



1990–2020

## THOUGHTS ON OFFICE DESIGN AND OPERATION AFTER COVID-19

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### Introduction

The COVID-19 pandemic is affecting how we use buildings now and is likely to affect how we design buildings in the future.

To help us prepare for occupier expectations – and perhaps government regulation – this briefing note collects some ideas to consider in the design and delivery of office space. This is not a specific reaction to COVID-19, but a broader view of protection from all sorts of infectious diseases.

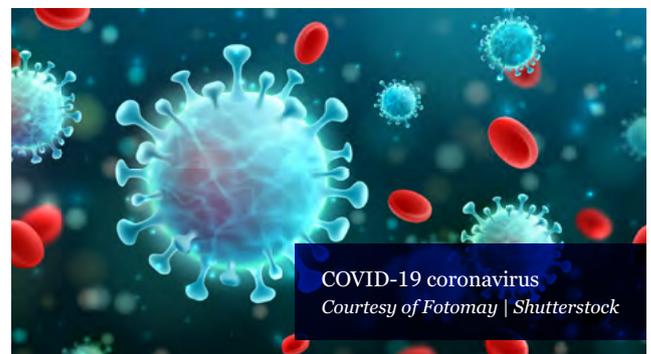
The following notes explain a little about how the virus is spread, how this relates to office use, and what we can do to reduce its effects.

A number of the anticipated changes are likely to give rise to legal and commercial considerations for building owners, occupiers, investors and their managing agents.

A realignment of the new responsibilities and interface between managing agents, occupiers and their HR teams is to be expected. Landlords and occupiers may need to take a closer look at existing lease obligations and service charge arrangements in relation to the evolving new working practices and guidelines anticipated.

### Contamination routes

- **Contact.** This may occur direct from person to person, or indirectly via person to surface to person.
- **Airborne.** Large droplets ( $>10\ \mu\text{m}$ ) are expelled by sneezing and coughing, and in still air typically drop within about 2 m of the infected person. Small droplets ( $<5\ \mu\text{m}$ ) may travel for long distances but have not currently been identified as an infection mechanism for COVID-19. There is evidence from the SARS epidemic that this was a cause of spread, and so it would be wise to take precautions.
- **Faecal–oral.** SARS was spread via a defective sanitation system in at least one severe case. Maintaining water in toilet traps and making sure that toilet lids are closed before flushing is important.



### Workplace appeal

As restrictions are lifted and people return to work, some will look forward to the sense of community and social interaction, while others will have adapted to the convenience of working from home. Concerns about infection will remain for all, and offices will have to change to reassure users.

Outside the office environment, for many it may be the fear of using packed public transport that affects their motivation to return to the workplace.

### Occupational densities

Office occupation (or at least headline occupancies) has become denser over the last 10 years or so. Desks have become smaller and more densely packed, so workers sit closer together, which is in conflict with expert advice for social distancing. Headline occupancy density – typically  $8\ \text{m}^2$  per person – may decrease, and the trend to share desks may be reversed, with more desks being individually allocated to particular users.

Desk sharing results in many different workers using the same facilities – desks, seats, monitors, etc. More frequent and intense cleaning routines may be used to sanitise workstations before a new user takes over. This will require more frequent and intense workplace management. It is likely that desk-sharing ratios will be reviewed.

## User experience

- **Building entrance.** Automatic doors should ideally be used to avoid contact with contaminated surfaces.
- **Reception.** Receptionists should ideally be protected by screens or (less effectively) by maintaining a greater distance between them and visitors.

Reception desk surfaces should discourage touching by visitors, perhaps by setting desks at a lower height or by the provision of a thin glass barrier.

Avoiding physical contact on the journey through reception will be critically important. Security badges for visitors could be machine-delivered, sticky, lapel labels rather than a hand-delivered plastic pocket on a lanyard or clip. Alternatively, security credentials could be delivered to visitors' smart phones as QR codes or something similar.

Waiting and queuing areas by reception desks and other interaction points such as food and beverage (F&B) concessions, pop ups, etc., may have to be rearranged to provide social distancing.

- **Cycling.** It is likely that more people will cycle to work to avoid using public transport, requiring expansion of facilities.
- **Lifts.** Outside peak use times, close-quarters occupancy could be reduced by programming destination control to minimise the number of people in each car.

Fewer people will want to travel in a packed lift, perhaps refusing to enter a lift that appears too full. This may influence users' view of lift performance and encourage greater use of stairways.

To minimise crowding while waiting for lifts, new building designs should consider increasing the size of lift lobbies and simplifying access to stairs.

- **Desks.** Surfaces will need to be kept clear to facilitate cleaning and sanitising; more personal storage space will be needed to accommodate 'stuff' displaced from desks.

All workers will need easy access to sanitisers and wipes at their workstations. This may be an opportunity for a clever design feature.

Desk sharing is likely to become very unpopular, although more frequent and intense cleaning may help to reassure users.

- **Meeting rooms.** The number of people allowed in a meeting room should be prominently displayed in order to prevent overcrowding. Table and chair layouts should discourage close proximity of attendees.

Fresh air quantities should be enhanced to aid dilution of contaminants, and a 'purge' period of at least



15 minutes should be allowed between uses. This will also allow for all contact surfaces to be cleaned before the next room use.

The need for face-to-face meetings may be reduced as workers gain familiarity with video conferencing.

- **Refreshments.** Common-use items, such as coffee pots and water bottles, should be minimised. Consideration should be given to in-room drinks dispensers to prevent surface contact transmission.
- **Kitchenettes/beverage bays.** Clutter should be minimised to allow frequent cleaning. Enhanced fresh air rates should be used to increase dilution of contaminants. Use of personalised crockery or single-use disposable items would reduce the risk cross-contamination. Touch-free taps and dispensers should be used where possible. Cupboard doors could be omitted where possible to reduce common areas of contact.
- **Toilet accommodation.** Superloos or pod-type toilets with touch-free door access and dispensers increase social distancing compared to single gender toilets. Supply and extract ventilation may be preferred to the usual extract-only systems, to improve dilution and removal of contaminants.

## General measures

- **Touch-free devices.** Sensor taps, hand driers or automatic towel dispensers, and automatic doors should be used wherever possible. Automatic doors will be particularly important in common-use areas such as reception, lift lobbies and toilets.
- **Clean-as-you-go.** Hand-sanitiser dispensers and handwashing facilities should be plentiful, easy to find and strategically placed in thoroughfares and frequently used routes throughout the building.

- **Facilities cleaning.** Materials and finishes should be selected to be easily cleaned; they should be hard, smooth and resistant to appropriate cleaning chemicals. Surfaces should be free from irregular features (nooks and crannies) that may harbour contamination.

Cleaning protocols must be thorough, conspicuous and scrupulously implemented.

Waste and recycling will need close attention. Particular care must be taken with potentially contaminated waste streams (face masks, gloves, cleaning materials, etc.).

## Building services

General guidance on the operation of buildings in areas subject to a virus outbreak is given in the World Health Organization (WHO) document *Getting Your Workplace Ready for COVID-19*.<sup>\*</sup> The following advice on the operation of building services should be read as interim guidance, which will be subject to development as new evidence and information on effective measures becomes available.

- **Mechanical ventilation.** Run office plant 24/7, but at a lower rate outside normal hours, to maintain dilution of contaminants and to purge the building when not in occupation. Toilet ventilation plant should be run 24/7, ensuring that a negative pressure is maintained in toilet cubicles to minimise faecal–oral transmission. During outbreaks, any demand-controlled ventilation should be disabled.
- **Natural ventilation.** Actively use operable windows and openings to boost ventilation to occupied spaces as much as possible, even if this is at the expense of thermal comfort.
- **Humidification.** There is some evidence that people are more susceptible to infection when the relative humidity is below 30%, which may happen during colder months. Where humidity control is not part of the base building provision, space and utilities should be provided for later installation of humidification in air-handling units. The base build building management system (BMS) should include the measurement of relative humidity at each demise.  
  
Note that increased levels of fresh air will tend to decrease internal humidity in winter months.
- **Heat recovery.** Some rotary heat exchangers may allow cross-contamination from exhaust to fresh air. These need careful specification and maintenance. In some cases, it may be necessary temporarily to suspend their use during virus outbreaks.
- **Recirculation.** This should not be used in new buildings. Where an existing system uses recirculation, HEPA filters should be considered for the recirculated air.



- **Fan coils, fan-assisted VAV terminals, active and passive chilled beams.** All these recirculate air locally in the occupied space and should be frequently and thoroughly cleaned.

Where condensation occurs at fan coils, drain pans and traps should be maintained frequently to prevent growth of bacteria and mould. In new buildings, fan coils may be designed to avoid condensation.

- **Up-flow and displacement air systems.** These are designed to minimise local air recirculation and may aid the removal of contaminants from the occupied space.
- **Maintenance.** Obviously, system maintenance and cleaning regimes should be regular and scrupulous.

## Smart solutions

Smart solutions could include apps for location-based reminders to use hand sanitiser, to wash hands, or to clean desks, laptops and other technology devices. More 'out there' apps could monitor and count face touching.

There are already smart solutions that monitor office spaces to track occupancy, issue security credentials for meetings and allow users to call lifts from their phones. Widespread use of these solutions and wearable technologies may become the new 'normal', albeit recognising the constraints of GDPR.

## Carbon emissions

Many of the measures that help to prevent infection will increase carbon emissions. For example, there is greater embodied carbon in more and larger equipment, and extra operational carbon from increased levels of fresh air ventilation, extended operation periods and enhanced maintenance regimes. ■

<sup>\*</sup> WHO (3 March 2020) Available at: <https://www.who.int/docs/default-source/coronaviruse/getting-workplace-ready-for-covid-19.pdf> (accessed 22 April 2020).

## Key information sources

- REHVA – The Federation of European Heating, Ventilation and Air Conditioning associations
- CIBSE – the UK's Chartered Institution of Building Services Engineers
- National Research Council (NRC) of the National Academies of Science, Engineering and Medicine (NASEM) – US guidance on the characteristics of infection and the spread of infectious diseases in schools
- Professor William Bahnfleth – Penn State University, Pennsylvania, USA
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## DISCLAIMER

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## ABOUT THE BCO

The BCO is the UK's leading forum for the discussion and debate of issues affecting the office sector. Established in 1990, its membership base comprises organisations involved in creating, acquiring or occupying office space, including architects, lawyers, surveyors, financial institutions and public agencies.

The BCO recognises that offices don't just house companies, they hold people and so what goes on inside them is paramount to workplace wellbeing.

## ABOUT THE AUTHORS

The Technical Affairs Committee is the voice for the BCO on technical aspects of the built environment. It is responsible for the organisation's globally recognised best practice guides on office specification and fit-out, and acts as a forum for new ideas and discussion to address the technical challenges facing the workplace sector.

## ACKNOWLEDGEMENTS

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The principal author is Stanhope's Technical Advisor Peter Williams. Peter is a member of the BCO Technical Affairs Committee and an editor of both the *BCO Guide to Specification* and the *BCO Guide to Fit-Out*.

The text has also been reviewed and edited by Neil Pennell of Landsec, editor of the *BCO Guide to Specification* and the *BCO Guide to Fit-Out*.

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