

# **THOUGHTS ON WASHROOM DESIGN AND OPERATION** POST COVID-19

"It is the responsibility of developers to design and construct new buildings with the latest, safest, and most sustainable technology available for the health, welfare, livability, and productivity of its occupants."

> Bob Wislow Chairman & CEO, Parkside Realty Inc., USA

# Introduction

This briefing note is part of a series of notes which examine the impact of the COVID-19 pandemic on office design. We are in turbulent, unprecedented times, with continually changing guidance. We have to be flexible, adaptable and imaginative to address these challenges head on. The BCO firmly believes that the office building will survive; it will need to evolve to meet these new challenges, but we are a social species that thrives on the interaction and learning that the office environment provides.

As people return to the workplace, they will be more conscious of the risks of exposure to their surroundings. Our industry is at the forefront of addressing this challenge to provide safe and comfortable environments, but we must not forget that we are designing for people, not against the virus. Spaces should be inviting, pleasant and safe. Every space that people occupy during the day, from the point of entry and at each stage of their journey through the building, must be considered and adapted, if necessary, to ensure the health and wellbeing of its users.

It is surprising that there has been a raft of guidance produced on creating a safe workplace during the COVID-19 pandemic but very little guidance on how to make washrooms safe. Washrooms are one of the most frequently visited spaces within an office building. They are confined spaces and all three of the acknowledged contamination routes (contact, airborne and faecal–oral) are present in these rooms.

This briefing note presents the BCO recommendations on how existing washroom layouts can be adapted and operated to minimise the risk of transmitting infection, and considers what changes may be needed as we start to reimagine the design of future office spaces in a post-pandemic world.

# Challenges for washrooms and wet areas

In an earlier BCO briefing note,<sup>1</sup> the key virus contamination routes were identified as:

- contact
- airborne large and small droplets
- faecal-oral.

The UK government advice, to protect ourselves and others from the spread of the virus, is to 'Wash hands', 'Cover face' and 'Make space'.<sup>2</sup> The biggest challenges to current washroom, shower and changing area layouts are minimising the risk of transmission from contact surfaces and responding to the 'Make space' advice.

## Washroom design

Traditionally in office design, there has been a requirement for separate single-sex toilet arrangements with a 60/60 split between male and female genders. The typical standard used for washroom facilities is BS 6465-1:2006.<sup>3</sup> There is nothing that currently suggests the base number of facilities required should be re-examined for future developments, but how these spaces are designed and used will need to be reconsidered.

To comply with government guidelines and regulations, office occupancy levels will reduce substantially during a pandemic, particularly when the advice is to work from home where possible. The consequent reduction in demand on washrooms aids building management teams to limit

toilet capacity and increase the frequency of cleaning. As restrictions are relaxed, staff numbers will increase, and when community transmission of the virus is eliminated the office can be reoccupied at its former level and the washrooms returned to their previous use profile.

It is too early to say if the future levels of office occupancy, which were being driven to ever higher densities to maximise space utilisation, will change as employers seek to respond to a more hygiene- and health-conscious workforce, where personal working space and more generous communal spaces, including washrooms, are seen to add value.

#### **COVID-19 secure measures**

Preparations for a return to work while the COVID-19 virus is still in circulation have included:

- increased hygiene measures
- staggered working patterns
- reduced occupancy
- the introduction of one-way systems to prevent people coming into close contact.

While a one-way system can usually be accommodated within the overall office space, this is very challenging in traditional washroom layouts. It is easier to achieve with a row of 'superloo' toilets, which should have full-height walls and doors. This has the advantage of isolating each washroom module and making cleaning easier.

Most washroom layouts are currently gender split, consisting of a series of toilet cubicles with a facing row of wash basins, which could be set in a vanity slab. BS 6465-2:2017<sup>4</sup> provides guidance on the dimensional laying out of these facilities. Typically, the wash basins are spaced at 700 mm centres, with a 700 mm standing space at the basin and a varying circulation space. Urinals are spaced at 800 mm centres, with a 500 mm standing space and varying circulation space (Figure 1). It is clear that these dimensions make it very difficult to maintain minimum social distancing requirements of 1 m (where further measures are being taken) and the more general 2 m separation encouraged in public spaces.

Existing office facilities management teams have had to resort to taking some WC cubicles, hand basins and urinals out of service to increase the separation space between users of the facilities (Figure 2), and to restrict the number of users allowed to enter at the same time.



Figure 1

Washroom layout with thin, part-height, cubicle walls, urinals and basin layouts in accordance with BS  $6465-2:2017^4$ 



Figure 2

Washroom layout indicating appliances out of use to allow for social distancing

In new buildings, some developers are considering 'superloo' arrangements as COVID-19 mitigation, or choosing to increase the space allowed for washroom facilities, as illustrated in Figure 3.

Washrooms are heavily trafficked spaces, and over the course of a day are likely to be used by all the occupants in the areas they serve. There are multiple points of contact where successive users are at risk of touching surfaces that may have become contaminated. On the positive side, hand-washing facilities are always provided. However, it is now even more important to minimise the number of contact points, and aim to create a touch-free experience where possible.

Approaching a washroom, one normally encounters a vestibule or lobby with two doors. The role of this lobby is to prevent the transfer of sound into the office space, help reduce air leakage to adjacent spaces and avoid direct sightlines.

Thought should be given to the necessity of these doors, and how people enter and exit through them. The aim is to reduce the need to touch the doors or, where this is unavoidable, at least to provide conveniently placed hand sanitiser stations and waste bins (to allow paper towels used to open doors to be deposited). The desire to create a touch-free experience has led to an increase in automated and foot-operated doors, both for the vestibule arrangement and for WC cubicle doors.

Over the last 10 years there has been an increase in the use of motion-sensor taps, towel and soap dispensers, and hands-free WC and urinal flushing. Sanitary-fixture manufacturers now offer a wide range of solutions, and it is expected that the desire for a touch-free experience will make hands-free means of operation the norm in new washroom design and accelerate their retrofit into existing facilities.

Research by the US Centers for Disease Control and Prevention (CDC)<sup>5</sup> suggests that toilet plume could play a contributing role in the transmission of infectious diseases, and while additional research is underway, it may be best to close the toilet lid (if provided) before flushing.

There are a number of 'emerging' products and methods that are being discussed for beneficial use in washroom areas. These include the installation of ionisation units to purify the air, UV light surface cleaning and antiviral surface coatings. While these may be worth considering, at the time of writing there is not sufficient evidence to fully understand their effectiveness.



Figure 3

Washroom layout modified to encourage social distancing, with full-height cubicle walls and basins at 1 m centres

# Shower and locker facilities

#### A growing need

Emerging local authority plans such as the New London Plan require an increase in the facilities provided in office buildings to meet growing demand and to encourage more people to cycle to work. COVID-19 has provided a further impetus for this modal shift, as office users choose to cycle to work to avoid using public transport. Building owners and occupiers will need to respond to this growth in demand through extending and retrofitting facilities in existing buildings and re-evaluating the capacity provided in new schemes.

#### **COVID-19 secure strategies**

At the end of the first phase of the pandemic, gyms and health clubs reopened. One approach taken to reduce the risk of transmission and reduce operating costs has been to close many locker and shower areas to prevent their use and to encourage people to shower at home before and after attending.

This is not practical in an office environment, where people are expected to work at their desks after cycling or running to work. Shower and locker areas present a particular challenge due to the potentially large number of people queuing to use them and the number of contact points throughout these areas.

Steps that could be taken to reduce the risk of virus transmission include:

- regulating the use of shower and locker facilities to reduce concurrent use
- encouraging social distancing as much as possible
- · introducing a one-way system, if possible
- increasing the frequency of cleaning in shower, changing and locker areas throughout the day and at the end of the day
- providing dedicated lockers for users, to reduce cross-contamination
- providing individual shower cubicles with full-height screens and integral changing space.

### Existing washrooms

Making visible changes to existing washrooms to improve the user experience sends a positive message as occupiers begin to return to the office. The following measures should be considered:

- · reducing touch points wherever possible
- investigating if foot-operated openers could be fitted to the doors to reduce contact
- installing motion-sensor taps, soap and towel dispensers and touch-free toilet and urinal flushing, if not already in place
- extending toilet cubicle partitions to be full height, if the existing ventilation systems can accommodate this
- permanently increasing the washroom extract rates by enhancing the existing ventilation system
- installing a dedicated fresh air supply, if practicable, rather than relying on transferring air from adjacent spaces
- applying antimicrobial and viricidal surface coatings to support traditional cleaning regimes, and active wall paints, which have similar properties, on untiled areas.





# New washroom design

Washrooms are integral to the functional use of the office space. The challenges presented by COVID-19 have exposed how the resilience of these key facilities can be compromised. The learning we have gained from the adaptions we have made in response to the virus provides us with a perfect opportunity to rethink the design of these spaces for future buildings.

#### Layout

These changes might be as simple as facilitating social distancing through creating a labyrinth entry to allow the omission of doors, automating doors, spacing hand basins and urinals further apart, or providing full-height WC partitions.

Perhaps the standard washroom layout should be questioned. There has been an increase in interest in 'superloos' or unisex washrooms, as these offer individual self-contained toilet and basin facilities, which make social distancing easier to achieve. Each superloo is separately ventilated, thus reducing the mixing of air compared with more traditional washrooms. This layout also provides a flexible gender-neutral provision, which can easily accommodate changes in the proportions of male and female users.

To assess the potential impact on floorplate efficiency, a key metric for office design, the difference in area needed to accommodate a unisex superloo compared with traditional single sex toilets for a notional office space has been investigated. The study was based on a 900 m<sup>2</sup> NIA floorplate, a 1 person per 10 m<sup>2</sup> occupancy density and a 60:60 male/female gender split for the traditional single-sex toilets. Based on the level of provision recommended in BS 6465-1,<sup>3</sup> the requirement would be as follows:

- superloos nine unisex WC cubicles with integral hand basins (this includes the recommended 25% increase in provision to cater for increased dwell time)
- traditional single-sex toilets –three WCs, two urinals and three hand basins for men, and five toilets and five hand basins for women.

Both of these options provided the required facilities to serve the assumed 900 m<sup>2</sup> NIA floorplate. It was noted that, by using the traditional setting out of the gender-split toilets, it was possible to create a compact arrangement that was approximately 17% smaller than the superloo arrangement with an access corridor. This is illustrated in the sketch layouts shown in Figures 4 and 5. However, when consideration is given to the other recommended measures, such as full-height partitions and separation of basins to ensure social distancing, the gender-split washrooms become larger and occupy a similar area to superloos.



#### Ventilation

The important role played by ventilation in controlling the transmission of airborne infection is widely acknowledged, with poorly ventilated indoor spaces being strongly associated with a high transmission of viruses.

In its most recent COVID-19 guidance document,<sup>6</sup> the Federation of European Heating, Ventilation and Air Conditioning Associations (REHEVA) concluded that:

"To date, there is evidence on SARS-CoV-2 aerosol-based transmission, and this route is now recognised worldwide. The relative contribution of different transmission routes in the spread of COVID-19 is not yet known. Therefore, it is impossible to say whether aerosol-based transmission has a major or just a significant role. Transmission routes also depend on the location. In hospitals with an excellent 12 ACH ventilation rate, aerosol transmission is mostly eliminated, but in poorly ventilated spaces, it may be dominant."

Most washrooms in offices have mechanical exhaust systems, with supply air being drawn in from adjacent spaces or through external windows by the negative pressure created. The REHEVA guidance cautions against the use of open windows in conjunction with mechanical exhaust, as under some circumstances this could cause a contaminated airflow from the toilet area to other rooms.

Knowing the importance that clean fresh air has in reducing transmission of the COVID-19 virus, dedicated supply and extract ventilation may be preferred over the usual extract-only systems, to improve the dilution and removal of contaminants.



#### **Material selection**

Surface materials that are smooth, non-porous and easy to clean are ideal choices for washroom interiors. The use of large-format wall and floor coverings and antibacterial and viricidal surfaces should be considered. Tile and sanitary ware manufacturers now offer products that have antibacterial and viricidal coatings and glazes.

The *New England Journal of Medicine*<sup>7</sup> published a study in which the coronavirus was tested on various surfaces (plastic, stainless steel, copper and cardboard). The study showed that COVID-19 remained viable for up to 72 hours on plastic, 48 hours on stainless steel, 24 hours on cardboard and 4 hours on copper. It was also found that SARS-CoV-2 remained viable in aerosols throughout the duration of the experiment (3 hours). The results of the study are shown in Figure 6.

The need for maintenance of high levels of hygiene within washrooms is clear. Nothing can really replace the need for frequent cleaning, but the use of materials impregnated with antimicrobial and antiviral agents, copper and high copper content brass door furniture, and long-lasting surface coatings on high contact points can help to maintain hygiene levels. The use of paints with air-purifying properties on walls and other surfaces can also help to deactivate any virus present in the space.



Figure 6

Viability of SARS-CoV-1 and SARS-CoV-2 in aerosols and on various surfaces *Source: New England Journal of Medicine, March 2020*<sup>7</sup>

British Council for Offices Briefing Note November 2020

#### **Product selection**

The challenges posed by the pandemic have stimulated a concerted response from specialist suppliers and manufacturers to bring forward new products and solutions to improve washroom design.

Basin and toilet manufacturers now offer products that have antibacterial and viricidal glaze to prevent build-up of mould, lime scale and waste matter, and/or that are self-cleaning after each use.

Toilets are available that have flushing systems that are precise and spray-free, and some manufacturers are producing self-cleaning toilets that use electrolysed water and UV light. Similar products are available for urinals.

#### Management measures

All employers have an obligation to protect their employees from harm, including exposure to coronavirus. If there are more than five employees, it is a requirement for employers to complete a COVID-19 risk assessment of the workspace, which should include implementing social distancing measures and providing additional hand-washing facilities (if required).

To protect washroom users, the Health and Safety Executive (HSE)<sup>8</sup> recommends that all surfaces which require additional cleaning are identified, that there is a strategy in place for the frequency of cleaning, the replenishment of paper towels, soap and hand sanitiser, and that bins are emptied frequently.

Other management measures that can be implemented when required include:

- increased frequency of cleaning regime
- doors into washrooms that can be operated without touching, where possible (doors could be temporarily propped open if there are no sightline issues)
- · easy access to paper towels and disposal locations
- refuse bins and/or hand sanitiser stations located near the final exit door, so that users may use a paper towel



to open the door and then dispose of the towel safely and/or to sanitise their hands

- in-cubicle sanitiser or cleaning spray to allow users to wipe the toilet seat and lid (where provided) before and after use
- signage to instruct users to close toilet seat lids before flushing
- signage to encourage social distancing
- disengagement of alternate WCs, basins and urinals to encourage social distancing
- clear signage advising people to wash their hands properly after using the washroom
- use of sensors and smart technology to track washroom usage; informing users when facilities are available to use and to prioritise cleaning
- 24/7 operation of mechanical ventilation systems.

# **THOUGHTS ON WASHROOM DESIGN AND**

**OPERATION POST COVID-19** continued

# Hand hygiene

Hand hygiene is one of the most effective actions people can take to reduce the spread of pathogens and prevent infections, including the COVID-19 virus. It is important to ensure that washroom hand-washing facilities are well maintained, and that soap and hand sanitiser are available at all times.

Effective hand drying is important to minimise the spread of microbes, including coronavirus, as failure to do so increases the risk of transfer to surfaces and thus opportunities for transmission and spread. Both paper towels and warm-air hand dryers offer a hygienic way to dry hands.

# **How to Handwas**

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB O Duration of the entire procedure: 40-60 seconds

0 2 1 Apply enough so all hand surfaces 3 5 4 Right palm over left dorsum with interlaced fingers and vice versa; Backs of fingers to opposing palms with fingers interlocked; Palm 6 7 8 155 Rotational rubb in right palm an Ring forwards with clasped fingers of hand in left palm and vice versa 9 10 11 Dry hands thoroughly with a single use towe Use to el to turn off faucet World Health Organization SAVE LIVES **Patient Safety** 

#### Figure 7

A guide to hand washing created by the World Health Organization Source: World Health Organization

## Conclusion

The COVID-19 pandemic has exposed serious shortcomings in the current design of office washroom, shower and changing facilities. There is currently very little guidance on the design of these areas related to coronavirus infection control, even though they are probably some of the most frequently visited spaces in an office building, and are spaces where all known viral transmission paths are prevalent. This briefing note seeks to fill that gap.

Ensuring significant and visible hygiene improvements in these spaces will help to build confidence in the office environment, which will be key to the return to the workplace as part of the post-pandemic economic recovery.

The pandemic has forced us to reconsider our priorities and reassess our approach to the design of buildings. The availability of an effective vaccine may make many of the measures recommended in this briefing note unnecessary, but an investment in the health and wellbeing of office workers will repay itself many times over during the life cycle of a building, and help create a more resilient asset that is better prepared for the next pandemic. •

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## Further reading

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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 (TAC) 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. This briefing note has been authored on behalf of the BCO Technical Affairs Committee by Megan Royston ARB, RIBA, Principal of Adamson Associates. Megan is a member of the TAC and key contributor to the BCO *Guide to Specification*.

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