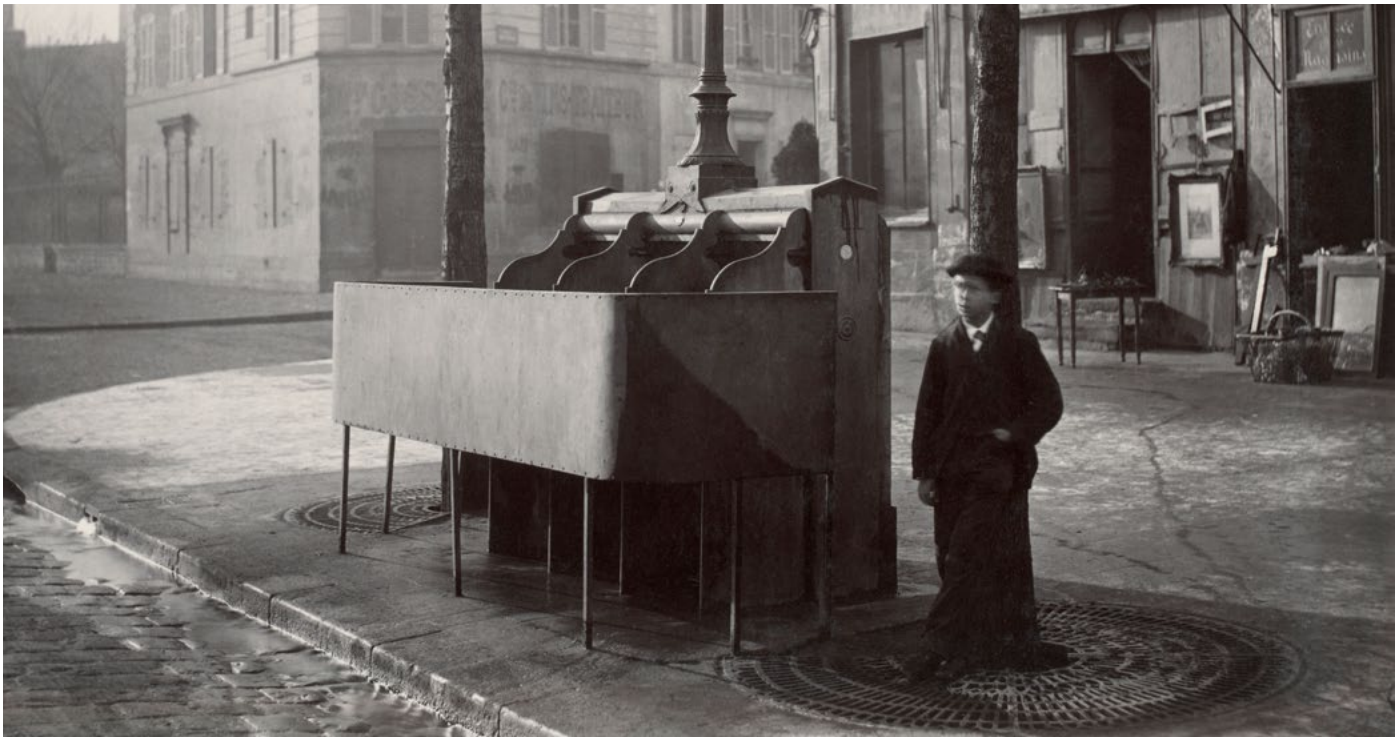
COLUMBIA UNIVERSITY **GRADUATE SCHOOL OF ARCHITECTURE PLANNING AND PRESERVATION**
CORE I STUDIO A4101X FALL 2014

Core Director: Michael Bell
Core I Coordinator: Galia Solomonoff
Critics: Mark Rakatansky, Christoph a. Kumpusch, Paula Tomisaki, Josh Uhl, Janette Kim, Gisela Baurmann, Pep Avilés, Jeffrey Johnson
Studio Assistant: Jesse Catalano

TEMPORALIS
BRIEF II: Earth Closet



THESIS

Measure allows us to understand spatial relationships: our body in relationship to its environment, the proximity of objects, reactions to threatening conditions, the thickness of walls and vulnerability to weather. The fundamental tool of this project is the correspondence of plan to section and the awareness of the presence of an interior, exterior, and a human body. In this exercise you are asked to explore the relationship between ecological and mechanical systems, and to ask what is public about a public bathroom.

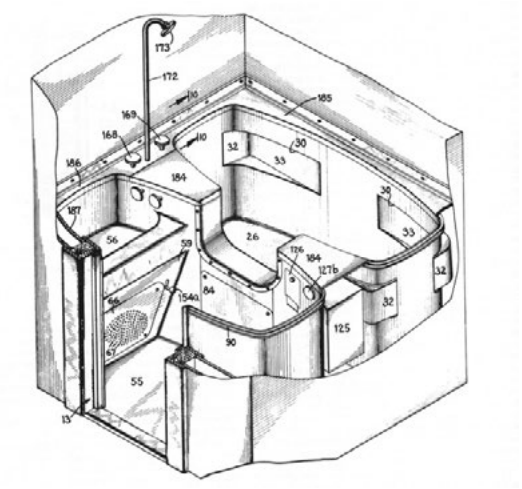
A central task of architecture is to create enclosure, separating a within from an outside. This relationship is expressed most explicitly through the use of section. A section is a key drawing tool invented about five hundred years ago in order to give determinacy to the relationship between inside and outside and to articulate its tectonic transition. One of the central tasks of tectonic articulation is to keep certain elements of weather out: rain, humidity, heat and cold and to strategically mediate the penetration of light and air through windows, doors, vents and such outlets and apertures.

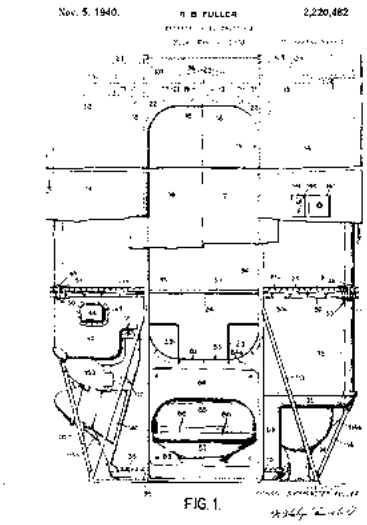
In bathrooms, as in all architecture, membranes and apertures manage organic systems. Flush toilets efficiently draw waste matter to massive, centralized sewage treatment plants while earth closets that preceded W.C.'s produce nutrient-rich fertilizer. As tiny but urban objects, the envelopes of bathrooms regulate these organic systems as a finely tuned regiment of hygiene, privacy, maintenance, and notions of propriety in public behavior.

PROGRAM

Using section and plan together, design a bathroom that is to accommodate two separate users at a time. The facility must include toilets, sinks, trash cans for garbage, sanitary napkins and insulin needles, and changing stations. Each student is asked to identify the water and power systems at work in this bathroom and articulate an argument about the ecological and social significance of their chosen approach. Along these lines, toilets might be waterless compost toilets ("off the grid," meaning that they are independent from city-provided utilities such as water, sewer, electricity, communication, gas or steam"), flushable toilets connected to the city grid, or toilets with high-performing Septic systems. Other systems affecting the structure might include stormwater or wastewater recapture, solar energy sources, or natural ventilation methods.

You are asked to design a prototype of a self-contained unit that can be installed throughout New York City and maintained by the Department of Sanitation. The unit must be accessible 24 hours a day. To test your prototype, you are to site the structure along the section provided. Each student is asked to develop a deliberate site strategy for his or her bathroom, with consideration for urban conditions (approach, visibility, social ritual, and urban infrastructure) and ecological impact (watershed, groundwater, soil, topography, vegetation).





TASKS

Brief II requires two tasks, two drawings, two scales:

1. Through the use of Section, design a public bathroom unit to house two separate occupants at a time.
2. Through the use of Plan, map the flow of water and waste.

Using the idea of drawing intervals from Brief 1, chart the flows of water and orient the enclosure to take advantage of natural light and air flow.

This exercise is designed to tests the ability to gather, assess, record and quantify the circumstances needed to treat waste in a public setting. The structure should reflect the impact and correlation of your design to the overall form and performance of the structure in its environment. The mechanism of the toilet should exhibit a clear advantage over existing and common portable toilets. Each project must articulate an attitude towards the ecological and urban effects.

Minimum Dimension: 7'-6"w x 6'd x 14'h / Maximum Dimension: 10'w x 12'd x 14'h

Bathrooms are to meet ADA code standards

DELIVERABLES

- Three drawings, each measuring 24"x36", including a corresponding plan and section drawing in ½"=1'-0" (layers can overlap, or be horizontal, radial, vertical, etc.)
- Consider all the techniques to explain material layer transition from inside to outside. These techniques may include section drawings, diagrams, timelines or charts.
- Consider the drawing medium: opaque vs. transparent, gloss vs. matt. Mixed media is encouraged.
- Use line weight to reveal what is above or below water/ground, to understand contours, and to identify what is cut, hidden, moving and beyond. Make your drawings afford as much information as possible. Convey depth, thickness, motion and rotation.
- Label the drawing with your; LAST NAME/GSAPP/CRITIC NAME/FALL 2014/BRIEF II

RULES

- Colors should be reproducible: RGB, CMYK, or other codification so that indicates quantifiable differences
- Topographic maps can be used as underlays
- Choose a consistent format (size, scale, measure, lettering) for the tasks.
- Note the drawings to express the body in scale.
- Represent the project in context: include site conditions and approach.

TIMEFRAME

- Deliver by October 1st or 3rd, as per your studio schedule

REFERENCES

Required (and attached)

- Siegfried Gideon, Mechanization Takes Command (Attached)
- ADA Architectural Graphic Standards (Attached)

Suggested (on courseworks or on reserve in Avery)

- Kate Ascher, The Works: Anatomy of a City
- Eric Sanderson, Mannahatta: A Natural History of New York City
- Jacques Guillerme and Helene Verin, The Archaeology of Section
- Alejandro Zaera Polo, The Politics of the Envelope, Volume #17, Fall 2008
- Ellen Lupton, Bathroom, the Kitchen, and the Aesthetics of Waste
- Leonard Koren, Undesigning the Bath
- Italo Calvino, Invisible Cities," Thin Cities 3," pp. 49-50
- Adolf Loos, Adolf Loos: Pioneer of Modern Architecture, "The Plumbers," pp. 219-222

PRECEDENTS

APT: Automated Public Toilet
Cemusa
New York, NY, United States

Toilettenmodul
FIERZ
Switzerland

Public Toilet Unit
Schleifer & Milczanowski Architekci
Gdansk, Poland

Vespasienne (Traditional)
Paris, France

Urinoir de Rue / Vespasienne
Paris, France

Composttoilet
Atelier Van Lieshout

Public Toilet
Sou Fujimoto Architects
Ichihara, Japan

Don't Miss a Sec (Public Toilet with One-Way Mirrors as walls)
Monica Bonvicini
Art Basel, Basel, Switzerland

SITE: STRAUS PARK

Scale 1/256" = 1'

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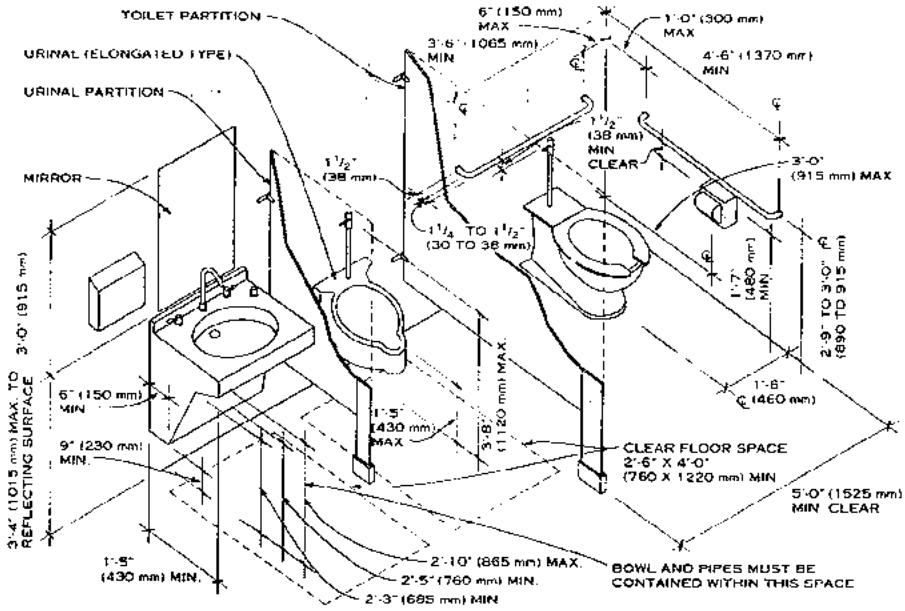
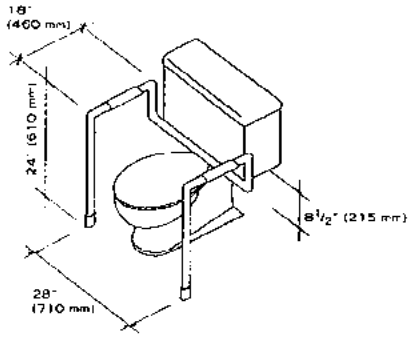
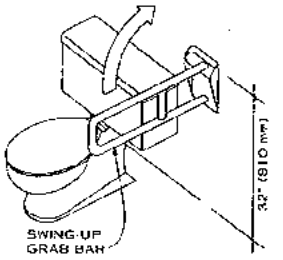


NOTES

1. Depending on the configuration of clear floor space, the maximum height of the controls ranges from 3 ft 8 in (1120 mm) to 4 ft 6 in. (1420 mm), and the minimum height ranges from 9 in. to 2 ft 10 in. (230 to 865 mm).
2. If the partition is greater than or equal to 2 ft 0 in. (610 mm) deep, urinal clear floor spaces must be 3 ft 0 in. (915 mm) wide. If the partition is less than 1 ft 5 in. (430 mm) deep, urinal clear floor space may be 29 in. (735 mm) wide.

LOCATION OF ACCESSIBLE FIXTURES AND ACCESSORIES

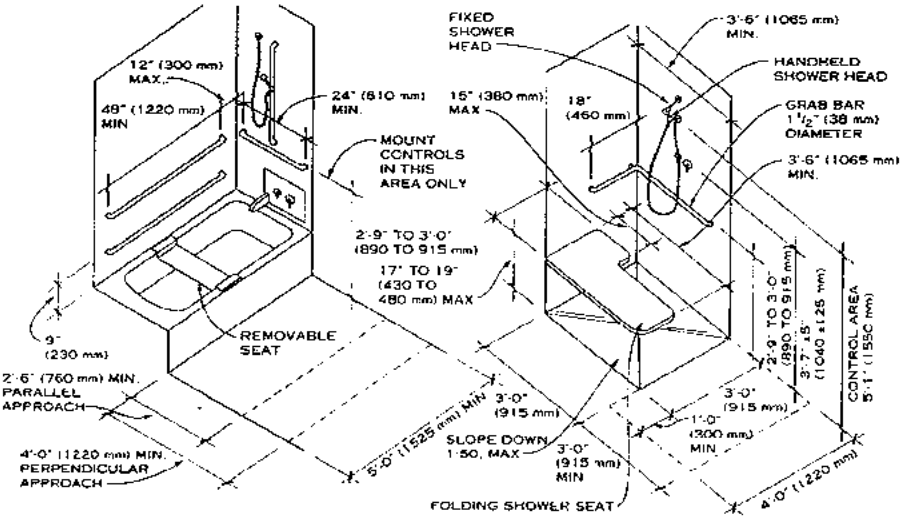




NOTE

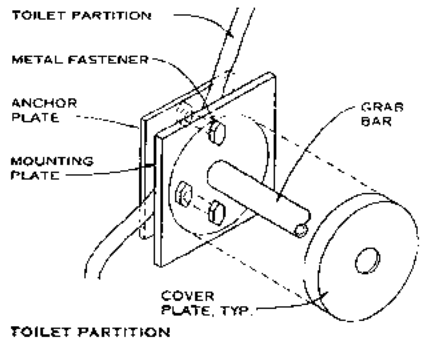
These configurations do not comply with UFAS or ADAAG.

OPTIONAL GRAB BAR CONFIGURATIONS

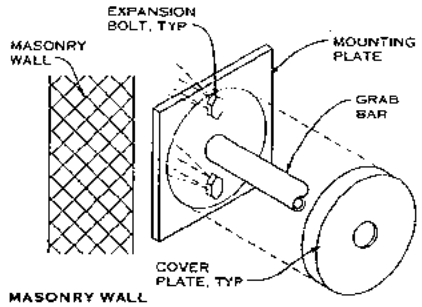


ACCESSIBLE BATHTUB AND SHOWER

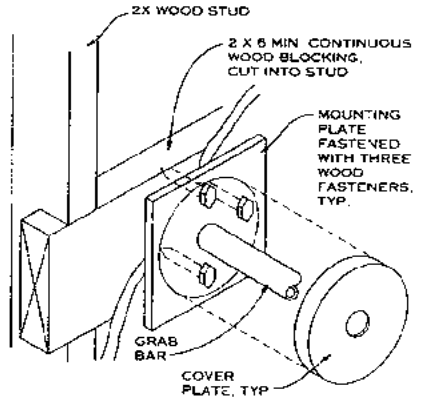
Mark J. Mazz, AIA, P.A.; Hyattsville, Maryland



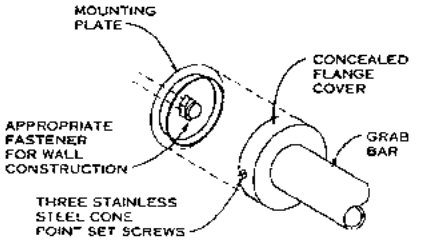
TOILET PARTITION



MASONRY WALL



WOOD CONSTRUCTION



CONCEALED FLANGE

NOTES

1. Size: 1 ½ or 1¼ in. O.D. with 1 ½ in. clearance at wall.
2. Material: Stainless steel chrome-plated brass with knurled finish (optional).
3. Installation: Conceal or exposed fasteners; return all ends to the wall, intermediate supports at 3 ft maximum. Use heavy-duty bars and methods of installation.
4. Other grab bars are available for particular situations.
5. Consult ANSI and ADAAG requirements, as well as applicable local and federal regulations.

GRAB BAR ATTACHMENT DETAILS

GENERAL NOTES

1. All dimensional criteria on this page are based on ANSI A117.1–1998, and on adult anthropometrics.
2. In new construction, all public and common use toilet rooms are generally required to be accessible.
3. Where multiple single-user toilet rooms or bathing rooms are clustered in a single location, and each serves the same population, only 5%, but not less than one, of the rooms must be accessible. The accessible room(s) must be identified by signs.
4. Single-user toilet and bathing rooms provided within a private office are permitted to be adaptable. Making the room accessible is permitted to involve replacement of the water closet and lavatory, changing the swing of the door, and installing grab bars in previously reinforced walls.
5. In accessible toilet and bathing rooms, at least one of each type of fixture and accessory provided must be accessible.
6. A wheelchair turning space is required within accessible toilet and bathing rooms.
7. Doors are not permitted to swing into the required clear floor space at any fixture, except in single-user rooms, where a clear floor space is provided beyond the swing of the door.

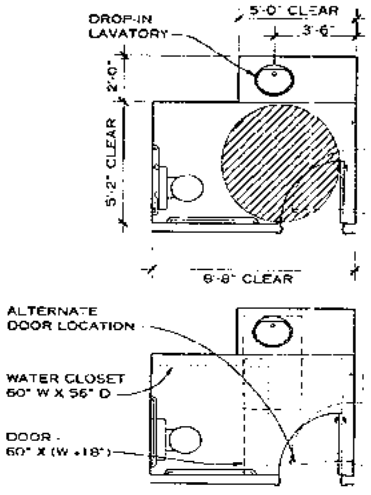
UNISEX TOILET AND BATHING ROOMS

ASSEMBLY AND MERCANTILE OCCUPANCIES

1. Recent model codes require accessible unisex toilet and bathing rooms in certain assembly and mercantile occupancies. These unisex rooms are beneficial for parents with small children and for persons with disabilities who require personal assistance in using toilet facilities, since the assistant may be a person of the opposite sex.
2. This requirement applies when a total of six or more water closets (or water closets and urinals) is provided in the facility.
3. Fixtures provided in unisex rooms are permitted to be included in the number of required plumbing fixtures.
4. Unisex facilities must be located within 500 feet, and within one floor, of separate-sex facilities. In facilities with security checkpoints, such as airport terminals, unisex facilities must be located on the same side of the checkpoint as the separate-sex facilities they serve.
5. Unisex toilet rooms require a single water closet and lavatory. Unisex bathing rooms must also provide an accessible shower or bathtub. An exception allows the use of a room containing two water closets (or one water closet and urinal) in lieu of a dedicated unisex room.
6. Doors to unisex toilet and bathing rooms must be securable from within the room.

ALTERATIONS

1. Accessible unisex toilet and bathing rooms are permitted in alterations in lieu of altering existing separate-sex facilities in certain conditions.
2. Unisex rooms must be located in the same area and on the same floor as the existing inaccessible facilities.



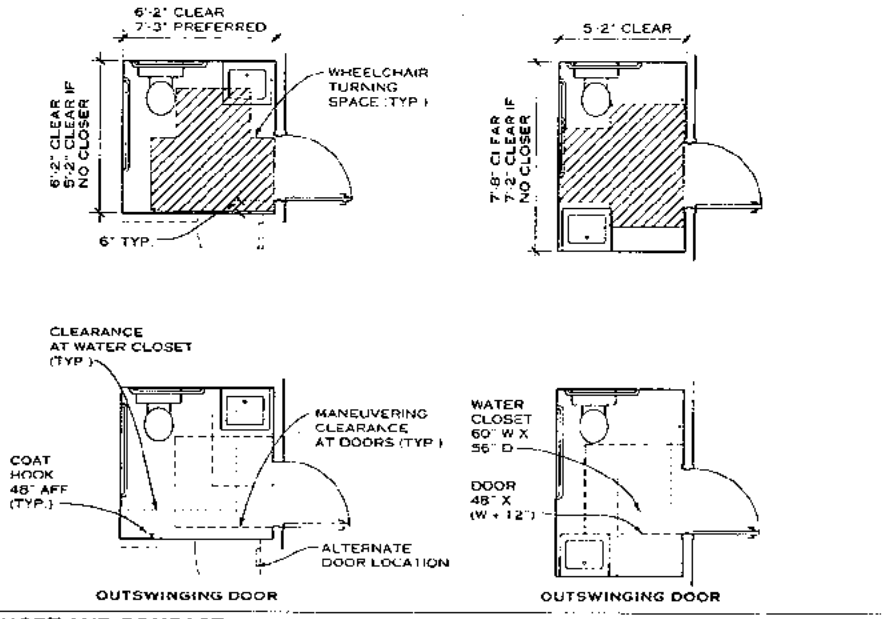
LAVATORY ON SIDE WALL

TOILET ROOM LAYOUTS

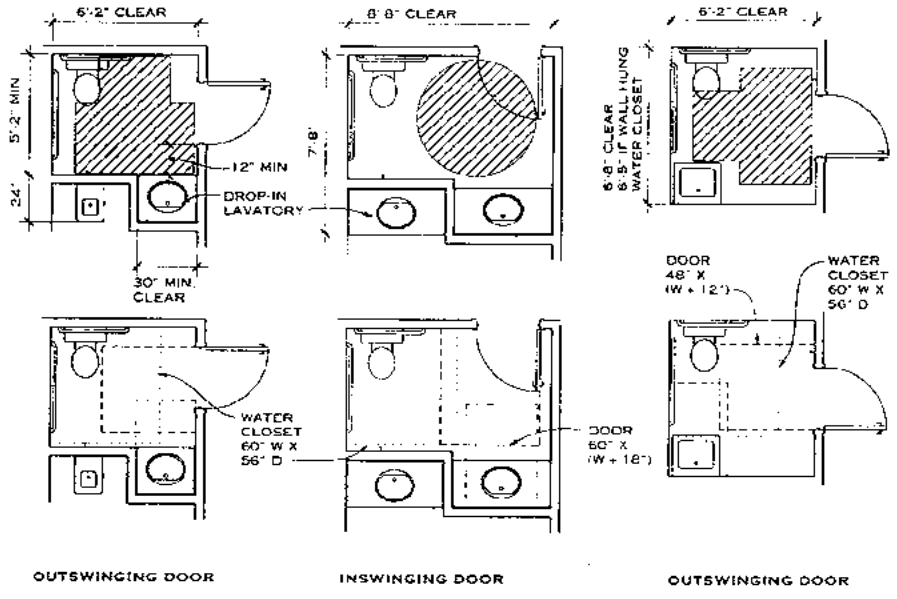
1. Some of the toilet room layouts shown are similar. Variations are in the direction of the door swing and whether the width or depth is the more constraining dimension. Dimensions show comfortable minimums and preferred dimensions.
2. Overall room dimensions include a 2 in. construction tolerance.
3. Each layout shows the required clear floor space for the fixtures and the doors. Frequently, the clear floor space at the fixture is more stringent than the 60-in. diameter or the T-shaped maneuvering space required. Both must be considered.
4. Door maneuvering clearances: see ADAAG (section 4.13.6 and fig. 25) for various requirements and conditions. Variables include direction of swing, direction of approach, size of door, and door hardware.
5. Doors to bathrooms are assumed to be 36 in. wide, with a closer and latch for privacy. Where noted, the overall dimension may decrease if there is no closer.
6. Maneuvering clearances at the base of water closets are based on American Standard model #2108 (floor-mounted tank type) and #2257 (wall-mounted, flush-valve type), mounted according to the manufacturer's recommendations. Confirm actual water closet dimensions for other makes and models.
7. Maneuvering clearances below lavatories are based on American Standard model #0355 (wall hung) and #0475 (mounted in countertop). Confirm actual lavatory dimensions for other makes and models.

TOILET COMPARTMENTS

1. Where toilet compartments are provided, at least one compartment must be wheelchair accessible.
2. Where six or more toilet compartments are provided in a toilet room, in addition to the wheelchair accessible compartment, a 36-in. (915 mm) wide ambulatory accessible compartment is required.

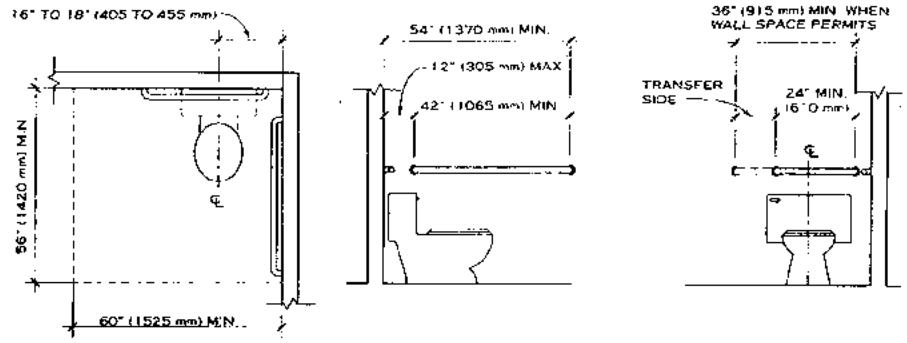


SHORT AND COMPACT



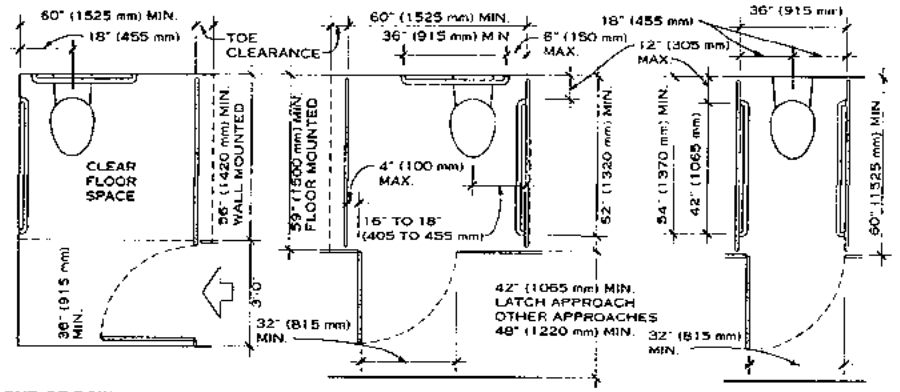
LAVATORY ON OPPOSITE WALL

Lawrence G. Perry, AIA; Silver Spring, Maryland



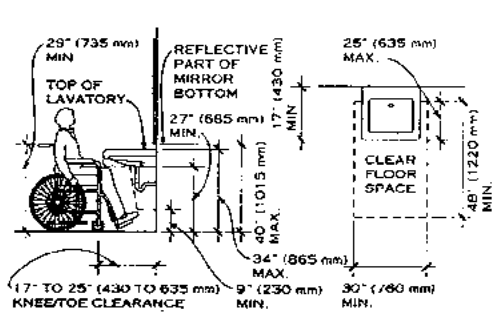
PLAN CLEARANCE — SIDE WALL ELEVATION — REAR WALL ELEVATION

WATER CLOSETS

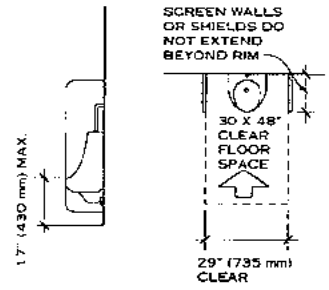


END-OF-ROW WHEELCHAIR ACCESSIBLE — MID-ROW — AMBULATORY ACCESSIBLE

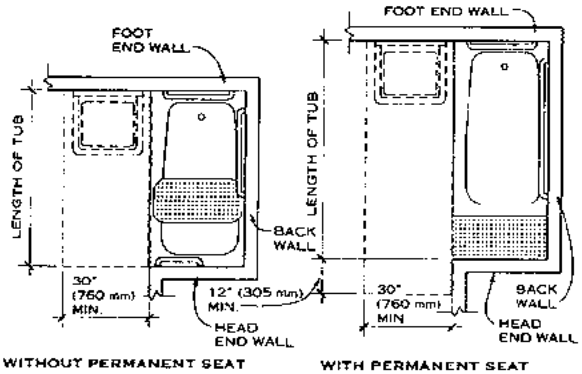
TOILET COMPARTMENTS



LAVATORIES

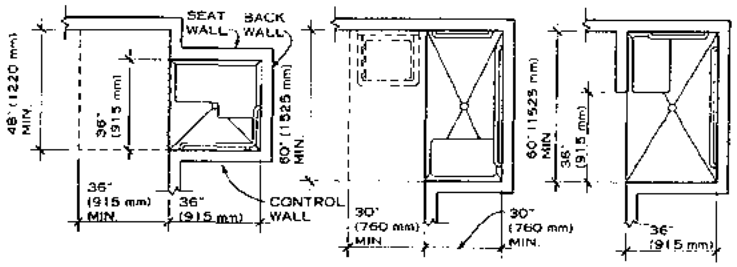


URINALS



WITHOUT PERMANENT SEAT — WITH PERMANENT SEAT

BATHTUBS



TRANSFER-TYPE — STANDARD ROLL-IN TYPE — ALTERNATE ROLL-IN TYPE

SHOWERS

GENERAL

See other pages in this chapter for requirements for accessible residential fixtures. All dimensional criteria are based on ANSI A117.1-1998, unless otherwise indicated.

WATER CLOSETS AND URINALS

1. A117.1-1998 allows water closets to be located 16 to 18 in. (405 to 455 mm) from the side wall. Previous editions of ANSI as well as other regulations require this dimension to be an absolute 18 in. (455 mm).
2. A117.1-1998 requires the water closet clearance to be unobstructed by lavatory or other fixtures. Previous editions and other regulations allow other configurations with a lavatory within the water closet clearance.
3. The dashed area indicates the allowable location of the toilet paper dispenser. Outlet must be within the range shown. Dispensers should allow continuous paper flow and not control delivery.
4. A117.1 does not require an elongated urinal rim; other regulations may.
5. Manually operated flush controls must be located not more than 44 in. (1120 mm) maximum above the floor.

TOILET COMPARTMENTS

1. Toe clearance 9 in. (230 mm) high and 6 in. (150 mm) deep is required at the front and at least one side of accessible toilet compartments. Toe clearance is not required when the compartment size exceeds the minimum dimension by 6 in. (150 mm) or more.
2. Left- or right-handed configurations are permitted.

LAVATORIES

1. Knee and toe clearance is required below accessible lavatories. The lavatory overflow is permitted to project into the knee clearance.
2. Exposed pipes and water supply pipes located beneath accessible lavatories must be insulated or located so as to protect users from contact with the pipes.
3. Lavatory controls should be within accessible reach range, be operable with one hand, and not require tight grasping, pinching, or twisting of the wrist. Automatic controls are acceptable. Manually activated, self-closing faucets should operate for not less than 10 seconds.

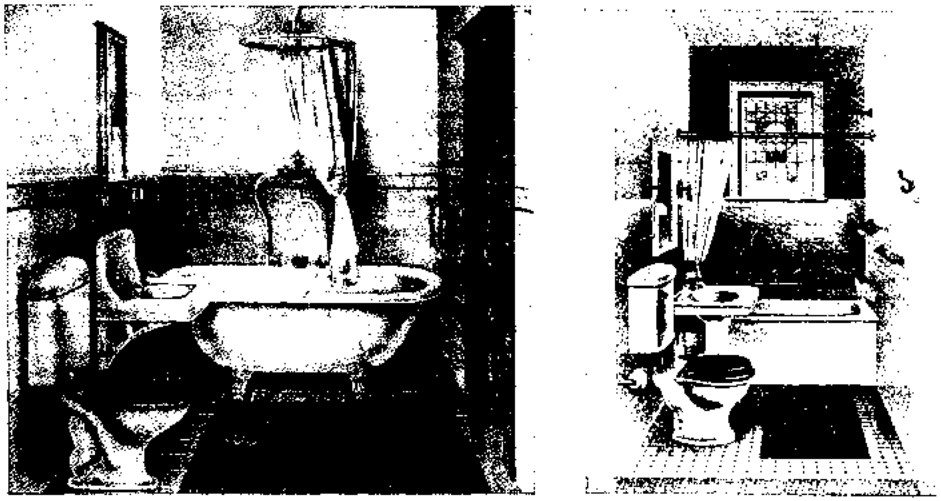
BATHTUBS

1. Bathtub controls, other than drain stoppers, must be located on an end wall between the tub rim and grab bar and between the open side of the tub and the midpoint of the tub width.
2. A 59 in. (1500 mm) minimum length shower spray unit is required.
3. Tub enclosures must not obstruct controls or interfere with transfer from a wheelchair to the tub. Enclosures must not have tracks mounted on the tub rim.

SHOWER COMPARTMENTS

1. Shower compartment thresholds are not permitted to exceed ½ in. (13 mm). Design should anticipate water escaping from the compartment.
2. A fixed, folding, or removable seat is required in transfer-type compartments. Seats in roll-in showers, where provided, should be located on the wall adjacent to the control wall and should be folding-type seats. Seats can be rectangular or L-shaped; see A117.1 for details.
3. A 59 in. (1500 mm) minimum length shower spray unit is required.
4. Shower enclosures, where provided, must not obstruct controls or interfere with transfer from a wheelchair.

Lawrence G. Perry, AIA; Silver Spring, Maryland



495. American Compact Bathroom, 1908. *Around 1908 catalogues show the compact bathroom as the new hotels were beginning to install it. Fixtures are still supplied from different walls; the tub is still raised on feet. Its position along the short wall contrasts with what was hitherto normal. (Catalogue, L. Wolff Co., Chicago)*

496. American Compact Bathroom, 1915. *Before the one-piece double-shelled tub could be mass produced leading American firms were already propagating the compact bathroom with recessed tub. (Catalogue, Crane and Co., Chicago)*

THE COMPACT BATHROOM

The rigid layout of the bath, basin, and toilet, and their compression within a minimum space, was what America called the compact bathroom. The prerequisite for this, the aligning of all fixtures along one wall, had long been anticipated in the United States. The bathroom of George Vanderbilt's Fifth Avenue house, 1885 (fig. 476), with its proudly displayed pipes and small intervals between the fixtures, already seems to announce the compact bathroom.

Chicago, in so many ways America's boldest testing ground of the late 'eighties, was also at the forefront in the comfort of the dwelling. Its apartment houses — a still unexplored development — with their triple 'Chicago windows,' no way betrayed the fear of light that darkened European houses at that time. Here the immediate forerunners of the compact bathroom are also to be found. *Industrial Chicago*, that indispensable source for the period, devotes one of its chapters to recent advances in plumbing. The page 'plumbing in a flat' (fig. 491) [98] records the most progressive standards of the day. As one might expect,

[98] *Industrial Chicago*, Chicago, 1891, vol. 2, pp.31–97.

the skyscrapers and their sanitary equipment grew up together. The arrangement of toilet, basin, and tub along one wall is already achieved. To complete the compact bathroom, there remained only to turn the tub 90° into a transversal position. All the fixtures are now concentrated on one wall.

What was the layout of the bathroom in the private house? The English bathroom, as we have mentioned, was scaled down to suit more modest circumstances, its fixtures being reduced in number, but the English layout being retained in its principle: loose arrangement of the fixtures.

Consider as many houses as one will, they exhibit one regularly recurrent feature: the tub is free standing and runs parallel to the long wall. Around 1908 the catalogues of the leading firms already show plans for the compact bathroom such as the new hotels were installing. Yet the fixtures are still distributed on different walls (fig. 495).[99] The cast iron, enameled tub is still raised on feet.

Around 1915 the domestic bathtub appears in its now familiar recessed form (fig. 496).[100] But only around 1920 could the double-shelled, enameled tub be made in one piece and put out in mass production. Its price was thus cut by some 20 per cent. Soon the five-foot tub established itself as the standard; it amounts to 75 per cent of the present output. The tub became a module determining the breadth of the cell, while the basin and toilet at minimal distances determine the long wall. The five-foot bathroom unit became standard. Private dwellings preserved these dimensions set by the hotels. The larger houses prefer to own six or seven standard-size bathrooms rather than one or two bathrooms of the 1900 English type. The bathroom now serves one person, or, as is still most commonly the case today, interconnects two bedrooms. American architects criticize nothing in the European ground plans so sharply as the separation by a passage of the bathroom from the bedroom. The compact bathroom attained its standard form around 1920. There have since been attempts to fill it with all manner of furniture and to give it the flavor of a living room, leading it back to the luxury standard. But these excursions need not be taken very seriously. Truer to the times were the attempts, beginning around 1931, to build the standard bathroom in larger units at the factory, thus reducing the installation costs. 'Studies showed that the bathroom-kitchen section of a dwelling — including foundations, floor and roof — cost 90 cents per cu. ft., with utilities included, as opposed to 25 cents per cu. ft. for a similar section without these provisions.' [101]

[99] Catalogue of the L. Wolff Mfg. Co., Chicago, Ill., 1908, p.391.

[100] Catalogue of the Crane & Co., Chicago, Ill., 1915.

[101] Alfred Bruce and Harold Sandbank, *A History of Prefabrication*, John B. Pierce Foundation, Research Study #3, New York, 1944, p.27.

THE STANDARD AND MODULE OF THE COMPACT BATHROOM

The American bath unit takes its standard from the glossy enameled tub. A special form of this type, the one-piece, double-shelled, built-in tub, was developed in America around 1920 by mass production. It can be built with a minimum of time and expense. This type forms not only the standard of the American bathroom but its backbone and module.

The concise lines of this white bathtub will perhaps bear witness to later periods for the outlook of ours as much as the amphora for the outlook of fifth-century Greece. It is a luxury article, which the combination of refined metallurgical and technical skills transformed into a democratic utensil. In its own way, this double-shell tub, which on the other side of the Atlantic still smacks of luxury, numbers among the symbols of our time.

All seems so simple in this plain, undecorated type. Yet the emergence of the standard form from the chaos of inadequate solutions was long delayed. The awareness that the mechanized bathtub cannot be a plaything for the ornamentalist was driven home only when the method of its manufacture -- cast iron, enamel — raised a natural veto.

The Chaos around 1900

To give insight into the desolate confusion that still prevailed around 1900, we must let the expert [102] speak his pros and cons:

'What kind of a bathtub to use?

'This is not an easy matter when we are told of the many different kinds and finishes of bathtubs in the market. . . . One of the first we had was a wooden box, lined with sheet lead.' Characteristics: 'Lasting but could never be thoroughly cleaned.'

'The next bathtub we find making its way into the market was the wooden box lined with zinc.' Characteristics: 'Looked better and bright when new, but its lasting qualities were not good.' 'It almost disappeared.'

'Then came the wooden box lined with sheet copper.' Advantage: 'Could be kept looking clean for a long time.' Drawback: 'Copper . . . soft and easily penetrated.' 'Almost lost sight of today [1896].'

The cast-iron tub, which was later to triumph over all others, was available in many finishes: 'Plain cast iron painted,' usually marble-veined on the inside. Characteristics: 'Strong enough to last for ever, but when the paint is worn off it becomes rusty and unsanitary.'

'Cast iron tubs galvanized.' Characteristics: 'This coating soon wears off.'

'*Cast iron enameled bathtub* . . . a good sanitary article . . . but hard to get

[102] J. J. Lawler, *American Sanitary Plumbing*, New York, 1896, pp.227–33.

and this finish will not stand hard usage, as the enamel coating cracks easily and peels off.'

The popular tub, 'having quite a large sale, is the tub formed out of sheet steel' with 'an inner lining of sheet copper (no casing necessary) provided with cast-iron legs.'

Next come the three luxury versions. First 'the all-copper bathtub, a bathtub made from one piece of sheet copper, having no outside shell . . . neat iron support and a hard wooden cap. The all-copper bathtub is also meeting with great success.'

'The porcelain crockery enameled bathtub.' Characteristics: 'No chance for dirt . . . no wood work in or about it, made of one piece . . . this tub will last a life.' Drawback: 'Requires greatest care in handling to deliver it safely. . . . Very cold to the touch until it has become entirely warm from the hot water.'

And a final trump card: the new aluminum bathtub. Advantage: 'Very light, makes a beautiful finish, a perfectly sanitary article, but . . . very high in price and can only be bought by the rich.'

To the exceptionally discriminating client a sunken bath with richly ornamented tiles is recommended.

What, then, was the average man to choose if, of the dozen models, one alone, the aluminum tub, was allegedly without drawbacks — but at an inaccessibly high price?

The Shaping of the Standard Type, c. 1920

Such was the situation around 1900. From this chaos, the present-day standard type finally emerged around 1920. This was the durable cast-iron enameled tub. Its technical development had required close to half a century.

It made its appearance in America around 1870: Output of the leading manufacturer, one tub per day.[103] The mid-'seventies saw a slow rise in production. Yet in 1890, this tub was still being advised against: 'White-glass enamel looks well at first but it is certain to chip where hot water is used, as the iron expands and contracts much more freely than the enamel.' [104] Thus in the mid-'nineties, a pioneer Chicago firm could adduce long manufacturing experience as a strong point in favor of its wares.[105] Down to 1900, all sanitary fixtures were hand-

[103] Information concerning the early development will be found in John C. Reed, 'The Manufacture of Porcelain Enamelled Cast Iron Sanitary Ware,' an address delivered at the annual meeting of the Eastern Supply Assn., New York, 14 Oct. 1914. Manuscript in possession of the American Standard and Radiator Co., Pittsburgh, Pa.

[104] W. B. Maguire, op.cit., p.271.

[105] 'A quality of unsurpassed perfect workmanship and thorough experience, enable us to place on the market enamelled iron bathtubs of every size and description.' L. Wolff Mfg. Co., Chicago, Ill., Catalogue for 1895–6.

modeled.[106] Then partial mechanization set in, raising productivity to ten baths per worker per day, or five times the rate of the 'nineties.

No satisfactory picture can be given of the rise of the double-shell enameled bathtub, for the pioneer firms are often at variance in their accounts. The enameled bathtub came to the fore around 1910. The first patents for built-in tubs were granted in 1913. These types were enameled on the inside only. The outside surface was painted over or tiled in (as is still the European practice) or concealed by a separate one-piece enameled apron.[107]

Not until 1916 did it become possible to manufacture the one-piece, double-shell, cast-iron, enameled bathtub in mass production. Made-to-order examples of this type are said to have first been used in private Pullmans before 1900 — being as elegant as the porcelain tubs, and much lighter.[108] Mass production (aided, an official of a Chicago mail-order house informs us, through billboard advertising) brought the recessed tub to a far broader class of consumers. In 1940 the mail-order houses were selling the full set of fixtures — tub, basin, toilet — for around $70, as against the $200 price of the porcelain bathtub alone in the Crane (Chicago) catalogue for 1910.[109]

Due to the sparse and often completely lacking historical data, we sent out questionnaires in order to obtain an approximate picture of the development. A sample questionnaire and reply are here reproduced in full. The thoroughness of this answer, returned by Crane and Co., Chicago, was, however, not paralleled in every case.

Questionnaire

QUESTION 1. When did mass production of the one-shell enameled built-in bathtub begin?

ANSWER. Roll-rim tubs on feet in enameled iron, according to our records, started about 1893. Enameled tubs on legs with wood roll rim began about 1892 to 1895. Copper-lined wood bathtubs started about 1883 and continued in popularity until about 1898. Single shell or one-shell tubs began about 1910 and some manufacturers are making them at the present time.

Q. 2. When did mass production of the double-shell enameled built-in bathtub begin?

A. Double-shell enameled iron tubs were introduced in about 1915 and manufacturers are continuing to produce them up to the present time.

[106] Reed, op.cit.

[107] Separate enameled apron or front plates were made by the Standard Radiator Co. in 1909, by others in 1912.

[108] According to oral information from the L. Wolff Mfg. Co., Chicago, Ill., these tubs were supplied by their firm to the Pullman Standard Car Co. The Pullman Co., Worcester, Mass., was unable to find photographs of these tubs, but blueprints of the early private cars are available.

[109] Crane and Co. catalogue, Chicago, Ill., 1910, p.112.

Q. 3. To what extent did the mass production reduce the price of the built-in bathtub?

A. So far as we can determine from our past price schedules on built-in bath tubs, the price from 1918 to 1944 has been reduced about 20%.

Q. 4. What is the proportion of the production of the recess-type to the production of the corner-style type and of the leg type?

A. The 5′ 0″ recess double shell tub is by far the largest seller. It is approximately 75% of the market. The corner-style double shell tub has only a small sale and is used in unusual bathrooms which are larger than the conventional bathroom in homes, thus requiring a corner pattern tub instead of the recess type. At the present time, the leg-type tub popularity has dwindled until now it is about 25% of the overall bathtub sale.

Q. 5. Among the more expensive types, has the recess-bathtub or the corner bathtub been preferred?

A. The 5′ 0″ recess double shell tub is by far the most popular and preferred bathtub; possibly for two reasons — one, lower cost, and two, it permits a smaller-sized bathroom. As I have indicated above, the corner-type tub is only used in larger-sized bathrooms.

Q. 6. Did you reduce bathtubs to a few standard sizes? Which size is the preferred one?

A. The recess type double shell tub has four standard sizes; namely,

4′ 6″ 5′ 0″ 5′ 6″ 6′ 0″

By far the greatest sale and popularity is the 5′ 0″ size, in fact the 4′ 6″ and the 6′ 0″ size are used very occasionally, while possibly 10% of the business is 5′ 6″ size.

Q. 7. Do you think that the size of the built-in bathtub is largely responsible for the size of the present-day bathroom?

A. Without question, the universal acceptance of the 5′ 0″ recess double-shell tub has largely been responsible for the size and shape of present-day bathrooms. Over a period of years of experience with builders and architects, as well as home owners, we have found that the 5′ 0″ tub is averagely an adequate size bathtub for the average size person. The 4′ 6″ tub is used in extremely small rooms, while the 5′ 6″ and 6′ 0″ tubs are used by home owners that are of exceptional size and desire a larger size bathtub than the conventional 5′ 0″.

Q. 8. Which types of bathrooms are most prevalent in apartment houses and hotels? The type shown in my sketch or others?

Q. 9. Which types of bathrooms are most prevalent in private homes?

A. The most typical bathroom layout used in homes, apartment houses, and hotels at the present time is the regular 5′ 0″ recess tub with the lavatory and water closet and tub fittings all along one wall, thereby simplifying the roughing-in or the supply and waste piping in the wall. We attach a sheet indicating various types of bathroom layouts that have been used by architects and builders rather freely over the period of the last 15 or 20 years.

You will note that all of these lay-outs embody the conventional shape and design of fixtures.

Q. 10. What are the trends concerning future types of bathtubs and bathrooms? Will the present-day trend for small bathrooms with built-in bathtubs be continued?

A. At the present time, there are no trends that indicate a change in the shape or size of bathrooms for postwar use. The only other type bathroom layout that was used just prior to the war embodied the square-type tub, and I am enclosing a circular showing bathroom arrangements embodying this type of tub. We intend to continue this type of square tub after the war.

Q. 11. Will the trend, every bedroom with adjoining bathroom, be further developed?

A. As regards the trend of a bathroom for every bedroom, this has become rather accepted general practice amongst leading architects and builders throughout the country; in fact, the real requirements for good homes at the present time are a bathroom for each bedroom and a powder room or a small washroom on the main floor adjoining the living-room and the dining-room for guest use. At the present time, we do not see any trend indicating a change from this overall specification of requirements for homes.

Chicago, Ill., May 1944.

The double-shell tub is a product of full mechanization. The highly skilled workers, formerly essential in every phase of its production, are no longer needed. No hand touches the mold. A mechanism automatically distributes the sand. The castings are serially poured, cooled, and scoured. Automatic sifting devices lay on an even coating of powdered enamel prior to fusion in the kiln.[110]

If the bath and its equipment passed from a nomadic to a stable condition in the course of the nineteenth century, the growing popularity of the built-in tub meant its passing from the status of furniture to incorporation in the organism of the house.

Its incubation period at an end, the bath merged into this organism with

[110] In 1916. At this time earthenware tubs were first put into mass production. It was the enameled cast-iron tub that prevailed, but the mass manufacture of earthenware served to popularize the wash-basin and water-closet fixtures.

Previously the clay was 'placed on the mold and shaped by hand to get the impression. The making of the thickness was left entirely to the skill of the operator with the result that thicknesses varied' (Standard Potteries, Technical Article, n.d., p.3). This complex handicraft was eliminated when china-ware came to be cast in molds. Europe had succeeded in liquefying the clay by addition of water and chemical salts (1906). The Americans took over this method, and after some ten years of experiment built factories in which the liquid clay was distributed through tubes. This fluid was poured into plaster molds, which absorbed the water content. The result was a product of perfectly uniform thickness. The tubs were then baked in tunnel kilns, just like bread at the same period, their passage through the kiln being as accurately controllable as that of the loaves.

surprising speed. Around 1900 the triumph of the present-day bathroom became clear. Around 1920 it established itself as an appendage to the bedroom in the private house.

It may be said without exaggeration that this standard, the double-shell enameled tub attains a degree of comfort that had been pursued for thousands of years. By long technical training our age acquired the facility to solve almost any problem it cared to tackle. When the present-day standard type was called for, it too sprang into being.

The Bathroom and the Mechanical Core

What might be done to reduce that ever-growing part of the building outlay, the cost of mechanical utilities? The bathroom had at last acquired a standardized layout. Was it not time for mass production to step in? Could not the laborious mode of installation be simplified?

By 1945 the leading fixture companies were at work on assembled plumbing units that should satisfy a variety of requirements. Systematization should help abbreviate the labor of building, without curtailing the freedom of the architect.

Prior to this, in the early 'thirties, a movement to cut down sharply the cost of plumbing, still fitted laboriously by hand methods, had got under way among the engineers. Yet in 1945, satisfactory solutions were not at hand. The reason lay in the complexity of the task, for the bathroom, it soon became clear, is but part of a larger entity, the mechanical core. Kitchen, laundry, heating, atmospheric regulation, were claiming more and more space. In the basement of a luxurious American house having all the technical aids to comfort on the modern market, there was plant enough to run a small factory. To scale this down to the size of the normal household was no simple task. Another reason why the bath unit progressed so little toward a true solution lay in the isolated way technicians envisioned and handled the problem. For it could only be solved by submitting all parts of the house to thoroughgoing reconstruction.

The course chosen by the engineers — for it was they, and not the fixture manufacturers who made the first move — may be indicated by a few proposals which reached beyond the experimental stage. The aim is to mass-produce the entire bath unit — floor, ceiling, walls, from the plumbing down to the built-in soap holder, for shipment direct from the factory to the building site.

It is to be transported either as a structural unit or in a number of sections. If sectioned, the choice lies between horizontal slices or vertical ones. An early

patent (1931) (fig. 497) [111] would deliver the sections of the bathroom in panel form to be assembled by 'a mason, a carpenter, and a plasterer,' the plumber being almost altogether done away with. The bath unit in horizontal sections is also deliverable 'in packaged form.' Its 'non-separable,' rounded corners were claimed as an especial advantage [112] (fig. 499).

Other early proposals (1931) make the bath cell a structural unit installable 'in sealed condition,' no workman having to set foot in it while the house is under construction. All the connections are on the outside, ready to be screwed through extensible joints to the units above and below. A crane swings the unit bodily from the truck to the exact spot in the building where it is needed [113] (fig. 498). It was mainly intended for the skeleton construction of apartment houses or hotels. Raymond Hood, inspirer of Rockefeller Center, planned (1932) to incorporate the plumbing and fixtures of an apartment house (unfortunately never executed) within a mechanical core.

In type, R. Buckminster Fuller's 'prefabricated bathroom' [114] (1938) (fig. 500) is a structural unit. His sectioning of the shell into two parts for easier indoor and outdoor transport is of minor importance. The solution is original, comprehensive, extreme. A model made of copper sheeting was shown in prominent places and aroused lively discussion.

Its every component, from the soap holder to the tub, forms an integral part of the wall or floor. The washbasin and toilet are placed opposite one another, with the somewhat raised bathtub behind them — a 4′6″ × 5′ layout such as is normal only in cramped circumstances. All the components are pressed simultaneously with the metal skin, their hollows sometimes helping to give the system additional rigidity. The exhaustive patent specification, a model of precision, is evidence of the care with which every square inch was worked out, so that the dies would have the highest industrial efficiency, and the bathrooms could be stamped out by the million at minimal cost. Why not seize this opportunity?

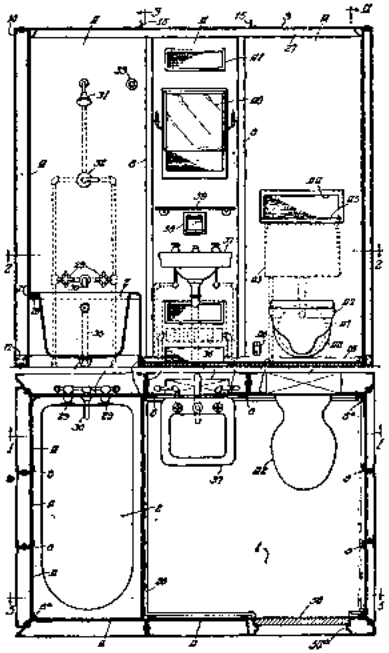
As so often in the eagerness of full mechanization, the construction ran away with the constructor and the human problem became lost in the stamping. From clean, hygienic enamel, the material is changed to thin metal sheeting, so that the machine may complete its work at one blow. In terms of comfort, this means

[111] U.S. Patent, 1,978,842, 30 Oct. 1934. The patent specification thoroughly describes the patchwork of hand-installed plumbing.

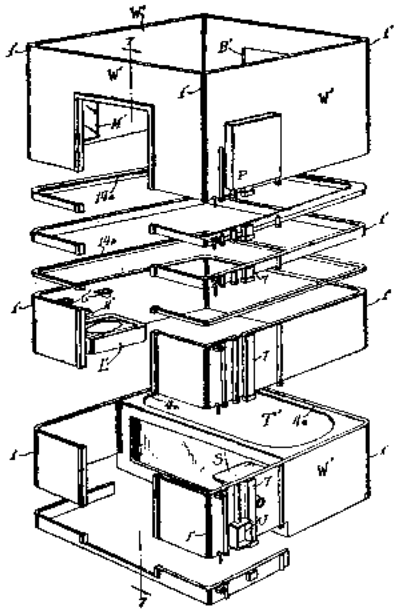
[112] Applied for in 1934. U.S. Patent, 2,087,121, 13 July 1937. This 'consolidated room unit' as it is called in the specification directly combines the pipe-elements and the walls — which suggests a difficult task of replacement should freezing cause a pipe to burst.

[113] Applied for 1931, Patent 2,037,895, 21 April 1936.

[114] Illustrated in A. Bruce and H. Sandbank, *A History of Prefabrication*, New York, 1944, p.26.

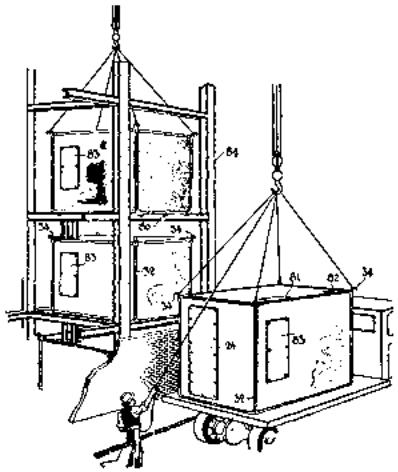


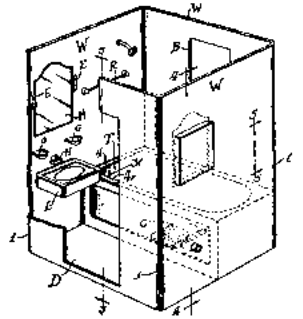
497. Prefabricated Bathroom, Vertical Panels, 1931. *The bathroom prefabricated to reduce plumbing costs was patented from the early 1930's on. Here the bathroom is divided into panels.* (*U. S. Patent* 1,978,842, 30 *October* 1934; *filed* 1931)



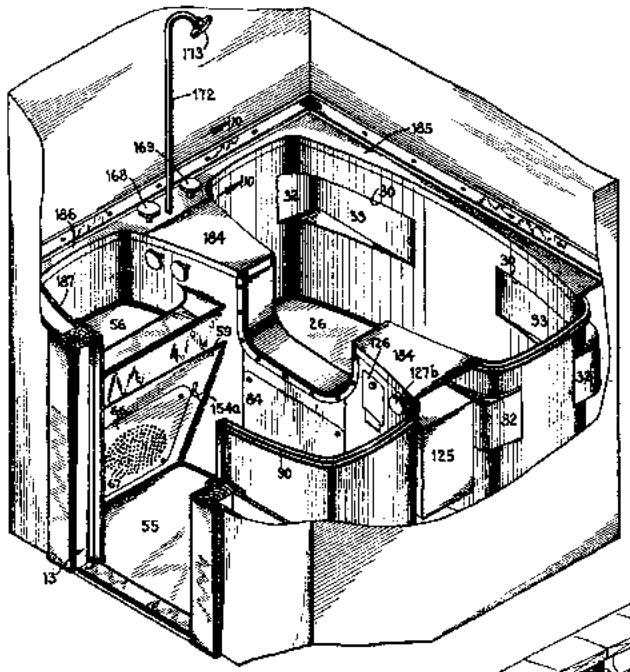
499a. Prefabricated Bathroom in Horizontal Sections, 1934. *The cell is divided into horizontal slices to be screwed together. Pipe elements and walls are combined.* (*U. S. Patent* 2,087,121, 13 *July* 1937; *filed* 1934)

499b. Prefabricated Bathroom in Horizontal Sections, 1934. *The bathroom assembled.* (*U. S. Patent* 2,087,121, 13 *July* 1937)

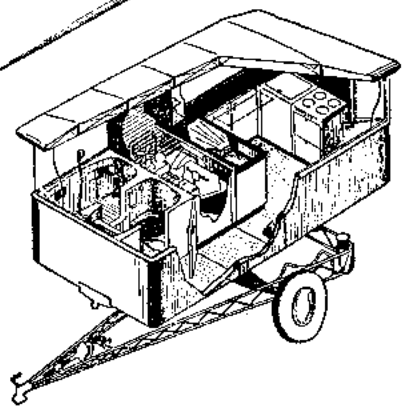




498. Prefabricated Bathroom Installable as a Sealed Unit, 1931. *The bathroom is shipped directly to the building plot, where a crane swings the unit to its exact location.* (*U. S. Patent* 2,037,895, 21 *April* 1936; *filed* 1931)



500. Prefabricated Bathroom Sectioned in Two Parts. R. Buckminster Fuller, 1938. *All the components are pressed simultaneously with the metal skin. Every square inch is carefully calculated.* (*U. S. Patent* 2,220,482, 5 *November* 1940; *filed* 1938)



501. The Mechanical Core. R. Buckminster Fuller: Bathroom-Kitchen-Heat-Light-Unit, 1943. Ready for Transportation. *Buckminster Fuller early recognized that the bath demands combination with the other mechanisms of the house.* (Bruce and *Sandbank*, A History of Prefabrication, *New York*, 1944)

the jettison of half a century's effort. To the crew of a submarine, or to men without a roof over their heads, a metal box in which one can barely turn around may come as a welcome solution. But this constructional element is too large and too rigid to be easily assimilated in the house having any flexibility of ground plan.

Buckminster Fuller was among the first to recognize that the bath is no isolated unit, but demands combination with the various other mechanisms of the house. In his first mast-house (1927) he gave shape to this idea. He placed the mechanical core within the 'mast' on which the dwelling hangs. Here too

it is seen how new materials and constructions — presumably because we have not yet learned to master them — easily lead to grotesque throwbacks. The house, hanging like a merry-go-round on a central pole, tends to circular, polygonal shapes, or the half-pumpkin shape that Fuller developed in an airplane factory around 1945.[115] The idea of resting the house upon a central prop dates back well into the nineteenth century and can in some cases have charm and meaning.[116] But as a standard form, multiplied by millions, these self-enclosed huts become a city planner's nightmare. A similar surrender of human comfort is to be noted from the dweller's point of view. Slowly, adaptation of the house to the site, of which Frank Lloyd Wright was the foremost exponent, established itself beyond challenge. Communication with outer space, through a protected zone (porch), is one of the most attractive features of the American house. And the decisive factor: freedom to alter the ground plan or add to it is abolished, the dweller being imprisoned within the rigid, uniform shell. Why? Because in the center, within the mast, sits a robot, the mechanical core, tyrannizing the whole structure.

With attention-compelling fanaticism, Buckminster Fuller has devoted decades to the perfecting of his idea. His insistence that the house of this century, with its mechanical comfort, can be made available to the broad masses, by the simultaneous production and assembly of its utilities is certainly in line with the inevitable course of things. We have seen how the new architectural generation took this problem to heart, and sought ways of reconciling the mechanical core with the broader concept of the house. The demand for a mechanical core is a token of full mechanization.

In agriculture, at the same period, the harvesting 'combines' concentrated all the phases of the process — from mowing to bagging, from plowing to dunging — into a single one. A parallel phenomenon arises in the sphere of the dwelling: the unit that combines kitchen, bath, laundry, heating, climatic control, and plumbing in one mechanical nucleus; but here we speak not of a 'combine,' but of the mechanical core. In agriculture, after a century of mechanization, the problem became relatively easy to solve. In the house, our mechanical experience begins with the time of full mechanization. A quarter of a century is not much in a development. And again, the roots of the problem grow into the human sphere. It is too late for us still to be cheated by purely engineering solutions won at the expense of human comfort.

The mechanical core must share in the general direction to be followed by

[115] *Architectural Forum*, Mar. 1945.

[116] In a project for a glass-walled apartment house, Mies van der Rohe (1921) also rested his construction upon central pillars.

the coming development as a whole: co-ordination and freedom of treatment — no rigid, ever-repeated mold, adequate to everything and to nothing. The solution of the bath unit, of the mechanical core assembled from standardized elements, lies in this direction. A house is neither an automobile nor a trailer. Houses do not move. Houses stand on a specific site and must adapt themselves to this environment. Houses rolling ready-made off the assembly line will but rarely satisfy on this score. Hence, the solution of the mechanical core, like that of the prefabricated house, depends on one condition: freedom allied with co-ordination. For neither he who dwells in the house nor he who designs it should suffer himself to be tied. That is, the task of mechanization is not to deliver ready-made, stamped-out houses or mechanical cores, but flexible, standardized elements admitting of various constellations, so as to create better and more comfortable dwellings.

Regeneration a Gauge of Culture

Our aim throughout has been to trace the two basic types of bathing: the bath as an ablution and the bath as total regeneration. Both types are often found together, one usually dominating the other. Closely connected with the type of bath is its social significance. The ablution bath, by its very type, easily leads to the position that bathing is a private matter. Of this view, the tub bath, especially in its present-day mechanized form, is the chief exponent.

The regeneration bath, by its very type, favors social intercourse and almost automatically becomes a focus of communal life.

Periods have developed various types of regeneration just as they developed various types of comfort. The Greeks, in their regenerative type, were able to interweave invigoration of the body and invigoration of the mind to a degree unequaled by any other culture. Operating within a universal framework, their bath type did not have to be a complicated one. The Greeks of the fifth century B.C. were little inclined to technical refinement.

Not until post-Alexandrian times did the scientific thought of the Greeks move closer to practical ends. The basis which Alexandria had laid in the third and second centuries B.C., Roman engineering fully elaborated in the first. The thermae of the Roman masses have their center in the now-dominant hot-air bath and its accessories, the universal Greek framework, however, not being altogether discarded.

But in the Islamic type of regeneration, the games and athletics — self-invigoration — fall away. Instead, the organism is penetratingly worked upon by various massages, especially cracking of the joints, perhaps brought from India.

The Roman bath and the Islamic bath must rely upon numerous attendants. Both drew upon a plentiful labor supply. The Russian bath is the simplest of regeneration types, and perhaps the most natural. It calls for no massive buildings, no technified apparatus, and no slaves. The whole pattern suggests an origin in remote times, now lost in historical darkness. The austerity of the Russian bath corresponds to a humble standard of living. It is at the same time the most democratic and the most long-lived type of regeneration.

After late Gothic times, the bath ceased to be a social institution. We tried to show the chaos and helplessness in which the nineteenth century lingered before making a small part of its technical genius available to human requirements. Finally, this century, in the time of full mechanization, created the bath-cell, which, with its complex plumbing, enameled tub, and chromium taps, it appended to the bedroom. Yet the fact cannot be lost from sight that this convenience is no substitute for a social type of regeneration. It is tied to the plane of simple ablution.

A culture that rejects life in stunted form voices a natural demand for the restoring of the bodily equilibrium of its members through institutions open to all. Whether as Roman marble halls or as Siberian log-cabin is unimportant. Neither, as so often claimed, is finance the decisive factor. Financial considerations are often no more than pretexts.

A period like ours, which has allowed itself to become dominated by production, finds no time in its rhythms for institutions of this kind. That is why the nineteenth century failed in its efforts to revive the regeneration of former ages or to devise new types shaped to our specific needs. Such institutions stood in contradiction to the period.

Regeneration is something that cannot arise in isolation. It is part of a broader concept: leisure. Jacob Burckhardt found in the word ἀρετή the key to Greek conduct. Leisure, in this sense, means a concern with things beyond the merely useful. Leisure means to have time. Time to live. Life can be tasted to the full only when activity and contemplation, doing and not doing, form complementary poles, like those of a magnet. None of the great cultures has failed to support this concept.