HEALTHIER BUILDINGS
RETURNING FROM COVID-19
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DISCLAIMER

This presentation is provided to share knowledge and is based on current information at the time. The information presented should be thoroughly reviewed with respect to specific situations prior to implementation. Cosentini reserves the right to edit or change any and all information as needed based on changing information.
CURRENT SITUATION

SARS-CoV2 is a contagious virus that causes the illness COVID-19 and is primarily transmitted through respiratory droplets (>5 microns). Other modes of transmission may include aerosols (<5 microns) and touching contaminated surfaces, although this is not thought to be the main way the virus spreads¹.

We need to re-think how we design buildings moving forward with a focus on healthy buildings

COVID-19 RESPONSE

Awareness of SARS-CoV2 & COVID-19

Operational Concepts

Physical Environment Design Concepts

Social Behaviors
SARS-CoV2: Severe Acute Respiratory Syndrome Corona Virus 2
The illness caused by the virus is known as COVID-19

<table>
<thead>
<tr>
<th></th>
<th>SARS-CoV1</th>
<th>SARS-CoV2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of affect</td>
<td>2002-2004</td>
<td>2019-ongoing</td>
</tr>
<tr>
<td>Confirmed Cases</td>
<td>8,096</td>
<td>14,604,077*</td>
</tr>
<tr>
<td>Mortality Rate</td>
<td>9.50%</td>
<td>4.33%</td>
</tr>
</tbody>
</table>

*as of 2020/07/21

SARS-CoV2 is 60-140 nanometers in diameter

Human Hair: 80,000 nm
SARS-CoV2: 60-140 nm
Influenza: 100 nm
Rhinovirus: 30 nm
TRANSMISSION

The primary transmission method is from person-to-person in close contact through respiratory droplets.

Respiratory droplets >5 microns

Coughs, sneezes, or exhales release droplets of infected fluid most fall quickly. If you are standing within 6 feet of someone you can catch it by breathing in droplets.

Fomite Transmission

Touching contaminated surfaces or objects and then touching your eyes, nose or mouth.

Aerosolized Droplets <5 microns

Aerosolized droplets (droplet nuclei) can travel long distances through the air stream and linger, where they can be breathed in before eventually settling on surfaces. Most small particle losses are by exchange with outdoor air.

Sources:
- WHO: "Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations"
- CDC: "Generation and Behavior of Airborne Particles (Aerosols)"

Virus found to live in the air for up to 3 hours

<table>
<thead>
<tr>
<th>Material</th>
<th>4 hours</th>
<th>1 day</th>
<th>3 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardboard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel/Plastic</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Kimberly A. Prather et al. Science 2020; DOI: 10.1126/science.abc6197
There are 4 main elements to consider when identifying the risk of transmission.

**Distance**
The closer you are to others the higher the risk. It is recommended by the CDC to stay at least 6 feet apart.

**Environment**
A majority of infections (outside of nursing homes) occurred indoors, at home, in workplaces, on public transit, and during social gatherings. Reduce risks indoors with good ventilation.

**Time**
The longer amount of time spent with others increases transmission risk. It is recommended to reduce sustained contact time to less than 15 minutes, especially if you are indoors.

**Activity**
Singing and yelling produce far more droplets than breathing, leading to an increased risk. Consider the activities happening around you to reduce risk.

2. https://www.erinbromage.com/post/the-risks-know-them-avoid-them
**TRANSMISSION**

Pre-symptomatic spread: Those infected with the coronavirus are emitting the virus BEFORE they are symptomatic\(^1\).

Asymptomatic spread: Those that are truly asymptomatic (never develop symptoms) appear to be a lower transmission risk\(^1\).

<table>
<thead>
<tr>
<th>2.5 days</th>
<th>18 hours</th>
<th>44%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time an infected individual is estimated to be spreading the virus before first symptoms appear</td>
<td>Time before developing first symptoms at which an infected person is estimated to be most contagious</td>
<td>Estimation of transmissions that may occur during the pre-symptomatic period</td>
</tr>
</tbody>
</table>

Symptoms may appear 2-14 days after exposure to the virus\(^2\).

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The infectious dose (the amount of virus necessary to make someone sick) of SARS-CoV2 is currently unknown. Experts speculate it ranges from a few hundred to thousands of infectious particles.\(^1\)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Droplets</th>
<th>Infectious Particles</th>
<th>Travel Speed</th>
<th>Airborne Lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing</td>
<td>50-5,000</td>
<td>~33 infectious particles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaking</td>
<td>600-2,600</td>
<td>~200-1,000 infectious droplets per minute &amp; can stay in the air for 8-14 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coughing</td>
<td>3,000</td>
<td>~millions of infectious particles, travels at 50 mph, and can stay in the air for 30 minutes or more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sneezing</td>
<td>40,000</td>
<td>~millions of infectious particles, travels at 200 mph, and can stay in the air for 30 minutes or more</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. https://www.erinbromage.com/post/the-risks-know-them-avoid-them
HEALTHIER BUILDINGS RETURNING FROM COVID-19

Recommendations for healthier buildings

**Architectural**
- Space planning for distancing
- Frictionless entryways
- Lighting Controls & Automated Shading
- Distance Indicator on Floors
- Larger workstations

**Material**
- Low-VOC materials
- Easy to clean surfaces
- Anti-microbial applications

**HVAC**
- Improve air quality: Increase air exchange rates & High-efficiency filtration/air treatment
- Ensure pressurization between spaces
- Humidification
- Decentralized Systems

**Technology**
- High-tech connectivity
- App-based touch-free systems
- Smart Concierge
- Thermal Scanning
• One-Way Entry / Exits
• Lighting Controls & Automated Shading
• Frictionless Entryways
• Appropriate Signage (graphics for visual social-distancing guides and reminders)
• Space Planning for Distancing
• Modular Furniture (adjusting to any space and situation)
• One-Way Entry / Exit
• Space Modifications
ARCHITECTURAL || DE-DENSIFICATION

- Classrooms at 40% - 50% Capacity
ARCHITECTURAL || DE-DENSIFICATION

LECTURE HALL FALL 2019

LECTURE HALL FALL 2020

- social distancing
- reduced capacity

25-35% capacity

45-50 SF per seat

3 spaces between students

Stopper seating at north row

144 seat room

14 SF per seat
ARCHITECTURAL || DE-DENSIFICATION

- Space Planning for De-densification on Campus
- Outdoor Classrooms & Green Space (not a new phenomenon!)
ARCHITECTURAL || DE-DENSIFICATION

Distancing Solutions at Large Gatherings
Necessity of Antimicrobial Finishes?

- avoid cross infection by pathogenic microorganisms
- control the infestation by microbes
- arrest metabolism in microbes in order to reduce the formation of odor
- safeguard the textile products from staining, discoloration, and quality deterioration
- deterioration
Why Are Natural Wood Materials Healthier?

- natural antibacterial and antimicrobial properties which eliminate potential contaminants
- dries quickly putting bacteria at a disadvantage
**Copper Antimicrobial Laminate**

**How it Works:**

- **Surface with the shortest life-span for bacteria.**
- Copper ion penetrates bacteria, so the cell loses significant nutrients and water.
- Bacteria gets serious prevention for respiratory and metabolic activity, which leads to complete extinction.

**Excellent use on covering items such as:**

- Any knobs, buttons, handles, equipment in high traffic areas
HVAC || ENHANCED HVAC SYSTEMS

**Air Quality**
(Dilutes Contaminants)

- Increase outdoor air ventilation
- Disable demand-controlled ventilation
- Extend hours of operation and consider pre/post occupancy purge ventilation
- Provide CO2 sensors in densely occupied spaces

**Air Treatment**
(Removes/Disables Contaminants)

- Enhanced Filtration (MERV 14+)
- Air Ionization (Bi-Polar Ionization / Photo-Hydro Ionization)
- UV Light Sanitizers (Ultraviolet Germicidal Irradiation & Photo Catalytic Oxidation)

**Air Exchange**

- Reduce air recirculation with smaller HVAC zones
- Increase bathroom exhaust and elevator ventilation
- Control pressurization relationships

**Humidification**

- Control humidification within optimal bandwidth
Because it is sufficiently likely that SARS-CoV-2 can be transmitted through the air, airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.

Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air.

Source: ASHRAE’s statement on airborne transmission of SARS-CoV-2/COVID-19
# INCREASING AIR QUANTITY (ACH)

Increase outdoor air change to dilute contaminants in the air.

## Air Changes Per Hour (ACH)

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Typical Modern Building</th>
<th>Typical 1970’s Induction Building</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outside ACH</td>
<td>Filtered Recirculation ACH</td>
</tr>
<tr>
<td>Outside air</td>
<td>.15 CFM/sf</td>
<td>.25 CFM/sf</td>
</tr>
<tr>
<td>Time for 100% outside air change</td>
<td>60 minutes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>If % outside air is doubled</td>
<td>30 minutes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

**Assuming 12’ ceiling and 1 CFM/sf**

<table>
<thead>
<tr>
<th></th>
<th>Typical Modern Building</th>
<th>Typical 1970’s Induction Building</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time for 100% outside air change</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80 minutes</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>If % outside air is doubled</td>
<td>40 minutes</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td>4.5</td>
</tr>
</tbody>
</table>

## Implications of HVAC Energy Usage

- Code outside air without demand controlled ventilation +5% energy usage
- Doubling the ventilation without demand controlled ventilation +20% energy usage

*These numbers are for a floor by floor VAV system.*
Due to the nature of the SARS-CoV2 virus, HVAC solutions are not effective in preventing the spread of contamination person to person or eliminating airborne transmission risk, however the following technologies are presented because they provide benefit in bacterial and virus reduction within their path of effect. The highest performance treatment systems can remove up to 99.99% of viruses.
HEPA filters consist of interlaced glass fibers that create a fibrous maze that takes particles out of circulation through diffusion, interception, straining, and inertial impaction.

When selecting a filter, careful consideration must be given due to the pressure drop from a high filter.

*In large central stations consider electronic filter (performs at MERV 15 level)
AIR TREATMENT & FILTRATION

MERV - Minimum Efficiency Reporting Value

<table>
<thead>
<tr>
<th>Ratings</th>
<th>0.3-1 microns*</th>
<th>1-3 microns</th>
<th>3-10 microns</th>
<th>Filter Type</th>
<th>Controlled Particles</th>
</tr>
</thead>
<tbody>
<tr>
<td>MERV 8</td>
<td>-</td>
<td>-</td>
<td>70-85%</td>
<td>Low Quality MERV Filter</td>
<td>Mold spores, pollen, dust</td>
</tr>
<tr>
<td>MERV 9</td>
<td>-</td>
<td>&lt;50%</td>
<td>85-90%</td>
<td>Standard MERV Filter</td>
<td>Fine dust</td>
</tr>
<tr>
<td>MERV 11</td>
<td>-</td>
<td>65-79%</td>
<td>85-90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MERV 13</td>
<td>&lt;75%</td>
<td>&lt;90%</td>
<td>&lt;90%</td>
<td>Superior MERV Filter</td>
<td>Bacteria, viruses, smoke</td>
</tr>
<tr>
<td>MERV 14</td>
<td>75-84%</td>
<td>&lt;90%</td>
<td>&lt;90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MERV 15</td>
<td>85-94%</td>
<td>&lt;90%</td>
<td>&lt;90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MERV 16</td>
<td>&lt;95%</td>
<td>&lt;95%</td>
<td>&lt;95%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MERV 17</td>
<td>99.97%</td>
<td>&lt;99%</td>
<td>&lt;99%</td>
<td>HEPA / ULPA Filter</td>
<td>Small bacteria and viruses, fumes</td>
</tr>
<tr>
<td>MERV 18</td>
<td>99.997%</td>
<td>&lt;99%</td>
<td>&lt;99%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MERV 19</td>
<td>99.9997%</td>
<td>&lt;99%</td>
<td>&lt;99%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MERV 20</td>
<td>99.99997%</td>
<td>&lt;99%</td>
<td>&lt;99%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Filters must be changed regularly. Consider monitoring air quality as well.
Composite model of how filters perform for influenza virus filtration versus MERV

Fractional Efficiency of MERV Rate

AIR TREATMENT vs FILTRATION

How filters perform for influenza virus and cost of filtration versus MERV

Infections Versus Filtration Rate

![Infections Graph]

Cost of Filtration Versus MERV

![Cost Graph]

AIR TREATMENT & ELECTRONICALLY CHARGED FILTERS

Electronically charged filters use active-field polarized media to remove particles from the air. Another inherent mechanism of polarization uses particle agglomeration whereby ultra fine particles become polarized after passing through the air cleaner and as a result of polarization are attracted to each other, in addition to other chemical contaminants, to form bigger particles that are subsequently captured.

Does not require frequent filter changes and is a good option for large plant retrofits

Equivalent to a MERV 15 filter
Bi-Polar Ionization works by introducing positive and negative ions into the air via the supply side of ducts. The ionization causes production of clusters of hydroxyl (OH) radicals which are formed on the surface of microbes, removing hydrogen from the microbes cell wall, thereby inactivating the virus.

ASHRAE Position: Systems are reported to range from ineffective to very effective in reducing airborne particulates and acute health symptoms. Convincing scientifically-rigorous, peer-reviewed studies do not currently exist on this emerging technology; manufacturer data should be carefully considered.
AIR TREATMENT & BI-POLAR IONIZATION

Installation is most often in supply ducts, but can also be rack-mounted in plenums, in air handling units, or smaller units can be installed within fan coil unit plenums.

Bi-Polar Ionization

The unit has negligible air pressure drop, and can be easily retrofitted to an existing HVAC system.
Ultraviolet light kills bacteria and viruses by destroying bonds that hold their DNA together as particles pass under the UV light they are destroyed. UV-C energy in the wavelengths from 200 to 280 nm provides the most germicidal effect, with 265 nm being the optimum wavelength. Exposure to UV-C rays is harmful to occupants.

UV Light Sanitizers

Effectiveness is based on how long air is exposed to UV (resonance time) which is typically 6-10 seconds to kill the virus.
Installation can be in-duct or in AHUs. Lamps installed inside HVAC generally focus on cooling coils & drain pans.

The majority of modern UVGI lamps create UV-C energy at a near optimum 254 nm wavelength.

Works by installing banks of UV-Lamps inside HVAC systems or associated ductwork. Consider adding to return air plenums.

Requires high UV doses to inactivate microorganisms on-the-fly as they pass through the irradiated zone due to limited exposure time:
- Systems typically designed for 500 fpm moving airstream.
- Minimum irradiance zone of two feet.
- Minimum UV exposure time of 0.25 second.

Should always be coupled with mechanical filtration.
Upper room UV disinfection involves mounting lights from the ceilings or on the walls and pointing them upwards to disinfect the upper room air. It can be used in combination with in-duct UV for maximum effect. The UV-C lamps must be mounted 7′ in the air to protect inhabitants from the harmful UV rays. Requires low UV-reflectivity of walls and ceilings and ventilation should maximize air mixing (supplemental fans needed where ventilation is insufficient).
Air Treatment & UV Light Sanitizers

Portable, fully automated units that can be controlled remotely. Effective on air and surfaces where the light can penetrate (not in shadowed areas).

Units have settings for specific pathogens such as MRSA, C. difficile, both of which are harder to inactivate than coronaviruses.

- >99.9% reduction of vegetative bacteria within 15 minutes\(^1\)
- 99.8% for C. difficile spores within 50 minutes\(^1\)

Pulsed Xenon lamps: High-powered UV lamps (generally containing xenon gas) used in rapid pulses of intense energy. Emits a broad brand of visible and ultraviolet wavelengths, with a significant fraction in the UV-C band. Uses significantly higher power outputs than usual UV-C techniques.

AIR TREATMENT & UV LIGHT SANITIZERS

UV-C lights on occupancy sensors so they can sanitize spaces when unoccupied.

Far UV-C lights (200-230 nm spectrum) can sanitize without harming occupants\(^1\). Awaiting more testing.

More UV-C lights in various shapes and styles are currently in development, including UV-C LED's which are emerging for use.

One cleanse per 800ft³ achieves 4 air exchanges per hour (50cfm) and also includes a HEPA & Carbon filter.

Individual downlights and doorway disinfection technology currently in development

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AIR TREATMENT ñ INDIGO CLEAN

A dual-mode disinfecting light system that remains in the visible light spectrum, operating at 405nm. It is safe for human occupancy while on and has the ability to be on 24/7. The number of studies documenting its performance are very limited and the required exposure times required are relatively long.
Upper room UV disinfection has been found to have the most effect at UV sanitization. The UV-C lamps must be mounted 7' in the air to protect inhabitants from the harmful UV rays.
Higher humidity reduces infectivity of influenza\(^1\)
Membranes in the nose dry out quicker in low humidity\(^2\)
Low humidity results in breathing smaller particles\(^3\)

**HVAC || HUMIDIFICATION**

1. John Noti, et al, Humidity Leads to Loss of Infectious Influenza Virus from Simulated Coughs (February 27, 2013)
3. ASHRAE Guidelline 10-2016, Interactions Affecting the Achievement of Acceptable Indoor Environments
Using smaller zones (500 sf) will lower recirculation of air. Consider use of VRF or DOAS systems.

Typical zoning with Floor-by-Floor AHU
Floor by floor AHUs have a higher efficiency filter (typically MERV 8-13) but the mix of outside air percentage can vary and contamination zones are larger.

Multiple small zones from use of VRF system
VRFs have a lower efficiency filter but can be retrofitted to accept a MERV 8 or potentially higher efficiency filter. Percentage of outside air is assured.
COVID-19 Outbreak Study within a Restaurant in Guangzhou, China
January 24, 2020, 12:00 PM, Chinese New Years Eve luncheon
5-story restaurant, 3rd floor of the restaurant

TOUCHLESS TECHNOLOGY

Doors & Entryways
- Destination Dispatch
- Elevators
- Automatic Doors
  (motion sensor, facial recognition, optical foot sensor)

Pantries
- App-based coffee and water machines
- Motion sensor faucet with 20 second timer and soap dispensers
- Touchless cabinets or open shelves for frequently used items
- Use bottle fillers instead of drinking fountains

Bathrooms
- Motion sensor flushometer, faucet with 20 second timer, and soap dispenser
- Paper towels instead of automatic hand dryers
- UV disinfecting on seats
- UV lamps in bathrooms for after-hours disinfection

Lighting
- Lighting Controls
- Automated Shading
- BMS & app-based controls for lighting controls & automated shading
Touch-free Technology in Common Areas
• Touch-Free Entry / Exit
• Thermal Scanning Stations
• App-based Technology
BUILDING LOBBY

- **Automatic doors**
- **Plexi barrier for security/reception desks**
- **Facial recognition/mask scanning, thermal scanning, and touch-free security**
- **Sanitization station at entry**
- **Entryway mats**
- **Increase outside air, enhanced filtration, and air treatment systems**
- **Minimize elevator occupancy and use floor stickers. Consider UV & HEPA filters in elevator cabs.**
- **Touchless destination dispatch system via card or mobile app. Keep elevator doors open at lobby/floors (note stack effect concern in winter).**
AUDITORIUMS

- Increase outside air, enhanced filtration, and air treatment systems
- Space out seating, add CO2 sensors, consider portable air filtration.
- Desk dividers between seats
- Floor markings for circulation and 6’ separations
Increase outside air, enhanced filtration, and air treatment systems

Larger or separated workstations, stagger work hours and occupancy (occupy every other desk) for social distancing

For conference rooms space out seating, add CO2 sensors, consider portable air filtration. Reduce open collab/touchdown spaces.

Desk dividers for existing desks

Floor markings for circulation and 6' separations
PANTRIES

- Handwashing education posters
- App-based coffee machine and automatic water bottle filler
- Countertop cut-outs for touchless waste and recycling system
- Motion-activated faucet with 20 second timer
- Touchless cabinets
**BATHROOMS**

- Increased Bathroom Exhaust
- Automatic Flushometers
- After-hours UV disinfection
- Motion-sensor 20 second faucet and automatic soap dispenser
- Full-height water closet partitions ($7,500/unit)
- Automatic closing lids, optional UV disinfection (not yet readily available)
- Automatic paper towel dispensers and open trash can located by door. Disable air dryers
- Automatic bathroom doors or foot pulls
OPERATIONAL CONCEPTS

Proactive things building owners can do

**Cleaning**
- New cleaning protocols
- More regular deep cleaning
- Frequent cleaning of common touchpoints
- Increase supply of sanitizing products
- Ductwork and unit cleaning

**Air Quality**
- Changing filters
- Monitoring air quality
- Extending ventilation hours and after-hour purge with outside air

**Screening Protocols**
- Thermal Camera Scanning/Elevated Body Temperature (EBT) checks
- Staggered Arrivals and Departures
- Packages Sanitization

**Commissioning**
- Commissioning of systems with periodic validation
- Creating operations and maintenance manuals for staff
- Create a best practices manual for tenants
INCREASED CLEANING STRATEGIES

**Deep Cleaning**
- Regular deep cleaning of tenant spaces and common areas
- Periodic fine mist/fog of space with germicide solutions
- Flush building pipes & prime floor drains before reoccupation
- Elevator cab UV sterilization

**Packages**
- Sterilization space for incoming packages (with UV sterilization)

**Sanitization Stations**
- Add sanitization stations at entrances and throughout office
- Provide tissues, soap, hand sanitizer, and disinfecting wipes in the offices and by copy machines, common areas

**Lease Terms**
- Review lease terms on general cleaning and nightly deep cleaning for building common areas
- Update facility maintenance contract to include additional cleaning (such as cleaning of desks, multiple cleanings of common areas on tenant floors)
THERMAL SCANNING

This thermal scanning system works at the turnstile and has facial recognition, mask recognition, and thermal scanning. Facial recognition can be turned off to protect privacy.

https://www.youtube.com/watch?v=PLqdXJLo5Uc
THERMAL SCANNING

This solution is for large volume scanning without turnstiles and can scan from 20 feet away.
SMART BUILDING WORKPLACE MANAGEMENT

Help maintain social distancing requirements
Contact tracing identification and reporting
Instant communication

Smart Building Digital Platform
- Ultra high-speed connectivity (DAS/5G)
- Artificial Intelligence (AI)
- Analytics - IoT
- Big Data
- CBRS, mmWave
- WIFI 6

Touchless Environment
- Biometrics (Face ID, Iris, Palm)
- Destination dispatch via touchless lobby turnstiles
- Virtual Assistants/Help Desk
- Voice/Gesture Control for AV and Conference Sys
- Real Time Occupancy Monitoring
- Social distancing density control
- Dynamic Indoor Wayfinding
- Workspace Management Flexible Seating
SOCIAL BEHAVIORS

What the building occupants can do

Social Distancing
- Always stay 6’ apart
- Shifted work schedules (Different days, different hours)
- Staggered reoccupancy
- One-way office circulation where possible

Education
- Educational posters about hand washing, wearing masks, touching your face, and other best practices
- Periodic hand washing reminders
- 20 second timers at faucets

Go Digital
- Flexible work from home policy
- Use videoconferencing for meetings when possible
- Postpone large gatherings
- Assess risk of travel

New Protocols
- Wearing face masks
- Keeping your desk clean
- Minimize elevator occupancy
- Communication with staff
IMMEDIATE RECOMMENDATIONS

Healthy Building Checklist

- Healthy finishes - copper film and materials
- Gathering spaces with built in social distancing / natural finishes
- Increase outside air throughout occupied space where possible.
- Replace existing air handling unit (AHU) filters with MERV 13 or better.
- Consider Bipolar Ionization
- Replace all existing AHU UV lights with higher density for 95% or above "on the fly" virus kill.
- Add UV-C lights to any existing AHU that does not currently have them.
- Add needlepoint bipolar ionization air purification devices to each existing AHU supply duct.
- Consider free-standing Hepa Filters in classrooms
NEXT STEPS

Let us know how we may serve you.

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