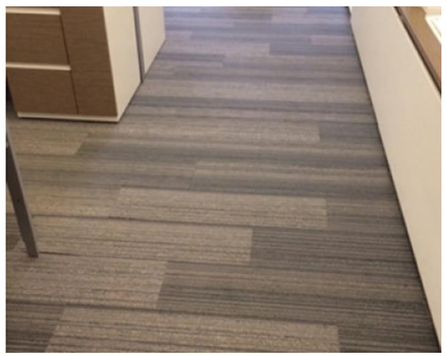
- All you'll see above are sprinkler heads and light fixtures
- Cable tray is hidden beneath the raised floor – if it's needed at all!



Aesthetics

Access Floor with Underfloor Air Distribution

- Eliminate ceiling mounted WiFi antenna and cabling/conduits



Aesthetics

Which is More Attractive?

This?

Aesthetics

Which is More Attractive?

Or This!

Aesthetics

Now That the Ceiling is Exposed, Look Down

- Bare TecCrete panels look great!
- A simple, clear, low-VOC sealer over bare TecCrete panels is an attractive, low-maintenance and complimentary look

Aesthetics

Bare TecCrete Panels Look Great!

THE BOTTOM LINE:

Raised Access Flooring + UFAD + Modular Power + Modular Floor Finishes = more visible wood + less overhead clutter + enhanced aesthetics

MORE BIOPHILIA

MORE NATURAL BEAUTY!

What is Biophilia?

bio·phil·ia | \ ˌbī-ō-ˈfi-lē-ə

“the rich, natural pleasure that comes from being surrounded by living organisms”

“the instinctive connection and attraction people have to natural materials, and many designers cite the warm and natural attributes of wood as a reason for its use”

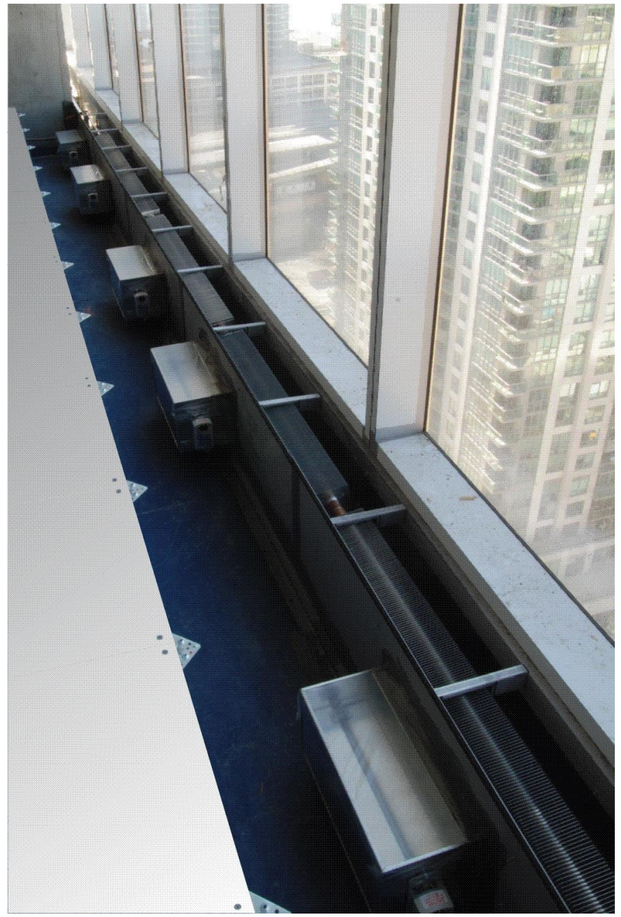
Q: How Is It Possible? A: UFAD 2.0

Air Towers

- Compact footprint & no underfloor ducts
- Works w/ any base mechanical system
- Self contained vertical air handlers
- Sized from 2,500 to 15,000 CFM

In-floor Terminals/Perimeter Troughs

- Eliminates fan powered boxes & ducts
- Provides heating & cooling to perimeter
- Simple & low maintenance



WHY: Underfloor Air Distribution (UFAD)

UFAD: Why You Should!

UFAD delivers 15 to 25% energy savings

- Lower static pressures → lower fan HP
- More economizer hours
- Reduced CFM outside air due to higher ventilation effectiveness

Better indoor air quality

- Clean, fresh air delivered to occupant first
- ASHRAE ventilation effectiveness = 1.2 to 1.5
- No mixing of supply air with expired air

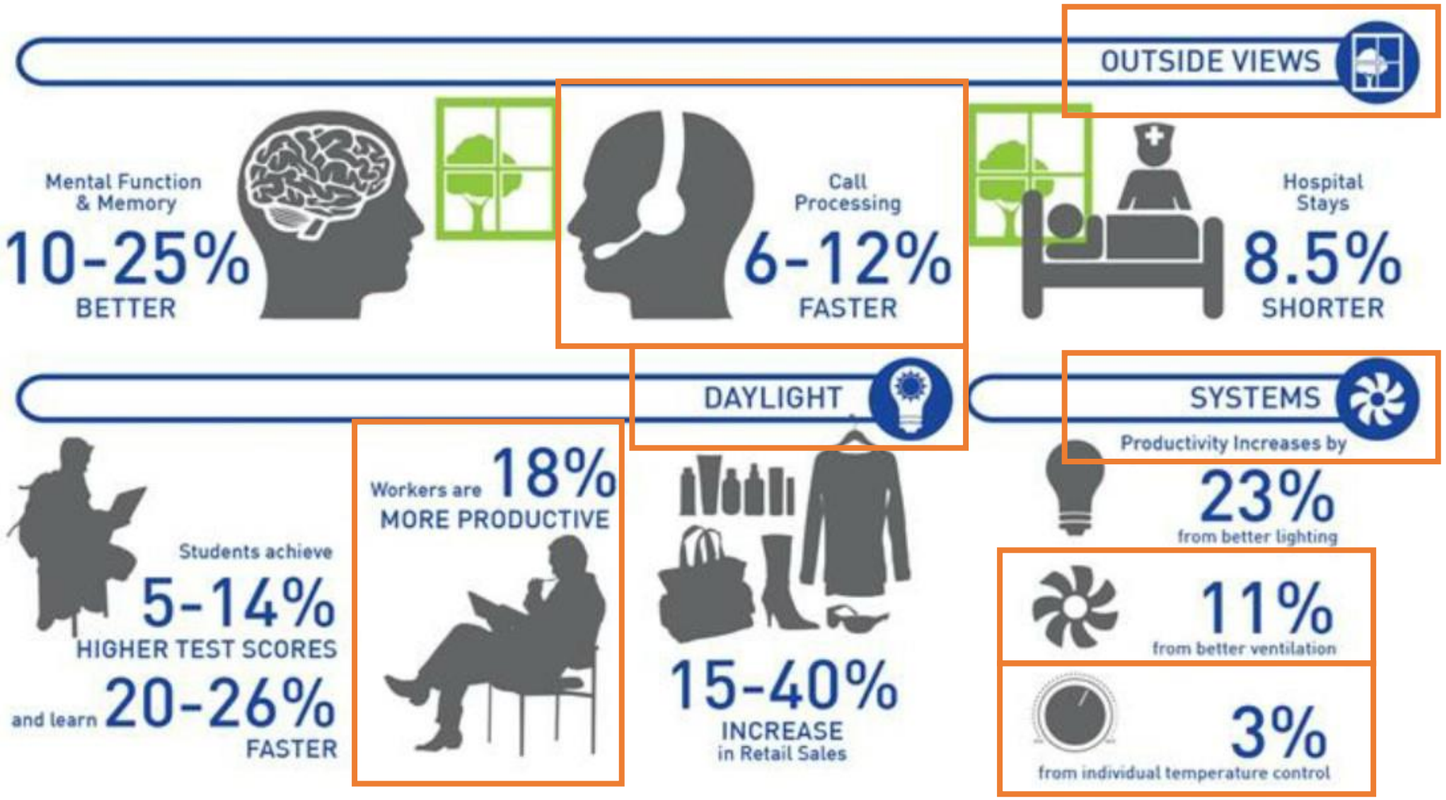
Improved occupant productivity

- Occupant adjustable diffusers improve employee comfort
- Reduces employee sick days

UFAD: Why You Should!

High Performance Benefits

The access floor design results in happier and healthier employees, attracting & retaining employees, improved productivity, reducing the number of sick days per year and increasing an organization's bottom line.



UFAD: Why You Should!

Sustainable Design

LEED Design

- Platinum
- Gold
- Silver
- Certified

Well Building

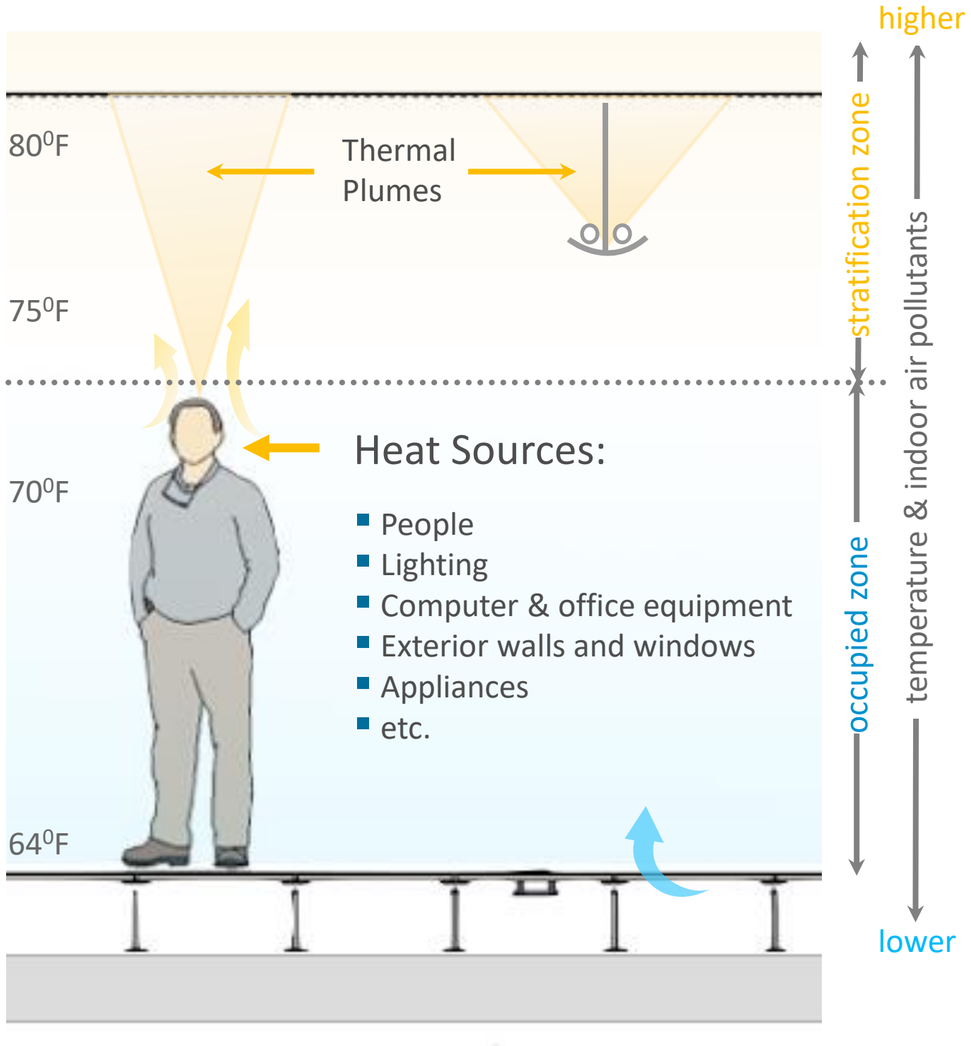
UFAD: How It Works in Theory

“Thermal Plumes”

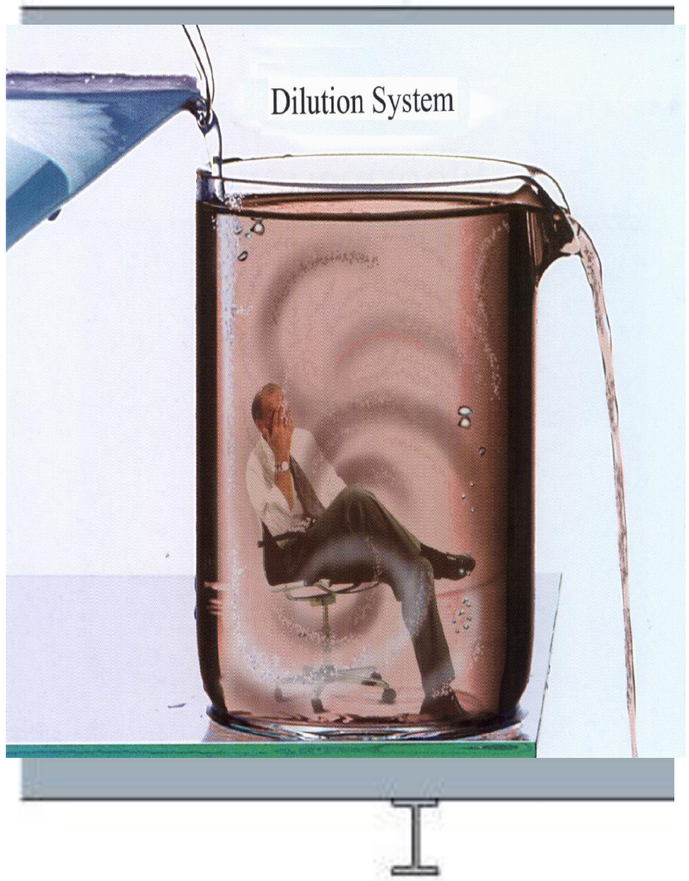
Thermal plumes are a natural effect of heat dissipation. Most office buildings need to be cooled due to heat generated by people, lights, computers, sun light, etc. UFAD takes full advantage of the principle that “warm air rises”

UFAD uses physics to its advantage!

As the air in the space warms and rises indoor air pollutants, humidity and particulate matter are carried upwards and returned to the building’s HVAC system where it is cooled, filtered and fresh air is added



UFAD: How It Works in Theory

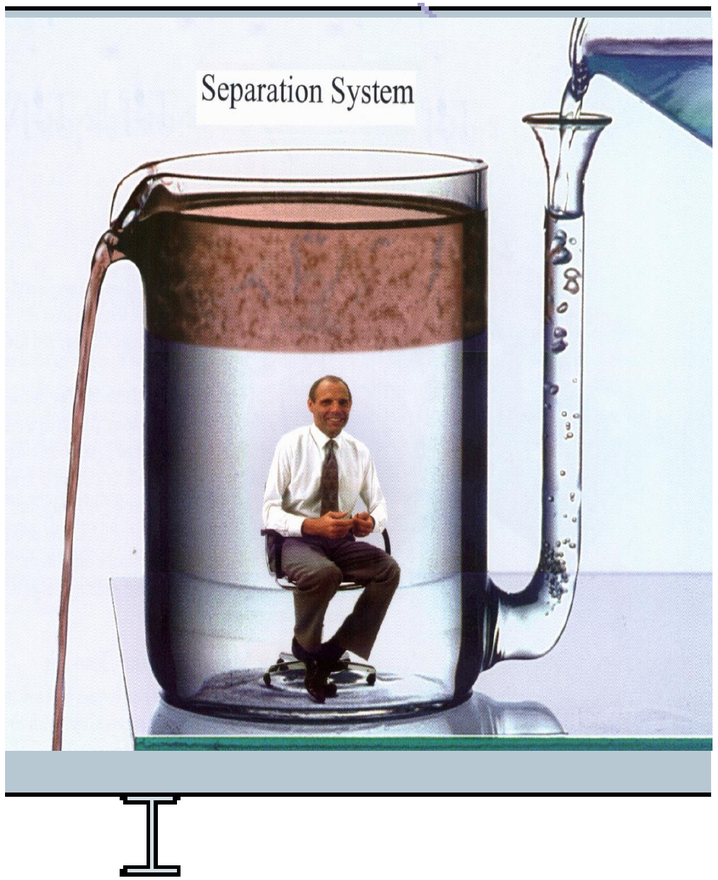


Overhead “Well Mixed” Design

- Cold conditioned air is forced at high pressure through overhead ducts and discharged thru ceiling mounted diffusers designed to mix the clean, fresh air with spent air and contaminants. The air mixture is efficiently distributed throughout the space.
- ASHRAE Ventilation Effectiveness = 1.0

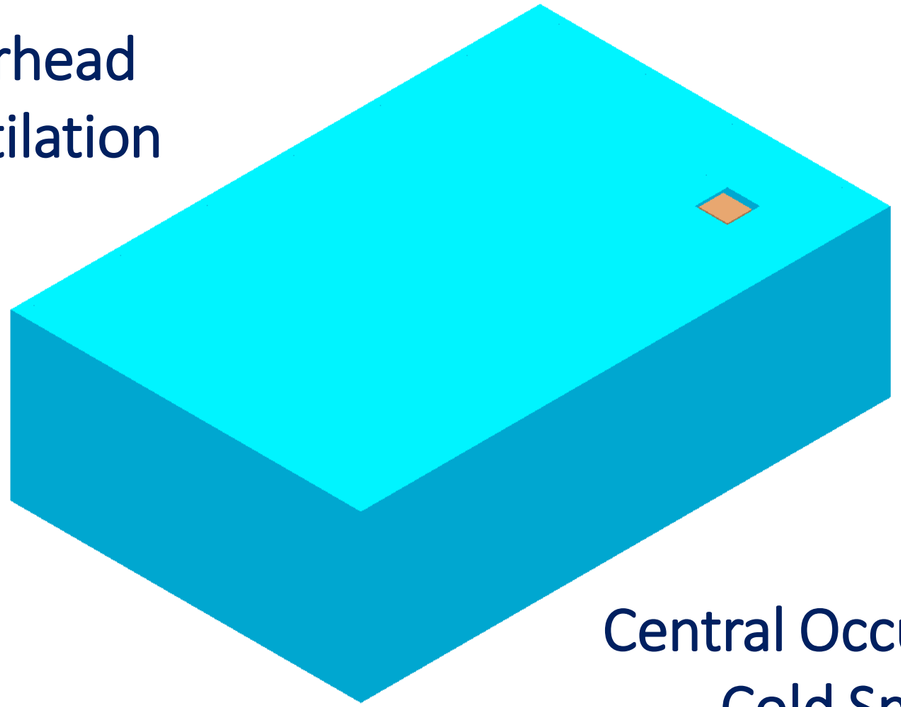
UFAD System Design

- Cool conditioned air is delivered into an open floor plenum at low fan speeds where the air is delivered at low velocity thru adjustable floor diffusers forcing contaminants to naturally rise above the breathing zone. Contaminants and spent air are NOT mixed into the air the occupants breathe.
- ASHRAE Ventilation Effectiveness = 1.2 to 1.5
- Building occupants get 120%+ benefit of ventilation air

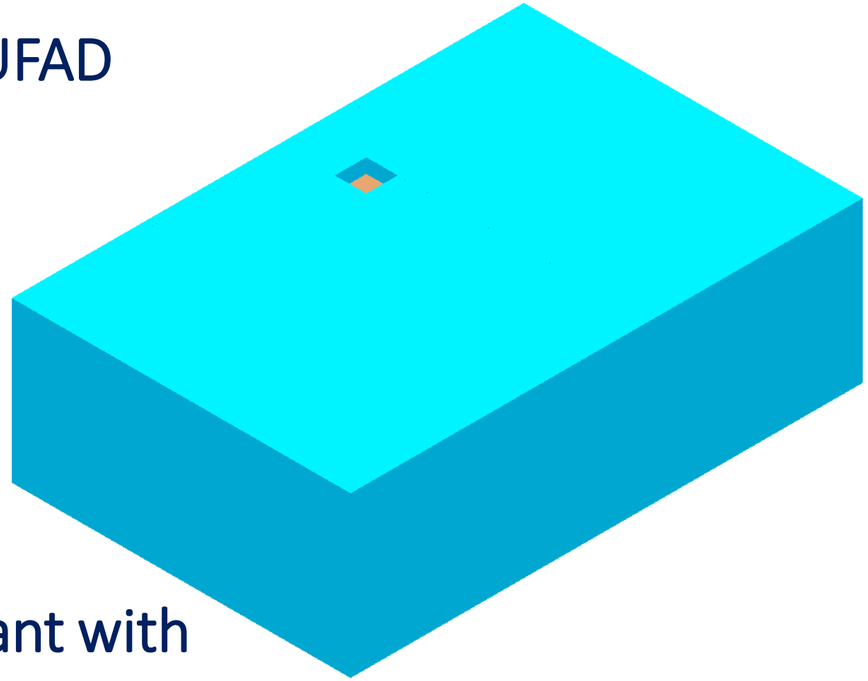


UFAD: How It Works in Practice

Overhead Ventilation



UFAD

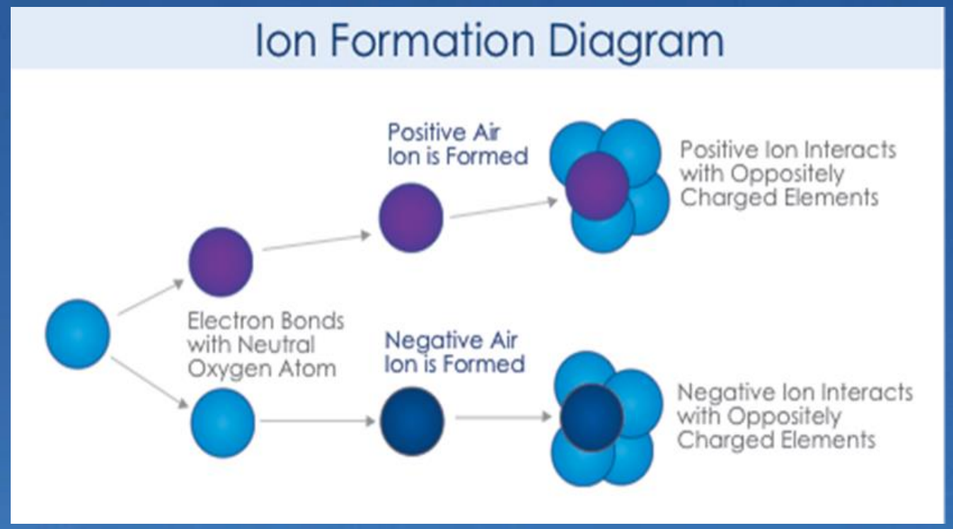


Central Occupant with Cold Sneezes

Germ Concentration

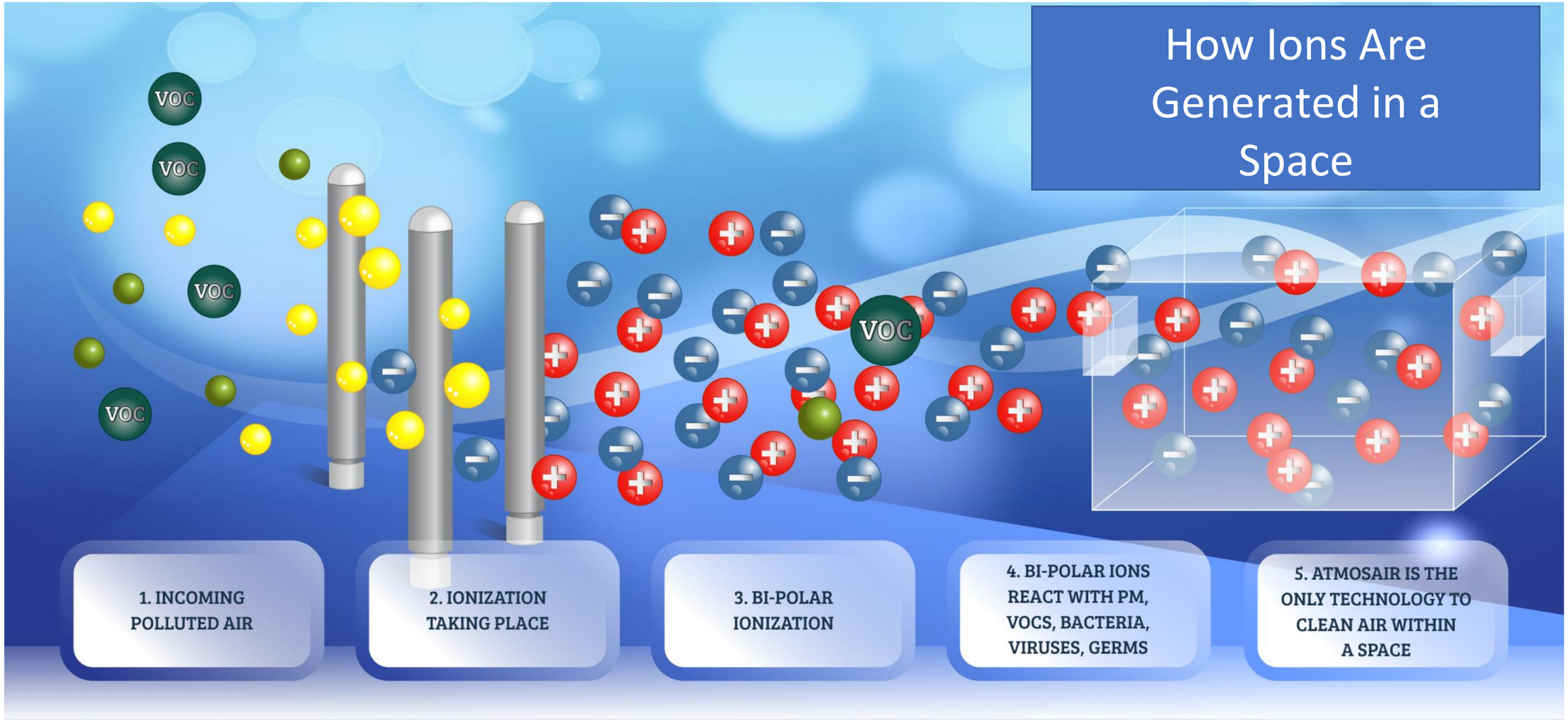
Extreme high low nil

Air Purification: How It Works in Theory



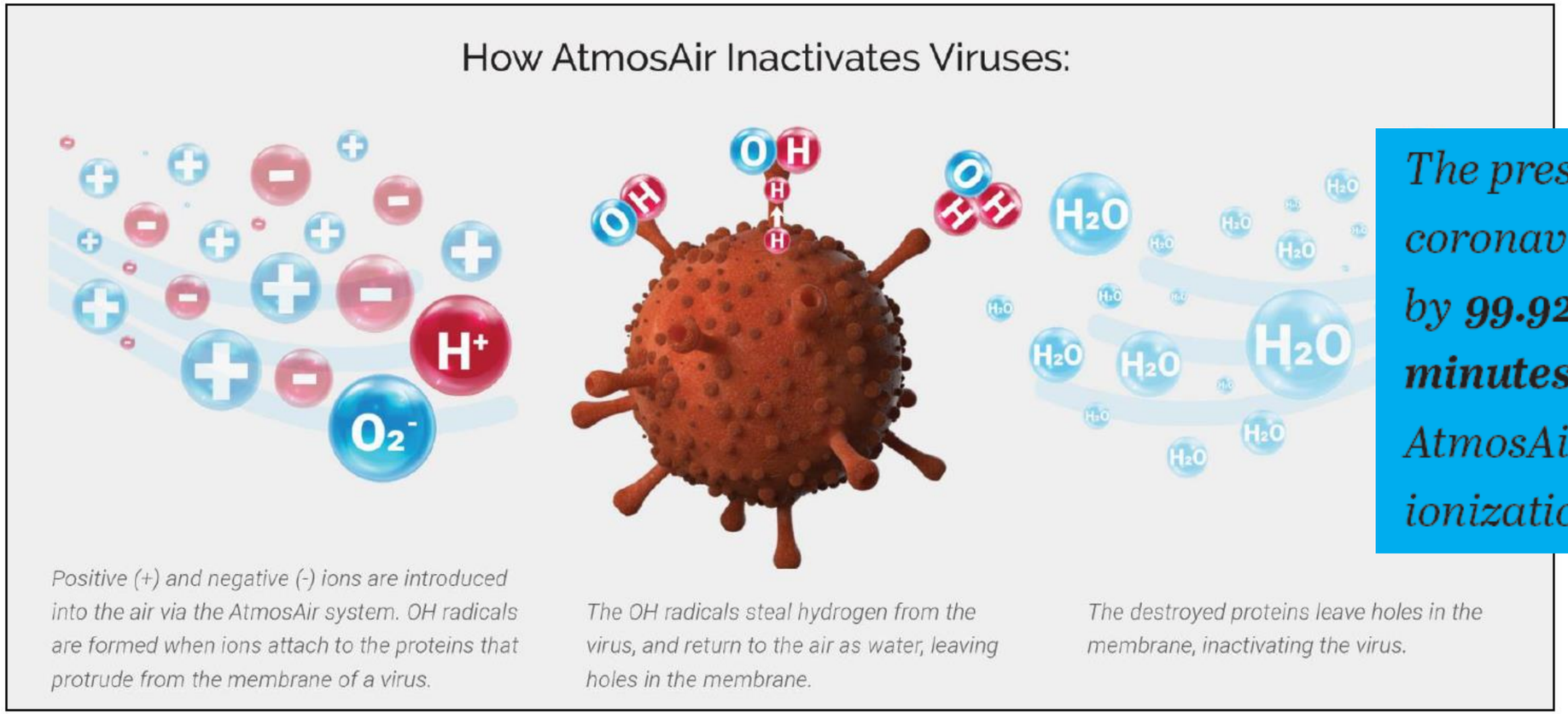
Ionization is nature's air cleaning process. The positively and negatively charged ions generated by the Bi-Polar Ionization system mimic the process that occurs in nature and actively attract, bind, and neutralize all types of pollutants from the air in indoor environments.

Air Purification: How It Works in Practice



Air Purification: How It Works in Practice

AtmosAir "Continuous Disinfection"



*The presence of coronavirus was reduced by **99.92% within 30 minutes** of exposure to AtmosAir's bi-polar ionization technology*

AtmosAir is the only SUPPLY SIDE indoor air treatment solution that continuously measures, monitors and *smartly* disinfects viruses and air in the occupied space.

WHY: Low Profile UFAD

Low Profile UFAD Prevents This!

Consequences of the Design

How To Go Low: Air Towers with In-Floor Terminals

Saves Money

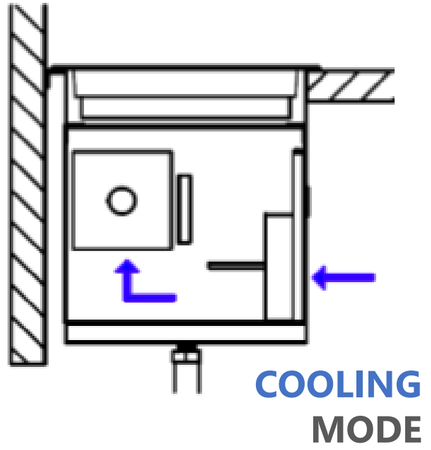
- Increases net rentable space
- Improves tenant flexibility
- Reduces system maintenance costs

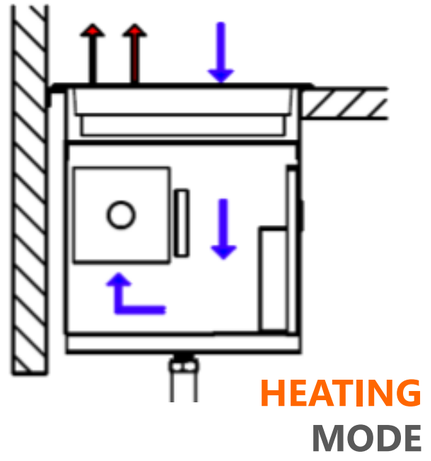
Reduces Complexity

- Simple to install
- Eliminates underfloor ductwork & fan powered boxes

Improves Occupant Comfort

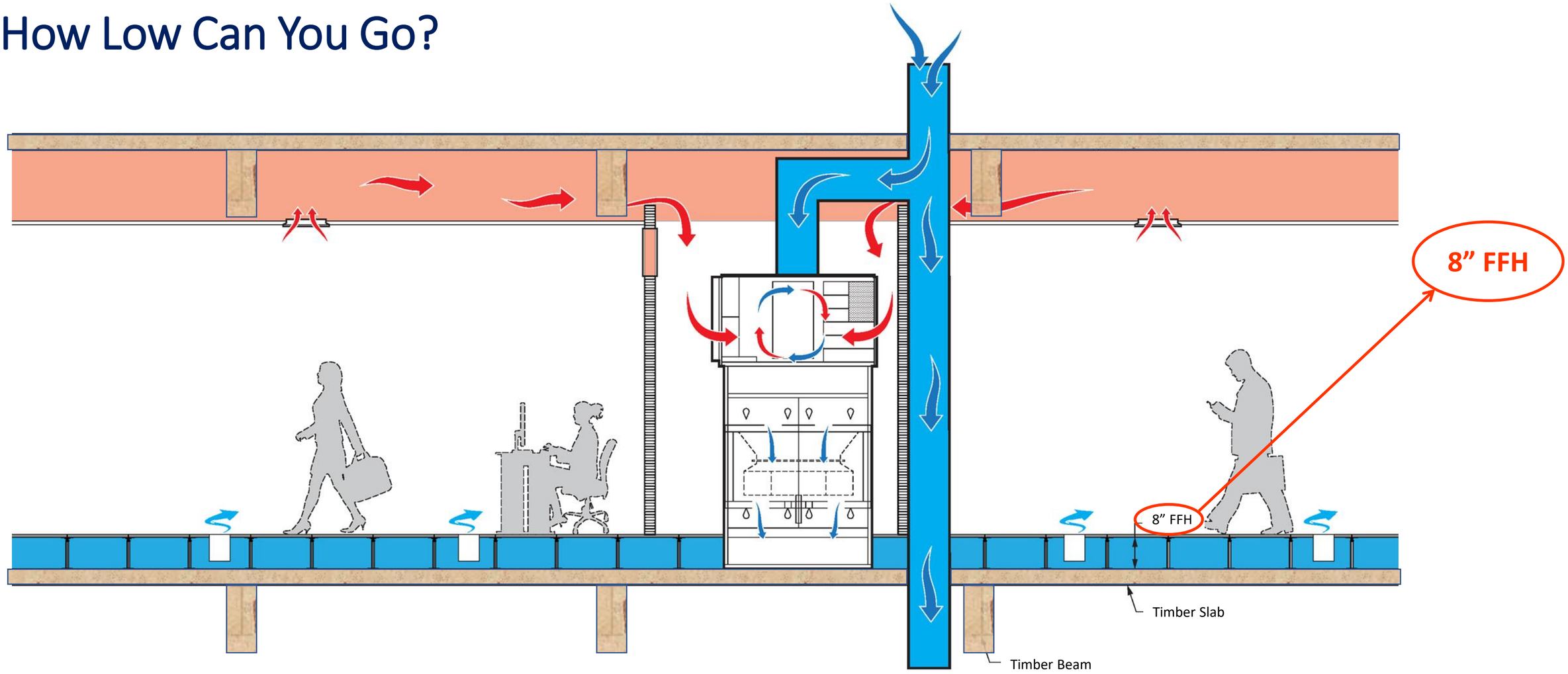
- Greater precision of underfloor static pressure & supply air temperature can maintain more comfortable space temps





UFAD: How It Works in Practice

How Low Can You Go?



UFAD: How It Works in Practice

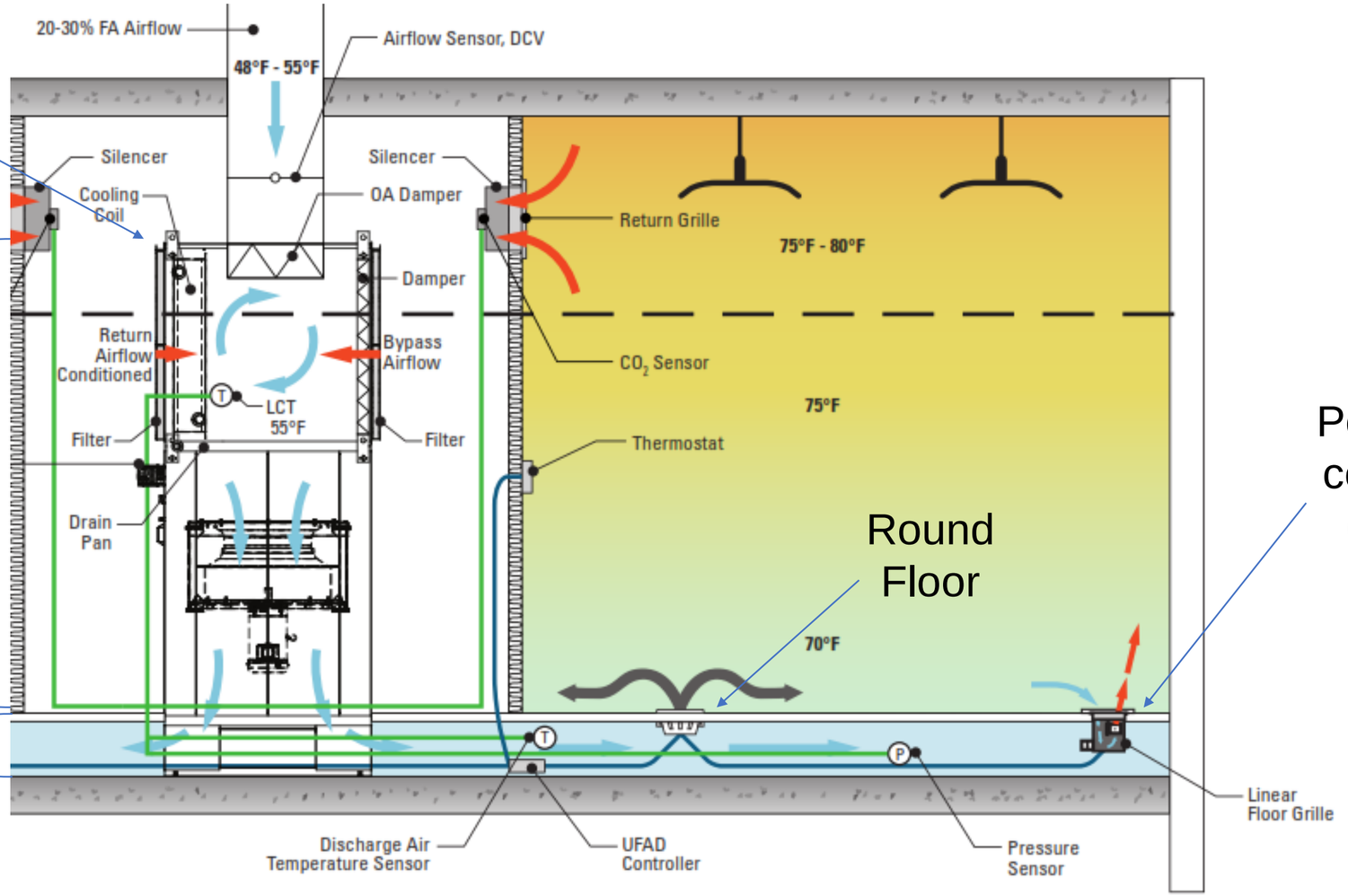
Air Tower

Above floor heights <10’

8” - 14” tall plenum

Round Floor

Perimeter cool/heat device



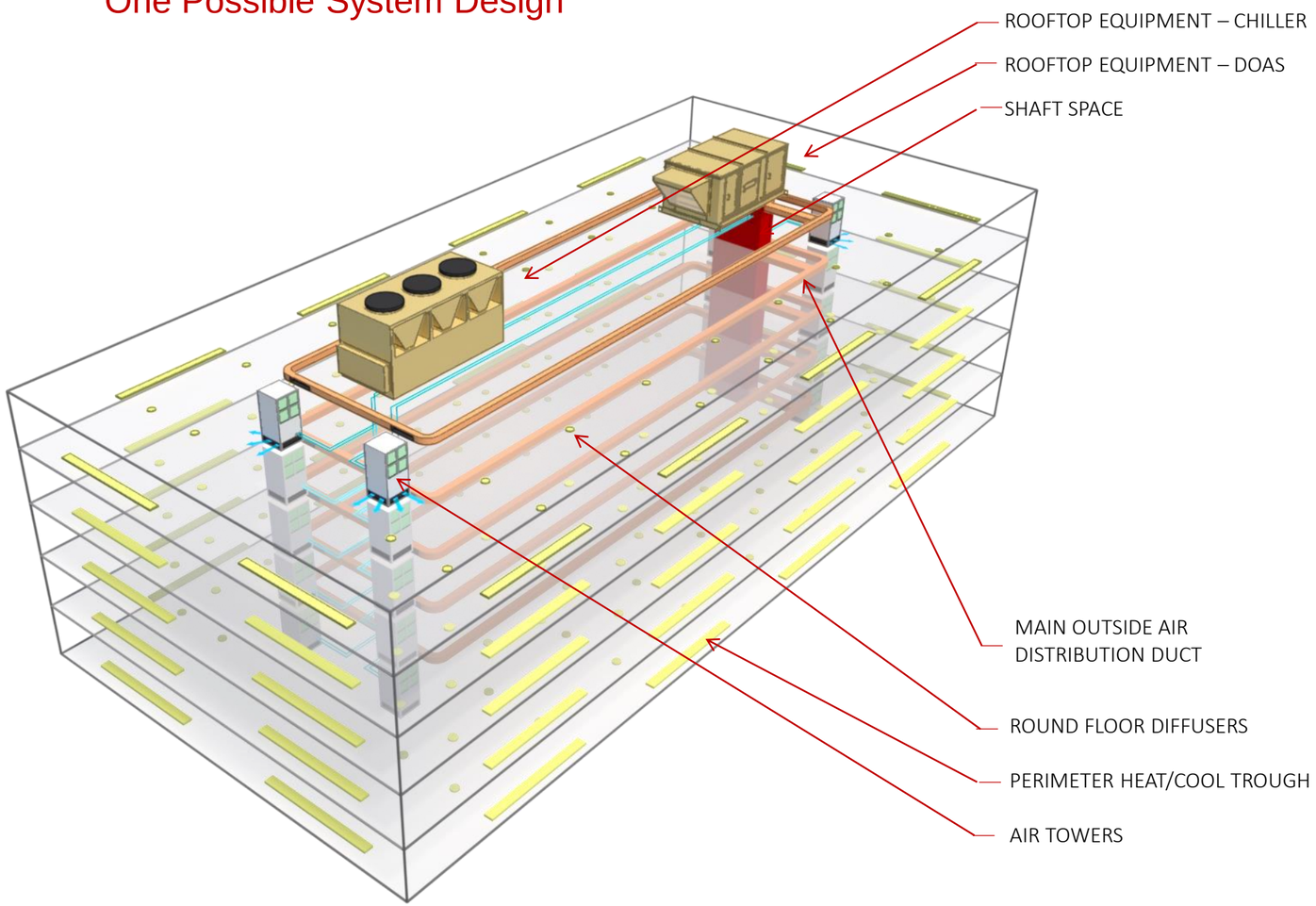
How low can we go?

Supply Air from Air Towers: Typical Design Strategy

Highlights

- Multiple air injection points reduce throw distance for reduced thermal decay
- Eliminates underfloor distribution ductwork
- Multiple air return points for more even space temperatures
- Low pressure operation with large open discharge area for very quiet operation
- Increases rentable area due to smaller mechanical footprint
- Enables smaller zoning sizes for multi-tenant or multi-zone applications
- Ventilation Effectiveness of 1.2 or higher
- VERY QUIET – (NC30 or lower)
- Only maintenance requirements are at Air Towers

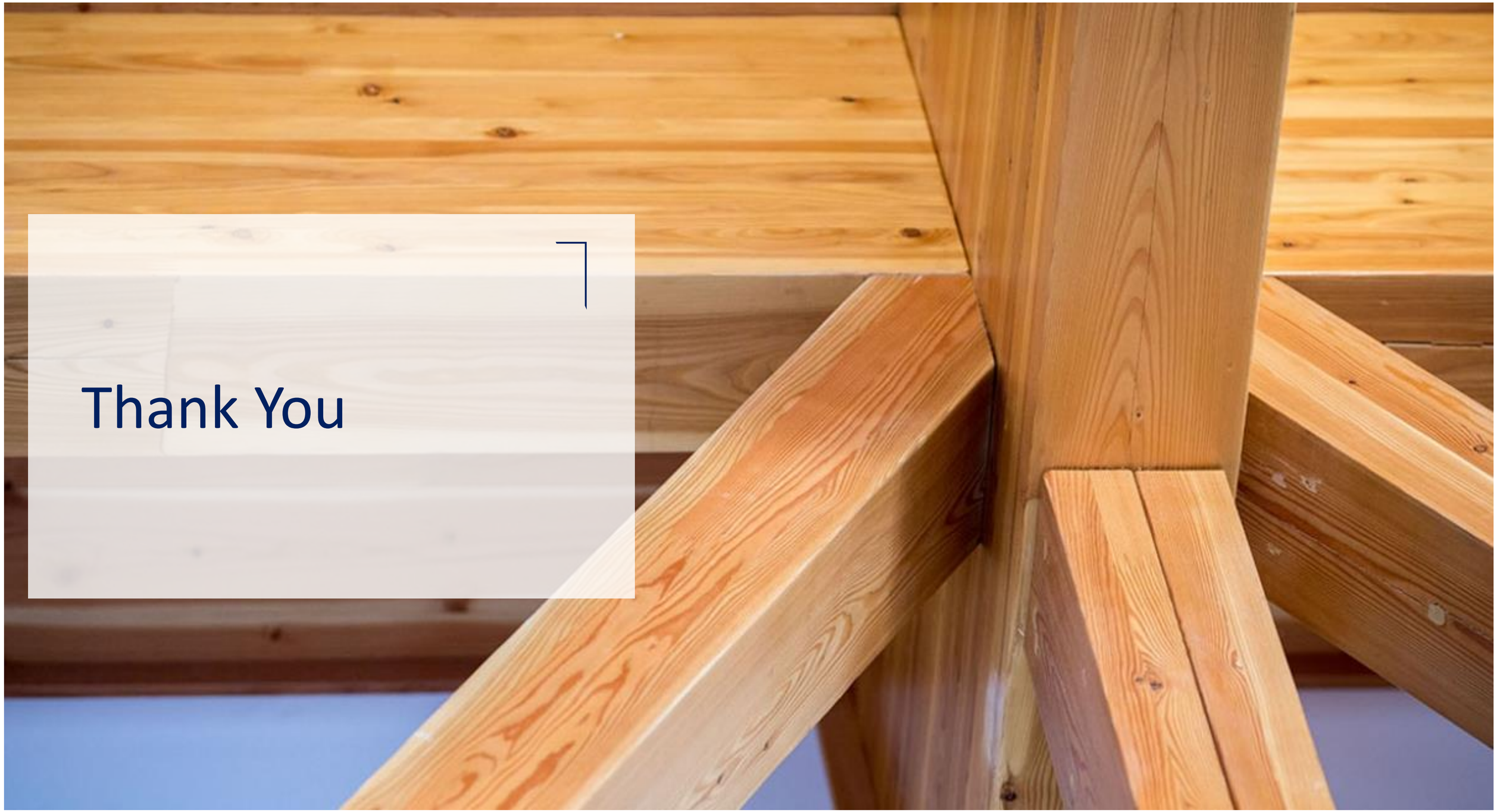
One Possible System Design



ASHRAE Resources

- North America has nearly 100MMsf of operational UFAD in prominent cities & structures
- Canada has widely adopted the technology as the norm for office buildings that seek sustainability & high operational performance
- Over 60% of commercial buildings in Europe and Japan use UFAD
- ASHRAE along with the Center for Built Environments at UC Berkeley have released a UFAD Design Guide with comprehensive guidance

Q & A


Thank You