

Question 1 taken on notice:

*'My final question, and I'm happy for you to perhaps take this on notice if a little bit more reflection is required, but I wonder whether you might be able to articulate the **kind of design principles** that you think might be usefully incorporated in some kind of regulation around the provision of public toilets.'*

My response to the question:

The kind of design principles that might be usefully incorporated into regulation are:

1). Re-define Scope

Explore and expand the scope of what a public toilet is/means. The current scope of what constitutes a public toilet is a very narrow single issue focussed approach about providing an ablution facility. However, public needs are much broader and more comprehensive and complex than this. Therefore it is necessary to expand the scope of what a public toilet constitutes and what it means for an inclusive range of our community and a broad range of settings, beach, sports ground, park,...

I'm suggesting that the notion needs to be reframed and turned into a more inclusive offering that addresses a broad range of needs. Especially considering the importance of what a private space in public affords and to provide a considered and comprehensive response to those requirements. Consider children in the design and provide for them, reduced height urinals, toilets and sinks. Include more than human users for example guide dogs for the vision impaired.

2). Regular review of existing standards

Update, revise and expand the scope (i.e. every five years) in line with changing community needs and expectations, building practices, material and technological developments. Include and update the more intangible aspects of this facility that relate to the emotional and sensorial aspects i.e. creating a relaxed atmosphere, an welcoming ambience, a feeling of safety and comfort, a restful environment. Aesthetic Design like themed restrooms (e.g., "Orchid Garden" in Terminal 2 with live plants, which requires careful maintenance regimes)

This means revising lighting, colour schemes, ventilation, acoustic standards, specifications of surface treatments and finishes and to incorporate more decorative elements.

3). Community engagement

Engage in broad community consultation to obtain a wide range of input much like this enquiry has received from the individuals, youth and social services, professional bodies, industry, councils, businesses, and special interest groups.

Engage in broad community consultation before, during and after construction, consider to engage community in the maintenance. Like the neighbourhood watch initiative consider to establish a Loo Watch volunteers who report issues via a government app.

4). Actively obtain, collect and compile user feedback data

Monitors foot traffic and cleanliness (alerts cleaners when restocking is needed). Collect these responses and create a database to provide access to documented user needs, user frequency, peak use times to inform maintenance schedules, intervals. Use this data to evaluate impact of the provision of the public toilets for an area and its associated activities.

5). Establish a national research facility

Establish an evidence based approach towards how to cater for private space in public and how to incorporate this into public toilets. I am suggesting a **user centred design co-design** approach to ensure community engagement in the process and ownership in the outcome.

The design of public toilets has to transcend the council/builder/architect lead approach based on existing standards and guidelines and needs to be based on empirical data resulting from recent and relevant user testing by a diverse and inclusive range of prospective users before they these facilities are being commissioned. It appears that this is not common practice as there is no established body in the state that engages in research into these public facilities.

6). Cubicle Design

Focus on the design of the cubicle and how it is fitted out, its size and provisions for storage, basin, hand dryer, waste bin, seating, etc... It is the **importance of the 'unimportant things'** that will help create a more comfortable environment. Shift the focus from ease of maintenance and vandal resistance, which leads to heavily utilitarian and institutional atmosphere, to providing environments that actually cater to and focus primarily on the needs of those that use these facilities and their requirements. Consider themed cubicles, (music, inspiring quotes, historical detail, cultural references, public health messages,...)

7). Culturally relevance

In recognition of our diverse cultural fabric of our society it is appropriate to provide either a combination of squat and sit-down toilets or provide designated cubicles.

Install flexible water hose within spray nozzle within reach of the toilet to allow for washing of the body area in addition of only offering toilet paper,

8). Elevate the perception of public toilets

Develop effective and far reaching strategies to change the public perception of public toilets. An ongoing promotional campaign that repositions public toilets as an important cultural and social good that are a pleasure to use and an honour to provide. Promote and elevate toilet cleaning as an aspirational, respected and much valued service occupation instead of it being the lowest paid and under appreciated job. This will require the reshaping of public opinion about preconceived ideas of public toilets. The lecture and approach by **Koji Yanai** in the Harvard Graduate school of Design addresses this issue very skilfully, comprehensively and impact fully.

9) Improve Maintenance Standards

Build on and improve on Singapore and Tokyo's approach towards maintenance.

Provide user grading option to incentivise cleaner toilets, touch screen feedback system, call buttons to alert need for maintenance. Develop **gold standard**.

10). Engage multi disciplinary design team

The success of the Tokyo Toilet lies in the comprehensive approach taken, from the design of the toilet, the toilet cleaners uniform, cleaning tools and methods all the way to custom grade special toilet paper and a feature length movie to promote the whole project and raise awareness and the standing of these facilities to create **Destination Toilets** as a **tourist attraction** in **themselves!**

Examples of design approaches and additional resources:

- **David Engwicht's** TedX Indianapolis talk '[Add some magic to a public space near you.](#)'
- Lecture by **Koji Yanai**, Harvard Graduate School of Design about the **Tokyo Toilet** project.
- **Perfect Days** a feature movie by Wim Wenders about iconic toilets and their cleaners.
- **Examples** of architects being involved in the design process of public toilets in Sydney.
- [Rutledge Handbook of People and Place in the 21st Century City, chapter 18](#)
- **Singapore's 5-Point Blueprint for Success**
 1. Strict Regulations - Fines for unclean toilets (up to SGD \$2,000 for repeat offenders).
 2. Tech Integration - IoT sensors for soap/paper levels (e.g., Toiletspy by RAS).
 3. Community Ownership - "Happy Toilet Ambassador" training programs.
 4. Universal Design - Singapore Standard SS 634 for accessibility compliance.
 5. Public-Private Partnerships - Sponsorships (e.g., Dettol supplies free disinfectants).

Below points included in my original submission.

1. External access to water and power

1.1. Not every trip to the toilet requires the **use of a cubicle** or urinal.

Consider the provision **on the outside** of a carefully designed basin/sink that can be used for washing hands, filling up water bottles, washing fruit or rinsing out a container, activities that are not really appealing do inside a toilet.

It can allow the users not to bring their bags, cases, etc.. into the toilet and in some instances to maintain a sightline to their things on a bench, and therefore making those spaces more safe and conducive for public use.

1.2. **Powerpoint/ usb ports**

Digital devices are virtually indispensable today and we rely on them for navigating the city and being in touch, yet being able to charge them in public is not easy. The provision of free public power points and free charging stations go hand in hand with the essential basic need the toilet is providing.

1.3. The provision of **services located on the outside** of the facility provides a more outward looking aspect to what is otherwise a predominately inward focussed design and less transparent, inviting and approachable.

2. **Internal design**

2.1. **Internal layout**

Provide a **rest area**, an area that feels private and safe and provides a sense of reprieve in the sense of the word 'restroom'. A space to take a rest while being in public, providing a facility to sit down, chair, bench, etc... to rest, take the weight of the feet and place one's things down safely, but not on the floor.

2.1.1. Having a **dry space** to place things while washing hands, applying make up, freshening up. A small shelf for keeping a ring, bracelet, phone or glasses for example.

2.1.2. The **provision of a restful**, safe environment that affords a sense of privacy and safety, to take a break, refresh - a place that can be sought out for this purpose - rather than a place of absolute last resort.

The public presents a big range of abilities, neurodiverse, elderly, frail, new to the city, etc... Being in public can be demanding, stressful, overbearing, and not everyone can 'rest' in a commercial setting like a coffee shop or shopping centre. The way public toilets are perceived deeply influences our way of being in the city, making us feeling welcome or alienated, respected or barely tolerated.

2.2. **Sinks, water access and hand hygiene**

Taps are used for more than just washing hands. They often provide the only regulated access to clean water. Yet, at times the distance between the tap and the sink is so close to make filling up a water bottle impossible. Why the emphasis on being so restrictive?

2.2.1. **Water temperature** at times pre-set to warm, not a pleasant drinking temperature.

2.2.2. **Soap dispensers** are notorious for being empty or not working.

2.2.3. **Air forced hand drying** while efficient and arguably more sustainable than paper towels, is often associated with loud operating noise, offering the option of paper towels would be an ideal scenario.

2.3. **Cubicles**

A cubicle is not only used for its primary conceived purpose. It might also be a place to change clothes, deal with a spill, stain or mishap. It should provide for those important activities to take place because it is the only private and safe space in public.

Therefore the cubicle size should consider different body sizes, the wearing of coats, carrying bags, shopping bags, briefcases, roller cases, handbags, etc... and be large enough to accommodate those day to day accessories of the commuter and pedestrian.

The provision of plenty of hooks and small shelves to place items like a phone and to make this a more conducive space by considering a bigger range of additional activities and provide a range of accessories to accommodate these.

2.4. **Materials**

Soften the appearance through material selection and surface treatments that provide some form of decorative (domestic) style elements. Hygiene and ease of cleaning does not mean stark white tiles and harsh lighting. Colour, Material and Finishes, can be carefully selected to provide a more welcoming and softer environment.

2.5. **Lighting, natural light**

Current lighting is often harsh and basic. It creates a predominant institutional and functional feel centred around crime prevention, safety and aiming to denote hygiene.

More considered lighting that is employed to create an atmosphere, a sense of environment that is carefully considered and designed to delight and create a feeling of being welcome, safe, protected, comfortable and at ease.

2.6. **Airflow, ventilation**

obviously a critical consideration in an environment such as a toilet, yet most often this aspect is not addressed successfully. And if it is sometimes at the cost of mitigating prevailing outside temperatures. The Urban Heat Island effect does not mean that all public toilets should from now on be well tempered and air-conditioned but it should be considered more comprehensively.

2.7. General look and feel

The current look and feel is one of bare necessity, extremely function focussed, has an overriding crime prevention feel and communicates distrust in the user (public) and therefore it requires such a robust vandal resistant fit out.

These objectives can all be achieved with a softer more domestic or decorated look that goes beyond white tiles and stark lighting. A more refined material palette with decorative surface finishes are options should be explored. These could be in reference to the specific location, its history, current population mix or other relevant factors.

3. The accessible/universal bathroom

3.1. Being larger and offering more space inside these facilities are conducive to many of the points raised above, f.e. changing clothes, taking off or putting on an extra layer or attending to a spill or mishap. However their design is just as devoid of the affordances described above. Besides the larger space, they are not offering more utility and they lack hooks, small shelves and seating affordances.

3.2. The larger space makes them more suited to providing a sense of refuge and therefore they offer a slightly more comfortable experience.

Question 2 taken on notice:

*'On that question of germs that you talked about, are you aware of any **relevant sources of information** that we could look at in terms of that question of germs and public health risk posed by public toilets?*

*As a follow-up, are there any **industrial design issues** we should be thinking about in terms of minimising those health risks?'*

My response to the question 2 part 1:

Relevant **academic disciplines** that can provide **authoritative sources** that address germs and public health risk and relating to public toilets and materials used in them are for example:

Material Sciences, Microbiology and Bacteriology, Chemical Engineering, Biomedical eEngineering, Nanotechnology and Nano-sciences, Food Sciences, Packaging Technology, Public Health and Epidemiology.

Their peer reviewed research findings are published in journals for example like:

- Advanced Materials (Wiley) – High-impact research on antimicrobial coatings, nanocomposites.
- Applied Materials & Interfaces (ACS) – Focus on functional materials, antibacterial surfaces.
- Biomaterials (Elsevier) – Medical-grade materials with antimicrobial properties.
- Journal of Materials Chemistry B (RSC) – Biomaterials and antibacterial polymers.
- Applied and Environmental Microbiology (ASM) – Covers biofilm inhibition
- Biofouling (Taylor & Francis) – Anti-biofilm and antifouling materials
- Nano Letters (ACS) – Nanoscale antibacterial agents (e.g., Ag, ZnO nanoparticles).
- Journal of Biomedical Materials Research (Wiley) – Antibacterial coatings for devices.
- Journal of Food Science – Antimicrobial packaging innovations.
- Environmental Science & Technology (ACS) – Impact of antibacterial materials on ecosystems.
- Advanced Functional Materials (Wiley) – Innovative antibacterial surfaces.
- Nature Communications – Cross-disciplinary antibacterial materials research.
- Materials Today -covering the most innovative, cutting edge and influential work in the materials science community

My response to the question 2 part 2:

Industrial Design can respond by specifying materials or material finishes and coatings in the design of products that are exposed to bacterial transmission and contamination. There are a number of different materials and surface coatings or treatments that can inhibit bacterial growth \ examples are: Toto's Hydrotect tiles, UV Direct Germicidal,

Materials and processes to consider are:

- Silver (Ag), silver coatings, or silver nano coatings, disrupt bacterial cell membranes
- Copper (Cu), and copper alloys like brass and bronze, they release ions th damage bacterial cell walls and generate oxidative stress,
- Zinc (Zn), or zinc coatings, interferes with bacterial metabolism

- Copper infused ceramics for touch surfaces
- Photocatalytic Titanium Oxide (TiO₂), in combination with UV light kills bacteria
- Graphene Oxide coatings
- Hydrophobic or Superhydrophobic coatings, however these might not be very durable

The most relevant and effective treatment would have to be developed and tested in conjunction with the experts and in close liaison with the commercial manufactures.