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ABSTRACT

This report is an outgrowth of discussions held by the Council for Cultural Cooperation (CCC) in Cologne, Germany from September 26-30, 1967 aimed at organizing a systematic exchange of information among European countries for the purpose of providing low-cost sport facilities. Part I deals with fundamental priorities, type, size, and site. The quality of water, installation specifications, and facility supervision are covered as minimum health requirements. The minimum safety requirements for the facilities are presented in relation to design, construction, staffing, lifesaving, and available first aid. Part II comprises three specific studies on outdoor, indoor, and combined pools. Some general aspects of the problem of providing low-cost outdoor swimming pools and specific cost reduction measures are highlighted in the first article from the Netherlands. The second article on indoor swimming pools presents a definition and breakdown of building costs, an analysis of trade branches, and six photographs showing low-cost indoor pools. The third article explains the uses of a combined pool and the general principles for planning and building one. The appendixes include a list of participants, the program outline for CCC, and the coefficients expressing the recommended ratio between the size of population and the water surface area of swimming pools. (BRB)

The Council of Europe was established by ten nations on 5 May 1949, since when its membership has progressively increased to eighteen. Its aim is "to achieve a greater unity between its Members for the purpose of safeguarding and realising the ideals and principles which are their common heritage and facilitating their economic and social progress". This aim is pursued by discussion of questions of common concern and by agreements and common action in economic, social, cultural, scientific, legal and administrative matters.

The Council for Cultural Co-operation was set up by the Committee of Ministers of the Council of Europe on 1 January 1962 to draw up proposals for the cultural policy of the Council of Europe, to co-ordinate and give effect to the overall cultural programme of the organisation and to allocate the resources of the Cultural Fund. It is assisted by three permanent committees of senior officials: for higher education and research, for general and technical education and for out-of-school education. All the member governments of the Council of Europe, together with Finland, Spain and the Holy See which have acceded to the European Cultural Convention, are represented on these bodies [1].

In educational matters, the aim of the Council for Cultural Co-operation (CCC) is to help to create conditions in which the right educational opportunities are available to young Europeans whatever their background or level of academic accomplishment, and to facilitate their adjustment to changing political and social conditions. This entails in particular a greater rationalisation of the complex educational process. Attention is paid to all influences bearing on the acquisition of knowledge, from home television to advanced research; from the organisation of youth centres to the improvement of teacher training. The countries concerned will thereby be able to benefit from the experience of their neighbours in the planning and reform of structures, curricula and methods in all branches of education.

From 1963 to 1968 the CCC published, in English and French, a series of works of general interest entitled "Education in Europe", which recorded the results of expert studies and intergovernmental investigations conducted within the framework of its programme.

A list of these publications will be found at the end of the volume.

These works are being supplemented by a series of "companion volumes" of a more specialised nature, including catalogues, handbooks, bibliographies etc., as well as selected reports of meetings and studies on more technical subjects. These publications, to which the present study belong, are also listed at the end of the volume.

General Editor:

The Director of Education and of Cultural and Scientific Affairs, Council of Europe, Strasbourg (France).

The opinions expressed in these studies are not to be regarded as reflecting the policy of individual governments or of the Committee of Ministers of the Council of Europe.

1. For complete list, see back of cover.

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SPORT FOR ALL

LOW-COST SWIMMING POOLS

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INTRODUCTION

Although a number of past courses of the Council for Cultural Co-operation (CCC) have studied problems of sports facilities, the one held at Cologne, in the Federal Republic of Germany, from 26 to 30 September 1967 on "Low-cost sports facilities: swimming pools" marked the beginning of a new series.

As part of a social and cultural campaign to promote *Sport for All,* the CCC decided to give special attention to low-cost sports facilities, which are essential to enable increasing numbers of the population to take up physical activities.

To this end a long-term programme was drawn up to deal successively with the various facilities—swimming baths, indoor sports centres, playing fields, sporting equipment for recreational centres—and the specific problems they pose.

By organising a systematic exchange of information and encouraging the pooling of experience in this field, European co-operation should help make it possible to build better facilities at the lowest possible price.

The subject of the present report was touched on at the Course organised by the Government of the Federal Republic of Germany, at Cologne from 26 to 30 September 1967.[1] The German Government had entrusted the technical and scientific preparatory work to the *Institut für Sportstättenbau* of the *Deutscher Sportbund,* in particular its Director, Mr. F. Roskam. The *Deutsche Olympische Gesellschaft,* the *Deutsche Gesellschaft für das Badewesen* and the *Deutsche Schwimmverband* kindly gave assistance.

The conclusions of the Course were based on preliminary drafts prepared at two meetings of a working party in 1966 and 1967. During the Course, detailed statements were made on these drafts at the plenary meeting on 26 September 1967 by Mr. J. L. Henderson, Sports Adviser to the Ministry of Housing and Local Government, London (subject: preparatory planning), Mr. E. Hirt, Director of the *Ecole Fédérale de Gymnastique et de Sport,* Macolin (subject: requirements of the public, schools and sports circles), Dr. L. Coin, Director of the Health Laboratory of the City of Paris (subject: hygiene) and Prof. Dr. W. Künzel, representing Prof. Dr. Med. L. Prokop, Vienna (subject: safety).

The conclusions were examined by working parties on 27 September 1967 and adopted at a plenary meeting on 29 September 1967.

At the end of the Course the participants expressed their congratulations on the excellent organisation of the proceedings and the study visit and thanked the organisers for their generous hospitality.

The conclusions of the Course are contained in a report published by the Council of Europe in Doc. CCC/EES (67) Stage 35,8.

In view of the great interest of the subjects treated, the Committee for Out-of-School Education of the CCC subsequently decided it would be useful to publish practical advice which could be followed by those responsible for the planning, construction and operation of swimming pools in general and by local authorities in particular.

A drafting group comprising Prof. H. Deilmann, Prof. Fr. Fl. Grünberger, Mr. Ernst Hirt, Mr. Åke E. Lindqvist and Mr. F. Roskam was appointed to prepare the present publication.

1. See Appendices II and III for the names of the participants and the programme of the Course.

Completion of the report has been delayed by technical difficulties.

Any comments or criticisms by readers concerning Part I or Section B of Part II will be welcomed with a view to a possible later edition.

The three specific studies in Part II are final revised versions of the lectures given at Cologne by well-known architects: by Mr. Wesselo, of Bussum, Netherlands, on outdoor pools, by Prof. Fr. Fl. Grünberger, of Vienna, Austria, on indoor pools and by Mr. Åke E. Lindqvist, of Stockholm, Sweden, on combined pools.

It is of interest to note that in the pages that follow, Mr. Lindqvist and Prof. Grünberger discuss, with plans and models, two projects of their "European" swimming pools,—one combined and the other indoor.

Part I

GENERAL PRINCIPLES

A. The basic options

Any swimming pool requires a substantial amount of capital. Large sums have to be invested for its construction, and its subsequent operation continues to entail high expenses. Both categories of cost can be reduced if the pools are built and operated according to certain technical and other methods which are described in Part II of this report.

There are, however, many measures which have to be taken long before the stage of construction or even design and which determine whether a project will ultimately be economic or not. Any project which, within the limits of available resources, is not strictly in accordance with what is required is uneconomic, even if carried out at little cost. Thus a swimming bath with excess capacity or with special installations for which there is not sufficient demand is uneconomic. If it is too small or inadequately equipped it is also uneconomic, for opposite reasons.

Preliminary planning therefore appears to be of vital importance. It is at that stage that all the basic choices are made with regard to the size, type, situation, and the like, of the pool; it is at that stage, therefore, that any sound measure of cost reduction should be decided on.

1. *Choice of priorities*

Be preliminary planning is meant all preparatory measures which must be taken before a project is conceived or put into effect. Its aim is to provide swimming baths whose size and equipment meet the needs of the various categories of user as closely as possible, within the limits of available resources.

To achieve this aim it is necessary to compare needs, assessed as precisely as possible, with resources. Where they conflict it will be for the planners to make a choice likely to reconcile, as far as possible, the various needs with each other, and the needs as a whole with available resources. That is to say, that in such a case, which in practice will be frequent if not the rule, it will be necessary to fix priorities and for the time being to postpone the satisfaction of over-ambitious demands which the resources cannot cover.

But even where there is, or appears to be, no incompatibility between needs and resources, planning has an outstanding part to play in making economies possible, by eliminating superfluous building not warranted by needs or demand.

In this way preliminary planning can perform a two-fold task, seeking to provide what is possible and excluding the superfluous. Its aim will be to achieve the maximum with the minimum of resources.

If planning is to play its part fully, it is essential that its terms of reference should be sufficiently broad. Indeed, the broader they are, the easier it will be to harmonise and balance the wishes of the various categories of users in order better to satisfy them.

Those responsible for preliminary planning should at least take into account swimming pools existing in the immediate vicinity, provided they comply with elementary standards of hygiene and safety. The extent to which these pools can be used should be very carefully studied.

The ideal solution would be to plan for a whole region or even country. At the least there should be a system for co-operation between local authorities. For small municipalities this would seem essential. Co-ordinated studies are a sure means of preventing, in the general interest, any overlapping due to rivalry and prestige-seeking among contractors. The aim is not to give each municipality, whether big or small, its own swimming pool, but rather to ensure that each inhabited sector (which may be either a single municipality, a group of municipalities or a part of a town) can be served by a pool of optimum size.

If the planners are to do their job properly they must possess accurate and detailed information on the volume and nature of the needs to be met. Over a whole planned area the total volume of needs will determine, according to a system of priorities, the number of sectors to be served by a pool. Within each sector the volume of needs will generally determine the size of the bath to be constructed: the water surface areas, the extent of auxiliary installations, any special equipment etc.

The volume of needs depends mainly, though not solely, on population data: the size of the population, its social structure etc. Other factors, such as climatic conditions, can also affect needs. In special local situations such as exist in seaside resorts, tourist centres or holiday areas it may be necessary to provide pools with additional capacity.

The type of pool and the kind and quality of any special installations which have to be provided depend essentially on the nature of the needs. These may be of three kinds. According to the category of user for which it is intended a pool may have either to satisfy general recreational needs, to cater for swimming lessons and sports training or to be suitable for competitive events. Each of these categories has its own demands, which may sometimes conflict, for the pool must perform a different function for each group of users.

When it comes to making a choice between these various functions—and this will nearly always be necessary, as we have seen—priorities will again have to be laid down. It will be advisable, and in accordance with the idea of *Sport for All* advocated by the Council of Europe, to satisfy the various types of need in the following order:

1. The requirements of the general public. Giving priority to this category of needs assigns to swimming baths a primarily recreational function.

2. The requirements of those who desire swimming instruction or training. This may constitute a second function for baths.

3. The special requirements of highly competitive swimming, diving, water-polo etc. Satisfying this last category gives baths a third function, that of serving sport in the strict sense of the term.

These three functions are not of course mutually exclusive. In many cases it will be desirable, if not essential, to combine the first two. A pool designed for recreation, for instance, should as far as possible provide a minimum of instruction and training. Similarly, one designed for competition purposes should also be able to perform the two other functions, at least to some extent.

Here again, the wider the geographical context of the preliminary planning, the easier it will be to balance the different kinds of need. It would be extremely ambitious to try to supply a whole region or country with pools every one of which fulfilled the three functions mentioned above. But it is perfectly feasible to provide certain "main swimming baths", judiciously distributed, with installations which meet the stringent requirements of sport.

The requirements of schools will clearly have to be taken carefully into account by the planners in accordance with the country's legislation. In all cases where existing baths do not enable all pupils to practise school swimming, school baths should be created. They would pay their way much better if they could serve not just one school but several.

2. *Choice of type*

By "type" is meant whether a pool is outdoor, indoor or a combination of the two.

The choice of type will depend largely on the geographical situation and particularly the climate.

In general, preference will have to be given to baths which can be used all the year round.

In principle, at least as far as the member countries of the Council of Europe are concerned, outdoor and indoor baths should be regarded not as alternatives but as complementary. On the one hand, outdoor pools cannot be used in winter and on the other, indoor baths capable of catering for the heavy demand in the summer months would not be economic. For this reason, in countries where both indoor and outdoor pools are necessary the combined type often presents considerable advantages from the point of view of use, management and staffing.

Artificial heating of the water of open air pools and, if necessary, of the changing rooms, shower rooms and lavatories has proved very valuable in some climatic zones. It often makes the pools a more paying proposition.

3. *Choice of size*

As remarked above, the dimensions of a pool must be calculated very precisely in relation to the estimated number of users. For this purpose it is essential to consult experts or institutes specialising in sports facilities.

For countries which have no regulations on this subject, and excluding special local conditions. a water surface of 0.08 - 0.1 sq.m. per inhabitant seems a desirable minimum. These figures should be regarded as average ones applying to baths in general, whether outdoor or indoor. In fact there should be worked out for each country, indeed for each region, a coefficient which would serve as a guide to the desirable ratio between the number of inhabitants and the measurements of the pool (see Appendix I for details of the criteria laid down for the Federal Republic of Germany).

If for exceptional reasons, such as the climate, it is necessary and possible to provide a whole area with indoor baths, the planning should be based on a water surface of 1 sq.m. to 100 - 200 inhabitants.

The size and type of pools (for instance, whether for swimmers, for non-swimmers, for divers, for swimming lessons, multi-purpose pools etc.) will depend on local needs. Multi-purpose pools intended for both swimmers and non-swimmers should no longer be created except in small establishments.

Sport should be possible in baths intended mainly for recreational purposes for the general public even if their size and installations do not meet the international standards required for competitions, provided that they have pools of a length which is a sub-multiple of 50 m. The pools should be wide enough for 4 - 8 lanes of 2 - 2.50 m. to be marked off; the depth, at least at one end, should be sufficient for a "salto" to be possible.

Densely populated areas should have a limited number of what might be called "main swimming baths" which, while providing for the needs of other users, also cater for swimming, diving and water-polo competitions. These should be 50 m. in length and, at least in the case of outdoor baths, should have a separate pool for diving.

The amount of auxiliary installations (changing rooms, showers, lavatories etc.) depends on the water surface area. These installations should be designed so that they can be adapted to the needs of the various categories of user, particularly schools and clubs.

4. *Choice of site*

In order to prevent land speculation the ground should be acquired as quickly as possible, that is as soon as the planners have fixed the priorities. It matters little whether or not at that stage funds are available for building; the essential thing is to acquire the necessary land.

The choice of site will depend on the following factors among others:

— the social structure of the population in the sector in question;
— the distribution of the population within the sector;
— the position of any schools;
— the price of the land;
— the situation as regards communications (roads, cycle tracks, public transport etc.);
— the natural setting, e.g. whether there are adjoining green spaces which will obviate the need to develop the pool's surroundings;
— the existence of any amenities which might serve the pool, such as car parks;
— the nature of the ground: solidity of the soil, any underground water, absence of slopes, loose sand or ruins, supplies of drinking water etc.;
— the direction in which the land faces;
— the possibilities of connection with water, electricity and gas supplies, municipal heating, drains etc.

Owing to the high cost of their construction and operation, it is desirable that baths should be concentrated provided that geography and access routes (roads and public transport services) permit. The establishment of "main swimming baths" will make it possible to equip outdoor pools, as well as some indoor or combined baths, in accordance with the wishes of the various categories of user, and so to meet the demands of schools and clubs and the requirements of accident prevention and management.

Special equipment for diving should preferably be provided in baths occupying a central position. The construction and upkeep of the equipment is, however, very costly and high diving-boards are used by only a small number of swimmers. For this reason the extent to which the equipment is likely to be used should be studied with the greatest care in the course of the preliminary planning. Diving-boards for competition purposes should not be contemplated except in special centres for divers, with pools designed for the purpose.

As far as possible town-planning projects should combine swimming pools with other sports facilities or social and cultural amenities such as playing fields, recreation centres with library, theatre, workshop and the like. The social and educational value of such combined installations is today widely recognised. Furthermore, they effect considerable savings, for in this way the auxiliary amenities such as changing rooms, showers, lavatories, car parks, lawns etc. can be used by a far bigger public. Staff, maintenance and heating costs will also be greatly reduced.

The combination of a swimming bath with an ice rink is attracting increasing interest, in particular because the cooling and heating equipment can be combined, the heat generated by the cooling system being used to warm the bath.

B. Minimum health requirements

One of the main aims of the health measures is to protect users of the bath against infection and prevent the spread of contagious diseases among them.

Thus all pools of whatever type, even low-cost ones, should comply with the absolute and permanent standards of hygiene dictated by general epidemiological considerations.

1. *Quality of water*

The quality of the water in the pools must always meet the minimum requirements laid down in the health regulations of each country.

The rules to be observed concern the origin, disinfection and treatment of the water.

It is recommended that only water that is clean from the beginning should be used, although it is possible, and may be unavoidable, to draw upon multi-purpose surface water of various origins.

With regard to disinfection, the water in the swimming pools should be continually purified and have a disinfectant effect. When discharged from the pools it should still contain a sufficient quantity of disinfectant substances.

The operation of disinfecting equipment should take into account the number of users and, in the case of outdoor pools, of weather conditions.

The disinfecting system must not be harmful either to bathers or to the installations.

The water circulation system must be designed so as to renew the water both at the bottom and at the surface. Fresh water should constantly replace the water lost.

The even distribution of water is of particular importance in the case of heated pools and pools with movable floors.

The rate at which the water is renewed must be related to the number of users.

As regards the treatment of the water, it is essential to provide regenerating systems (filtering and disinfection) which suit the quality of the original water and comply with the requirements of the health authorities.

2. *Installations*

Bearing in mind the use for which a swimming pool is intended, its architecture must be such as to enable the necessary measures of hygiene to be observed. The materials should be carefully selected with surfaces that do not lend themselves to the spread of cryptogams.

The capacity of the ventilation and heating systems of an indoor bath must be adequate to its size and uses.

Access to the pools should never be possible without first passing through changing rooms and a sanitary area with a sufficient number of showers and lavatories.

Persons walking barefoot within the precincts of the bath will normally be segregated from those wearing shoes. This segregation is not necessary if foot-baths are provided between the changing rooms and the pool.

Segregated areas with lavatories should be provided for clothed visitors (spectators etc.).

Disinfection should cover the entire premises and installations of the bath, including the parts used by visitors. Regular disinfection airing and cleaning are necessary.

The number and quality of showers and lavatories must not be restricted in any way, even in the more modest establishments. Special attention must always be paid to their cleaning and to the disposal of the effluents and water that has been used for washing, so as to prevent any risk of contaminating the pools, changing rooms, showers, rest areas, paths or passageways.

Lastly, hygienic arrangements must be made for looking after clothing in changing rooms.

3. *Supervision of functioning*

The staff of swimming baths must have adequate occupational training and be provided with simple means by which they can at all times directly control the water of the bath and the proper functioning of the installations.

These devices must also make it possible for the responsible authorities to check periodically whether the health regulations are being observed.

C. Minimum safety requirements

Careful choice of dimensions and judicious design for the building and equipment of pools and surrounding areas are essential to the safety of users and staff. A dangerous situation might result from a combination of several errors, even if each was fairly harmless in itself.

For instance, non-slip floor coverings, clear notices, safety barriers and safeguards against mechanical and electrical faults are absolutely essential. There must be sufficient supervisory staff qualified to control and maintain the installations. Lastly, life-saving and first-aid equipment must be ready for use at all times and medical assistance must be promptly available on call.

A number of special rules for design, construction and operation are summarised below.

1. *Design and construction*

While the depth of a pool depends on its purpose, there must not be any steep gradients or unexpected changes of floor level. Suitable holds should be fitted at the edges of pools and alongside steps and ladders.

Resting ledges (projecting or recessed) are desirable for pools over 1.25 m. in depth. In competition pools they must not contravene the regulations, i.e. the turning surfaces must not have steps for resting.

Starting studs should be provided only when the depth of water is sufficient.

The dimensions of diving pools must accord with the height and arrangement of the diving-boards. There must be sufficient height above the diving installations. Diving platforms should have railings, firm non-slip covering and suitable ladders.

Circulation areas should be so designed as to facilitate supervision; the materials used should be non-slip, unbreakable and not subject to cracking and resultant splintering.

Barefoot (wet) areas should have slip-proof surfaces. Here too steep inclines and dangerous steps are to be avoided.

Pools, water depths and dangerous areas should all be clearly marked by appropriate signs.

The fine-mesh gratings covering water outlets should be of safe design.

National regulations for plant and storage rooms (e.g. for chlorine) should be strictly observed.

The first-aid room should be placed in such a way that stretcher cases can easily be carried to a waiting ambulance.

2. *Staff*

The staff should be responsible for supervising the pools, circulation areas, any recreation areas and the installations and workshops. They must be adequately trained in life-saving and first aid, and their proficiency in this field must be regularly checked. They must keep themselves trained in life-saving and first-aid techniques and attend refresher courses.

The health of staff should be checked periodically.

They must also be thoroughly trained in the handling and use of toxic or dangerous substances in the installations for which they are responsible.

3. *Life-saving and first aid*

Each bath must possess appropriate equipment ready for immediate use.

The minimum equipment required in a bath with an artificial outdoor pool is two light lifebelts (or alternatively two balloons with safety grips) to which ropes at least 15 m. in length must be attached and four rescue poles. An indoor bath should possess at least two rescue poles.

Boats and artificial respiration apparatus are highly desirable.

A first-aid room with telephone is indispensable. The telephone numbers of the doctor, the ambulance service and the áre brigade should be prominently displayed.

The whole community in general, and school-children in particular, should be given information in simple terms on safety precautions and first aid in case of bathing accidents.

Part II

DESIGN, CONSTRUCTION AND EQUIPMENT OF LOW-COST POOLS

A. Specific studies

1. *Outdoor pools*

Study by Mr. Wesselo, Architect, BNA, Bussum, Netherlands

I am convinced that there are scarcely any methods of building outdoor swimming pools which are economical in all cases. The opportunities for saving lie in the various components of the pools and their equipment.

General aspects of the problem

Of great importance in cutting down expenses is well thought out planning. In small municipalities, or groups of them, such planning will make it possible to size down ambitions to existing local resources. In my opinion a swimming pool is too often a question of prestige for a local authority and this leads in many cases to the building of unduly large installations. Some higher authority should therefore determine the exact requirements of a large area, taking into account the building sites available.

I also look on the concentration of swimming facilities and the exclusion of swimming instruction from public baths as a measure of economy.

As a result of compulsory schooling in European countries illiteracy hardly exists any more. In our schools we must teach children to swim before they are eight years old. This would be possible if every school or group of schools had a pool for swimming instruction as well as a gymnasium. It seems to me that there are compelling reasons for giving every school, in addition to a "dry" gymnasium, a "wet" one in conformity with its requirements, so that every child from the age of eight onwards can learn swimming as well as reading, writing and arithmetic and so that just as much time can be devoted to this excellent form of physical education as to gymnastics. If this were achieved all other facilities for teaching swimming would become unnecessary. This would result in a considerable saving, not only in building costs but also in staffing and thus in operating costs. After all, one goes into a library to read and not to learn how to read.

The combination of "dry" and "wet" gymnasia would mean that certain units need not be duplicated as, for example, toilets, showers, changing rooms and heating.

The choice of site for public baths would thus no longer depend on their use by schools and so need not be near residential areas. This would make possible the free choice of a more suitable site, which in many cases would itself lead to a considerable saving in total expenses. Sometimes it would thus be possible to choose a more central position.

Another point in cost reduction which I should like to make is the need for a careful study and comparison of desires and actual needs. This holds good for all types of bath, whether outdoor or indoor. Health experts, sportsmen, safety specialists and above all architects, with their original ideas, should not look for complete perfection or the greatest beauty but should work out acceptable minimum standards.

I see one possibility of saving in standardisation, provided it is applied to all pools—outdoor, indoor or combined. Thorough and exhaustive planning will show that requirements in many cases are the same, or almost so. · Here the planning of a series of baths with prefabricated sections will result in a considerable saving. Even if the baths are not all completely identical, some units will have to be the same throughout.

It is an absurd waste of resources to have fresh models of starting blocks, changing rooms, showers, diving boards etc. designed for each new bath and to have single ones made or installed each time. It should be possible to use cheaper but good mass-produced materials; I think it might even be possible to mass-produce the pools in prefabricated units.

I think that covers the general economy aspect. I am well aware that I have repeated or stressed points already made by others.

Spec..ic cost reduction measures

However, the task entrusted to me requires that I should also attempt to analyse how specific savings can be made in the case of outdoor pools, though, as I pointed out in the first part of this study, I think the greatest savings possible are of a general character.

In the case of open air pools it seems to me that planning is the most important factor, and I even venture to say that by good planning one can size down ambitions and demands to the actual possibilities.

All too often the desire is expressed for pools suitable for competitions, even though doubts may already have been voiced about the necessity for this kind of pool. The need for a three-metre diving stage is clearly demonstrated. Now diving stages are certainly widely used, but more for a pleasant recreational activity than for diving competitions.

If one compares visitors to open air pools with those to indoor baths, one notices a considerable difference of type. The latter are regular swimmers who come throughout the year, and among them there are certainly far more competitive swimmers than among visitors to outdoor pools, the majority of whom are occasional swimmers who have come because of the fine weather.

In view of the relatively small percentage of visitors to open air pools with ambitions in sport, I find it utterly unnecessary to incur the expense of building such pools to be suitable for competitions. Moreover, it is perfectly possible to keep fit, to do the elementary water exercises and to improve one's style in a pool which does not meet the requirements of competitive sport. In exceptional cases I think it would be possible for preparation for competitions and learning how to distribute one's energy over the appropriate distance to be centralised in district baths.

If, with the exception of a few central pools, one dispenses with special competition facilities, undoubted savings in building costs, running expenses and staffing can be achieved. I think that what the public in general most needs is sufficient space in which to relax, both in and out of the water. To a small extent relaxation in the water consists of actual swimming, and for this a depth of two metres is sufficient. It is far preferable to have a very large shallow pool in which people can play and splash about. Of course, no open air pool should be without a special corner for very small children, totally separate from the others, with a paddling pool and sufficient space for parents.

One must also accept that it is impossible to build outdoor pools adequate for the rush of visitors in the few days of exceptionally fine weather.

While allowing for aesthetic considerations one must also opt for robust, solid construction requiring little or no maintenance.

The majority of bathers realise the difficulty of providing individual cabins for everyone. Moreover, everyone understands that undressing means shedding many social differences and that in a democratic world there is no place for obtaining a private cabin against extra payment. Even the system of changing-cabins and a common storage for clothes is rather expensive and can be partly replaced by a common changing room with or without separate lockers for clothing.

Functional layout can also lower building costs and, above all, running costs by reducing the supervisory staff required.

I realise that I have not supplied a universal remedy that will in all cases reduce the costs of constructing and running open air pools. I hope, however, that I have spotlighted one or two ideas which may help to lessen these costs.

2. *Indoor pools*

Study by Prof. Fr. Fl. Grünberger, Architect, Vienna, Austria

General considerations and definition of "building costs"

Let me start my study with a short survey of the development which, in the Central European countries, has made the problem of "low-cost swimming pools" a topical one.

The beginning of the boom after the last war was marked by efforts to create living space. In this context the prime consideration was not so much design and equipment, but rather the satisfaction, however incomplete it was bound to be, of an urgent demand. After the first period of reconstruction, with the boom still going strong, there vas an increasing awareness of the need for other facilities in general and for sports facilities in particular. In the course of this development the construction of swimming pools was also taken up. This was the time when the economic boom had reached its peak, a time in which tremendous technological advances were made.

It was only natural that in carrying out these projects which in the long run were to offer the public recreation and relaxation through sports activities everything should be done to accomplish these ends. These projects were to be an improvement on the housing schemes of the first boom years.

All authorities in any way concerned with building swimming pools did their best in this respect. The sports associations and all the other competent authorities wanted their justifiable demands to be met as fully as possible. Doctors and health authorities called for the practical application of modern knowledge in the field of hygiene. Moreover, the new projects were to benefit from the experience obtained in the operation of existing facilities.

The lack of pertinent provisions concerning the construction of swimming pools and the resulting uncertainty in the application of regulations originally conceived for other projects caused the authorities to take measures—again with the best of intentions—which in one way or another were bound to affect building costs. Developments in the field of building materials and construction machinery had been such that both the designer and the builder were able optimally to meet the demands made on them. In planning it was moreover necessary to take into account the increasing shortage of personnel. In this context the use of automatic systems in the mechanical engineering sector proved to be a revolutionary development.

The same shortage of personnel was found in the building trade. This was particularly true of specialists experienced in the execution and co-ordination of the work involved in the construction of indoor swimming pools. Even in housing the situation was such that the quality of building had to be improved by the use of prefabricated sections and the supervision and rationalisation of working processes. In the last few years this modern building method has also been increasingly used in the construction of indoor swimming pools.

The recent slackening of the boom with everything it entails has naturally caused those who call for economies to raise their voices. On the other hand, unfortunately, even those who should know better have often described swimming pools as luxuries, without being able to prove their point. Let me be quite frank.

We are living in a democracy. It is the wishes of the sponsor and the material supply of the industry, as well as individual taste, which are decisive for building costs. In the construction of swimming pools there is no such word as luxury, particularly during an economic boom, for swimming pools have always been indicative of the cultural level of a society. I regard something as a luxury if it is discarded when it could still be used. Good building has never been a luxury.

Before discussing the costs of the construction of swimming pools I should like to define the term "building costs". A comparison of tenders in Germany and Austria (figure 1) shows that in these two German-speaking countries the term "building costs" is not synonymous. In Germany DIN (*Deutsche Industrienorm*) 276 is used, whereas Austria applies *Österreichische Norm* B 4000, Part 6. In Austria building costs cover what in Germany is called "net building expenses", and comprise only a fraction of what is called building costs. If the costs of the same project were entered in the table of standards, the project would cost AS 57,000,000 according to the German standard and AS 28,000,000 according to the Austrian standard. Whereas in Germany real estate costs are quoted separately, in Austria everything which accounts for the difference between net building expenses and building costs according to the German standard is termed "special costs", and this includes real estate costs.

In my paper building costs will include the net building expenses plus the costs for special equipment according to the German standard.

Breakdown of total building costs and cost analysis of trade branches

A breakdown of the costs of an indoor swimming pool into costs for the shell construction, the interior work and the technical installations shows that with swimming pools of different sizes each of these building stages usually accounts for about one third of the total costs.

In this context it is interesting to look at the corresponding ratio between shell construction, interior work and technical installation costs in housing construction (fig. 3). Here the values are 40 %, 40 % and 20 %, whereas in the case of six indoor swimming pools built over the last few years within an area of ten kilometres, the average values are 30 %, 38 % and 32 %. Thus the proportion for interior work is not higher than in housing construction; on the other hand, the proportion for technical installations is of course higher in indoor swimming pool construction. This shows that the interior work carried out in indoor swimming pools corresponds to the general standards in housing construction and does not allow for any radical cuts.

The interior work and the technical installations can be further subdivided into cost groups (fig. 4). As far as the interior work is concerned the largest share falls to the ceramic wall and floor linings (9.15 %). Another important item is the construction of the swimming hall (5.57 %). Understandably the percentage of costs for the ceramic partition walls and plastic-faced doors and for glazing is considerable (4.4 %, 3 % and 2.7 %). The percentages for the remaining work taken together are about the same as for the ceramic wall and floor linings (9.24 %).

In the technical installations, the heating system accounts for the highest proportion (10.16 %) followed by the ventilation (8.54 %) and water conditioning plants (6.5 %). The percentages for electrical installations (3.56 %), cold and warm water supply and sewage disposal (3.1 %) are comparatively low. Here a clear separation of the various cost components is not possible, since the various plants overlap to a certain extent. The ventilation plant is supplied with heat by the heating system and with electrical energy by the transformer station which is included among the electrical installations in the cost analysis. The counter-current installations for the hot-water plant might be allotted either to the heating costs or to the costs of the hot-water plant. However, such shifts in the various cost items are of no importance for the following study.

When cutting down expenses we must start with the larger cost items, particularly with the shell work, the ceramic installations and linings, the window surfaces and the technical installations for heating, ventilation and water conditioning.

Let us now consider the possibilities for cutting down expenses.

As a rule indoor swimming pools built for a neighbourhood of about 30,000 to 50,000 inhabitants are equipped with a combined swimmers' and non-swimmers' pool of 25×12.5 metres and a 1-metre and 3-metre diving board. They have a capacity of 640 cubic metres of water and offer changing facilities with showers and baths for about 300. Now it is the communities with about 10,000 to 25,000 inhabitants which are expected to call for indoor swimming pools. This means that the size of the pool will have to be between 28×8 and 25×10 metres.

For the purpose of our analysis I shall choose a medium-sized swimming pool (as compared to the one mentioned above) with a basin of 25×10 metres, no diving board, a water capacity of 300 cubic metres and changing facilities for about 200.

The following mathematical example may illustrate how important even small changes can be in certain cases (fig. 5). By shortening the edges of a cube by only 10 % one can reduce its volume by as much as 27 %. A shortening of the edges by 15 % will cause the volume to shrink by 38.6 % and a shortening of the edges by 20 % reduces the volume by about 50 %.

This is to say that about one third of the cubic volume could be saved by shortening the building on all sides by about 10 %: the rooms would then have a height of 2.70 instead of 3 metres, the changing cubicles a size of 0.90×1.05 metres instead of 1.00×1.20 metres, the doors would be 0.80×1.85 instead of 0.90×2.05 etc.

In our effort to save we cannot reduce the length of the 25×10 metre pool (fig. 6), but we might reduce the width of the floor space around it. This would reduce the overall width of the hall and would also allow for a lower roof structure. By omitting the diving board we could save on the length of the hall as well as on headroom in the hall and depth in the basin.

There may be some who think that a lower hall without a diving board would not be aesthetically pleasing, but illustrations 7a, 7b and 8 will show that this is not the case. In both cases the swimming pools are 25×12.5 metres. Illustrations 7a and 7b show the usual view of an indoor swimming pool with a 1-metre and 3-metre diving board, which means that the hall has to be about 8 metres high. Figure 8 shows a multi-purpose hall with a pool of equal size but without a diving board.

Another factor which is decisive for the cubic volume is the arrangement of changing facilities and lockers. The space required for single dressing cubicles separating areas where one may walk with shoes from "barefoot" areas is many times what is needed for lockers with one changing cubicle or for lockers in a general dressing room. For our purposes here we shall therefore consider space-saving patent-lockers in dressing nooks.

Here the partition walls between the upper and the lower lockers are so designed as to allow for two lockers of a total width of 40 centimetres to be arranged one on top of the other, leaving plenty of room for one person's clothing. The hooks of the upper locker can easily be reached even by small persons.

Part A of the table on figure 9 shows the average space requirements for various types of changing facilities. Single clothing cubicles consume the greatest amount of space, especially if they separate the "shoe area" from the "barefoot area". If there is no such separation the situation is somewhat better. Even more space is saved if single dressing cubicles which cannot be used by others throughout the occupant's stay at the swimming pool are replaced by changing cubicles for a greater number of persons; the greater the number of lockers per changing cubicle, the more space is saved.

In part B of the table on figure 9 these calculations are carried still further. The most economical arrangement is a two-level rack with hangers. The visitors puts his clothes on a hanger and hands them in at a counter, where the hangers are placed on a rack. In a two-level arrangement there are two rows of hangers one on top of the other. In the case of indoor swimming pools, however, it will be advisable to use a single row only for comparatively bulky winter clothes. The figures given in table B apply to the entire arrangement, including the necessary single dressing cubicles and general dressing rooms.

Another economical arrangement is the use of the above-mentioned patent-lockers or of regular lockers in open dressing rooms. In these dressing rooms several persons can change at the same time. There is no separation in the room itself between a "shoe area" and a "barefoot area" although there is a separate entrance from the "shoe area".

Where the room is subdivided into a "shoe area" and a "barefoot area" by means of a bench extending the whole length of the room (called "step-over bench", since one has to step over it to reach the "shoe area" or the "barefoot area"), more room is needed than with the above-mentioned arrangement. Dressing rooms with step-over benches would require about as much space as regular lockers with dressing cubicles, one cubicle serving between 3 and 5 regular or patent-lockers; this arrangement would also include a complete separation between the "shoe" and the "barefoot areas" on the other side of the dressing cubicle.

In 1961 I undertook to study the various changing facilities in German and Austrian swimming pools and compared the results obtained with the corresponding arrangement of changing facilities in the "Südbad" at Dortmund, which had just been completed. Figure 10 shows the proportionate distribution of changing facilities in Germany (left) and Austria (right), subdividing the various arrangements into single dressing cubicles, changing cubicles with lockers and dressing rooms with and without lockers. In this context it must be pointed out that, unlike Germany, the separation into "shoe" and "barefoot areas" is not common in Austria. In Austria it is definitely the more convenient single dressing cubicle which predominates; dressing rooms without changing cubicles are rare.

Naturally this does affect the size of the part of the building in which the changing facilities are accommodated (fig. 11). If we take a swimming hall of a given size with a 25×12.5 metre multi-purpose basin, the overall cubic capacity of the changing facilities is about 2,900 cubic metres in the space-saving Dortmund pool; with a proportionate distribution of the various changing facilities as given in the left-hand column of table 10 the cubic capacity is 4,900 cubic metres, whereas in the swimming pools of the City of Vienna, it is almost twice that of the Dortmund pool, i.e. about 6,200 cubic metres.

This is only meant to illustrate what has already been said. In the following analysis of savings possibilities the somewhat smaller swimming hall is to be equipped with patent-lockers in dressing nooks, which would be a more economical solution.

As far as the construction work itself is concerned the reduction of the building volume would allow for savings of about 21.2 % on the swimming hall, 15.6 % on the rest of the building and 16 % on the showers and baths, or altogether 52.7 % (fig. 12).

The left-hand column on figure 12 represents the costs of the construction work on the indoor swimming pool on which the savings analysis is to be carried out. The proportionate costs of the swimming hall, the changing facilities and the showers and baths are given. The latter item has to be eliminated first of all, whereas the proportional costs of the swimming hall and the changing facilities are to be reduced in accordance with the reduction of the cubic volume of the whole project. The middle part of the right-hand column shows the remaining 47.3 % of the building costs, whereas the savings made appear at both ends of the column.

Figure 13 and the following figures show costs and savings in a similar way. The left-hand column represents the entire costs and shows how much is saved by reducing the volume. In the middle part this share is separated from the total costs. The remaining costs—represented by the lower part of the column—are subdivided into costs that could be saved by further and more intensive efforts (dark area) and the remaining basic costs. The right-hand column then shows these latter costs, with all the savings shown above.

Figure 15 shows the situation with the ceramic wall and floor linings.

The reduction in size of the entire building also cuts down on the wall and floor surfaces. However, this reduction is not as big as the reduction in overall volume, amounting to about 36 %. Moreover, we could cut down on the expenses by not tiling the walls right up to the ceiling and by using plastics rather than tiles wherever possible. The flooring should be as economical as possible, with the same low-cost non-slippery material throughout the building. This increases the possible savings by 11.5 % to 47.5 % in all.

The reduction in size of the swimming hall will also affect the steel construction (fig. 14). Here the saving will be even greater than in the above example, reaching 53 %. As a consequence of the smaller surfaces the thickness of the bars may be reduced, allowing for further savings. A number of minor changes in the construction permit a further 3.8 % expense cut, which raises total savings to 56.8 %.

The use of dressing nooks with lockers permits us to save considerably on the ceramic partition walls (fig. 15), i.e. about 78 %. Further material savings result from the use of plastic-faced partition walls (12.3 %). Altogether savings amount to 90.3 %.

The situation is similar as far as the plastic-faced doors are concerned (fig.16). The reduction of volume results in a 68 % expense cut, whereas savings on materials account for 19.5 %, i.e. altogether 87.8 %.

The expenses on glazing are cut down by about 46 % owing to smaller volume and by 6.5 % through material savings. Total savings 52.5 % (fig. 17).

With the paintwork (fig. 18) savings owing to smaller surfaces amount to 28 % and savings made by using cheap material account for 5.8 %, i.e. a total of 33.8 %. With builders' hardware and locks (fig. 19) the savings are 26 % + 3.7 % = 29.7 %

total savings. In the roofing work (fig. 20) the only worthwhile savings—26.3 %—result from the reduction of the surfaces. Savings on material are also possible with the acoustic ceiling (fig. 21) provided the reverberation time is more than 2 seconds. Total savings 62.6 %.

The remaining interior work, which accounts for less than 3 % of the net building expenses, has also been rendered more economical, with savings of between 12.5 % on the pool ladders and 100 % on fans and carpenter's work (table, fig. 22).

The reduction of volume also affects the technical installations, but indirectly rather than directly, since the required heat, electrical power and hot and cold water volume depend on operational rather than constructional factors.

The heating costs include the cost of the boilers themselves with all the necessary accessories, the cost of the pipes, the distributor, the heating units etc. as well as the cost of the hot-water plant and the automatic control system. The share of the automatic control system in the overall costs is comparatively high, since the shortage of staff necessitates the choice of a highly automated system (fig. 23).

The boiler plant not only heats the building, but also supplies the warm air for the ventilation plant and the warm water for the hot-water plant. If savings of about 47 % are possible here this would mean an expense cut of 10.8 % on the overall heating costs. The reduction in size of the project and the use of radiators instead of convector radiators result in a 2.8 % decrease in costs of pipes, heating units etc. The reduced warm-water requirements cut down on expenses for the hot-water plant.

About 53 % of this cost item, i.e. 8.5 % of the entire heating costs, may be saved because there will be fewer bathers, a smaller basin and a longer heating time for the water when it is first let into the pool. Provided that the staff are prepared to pay greater attention to the operation and maintenance of the pool, considerable savings can be made in respect of the automatic control system. For the sake of our study of possible savings let us assume that this is the case. The costs of the automatic control system may be reduced by about 83 %, i.e. about 17.4 % of the entire heating costs. This means that altogether savings amount to 49.5 %.

With the ventilation plant (fig. 24) costs drop by about 40.3 %. As a consequence of the smaller cubic volume of the swimming hall and the other parts of the building it is possible to use shorter air ducts with smaller cross sections and higher speeds in pressing the air through the ducts. Moreover, operation of the ventilation system can be simplified, although this means that the work load on the staff will be increased.

Since the water capacity of the 25×12.5 metre multi-purpose basin is reduced from about 650 cubic metres to 300 cubic metres, the savings on the water conditioning plant amount to about 39 % (fig. 25).

About 22 % of the costs are saved on electrical installations (fig. 26).

The savings on the water supply system and the sewage disposal are considerable (fig. 27) provided that the separate showers and baths are dispensed with. The 200 bathers will consume less water when using the showers in the swimming hall proper. If, moreover, a cheaper material than copper is used for the tubes, the saving will be as much as 56.8 %.

Let us now look at the results of this detailed investigation (fig. 28). The reduction of the building volume affects almost all the cost items to some extent, although in varying degrees and not always proportionately to the reduction of building volume. With each cost item we have considered and actually put down further savings. In some cases the savings were considerable. What now are the effects of these savings on the overall building costs?

In order to determine this we have to correlate the individual saving rate to the share of the respective cost component in the overall building costs (fig. 28). The values obtained in this process are sometimes very small indeed. Accordingly, the actual effect of the computed savings is not as great as it might look at first sight. Nevertheless, total savings amount to as much as 50.57 %.

In our investigation we used a concrete example and suggested possibilities of cutting down expenses which may not be to everybody's liking. The method employed, however, is of general importance, since it would be possible for expert committees to carry out cost analyses and consider saving possibilities in a similar way. The individual figures obtained will certainly differ to some extent, but the overall result will almost certainly be the same. After all, major savings are possible only with those cost components which account for a high proportion of the overall costs. As long as this is not taken into account, no major savings will be made. Although it is possible to obtain radical cuts so far as the equipment is concerned by the use of cheaper materials, the effect on the overall costs is but negligible. Instead, more repairs will be necessary and maintenace costs will be higher as a consequence.

When looking at the swimming pools built in the last few years we can see that in Germany and Austria volume has on the whole been reduced as compared to the size of the pool itself. This relation between the total volume and the size of the pool in a way illustrates the economy in planning. We call it "utilisation ratio". The higher the cubage required for one square metre of water surface, the greater the costs for those facilities not directly utilised by the bather (see also figs. 6 and 31).

In 1964 and 1965 the swimming pools of Göppingen, Marl, Gaderbaum, Berlin-Tempelhof, Bonn, Geldern and Flensburg were opened. With these swimming pools the utilisation ratio ranges from 1:72 to 1:46, i.e. an average of 1:57. That is to say per square metre of water surface a cubic volume of 57 cubic metres is provided.

In 1967 the swimming pools of Büderich, Montabaur, Diepholz, Ennigloh, Marktoberdorf, Ketsch, Riesenbeck, and Fischbach Altenfurth were opened. Here the utilisation ratio ranges from 1:45 to 1:30, i.e. an average of 1:36.3. The cubic volume per square metre of water surface is smaller by 35 % than 3 or 4 years earlier (table, fig. 30).

Obviously efforts are being made everywhere to provide the highest possible number of communities with low-cost indoor swimming pools. In this context I should like to add one more observation which will certainly be of interest. In the left-hand upper corner of figure 31 you can see the swimming hall with the 25×12.5 metre multi-purpose pool also shown above in figure 6. For years endeavours have been made to reduce the air space of such halls in order to cut down on building and operating costs. The hall is not the same height throughout (a), it is higher around the diving board. Depending on whether this higher part extends along the entire width of the hall (b) or is built only around the 3-metre diving board (c), the reduction in volume ranges from about 9,000 cubic metres in case (a) to some 8,030 cubic metres in case (b) and about 7,720 cubic metres in case (c).

On the right, one sees the small swimming hall with the 25×10 metre basin shown in figure 6, the only difference being that here a wing has been added which contains a diving pool with the minimum measurements required for a 1-metre and a 3-metre diving board. This combination—a pool with a width of 10 metres and a separate diving pool—permits a reduction in volume of some 6,120 cubic metres, although the water surface has been increased by 5.6 %. Thus, this arrangement is even better than lowering the ceiling outside the diving area of a 25×12.5 metre pool. First of all, the water surface is larger despite the smaller building volume, secondly the water volume is reduced by 11.4 % and, last but not least, the separate pools can be much better utilised. This solution is in complete accordance with the recommendations made by working groups A I and A II of the Cologne Course.

Other factors influencing building costs

We have talked about the possibilities of cutting down expenses in the construction of indoor swimming pools. The possibilities are varied as are the effects of the various measures on the building costs. Only in individual cases is it possible to tell exactly how far these measures can go.

For example, the climatic conditions in Europe differ greatly from region to region. In the Netherlands the heating requirements will differ from those in Switzerland, in Italy they will not be the same as in Sweden. In fitting the windows attention must be paid not only to the cold, but also to wind and rain. The minimum heating and ventilation requirements are highly dependent on the climatic conditions.

Another important factor is the sociological set-up in the various regions. Whereas in a city, let us say in Vienna, it may very well be possible to have 20, 30 or even more people change in one dressing room, the population in other cities may prefer a subdivision into smaller rooms or nooks. These attitudes are reflected in the volume required and sometimes are responsible for greater increases in construction costs than can be set off by material savings.

The building authorities, too, put certain limitations on the saving possibilities. At least in Germany and Austria indoor swimming pools are governed by the same regulations as meeting-halls (bye-laws governing theatre construction). The width of passages and doors, the height of rooms, the staircases etc. are planned not on the basis of operational requirements but according to regulations which were framed for theatre buildings. Escape routes and emergency exits which not only consume money and space but render more complicated the various operations involved in running the pool have to be taken into consideration as well. There are authorities whose regulations prohibit the use of even the smallest amount of wood in the swimming hall. This means that instead of the cheaper wooden acoustic ceiling a metal ceiling has to be used.

In some cases the use of prefabricated sections, which is much less time-consuming, helps to reduce costs and building time. Moreover, the shell can be set up even under very unfavourable climatic conditions in winter, saving much time.

Very often the opinion is heard that the use of prefabricated sections is the only absolutely effective measure in reducing costs. In this context I should like to quote an announcement in the press by the chairman of the German Building Contractors' Association. According to this, rationalisation in the building trade has advanced so far as to make the traditional and mixed building methods truly competitive with the prefabricated method in both cost and quality. The view that generally the latter is cheaper was refuted by the chairman, who claimed that in many cases the opposite was true.

I do not want to decide whether this expert opinion is correct. However, if we consider that with an indoor swimming pool the actual construction work accounts for only one-third of the net building expenses, we come to the conclusion that—assuming that prefabricated construction method is cheaper by 20 %—the overall savings would not be more than 6 %. It is highly improbable that genuine savings of as much as 20 % of the actual construction work are possible without affecting the quality. Therefore it is advisable to decide in each individual case after a careful study of the economic possibilities which building method should be recommended to the sponsor. Thus, I consider it the best solution in an indoor swimming pool to be built shortly to use precast reinforced concrete sections for the swimming hall, whereas I suggest the light construction method for the changing facilities and the conventional construction method for that part of the structure in which the technical facilities are accommodated. We shall thus use three different construction methods on one project in order to obtain optimum results as far as cost and quality are concerned.

Practical examples

In order to illustrate that the above analysis and studies can in fact be put into practice, I had several projects for low-cost indoor swimming pools worked out in my office. They are shown in the last pictures.

Figure 32:

A swimming hall in the Vienna Woods, Austria, with a 12.5×4 metre pool for teaching and relaxation purposes. Cubic content 603 cubic metres. Utilisation ratio 1:12. Construction period 3 months. Entire construction in wood-strip method with prefabricated sections produced in the casting yard. Swimming pool in plastics. Net building expenses about DM 100,000.

Figure 33:

Swimming hall for Neunkirchen, Austria, with a 16 2/3×7 metre pool (water surface 116.70 sq.m.), covered patio and terrace. Heated swimming hall, well protected against wind and weather, for use in bad weather in summer and after the bathing season proper. Cubic content 1,674 cubic metres. Utilisation ratio 1:14. Mixed construction method, construction period 9 months. Net building expenses about DM 260,000.

Figure 34:

Indoor swimming pool for Braunschweig, Germany, with 25×10 metre pool (water surface 250 sq. m.). 200 changing lockers in "comb system" Hanover. Cubic content 4,950 cubic metres. Utilisation ratio 1:20. Construction period 12 months. Mixed construction method. Building costs DM 1,000,000.

Before concluding, let me present the design of a so-called "Europa Pool".

This swimming pool is to be unique in its design and is supposed to come up to the most modern standards. It can be built in stages depending on the means available, starting with a swimming hall with a movable ceiling; three separate pools may then be added in due course. What is so exciting about this design is that for the loadbearing structure we use prefabricated sections of a material that will allow for further additions at any time. Everything else is part of the interior work. The size will differ according to region and climate, sociological set-up and catchment area.

Figure 35:

First building stage

Wind and weather-protected swimming hall as an extension of an existing open-air swimming pool with a pool 25×10 metres, depth 90 cm to 1.45 metres or 1.40 to 1.80 metres or 1.80 metres throughout, sliding ceiling for better sun protection in summer. Terraces and powerhouse for water conditioning. Water surface 250 sq.m. Cubic content 3,394 cubic metres. Utilisation ratio 1:12. Net building costs about DM 590,000.

Figure 36:

Second building stage

Installation of 200 changing facilities in "comb system" with entrance hall, cash-desk, bath attendant's room, lavatories and showers for an operational swimming pool. Water surface 250 sq.m., cubic content 4,671 cubic metres. Utilisation ratio 1:19. Additional net building costs about DM 420,000, altogether DM 1,000,000.

Third building stage

Extension by a learners' or non-swimmers' pool with 8×10 metre basin, depth 60 to 125 cm. Water surface 330 sq. metres. Cubic content 5,430 cubic metres. Utilisation ratio 1:16.5 Additional net building costs DM 130,000, i.e. a total of DM 1,140,000.

Fourth building stage

Extension by 80 changing facilities for schools and other groups or by a sauna or by a buffet. Water surface 330 sq.m. Cubic content 5,750 cubic metres. Utilisation ratio 1:17.5. Average additional net building costs DM 105,000, altogether about DM 1,245,000.

Figure 37:

Fifth building stage

Final development into a multi-purpose indoor swimming pool by way of extension by a multi-purpose hall with pool 7.65×10.50 metres, depth 3.50 metres, for the 1- metre and 3-metre diving board. Water surface 410 sq.m. Cubic content 7,252 cubic metres. Utilisation ratio 1:18. Net building costs of the entire project about DM 1,500,000. A sixth building stage adding a grandstand for 240 spectators is possible.

Concluding remarks

What we call civilisation is the result of many years of fair play. It would be quite contrary to this concept if in our efforts to save money at any price we were to return to an outmoded and even primitive way of building our swimming pools. After all, we do not only want the various projects to be cheap, we also expect them to fulfil their purpose in the best possible way, because only then are they truly inexpensive and economical.

To build economical, low-cost indoor swimming pools means:

— to come to a clear understanding of the ends to be achieved,
— to determine the final purpose, i.e. whether the pool is to serve for sports and family entertainment, as a district swimming pool, for leisure-time activities or for the tourist industry,
— to choose a site where development costs are reasonable,
— to choose the simplest type of construction,
— to adjust the technical installations to operation and maintenance requirements,
— to limit the equipment to what cannot be dispensed with,
— to determine operating costs on the basis of operating times,
— to charge realistic prices.

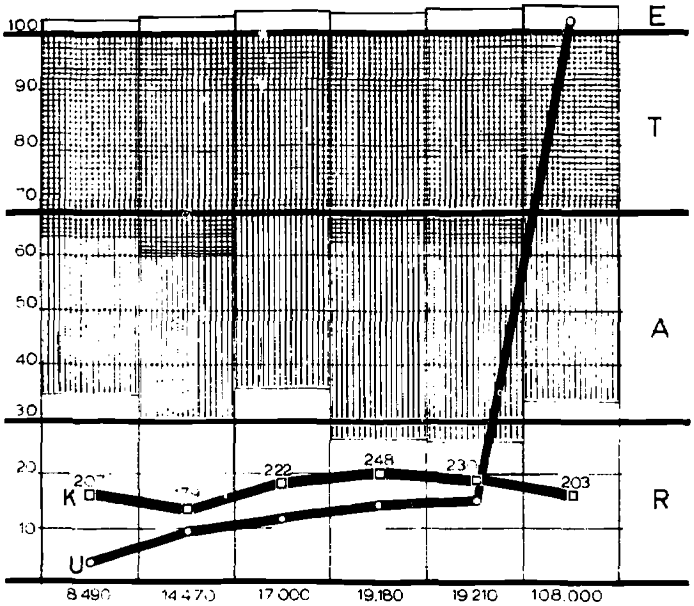
If on the basis of the results obtained in the Council of Europe's Course at Cologne we succeed in building low-cost indoor swimming pools which fit into the landscape and are pleasing to be the eye in summer, in winter, by day and by night, the construction of indoor swimming pools will be taken up with enthusiasm even by smaller communities.

Better a small pool than none at all. Swimming is still the most popular and the healthiest of sports.

1 Definition of "building expenses" in various countries; a comparison between DIN-Norms in Germany and Ö-Norms in Austria

		Germany DIN 276	Austria ÖNorm B 400, Part 6
1. Real estate costs			
1.1 Value of site - price			
1.2 Acquisition costs			
1.3 Development costs			
1.3.1 Indemnities and compensation	3,000,000.—	Costs of building site 3,000,000.—	Special costs 3,000,000.—
1.3.2 Clearing of building site			
1.3.3 Public drainage system, public utilities - conduits, streets			
1.3.4 Non-public drainage system, utilities - conduits, streets			
1.3.5 Other expenses			
2. Building costs			
2.1 Building costs (net building expenses)	28,000,000.—		Building costs 28,000,000.—
2.2 Costs of outdoor installations			
2.2.1 Drainage and utilities - branch to building			
2.2.2 Fixing work on site, fences	4,000 000.—		
2.2.3 Garden work			
2.2.4 Other outdoor installations			
2.3 Secondary building costs		Building costs 57,000,000.—	
2.3.1 Architectural and engineering fees			Special costs 29,000,000.—
2.3.2 Administrative fees	8,000,000.—		
2.3.3 Public authorities			
2.3.4 Financial means			
2.4 Costs of special installations	11,000,000.—		
2.5 Costs of equipment	6,000,000.—		
Total costs	60,000,000.— AS	60,000,000.— AS	60,000,000.— AS

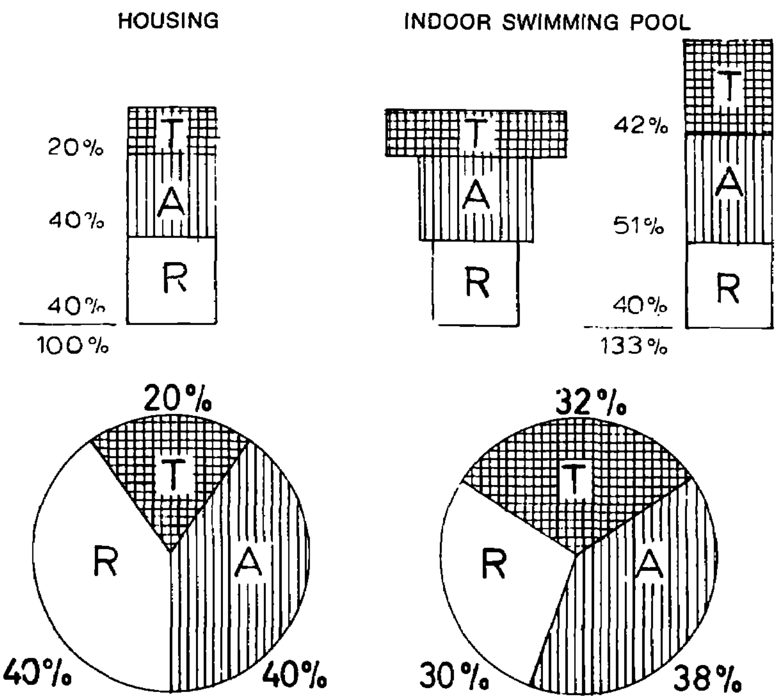
AS: Austrian Schilling



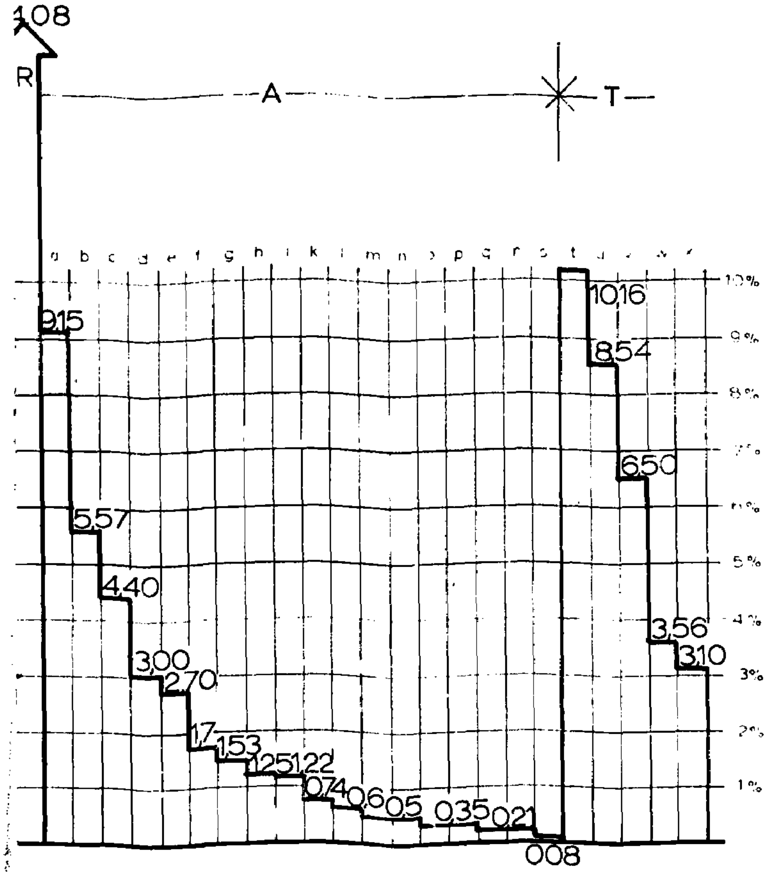
E - Equipment
T - 32 % Technical installations
A - 38 % Interior work
R - 30 % Shell
K - Price per cubic metre in DM
U - Cubic content

2 Comparison of specified building expenses of six indoor swimming pools of different sizes according to the share of costs for the shell construction, completion, and technical installation

3 Comparison of the shares of the shell construction, completion, and technical installation in housing construction, and in indoor swimming pool construction

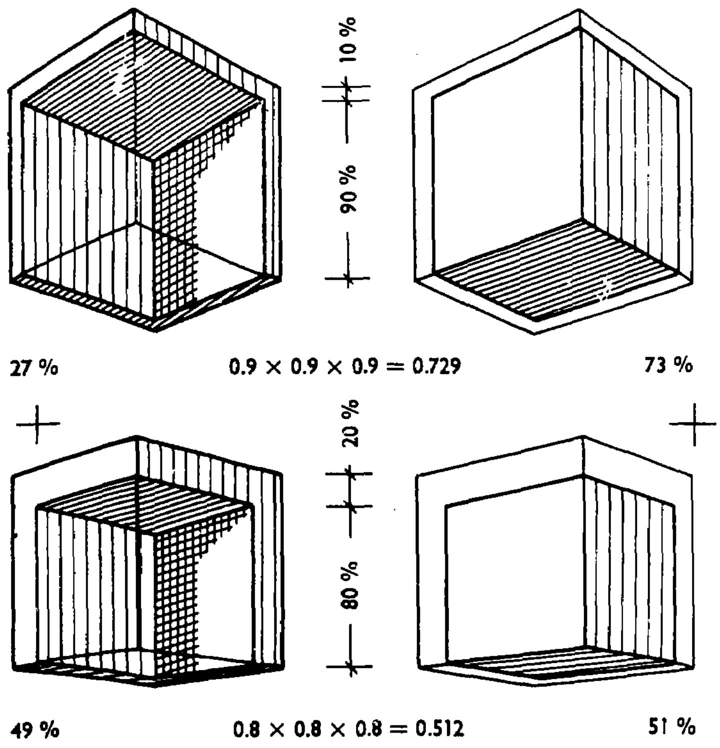


T - Technical installations
A - Interior work
R - Shell



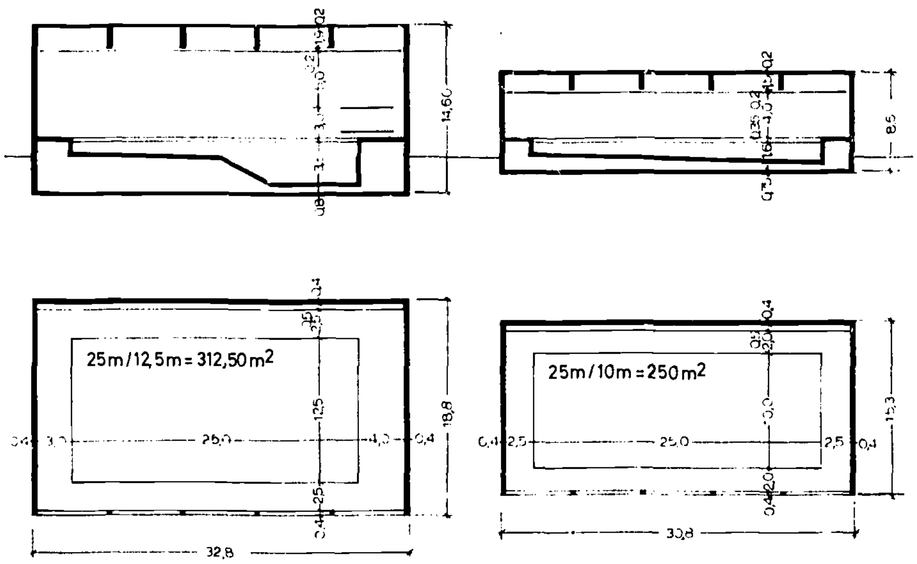
R - Shell
A - Interior work
T - Technical installations
a - Ceramic wall and floor linings
b - Steel constructions
c - Ceramic partition walls
d - Plastic-faced doors
e - Glazing
f - Paintwork
g - Builders'hardware
h - Roofing
i - Locks
k - Acoustic ceiling
l - Joinery work
m - Locksmithing
n - Ladders into swimming pool
o - Cast stone work
p - Pneumatically applied plaster finish
q - Roof ventilation
r - Scaffolding
s - Carpenter's work
t - Heating
u - Ventilation
v - Water conditioning
w - Electrical installations
x - Water supply and sewage disposal

1 **Further sub-division of costs for completion work and technical installation of a swimming pool with a 25 m × 12.5 m multi-purpose pool**



5 **Decrease of the volume of a cube when shortening its edges by 10 % or 20 %**

6 **Comparison of the building vol and the ratio of utilisation of swimming halls**



Swimming hall with 25×12.5 metre multi-purpose basin and 1-metre and 3-metre diving board, 28.80 cubic metres/square metre of water surface. Utilisation ratio 1:28.8.

32.80 m × 18.80 m = 616.60 m²
616.60 m² × 14.60 m = 9,002.90 m³
100 %

Swimming hall with 25×20 metre pool without diving board, 16.20 cubic metres/square metre of water surface. Savings 43.5 %. Utilisation ratio 1:16.2.

30.80 × 15.30 m = 471.20 m²
471.20 m² × 8.60 m = 4,052.70 m³
45 %

Savings 55 %

7a **Swimming hall with 25 m × 12.5 m multi-purpose pool 1 m and 3 m diving facilities; one longitudinal side swimming hall glazed**

9 **Comparison of various changing facilities according to their space requirements. For further explanations of the changing facilities mentioned see text**

A. *Space requirements*

2.30-2.60 sq.m	Single dressing cubicles with separation into "shoe" and "barefoot" areas
1.75-1.90 sq.m	Single dressing cubicles without separation into "shoe" and "barefoot" areas
1.25-1.33 sq.m	Lockers with changing cubicles, 3:1
0.90-1.00 sq.m	Lockers with changing cubicles, 1:4
0.75-0.80 sq.m	Patent-lockers with changing cubicles, 1:5

B. *The same area could accommodate*

1,000	hangers in two-level racks
500	hangers in single-level rack
500	patent-lockers without step-over bench
280	regular lockers without step-over bench
245	patent-lockers with step-over bench
225	patent-lockers with changing cubicles, 5:1
185	regular lockers with changing cubicles, 4:1
145	regular lockers with step-over bench
135	regular lockers with changing cubicles, 3:1
95	single dressing cubicles without separation into "shoe" and "barefoot" areas
75	single dressing cubicles with separation into "shoe" and "barefoot" areas

10 **Proportionate distribution of the changing facilities in Germany and Austria, spring 1961**

INDOOR SWIMMING POOLS - GERMANY

IN PER CENT

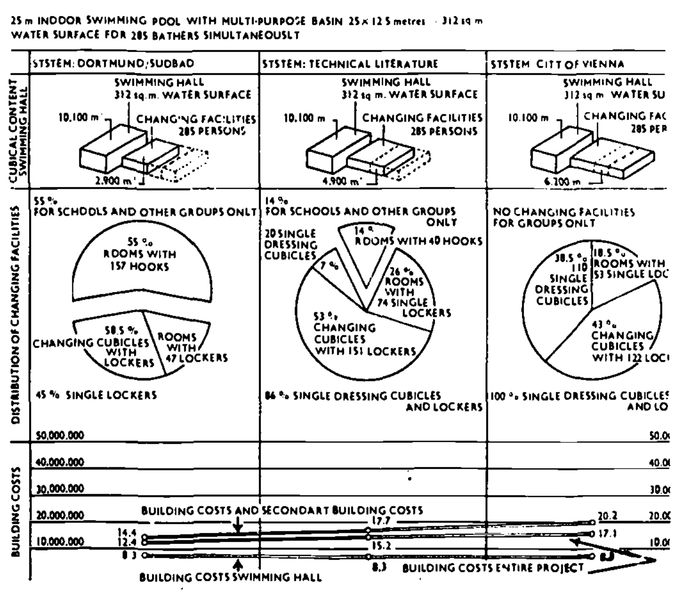
	SWIMMING POOLS	Single dressing cubicles	Changing cubicles with lockers	General dressing rooms with lockers	General dressing rooms without lockers
1	WIESBADEN	—	100	—	
2	BADEN-NORD	—	94	6	
3	DÜSSELDF-GERRESHM	—	86	14	
4	GELSENKIRCHEN	—	76	24	
5	LUDWIGSHAFEN	—	70	30	
6	OBERHAUSEN	—	69	31	
7	KARLSRUHE	—	68	32	
8	BIELEFELD	26	42	32	
9	BREMERHAFEN	16	52	32	
10	WEIDENAU / SIEG	—	65	35	
11	REGENSBURG	—	63	37	
12	HAMM I. W.	7	56	37	
13	WANNE / EIKEL	—	62	38	
14	BOCHOLT	4	57	39	
15	AHLEN	9	48	43	
16	FRANKFURT-HOCHST	22	22	56	
17	MÜNCHEN/ NORDBAD	42	—	58	
18	LUNEBURG	—	37	63	
19	BOCHUM	8^5	27^5	64	
20	DORTMUND	—	289	16^5	55
	AVERAGE ACCORDING TO Dr. FABIAN	7	53	26	14
21	WIEN - FLORIDSDORF ●	38^5	43	18^5	
22	DÜSSELDF. / ZENTRALBD.	52	27	21	

INDOOR SWIMMING POOLS - AUSTRIA

IN PER CENT

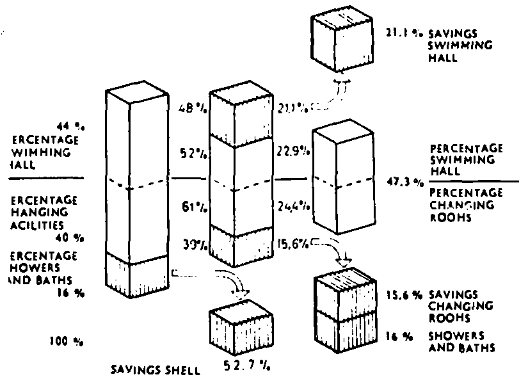
	SWIMMING POOLS		Single dressing cubicles	Changing cubicles with lockers	General dressing rooms with lockers
1	GRAZ / SONNE	●	100	—	—
2	JUDENBURG	●	56	44	—
3	WIEN / AMALIENBAD	●	47	53	—
4	WIEN / JÖRGENBAD	●	22	78	—
5	ST. PÖLTEN	●	—	100	—
6	SEMMERING	●	—	100	—
7	WARMBAD VILLACH	●	—	100	—
8	WIEN DIANA	●	—	98	2
9	LINZ	●	26^5	68	55
10	VEITSCH	●	12^5	81	65
11	INNSBRUCK	●	12^5	80	75
12	KREMS	●	15	75	10
13	KAPFENBERG	●	—	90	10
14	SALZBURG		22	64	14
15	WIEN - FLORIDSDORF	●	38^5	43	—
	AVERAGE		22	74	4
	AVERAGE-GERMANY ACCORDING TO Dr. FABIAN		7	53	14

KEY:
- SINGLE DRESSING CUBICLES
- CHANGING CUBICLES WITH LOCKERS
- GENERAL DRESSING ROOMS WITH LOCKERS
- GENERAL DRESSING ROOMS WITHOUT LOCKERS
- ● NO SEPARATION INTO "SHOE" AND "BAREFOOT" AREAS

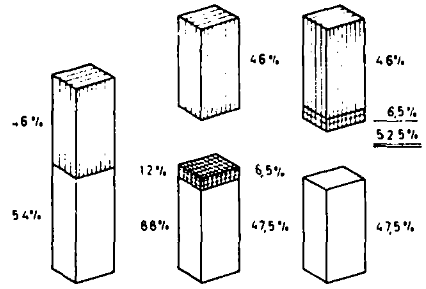


11 **Proof of the dependence of the building capacity on the type of changing facilities chosen**

'OSSIBILITIES OF ECONOMISING IN THE VARIOUS TRADE BRANCHES



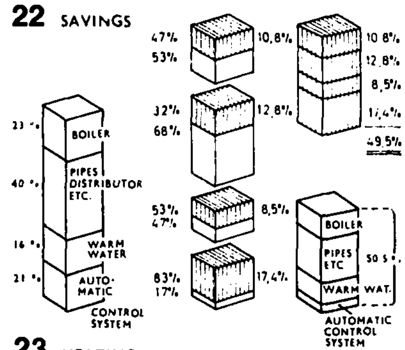
12 WALLS



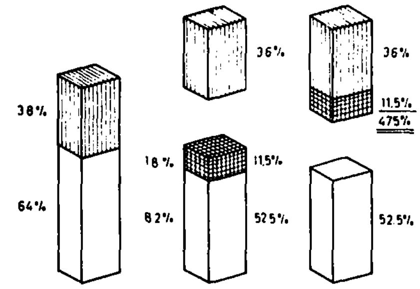
17 GLAZING

	SAVINGS
JOINERY WORK	35 %
LOCKSMITHING	38 %
LADDERS INTO POOL	12.5 %
CAST STONE WORK	45 %
PNEUMATICALLY APPLIED PLASTER FINISH	80 %
ROOF VENTILATION	100 %
SCAFFOLDING	60 %
CARPENTER'S WORK	100 %

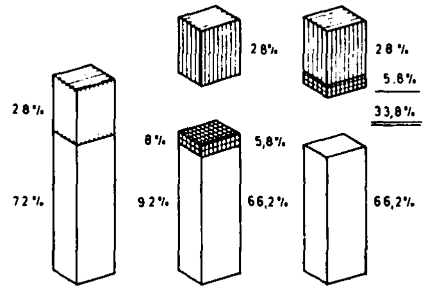
22 SAVINGS



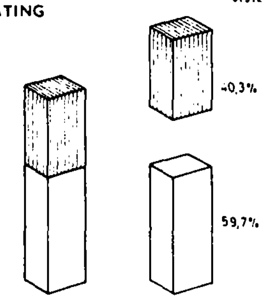
23 HEATING



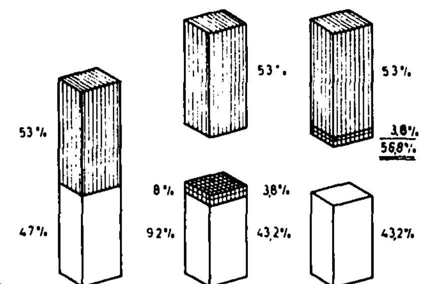
13 CERAMIC WALL AND FLOOR LININGS



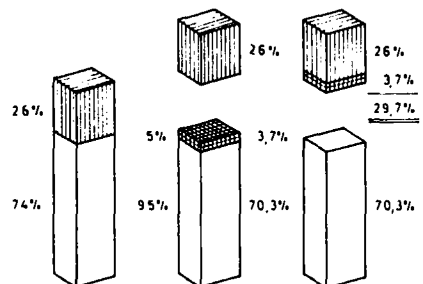
18 PAINTWORK



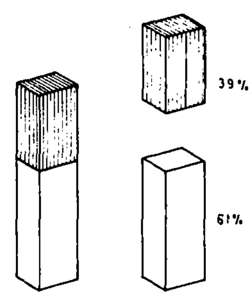
24 VENTILATION



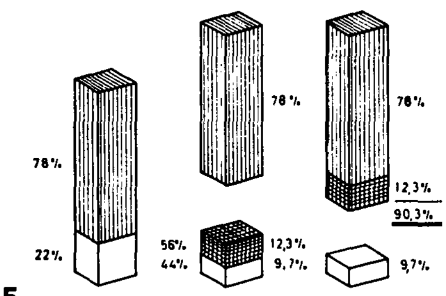
14 STEEL CONSTRUCTIONS



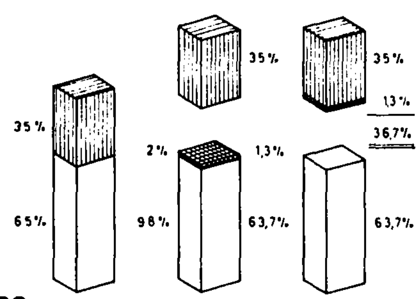
19 BUILDERS' HARDWARE, LOCKS



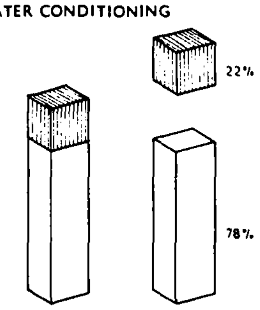
25 WATER CONDITIONING



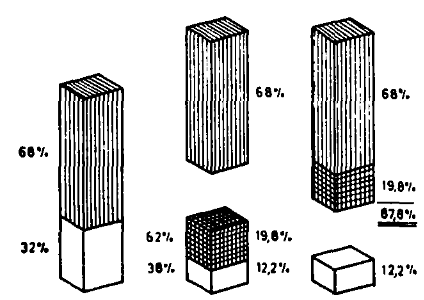
15 CERAMIC PARTITION WALLS



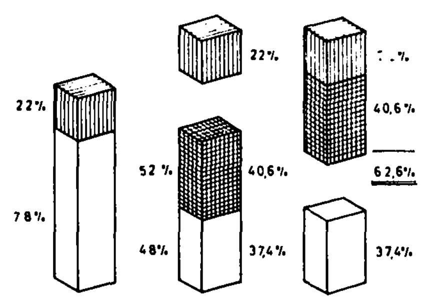
20 ROOFING



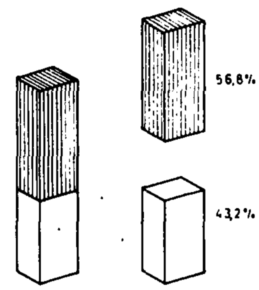
26 ELECTRICAL INSTALLATIONS



16 PLASTIC-FACED DOORS

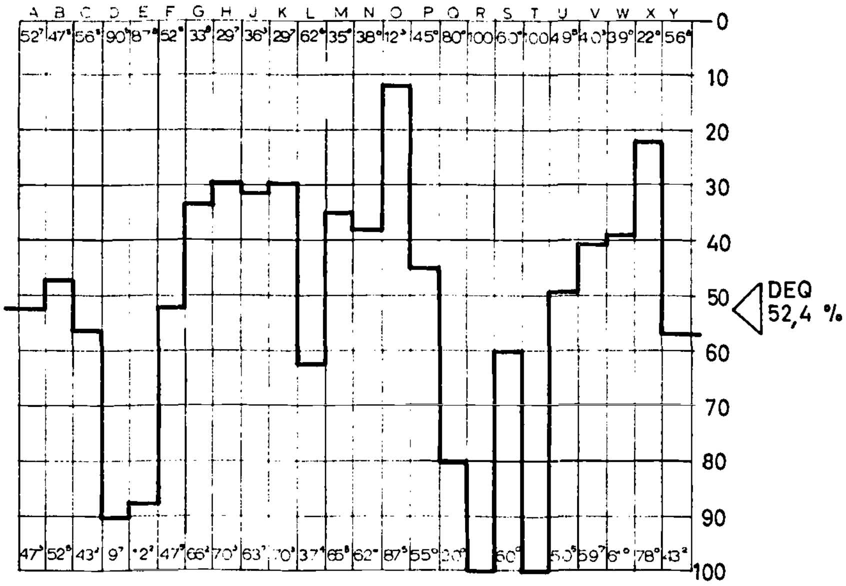


21 ACOUSTIC CEILING



27 WATER SUPPLY, SEWAGE DISPOSAL

28 **Result of the individual examinations o possible saving within the individual co: groups**



A - Shell
B - Ceramic wall and floor linings
C - Steel constructions
Ceramic partition walls
E - Plastic-faced doors
F - Glazing
G - Paintwork
H - Builders' hardware
J - Roofing
K - Locks
L - Acoustic ceiling
M - Joinery work
N - Locksmithing
O - Ladders into poc
P - Cast stone work
Q - Pneumatically applied plaster finish
R - Roof ventilation
S - Scaffolding
T - Carpenter's work
U - Heating
V - Ventilation
W - Water conditioninç
X - Electrical installations
Y - Water supply anı sevage disposal
DEQ - Average rate of savings

29 **Result of the individual examinations on possible saving within the individual cost groups with regard to the building expenses**

Trade branches	Share in building costs	Savings	Savings/ percentage of building costs
	%	%	%
Shell work	34.08	52.7	18.06
Ceramic wall and floor linings	9.15	47.5	4.35
Steel constructions	5.57	56.8	3.16
Ceramic partition walls	4.40	90.3	3.97
Plastic-faced doors	3.00	87.8	2.64
Glazing	2.70	52.5	1.46
Paintwork	1.70	33.8	0.57
Builders' hardware	1.53	29.7	0.45
Roofing	1.25	36.3	0.44
Locks	1.22	29.7	0.36
Acoustic ceiling	0.74	62.6	0.29
Joinery work	0.60	35.0	0.21
Locksmithing	0.50	38.0	0.19
Ladders into pool	0.50	12.5	0.06
Cast stone work	0.35	45.0	0.16
Pneumatically applied plaster finish	0.35	80.0	0.28
Roof ventilation	0.21	100.0	0.21
Scaffolding	0.21	60.0	0.12
Carpenter's work	0.08	100.0	0.8
Heating	10.16	49.5	5.03
Ventilation	8,54	40.3	3.44
Water conditioning	6.50	39.0	2.54
Electrical installations	3.56	22.0	0.78
Water supply, sewage disposal	3.10	56.8	1.76
	100.00		
Savings as a percentage of building			50.57

30 **Decrease of the ratio of utilisation in recent years**

Indoor swimming pools opened 1964, 1965

Göppingen	Utilisation ratio 1:'
Marl	Utilisation ratio 1:(
Gadderbaum	Utilisation ratio 1:!
Berlin-Tempelhof	Utilisation ratio 1::
Bonn	Utilisation ratio 1:!
Geldern	Utilisation ratio 1:‹
Flennsburg	Utilisation ratio 1:‹
	Average utilisation ratio 1:!

Indoor swimming pools opened 1967

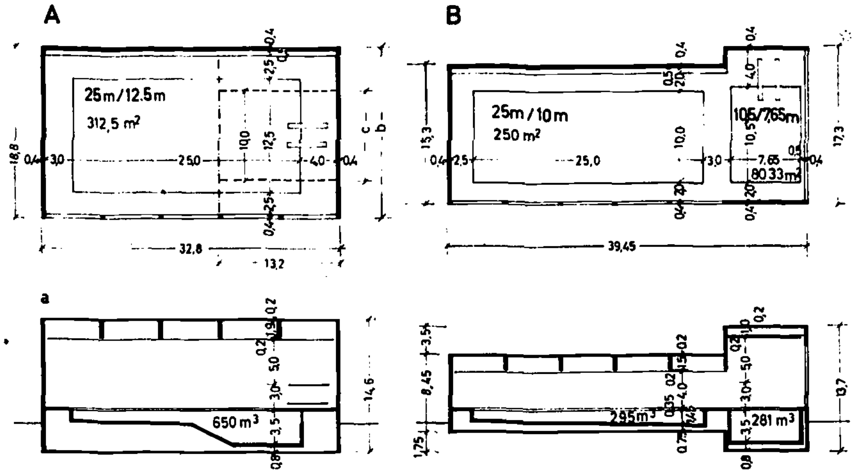
Büderich	Utilisation ratio 1:‹
Montabaur	Utilisation ratio 1:‹
Diepholz	Utilisation ratio 1:‹
Enigloh	Utilisation ratio 1::
Marktoberdorf	Utilisation ratio 1::
Ketsch	Utilisation ratio 1::
Riesenbeck	Utilisation ratio 1::
Fischbach-Altenfurt	Utilisation ratio 1::
	Average utilisation ratio 1::

Multi-purpose pool

Separate pools

A

B



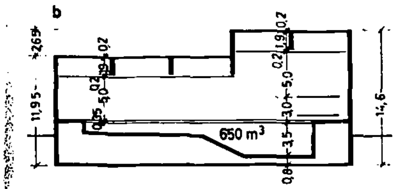
a

UR : 9000 m³

UR : 6120 m³

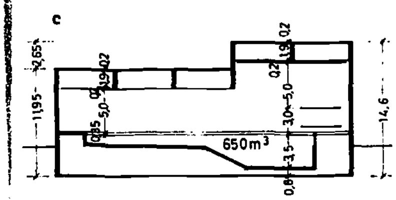
31 **Comparison of a swimming hall with 25 m × 12.5 m multi-purpose pool for swimmers and divers from 1 m and 3 m boards, and *a swimming hall with two pools,* one of 25 m × 10 m for swimming and one of 7.65 m × 10.5 m for diving from 1 m and 3 m boards**

b



UR : 8030 m³

c



UR : 7720 m³

Cubic content	A to B		Result	
Cubic content Aa	9,000 m³	6,120 m³	B 32 %	<
Cubic content Ab	8,030 m³	6,120 m³	B 24 %	<
Cubic content Ac	7,720 m³	6,120 m³	B 21 %	<
Water surface	3,125 m²	330 m²	B 56 %	>
Water capacity	650 m³	576 m³	B 114 %	<

Utilisation ratio

1 sq.m of water surface:1 cubic metre of cubic content

Aa 1:29
Ab 1:25.5
Ac 1:24.5
B 1:18.5

32 **Small swimming hall in Wiener Wald, Austria, with a 12.5 m × 4 m pool**

3. *Combined pools*

Study by Mr. Å. E. Lindqvist, Architect SAR, Stockholm, Sweden

Why a combined pool?

On a really warm summer day one tends not to visit an indoor pool, however well equipped—one naturally prefers to bathe outdoors, under the open sky. When the weather is uncertain, however, people will hesitate to visit an outdoor pool, since the excursion can easily prove a failure. The great advantage of a combined pool is that it will fulfil its purpose under all weather conditions. It is designed to provide for alternative types of bathing, indoor or in the open air. This is one of the reasons why we should concentrate preferably on building such combined facilities, at least in Central Europe, as will be explained below.

In the peak of summer, the demand for bathing facilities naturally increases, and people will naturally prefer to visit an outdoor pool to have a "quick dip" before work, over lunchtime, after work, or, if they have the time, a "long bathe" of 3-4 hours. In the latter case, sun-bathing, games, exercise and various activities will claim more time than the actual swimming.

School holidays and the parents' vacations are other factors that help raise the number of users during the summer. Such visits to pools in fine weather are relatively prolonged.

At present, bathing requirements in the summer months are on the average per day about five times higher than in the winter half of the year. It is possible, however, that this situation may alter as we build more and better equipped combined pools. I believe, in fact, that the need for bathing and relaxation in a suitable and attractive environment is at least as great in the winter, and in the future we will surely find more interest in bathing also during the winter half of the year.

There is a tendency at present to an increasing amount of leisure time. In the summer one has a wide variety of free-time activities at one's disposal, but the possibilities on a grey, cold, blowy, wet winter day are extremely limited. If the bad weather persists for a long period, with no intervening sun and warmth, this has a bad effect on our tempers, and we need some form of relaxation. An increasing amount of daily free time has been accompanied by improved financial resources and longer holidays. People are more and more inclined to take a holiday in some warmer country, but for most this can only be a valuable break of 2-3 weeks. After such a trip, the darkness and the cold can be even more difficult to bear. I believe, therefore, that pools in the future must try to offer the whole family an entirely different environment from that previously provided. They must be designed to offer a substitute for the sun and warmth that we lack during a large part of the year.

I think that we must try first of all to increase the size of the facilities as such. They must not just contain the space for the actual pool with a 3-4 metre surround. Our starting-point must be that bathing will take longer than an hour—surely two or three hours. A longer visit means an opportunity to engage in activities other than just swimming. Most people want to be in the water for a bit and then take a rest, sun-bathe, take some exercise or buy a refreshment before diving in again. A pool where bathers stay this length of time should provide a winter-garden for rest, with tables and seats for refreshments and offer exercise rooms, with gymnastic equipment for individual training, and sun-bathing cubicles.

A sun-bath with ultra-violet lamp should be included in the price of the ticket. In individual cubicles, the sun-ray lamp can be switched on for 3-minute periods by means of a timer.

I have just described what I believe to be the pool of the future. Equipped in this way, it really is a combined indoor and outdoor facility, which even in winter can offer something of the environment and relaxation that an open-air pool gives in the summer. It follows that these new pools will attract more users than the traditional facilities.

Such a combined pool, however, naturally involves a large investment. I should therefore like below to propose certain measures to reduce costs, and above all I would suggest that such a facility be built in stages, but in such a way that even the first stage offers a perfectly usable pool.

Apart from its great possibilities of flexible use, a combined facility offers also certain purely economic advantages. These are:

1. A single purifying plant can be used for all pools. If the amount of water in the basins of the open-air facility is not much greater than in the indoor section, then the purifying plant will be sufficient also for the former.
2. Same heating and power units.
3. Joint entrance hall.
4. Joint parking. A Swedish pool for 250 users in the winter requires space for 20 cars, and for the outdoor pool's 1,250 users in the summer, space for 75 cars is required.
5. The indoor pool, when combined with an outdoor pool, acquires access to a sun-bathing area and garden plantations that, in the intermediate season, can be used 1-2 months per year for sun-bathing before the outdoor pool opens.
6. In the changing rooms of the outdoor pool, the sections sensitive to frost—the shower rooms and toilets—can easily be heated to at least +5 °C during the winter, since they are situated near the indoor pool's heating unit.
7. The purifying plant, which is used all the year round, need not be shut off during the winter.

General principles for planning and building a modern pool

The simplifications and savings in planning and construction that I have outlined below are not intended for the central facility in a big city or for that in the main county town or such places, where the pool should be larger and equipped for championship swimming; I am thinking of the pools in smaller towns, and districts (25,000-50,000 inhabitants).

Also my proposals on planning are designed to save staff. In Sweden we have enormous labour problems, and the situation unfortunately seems to be becoming similar in more and more countries.

First, however, something about the three general factors that influence the planning of a combined pool, namely:

1. The geographical situation of the pool.
2. Its size.
3. Position of the pool in the town/urban area.

The number of months in which indoor and outdoor facilities are used will depend entirely on the geographical situation of the pool, and the local climate. In some parts of Europe it is open to question whether a combined pool is necesary, since the climate permits the use of mainly one type. At all events, however, the climate will be a decisive factor in planning (fig. 1).

I have tried to give a picture of this variation on the basis of the January isotherms. Europe can be divided largely into six different zones: North Northern

Europe, South Northern Europe, North Central Europe, South Central Europe, North Southern Europe, and South Southern Europe.

The northernmost zones lies north of the January isotherm −5 °C, which runs at about latitude 62. It is questionable here whether, for a single month in the summer, it is worth building an outdoor pool. An outside sun-bathing terrace would be a useful complement to the indoor pool during the one or two summer months in question. Also, one can provide outside showers and a paddling pool for children on the terrace.

The southernmost zone lies south of the January isotherm +10 °C, which runs at about latitude 37. Here the actual indoor pool can be replaced by a rain and sun tent over one of the basins. Changing rooms and shower rooms to be built on the usual scale. Also, the changing section should include a sauna room. Particularly in hot climates, the steam bath has long been popular. Such baths are really cooling, when it is hot outdoors.

In Central Europe, around the January isotherm +2.5° and latitude 50, the outdoor pool can be used 4-6 months. The indoor pool can be used during the winter for 6-8 months, and in the intermediate seasons in spring and autumn it can be supplemented for 1-2 months with outdoor sunbathing. It is in this belt that I think the combined pool really can be exploited. Here it is beyond all doubt the best solution.

Another important factor in planning a pool is to get the right size. This, of course, is determined by special calculations based on local bathing habits, density of population, communications within the area etc.

In Sweden, which is fairly sparsely populated, it is usual to plan a bath for a basic population of 20,000-40,000 inhabitants in the actual built-up area, plus 5,000-10,000 inhabitants in the surrounding countryside within a radius of 10-20 km.

These figures give for the indoor pool 200-350 bathers at the same time, and for the outdoor pool 1,000-2,000 bathers at a time.

For a combined facility to be properly used, it is extremely important that the site should be in the centre of the town, if it is the town's only pool, or in the case of a suburb or district in the local centre, where shops, schools and communications are concentrated. It is also necessary that the site should lie in a park, well embedded in a "green" area, to protect the pool from dust, smoke and traffic noise, and to give it the proper environment and general setting. Since such a site is often difficult to find—particularly if a surface of about 10,000-20,000 sq.m. is needed—it is important for local councils and town planners to bear this function in mind in the general planning of our towns and built-up areas.

I should like at this point to show examples of Swedish combined pools I have designed, and how they have been centrally placed in the town or built-up area concerned.

The Södertälje combined pool (fig. 2), in a satellite town 35 km south of Stockholm, lies in a park on the south-west slope of a boulder ridge, covered by pines, on the shore of Lake Maren in the centre of the town. The pool's contact with the lake is particularly valuable.

The Falköping combined pool (fig. 3), 60 km east of Gothenburg, lies at the bottom of a limestone quarry, where the 3 metre high quarry surfaces provide protection to the north and at the same time cut off the view from the sub-bathing area in the direction of disturbing buildings. The part that surrounds the pool contains also the town's sports hall and stadium.

For the "central pool" in a big city, it can sometimes be extremely difficult to secure a site that meets the above requirements. As an alternative, one can design the facility as a terrace pool and outside the indoor pool construct a planted sun terrace, well protected from wind, dust, smoke and the noise of traffic. Compare the Högdalen pool in Stockholm (fig. 4).

Following these general considerations, I should like to show how I think an attempt to reduce building costs can be concentrated (*a*) on the actual planning and (*b*) on construction.

As regards planning, I should like to draw attention particularly to the following two points.

First, certain functions should not be duplicated; in other words, any specialised facilities should not be provided in both the indoor and the outdoor pool. I am thinking mainly:

— that there should be only one teaching pool, and that it is best for such a pool to be indoors, in view of uncertain weather in the summer and the teaching requirements of schools in the winter;
— that any major swimming and diving competitions should be assigned entirely to the outdoor pool in summer.

Secondly, certain details in planning can save on choice of materials, and operation. What I am thinking of mainly is:

— that in the indoor pool, between the showers/pool (wet section) and the changing rooms (dry section) there should be a drying room, acting as an air sluice;
— that one should try to draw plans that simplify and facilitate the increase in changing capacity in the summer, when one needs about five times the winter capacity;
— that the additional changing buildings for the outdoor pool should if possible have the sections susceptible to cold (showers rooms and toilets) placed either in the warm part of the facility or where it is easy to heat them separately to prevent frost damage; i.e. they should be as close to the indoor pool and its heating unit as possible.

As regards *construction* I should like to draw attention particularly to the following three points:

1. Standardisation of the various buildings for a facility, a greater degree of centralised industrial fabrication of these parts, and a rational assembly of them on the site.
2. A careful choice of materials in floors, walls, ceilings, windows, doors and fittings, but without excessive concern for hygiene, wear and maintenance.
3. Right choice of type of purifying plant.

I will now consider these measures to save costs in more detail, starting with the planning, above all the communication between changing rooms and shower rooms.

We believe in Sweden that the changing section should be planned with a *drying-off room*, i.e. a sluice between the shower room, with its wet, warm air, and the changing room with its dry, normal air. Such a drying-off room not only serves as a sluice; it is there that people take off and put on their bathing suits before and after the showers, it is there they rinse their bathing suits in special troughs at the end of their stay, and rinse their feet after the last visit to the pool.

In this room, which should be of ample proportions, central foot disinfection can be performed; every user should here put on throw-away bathing slippers of impregnated paper, provided free.

Since most baths have dispensed with separate entrances for bathers with shoes and those without shoes, rainy weather can mean a fair amount of dirt in the corridors etc. of the changing section—slippers then provide protection when passing from the pool to the changing room. Many people are afraid of picking up foot infections in swimming pools—here again the slippers provide protection, after foot disinfection in the drying-off room.

Let me also in this context say something about the shower rooms. In each shower there should be installed a dispenser for liquid soap, and each bather should receive at the cash-desk, together with towel, a sponge of foam plastic in a plastic bag. A chute or other means of disposing of these must be provided in the shower room.

In connection with the changing rooms, I should like to mention another point. It is probable that the type and standard of changing rooms will alter from time to time (within 10-year periods). It is therefore important that the different sub-rooms of the changing section be combined into a large, uniform room that can be furnished in different ways. It is also important not to fix for all eternity the type and number of cubicles and lockers, and then manufacture them in a heavy, unchangeable material such as tiling.

As I have suggested, changing in the future may develop either towards a lower standard and more bathers (mass changing and clothes kept in lockers) or towards a higher standard and fewer bathers (individual changing, and clothes kept in cubicles).

I should like also to say something about the varying requirement for changing facilities in winter and summer in the combined indoor and outdoor pool. As an example I have chosen 250 bathers in the indoor pool in winter and 1,250 bathers in the outdoor pool in summer. These changing places and the size of shower rooms are broken down as follows:

Indoor pool—250 places in winter:

Changing		*Showers*
Men and boys	150	15-22
Women and girls	100	10-15
	250	

Outdoor pool—1,250 places in summer:

Changing		*Showers*
Men	450	15-20
Boys	300	10-20
Women	250	8-15
Girls	250	8-15
	1,250	

Two factors facilitate the solution of this varying requirement. The first is that the young people who visit the outdoor pool on fine summer days are extremely lightly dressed, and can be given simple changing facilities. The second is that the need for showers with an outdoor pool is considerably smaller than with an indoor pool. The reason for this is that the period of the visit is considerably longer in the summer, in fact two or three times as long, so that the "turnover" of bathers is lower and there is less need of showers. We consider in Sweden that an indoor pool requires places in the shower unit to 10-15 % of the number of changing-room places, while the corresponding figure for an outdoor pool is 3-8 % of the number of changing-room places. In accordance with the above argument, the summer changing facilities for an outdoor pool can be divided into two different types:

— *simple changing* for children and young people (without supervision, only benches and hooks), charge SKr. 1:— per person;

— *extension of winter pool's changing rooms* for adults (clothes kept in locker), charge SKr. 3:— per person.

Also, as indicated above, the need for shower room capacity per person is lower in the summer, so that the shower rooms of the winter pool can be used to some extent to provide increased locker changing capacity for adults at the summer pool.

For the simple changing unit used by school children, however, there is a separate shower room, so situated that it can easily be protected and heated (+5 °C) in the winter.

See the plan given as an example in figure 7 (see also figs. 8 and 9).

The three points I mentioned as regards construction, namely industrial construction, choice of materials and choice of purifying plant are extremely important in trying to reduce costs. Let me therefore consider these factors in more detail.

The real opportunity of achieving our aim of "giving every community a pool at low cost" lies in the application of industrial building.

If such an approach is to succeed, however, one necessary condition must be met:

A certain amount of preliminary planning must be done centrally, and agreement reached on certain model plans, the main measurements of which are fixed. In spite of this, the system will offer great flexibility for each individual project.

With this main premise, different factories can then produce "building kits" for different materials and constructions. These are to be designed above all for the actual frame of the building—fully complete. They can also relate, for instance, to all the plumbing in shower rooms the type and size of which have been determined in advance. They can cover all cubicle and locker fittings, particularly if these are in wood or laminated plastic.

The following application of standardised building is possible in a combined indoor and outdoor pool.

A. *Indoor pool*

1. Changing building, frame
2. Ditto, plumbing
3. Ditto, fixtures
4. Actual pools in prefabricated concrete units
5. Ditto, plumbing
6. Ditto, fixtures

B. *Outdoor pool*

1. Summer changing pavilions
2. Fixtures in changing pavilions
3. Actual pools in prefabricated concrete units
4. Purifying plant, and plumbing for pools.

Industrial building methods of this kind have long been designed and applied in building houses and schools. Necessary conditions to make this approach profitable are short transport routes from the factories to the building sites, and a sufficient number of projects. These conditions are easily met in densely populated areas, and it is there that ample bathing facilities are really needed.

If one studies pools in different countries from the standpoint of materials, particularly interior materials, one finds certain peculiar local developments. One gets the feeling that people have without any great study established a given (complicated and expensive) way of building, which is then repeated for one pool after another. It is often possible to use considerably cheaper materials and methods, and thus save on costs. It is obvious that a pool must be hygienic and that all materials should be chosen with care and thought—but not to excess.

The choice of materials in changing rooms provides one example of such excesses. If, as I suggested just now, one has a sluice, a drying room, between the showers/pool and the changing rooms, then one gets dry, normal air in the latter, and can thus dispense with ceramic tiling on the walls, floor and fixtures, and instead use wood, plastic and linoleum. The floor of the changing rooms should be made without a slope, and without floor wells. The floor should not be flushed, but dried with a rag. The walls can be executed in painted concrete or brick. Fixtures can be in wood or plastic laminate.

In the drying-room and shower rooms, small non-vitreous mosaic tiles are a good non-slip floor material. The walls should be clad entirely with tiles or similar materials.

In a combined indoor and outdoor pool, one tries to achieve a good contact with the outdoor sun-bathing area/garden and the pool. An excellent floor material in the indoor pool is sand-blasted fine-aggregate concrete tiling, which is non-slip and harmonises easily with the concrete tiles of the sun-bathing area.

Figure 5 shows, schematically, proposals for materials for a combined indoor and outdoor pool.

Types of purifying plant vary from country to country. As shown by this table, the choice of purifying plant influences both initial and operating costs.

These costs are very roughly estimated. The exact costs of different purification systems and their suitability should be studied in more detail by a neutral international working committee.

During 1967-68, I had occasion to plan a minimum combined pool of the type I have described, suitable for a district within a larger town—here generalised and called "ÅEL's combined indoor and outdoor pool for Europe 1968". I have also compared its estimated building cost with three other combined indoor and outdoor pools that I built or planned previous to 1967, in Falköping, Södertälje and Tranås.

A description of these four pools is given below (see also figs. 8-19, and the comparison of costs in fig. 24).

ÅEL's combined indoor and outdoor pool for Europe 1968 (see also figs. 8-13).

This pool has been planned on the following assumptions.

The facility is to be so designed that either the indoor or the outdoor pool can be built as an independent phase of the project, complete in itself, and without any unnecessary investments being required for any subsequent stage. The combined facility is intended primarily for a small town, or for a district within a larger town, about 30,000 inhabitants. The capacity of this combined facility has been set at 250 users during the winter, and 1,250 users at a time during the summer.

The facility is to offer only one form of bathing, namely in the winter an indoor pool preceded by shower and sauna, and in the summer an outdoor pool preceded by shower.

The pool is to be open at the same time for both sexes, primarily for school children 8 a.m.—2 p.m. daily, and for the general public (adults and school children) 2-8 p.m.

The proposed distribution by sex is as follows:

for the winter pool: 100 women or girls and 150 men or boys,
for the summer pool: 250 women, 250 girls, 500 men, and 250 boys.

It is assumed that all users will bring their own towels and bathing costumes. Only in exceptional cases can these be provided at the pool by the staff (purchase or possibly hire). This makes it possible entirely to dispense with the cash-desk. Users can reach the staff from the entrance, in their staff-room, which faces the entrance (hatch and bell), in order, for instance to hire the above equipment in exceptional cases.

In winter all changing is in changing rooms, separate for each sex, in which users change openly at a bench and hang up their clothes in special key-operated lockers. Users reach the changing section via a coin-operated turnstile, and this is the first payment made (SKr. 1:—). The second charge is paid when the locker is closed and the key withdrawn (SKr. 2:—). These lockers are 60 cm deep, 35 cm wide, and placed two on top of each other in double rows, with free-standing double-sided benches in between.

In summer the same changing system is used for adults (charge SKr. 3:—), but the number of places is increased. Girls and boys (up to maximum 15 years of age) have simpler facilities, in separate, very simple changing buildings where they change openly at benches. Clothes are hung up on hooks (without supervision). Changing rooms are reached via a coin-operated turnstile (SKr. 1:—).

The ceiling height in the indoor pool is only 4 metres. The larger basin with plan measurements 25×12.5 m. is 0.9 to 1.6 m. in depth, and is thus not intended for diving. The smaller pool for teaching, measurements 12.5×6 m., has a depth of 0.7 to 0.9 m.

There is room only for one seating bench along each of the two long sides of the pool, which means space for 100 persons seated and 100-150 standing at simple local swimming events. All major swimming and diving competitions take place in the open-air pool in the summer.

The indoor pool can be extended if desired, if it is financially possible, by a lower section facing the sunbathing area and the outdoor pool. This extension is conceived as a cafeteria and winter-garden, so that more space is available with the winter pool for rest, exercise. sun-bathing. refreshments etc.

The pools in the outdoor facility have only been sketched in, and can vary according to local requirements. I have reckoned in my proposal on one larger basin, plan measurements 50×20 m., depth 0.9-3.6 m., and diving from 5 m., 3 m., and 1 m. I have also planned a paddling pool for children, but the training pool is conceived as in the indoor facility. There is room for a large, movable spectators' stand (1,000 persons). Outdoor showers for sun-bathers are planned on the sun-bathing strip.

Outdoor catering is conceived as combined with the cafeteria in the extension to the indoor pool, but if this is not built then there is room for a service kitchen in the storage pavilion (see reference no. 28). This part of the building is also planned to contain club rooms for swimming associations. stores for deckchairs and garden furniture, extra toilets for spectators, office for competitions management etc.

Of the three combined pools I planned in Sweden before 1968, I should like to start by describing:

ODENBADET IN FALKÖPING, which is fully completed. Falköping is a town 60 km east of Gothenburg, situated in a district of Sweden that has no natural bathing facilities at all. The pool was inaugurated on 28 May 1967.

The initial or construction cost for the indoor pool is £469,200 and for the outdoor pool (incl. changing rooms, plantations etc.) £138,160, making a total of £607,360.

The capacity is 250 bathers in the winter, and 1,250 in the summer. The summer pool can be extended with a further 600 changing places to 1,850 bathers, and the indoor pool can be extended to the west so as to give more space there for rest, exercise, sun-bathing etc. (see also figs. 10-13).

TÄLJEBADET IN SÖDERTÄLJE, a satellite town to Stockholm (35 km to the south), is an example of a combined indoor and outdoor pool that from the standpoint of investment, and for lack of money, was planned for construction by stages. The first stage, the indoor pool, was completed in 1963. Stage II, the open-air pool, is to be built within the next few years.

The two pools have a common entrance and cash-desk. In the peak summer period, the cash-desk can be doubled. The indoor pool in winter can accommodate 400 bathers at the same time (see figs. 14 and 17). The pool lies on a south-west slope, and has been formed with terraces down to Lake Maren. The difference in level between the walks in the park north of the pool and the upper terrace is 2.5 m., and between the upper and lower terrace 3.5 m.

Users of the outdoor pool enter the changing section via the upper terrace, descending from this by separate steps. The changing unit is under the upper terrace on the same level as the lower terrace, which is also that of the sunbathing strip and the pool itself (see figs. 15 and 16).

The changing unit for the outdoor pool is designed for changing in alternately used cubicles, clothes being kept in wardrobe units with supervision. The outdoor pool can take 2,000 bathers at a time.

THE TRANÅS SWIMMING BATHS AND OPEN-AIR POOL constitutes a second stage to the sports hall completed in 1963.

Tranås is a town of 20,000 inhabitants in Southern Sweden, at roughly equal distances from Stockholm, Gothenburg and Malmö. The pool and sports facility have been built in conjunction with the town's new Senior Grammar School, but serve all schools in the district.

The facility is situated close to a river which runs through the town. By the river there was previously an open-air pool with a small basin with purified water. The outdoor pool will now be considerably larger.

The indoor pool is calculated for 230 bathers in the winter, and the outdoor pool for 1,130 bathers in the summer.

As the architect I have had the opportunity for a couple of years now to study the fully completed indoor and outdoor pool in Falköping, which was completed in the spring of 1966.

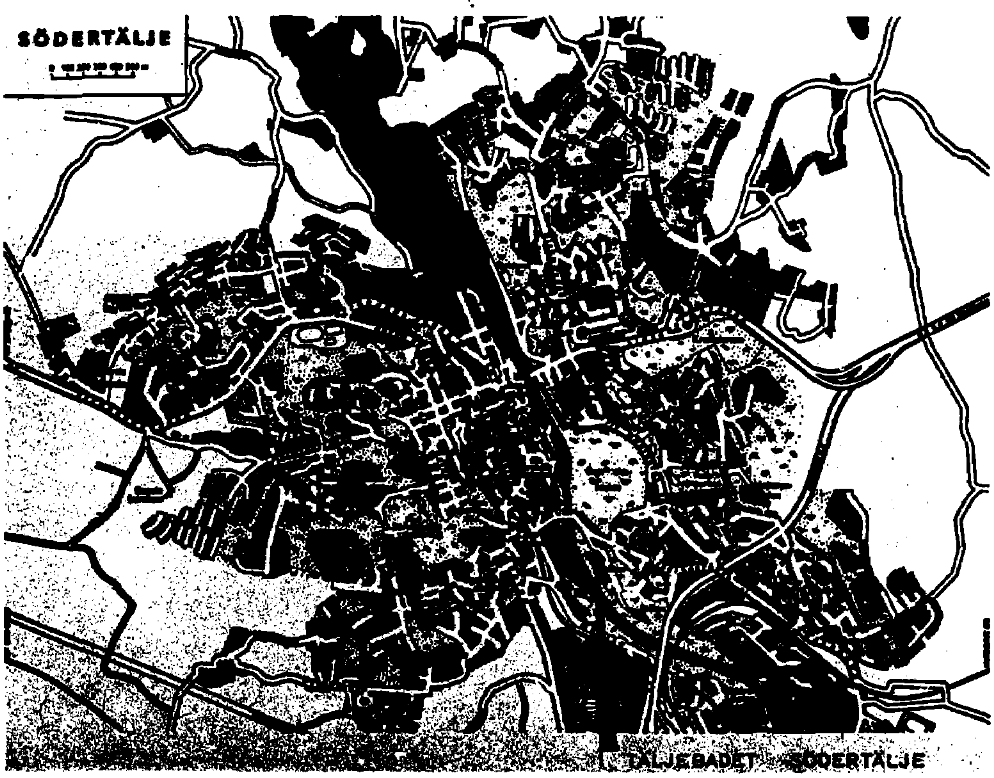
Falköping has 20,000 inhabitants in the centre of the town, and a further 10,000 in the surrounding country within a radius of 20 km.

With this pool, the town has a place to which young people stream in winter and summer alike. The interest in bathing and swimming in the town has increased considerably. After only a year, the town began to produce good swimmers, who in the inaugural competitions in the spring of 1967 could compete against swimmers from the nearby big city of Gothenburg. That people of all ages had suddenly been given an opportunity to bathe throughout the year, regardless of the climate and weather, was something everybody seems to have appreciated. It is therefore my hope that combined indoor and outdoor pools of this kind will be built in the future in increasing numbers of towns and built-up areas.

COMPARATIVE REGIONAL USAGE OF THE DIFFERENT FACILITIES OF COMBINED INDOOR-OUTDOOR BATHS

1 Division into zones

Duration of use — Annually in months			
Zone	Indoor baths exclusively (in months)	Indoor baths + outdoor sun terrace (in months)	Open air baths predominantly (in months)
I. Northern North Europe	10	1	1
II. Southern North Europe	9	1	2
III. Northern Central Europe	7	1	4
IV. Southern Central Europe	5	2	5
V. Northern South Europe	3	2	7
VI. Southern South Europe	1	2	9



2 Town plan of Södertälje

DRAFT PROPOSAL ON MATERIALS AND FINISHINGS
FOR A COMBINED INDOOR-OUTDOOR BATHS

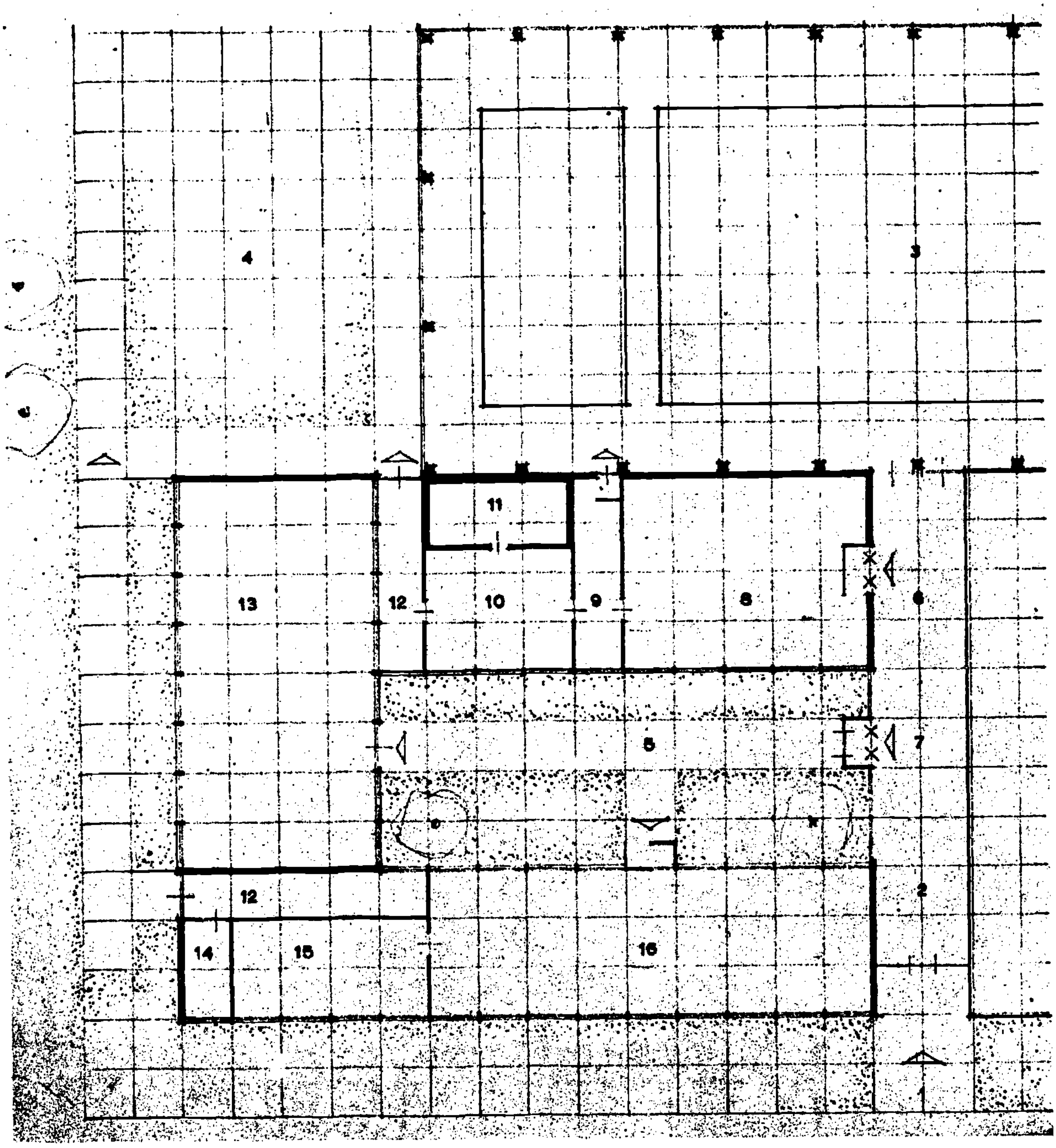
Location	Floors	Walls	Ceilings	Fixtures and doors	Windows and Main doors
Indoor baths					
Entrance hall	stone, hard burned floor tiles or concrete tiles	painted concrete or brick	wood or painted aluminium panel	wood	wood
Changing	plastic sheeting or tiles	painted concrete or brick	wood or painted aluminium panel	wood or laminated plastic	
Drying-off room and showers	small non-vitreous mosaic tiles	glazed tiles	painted aluminium panel	laminated plastic or aluminium	aluminium
Pool hall	precast fine aggregate concrete tiles sand blasted non-slip finish	painted concrete or brick	wood or painted aluminium panel	wood or laminated plastic	wood
Pool	glazed tiles or painted concrete	glazed tiles or painted concrete			
Open air baths					
Sun terrace	concrete slabs				
Pool	painted concrete	painted concrete			
Changing	concrete tiles	wood	wood	wood	
Showers	hard burned floor tiles	painted concrete or hard burned wall tiles	painted aluminium panel or wood	laminated plastic or aluminium	aluminium

5 Proposals on materials for a combined pool

INITIAL COSTS AND RUNNING COSTS
FOR VARIOUS TYPES OF WATER TREATMENT PLANT

System	Initial costs			Annual running costs
	Building costs	Water treatment plant	Total	
1. *Coagulation process* An open system with sand filtration and chemical sedimentation	£17,000 (1,000 m^3)	£15,000	£32,000	£3,500
2. *Magna-Chlor process* A closed system using Magna-Chlor	£7,300 (350 m^3)	£15,000	£22,300	£4,000
3. *Diatomite process* A closed system using diatomite	£4,000 (200 m^3)	£11,000	£15,000	£3,000

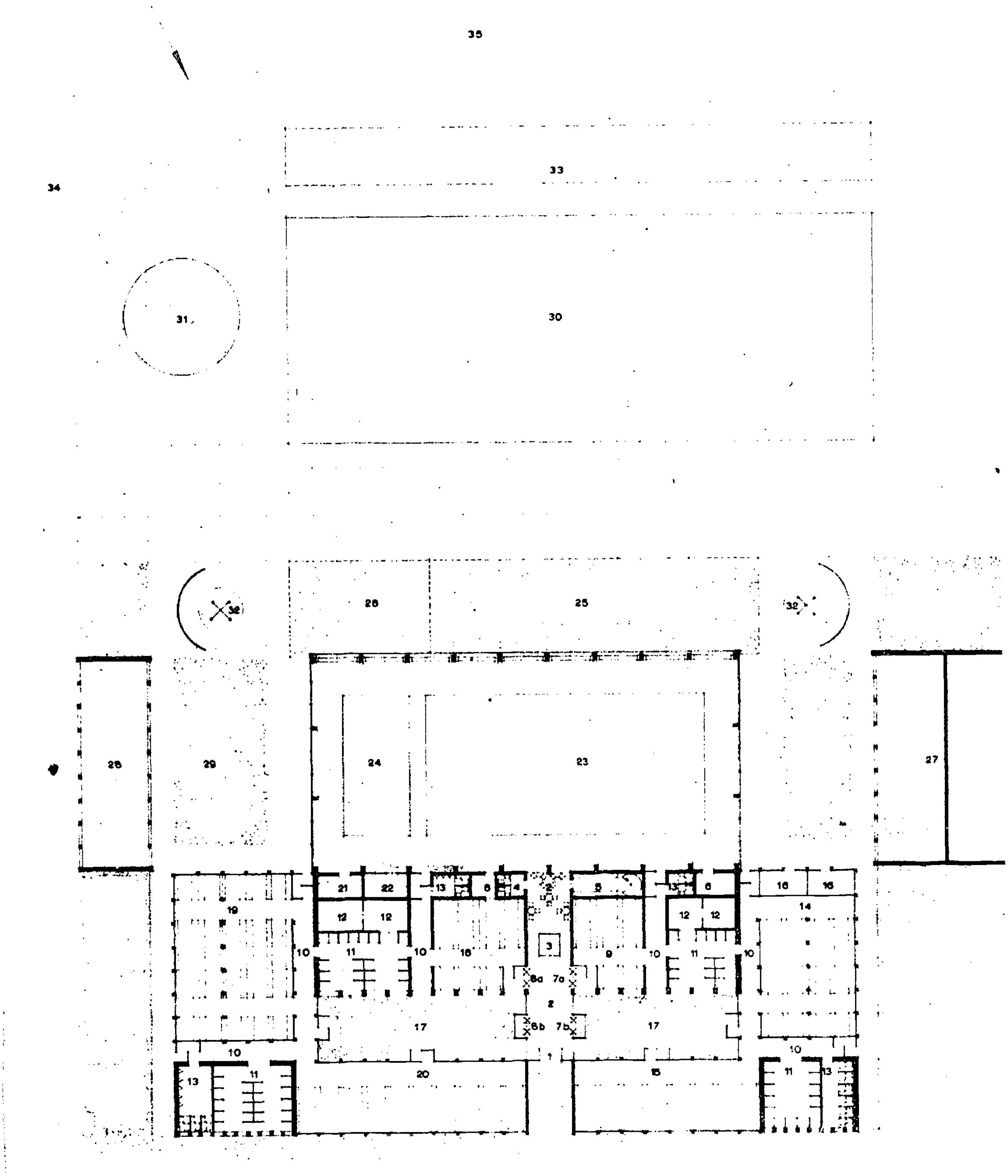
6 Different types of purifying plant, with comparisons of initial costs and operating costs



7 **Example of plan solution, showing how the summer changing facilities can be made five times larger**

Key

1. Main entrance
2. Entrance hall
3. Pool hall
4. Sun plage
5. Courtyard, summertime
6. Entrance to indoor pool
7. Entrance to outdoor pool
8. Winter-changing unit with lockers
9. Drying-off room
10. Showers
11. Sauna
12. Drying-off room
13. Summer-changing unit with lockers
14. Toilets
15. Showers
16. Simple changing for young people



8 The combined pool (fully completed) (master plan)

MODEL PLAN FOR COMBINED INDOOR AND OUTDOOR SWIMMING POOL FOR 250 PERSONS IN WINTERTIME AND 1,250 PERSONS IN SUMMERTIME

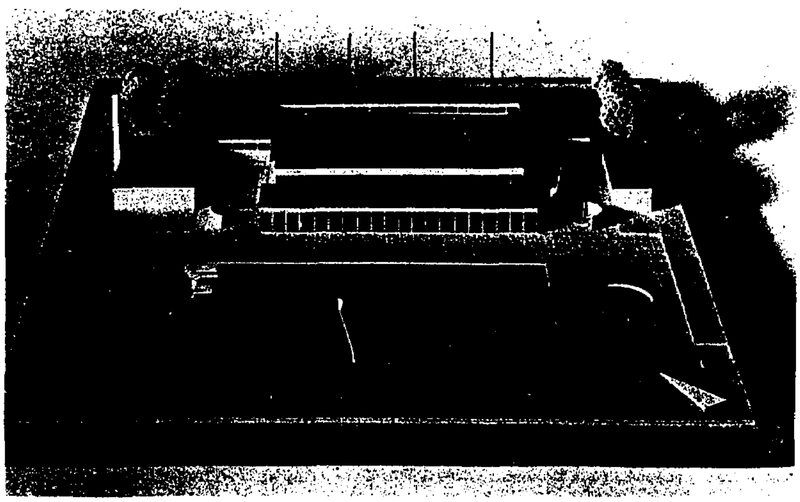
Architect : Åke E. Lindqvist, combined pool for Europe 1968

Key

1. Main entrance
2. Lobby
3. Staff
4. Toilets
5. Storage for bathing costumes and staircase to staff rooms in cellar
6. Storage
   Entrance via coin-operated turnstile (1 sh) under supervision by staff to:

7(*a*). Winter-changing unit for women
7(*b*). Summer-changing unit for women and girls
8(*a*). Winter-changing unit for men
8(*b*). Summer-changing unit for men and boys

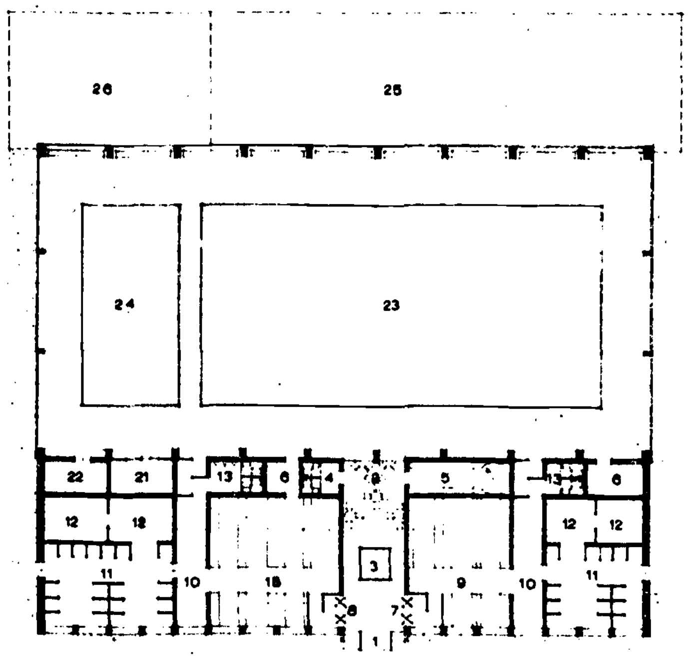
9. Winter-changing unit for 100 women with lockers (2 sh)
10. Drying-off room and sluice
11. Showers
12. Hot room (+50 °C) and sauna
13. Toilets
14. Summer-changing unit for 175 women with lockers (2 sh)
15. Simple summer-changing unit for 250 girls (benches and hooks)
16. Storage for gardening
17. Court-yard
18. Winter-changing unit for 150 men with lockers (2 sh)
19. Summer-changing unit for 350 men with lockers (2 sh)
20. Simple summer-changing unit for 250 boys (benches and hooks)
21. Storage
22. Teacher
23. Indoor pool 25×12.5 m. Deep 90 and 160 cm
24. Swimming teaching pool 12.5×6 m. Deep 70 and 90 cm
25. Winter-garden for rest, relaxation, individual exercise and sun-bathing (later stage)
26. Cafeteria (later stage)
27. Water treatment and heating plant
28. Storage, clubrooms etc.
29. Outdoor catering
30. Outdoor pool with 7 lanes: 18×50 m. Diving from 5 m, 3 m and 1 m
31. Paddling pool
32. Outdoor showers
33. Spectators' stand for competitions
34. Entrance for spectators
35. Sun plage



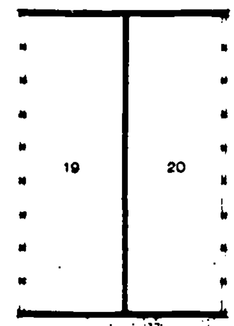
9 The combined pool, model photograph

MODEL PLAN FOR INDOOR SWIMMING POOL FOR 250 PERSONS
FIRST STAGE TO A COMBINED INDOOR
AND OUTDOOR SWIMMING POOL

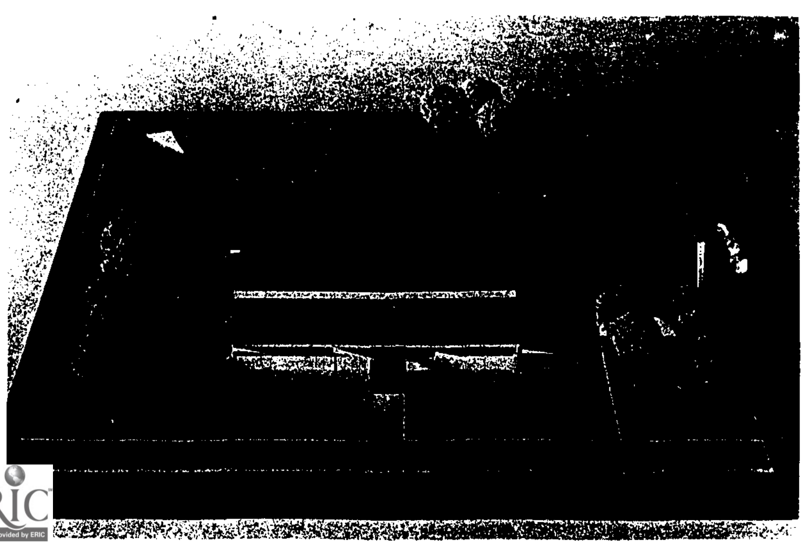
Architect : Åke E. Lindqvist, combined pool for Europe 1968



10 **The combined pool (indoor facility only) (master plan)**



11 **The combined pool (indoor facility only), model photograph**



Key

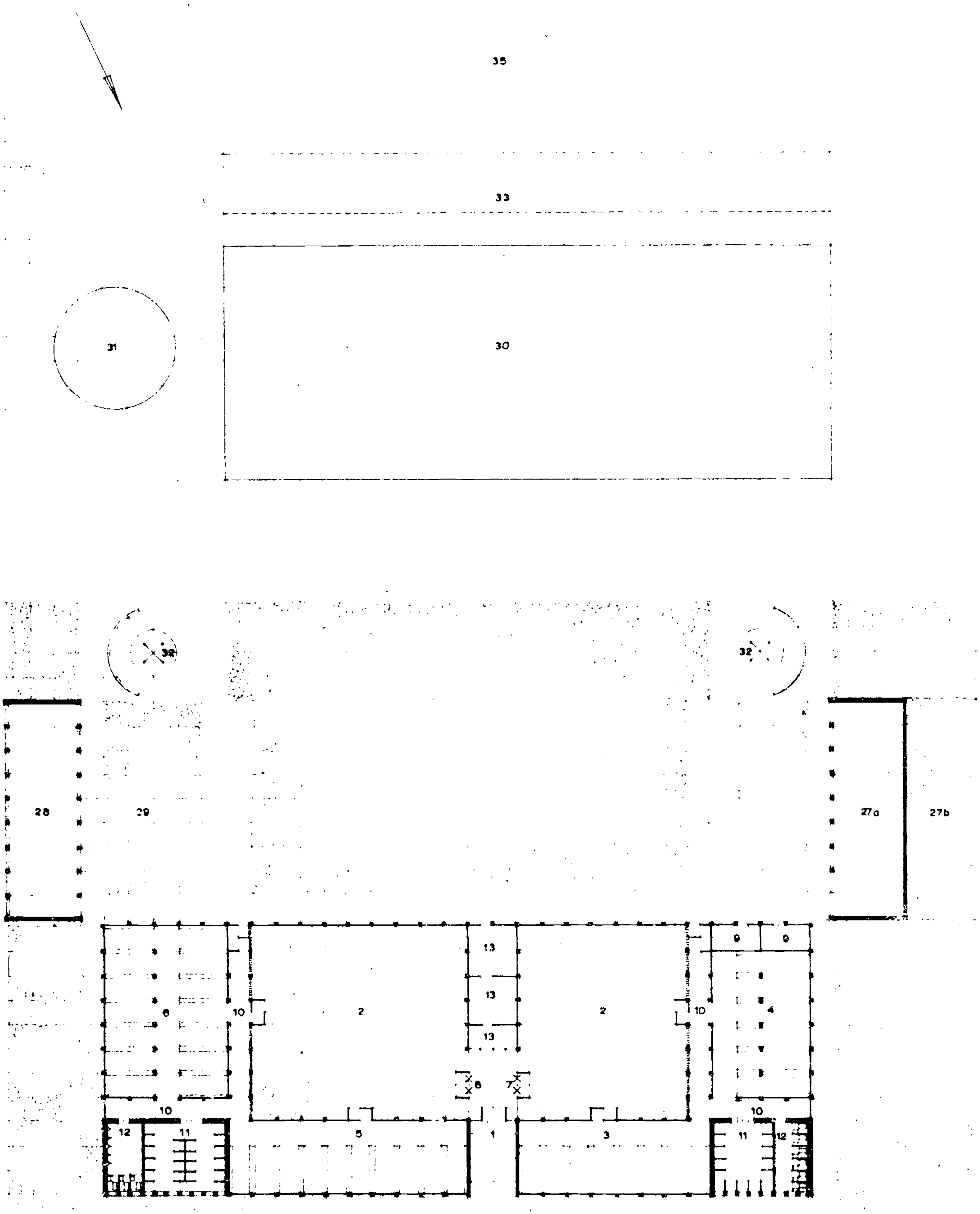
1. Main entrance
2. Entrance hall
3. Staff
4. Toilets
5. Storage for bathing costumes
6. Storage

   Entrance via coin-operated turnstile (1 sh) under supervision by staff to:

7. Changing unit for women and girls
8. Changing unit for men and boys
9. Winter changing unit for 100 women
10. Drying-off room and sluice
11. Showers
12. Hot room (+50 °C) and sauna
13. Toilets

14-17. Vacant numbers for the outdoor swimming pool

18. Winter changing unit for 150 men and boys with lockers (2 sh)
19. Water treatment
20. Heating plant
21. Storage
22. Teacher
23. Indoor pool 25×12.5 m. Deep 90 and 160 cm
24. Swimming teaching pool 12.5×6 m. Deep 70 and 90 cm
25. Winter-garden for rest, relaxation, individual exercise and sun-bathing (later stage)
26. Cafeteria (later stage)



(See notice on following page)

12 The combined pool (outdoor facility only) (master plan)

MODEL PLAN FOR OUTDOOR SWIMMING POOL FOR 1,250 PERSONS
FIRST STAGE TO A COMBINED INDOOR AND OUTDOOR SWIMMING POOL

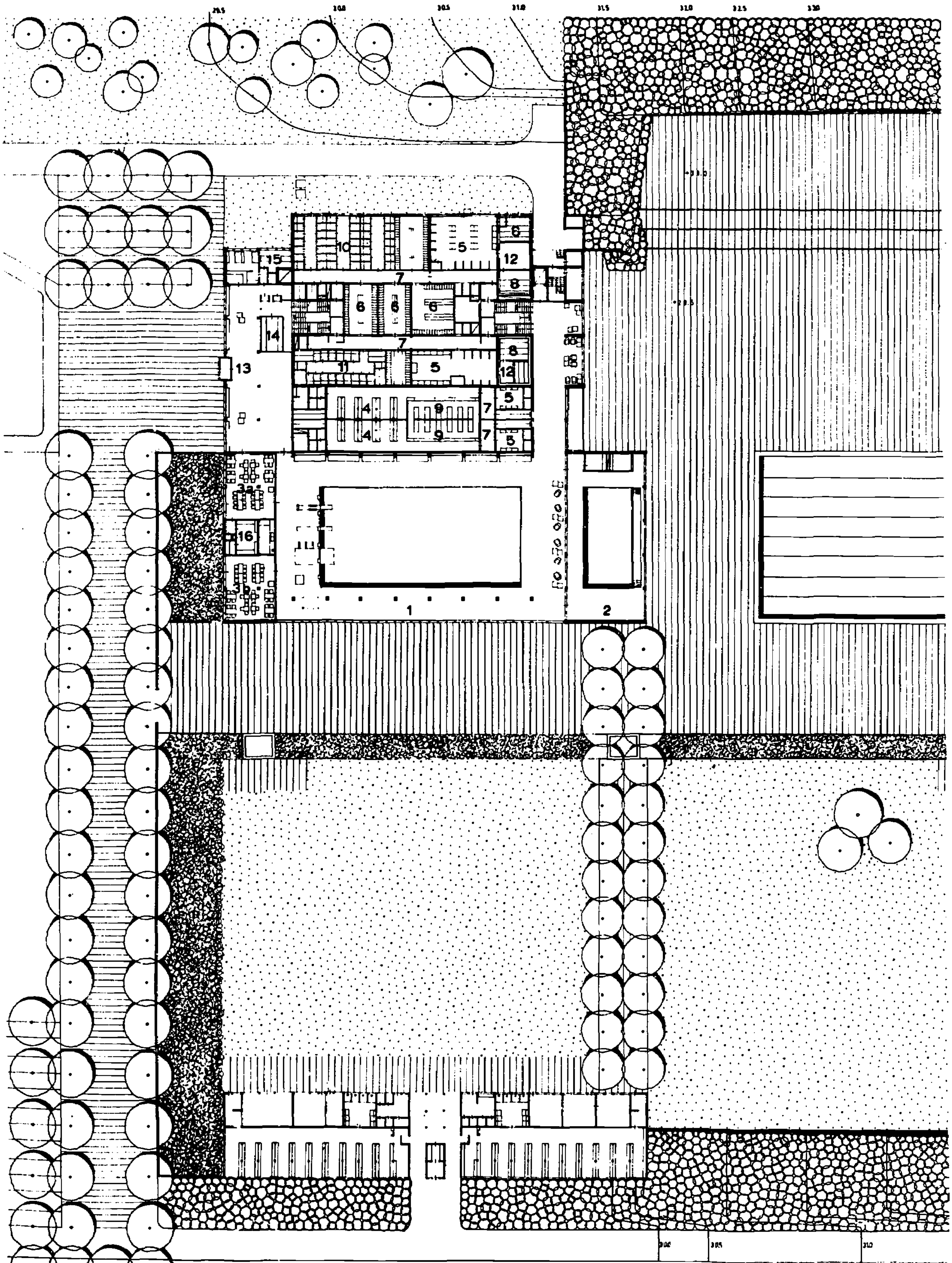
Architect : Åke E. Lindqvist, combined pool for Europe 1968

Key

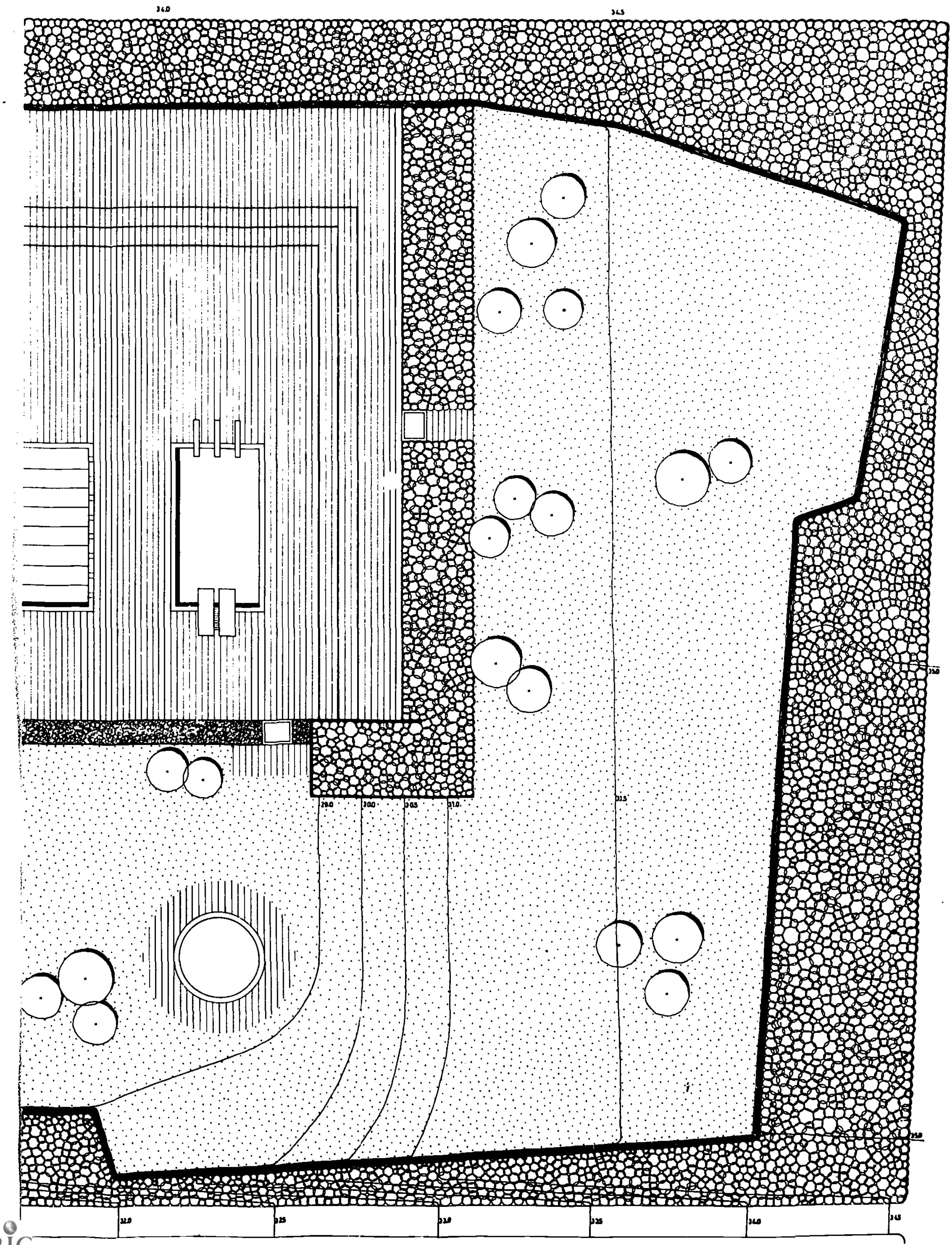
1. Main entrance and entrance hall
2. Court-yard
3. Simple changing-unit for 250 girls (benches and hooks)
4. Summer changing-unit for 250 women (benches and hooks)
5. Simple changing-unit for 250 boys (benches and hooks)
6. Summer changing-unit for 500 men (benches and hooks)
7. Entrance to the court-yard for women's changing-unit via coin-operated turnstile (1 sh) under supervision by staff
8. Entrance to the court-yard for men's changing-unit via coin-operated turnstile (1 sh) under supervision by staff
9. Storage for gardening
10. Drying-off room
11. Showers
12. Toilets
13. Staff and storage

14-26. Vacant numbers for the indoor swimming pool
27(a). Water treatment
27(*b*). Heating plant
28. Storage, clubrooms, kitchen etc.
29. Outdoor catering
30. Outdoor pool with 7 lanes: 18 × 50 m. Diving from 5 m, 3 m and 1 m
31. Paddling pool
32. Outdoor showers
33. Spectators' stand for competitions
34. Entrance for spectators
35. Sun plage

(See figure 12 on preceding page)



14 Odenbadet in Falköping (master plan)



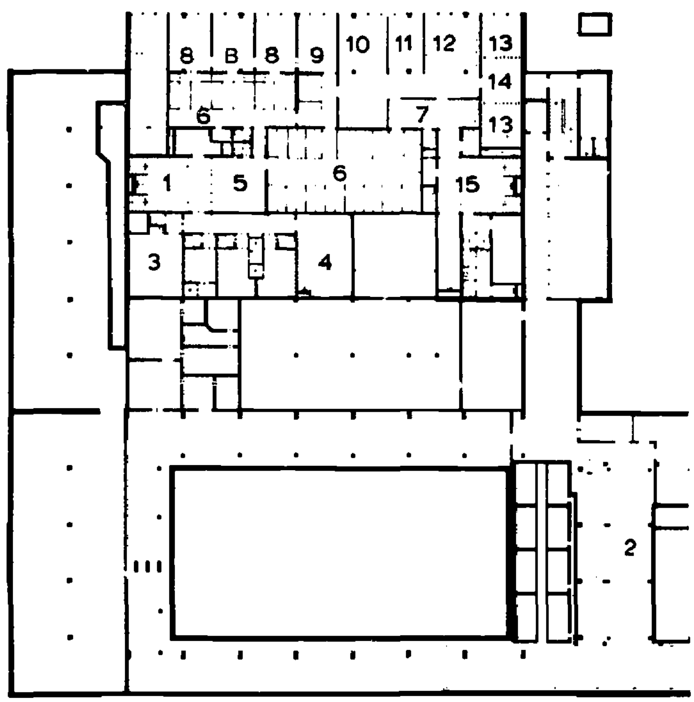
(See notice on following page)

ODENBADET, FALKÖPING (main plan)

Key

1. Swimming hall
2. Teaching pool
3. Cafeteria
   (*a*) Department for dressed people
   (*b*) Department for bathers
4. Simple summer-changing unit for young people (For exercises in wintertime)
5. Showers
6. Common changing rooms
7. Drying-off room and sluice
8. Saunas
9. Common cloak-room
10. Changing unit for men
11. Changing unit for ladies
12. Warm-room (+50 °C)
13. Entrance
14. Cash-desk
15. Staff
16. Catering
17. Passage and winter-garden

(See figure 14 on preceding page)



15 Odenbadet in Falköping, basement storey

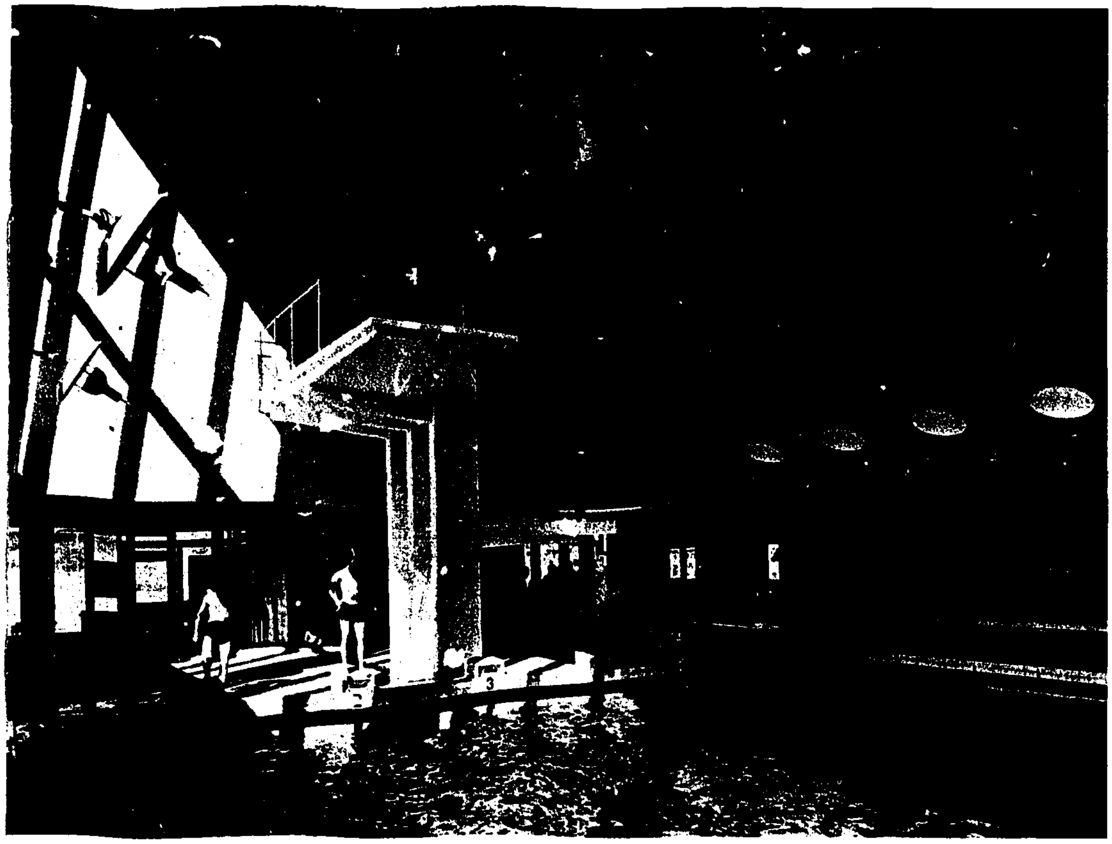
ODENBADET, FALKÖPING (cellar plan)

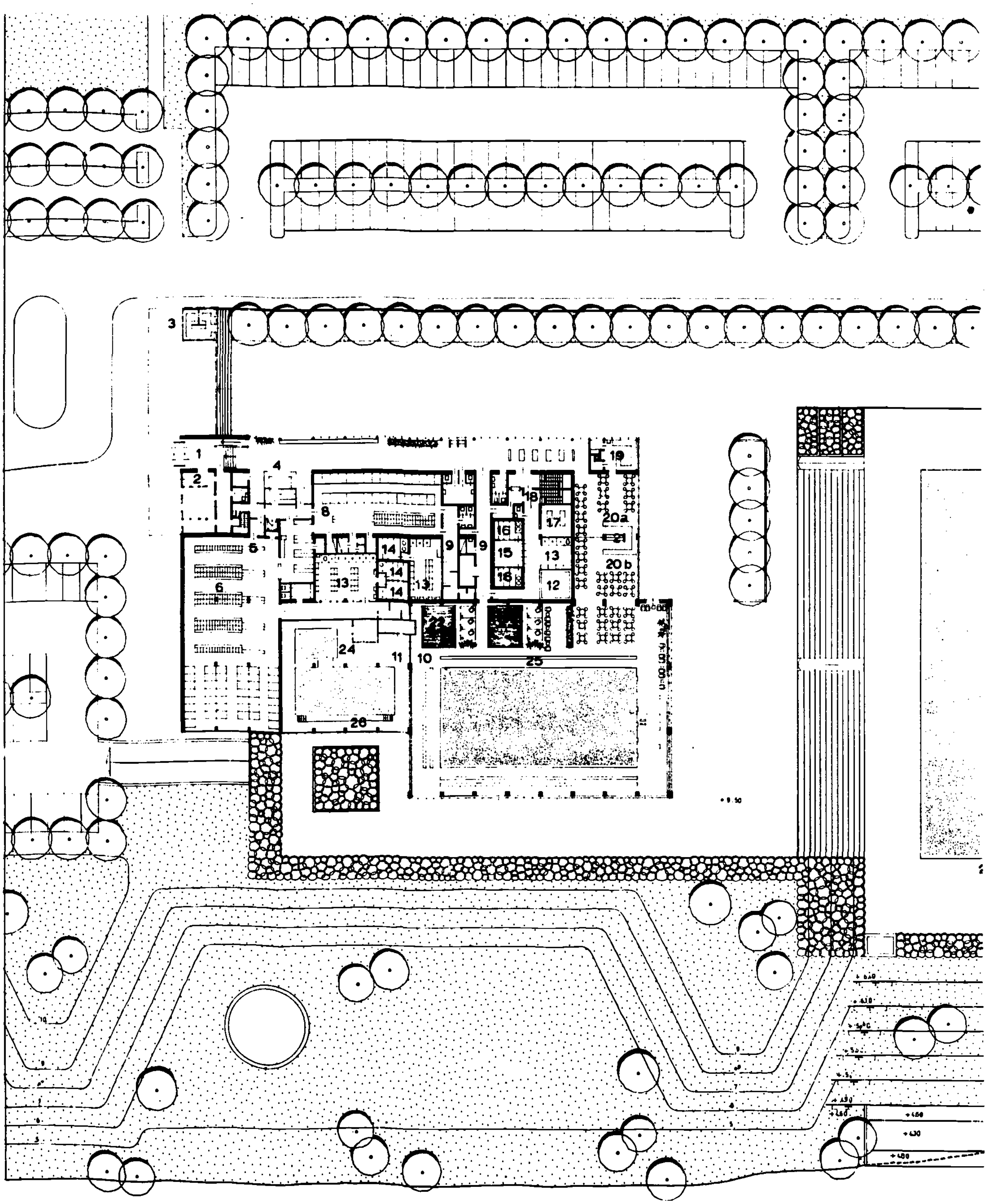
Key

1. Stairs up to entrance
2. Water treatment
3. Club room
4. Changing unit
5. Waiting room
6. Cabins
7. Drying-off room and sluice
8. Hot bath
9. Massage
10. Pool (+18 °C)
11. Soap massage
12. Showers
13. Saunas
14. Warm-room (+50 °C)
15. Stairs up to the swimming-hall

16 Photograph of the outdoor pool

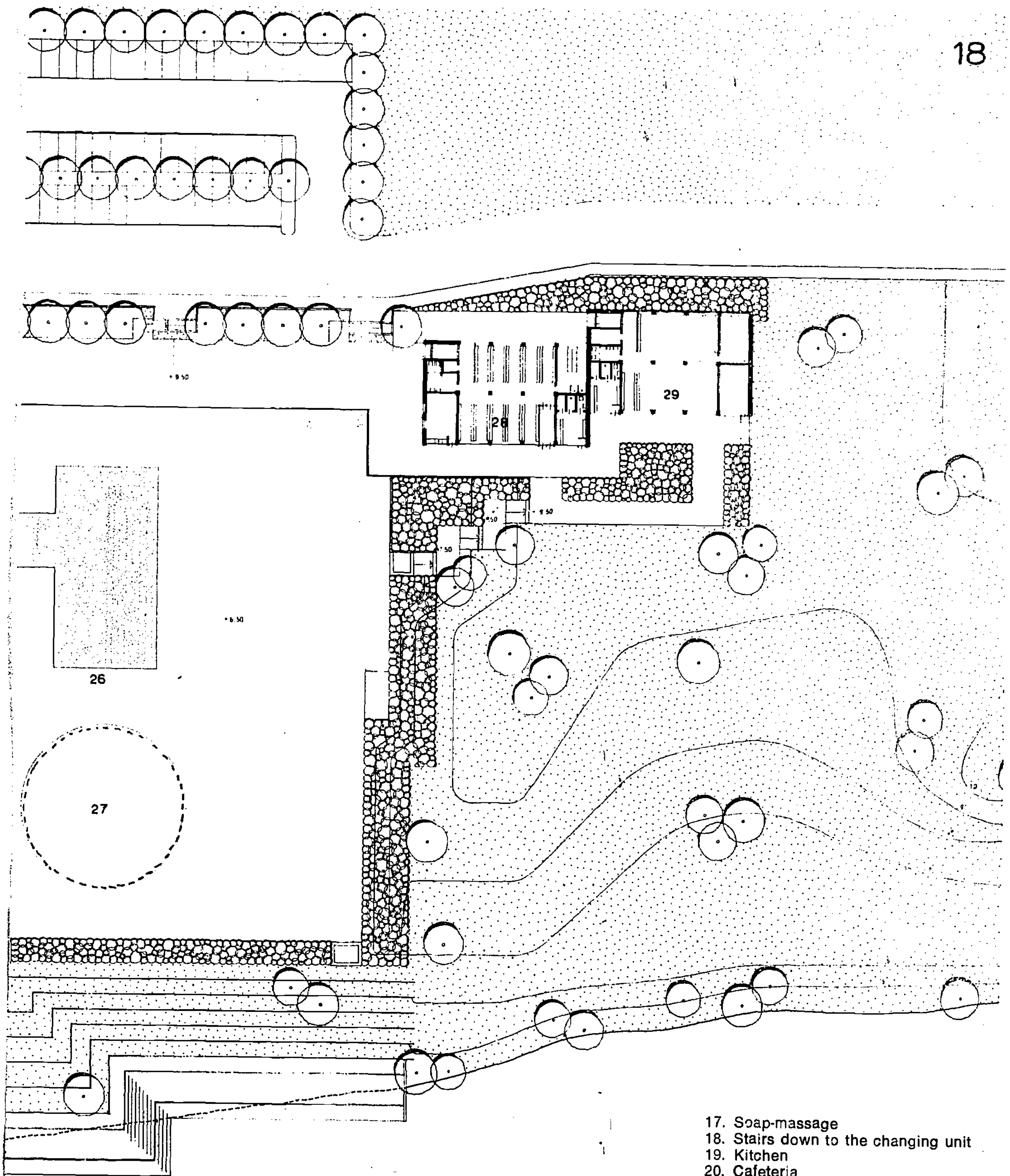
17 Photograph of the indoor pool





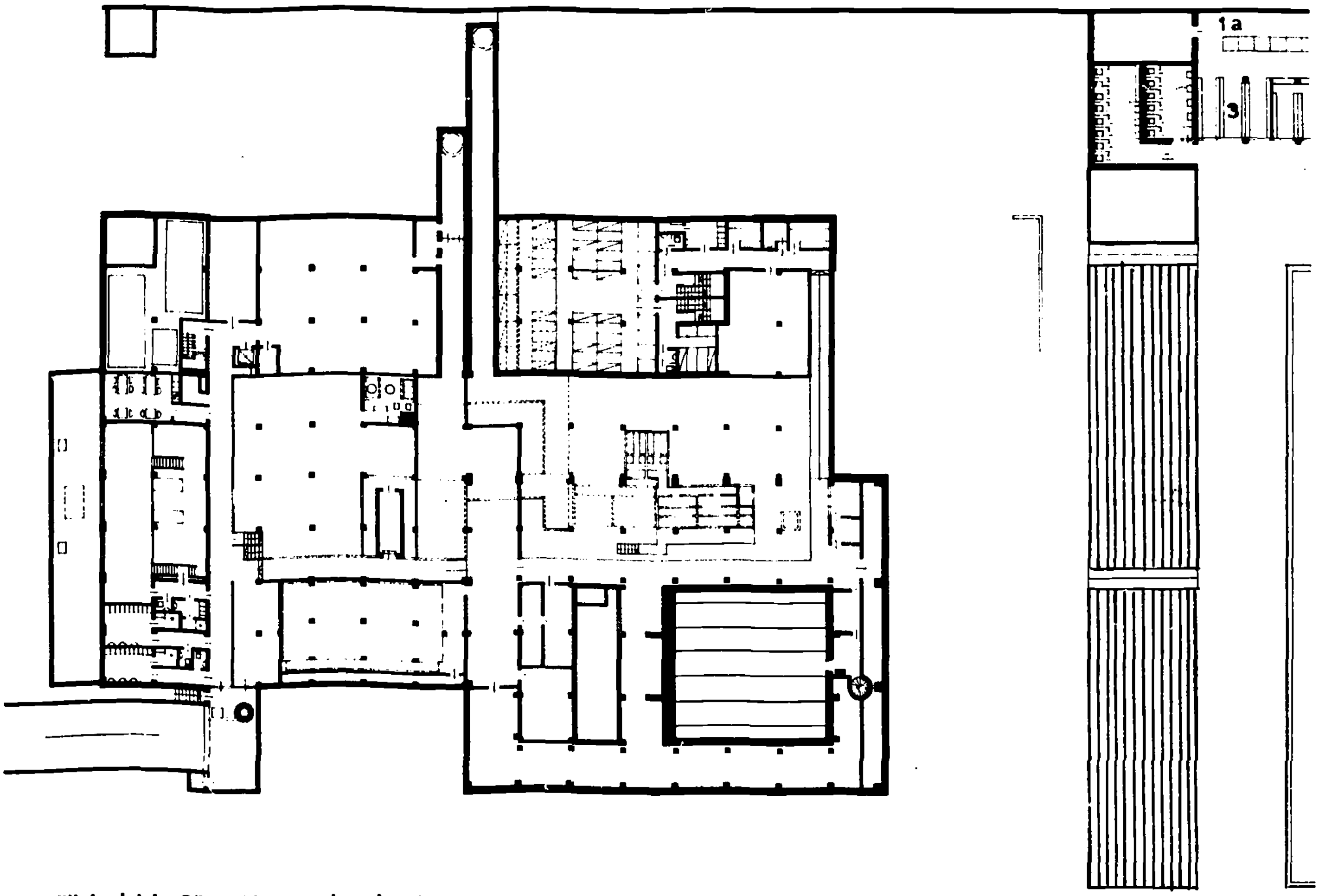
18 Täljebadet in Södertälje, master plan for indoor pool

18

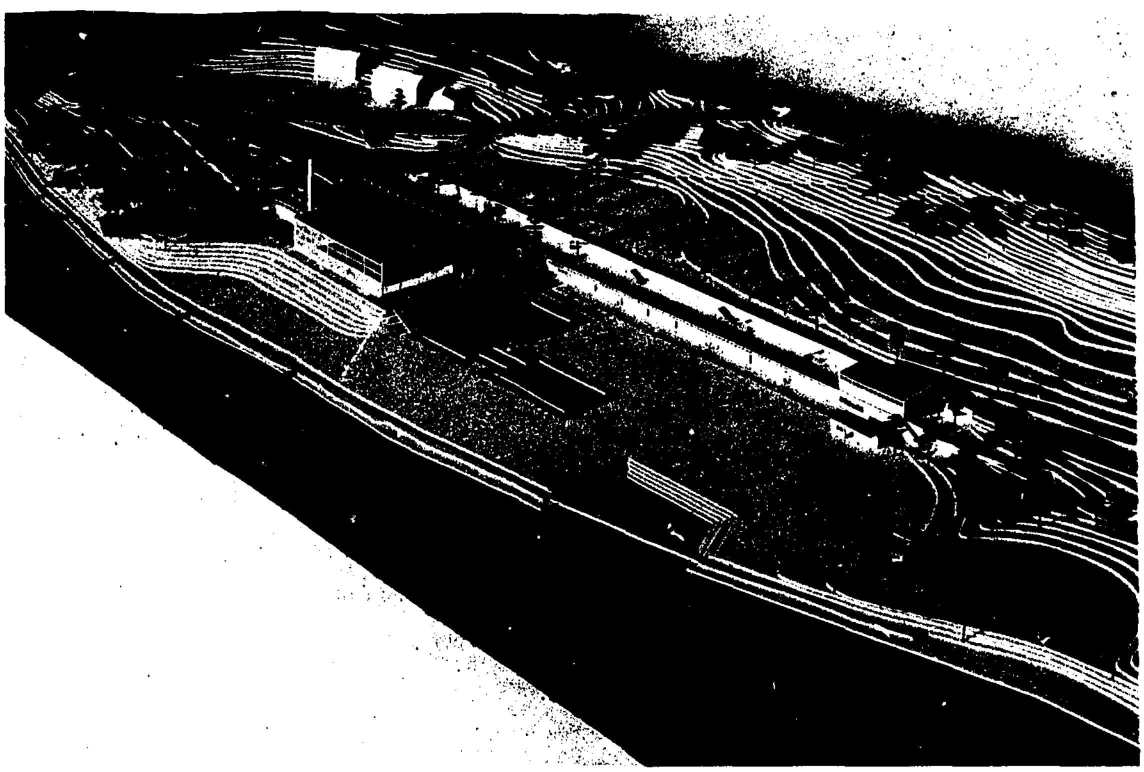


Key

1. Entrance
2. Cash desk
3. Reserve cash desk (in summer)
4. Linen distribution
5. Changing unit for men
6. Lockers
7. Cabins
8. Changing unit for ladies
9. Drying-off room and sluice
10. Swimming-hall
11. Teaching pool
12. Pool (+18 °C)
13. Showers
14. Saunas
15. Warm-room (+50 °C)
16. Sauna (first class)
17. Soap-massage
18. Stairs down to the changing unit
19. Kitchen
20. Cafeteria
    (*a*) Department for dressed people
    (*b*) Department for bathers
21. Catering
22. Place for exercises for men
23. Place for exercises for ladies
24. Paddling pool
25. Swimmers' pool
26. Non-swimmers' pool
27. Diving pool
28. Changing unit for 200 boys
29. Changing unit for 200 girls



19 Täljebadet in Södertälje, master plan for outdoor pool



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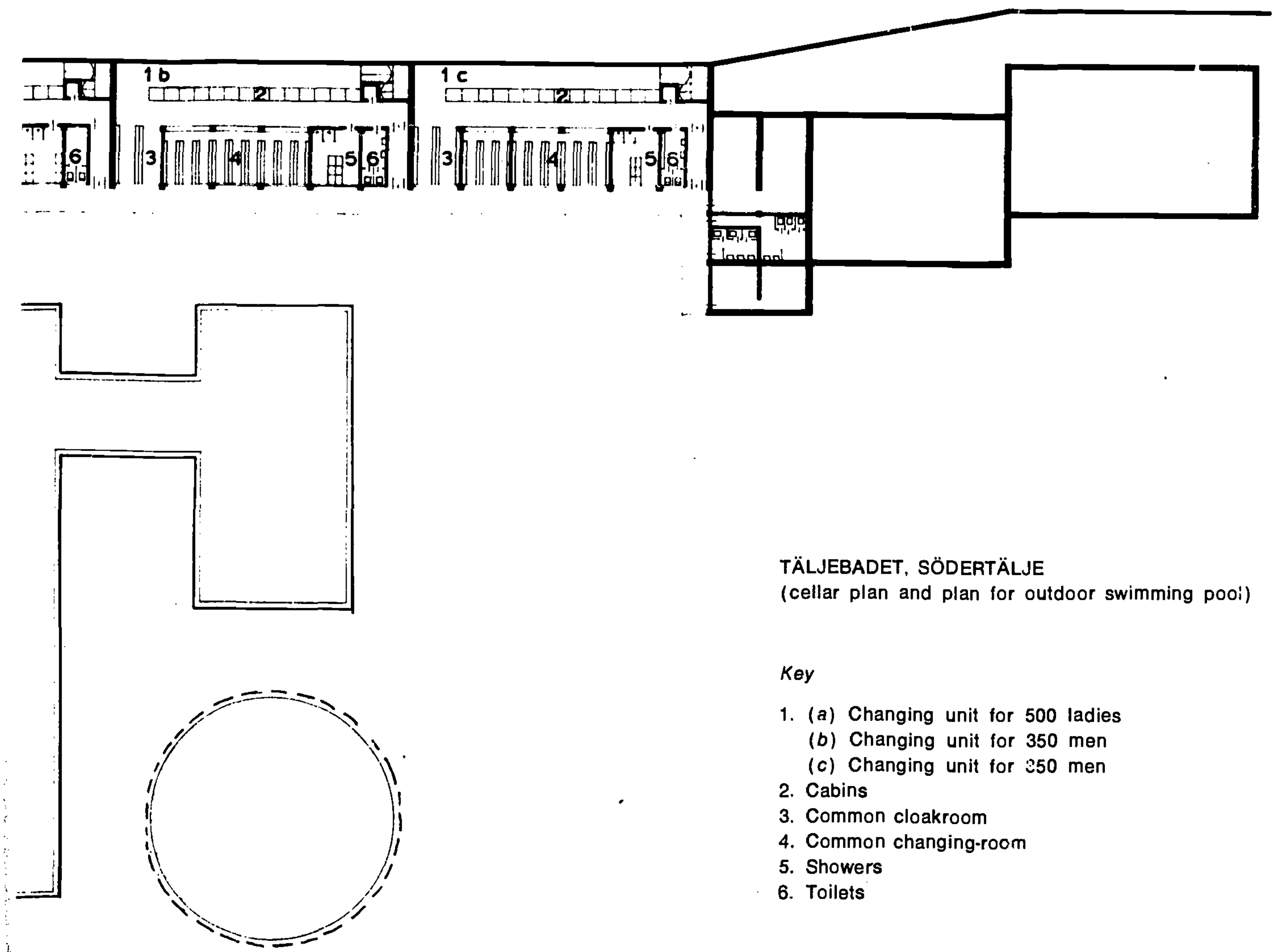
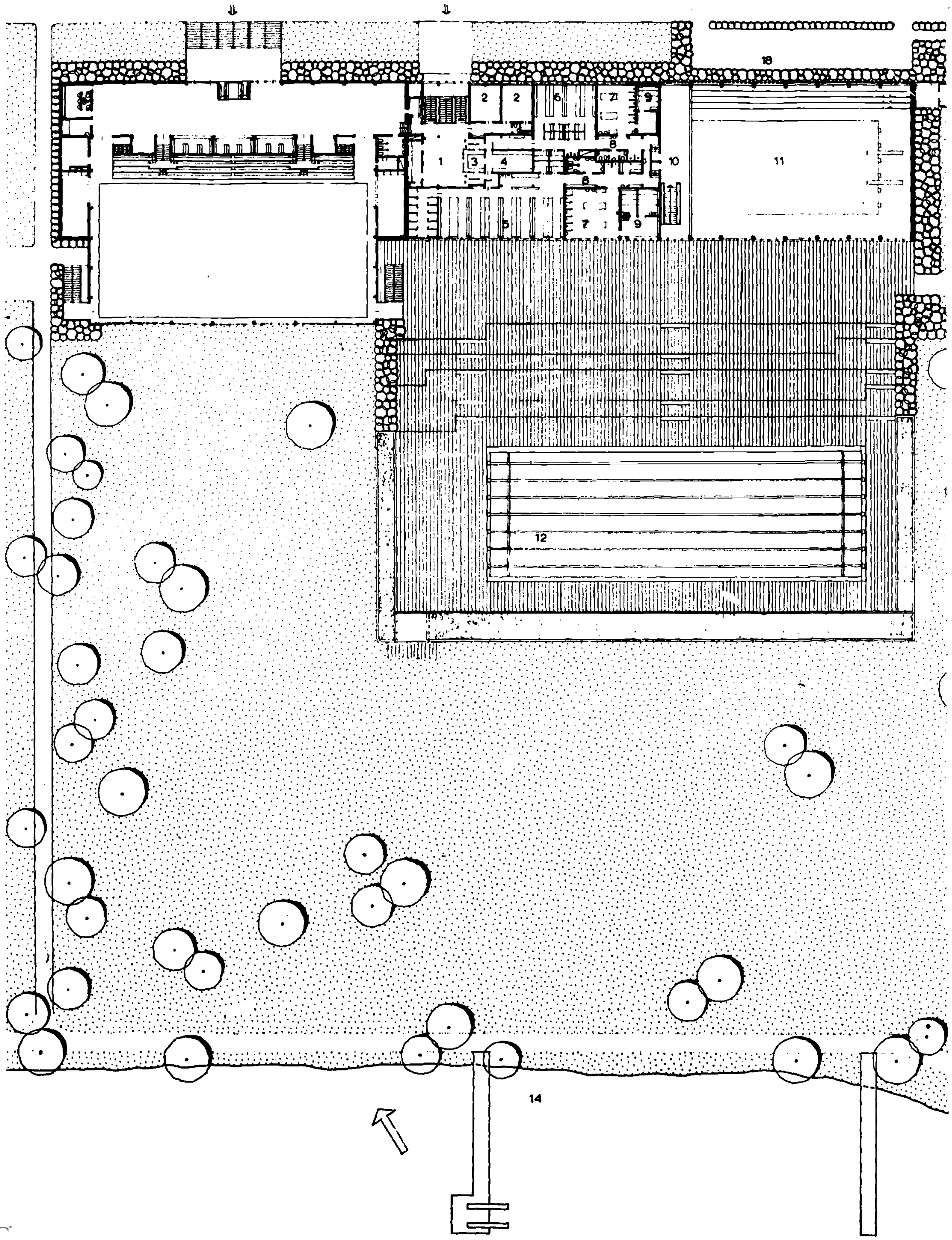


TÄLJEBADET, SÖDERTÄLJE
(cellar plan and plan for outdoor swimming pool)

Key

1. (*a*) Changing unit for 500 ladies
   (*b*) Changing unit for 350 men
   (*c*) Changing unit for 350 men
2. Cabins
3. Common cloakroom
4. Common changing-room
5. Showers
6. Toilets

21 Photograph of the indoor pool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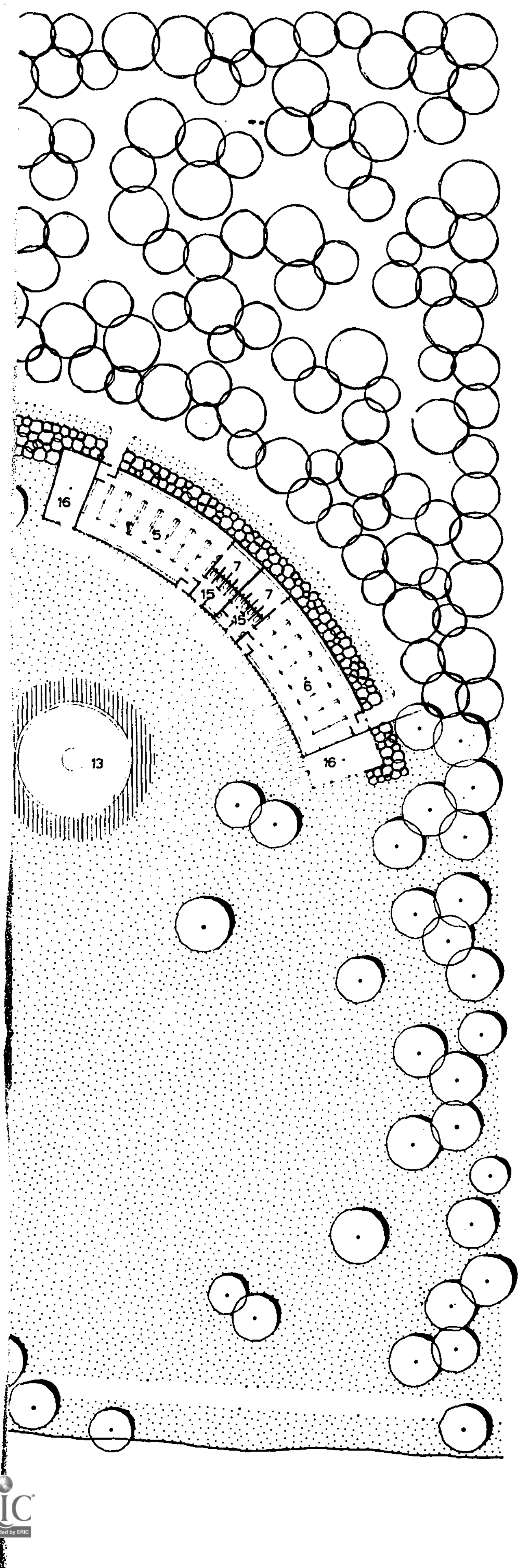

TRANÅSBADET, TRANÅS
(main plan)

Key

1. Entrance
2. Office
3. Cash desk
4. Storage
5. Changing unit for men
6. Changing unit for ladies
7. Showers
8. Drying-off room
9. Sauna
10. Balcony
11. Swimming hall with pool 12.5×25 m
12. Outdoor pool 16.7×50 m
13. Paddling pool
14. Beach
15. Toilets
16. Storage
17. Entrance to open air baths
18. Cycle parking

22 Tranåsbadet in Tranås (master plan)

TICAL EXAMPLES OF COMBINED INDOOR AND OUTDOOR SWIMMING POOLS BUILT AT LOW COST IN SWEDEN

	Å.E.L. European baths 1968			Odenbadet in Falköping					Täljebadet in Södertälje					Tranåsbadet in Tranås				
	As per drawings		Cost per person £	As per drawings		After reduction [1]		Cost per person £	As per drawings		After reduction [1]		Cost per person £	As per drawings		After reduction [1]		Cost per person £
	Price £	Number		Price £	Number	Price £	Number		Price £	Number	Price £	Number		Price £	Number	Price £	Number	
Indoor pool inclusive of everything	156,000	250	**624**	469,200	265	244,000	375	**648**	690,400	400	320,000	500	**640**	350,400	230	181,280	255	**712**
Outdoor pool as per drawings including pools, changing rooms, ground finish and garden	120,000	1,000	**120**	138,160	1,100	138,160	1,100	**125**	277,040	1,600	277,040	1,600	**173**	96,000	800	96,000	. 800	**120**
Total number of persons summertime		1,250			1,365		1,475			2,000		2,100			1,030		1,055	

1. The reduction means that facilities projected previous to 1968 have been reduced in volume and simplified, so that their standard is comparable with that of Å.E.L. European baths 1968, i.e.

— that all diving facilities have been eliminated in the big pool; ceiling height 4.0 m; depth of pool 1.6-0.9 m;

— that all cubicles in the changing room have been exchanged for lockers+benches, i.e. one cubicle = 3 lockers+benches;

— that special forms of bathing, such as bath tubs and Roman baths, have been eliminated in the comparison;

— that the volume cost of the facility has been calculated at £24:— per cu.m.;

— that the sq. metre cost of the outdoor-changing facilities has been calculated at £56:— per sq.m.

The average for the cost per person for three swimming pools built before 1968 is £664:—. Å.E.L. European baths 1968 cost £624, i.e. about 6 % lower.

The average for the cost per person for three outdoor pools built before 1968 is £139. Å.E.L. European baths 1968 cost £120, i.e. about 16 % lower (Cheap changing-facilities, no terrace-buildings or concrete building).

B. Some practical suggestions

In Part I a few basic principles were laid down which call for meticulous preliminary planning (assessment of needs, programming) and compliance with certain minimum health and safety requirements.

These principles if applied should make it possible to reduce the cost of building and/or running pools.

In the light of the specific studies by Mr. Wesselo, Prof. Grünberger and Mr. Lindqvist, which follow these principles, an attempt will be made below to put forward some practical suggestions on how the principles can be implemented.

A general point to remember is that any lowering of building costs that would disproportionately reduce the number of users, impair rational operation or in any other way increase running costs, would be a false economy. The contrary is equally true: any reduction in the running costs which would entail a disproportionate increase in building costs would defeat its purpose.

With regard to design, it is important to bear in mind that the main problem is to devise a plan requiring the least open space and built-on surface possible. The most rational layout of all surfaces, particularly circulation areas, must therefore be sought. To reduce paths and passageways to the absolute minimum both for users and for the staff is a measure of economy. It should also be remembered that if necessary the segregation of persons walking barefoot from those wearing shoes can be dispensed with, subject to the conditions mentioned in Part I of this report.

It is important to lay down a building programme which can be carried out in stages.

The use of prefabricated units should be seriously considered, both for the building (for instance walls, partitions, supports, breeze blocks, roof coverings or self-supporting monocoque roof construction etc.,) and for the equipment (e.g. diving-boards, ladders, starting ramps, water chutes etc.).

A maximum use of the surface conditions (inclines, reliefs and the type of soil) may reduce the cost of building the pools.

Tenders for the work must be invited on the basis of a meticulously detailed plan (including ground studies) so as to avoid the need for later supplementary tenders.

By establishing a time-table and co-ordinating the contractors' work, masonry and finishing costs can be reduced and the work made independent of weather conditions.

The masonry and concrete work should be of a quality which will make costly additional finishing work superfluous. This entails calling in specialist firms and suitable planning and tenders.

APPENDIX I

COEFFICIENTS EXPRESSING THE RECOMMENDED RATIO BETWEEN THE SIZE OF THE POPULATION AND THE WATER SURFACE AREA OF SWIMMING POOLS

(worked out for the Federal Republic of Germany by the *Deutsche Olympische Gesellschaft*)

As a guide, indoor swimming baths can be estimated to require a water surface area 1 sq.m. for 5-15 inhabitants.

The higher coefficient must be applied in densely populated areas and the lower one in areas with low population density.

The standards proposed above are based on the following tables drawn up by the *Deutsche Olympische Gesellschaft*.

Table I

Indoor swimming baths: coefficients for the Federal Republic of Germany

Population of area served	Type of bath	Purpose	Measurements of pool
5,000[1]- 15,000[2]	Very small indoor bath	Pool with mezzanine of adjustable height	8×16 2/3 m
10,000- 30,000	Small indoor bath	Multi-purpose pool	8×25 m
20,000- 45,000	Small indoor bath	Multi-purpose pool	10×25 m
35,000- 70,000	Indoor bath	Multi-purpose pool	12.5×25 m
60,000- 80,000	Indoor bath	a) Pool for swimmers b) Pool for non-swimmers and instruction	12.5×25 m 6×12.5 m
70,000- 90,000	Indoor bath	a) Pool for swimmers b) Pool for non-swimmers and instruction	12.5×25 m 8×16 2/3 m
90,000-120,000	Indoor bath	a) Pool for swimmers b) Pool for non-swimmers and instruction	16 2/3×25 m 8×16 2/3 m
Larger towns or areas		Additional baths based on the above standards, with locations away from centre determined by structure of area	

1. Densely populated area.
2. Sparsely populated area.

Table II

Outdoor swimming baths: coefficients for the Federal F public of Germany

Population of area served	Total surface of bath	Measurements of pool	Approximate water surface area
5,000[1]-10,000[2]	10,000-15,000 sq.m.	Pool for swimmers 16 2/3×25 m.; end for divers 100 sq.m.; pool for non-swimmers 450 sq.m.; paddling pool 50 sq.m.	1,000 sq.m.
7,500-15,000	10,000-20,000 sq.m.	Pool for swimmers 15×50 m. (or 16 2/3×50); pool for divers 240 sq.m.; pool for non-swimmers 700 sq.m.; paddling pool 75 sq.m.	1,750 sq.m.
10,000-20,000	15,000-25 000 sq.m.	Pool for swimmers 16 2/3×50 m.; pool for divers 240 sq.m.; pool for non-swimmers 925 sq.m.; paddling pool 100 sq.m.	2,100 sq.m.
15,000-25,000	20,000-30,000 sq.m.	Pool for swimmers 21×50 m.; pool for divers 300 sq.m.; pool for non-swimmers 1,150 sq.m.; paddling pool 100 sq.m.	2,550 sq.m.
20,000-40,000	25,000-35,000 sq.m.	Pool for swimmers 21×50 m.; pool for divers 300 sq.m.; pool for non-swimmers 1,150 sq.m.; paddling pool 100 sq.m.; but larger changing rooms and sanitary installations	2,550 sq.m.
Larger towns or areas		Additional baths based on the above standards	

1. Densely populated area.
2. Sparsely populated area.

APPENDIX II

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Division for Out-of-School Education

APPENDIX III

PROGRAMME OF THE COLOGNE COURSE

Tuesday, 26 September 1967

9.00 a.m.	*Opening ceremony* Welcoming speeches: — Frau Prof. Dr. hc. L. Diem, Rector of the *Deutsche Sporthochschule* — Dr. Gérard Herberichs, Council of Europe — His Excellency Mr. Gumbel Secretary of State Federal Ministry of the Interior
10.15 a.m.	*Plenary meeting* (Chairman Mr. Finckenstein) Brief communications by Delegations on their countries' experiences
1.00 p.m.	*Lunch* at "Kuckuck" Restaurant
2.30 p.m.	*Plenary meeting* (Chairman Mr. Ruychaver) Introductory lectures to Part A: — A I Preparatory planning (Mr. J. L. Henderson) — A II All minimum requirements of the public, schools and sports circles (Mr. Ernst Hirt) — A III Hygiene (Dr. Louis Coin) — A III Safety (Prof. L. Prokop, read by Prof. Künzel)
5.30 p.m.	*Formation of working groups* A I, A II and A III
7.30 p.m.	*Reception* offered by the city of Cologne

Wednesday, 27 September

9.00-12.30 a.m.	*Meeting of Working Groups A I and A III* — A I Preparatory planning (Leader: Mr. Schirmer) — A III Hygiene and safety (Leader: Prof. Künzel)
2.30-6.00 p.m.	*Meeting of Working Group A II* (Leader: Mr. Runstromer)
7.30	*Supper* at Restaurant "Treppchen-Keller"

Thursday, 28 September

Working excursion (Leader: Mr. Ehlers)
- Dortmund: indoor swimming pool Südbad
- Bochum-Nord: combined indoor and open air swimming pool
- Essen: Gruga outdoor swimming pool
- Reception given by the Mayor of Essen
- Lintorf: indoor swimming pool
- Neuss-Weissenberg: combined indoor and open air swimming pool
- School indoor swimming pool in Kaarst school centre

Friday, 29 September

Plenary meeting

9.00 a.m.-12.15 p.m.	— Adoption of conclusions on Part A (Chairman: Mr. Ruychaver, Rapporteurs: MM. van Gelderen, Runstromer, Künzel) — Introductory lectures to Part B (Chairman: Prof. Dellmann):

12.15-1.00 p.m.	— Indoor swimming pools (Mr. Grünberger)
2.00-2.30 p.m.	— Outdoor swimming pools (Mr. Wesselo)
2.30-3.15 p.m.	Combined pools (Mr. Lindqvist)
3.15-6.00 p.m.	*Discussion of part B* (Chairman Prof. Deilmann)
7.30 p.m.	*Supper* offered by the Federal Ministry of the Interior

Saturday, 30 September

	Plenary meeting
9.00 a.m.	— Adoption of conclusions on hygiene (Chairman: Mr. Ruychaver)
10.15 a.m.	— Adoption of conclusions on Part B (Chairman: Prof. Deilmann)
11.00 a.m.	*Closing ceremony* (Chairman Mr. Finckenstein)

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General and technical education

Books Dealing with Europe - Bibliography for teachers (1965).
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Towards a European Civic Education During the First Phase of Secondary Education (1969).

1. Published by G. Harrap Ltd., London.

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European Youth in International Volontary Work Camps (1967).
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The Theatrical Distribution of Cultural Films (1967).
European Research in Audio-visual Aids (1967/68).
Films for Teaching European Geography (1968).
Second Seminar on Direct Teaching by Television - Scheveningen 1968 (1969).

On sale at the sales agents of the Council of Europe listed at the end of this book.

Each volume is published in English and in French.
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