Research Activity 1990-1992 at the L.T.N.-OIKOS Bologna: Europan and Barrier-Free Bathrooms

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During the three year period 1990-1992, the reasearch activity carried out in the Typological Laboratory has been focused on two specific themes: **flexibility and typological innovation in dwelling-areas** and **features of the bathroom for disabled users.** These themes reflect two among the chief subjects calling the attention of the Residential Building Committee of the Ministry of Public Works to which - as everybody knows - the Laboratory is subordinated.

Both themes have been approached through specific application programs which took as reference points, respectively, the Programm of EUROPAN Competitions and the proposals for bringing up to date the regulation concerning disability, worked out on a ministerial level.

THE EUROPAN 1 PROGRAM

This program concerns the theme of life style evolution and the dwelling's architectures.

In Italy, the initiative of the competition was taken by the Ministry of Public Works through the Residential Building Committee which also patronized, through the Typological Laboratory, the analysis of winning projects marked out in the Italian section.

The specific theme dealt with for analysis and space simulation in the Laboratory was the flexibility of dwelling-areas' planning and use compared with the usability conditions of these areas. This theme was clearly identifiable in the five projects examined, though interpreted in different ways by the various planners.

For the purpose of experimental work in the Laboratory, we can schematically frame a series of representative cases corresponding to different possibilites of analysis and interpretation of the areas simulated in actual size:

1 Flexibility is meant as a change in the intended use of the dwelling's rooms whose size and situation on the plans however are previously made congruent with their new use.

2 Flexibility coincides once again with a change in the intended use of the rooms whose size is considerably modified in the suggested functional change.

3 Flexibility is meant as a change in the organization of large portions of the dwelling in order to obtain different functional or layout arrangements. These are proportioned to the needs of families either differing from the ones whose needs had been met in the first planning or varying in time.

4 Flexibility is meant as a change in the general organization of the dwelling in order to obtain either more living units (compared to the original single unit) or

self-contained functional portions of the house so as to meet, for example, the needs of families with old people or young unmarried couples, etc.

First of all, laboratory testing pointed out what the equivalent is, in terms of space quality, of the best known cases of flexibility: from the change in the intended use of single rooms or portions of the dwelling to alternative arrangements of the living unit determined by major variations in the composition of the family.

In the case of the *project worked out by the architects Mallucci and Fatati of Rome, concerning* ***housing units in Cairo Montenotte*** *(Savona),* flexibility is meant both as a possible change in the layout of the houses's internal areas and as a possibility of expanding these areas in time.

The model of one of the arrangements planned for the competition was put into practice in the Laboratory, carrying out successively two variations on the basic model: the first variation makes it possible to obtain a self-contained bedroom with bathroom (as it is provided for in some Regional Technical Regulations). The second variation splits the original house into two units: the first one including two bedrooms and the second one consisting of a one-room flat; this arrangement can solve the cohabitation problems of an ordinary family and a son or a young couple needing a certain independence.

The use of colour was tested on some of the model's walls by coating the panels with adhesive plastic films.

The ***project carried out in Maglianico*** *(Chieti), planners: Paolo Costanzo e Alessandra Cesari,* concerns a series of dwellings orderly grouped on the slope of a hill; each dwelling includes three levels (living area, sleeping area, terrace on the roof). The planners took great care over the aspects qualifying internal areas and the relationship which should be created between the dwelling and the surrounding environment.

The model of the houses's living area has been carried out in the Laboratory with only minor differences compared to the original project, apart from the two curved walls situated at the beginning of the flight of stairs and closing the kitchen: they have been regularized at right angles.

The variation introduced in the functional organization was a widening of the kitchen, a different furnishing of it and the opening of a new window between the kitchen itself and the roof-terrace; the relationships between the dining/living areas, the entrance hall and the service parts of the house's living area were unchanged.

It should be noted that the introduced variation, however slight, rebalances the dimensional and functional relationships between the kitchen and the dining/living room without changing the visual connection between these and the roof-terrace, an element to which is connected the space quality of this portion of the house.

The ***project*** *by the P.O.Rossi team, worked out* ***for the S. Stefano district in Bologna,*** was carried out by the IACP of Pavia. It is a complex of 40 dwellings and the residential types envisaged can be classified as superimposed one-family houses. The housing organism is the result of the aggregation of five basic types of dwelling.

For Laboratory testing, the one-storey dwelling on the ground floor was considered. It was reproduced in its basic arrangement with minor dimensional and furnishing

differences compared to the original project.

In the first variation, the relationship between the two portions forming the living area was modified by moving the partition-wall in line with the course to a marginal position with respect to the living room; besides, the living area's furniture was changed.

In the second variation, the size of the bedroom was reduced to the advantage of the living room; a different arrangement of the furniture enriched the possibilities of use of the living room, yet confining the sleeping area to a more traditional use as compared to the authors' initial proposal.

In this case the theme of flexibility of use was interpreted in relation to the scale of the single dwelling area of the house and with reference to such parameters as: inter-room visual introspection, the relationship between furniture and the geometrical-dimensional aspects of the rooms, the relationship between the houses' internal courses and elementary rooms'arrangements.

The ***project for La Martella*** *(Matera) by the architect M.Saito* envisages a residential complex consisting of 24 one-family dwellings, organized according to an aggregation rule which is appropriate to the original morphology of the village.

The suggested dwelling is a two-storey house consisting of: dining area, living room, kitchen and bathroom on the ground floor; 2 bedrooms and 2 bathrooms on the first floor.

The theme for laboratory testing is, once again, the possibility of changing the dwelling model while respecting the author's planning intention.

Once the basic model of part of the house had been carried out with minor differences compared to the original project, a variation in the functional organization of ground floor areas was introduced.

The kitchen was moved from its planned situation and incorporated into the dining area in a rather large room; the size of the first bathroom was reduced; a self-contained room was obtained, accessible directly from the outside and susceptible of being used either as a multipurpose room or a bedroom.

The above-mentioned changes were suggested, among other things, by the large surface available for the living area of the house, according to the original project, as compared to the sleeping area.

If furnished with a single bed, the additional self-contained room could become, with the 1st bathroom adjoining it, a useful functional unit meeting the need for privacy of a cohabiting family member.

The ***project proposed for Mestre*** *by M. Lacconi* envisages a dwelling complex of low houses aggregated in a multi-yard system.

For the laboratory space simulation, reference was made to one of the suggested types of dwelling and the ground floor model was carried out according to the project's basic arrangement; it envisaged an entrance hall, a bathroom, a kitchen-dining room and a double bed room with self-contained bathroom.

A variation to the basic model was suggested as well: it is a self-contained dwelling

unit consisting of a dining-living room with a recessed kitchen, a bathroom and a double bed; it is connected to the main dwelling unit by a common entrance hall but it is also possible to fit it with a private access from the outside; the double bed room occupies the area intended as a garage box in the project's basic arrangement.

It is an application of the flexibility notion based on the following actions:

- transformation of the rooms whose size and fixtures are previously made congruent with the alternative functional model's arrangement;
- change of the intended use of each room;
- modification of the possibilities of access to the house from the outside and of internal mobility through the functional rooms.

The whole of these experiences carried out in the Laboratory made it possible not only to make a series of tests on the dwelling quality of the suggested space arrangements, but also to go thoroughly into the theoretical reflection on the notion of project flexibility.

The planners participated directly in some of these experiences, and actively co-operated with the laboratory staff when the variations to the basic projects were studied and carried out.

UPDATING OF THE ITALIAN LAWS CONCERNING ARCHITECTURAL BARRIERS: CHARACTERISTICS OF THE BATHROOM FOR DISABLED USERS

The condition of handicap, that is disadvantage, is a social condition in which a person is hindered from participating in some or all the aspects of social life.

Generally speaking, ***disability*** and ***handicap*** are not synonims: under certain conditions, a disabled (that is a person with physical - either sensory or motory - or psychophysical disabilities) becomes a handicapped when his exernal environment is a hindrance to him in the achievement of certain aims.

This is why reducing the difficulties of access to and use of the environment means reducing the handicap and contributing to put into practice an elementary right to equality of social conditions for all the citizens, whatever their psychophysical state or circumstance of life might be.

The problems concerning accessibility of built-up areas appeared in the Italian technical and legislative culture approximately 25 years ago, but the issuing of the first legislative act (Act 13) extending to the whole building sector, both public and private, a series of rules for the elimination of architectural barriers dates back only to 1989.

Previous legislative measures had been poorly successful: article 27 of Act 118 of 30.3.1971 laid down the elimination of architectural barriers in newly-built public buildings or buildings open to the public: but the enforcing rules contained in the Presidential Decree 384 of 27.4.1978 (issued seven years later) lent themselves to restrictive interpretation theories as to their field of application and did not define any control procedure.

Fifteen years after the issuing of Act 118, a few rules which can enforce some of the fundamental provisions of the Act itself are introduced with article 32 of the Financial Act n. 41/1986.

First of all, it is laid down that "building or restructuring plans which do not comply with the provisions of the Presidential Decree 384/1978 cannot be approved" and that "neither the Government nor any other public body can assign subsidies or credit facilities to carry out projects which are in contrast with the rules mentioned in the same decree".

An important change is represented by the fact that, within one year from the coming into force of this Act, competent local Governments are under the obligation to take "steps for the elimination of architectural barriers" in existing public buildings.

In spite of the availability of funds assured by the Act, its enforcement is in fact rather limited; in particular, the works carried out for accomodation of public buildings or buildings for public use are on the whole rather scanty, impromptu and lacking in organic unity; the interventions carried out in school building, mainly in newly-built schools, are the most substantial ones.

It is only with act 13 of 9.1.1989 that a real change is introduced in the body of legislation concerning architectural barriers. Eliminating any previous interpretative

doubt, the Act extends the field of application to all private buildings, including the ones which are open to the public, and their appurtenances.

From a technical point of view, the most important innovation in this Act is the introduction of three levels of performance for the works: ***accessibility***, ***adaptability*** and ***visitability***, thus assimilating normative notions which have long been tested and approved in various countries.

Accessibility means the possibility, also for people with either a reduced or an impeded motory or sensory capacity, of reaching the building and each of its units, entering them easily and enjoying their areas and equipments in a condition of reasonable safety and independence.

Visitability means the possibility, also for people with either a reduced or an impeded motory or sensory capacity, of having access to social life areas and to one at least of each unit's toilets. Social life areas include the living or dining rooms of the building as well as work places, service and meeting areas where the citizen comes into contact with the function carried out there.

Adaptability means the possibility of modifying built-up areas in time at a low cost, so that they can be completely and easily used also by people with either a reduced or an impeded motory or sensory capacity.

Thanks to the possibility of scaling planned works according to these performance levels, the aim of a complete process of accomodation of buildings to the needs of the disabled people becomes believable, even if there still are reservations mainly concerning the enforcement and control mechanisms.

The evolutionary character of some of the functions provided for by Act 13 should guarantee at least that they will be subject to further improvement and effectiveness check: this applies for example to the creation of the *Interministerial Standing Committee* (Public Works and Social Security) whose task is that of solving technical problems connected with the regulation's enforcement and evolution.

In the first place, this Committee produced the purview of decree 236 of 14.6.1989 containing the technical prescriptions for the enforcement of Act 13. It is an accurate and complete normative purview - rather innovatory for Italy - containing planning criteria for accessibility, visitability and adaptability. It also establishes a set of performance specifications and technical solutions which can be useful to guarantee, also through the introduction of "consistent arrangements", that the aims previously fixed are really achieved.

The last stage in this process of normative adjustment is the preparation, once again by the above-mentioned committee, of the enforcement (and, in a sense, updating) Regulations of article 27 of the Act 118/1971 and art. 32 of the Act 41/1986. This measure is needed to adjust and complete the old body of legislation concerning the elimination of architectural barriers in public buildings, bringing it into line with the regulation in force for private areas.

Already approved within the Supreme Council of Public Works but not yet converted into an act, this measure shall fill up the most serious gap in the regulations in force concerning public buildings' accessibility and introduces a set of prescriptions concerning pedestrian areas and crossings, public toilets, procedures, etc.

This will complete, at a national scale too, a normative framework which some regions had tried to make up by means of local measures focused on these problems.

The latest activity carried out by the above-mentioned interministerial Committee has been directed towards the updating and completion of the Enforcement Decree of Act 13 issued in June 1989.

In particular, the Committee prepared a series of possible *typical solutions* for both public and private bathrooms and toilets, meeting the requirements for *accessibility*, that is to say the possibility of use by a disabled person, fixed by the Act: these arrangements have been examined in the framework of a specific research and testing program carried out by OIKOS Ricerche, by order of the National Typological Laboratory, on the subjet *"Bathroom areas for disabled users"*.

The testing activity carried out includes:

- analysis of *typical solutions* identified by the Committee in the draft Decree;
- definition of integration and modification suggestions resulting from the experimental checks;
- identification of new layout arrangements.

Briefly, the work was divided into three stages:

1. The list of *typical solutions* identified by the Committee was compared with a series of examples of dwellings in order to grasp the relationship between the various arrangements for the bathroom area and the general organization of these dwellings from the point of view of layout, fixture and construction. This comparison was also aimed at checking the validity of *typical solutions* in view of their correct use in the practice of residential building planning.
   In particular, the size and functional aspects of the areas giving access to toilets and bathrooms were of great interest since these areas cannot be neglected when analyzing the features of toilets and bathrooms themselves.
2. All the above-mentioned *typical solutions* were submitted to laboratory testing through the creations of actual size models on which numerous experiences were carried out, simulating the behaviour of a user on a wheel-chair. In many cases, changes in size and functional equipment were introduced as variations to the basic model, as their need was suggested by testing.
   On the whole, 18 models and 12 major variations were carried out.
3. On the basis of what has been stated in the previous points, an outline of planning proposals has been worked out to synthesize the work done. These proposals are useful both to clearly identify the minimum functional areas needed for the disabled user's access to and movements in the bathroom, and to compare these areas with realistic arrangements of bathrooms also meeting requirements such as: possibility of being built correctly, appropriate furnishing and rational planning of sanitary fittings. In this summing up stage, the requirements laid down by Act 13/89 and by Ministerial Decree 236/89, that is *accessibility*, *visitability* and *adaptability*, were taken as reference points.

Let now discuss the merits of what was carried out in the three above-mentioned stages. The specific research developed in the first stage made it possible to grasp, for a series of orderly grouped, in line and tower residential buildings, the relationship between bathroom and house from a morphological, dimensional and functional point of view. In particular, this research points out the importance of the relationship between the bathroom and the system of internal courses and access modes to the bathroom itself.

As a matter of fact, the functional arrangements suggested by the Committee confine themselves to solving the problems of moving *within the bathroom*, without taking into account the organization of the access area situated before the bathroom.

In fact, the qualification of this access area is all-important in the majority of cases - as it was proved by the testing work carried out - to establish the conditions of use of the bathroom itself.

Besides, the analysis carried out made it possible to define more precisely a few general aspects which have been taken as guiding requirements in the study and evaluation of the list of arrangements successfully checked in the Laboratory:

- sanitary facilities are generally concentrated along one or two sides of the bathroom for reasons connected with fixtures;
- the window, if any, is preferably situated on the one side opposite to the entrance;
- in case of accomodation for the disabled, the entrance door is generally replaced by a sliding panel door in order to make the best use of available space without widening the area.

This research also pointed out the connection between size, furnishing of the bathroom and meeting of lighting and natural ventilation requirements which directly affect the situation of the bathroom itself with reference to the general layout of the dwelling.

In the second stage, the *17 typical solutions* suggested by the Committee were considered for testing work. Rather than complete space arrangements, these are *functional schemes* in which space organization is merely aimed at enabling the disabled person on a wheel-chair to move correctly and approach sanitary facilities. Therefore, these arrangements do not coincide with the built-up area of the typical bathroom suitably equipped with all its requisites.

The difference between the two definition levels is the absence of some functional and building specifications in *functional schemes*; it is possible, however, to make precise comments and evaluations on this subject with reference to: general obligations not directly concerning the bathroom, observance of specific regulations and building procedures used.

The Laboratory testing activity - which developed through the implementation of about thirty models - examined two main aspects:

a. The study of minimum manoeuvring area, on the basis of what is laid down in

Ministerial Decree 236/89, for all kinds of movements considered by this rule.
These spaces were tested in two different ways:

- creating a physical border to the regularized monoeuvre space, by means of 90 cm high wall. The space model was confined to the mere monoeuvring area, irrespective of the sanitary fittings' size and situation. For the kinds of movement referred to as *"reversing by a combined manoeuvre"* and *"turning at right angle"*, the dimensions of the manoeuvring area were progressiely varied, by 10 cm at a time, and the conditions of use were checked each time.
- checking the manoeuvring areas within bathroom models fitted with sanitary facilities and considering not only the walls but also the size of sanitary facilities themselves as a limit to these areas.

In this stage of testing, the use of *unhanging* sanitary fittings was assumed, thus excluding the possibility of using the space underneath the sanitary fittings for manoeuvring. This choice results from the awareness that *grounded* sanitary fittings are more widely spread than the hanging ones.

b. The analysis of how manoeuvring areas and the relevant movement schemes are congruent with the layout of sanitary fittings within the bathroom's perimeter; in some instances, the relationship between the area before the bathroom and the modes of access to the bathroom was analyzed too, since this aspect has proved to be crucial for understanding the real usability of the bathroom itself (modes of door opening, interference of internal and external manoeuvring areas with the door's opening space, directions of access, etc.).

The staff of the Laboratory tested, by means of actual size models:

- Public bathrooms (equipped with max.2 sanitary fittings) and
- private bathrooms

In most cases, a basic model and a number of variations were carried out: the variations resulted both from a different layout of sanitary fittings with the same bathroom size/shape and mode of access and from the variation of these two elements while keeping the layout of sanitary fittings unchanged.

For each model tested in the Laboratory, a paper was drawn up reporting, beside the model identification data, the results of testing and the suggested variations, some of which had been submitted in turn to Laboratory testing. Besides, the experience records were completed with photographs and videotapes.

In general, the geometrical-dimensional parameters adopted for testing are the ones laid down in the Presidential Decree 236/89 with a few partial amendments resulting from previous experiences on this subject carried out in the Typological Laboratory.

The results of the testing activity carried out in the Laboratory on the 17 consistent arrangements suggested by the interministerial Committee were documented by means of summary cards in which consistent arrangements (basic one and variations) are compared with the corresponding functional schemes.

The functional scheme shows:

- the correct layout of sanitary fittings with reference to the needs of movement and use;

- the situation of the walls supporting sanitary fittings and fixtures;
- the characteristics of the area needed and sufficient for a correct arrangement of sanitary fittings, internal movements and use of sanitary fittings themselves. In this respect, it is clear that the introduction of any other element (furniture, etc.) or the solution of any other problem (functional, concerning fixtures, etc.) will involve an expansion of the area in compliance with the identified functional scheme.
- the most appropriate situation of possible point(s) of access.

Finally, in order to systematize and organize the subject-matter of study and Laboratory testing in a comprehensive summary paper, a matrix was worked out where all the functional schemes considered were arranged according to two organizing standards:

- number and situation of the walls needed and sufficient for a correct organization of the functional scheme (horizontally);
- number and type of sanitary fittings used (vertically).

With a same layout (number and position of sanitary fittings and walls), the compared arrangements differ from one another for the kind of movements which they allow inside.

In the last stage, a few general standards for the evaluation of the examined arrangements as well as an outline of planning proposals were framed on the basis of the results obtained from the studies and experiences carried out.

These standards concern:

- *The relationship between the modes of movement and manoeuvre of the disabled person and the modes of access to the bathroom*: arrangements which imply entering or going out by a backward manoeuvre are not acceptable since this involves obvious and serious difficulties for the majority of the disabled people; similarly, arrangements which imply closing the door by a rotation of the bust backwards are not recommendable. This is the case for most of the arrangements identified by the Committee, apart from the cases in which rotation, even partial, can be made very close to the entrance door;
- *the possibility* - in the arrangements for public bathrooms which concern the majority of people - *that an accompanying person is present inside the bathroom*, which is necessary in the most serious cases of disability. This implies that some functional schemes are not consistent and the suggested size need to be adjusted;
- *the clear inconsistency between the bathroom layout and the possibility of including it correctly in a dwelling* with ordinary dimensional and functional features, as it was pointed out in a few arrangements;
- *the possibility of furnishing the bathroom, its equipments and the organization of fixtures* (presence of heating elements, vertical and horizontal main housings) which are, together with the other requirements, a necessary condition for a total usability of the bathroom; therefore, they involve the need of modifying some the examined arrangements.

Putting together the evaluations on these various aspects it is possible to obtain a

comprehensive **judgement** on the examined scheme.

Obviously, the weight of these evaluation standards varies considerably from one another and they affect the final judgement in a complex way.

We can therefore distinguish between *primary requirements* which must absolutely be fulfilled if the arrangement is to be accepted, and *secondary requirements* whose meeting is desirable and improves the suggested arrangement but which can also be disregarded in case it is not possible to do otherwise.

In other words, a bathroom which does not meet the first type of requirements cannot be regarded as **an accessible bathroom** while a bathroom which does not meet the second type of requirements is not regarded as an optimum but **is nevertheless classifiable as an accessible bathroom**.

The first type of requirements include:

- minimum size, especially with reference to access and movement areas
- the presence of an accompanying person (bathrooms in public buildings)

The second type of requirements include:

- the possibility of going in/out by moving forward
- the kind of manoeuvre which can be made
- the possibility of introducing a window
- the possibility of fitting the bathroom correctly with fixtures
- the possibilty of furnishing it.

As far as primary requirements are concerned, 15 out of the 17 arrangements identified by the Committee are consistent; as to the secondary requirements instead, all the arrangements need some more or less substantial change.

As we have previously observed, in order to provide complete solutions for the problem on which our work is focused, it is necessary to pass from *functional schemes* to the identification of *typical planning arrangements* which, in addition to meeting the functional scheme requirements, can also adequately solve problems concerning fixtures, building and minimum furnishing of the bathroom.

The conversion of *functional schemes* into *typical planning arrangements* is needed in order to avoid that, when the regulation is interpreted and implemented by planners, they make the mistake of taking the functional scheme, without modifying it at all, as a planning and building arrangement, thus failing to obtain a really functional bathroom.

- Note of Ministry of Public Works N. 4809, 19.06.1968
  Norms for promoting the free use of social buildings by handicapped and for gathering general usability.

- L. 118, 30.03.1971
  Norms and financial aids for handicapped.

- D.P.R. N. 384, 27.04.1978.
  Technical regulations concerned with Law n.118/71 about architectural barriers and public transports.

- L. 41, 26.02.1986 (art. 32 points 20-25) (financial law)
  Architectural barriers

- D.L. N. 371, 7.9.1987
  Interventions for structural and functional renovation of buildings for museums, libraries and archives (elimination of architectural barriers).

- L. 13, 1.1.1989
  Norms to promote the elimination of architectural barriers in private buildings.

- D.M. Ministry of Public Works N. 236, 14.06.89
  Accessibility, adaptability e visitability of private buildings (Law n. 13/89)

- D.M. Ministry of Public Works N. 1669, 22/06/89.
  Notes of explication of Law n. 13/89.\