STO BUILDING GROUP

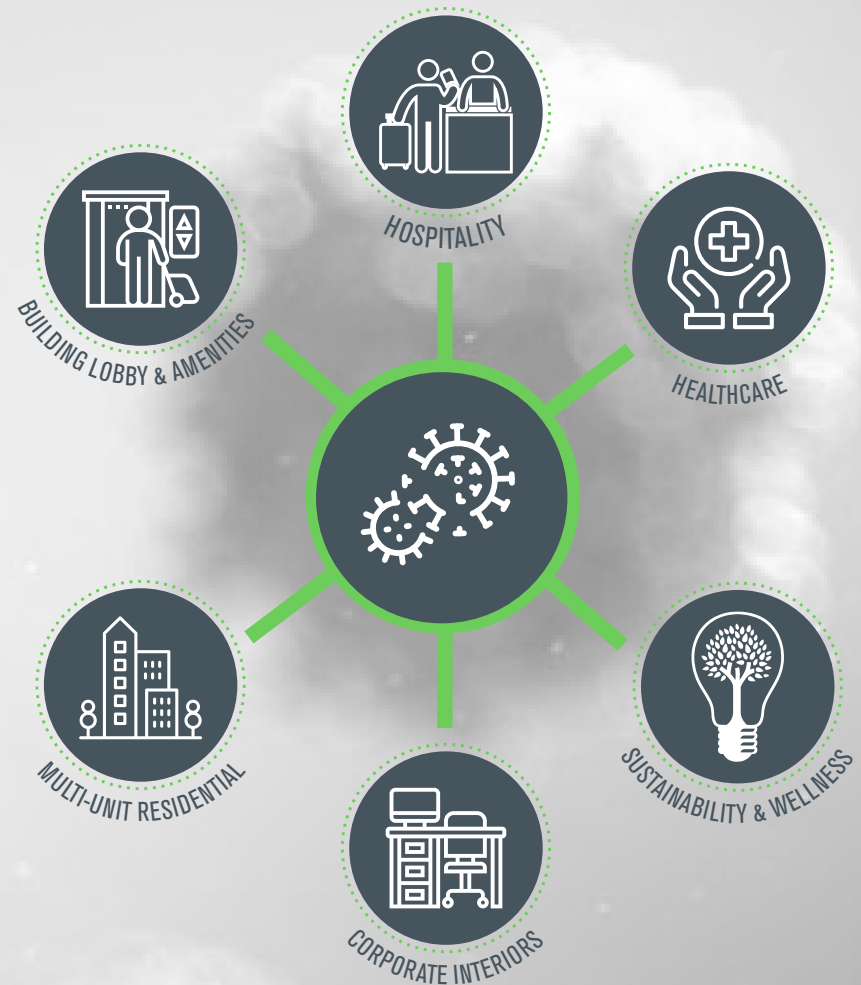## COVID 19
# Impact on Design & Construction v 1.0

This taskforce took a deep dive into the impacts on design in various sectors and categories to better prepare our organization on short, mid-term, and long-term changes caused by COVID 19.

HOSPITALITY

BUILDING LOBBY & AMENITIES

HEALTHCARE

MULTI-UNIT RESIDENTIAL

CORPORATE INTERIORS

SUSTAINABILITY & WELLNESS

Our mandate is to tap into our networks and conduct industry research in order to ascertain the industry's response to our clients' needs, CDC guidelines and employee sentiment that could impact the way we design and build spaces – including what technology solutions could come into play. The task force will not editorialize or make recommendations regarding the information we find, but will attempt to report on the short term vs. long term implementations. We also see this as an evolving document as the situation unfolds and our clients continue to evaluate their real estate and operational needs.
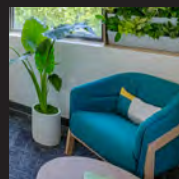
COVID 19 IMPACT ON DESIGN & CONSTRUCTION

As society recovers from the devastating effects of the COVID-19 pandemic, we find ourselves entering a world that is vastly evolving in order to mitigate future outbreaks. Our daily work and livelihood has rapidly changed from one of close-quarters collaboration to that of remote communication. As such, it is evident that interior design and construction needs to adjust as well in order to provide workers the ability to continue business. The following is a review of the impact on several sectors and the direction needed in order to adapt post COVID-19.
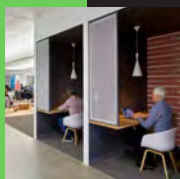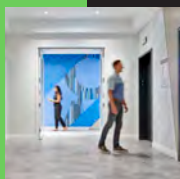
Corporate Interiors

As employees return to work, there are modifications that can be made to help keep them safe. Click to learn more.

Building Lobby & Amenities

Safety and aesthetics will be key to setting a positive experience in buildings post pandemic. Click to learn more.

Hospitality

Design changes that mitigate contagion between individuals will likely influence hospitality design. Click to learn more.

Multi-Unit Residential

With increased time spent at home, people are increasingly seeking healthy spaces connected to nature. Click to learn more.

Healthcare

This industry will be a proving ground for novel design & construction techniques to manage crises. Click to learn more.
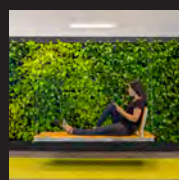
Sustainability & Wellness

A shared theme of COVID-19's impact on the industry is increasing wellness within the physical environment. Click to learn more.

CORPORATE INTERIORS

As we adapt to new interactions post pandemic, the way employees utilize workspace could look and feel different. Modifications we expect to see in the physical office environment include:

Design & Materials

- Increased use of hospital-grade fabrics, vinyls, plastics, faux leathers, instead of soft fabrics.
- Increased use of antimicrobial materials, particularly for countertops.
- Design solutions and graphics to encourage 6' physical distancing.
- Restroom doors that swing out to avoid touching.

Workstations

- An altered approach to the open office environment may include a new hybrid between open office/enclosed office and/or new furniture solutions that help provide physical distancing.
- Height-adjustable desks controlled by Bluetooth or app to avoid touching buttons.
- We could see a reduction of hoteling/shared workstations to reduce spread of bacteria.

Conference Rooms, Phone Rooms, and Lounges

- Conference room to workstation ratios may change. With fewer people in an office and in in-person meetings the ratio could be 1:1.3.
- Requests for high-tech virtual boardrooms will likely increase.

Reception, Other Support Spaces

- The "reception of the future" could be altered to utilize a digital interface.
- Redesign of reception desks to provide physical distancing.
- Additional use of mail/package rooms instead of relying on package storage at reception.

Workplace Cafes, Pantries, Food Service

- At corporate cafes, barista stations could be utilized instead of self-service coffee stations.
- Hire more staff so that only one person is serving each food item instead of each staff members serving themselves.

CORPORATE INTERIORS (CONT.)

Workplace Circulation

- Designs to include wider corridors to allow for safer two-way circulation without pinch points.

MAINTAINING SUSTAINABILITY

Increased HVAC to improve indoor air quality comes at a cost to the environment. We need to think about switching to clean energy, so outdoor air pollution is not adversely affected by the increase in energy used to deliver more outside air to buildings.

Another large contributor to an offices' carbon footprint is commuting. Flexible work schedules and an increase in telecommuting will help lower the overall carbon footprint of companies. Bike storage or bike share promotions can help commuters maintain social distancing, which will be challenging on public transit, and at the same time will allow them to reduce their commuting carbon footprint while getting fit. Biking is a great alternative to driving, where the range to the office is reasonable and infrastructure is in place.

Elevators

- New solutions to avoid the need to push a button. Dedicated elevators could stop only on certain floors to prevent cross-contamination between companies in multi-tenant buildings.

A Touch-Free Workplace

- Reduced touchscreen AV components—people connecting via their devices directly.
- Increased use of voice-activated assistants and technology to minimize touch points (elevator call buttons, doors, way finding, etc).
- Automatic and/or foot operated door openers.

Technology

- Online workstation scheduling/reservations for staff coming into the office.
- Technology that can pinpoint employee locations via smartphones to determine who an infected worker might have had contact with. (If this is in line with the companies culture/broader company policies).

Air Quality & Filtration

- Trends could return to living walls as an additional air filter—with improvements to existing water usage and maintenance.
- We could see code changes regarding air recirculation that require bringing in more outside air. However, this goes against many jurisdictions' sustainability goals.
- Tactics that can be used to reduce the spread of viruses include: ventilation, filtration, humidity, pressurization, UV and monitoring. **Click here to read more about air quality.**

Return to Work

- Research shows 70% of people want to return to work in the office the majority of their week, but with more space (less density) for social distancing and an assigned workspace.
- 30% of people want a flexible work arrangement and with spaces that could be used for other functions when not in use as workspaces.
- The top reason employees want to return to the office is the people. 74% say the people are what they miss most about the office; 55% say collaborating with others is harder at home; and 51% say staying up to date on what others are working on is harder at home.
- For people to feel comfortable coming back to the office, a combination of more space, more cleaning, and stricter sick policies is required.
- People expect to return to a different workplace: more space, less desk sharing, and increased support for mobile and virtual work.

Reference: https://www.gensler.com/uploads/document/695/file/Gensler-US-Work-From-Home-Survey-2020-Briefing-1.pdf

Click here to learn more about what companies are doing to prepare the office environment for return post COVID.

Commercial Real Estate & Leasing

- With expanded working from home and rising real estate prices, we could see companies leasing smaller spaces with an increased demand for space with outdoor areas to provide employees access to fresh air. This could mean several small regional offices dispersed through a metropolitan area instead of one large headquarters. Leasing may rely on 3D building scans can create virtual real estate tours and reduce physical site tours of potential spaces.

BUILDING LOBBY & AMENITIES

The initial experience tenant and visitor's have is the interaction with a building's lobby. Addressing both safety and aesthetics will be key to setting a positive expectation in the post pandemic environment. This may require not only physical modification to the space, but also adjustments to user behavior.

AIR QUALITY in the lobby is a key concern. Providing a dedicated HVAC plant can be a huge step toward wellness. By introducing greater natural ventilation and controlling air pressure, with a goal of providing greater than 50% fresh air, the feeling of wellness can be increased for the entire tenant population. An architectural feature which can also improve lobby air quality is the introduction of living (green) walls.

Vertical Transportation
Queue control & attempts to incentivize tenants to modify working hours to flatten the flow of people in/out of the building, as well as elevator traffic. In the longer term, ropeless elevator technology (flexibility in up/down and side-to-side) may be introduced.

Core Restrooms
Installation of hands-free fixtures & door hardware. Controlling traffic is also a major concern. Exterior signage will need to be employed to manage traffic/expectations. This information may eventually need to be communicated to individual tenants via their ID cards.

Hands-Free Technology
Entry door hands free, and facial recognition for entry turnstiles/barriers. These turnstiles also manage entry of unauthorized visitors, contractors and delivery personnel.

Ground Level Retail & Amenities
Greater separation of servers and customers will be required in these spaces, as well as hand-free payment schemes. Landlords & clients will maintain these services inside the building to minimize outside vendors and occupant traffic in/out of the building during working hours.

Reception Duties & Configuration
Full-height separation between the concierge and visitors will need to be put in place, accompanied by hands-free scanning of identification documents, opening of entry barriers, and elevator calls. Temperature-taking, when and where required

Service Entries
Separate drivers & delivery personnel from building employees. This would also apply to health & security screening as well as monitoring of those service people who need to access tenant spaces for maintenance and installations.

WORKPLACE 2030

Aligning with the efforts of STO Building Group's Taskforce 5 team, Workplace 2030 provides businesses with the educational resources needed for a safe return to the workplace and catalyze economic recovery. Collaborating with medical advisors, Workplace 2030 builds a real-life, state-of-the-art model office of the future with all the technology, services, and design needed to operate safely throughout the next decade.

Multi-Purpose Project

- Workplace 2030 will function first as an innovation lab where the leading workplace technology companies (Accenture, BlueJeans, Microsoft, Proxy) can work with leading design (Gensler, One Workplace) and real estate companies (BCCI/STO, Cushman, Vanguard) to develop integration solutions for the healthy productive workplace.
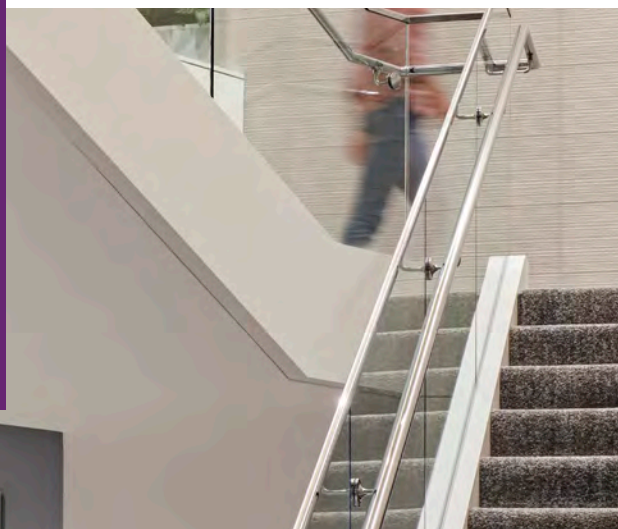
- Opening in September of 2020 with this initial prototype, Workplace 2030 will serve as an interactive learning center and client showroom where office re-opening management (physical security, HR, workplace, facilities) can access educational, how-to content centered around health and productivity use cases developed in the innovation lab. We look forward to launching other facilities in major markets in 2020/2021.

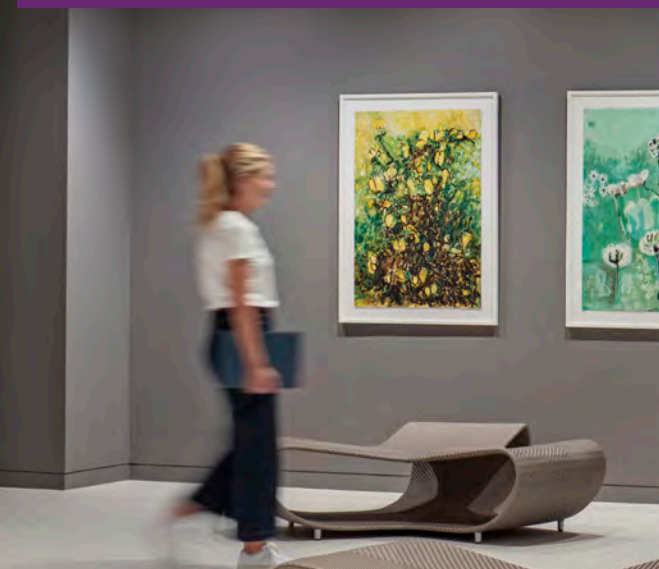## Not Just for Today, but for the Next Decade

- Epidemiologists remind us that we are just as likely to encounter the next viral pandemic today as we did the first one. It is critical that we can respond using what we've learned to create less disruption to business and society.

- Workplace 2030 will incorporate the following health and safety measures into its design: Touchless building access, tap-in health screenings, occupancy alerting, hot spot visualization, workplace contact tracing, and occupancy triggered cleaning.

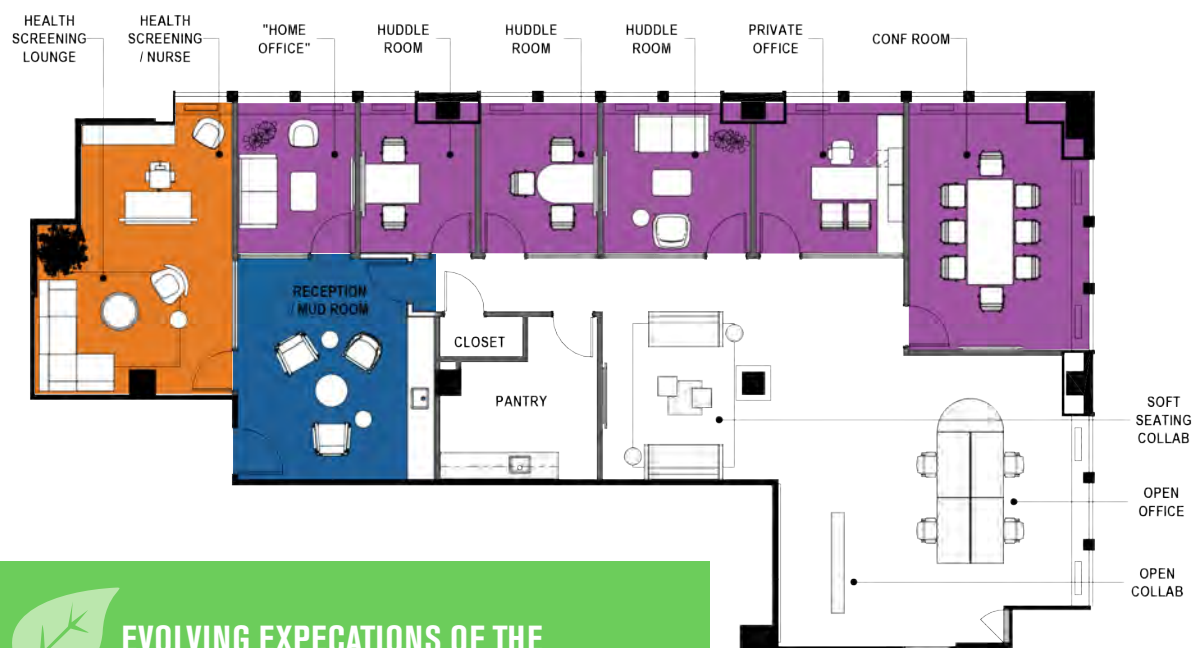## People are Expecting Worse, We Show Them Better

- People often associate safety with inconvenience, but what if the new office is actually more comfortable and productive than the one we left? After two decades of cramming people into every square foot possible, the pendulum is swinging back. The workplace of the future will give space to breath, respond to employees dynamically, and will actually make working easier for remote employees not in the office as well.

DOMINIC SARICA "Companies are swiftly acting to safeguard employees and migrate to a new way of working across multiple industries. The physical space will be resized creatively to adopt social distancing and increased hygiene practices. Technology will play a central role in supporting these environments to best connect our increasingly varied remote work force to our office locations-seamlessly."

BRANDON COOK "Those with the unenviable task of reopening their office are inundated in high-level guidance and advice with little practical experience implementing these new procedures and technologies. Workplace 2030 explores the details and nuance of creating a healthy and productive workplace by doing it in a real office, thus providing pragmatic, experienced-based education for the people who have to do this for the first time"

WORKPLACE 2030 (CONT.)

HEALTH SCREENING LOUNGE
HEALTH SCREENING / NURSE
"HOME OFFICE"
HUDDLE ROOM
HUDDLE ROOM
HUDDLE ROOM
PRIVATE OFFICE
CONF ROOM
RECEPTION / MUD ROOM
CLOSET
PANTRY
SOFT SEATING COLLAB
OPEN OFFICE
OPEN COLLAB

EVOLVING EXPECATIONS OF THE WORKPLACE
requires that we start treating remote employees like first class citizens as significant ratios of employees are working from home or a hybrid home/ office environment permanently. This means collaboration and information sharing must happen with an online first mentality. Workplace 2030 encourages this by incorporating internet whiteboards and volume normalization into its designs so those at home can participate as if they are actually in the office.

Airport-like Model

Airports have very distinct secured (airline gates) and non-secured (drop-off and ticketing) areas. Like an airport, the future office separates the secured (interior) and non-secured (reception and health screening lounge). Visitors, deliveries, and guests may only access the interior portion of the office once they have checked in and passed a privacy-preserving health screening in the screening lounge.

Health Screening Lounge

Temperature check and risk questionnaires are conducted in the health screening lounge. They can be self-administered using the latest technology or administered by a contracted health professional. The health screening area is intentionally comforting and relaxing so negate anxiety caused by the screening.

Hotel Desks & Collaboration Rooms

With large groups now working from home, most office space is split up between daily hotel desks and shared spaces like conference rooms and huddle rooms. Hotel desks have built-in occupancy sensing so they can summon cleaners once vacated and prevent re-booking until they have been cleaned.

HOSPITALITY & MULTI-UNIT RESIDENTIAL

The COVID-19 virus has altered our way of life and this also could bring changes in the way projects are designed and specified. Because viruses can spread through airborne particles and in touching contaminated areas, design changes that aim at avoiding contagion between individuals could be implemented in both hospitality and multi-unit residential spaces.

Reduced Interaction with Building Functions/ Hand-Free Solutions

- Mitigating propagation of the virus via the hands can be technology driven through: facial recognition for secured access, voice command for elevators, sensor equipped taps in public bathrooms and mud rooms, phone apps to pour a cup of coffee or open a door, and generalized light sensors. IoT device online sales have already seen a significant uptick in the past weeks. Modifications could also be as simple as removing doors in public bathrooms (like in airports), or installing pedal actuated taps.

- Healthcare industry solutions may be incorporated into hospitality and multi-unit residential projects by reducing flat surface areas and favoring the use of antibacterial fabric, as well as designing healthy and easy to clean surfaces. For example, substituting carpet with linoleum floors or substituting wood counters and sills with stone or Corian.

- Increased handwashing opportunities and sanitation in common areas.

Social Distancing

- Public and amenity spaces may begin designing for social distance due to a new awareness of personal safety. Zoning induced usability in amenity spaces will need to be demonstrated.

- Technology could help social distancing, but likely faces hurdles of individual liberties and privacy.

- High rise buildings could become less efficient with wider corridors and more stairs to allow for social distancing.

Mitigating Airborne Propagation with HVAC Systems

- Appropriate filters can trap pathogen particles. This requires a filter replacement program to change used filters, which is easy and does not require new equipment. Filtration capacity could be added to high occupancy/traffic areas.

HOSPITALITY &
MULTI-UNIT RESIDENTIAL (CONT.)

- UVC light in ductwork can be used to kill viruses. Existing buildings could upgrade used UVC lights or add this equipment onto main distribution ductworks.

WELLNESS AT HOME has become more prevalent in direct relation to the amount of time we are spending there now, and will in the future. A healthy home is important for not only preventing the spread of virus, but also mental health. Green spaces are becoming more valuable. A shift of the market to secondary cities where people can have backyards is expected and new projects in dense cities could begin to offer more green spaces including balconies and terraces along with space for interior/winter gardens.

- Flushing/diluting air and reducing the amount of recycled air by bringing in more fresh air from the exterior can decrease the amount of airborne particles in a building.
- HVAC systems can be designed to give the option of isolating areas/floors.
- Increasing the humidity level to 40-60% lowers the possibility of the virus spreading.
- Greater flexibility in mechanical systems could allow for adapting to outbreak special needs.
- Permanent air quality monitoring can communicate results in real time.

Supply Chain Disruption

- With the problem of supply chain disruption, architects may look to shorter the supply chain and will increasingly source local manufacturers and materials.

HOSPITALITY
Way of Life and Design Changes

- Design of hospitality projects is expected to have a greater focus on holistic health and well being in the future, especially as hospitality in 2020 is all about the experience.
- We could see a shift of value from communal amenity space to private space which is considered safer. In other words, we may see fewer amenities to the benefit of larger hotel rooms that include elements that were eliminated or greatly reduced in shared spaces.
- Hotels may look to diversify and incorporate in their built environment space dedicated to events, entertainment, restaurants, etc. and look to be more locally integrated and not overly dependent on tourism.

MULTI-UNIT RESIDENTIAL
Way of Life and Design Changes

- Future homes may provide purpose built home office space.
- More flexibility of the unit mix in multi-unit buildings could become a trend. We may see an increased demand for two bed one bath or one-plus-den offerings.
- Designing versatility into residential units to provide for various uses and increased privacy could provide a solution for tenants/buyers who cannot afford the cost of an additional room. This could mean going from a full bathroom to two half bathrooms.
- We could see a compartmentalization of home layouts for entrances, foyers, and mud rooms to act as sanitation areas (with a sink) between the safe space inside and the potentially contaminated space outside.
- Increasing work from home opportunities may lead to less socialization through work and less shopping while commuting. Also, public transportation will likely be avoided as much as possible. Residential project developers could account for community integration through increased walkability to offices and local shops, and provide socializing spaces. This concept of a village in the city could be created by developers of large mixed-used projects.
- The increasing cost of utilities, specifically energy use at home due to a higher rate of occupancy during the day, is expected to drive a greater move towards sustainability.

Overall, the COVID-19 outbreak points to a move towards healthier and more sustainable spaces. However, this is a cost to benefit equation that provides a different result whether we have a long, medium or short term vision.

HEALTHCARE

COVID-19 is already changing the built environment of the healthcare industry from temporary containment tents that move triage a safe distance outside of the physical emergency department, to removal of common area furnishings to promote social distancing, to wholesale relocation of healthcare services into alternative care facilities such as civic buildings. Some of these changes will be fleeting responses that will be phased out as quickly as they were implemented. Others may become the next normal for the care environment of the future.

We analyzed the effects of COVID-19 on the healthcare sector to identify which impacts may have longer-lasting implications and lead to the next best practices. Our analysis distilled the impact of COVID-19 into four categories: Change in Consumer Demand; Increased Requirements for Worker and Customer Protection; Financial Strain; and Other. We then asked some of the most well-respected healthcare operators, designers, and advisors to quantify these impacts relative to each other and summarize how their organizations are responding. **Click here for the full report.**

Change in Consumer Demand

COVID-19 has significantly impacted the demand for some healthcare services. Demand for inpatient bed-days and ventilators have spiked dramatically, sparking concerns that demand could exceed supply. On the other hand, governmental restrictions on elective procedures have artificially reduced demand to near zero, resulting in furloughs and layoffs. In addition, both restrictions on and consumer concern about in-person physician visits have pushed a significant percentage of patient-provider interaction to the virtual environment. Our customers expect healthcare facilities to respond by:

- Incorporating more flexibility into permanent bed supply by planning a greater percentage of universal beds that can easily convert to critical care.

- Recalculating the amount and type of physical space required for in-person provider visits—as certain types of visits are shown to be just as effective when the encounter is virtual.

- Creating strategies to separate acute from sub-acute patient populations to allow sub-acute services to continue uninterrupted in the event that acute resources are overwhelmed.

HEALTHCARE (CONT.)

Increased Requirements for Worker & Customer Protection

COVID-19 has exposed significant shortcomings in our national healthcare system's supply chain

HEALTHCARE DESIGN has led the way in incorporating materials that have antimicrobial properties. It has been demonstrated that bacteria, yeasts, and viruses are rapidly killed on metallic copper surfaces. Copper has no known negative effects, in stark contrast to other antimicrobial materials using chemicals or nanotechnology, thereby creating a crossover opportunity for use in both healthcare and other sectors.

process for procuring and distributing personal protective equipment (PPE). While availability of PPE is perhaps the most-discussed response to keeping workers and customers safe, there are many other measures that will likely have a longer lasting impact. Ambient infection control measures such as airflow isolation and structured social distancing (enforcing social distancing via the built environment) could become the norm for the design of healthcare facilities in the future. Additional ways in which our customers expect healthcare facilities to respond include:

- Utilizing advanced technologies such as anti-viral materials, UV light disinfecting equipment, and sensor-based activity monitoring to track/manage social distancing.
- Relocating non-clinical services from the hospital environment in order to limit infection infiltration points and create space for social distancing.
- Expanding telehealth programs to limit face-to-face patient/provider interactions.

Financial Strain

A trailing impact of COVID-19 is only now emerging as perhaps the most significant effect of the pandemic: financial strain resulting from increased expenses and loss of revenue from elective procedures. Even communities that have reopened nonessential procedures and patient visits are reducing workforce to align with reduced demand. Our analysis looks at how deep this impact is likely to be and how long it may last. Healthcare facilities may respond by:

- Exploring alternative sources of financing of capital projects, such as partnering with developers or institutional real estate owners like REITs.

Other

We reviewed a myriad of "other" impacts of COVID-19 on healthcare's built environment, and one repeatedly surfaced: flexibility. Our national response to COVID-19 is an exercise in emergency preparedness, and it reinforced the need to have flexible, adaptable healthcare facilities that can respond to a variety of emergent needs. Whether it is an outbreak of another novel disease with a different means of spread, a surge in demand due to a conflict or mass casualty event, or the financial impact of an economic recession, our healthcare facilities must be able to pivot toward the need and adapt quickly while also maintaining essential levels of capacity.

Other ways our customers expect healthcare facilities to respond after the pandemic include:

- Tracking the operational outcomes of current COVID-19 responses to inform an evidence-based design approach for future design and construction.
- Incorporating maximum functional and programmatic flexibility into future planning with the ability to increase isolation and acuity on-demand.

Fortunately, the other recurring observation we've made is that healthcare workers are our most adaptable asset. They continue to demonstrate a willingness to step up and improvise when weaknesses in the healthcare infrastructure arise.

Our job as designers, builders, and managers of the built environment is simply to give healthcare workers the best possible tools to do their jobs. Our hope is that the information in **this report** will enhance that effort.

SUSTAINABILITY & WELLNESS

Using the leading industry research around health and wellness in the built environment and the relationship between COVID-19, we aim to provide a clear framework for what our real estate design response will be for STO Building Group and our clients.
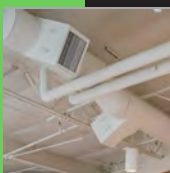
Air Quality

There are several tactics that can be used to reduce the spread of the virus within our spaces including: ventilation, filtration, humidity, pressurization, UV and monitoring. Click here to read more about air quality.

Wellbeing

A gradual return to work, knowing what to expect upon return, removing hot desking, and scheduling regular meetings with your manager for open dialogue about your challenges and needs are all key pieces to maintaining workplace wellness. Click here to read more about wellbeing.
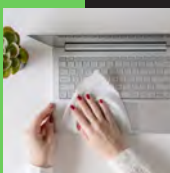
Cleaning

The importance of enhanced cleaning, while also being mindful of the products we are introducing into our indoor environment,s is imperative when returning to the workforce during the COVID-19 pandemic. Click here to read more about cleaning.
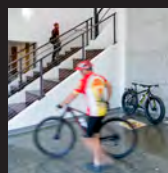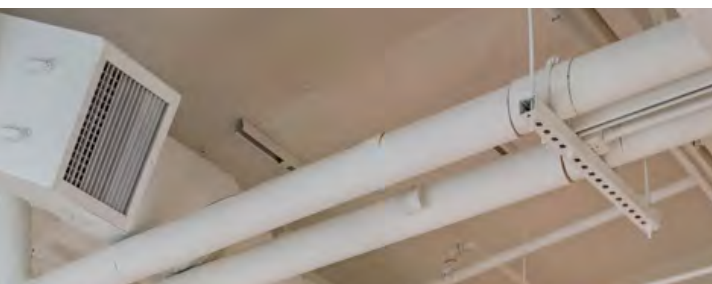
Maintaining Sustainability

Being mindful about maintaining sustainability while adhering to proper safety and PPE protocols amid the pandemic could include simple solutions such as reducing waste generated in the workspace and making modifications to employee commuting, like encouraging biking. Click here to read more about maintaining sustainability.

AIR QUALITY

Data suggests COVID-19 can be transmitted through the air. There are several tactics that can reduce the spread of the virus within indoor spaces including: ventilation, filtration, humidity, pressurization, UV and monitoring[1].

According to Delos research, air pollution may exacerbate the spread of COVID-19. Air pollutants such as PM2.5 and NO_2 have been linked to increased respiratory risks which can result in a higher risk of fatality if COVID-19 is contracted.

One way to reduce the pollutants in indoor air is to increase ventilation to ensure CO^2 concentration does not exceed 600–800ppm. This can be accomplished by increasing the outdoor air supply through the HVAC system, if possible based on the system design, or supplementing with passive outdoor ventilation from open windows or doors. Existing buildings can also increase the time the HVAC is running to 24/7 in efforts to further increase the outdoor air supply to indoor spaces. While increasing HVAC can improve indoor air quality, moving forward we need to think about switching to clean energy, so outdoor air pollution is not adversely affected by the increase in energy used to deliver more outside air into buildings[2].

Improving air filtration in HVAC to MERV 13 is an effective way to capture airborne particles[3]. While MERV 13 filters do not capture the actual size of the COVID-19 virus, they capture airborne contaminants that are likely bonded with the virus. Where building filtration is not able to increase to MERV 13, spaces can supplement by installing stand-alone air purification systems with HEPA filters.[4] Air purifiers should use high fan settings to more effectively capture pollutants.

Indoor air humidity levels should be around 40%–60% to slow the spread of COVID-19. This is also in line with ASHRAE 55 guidelines for thermal comfort. While this humidity level has been suggested by the medical industry to slow the spread[5], humidity levels are often not tracked by building management and it would be necessary to add humidification in heating months. Added humidification can create adverse effects such as an increase in mold and mildew growth which leads to poor indoor air quality.

Pressurization is a design methodology that could be applied in the future design of office space, though it is more typically used in hospitals and labs. Pressure differentials and directional airflow essentially move the air in clean spaces to less clean spaces. In office setting those less clean spaces have typically been defined by green third-party rating systems as bathrooms, copy areas and janitor closets. These design philosophies are important for controlling airflow between zones in a building and have the potential to control the transmission of aerosols when used in conjunction with other HVAC design strategies.[6]

Bundled together, there are strategies available to increase filtration and ventilation as an effective way for buildings to help fight the spread of COVID-19 and other airborne viruses, though this is not the only way we need to prepare our buildings for sustained occupant health[5].

TECHNOLOGIES

New technologies for air purification, disinfection, and filtration are being discussed as preventative measures against COVID-19. Manufacturers, such as HealthWay, suggest advance filtration can capture particles up to 0.007 micrometers, which is smaller than the size of the coronavirus.[17] This filtration technology suggests that all air passed through the filter will be free of the infectious virus and other common air pollutants. Germicidal Ultraviolet Irradiation (UVGI) has also been discussed as an effective way to deactivate the virus in indoor air.

CLEANING

The importance of enhanced cleaning is imperative when returning to the workforce during the COVID-19 pandemic. With an increase in cleaning frequency, we must also be mindful of the cleaning and disinfecting products we are introducing into our indoor environments, as many contain toxic chemicals that can have an adverse effect on the occupants' health.

Through our research, we have not found definitive information that the use of UV-C cleaning is an effective way to inactivate the COVID-19 virus, though UV-C has been proven effective against other coronavirses[7].

Furthermore, there are conflicting studies related to the overall health impacts of human exposure to UV-C. This is an area where more research is needed, and tenants should be aware of any potential risks prior to implementing this technology.

Cleaning protocols for our offices and our jobsites have been created in accordance with the latest CDC guidelines for cleaning[8]. Offices should identify a competent individual to be trained to use the disinfectants properly to maintain personal safety[9].

TECHNOLOGIES
Germicidal Ultraviolet Irradiation (UVGI) could be an effective way to deactivate the COVID-19 virus on surfaces, however using this as a surface disinfectant requires a very specific time of UV-C exposure and can only disinfect areas that have been directly exposed to the light.[18] It is also worth noting that UV-C should never be used when people are present as it is dangerous to humans and improper use could be extremely harmful.

WELLBEING

At least one in six workers experience common mental health problems, including anxiety and depression[10]. A gradual return to work, creating a schedule with your manager, knowing what to expect upon return, removing hot desking, and scheduling regular meetings with your manager for open dialogue about challenges and needs are all key pieces to maintaining workplace wellness.

Reducing stress results in an overall higher immunity, which is imperative when coming back to work during the COVID-19 pandemic[11]. In efforts to reduce stress when returning to the office, companies can create specific communication plans for employees to understand new office protocols, cleaning protocols, path of travel, etc. Increased communication around new protocols and procedures can ease anxiety for employees when returning to the workplace[9].

While we are adjusting to our next normal, maintaining physical health and wellbeing is important for resilience. During shelter in place, while working from home, and when we return to the office, we need to keep hydrated, set good sleeping habits, eat healthy, and exercise. We are all eager to get back to work, but while we still need to practice physical distancing, we must also maintain our social connections for our mental wellbeing[12].

MAINTAINING SUSTAINABILITY

During this time of a global health pandemic, we need to be safe about proper PPE and cleanliness, but also need to be mindful about maintaining sustainability.

Some companies may consider continuing to reduce ongoing waste generated in the workspace with items such as breakroom cutlery, cups, and plates. It is not necessary to switch to single use items and water bottles for safety, increasing cleaning supplies around common areas and around shared resources such as water taps and coffee dispensers can be effective[13].

In further efforts to reduce ongoing waste and maintain safety, some companies are also providing branded reusable masks to all employees for daily use. These masks are intended to be laundered and reused to prevent the need of disposable PPE.

Another large contributor to the carbon footprint from offices is commuting to work[14]. Flexible work schedules and an increase in telecommuting will help lower the overall carbon footprint of companies. Bike storage or bike share promotions can help commuters maintain social distancing, which will be challenging on public transit, and at the same time it will allow them to reduce their commuting carbon footprint while getting fit. Biking is a great alternative to driving, where the range to the office is reasonable and infrastructure is in place.

The singular focus for many businesses throughout this pandemic has been on a traditional bottom line—profit. It is during challenging times of economic decline that it becomes even more important that companies that want not just to succeed, but flourish, move to triple bottom line thinking—people, planet and profit—and adding a fourth 'P'—purpose—to the dialogue.[15]

Purpose gives insight to a company's multi-stakeholder perspective as well as their ethics and furthermore, it creates strong connections to their employees, driving productivity, innovation, and evolution allowing companies to adapt to external stresses like the pandemic.[16]

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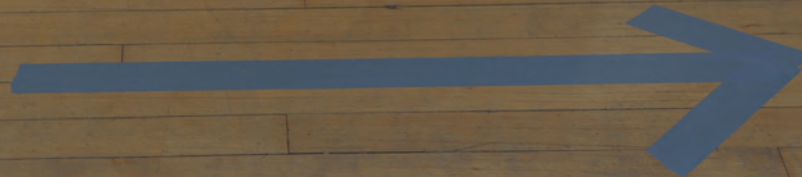(Structure Tone UK), Sarah Paul (Govan Brown)

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COVID-19

RETURN TO THE OFFICE

Please Keep
6ft
Distance
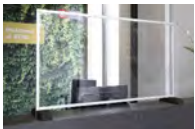
Behavioral + Cultural and Physical + Architectural
Strategies for Returning to the Workplace

STO BUILDING GROUP

|	Day 1: Return to Work Changes/strategies that need to be made to the workplace, temporary/quick solutions	Day 1 Feedback What is and isn't working? Any relaxations or ramped up restrictions?	Day 2: Next Phase 6–12 months after the return to the office	Day 3: Long-Term Solutions 12+ months/ long term solutions
Staff Morale, Health & Wellness of Employees	Take measures below to guard against the current spread of the virus, but also plan for what happens when the virus penetrates those defenses and a second wave occurs. Rethink giant, sweeping changes and full redesigns. Instead, focus on small high-impact revisions to ease anxiety of staff fearful to return to a completely different office. Weekly communication about the office itself and jurisdictional changes to shelter-in-place orders.	Surveys/opportunities for feedback weekly. Gauge comfort levels with what we are doing in the office and what we can be doing better.	Continued commitment to clear communication with employees about changes made to the workplace.	Continued commitment to clear communication with employees about changes made to the workplace.
Office Cleaning Policies	Increased frequency of office cleaning beyond what is provided by landlord. Increased surface cleaning of common areas and workstations. Offer cleaning supplies throughout the office for staff to take personal responsibility for cleaning when desired. Provide hand sanitizer stations at commonly touched surfaces and shared equipment.		Hire staff member to regularly clean most used spaces throughout the day.	
HR Policies	Expanded work from home policies. Determine how much staff monitoring is ethically in line with company policies. Determine who will be the „sheriff" to enforce new policies/rules. Confirm if this is in line with company culture/broader company policies.		How does work from home policy expand/extend to the future? Are some employees permanently work from home with less frequent office visits when needed?	With more robust work from home policies, companies can broaden their search for talent and have a bigger talent pool for recruiting.
General Office Policies	Handshaking alternatives. Reduction of in-person meetings. Staff to wear PPE in the workplace. Create policy for hand-washing for all people entering the office. Create policies about visitors—Where are visitors permitted? What is the policy for visitors entering the office? Create policies about entry into the space—thermal scanning, temperature checks, sign-in sheets confirming you are symptom-free, etc. Confirm if these policies are in line with company culture/broader company policies.			
Food Policies	Increase availability of single-use utensils and condiments. However, confirm if this is in line with broader company sustainability policies. Determine what catering options will provide pre-packaged snacks and lunches instead of buffet-style.			
Workstation Usage	Shift working & staggered work schedules—half the staff in the workplace at a time to reduce occupant loads. Remove personal items from desks to allow night crews to thoroughly clean desks—Is this in line with company culture and what negative impacts would this have on company culture?	Monitor % of staff working from home vs staff needing a desk in the office.		
Common Area Use	Staggered scheduled lunch times to reduce occupant loads in pantries & cafes.			
Public Transportation	Staff worried about commuting is a huge barrier to people wanting to come back. Companies can make the physical environment safer, but cannot control between the workplace and the home. How can companies ease these concerns?			

RETURNING TO THE OFFICE: PHYSICAL + ARCHITECTURAL

STO BUILDING GROUP

	Day 1: Return to Work Changes/strategies that need to be made to the workplace, temporary/quick solutions	**Day 1 Feedback** What is and isn't working? Any relaxations or ramped up restrictions?	**Day 2: Next Phase** 6–12 months after the return to the office	**Day 3: Long-Term Solutions** 12+ months/ long term solutions
Design & Materials	Graphics to encourage safe behaviors & new social policies. Avoid graphics that incite fear or just a list of rules.		Nano self-cleaning coatings on commonly-touched surfaces (push bars & door handles). Can some graphics be phased out/edited as staff get into the new social habits? Do the graphics rotate to say new things/highlight new behaviors?	Increased use of hospital-grade fabrics, vinyls, plastics, faux leathers, instead of soft/plush fabrics. Increased use of antimicrobial materials, particularly for countertops. How can architectural design encourage 6' physical distancing without having to put a 6' circle on the floor? Ensure restroom doors swing out, so people do not have to touch a door handle with clean hands as they exit.
Workstations: General Design	Take workstations offline that do not conform to 6' distancing. Rethink the density of the desks, but perhaps pause in absolutely reconfiguring all workstations. Instead, focus on small high-impact revisions to ease anxiety of staff fearful to return to a completely different office.		De-densify workstations to maintain 6' distancing. Add screens/partitions between workstations.	How can we rethink what a new approach to an open office looks like? Is there a new hybrid between open office/enclosed office? What furniture solutions can help provide physical distancing while still in an open office? Can height-adjustable desks be controlled by Bluetooth on a phone app/computer app so you don't have to touch the adjustment buttons?
Workstations: Hoteling/ Hotdesking	Allow hoteling, but procure enough devices so no one needs to share keyboards/mice.		Revisit unassigned seat theories—Does this allow for better cleaning because personal items are not on desks? Or does this cause more people to come in contact with bacteria on the shared surfaces?	Will we see a reduction of hoteling/shared workstations to reduce spread of bacteria?
Conference Rooms, Phone Rooms, and Lounges	Remove conference room chairs and lounge furniture to conform to new maximum room occupancies.		Reconfigure and re-allocate flex/shared spaces into dedicated workstations. With some desks offline to accommodate physical distancing, these can become functional work spaces while still maintaining physical distancing.	Do we rethink conference room to workstation ratios? Does it need to be 1:1.3 if there are fewer people in the office and fewer in-person meetings? Will we see increased client requests for high-tech virtual boardrooms?
Reception, Other Support Spaces	Temporary "sneezeguards" at reception. Package "quarantine" or package cleaning policy.			What does the "reception of the future" look like? Is there a person or a digital interface? Can we re-design reception desks to provide physical distancing? Increased requests for larger mail/package rooms instead of relying on package storage at reception.
Workplace Cafes/ Pantries/Food Service	Remove chairs to conform to new maximum room occupancies.		Hire more staff so that 1 person is serving each food item instead of each staff member serving themselves.	At corporate cafes, barista stations instead of self-service coffee stations.

STO BUILDING GROUP

	Day 1: Return to Work Changes/strategies that need to be made to the workplace, temporary/quick solutions	Day 1 Feedback What is and isn't working? Any relaxations or ramped up restrictions?	Day 2: Next Phase 6–12 months after the return to the office	Day 3: Long-Term Solutions 12+ months/ long term solutions
Workplace Circulation	Encourage one-way circulation paths and reinforce that concept with graphics on the walls or on the floor.			Designs to include wider corridors to allow for safer two-way circulation without pinch points.
Elevators	Graphics outlining physical distancing within elevator cab & maximum capacity.		Touchless elevator call options operations.	Does every elevator stop at every floor so buttons don't need to be pushed? Dedicated elevators to stop only on certain floors to prevent cross-contamination between companies in multi-tenant buildings?
Air Quality & Filtration	Add air filtering or air purifying units within the space. Landlords update & sanitize mechanical systems. Testing of UV light filtering & sanitizing mechanical units.			Could we see code changes regarding air re-circulation that may require bringing in more outside air? However, this goes against many jurisdictions' sustainability goals. Will trends go back to living walls as an additional air filter if water usage/maintenance can improve?
A Touch-Free Workplace	Replace existing items with easy to procure touchless items (most likely faucets, soap dispensers, etc.).		Motion-activated doors/foot-operated doors. Hands free sinks, faucets, toilets, urinals for a fully touch-free environment in restrooms and pantries. Hands-free motion-activated coffee makers & water dispensers. Motion-activated light fixtures. Touch free trash & recycling solutions—reduced drawers.	Reduced touchscreen AV components—people connecting via their devices directly. Increased use of voice-activated assistants and technology to minimize touch points (elevator call buttons, doors, way finding, etc).
Technology	Procure enough devices so no one needs to share keyboards/mice. Procure headphones/headsets for staff for teleconferencing.	Already experiencing issues with volume. With reduced conference room occupancy, people are taking meetings from their desks within the open office & there is a lot of background noise.	Increased IT bandwidth to accommodate higher volume of teleconferencing.	Online workstation scheduling/reservations for staff coming into the office. Technology that can pinpoint employee locations via smartphones to determine who an infected worker might have had contact with. Confirm if this is in line with company culture/broader company policies.
Commercial Real Estate & Leasing				With expanded working from home and rising real estate prices, we could see companies leasing smaller spaces, since there would be fewer people physically in the office. This could mean several small regional offices dispersed through a metropolitan area instead of 1 large headquarters. 3D building scans to create virtual real estate tours to reduce physical site tours of potential spaces. Increased demand in real estate for office spaces with access to outdoor areas to provide employees access to fresh air.

COVID-19
IMPACT ANALYSIS
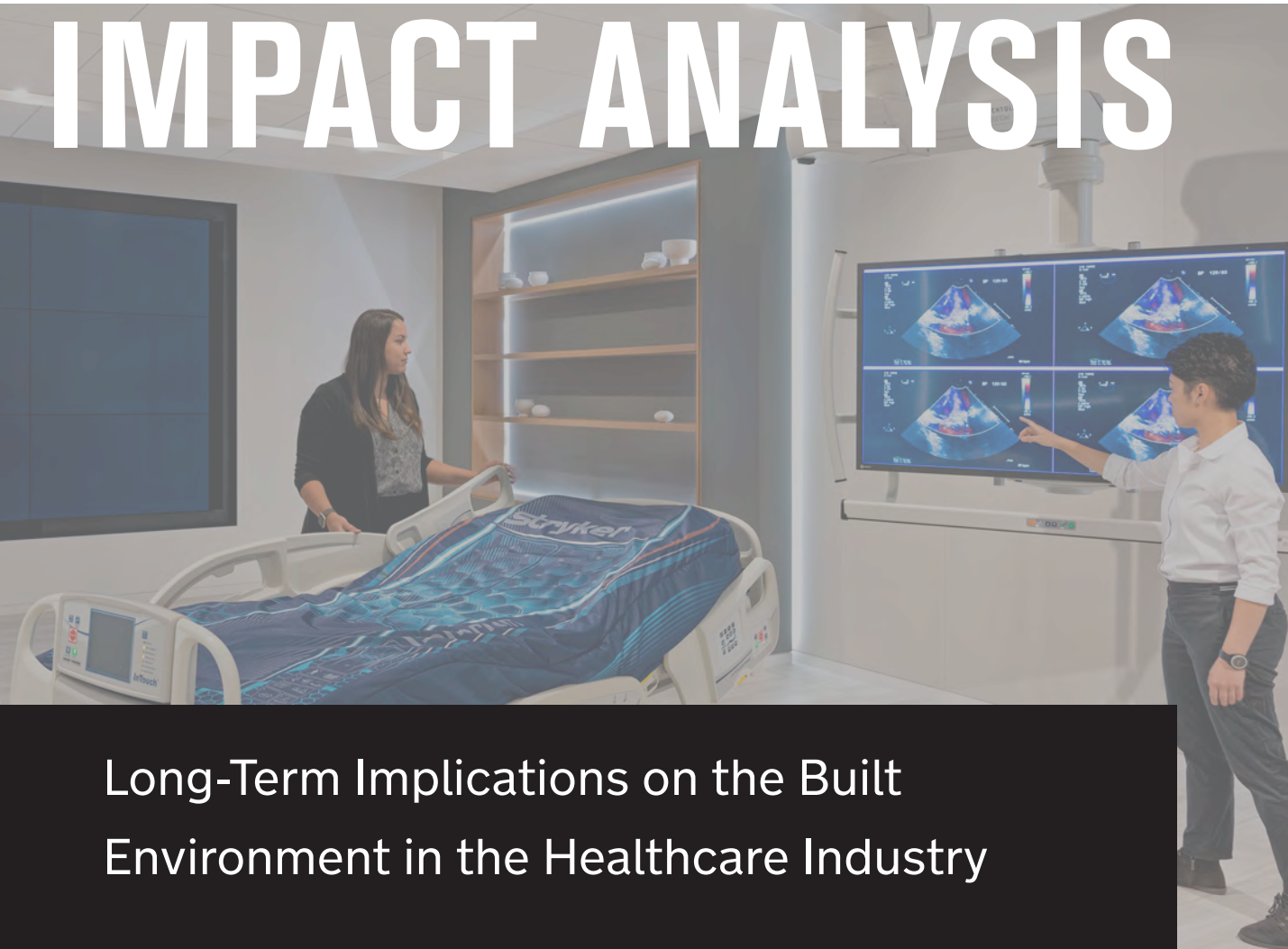
Long-Term Implications on the Built Environment in the Healthcare Industry

INTRODUCTION

The STO Building Group strives to build the very best solutions for our clients. This commitment begins with listening to our clients' needs. As the healthcare industry adapts to the COVID-19 pandemic, Structure Tone is also preparing for the next normal in healthcare design and construction best practices. We reached out to a select group of leaders among our healthcare customers and design partners to find out directly from them what they believe will be the most impactful force stemming from the COVID-19. We have compiled their responses, as well as our suggestions for long-term strategies that we as builders and the industry can employ to respond.

METHODOLOGY

Structure Tone posed the following question to a variety of healthcare industry leaders:

Which one (1) of the following four forces stemming from COVID-19 do you expect to have the most significant impact on the way you plan and build facilities in the future, and how will you respond?

1. Change in Consumer Demand

2. Increased Requirements for Worker and Customer Protection

3. Financial Strain

4. Other

We were grateful for the volume of responses we received from our friends and colleagues including:

- Planning, design, and construction executives within major healthcare systems

- Senior designers and planners within nationally recognized healthcare A/E firms

- Senior healthcare sector leaders within our STO family of companies

While the question was deliberately limited in scope in order to encourage the maximum response rate and to make it possible to measure the results, many respondents provided extensive analysis that we've also attempted to capture in the Summary section at the end of this document.

RESULTS

The answers we received were relatively evenly distributed among the options we suggested, but there were a couple of clear standouts. Below are the options ranked as weighted by the responses.

Based on the additional discussion and analysis provided by the respondents, we have summarized the perceived impacts and possible mitigating responses in the following graphics.

Change in Consumer Demand:

How has COVID-19 impacted consumer demand for healthcare services?

Other:

What does the COVID-19 response tell us about how to plan for the unknowable impact of future health events?

Financial Strain:

How will COVID-19 affect our healthcare infrastructure financially?

Increased Requirements for Worker and Customer Protection:

What are the implications of social distancing requirements, PPE shortages, and other measures healthcare providers may take to keep their employees and patients safe?
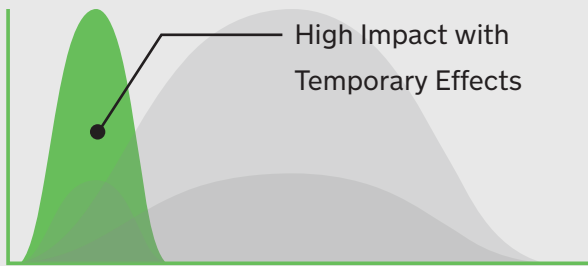
CHANGE IN CONSUMER DEMAND

How has COVID-19 impacted consumer demand for healthcare services?

SURGE IN DEMAND FOR NURSING SERVICES:

Sudden increase in demand for nursing beds stresses supplies of staff, PPE, and medical equipment.

IMPACT RISK:

High Impact with Temporary Effects

Assessment: Supply chain will increase output to meet demand.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT

Build and store temporary, on-demand facilities (ED pods, portable ICU rooms)

Plan a greater percentage of universal patient rooms that can convert to intensive care

Challenge: High cost for limited need

TECHNOLOGY

Implement tele-triage to eliminate ED visits for non-emergent patients

Challenge: Adoption and payment

BEHAVIOR

Restructure supply chain so that surge volumes of PPE and equipment are managed locally

Educate patient population to self-triage and seek care at lowest functional level (e.g. telehealth, urgent care) before presenting at ED

Cross train human resources to provide services required by surge while demand for other services (e.g. elective surgery) is low

Challenge: Availability of testing

REDUCTION IN DEMAND FOR NON-CRITICAL SURGICAL, ANCILLARY, AND CLINICAL SERVICES:

Artificial suppression of demand for non-critical care services reduces revenue and workforce utilization.

IMPACT RISK:

High Impact with Long-Term Effects
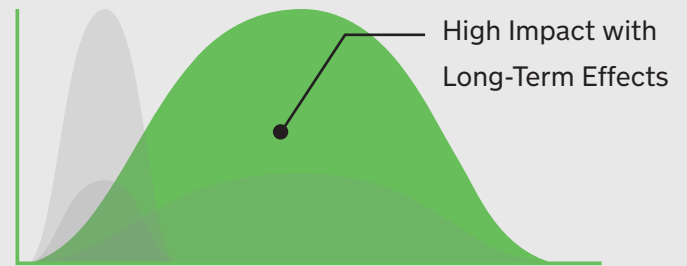
Assessment: Mandated closures of non-critical services will result in underutilization of healthcare resources and unaddressed patient care needs.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT

Segregate critical and non-critical services to eliminate risk of cross contamination

Challenge: Inefficient for normal operation

TECHNOLOGY

Increase utilization of virtual visits to maintain that revenue stream during a similar event

Challenge: Payment

BEHAVIOR

Maintain segregation of critical care and non-critical care staff to eliminate risk of cross contamination

Challenge: Inefficient for normal operation

Ensure public feels safe seeking necessary care
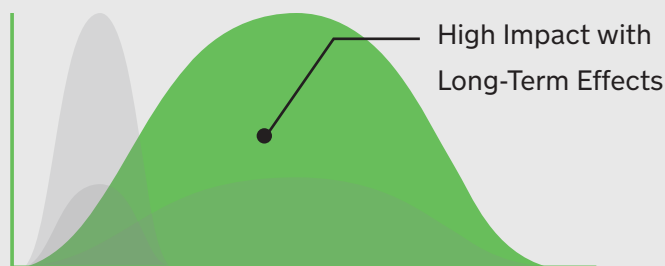
Challenge: Consistent messaging to public

How has COVID-19 impacted consumer demand for healthcare services?

SHIFT IN PREFERENCE FROM IN-PERSON TO VIRTUAL VISITS:

Acceleration in consumer comfort with virtual visits changing the decision drivers around how and where to seek healthcare services.

IMPACT RISK:

High Impact with
Long-Term Effects

Assessment: Migrating patient interactions online may dramatically reduce the type and number of healthcare facilities needed.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT

Evaluate need for physical space for healthcare services that can be delivered just as effectively via telehealth

TECHNOLOGY

Provide end-to-end telehealth services that do not require a learning ramp from patients who may abandon satisfactory clinical care due to unsatisfactory technology experience
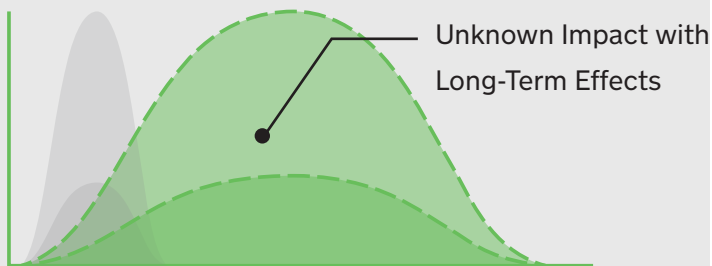
OTHER

What does the COVID-19 response tell us about how to plan for the unknowable impact of future health events?

PLANNING FOR NOVEL ILLNESSES:

How do we plan for a future disease that we know nothing about?

IMPACT RISK:

Unknown Impact with Long-Term Effects

Assessment: The need to maintain a pandemic response plan is perpetual.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT	Maintain the capability to segregate and isolate various populations within healthcare facilities as needed
	Challenge: Inefficient

| TECHNOLOGY	Maintain local testing and processing capabilities in order to steepen our learning curve about any new illness
	Maintain awareness of emerging technologies, even in other sectors such as hospitality, so that these technologies can be tested and proven in advance of future need
	Challenge: Adoption and payment

REACTING TO REGULATORY CHANGES:

Financial and operational risk of retroactive regulatory changes in response to COVID-19

IMPACT RISK:

Unknown Impact with Long-Term Effects
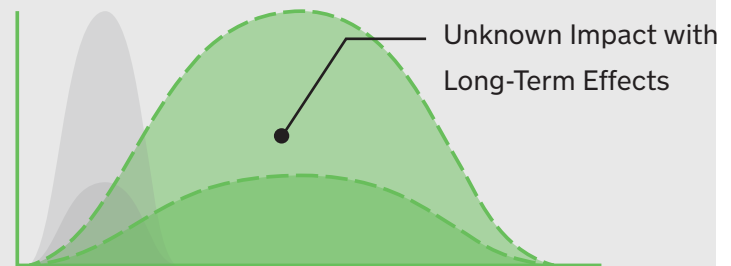
Assessment: Any regulatory changes in response to COVID-19 are likely to define the next normal for healthcare facilities and have long-lasting implications.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT	Plan and design healthcare spaces to maximize future flexibility and the ability to quickly pivot toward higher acuity care
	Challenge: Cost

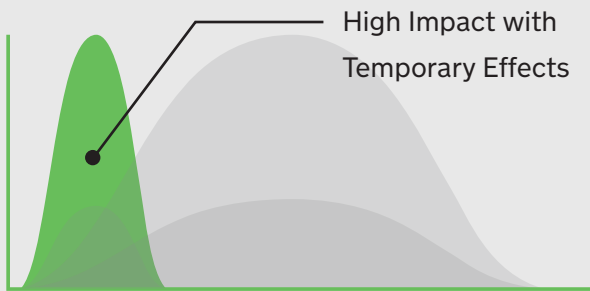| TECHNOLOGY	Track operational performance during the pandemic as a foundation for future evidence-based design strategies
	Challenge: Payment

FINANCIAL STRAIN

How will COVID-19 affect our healthcare infrastructure financially?

INCREASED OPERATING COSTS:

Increased costs due to hazard pay, PPE requirements, cleaning and disinfecting expenses, and temporary facilities.

LOST REVENUE:

Loss of patient revenues due to prohibitions on nonessential medical services as well as reductions in philanthropy due to economic contraction.

IMPACT RISK:

High Impact with Temporary Effects

Assessment: Cost spikes will normalize to slightly elevated levels in the near term.

IMPACT RISK:

High Impact with Long-Term Effects

Assessment: Idling more than 50% of the $3.6 trillion healthcare economy will have long-term effects on healthcare systems' balance sheets, resulting in reductions in both workforce and capital plans.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT

Replace temporary facilities with permanent solutions funded by capital

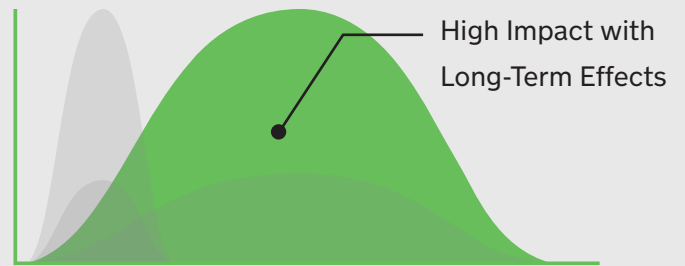Challenge: Long time frame to implement

TECHNOLOGY

Implement new technology-based cleaning and infection prevention solutions such as disinfecting robots, touchless controls, and UV lighting to replace additional disinfecting by hand

Challenge: Cost

SOLUTION STRATEGIES:

TECHNOLOGY

Migrate patient visits to telehealth where possible to multiply the productivity of a smaller workforce

Challenge: Patient adoption

BEHAVIOR

Increase the utilization of third-party, off balance sheet financing for appropriate capital projects

Challenge: Higher long-term cost

INCREASED REQUIREMENTS FOR WORKER AND CUSTOMER PROTECTION

What are the implications of social distancing requirements, PPE shortages, and other measures healthcare providers may take to keep their employees and patients safe?

PROHIBITION OF NON-ESSENTIAL PERSONNEL AND SERVICES IN HEALTHCARE FACILITIES:

Providers may be forced to prohibit high-risk, non-essential visitors (including families) and services (cafe, gift shop, business center) in order to maintain social distancing densities and limit the number of potential carriers in their facilities.

IMPACT RISK:

Low Impact with Long-Term Effects
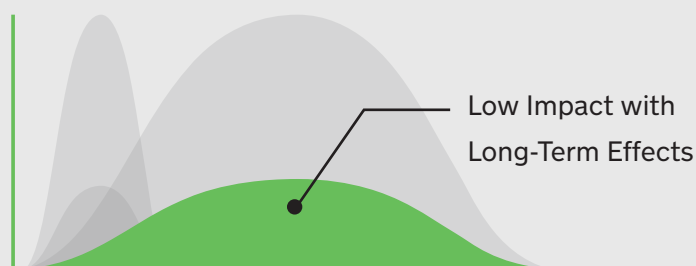
Assessment: Prohibition of families and amenities from healthcare facilities will undermine the hospitality feel that healthcare providers have been pursuing.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT

Convert family zones in patient rooms to caregiver zones with increased isolation

Convert disused common area amenity spaces into on-demand patient care

Create isolated pathways for non-critical healthcare services so that they can be provided with minimal risk

Challenge: Rooms not designed for this

TECHNOLOGY

Implement telehealth and telepresence technologies to enable virtual family visits and provider interactions

Partner with on-demand delivery services to replace non-essential services in the facility

Challenge: Cost

BEHAVIOR

Recognize that even non-critical healthcare services are necessary to support the healthcare infrastructure and they should therefore be deemed essential

Challenge: Political resistance

INCREASED INFECTION CONTROL MEASURES:

Facilities will be burdened with rapidly implementing improved infection control measures such as additional PPE, expanded negative airflow and infection isolation requirements, and heightened disinfecting protocols

IMPACT RISK:

High Impact with Long-Term Effects
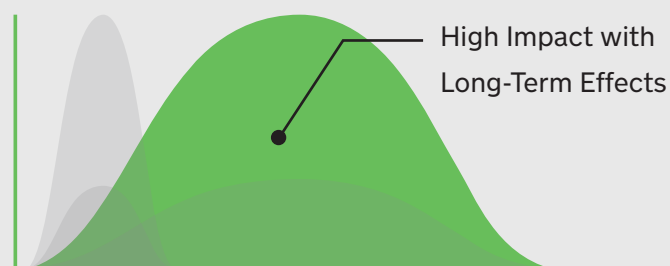
Assessment: Implementing an effective infection control response will have significant financial and operational impacts for the immediate future and will likely become the next normal.

SOLUTION STRATEGIES:

PHYSICAL ENVIRONMENT

Increase airflow isolation throughout facilities

Challenge: Significant disruption and cost

Physically separate high-contagion areas from facility

Challenge: Inefficient for normal operation

TECHNOLOGY

Increase passive cleaning technology such as disinfecting light/air filtration

Challenge: Unproven technologies

BEHAVIOR

Increase cleaning protocols

Challenge: Cost

INCREASED REQUIREMENTS FOR WORKER AND CUSTOMER PROTECTION (CONT.)

What are the implications of social distancing requirements, PPE shortages, and other measures healthcare providers may take to keep their employees and patients safe?

WORKFORCE ATTRITION:

Healthcare workers will reevaluate their personal exposure and risk in light of the pandemic and their employers' responses to the above issues.

IMPACT RISK:

High Impact with
Long-Term Effects
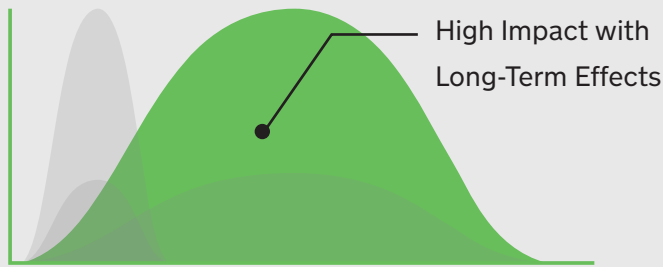
Assessment: Though the potential impact is long-lasting, initial indications are that the healthcare workforce is prioritizing patient needs above personal health and frontline workers are improvising, adapting, and continuing to serve.

SOLUTION STRATEGIES:

TECHNOLOGY

Increase utilization of virtual visits to maintain separation between caregivers and patients

Challenge: Quality of care

SELECTED RESPONSES

The following are excerpts are typical of the responses we received.

Change in Consumer Demand:

"...long standing [impact] will be a change in health delivery with telemedicine becoming more of a norm."

"Most organizations, including hospitals and health systems, will expand their work-from-home policies. This will significantly decrease the need for real estate and consequently the value of real estate; this could have long term economic impacts."

"I would say that I don't think there will be a surge in demand for intensive care beds, just that a hospitals ratio of ICU to MedSurge patients will go up."

Other:

"Preparedness for Future Pandemics and what their biology is and how they spread is probably the most important. "

"Going forward the built environment needs to accommodate the immediate needs required for an institution based on business as usual parameters but the infrastructure behind the finished walls need to be designed with flexibility in mind for facilities to convert quickly to adapt to the future unknown immediate need."

Financial Strain:

"...the impact of reduced wealth associated with investments will impact our clients, their staff and their donors (philanthropy) having the biggest impact on our industry."

Increased Requirements for Worker and Customer Protection:

"...the increased requirements for personal safety and protection will have an incremental impact on activities, but I believe will be adapted to and managed fairly quickly."