

PLANNING FOR PUBLIC TOILETS

PART 3: MICRO LEVEL: TOILET DESIGN CONSIDERATIONS:

Inclusive Design for Different Types of User Groups

'To a good doctor there is no physical or mental aspect of his patient which should embarrass him. He may be worried or shocked by what his diagnosis reveals, but if he's any good, he is not embarrassed. Correspondingly, therefore, there should be no type of building, and no human function related to it which should embarrass the architect!' (Architects Journal, 1953, No.117).

This section looks at the 'micro' level of detailed toilet design. However, the emphasis is upon principles, and upon 'seeing' how the different components of the toilet cubicle 'work' together, because, as they say, 'the devil is in the detail'. The emphasis is again upon the user, the range of user types, and the social and qualitative factors involved, rather than upon the technical plumbing and engineering aspects dealt with elsewhere in this course programme. There is also a longer optional explanation of the issues in the second part of the paper. A PowerPoint accompanies and illustrates Part 3. Part 3 is longer because detailed issues are so important. A fuller bibliography, list of references is given at the end. In fact Part 3 may be used as a module in its own right on inclusive design.

People are Important

There are many detailed design guides on the precise dimensions and locations of rails, toilet pans, washbasins, mirrors etc and so it is not the purpose of this chapter to give precise guidance on these. 'The problem' is that some toilet manuals deal with each component without seeing how they inter-relate with each other spatially. Emphasis is upon a user perspective on negotiating toilet space, in order to alert you to likely hazards and barriers encountered by would-be toilet users. Both abled and disabled people have such difficulties manoeuvring within toilet blocks because of the ill thought out positioning and relationship between objects within cubicles; even if the toilets are designed to current standards.

It is important to consider, 'who are the users?' as there is no one average, standard that is suitable for everyone. It is not true to say 'one size fits all'. Of course it is important to have a minimum standard that is more or less OK for everyone, but there is also a need to produce different toilet types for women and men. Furthermore, in larger toilet blocks a wider range of alternatives should be provided, to meet the needs of small children, babies, the elderly and those with disabilities. Cultural and religious factors are also important and in multi-ethnic areas, and tourist locations where there are many international people it is important to provide squat toilets as well as sit toilets.

As a basic design principle when 'testing' new designs it is important to ask all relevant users, women as well as men. An APC (Automatic Public Convenience) toilet manufacturer produced

a new type of disabled toilet, and they only asked a severely disabled man to try it out. They did not ask a disabled woman as well, because they imagined that 'if it was good enough for him, then "anyone" ought be able to use it'. But women have different needs from men, which cannot be subsumed under the needs of the 'worst' male case.

Toilet Hierarchy Revisited

In Parts 1 and 2 of this unit, the principle of a toilet hierarchy was established with the principle that different types of area needed different degrees of toilet provision. A large 'toilet palace' should be provided at city centre level, meeting a wide range of needs and providing a large number of toilets for both women and men. Such a facility would be open 24 hours a day, and provide an 'inclusive' approach to meeting everyone's needs. A 'universalist' rather than 'separatist' approach to disability provision would result in accessible, wider toilets being integrated into the regular toilet areas to meet the needs of everyone who has difficulty accessing the toilet. But additional 'disabled toilets' would also be provided for those who needed specialist facilities.

There is much debate about whether 'disabled toilets' (that is toilets for people with disabilities) should be separate or integrated into mainstream regular toilet provision, or indeed whether, a more inclusive, universal style of design can be developed that meets the needs of both abled and disabled users.

I now refer you to our ongoing research on this issue, to the paper, presented in Japan in 2004, by Julianne Hanson entitled, The Challenges of Designing Accessible Toilets in City Centres with PowerPoint, **and to our new report on the subject** Hanson,J., Bichard,J, and Greed,C. (2007) The Accessible Toilet Resource, London: University College London, Bartlett Graduate School of Architecture. In particular I would suggest you consider the extent to which we can accommodate 'everyone' in toilet design, and refer you to what is know as Benktzon's design pyramid. I quote from our 2005 paper on this:

Benktzon (1993) proposed a 'design pyramid' as a graphic illustration of how to overcome the objection that inclusive design is an unrealisable goal. She has divided the population into three broad but unequal bands, see Figure below. At the base of Benktzon's pyramid are the large numbers of able-bodied people, the middle layer comprises people with reduced capabilities and at the top are the small numbers of people with severe impairments, including "people in wheelchairs and people with very limited strength and mobility in their hands and arms", (*ibid.*, p.19). The approach assumes that if products are designed to be used by a particular layer, they will automatically be useable by all those in the lower layers.

Subsequently Julianne Hanson has developed this design pyramid approach further and you can read about it in the new report The Accessible Toilet Resource (2007) [which should be available by the time of the Toilet School for you all to read). This Toilet Resource manual covers many of the issues

that are of concern to you all in terms of how to design toilets for all sorts of different people including those with disabilities.

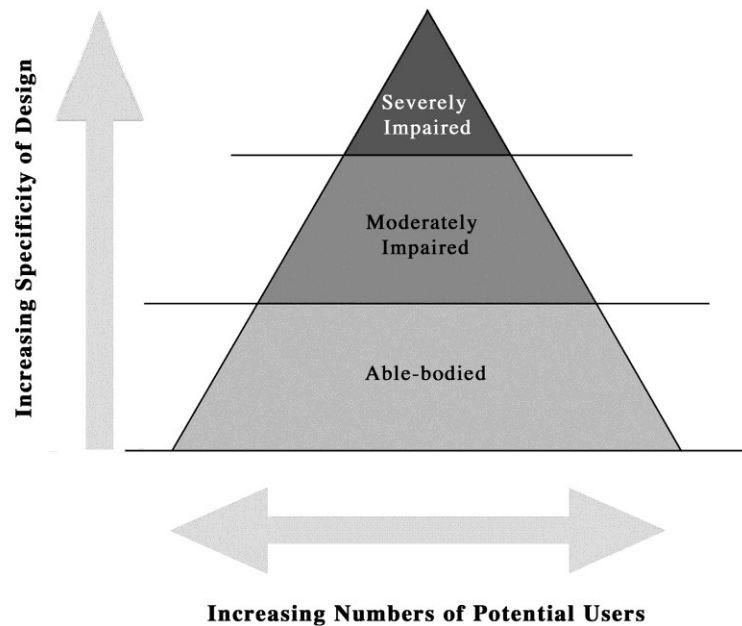


Figure. Benktzon's design pyramid (adapted from Benktzon, 1993).

Three levels of 'inclusion' have therefore been more generally adopted by the proponents of inclusive design (They are:

- 1) Mainstream products for everyone, including people with disabilities;
- 2) Mainstream products that can be 'customised' for use by people with disabilities; and
- 3) Specially-designed products 'tailored' to the requirements of people with severe disabilities.

This allows for customised and tailored products to meet a need in situations where it is particularly difficult to extend the design parameters of mainstream provision to include everyone. Clearly, this approach can be extended to the design of the built environment in general and public toilets in particular.

SPACE FOR EVERYONE?

Space standards need to be generous to enable access and circulation within the block because facilities for disabled people have been integrated in with 'standard' (abled) toilet provision, and since women with pushchairs and/or small children comprise a substantial proportion of all users facilities are also pushchair accessible. I have illustrated these principles in sketch form in the accompanying PowerPoint. Smaller-scale toilet blocks would be provided at the district and local level, and in some areas a basic, minimal facility would be provided to meet passing needs.

It should also be noted that because women need at least as many facilities as men, in fact a 2:1 ratio has been recommended by many, this will result in a larger floor space area being devoted to the women's toilets than the men's because cubicles take up more space than urinals. This

principle should be applied at all levels of the hierarchy.

Single 'unisex' toilet solutions such as the APC (Automatic Public Convenience) are not recommended, because they are not suitable for busy locations, are expensive and are not popular with users. There is often no room for more than one person in them and mothers are not willing to leave their children, pushchairs or shopping outside. One alternative is to have a row of separate toilets each accessible by its own door and containing a washbasin (as in the Danfo toilet designs). This provides more flexibility as the units can be used by men or women, but result in less flexibility and are less hygienic if there are not also washbasins outside the (dirty) toilet door.

Ideally separate male and female facilities should always be provided, and this is particularly important for those whose religion (and modesty) does not allow them to share facilities with complete strangers. The only exception would be in the case of disabled toilets where, for example, a husband is caring for his disabled wife or vice versa. It is also better to avoid long shared m/f corridors and have the toilets springing from the main access early on. But there should be 'neutral' outside waiting space either at the entrance, looked over by the attendant.

Space may also be needed for dogs, we were surprised how many people mentioned this. Some English people take their dogs with them when they go out shopping or travelling, for companionship or for security. This may be a Northern European cultural issue. Nevertheless many disabled people nowadays have companion dogs, such as 'blind dogs' (that is 'seeing dogs' or 'watchdogs') for people with visual impairments and there needs to be space to take a dog into the cubicle or a safe waiting area directly outside the door.

Controlled entrance to baby changing and unisex facilities is to be advised, but not to discourage legitimate users. Rather than trying to control the users through the design of the building or through restrictive entry systems, it is always better to have an attendant and studies have shown that they are more cost-effective in the long run.

We can never separate such 'management issues' from 'design' when thinking about toilets, as the chances of a toilet remaining clean, useable and accessible depend a great deal upon having an attendant. Surveillance and having someone on site is absolutely essential.

Diversification of toilet facilities by combining news-stands, left-luggage facilities, coffee kiosk, taxi office, telephone, internet and fax facilities should be considered especially in larger toilet blocks. Every toilet should have on its walls a town map, bus timetables, taxi information, and other publicity posters to show the toilets 'belong' to the community and to help tourists and visitors.

TOILET COMPARTMENTS

Cubicle Dimensions

There is no official minimum toilet cubicle size for standard (abled) toilets, and some are very small, so much so that the toilet door touches the edge of the toilet pan. On consulting the British standards and related Building Regulations one is confronted with a confusing pattern of recommended activity zones and circulation spaces. Individual dimensions of inanimate fixtures and fittings are prioritized, rather than a holistic set of principles derived from user needs are provided. I have set out some recommended dimensions in my book and on the PowerPoint. If these seem large, it is because of accommodating an inward opening door and making space for waste disposal bins, giant toilet roll holders, and other toilet fittings.

Doors

The door, in particular its arc of clearance, takes up the most space within a cubicle and is a major constraint on the overall length of the cubicle. WDS recommend at least 750 arc clearance making around 900 total cubicle width allowing for door posts (stiles). Ideally we need wide doors and more clearance if women are going to bring their shopping, pushchairs, accompanying small children into the cubicle. Under BS 8300 disabled toilets have much longer doors and the difference between the dimensions of abled and disabled toilet doors is marked. In the case of much longer doors (over 900mm) as shown in my toilet palace on the cubicles on the end wall with outward opening doors, power assisted doors with infra red opening devices would be ideal in an attended environment.

Women need to sit to use the toilet to urinate, so toilet cubicles are not 'just' for defecation as may be the case for men. Women and men are different, and gender equality should embody acknowledgment of biological differences. So do not forget that women have quite a different toilet experience from men! Women always use cubicles and therefore access is a major issue, as women need to 'turn around and sit or squat on the toilet': a very different experience from simply standing at the urinal!

One of the biggest problems for women is the lack of space between the edge of the door and the edge of the toilet pan. In the course of my research I found cubicles as narrow as 700 across by 1000 long with the door touching the lavatory pan.

The inclusion of a 450 circle between the pan and the door would greatly help women access the toilet, but it would create a long cubicle but if we offset the toilet bowl this will reduce the width. 250mm has previously been recommended by leading toilet authorities.

However, 'more is not necessarily better', much depends on how space and fixtures within the cubicle are arranged, and how the door problem is dealt with. There is also a debate about how much space should be left under the door. American standards specify at least a 9 inch clearance under the door, and many states require 12 inches, plus little 'gaps' between the door and the doorposts, presumably because of the problems of cottaging (cruising, sex) found in male toilets. All of this helps increase the overall dimensions of the compartment but may put users off. Those men who require privacy because of shy bladder syndrome (Soifer,2001) and those who are frightened a hand will reach under and steal their valuable laptop computer want a better

solution. Moslem designers recommend the use of louvered doors to increase ventilation, yet provide modesty with some visibility in an emergency as an alternative to a gap (Hamzah and Hooi,2001).

As with everything in toilet design, what is good for one person may be unusable by another. If outward opening doors are used on disabled toilets, some independent wheelchair users cannot reach out enough to close the door, unless they have very long arms, so clearly the situation is complex. In standard toilet arrangements outward opening doors can block the access corridor and can hit people waiting. This is yet another reason for having wider access aisles or more space in the cubicle. This is why professional judgment needs to be used, and fixed standards applied without thought can result in poor toilet design.

Sanitary Bins

In Ladies' toilets in England, a major problem is the location of the sanitary waste bin ('Sanpro' bins [Sanitary protection bins]) which is 210mm wide minimum as required under the Environment Acts 1990 and 1995 and BSI standards. The only place to put the bin in many compartments is right beside the toilet bowl in an already narrow compartment. This results in unsanitary overflowing bins potentially rubbing against women's legs and outer thighs when they sit down on the toilet. Women need to sit down to use the toilet, or at least they need to hover over the pan. Some bins are taller than the top of the toilet seat as well as sloping outwards as they rise they block access one side of the seat by the user.

It is recommended that a 250mm clearance is (also) maintained right around the toilet seat, even if this makes the toilet closet quite a bit wider. To avoid this 'extravagance' simply install an integral ducted disposer along with a ducted cistern. Alternatively the toilet bowl can be set out further from the wall and the sanpro container can be set sideways behind the seat. If the door is hung on the 'other side' from the bowl and the bin, with a bit of juggling a more usable cubicle can be achieved without over lengthening the compartment. The full waste management and design implications of menstruation are seldom taken seriously. Sanpro disposal should be treated as real disposal, and integrated disposal provision should be provided in the same way that every toilet has a cistern, rather than adopting a temporary plastic bin approach as if the problem is minor and temporary and too embarrassing to face.

This may not be such a problem in your country or other countries but it is certainly a trend that is creeping into new toilets as a result of 'western' influences. Can you identify other similar problems in your toilets?

Toilet Bowls and Seats: sit or squat?

Traditionally in the West both men and women have sat down on the toilet to move their bowels, whereas women also sit to urinate. In fact, because of fears about sitting on a wet seat after some complete stranger, many women will either 'hover' (crouch) over the toilet, or cover the toilet seat with toilet paper. In any case many debates exist about the height of toilet bowls and seats (as explained in my book, or consult your local standards). Small women have difficulty putting their

feet on the floor in standard toilets. Squat toilets are widespread across the world, and are seen as more hygienic and more biologically functional than sit toilets. The sit or squat debate is a major issue in toilet design. Trying to make women more like men by designing female 'urinals' (urinettes) has been much criticised on health grounds. It is recommended that most women's public toilets continue to be sit toilets, with no urinettes, but that as an alternative to sit toilets, squat toilets (rather than urinettes) are offered as well. The ratio between sit and squat versions would be based upon user need surveys. Squat toilets also have the advantage of being cheaper, offering less hardware for vandalism, and are generally lower maintenance and arguably are more natural thus contributing to the reduction of national constipation problems too. It is vital to carry out full toilet public participation among the local population to find out what they want and to give them a sense of ownership of the facilities provided.

As to the precise design of sit toilets, there are millions of versions available. Most public toilet bowls are pedestal form. Corbelled, cantilevered ones, and flush into the wall versions, are seen as more hygienic and more vandal proof but more complex and costly to install. Whatever the height or style, as a principle, all toilets should have a seat, and it should be continuous not one of those male ones with a gap in the middle (the male horseshoe as against the female full circle seat). Users should be able to put the seat up if they so choose. Immoveable seats as found on metal toilet bowls are not recommended. There are a variety of paper and plastic seat coverings that drop down or roll around when the plug is pulled creating a hygienic seat for the next user. Unless they are installed in vandal-proof, protected off-street environments, such as surgeries or hotels, they simply invite vandalism and are prone to malfunction.

Disabled Toilet

Some degree of mixing of able and disabled toilet provision is recommended. But disabled people are fearful of their disabled toilets being taken away and there are many people, especially in an ageing population that need dedicated disabled toilets.

Under Part M (updated by BS8300) the space allowances have been more generous for disabled cubicles, namely 1500 by 2000, or 1500 by 2300 or 2000 by 2500 with a 1000 door, or even more: a huge contrast from the tiny able cubicles found in some locations.

#add reference to new Vivacity toilet guide for principles##

Space is needed both within the cubicle and outside for wheelchair man oeuvre and most guides recommend a 1500 turning circle to accommodate the average wheelchair even if people are doing a series of three point turns. Modern motorized ones may need more room. Like people, wheelchairs come in many different sizes and types, so a variety of sizes of compartment should be provided, where possible. If a local user survey is undertaken, questions should be asked about the type and dimensions of wheelchair used by potential users. But 'more space is not necessarily better'. Much depends on how the space is arranged internally, especially as to where the toilet bowl is located and what obstacles are located within the toilet. So there are endless variations and debates, but as a general principle users, both male and female should be invited to test drive the toilet design at the earliest opportunity to see what the practical problems are likely to be.

The principle in all of this is to check what the user thinks of the toilet. Toilet design is a human issue not just a technical matter.

Rails

There is much debate about where to put grab rails in disabled and standard toilets. The general view is that is bad to fix rails immediately alongside the toilet as this blocks any chance of lateral transfer on to the toilet, and can get in the way of helpers too. It is not the intention to prescribe exact rail dimensions and locations as this is already covered by many disability groups. Against the principle is to check what is best with users, and to ask both male and female users. For example a rail on the rear wall behind the toilet bowl is not of much use to women users, who face away from the way to urinate!

Whatever the location, grab rails should have at least 35mm diameter to be grabbable, securely fixed and with a clean surface, although others would say that it is better to have textured surface for a better grip. Grab rails might also be provided in association with urinals, regular toilets, washbasins, squat toilets, sprung doors, dryers and vending machines. In discussing 'rails' within the context of 'the cubicle' it must be stressed that the rails should never be positioned in such a manner that they make it more difficult to open the door or in a way that restricts movement within the toilet.

'The devil is in the detail'. Fixing a rail one inch in the wrong direction might make the toilet inaccessible, and having a door that is too narrow might block many users' chances of getting into the toilet. Good supervision of construction and maintenance staff is essential. Ongoing management is essential as leaving temporary items such as a bucket or a bowl out on the disabled toilet's floor even for a short time is sure to inconvenience some would-be user (see Powerpoint of supermarket trolley left in disabled toilet).

Toilet Rolls

Having 'been' (used the toilet) the next problem is accessing the toilet roll. It is recommended that toilet rolls are set at 600mm to 650mm high which should be usable from a seated position using one hand. Roll based dispensers are less likely to get blocked, whereas single sheet dispensers tend to be inadequate and time consuming to use. Pulling on the last piece of paper that someone else has just touched using the hand that has wiped their bottom, whilst inadvertently rubbing their hands on the surrounding dispenser is another reason to make many people carry their own paper. Some local authorities appear to see it as their duty to deter people from using public toilet paper. American legislation specifically states that nothing should stop the flow of paper in disabled toilets, and would that this applied to abled UK toilets too.

In disabled toilets the toilet roll should be usable by a one armed disabled user. If the lav roll is too far away users cannot reach it, so a helpful person festoons the grab rails with string to hold a dangling toilet roll making life difficult for other users. Toilet paper should be located in an accessible dispenser that is not likely to hit either the inward opening door of the cubicle or the user's elbow. Toilet paper on a roll is to be preferred particularly in private, off street public

toilets, provided it is secured to the wall in such a way that two hands are not needed to tear paper off.

Alternatives such as individual sachets of toilet paper dispensed from the wall at minimum cost have advantages in terms of hygiene but are barely cost effective and may malfunction. Great attention must be paid to the location of toilet rolls in disabled toilets, so that paper can be grasped and pulled out by those with the use of only one hand as well as avoiding it getting in the way of wheelchairs and lavatorial manoeuvres.

But many cultures do not use toilet paper and prefer washing instead. In situations where water rather than toilet paper is used it is essential that a tap, hose or other water source is provided alongside or near the cubicle in both women's and men's compartments and in disabled toilets where local user surveys have shown there is a demand for this preference. Water supply taps should have enough space below them to put a jar or bucket under them for washing purposes.

Flushing the Toilet

Whereas in the past the toilet cistern was up on the wall and pulled with a chain, nowadays low level flush toilets are more common in public toilets and almost universal for domestic toilets. The flush handle should be around 900mm above ground for both adults and older children to reach. Ordinary toilets use around 7 litres per flush and low level flushes use around 4 litres. In disabled toilets the flush handle should be 800cm up from the ground but some say 700mm is better. Automatic flushes that operate after each user are more hygienic, and result in a better control of water supply. Using less water to flush for environmental reasons needs to be set against the question of how many times do users have to flush. If lack of water is compensated for by increased flushing pressure, can the pipes and sewers cope with this structurally.

The use of automatic electronic sensors which flush the toilet, turn the taps on and off, dispense soap, and 'keep and eye' on the installation are of value in increasing hygiene, but require ongoing maintenance and supervision, and contribute to higher capital and running costs. Ecologically friendly, dry toilet mechanisms based on a mechanical chute systems and recycling are suitable in wilderness areas. Solutions based on solar energy are best left at present to warmer climes although wind-based systems to generate flushing, heating and lighting have been achieved. Experimentation continues. There are even waterless, biological APC systems available which are more environmentally friendly, but this does not solve the user-related design problems associated with APCs.

Shelves

Shelves may seem a trivial matter but they are important for both hygiene and user reasons. Many women have stressed the importance of providing hooks and shelves to put bags and clothes up on both in the compartment and in the washing area. Also shelves are a requirement in disabled toilets. Because this is not a specifically 'plumbing' matter shelves have received low priority as a luxury, but they are important for hygiene and toilet-usability reasons. If a handbag is put on the

toilet floor and then later on put on a table or desk heaven knows what germs are clinging to its base, which will then spread to other surfaces and people. Shelves are important in disabled toilets particularly as many users cannot reach all the way down to the ground and now BS 8300 includes shelf specifications in its design guidance. Shelves should not stick out into valuable usable space in the cubicle, and so their location needs to be harmonised as an integral component of the whole design. Shelf corners should be rounded and shelves should be tilted back to the wall very slightly to stop things rolling off them.

Locks and Levers

Fiendish locking mechanisms make people feel uneasy about using public toilets and some women prefer to leave the door unlocked with a shopping bag wedged tight against it. Penny in the slot mechanisms are particularly feared. Touching toilet door locks and latches is unhygienic, and thus, as stated, many women are not in favour of having washbasins inside toilet compartments. Many would like emergency cords inside all toilets to call for assistance after all one reason for going to the toilet is feeling unwell (cords are now standard in disabled toilets under BS8300). For both disabled and standard toilets door locks should be easy to use, and have lever handles of 200mm minimum length and 35 mm diameter. L shaped door handles on hinged doors, and D shaped on sliding doors as provided for disabled toilets are ideal. Doors should be openable from outside in an emergency, and where possible outward opening doors should be installed in small cubicles. At least 3000mm (12 inches) space should be provided at the top of the door so people do not feel they are locked in and to allow for someone to crawl in an emergency, but a gap under the door is less acceptable for privacy reasons. Thus cubicle doors and walls should provide adequate privacy, but offer the occupant means of escape in an emergency. Many a Third World 'sites and services' toilet block has been shunned by women for modesty reasons because gaps have been left between the floor and walls for ventilation purposes, whilst gaps under western public toilet doors lead people to put their bags, computers, cameras and other valuables on their lap whilst using the loo: in case a hand stretches under the door or adjacent wall.

Colour coded and internationally understood means of showing whether a compartment is occupied should be used (red for occupied and green for empty). One of the reasons people are fearful of APCs (automatic toilets) is that they cannot see the outside. As stated small thickened one way glass panel or spyhole on the door might increase visibility from inside so that users can see who is hanging around outside. Disabled toilets that can only be accessed by a key will die out as greater attended provision is provided and as the toilet culture improves nationally, but they may remain a necessity in some areas. The introduction of European wide swipe cards, as being trialed by the 'Eurokey' organisation may also contribute to the demise of the RADAR key. Swipe cards for all toilets, for abled and disabled people, might reduce vandalism if the user's identity were encrypted on the key, but this would no doubt also lead to delays, fraud, malfunction and fear that someone was counting how many times people accessed the facilities. In this scenario bonus points and airmiles on loyalty cards (used as swipe cards) for faithful customers of brand APCs may no longer be a joke.

Again cleaning and management issues are very important to keep the toilets usable in the future. For example, don't let the cleaners shorten the length of the emergency pull by tying it up to make cleaning easier, for if someone has fallen down on the floor they won't be able to reach it! But make sure toilet cleaners and attendants have a chance to give their views on a new toilet design before it is approved, as they can tell if it will be easy to clean or whether there will be other unforeseen problems.

Urinals

Whilst urinals do not take up much space, there is a need for greater circulation space so users are not too close to each other. Users need a 500mm activity space each in front of the urinals plus another 600mm circulation space running along behind them, giving 1100 in all, whereas Americans recommend at least 1200 in all. Users each need around 650mm space sideways for each user. Trough urinals can cater for all heights but those that are accessed by a step are problematic for the disabled. There should be a range of heights available for users, or the option of a traditional trough, and grab rails should be integrated where possible, perhaps at the end of the run on the side wall and on the facing wall. A height of 500 is suitable for ambulant disabled men and one of 380 max for wheelchair users.

There appears to be a growing demand for more privacy at the urinal, and for panels that obscure users from their immediate neighbours. This is particularly important for men suffering from shy bladder syndrome (paruresis) and those with other medical or psychological difficulties. Moslem urinals provide more privacy, but some men would prefer to use cubicles.

Washing and Drying

Once out of the toilet we are then confronted with the problems of policies on handwashing facilities, with debates revolving around the merits of hot and/or cold water; solid or liquid soap; towel or hand dryer. Most public toilets have cold water, but occasionally one comes across a helpful notice saying, 'beware very hot water' but if there is no way of diluting it and no plug what can be done? 40 degrees centigrade is the recommended temperature. As to drying roller towels get 'stuck' unless maintenance is constant which should be possible with an attendant. Air based dryers can spread germs unless their filters are regularly changed whilst tissues and paper hand towels increase waste. 'Wipe your hands on your skirt' or 'shake your hands in the open air' is age old advice.

The maximum height of anything to be operated by hand should be placed at around 900mm from the ground, and not at more than 1200mm from the ground (ftg), not at eye level which is around 1400-1700 depending on height. Mirrors should start at 900 from the ground and go up to 1700 or even 1800. But women also like full length mirrors provided they do not invite being kicked and broken. Paper towel dispensers can be fitted at 950mm (ftf). Washbasins can be as low as 700-750 to accommodate children and the disabled and whereas 800-900 is around average, bearing in mind if the counter in which a basin is set is 750mm then one still has to put one's hands down into the basin. Generally the washing facilities in women's toilets might helpfully be set around 10mm lower than in the Gents. 8300 recommends washbasins are set at 720-740 and suggests adjustable washbasins, set at the best height by trained assistants. But all

these dimensions may require amendment depending on average national heights and the country in question. Many westerners are much taller and bigger than people in the Far East but there are always exceptions to the rule and there is a need to design for everyone.

Minimal contact with equipment is to be advised, therefore lever taps or electronic taps are to be preferred. But automatic taps should provide a reasonable amount of water not a brief tepid dribble. Some automatic sensors cannot sense darker skin so they must be calibrated so that 'white skin' is not the norm. There has been a trend towards the all inclusive combined washer, soap, drier, contraptions (such as the 'Wallgate') which are not ideal but vandalproof. Hot and cold taps should be marked, and colour coded as should everything else. In other words attention should be paid to detail and management control.

Babies and Small Children

To make fully inclusive toilets children need to be fully factored into the space standards as frequent customers of public toilets. Goldsmith (2001) argues women with pushchairs are far more numerous than disabled people with wheelchairs and that they need larger accessible toilets too. But unlike disability there is no law covering women, or women with children. But women with pushchairs are at least 10 times more likely to be out the streets at any time. In specifically family related locations they are 30 times more numerous (whether this is cause or effect is another debate as to why disabled people are not there too). WDS recommend smaller cubicles for children with a 710 door in a 750 wide toilet, whereas others recommend toilet cubicles containing both an adult and child toilet. Rubber safety strips to prevent little fingers getting caught in doors is a good touch. Ordinary cubicles should be designed to accommodate single buggies in shopping areas and the larger cubicles would accommodate double buggies.

Baby changing facilities should be an integral part of all public toilet blocks so all public toilets should be fully pushchair-accessible but baby changing tables should be provided in separate compartments. Babychanging counters 900mm in depth should be provided where possible but if this is impractical in retrofitted toilets a retractable baby changing table with security straps. The location of such facilities should not be too public where space is limited. The argument that adding baby-changing facilities will somehow create a family atmosphere and reduce crime detracts from the fact that such provision is perfectly valid expenditure in its own right, whilst such 'family policy' without proper design and management safeguards is putting a huge personal safety risk on the babies and parents concerned. Interestingly BS 8300 highlights the importance of 'sanitary and changing facilities'. Space must be allowed for both activities, as recommended by PAMIS too (BSI,2001), but 'only' within the context of disability (especially incontinence) whereas in reality 'changing' (and related disposal of soiled items) is a large, and unrecognised function of public toilets for all age groups, generating sanpro, nappies (diapers) and a range of incontinence pads large and small.

The National Childbirth Trust recommends accessible toilets in all town centres and major shopping complexes, with automatic double door access, no steps, a clear, clean, warm and bright atmosphere, and a main open area large enough to accommodate 4 double buggies and a

wheelchair. At least four wall mounted adult size seats, two changing tables at adult height, two ordinary tables to take weight of a child and a sink per table should be provided. All wall mounted baby changing tables should be attached sideways to a solid wall to stop the baby rolling off. But others say the table should open out longways with the short end attached to a wall so that mothers can access the baby from both sides. Debates also rage about restraint straps and other details, but at least these issues are now on the agenda after years of invisibility.

NCT recommend wall mounted toddler seats to be installed near the tables and others would welcome these in standard compartments too. Large clearly labelled nappy bins are stipulated, whilst nappy dispensing machines, disposable potties, are on the agenda too. Quiet private baby feeding facilities are requested but these should be far away from the main toilet arena. BTA do not recommend putting such facilities in the toilet cubicle itself, (would you eat your dinner in the toilet?). This is another essential facility that needs to be provided in a further multi-purpose community facility in every area.

In comparison in Japan many public toilet blocks contain a disabled toilet, and many ordinary Ladies toilets contain what looks like an old fashioned drop-side cot with a plastic covered mattress for baby changing. There are also some with quite a complex range of facilities for babies including bigger wash basins, electric plugs, easy chairs for mothers and wall mounted baby seats. There is a high standard of provision and dedicated attendants in most toilets. Space is made available for adult changing facilities as campaigned for by PAMIS, whilst facilities are made provided for incontinence pad disposal and purchase in both the Ladies and the Gents. Increasingly larger office blocks are also introducing dedicated mother and baby rooms for staff and visitors suggesting a greater level of care and a more welcoming environment.

TOILET AMBIENCE AND DECOR

Building Materials

The materials used inside the toilet block must be hygienic, easy to clean and vandal-proof. It is often recommended that walls should be tiled or stippled to discourage graffiti. But white does not necessarily mean clean as irregular surfaces can harbour germs and mould. Pale colours are better in terms of giving a light and clean appearance. But in the interests in meeting the needs of visually impaired people there should be a strong colour distinction between doors and walls, and essential grab rails. Materials should be easy to clean and maintain, vandalproof, and light. Maintenance should not over-ride the issue of utility for the user. Getting local children doing 'official' toilet murals can increase the sense of ownership and reduce misuse.

Continuous flooring is better than anything with joins in it, whilst traditional tiles are of questionable value on walls or floors. All facilities within the toilet should be at grade level with no further steps, thresholds or slopes. Steps down the washbasins are particularly unhelpful. There needs to be plenty of space for people to leave to move within the block, perhaps for friends and family to wait, for luggage, pushchairs and even bicycles, without getting in the way

of others. Wet slippery floors should be planned out by sloping the floor (slightly) to a central drain. Partition ceilings enable easy access to services but secure ceilings are being installed in some inner city areas because people hide drugs, stolen goods in ceiling cavities, as well as in cisterns, behind mirrors and under sinks. In Bristol some historic marble floors in the Victorian toilets are being eaten away by lemon juice which is apparently used by some drug addicts when injecting.

Aluminium, stainless steel and range of pre-fabricated 'plastic' materials are used instead of traditional porcelain for toilet bowls, urinals and squat toilets, for cost, vandalism and hygiene reasons. Some materials are robust but visually they soon discolour if cleaned wrongly such as aluminium which otherwise is virtually vandal-proof, although cold to the touch. Plastic polymers are particularly popular in the Far East whilst stainless steel is popular among Australians where vandalism is a problem.

Lighting

Where electric lighting is provided movement activated lighting, or automatic lighting at dusk are energy saving possibilities. Alternatively manual light switches under the attendant's control are suitable, and to avoid users having to use unhygienic light pulls or switches. But lighting should be to a high standard so that people do not feel they are descending into a dark cavern, thus contributing to fears of encountering criminal activity. Ultra blue light makes it difficult for drug addicts to see their veins to inject, and can deter certain bugs and germs too. According to BS 8300 lighting should not be less than 100 lux, and it seems reasonable to apply this to all toilets. A certain fastfood chain has replaced all its customer toilet light bulbs accordingly. But apparently ultrablue and ultraviolet light make sex in toilets more exciting? Natural lighting through sky lights rather than wall windows is safer and deters vandalism.

Whereas in the West we have major heating problems in the winter, with water pipes freezing, in the East keeping toilets cool and hygienic in the heat is more of a problem. Thus there is always a danger of using another country's toilet standards without first checking the climatic differences.

Smells and Hygiene

Public toilets are the subject of far greater problems than domestic toilets. Calc build up and staining are major issues in urinals which are generally chemically treated. Frequent old-fashioned cleaning, and the use of decomposing starch can allay the situation more environmentally, albeit more labour intensively. Toilets should be designed with a view to easy cleaning from the start (no little gaps and crevices). Full participation would involve toilet cleaners and attendants at the design stage. All drains and waste pipes should be easily accessible for cleaning including concealed systems. Dedicated space should be made available for cleaning equipment, not a corner of the attendants room or a spare toilet.

Natural ventilation can reduce smells more than the use of artificial air fresheners. But many of prefabricated toilet installations and APCs have no natural ventilation, windows or daylighting. There is also a trend within buildings of all sorts to install toilets internally without access to an

outside wall window. The use 'bloo' down the 'loo', and scented air sprays, have been much criticised by environmentalists but curiously it may make the public toilet seem more 'homely' and familiar to users, as psychology is all in reducing misuse. Setting a high standard of cleanliness and maintenance is the best way to prevent misuse. All these measures may make people linger longer but why not if they are decent honest toilet users and bring their friends for a day out. All in all if better toilet standards are achieved people will feel happier and more comfortable in every way.

Japanese Toilets: All in one solutions

In the future it is likely that toilets will be more high-tech and built more as a pre-fabricated total toilet unit or 'pod' particularly if future legislation is retrospective in requiring a higher standard of toilet provision for both abled and disabled users. The height of the high tech approach is to be found in Japan where firms such as TOTO, the Toyotas of the toilet world, have revolutionised the toilet market, so they require a special mention in looking at the future of toilet design. There are valuable lessons to be learnt from Japan, as any systems that reduce the need for users to touch appliances and which save energy and deliver an effective flush system are to be welcomed. High tech solutions should be applied if they benefit the user and increase hygiene standards, but this must be balanced against the initial cost to the environment, and longterm costs in terms of upkeep and maintenance. TOTO toilets include an array of gizmos and buttons alongside the toilet pan which electronically control the flush, provide a bidet spray, a hot air on the bum drying system, and 'responsive flushing'. Even humble little neighbourhood public toilets have photoelectric cells on the toilets, but to make them flush you are asked to put your hand in front of a unit in the corner by the door before you leave, not to break the beam with your bottom, as in some European versions.

Many Japanese toilets come as complete units - walls floors and all electrical and plumbing fittings included, which presumably could be fitted into 'modernised' houses or could be designed to operate as 'ready to go' public toilet units. Japanese toilet manufacturers were likely to be high-tech electrical companies, more akin to computer manufacturers, whose mentality contrasted with Western sanitary ware manufacturers established in the nineteenth century who emerged from separate plumbing, ceramics or metal manufacturing industries. But this trend is also evident in the development of the APC by European companies too, leading to a totally different corporate toilet culture based much more on profit-motivation and computer technology, than a culture of public service and municipal sanitary engineering. Japanese designs are not always appropriate for western needs (and average human dimensions) but they have set the standard of what might be in the future. With the increasing globalisation of toilet technology, toilet producers from different nations are always keen to copy, and adapt ideas from abroad to meet their own local cultural needs.

MINIMUM STANDARDS

- *According to the toilet hierarchy put the largest facilities in areas of highest footfall and demand, but with a range of smaller facilities in local areas.
- *Avoid ad hoc approach just because a piece of land happens to be available somewhere
- *Prioritise toilets in urban design as focal features as the fulcrum

- * Aim at widest possible access in terms of range of people and building dimensions
- * Allow 1:1 m/f at minimum and 1:2 in favour of women as ideal
- * Abled toilets must be pushchair accessible
- * Plan for inclusive provision in with regular toilets as well as dedicated disabled facilities.
- * All toilets should be at grade, on the level, accessible, not down steps
- * Width of cubicles min 900, max 1100, but must have 250 between side of pan and sanpro bin, better ducted or recessed into wall
- * Cubicle Length depends on space between the door and the edge of the pan, min 250, max 450 between pan and door edge, with min 1700 cubicle length and ideal 2500 to accommodate pushchairs, luggage, toddlers etc
- * Allow for variety of size of urinals and heights and aim for greater urinal privacy
- * Provide at least one hook on back of every door in the Ladies
- * In disabled toilets provide hooks, rails, shelves, emergency pulls but make sure they are not too high or low or in the way, so test drive every addition
- * Use infra red flushes, taps, dryers where possible, but as a minimum the less touching the better
- * Provide attendants as ideal, for good surveillance and frequent checking of premises
- * Always consult user groups and aim at participation, with sense of ownership and think about everything as 'the devil is in the detail'
- * Make sure there is colour contrast so that people with visual impairments, can 'see' where the door is, and where the toilet is.

Barkley, M (ed) (2005) Revisions to BS6465 Part 1, Sanitary Installations, Chapman Taylor Architects, London, mbarkley@chapmantaylor.com

Benktzon, M., 1993, Designing for our future selves: the Swedish experience, *Applied Ergonomics*, Vol. 24, No.1, pp.19-27.

BSI (2001) BS 8300:2001: Design of buildings and their approaches to meet the needs of disabled people - Code of Practice, London: BSI (British Standards Institute).

BSI (2006, previously 1996) BS 6465: Sanitary installations: Part I: Code of practice for the scale of provision, selection and installation of sanitary appliances London: BSI (British Standards Institute). (Key authors include Michelle Barkley, John Griggs and Clara Greed.)

BTA (2001) Better Public Toilets: A providers' guide to the provision and management of 'away from home' toilets, Winchester: British Toilet Association.

Cavanagh, Sue and Ware, Vron (1991) At Women's Convenience: A Handbook on the Design of Women's Public Toilets London: Women's Design Service.

Chuangyang, Xu (2005) 'Code of Practice for Management of Public Toilets', World Toilet Forum Conference Proceedings Shanghai.

Goldsmith,S (2001) Universal Design, London: Architectural Press.

Greed, C. and Roberts, M. (1998) Introducing Urban Design, Harlow: Longmans

Greed,C and Daniels,I (2002) User and Provider Perspectives on Public Toilet Provision Occasional Paper, University of the West of England, Bristol.

Greed, C. (2003) Inclusive Urban Design: Public Toilets Oxford: Architectural Press.
and published in Chinese, 2005, by China Machine Press, Beijing.

Greed.C (2004b) 'Public toilet provision: the need for compulsory provision' Municipal Engineer: Proceedings of the Institution of Civil Engineers No.157. Issue ME2, pp 77-85.

Greed,C. (2006) 'The role of the public toilet: pathogen transmitter or health facilitator' in Building Services Engineering Research and Technology Journal (BSERT) Special issue, on 'Research addressing cross-contamination and infection spread through building drainage and sanitation provision' Vol.27, No.2, pp 127-140. Spon Publication, London.

Hamzah,Hasan and Hooi, Yoke-Meng (2001) 'Toilet design for moslem users' paper presented at the World Toilet Summit, Singapore, 19-21 November 2001.

Hanson,Julienne and Greed,Clara (2003) 'Accessible public toilets in city centres' in Access by Design, Issue 95, pp 24-27, London: Centre for Accessible Environments.

Hanson,J, Greed,C & Bichard,J (2004) 'Inclusive design of public toilets in city centres' Vivacity: Sustainable Urban Environments - Urban Sustainability for the Twenty-Four Hour City.. London: EPSRC (Engineering and Physical Science Research Council).

*Hanson.J., Bichard,J. and C.Greed (2004) The Challenges of Designing Accessible Toilets in City Centre, Paper written and presented by Julienne Hanson at Japan Toilet Association Conference, Tokyo, Japan.

Hanson,J., Bichard,J. and C.Greed (2006), 'The challenge of designing accessible city center toilets' Contemporary Ergonomics, Annual Issue: pp 431-435

* Hanson,J., Bichard,J, and Greed,C. (2007) The Accessible Toilet Resource, London: University College London, Bartlett Graduate School of Architecture.

Kira,A (1976) The Bathroom Penguin, London.

Miyanishi, Yutaka (1996) Comfortable Public Toilets: Design and Maintenance Manual, Toyama: City Planning Department.

Penner,Barbara (1996) The Ladies Room: A Historical and Cultural Analysis of Women's Lavatories in London Research Report: Bartlett School of Architecture, University College London.

Soifer,Steven (2001) Shy Bladder Syndrome, Oakland,: Harbinger (Maryland)

Clara.Greed@uwe.ac.uk, ClaraGreed@aol.com
Spring 2006 , Bristol