Commission of the European Communities

Report on the ECSC experimental programme of modernization of housing

1975

This report presents the results of an experimental programme, launched at European level, within the scope of the European Coal and Steel Community scheme for financial aid to housing. The object of the experimental programme was to improve productivity and the standard of work in modernization, by means of rationalized organization at all levels and industrialized methods, including the use of prefabricated units.

The preparation and execution of the programme were in the hands of an international council of experts, composed of representatives of national building research institutions.

The report brings together commentaries on current policies, technical, economic, sociological and architectural aspects, which will be of interest to all those concerned with the improvement or modernization of older housing stock. It also includes, in an annex, rather more technical summaries of each project.

The conclusion of the report is that prefabrication has proved its efficiency, both in terms of speed and, in general, of economy.

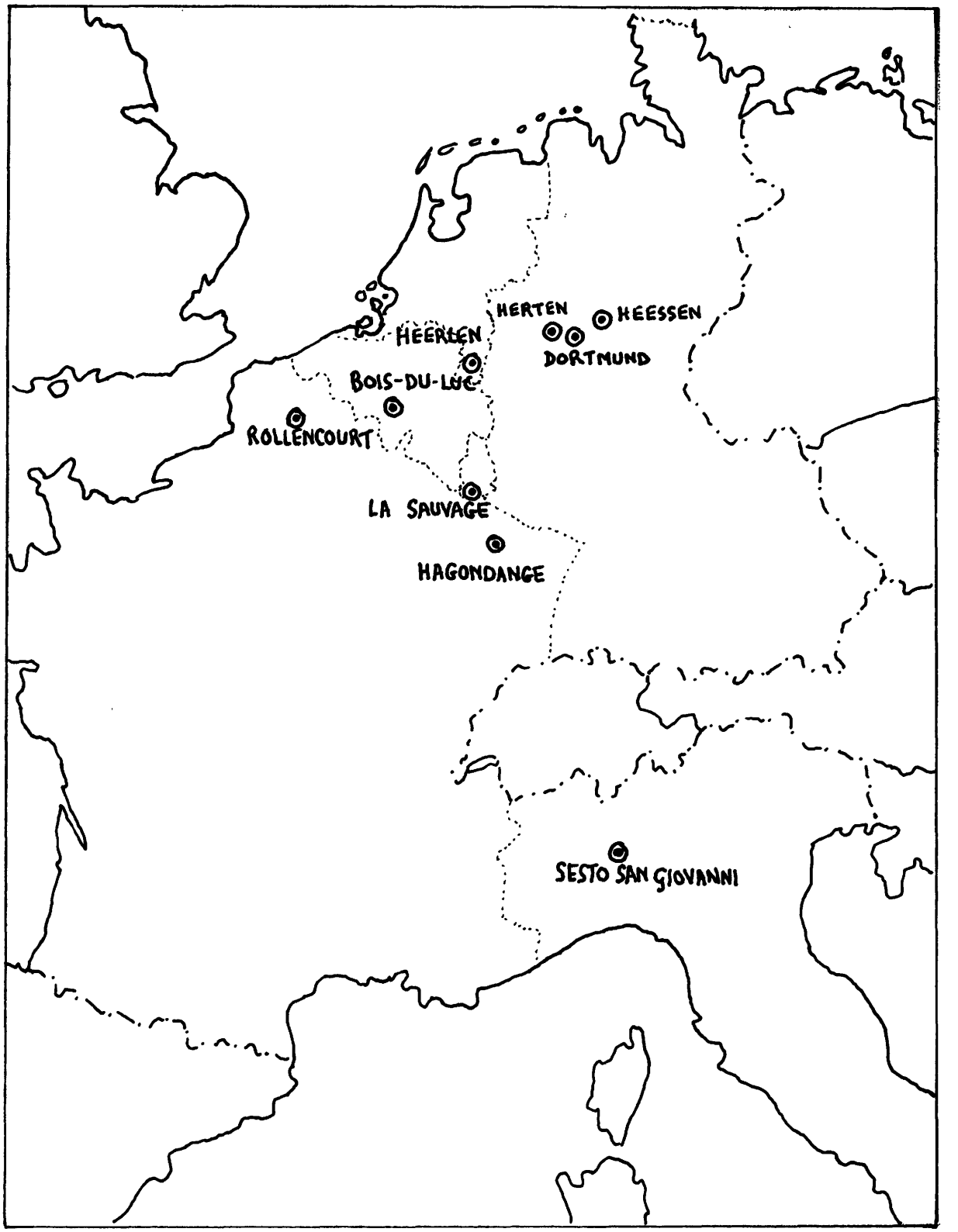
R E P O R T

ON

THE E.C.S.C. EXPERIMENTAL PROGRAMME

OF MODERNIZATION OF HOUSING

PLAN A — LOCATION OF BUILDING SITES IN THE COUNTRIES OF THE COMMUNITY



PREFACE

The High Authority of the E.C.S.C. and subsequently the Commission of the European Communities, conscious of the importance of housing for the social and economic development of the two key industries of the Community, have encouraged the provision of accommodation by financing some 130,000 dwellings for miners and workers in the steel industry, by carrying out experimental programmes and by organising an architectural competition.

Whereas during the first twenty years of the Community's existence the main aim was to make up for housing which had been destroyed during the war by the provision of new dwellings, present requirements relate more to quality of accommodation. The vast amount of old housing still in existence no longer satisfies modern standards of comfort and hygiene.

However, most of this old housing is situated close to available work and therefore relieves the pressure on urban traffic. Since it already benefits from all the necessary infrastructures and communal amenities they do not place upon the public budget the additional burden that investment in these sectors would require.

Rent is generally very low and even after modernisation is lower than the rents asked for new dwellings.

Since much of the accommodation is occupied by retired people, the aim of the industries concerned was to carry out improvements to make them suitable for occupation by their active labour force. Young families demand modern comfort so that modernisation was imperative.

In agreement with both sides of industry, the Commission decided to promote the large-scale modernisation of older housing. Practical experience has shown that from every point of view (financial, technical, architectural and social), modernisation is a very different proposition from new building and one with which those professionally involved in the building industry are not very familiar. It was for this reason that the Commission initiated an experimental programme in which, because of the need to rationalise to keep costs down and reduce the time involved for the work, emphasis was placed on the used of industrialised techniques with prefabricated elements (see Directives, page 1).

The preparation and execution of the programme was entrusted to the International Council of Experts, established for earlier experimental programmes of the ECSC. The Council is under the direction of the services of the Commission and composed of representatives of national building research institutions.

Its membership was as follows:

H. ZOLLNER	Chairmen	Commission of the European Communities
W.D. STUMPF		Commission of the European Communities
L. LE PETIT	Secretary	Centre Scientifique et Technique du Bâtiment, Paris
G. BLACHERE		Centre Scientifique et Technique du Bâtiment, Paris
G. ACHTERBERG		Institut für Bauforschung e.V., Hanover
W. TRIEBEL		Institut für Bauforschung e.V., Hanover
G. CIRIBINI		Centro per la ricerca applicata sui problemi dell' edilizia residenziale, Milano
G. GUARNERIO-CIRIBINI		Centro per la ricerca applicata sui problemi dell' edilizia residenziale, Milano
C. CRAPPE		Institut National du Logement, Bruxelles
A. APERE		Institut National du Logement, Bruxelles
M. LEBEGGE		Institut National du Logement, Bruxelles
K.L. de VRIES		Stichting Bouwcentrum, Rotterdam
F.H.J. NIERSTRASZ		Stichting Bouwcentrum, Totterdam
B. FROMMES		Société Nationale des Habitations à Bon Marché, Luxembourg
G. HOUIST		Sociologue à Paris, représentant des organisations familiales auprès de la Commission
J. DUBUISSON		Union Internationale des Architectes, Paris
D. BRAUCKMANN		Commission of the European Communities
W.G. O'BRIEN		Commission of the European Communities

The final report has been prepared by the secretary of the Council, Mr. Le Petit, on the basis of the following contributions:

Chapter I	D. BRAUCKMANN
Chapter II	C. CRAPPE and A. APERE
Chapter III	L. LE PETIT
Chapter IV	W. TRIEBEL
Chapter V	G. CIRIBINI
Chapter VI	J. DUBUISSON
Chapter VII	F.H.J. NIERSTRASZ
Chapter VIII	L. LE PETIT

The Commission takes this opportunity of thanking the Secretary of the Council in particular for his work of co-ordination, the members of the Council, the architects and promoters, who have contributed to the success of the individual schemes, and also the public authorities, trade unions and employers, who were ready to offer their free co-operation.

Although the project met with a considerable response, the Commission regrets that is was not possible for it to have a wider scope, even within the framework of an experimental programme. Nevertheless, the results obtained have revealed the complex nature of any modernization project and the summary contained in this report should prove informative and useful for all those involved in the modernization of older housing, whether at political or administrative level or as architects, sociologists, promoters or financial institutions. It is the Commission's hope that this programme will lead to a better understanding and the evolution of more adequate solutions in the field of modernization - a sector of enormous potential whose importance is going to increase in future years.

We trust that the work carried out will give similar satisfaction to the occupiers of the modernised houses.

On the basis of conclusive results, the Commission has decided to include modernization in the field of action of normal ECSC programmes of assistance to low-cost housing for coal and steelworkers.

The Commission also welcomes the opportunity of encouraging the exchange of ideas and experiences in European co-operation, likely to point the way to new avenues of progress in the field of housing and social policy.

Patrick John HILLERY
Vice-President of the Commission
of the European Communities

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CHAPTER I

INTRODUCTION - THE EXPERIMENTAL PROGRAMME OF THE E.C.S.C.

In 1970 the Commission of the European Communities decided to attack the pressing problem of the modernisation of older housing in the context of its social policy with a view to achieving a general improvement in older residential property in the Community countries.

It therefore took the initiative in carrying out an experimental modernisation programme, the purpose of which was to improve the efficiency and the quality of modernisation work by rational organisation at all levels and by the use of industrial methods involving the use of prefabricated elements.

The programme of practical research was carried out using the housing of employees of the ECSC industries and the Commission decided to publish the results so that the programme might serve as an example to all those wishing to know more of the problems which modernisation involves.

Although the programme covers various aspects - political, social, architectural, technical and economic - it is the last two to which the Commission devoted its particular attention and which were the main subject of the Experimental Programme.

This decision was justified not only by the considerable number of dwellings requiring improvement each year in the enlarged Community - approximately one million - but also by the inadequacy of accepted procedures and working methods to satisfy a demand which has been stimulated by government aid measures.

The manner in which the work is organised shows that an effort will be required if genuine modernisation is to be carried out in the years to come - that is to say complete modernisation involving a rational division of labour and the use of rapid working methods which result in minimum disturbance to the families occupying the accommodation, while avoiding a sudden upsurge in prices and achieving the desired end of providing those in the lower income group with good-quality housing at a cost lower than that of new buildings.

Works of modernisation, carried out piece-meal and without a comprehensive view of all the improvements which are necessary, result only in successive partial improvements. These improvements, conceived independently of one another, do not take all the deficiencies into account. Thus, one may think it an economy to leave the rooms partitioned as they are, while that is the very thing which makes the house ill-adapted to present-day patterns of living.

The surroundings are rarely the subject of improvement. It is rarely that a decision is made to carry out simultaneous general improvements to a block of houses or a housing estate, such as better street lighting, provision of parking lots, playgrounds, gardens, etc.

Those responsible for the improvement works are not organised for such projects. Individual small proprietors, reluctant to undertake such work, if they are elderly, put up with the consequences of bad planning (inadequate heating, badly arranged fittings) and the difficulties of co-ordinating the work of tradesmen already very busy with repair work. Larger proprietors carry out limited improvements, punctually, and without economic advantage.

When a bathroom is being refurbished, for example, one sees the various specialists coming to a house one after the other - mason, plasterer, carpenter, tile-layer, plumber, electrician, painter, floor-layer, etc. All these jobs are done on the spot. Labour costs are high and productivity is low.

The only prefabricated elements which are used for quick and easy installation are those developed for the new building sector.

Thanks to the constant effort of those who have drawn attention to the problems of house improvement in various countries, however, this situation may be beginning to change for the better.

It is against this background that the Commission of the European Communities considered that it should participate in the general movement in favour of older housing.

By calling upon the resources of a better organisation at all levels from contractor to workmen and by utilising industrialised methods with prefabricated elements it was thought that it should be possible to reduce

- the length of time taken and the inconvenience caused to occupants
- the amount of skilled labour required
- costs of finally achieving modernisation which raises all aspects of the dwelling to a level of quality approximate to that of a new dwelling.

The same means may be used in order to carry out any necessary improvements to the surroundings.

On the 30 June 1970 the Commission of the European Communities approved the General Directives for this Third Experimental Programme of the ECSC. The object of the programme restricted the selection of dwellings dealt with to rented accomodation. Under the seventh finance programme of the ECSC it allocated a grant of 1.6 million units of account to the project in the form of loans for 25 years at an interest rate of 1 %.

The preparation and implementation of the Third Experimental Programme was the same as in the case of previous experimental programmes. It involved the setting up of an International Council of Experts which helped to draw up the General Directives and followed closely the progress of operations in each country.

In the event, the objective of the programme limited the selection of schemes to rented housing, grouped in a single location and belonging to the same owner.

Houses had to be occupied by families of workers in the coal and steel industries, covered by the ECSC Treaties, the ECSC providing financial assistance. Since it was necessary to study the possibility of using series of prefabricated components, it seemed desirable to select houses which were fairly similar, with at least a hundred in each scheme.

The results of the programme, therefore, correspond with well-defined and previously agreed conditions. But there is no doubt that there are many ways in which the results of the experiment may be applied to other housing.

A choice was made from among the blocks owned by landlords of property on a large scale so as to enable them to benefit from the experience gained on a much larger scale of up to 500,000 dwellings.

Nine projects accounted for a total of 1000 dwellings and were approved by the Commission on 28 July 1971.

These projects are referred to in the report in the form of technical summaries.

It was found impossible to carry out operations simultaneously in all six countries because of the different procedures to be observed at national level. In some cases, because government grants were non-existent or not made in such cases, the projects were not always easy to implement.

Work is now sufficiently advanced for this report to be drawn up with some meaning. It would lose its relevance if one were to wait until work on the last project had been completed before preparing it.

The results set out in the ensuing chapters are sufficient to justify its publication.

The projects, five of which are completed, are shown in the following table (see next page).

Country	Location	Year of construction	Industry	Number of dwellings		State of progress at time of report
				before modernisation	after modernisation	
Belgium	Bois du Luc Houdeng-Aimeries	1855	Coal	222 one-family houses	220 one-family houses	Project planned
Germany	Dortmund	1951-53	Steel	92 apartments	84 apartments	Completed
	Heessen	1954	Coal	100 apartments	100 apartments	Completed
	Herten	1951	Coal	104 apartments	52 one-family houses	Completed
France	Hagondange	1912	Steel	103 one-family houses	103 one-family houses	Completed
	Rollencourt-estate Lens-Lievin	1920-24	Coal	90 one-family houses	90 one-family houses	Project planned but not carried out (1)
Italy	Rovani district Sesto San Giovanni	1936-37	Steel	103 apartments	92 apartments	Project planned but not carried out
Luxembourg	La Sauvage estate Differdange	1922-27 1946	Iron ore mining and steel	88 one-family houses	88 one-family houses	Project planned but not carried out
Netherlands	Maria Christina district Heerlen	1943-46	coal and steel	106 one-family houses	106 one-family houses	Completed

(1) It is planned to follow the Hagondange operation by an extension of the project in which the emphasis will be on improving the environment in the immediate surroundings. This will replace the cancelled project.

Although it was the technical aspects of modernisation, which are closely linked with the economic aspects, that were to be the main subject of interest in this experimental programme, other aspects of modernisation - political, sociological, architectural, socio-economic - in the various operations in the different countries could not be disregarded.

All the information collected on these points have been collected in this report which is divided into the appropriate chapters, viz.

- Present policies and legislation
- Technical aspects
- Economic aspects
- Architectural aspects
- Sociological aspects
- Social and economic aspects.

The last chapter is more of a series of socio-economic reflections than a direct result of the programme and may be regarded as an additional contribution to the study of modernisation problems.

Attached to this report are the General Directives of the Commission for the implementation of the programme. These show among other things how international cooperation was organised. That this was so effective is largely responsible for the quality of the achievements.

CHAPTER II

PRESENT POLICY AND LEGISLATION RELATING TO MODERNISATION

I. THE GENERAL SITUATION OF HOUSING IN THE COMMUNITY COUNTRIES

From the information collected it may be concluded that a large proportion of the housing in the Community countries dates back fifty years or more:

Belgium	43 %
Federal Republic of Germany	29 %
France	51 %
Luxembourg	51 % (single-family houses only)
Italy	49 %
Netherlands	33 %

These percentages are approximate.

Working on the hypothesis that a dwelling built fifty years ago or more is in general deficient in what concerns habitability, safety, hygiene and comfort in the light of present requirements, we come to the conclusion that a good third of the housing in the Community is in urgent need of modernisation. This takes no account of the substantial number of dwellings in a state of dilapidation which should be sentenced to demolition. The average age (*) of the dwellings in the various countries is as follows:

Belgium	56 years
Federal Republic of Germany	38 years
France	60 years
Luxembourg	58 years
Italy	57 years
Netherlands	36 years

(*) Assuming the oldest dwellings in the group to be 120 years old.

A look at the dwellings built since the second world war shows the following proportion in relation to total dwellings:

Belgium (since 1948)	34 %
Federal Republic of Germany (since 1949)	54 %
France (since 1949)	28 %
Luxembourg	29 % (*)
Italy (since 1946)	37 %
Netherlands (since 1951)	45 %

If we bear in mind the fact that immediately after the second world war the question of housing in all countries was first of all one of quantity and that the essential purpose of investments was to reduce the housing shortage, it may be assumed that the proportion of post-war housing will include a substantial number of dwellings in which the facilities, amenities and technical standards tend to leave much to be desired.

If we consider the connection between the age of dwellings and their qualitative deficiencies, their lack of comfort and the dissatisfaction to which they give rise, we must conclude that the problem of modernisation considered only from the point of view of magnitude is most acute in France, followed by Belgium and Italy.

When making this statement, it must not be forgotten that habits in the matter of housing, requirements as to comfort and the financial possibilities of the owners or tenants will directly influence the wish to modernise.

A sociological approach to the problem could demonstrate the extent to which modernisation activity is dependent upon these factors.

(*) Assuming two-thirds of the total number of apartments to have been built since 1945.

The type of building involved also certainly plays an important role in modernisation initiatives and a distinction is made in the statistical data between one-family and collective housing.

Work aimed at better adapting or modernising one unit of a collective dwelling cannot easily be restricted to that unit unless it relates only to a few items of equipment. Generally speaking, the work involves the whole building.

The resulting problem is not only one of cost. Problems may also arise with regard to temporary housing for families and the fact that the building belongs to more than one owner may also constitute a disincentive.

2. SUMMARY OF MODERNISATION NEEDS

Statistics on housing available and house-building prepared on different bases in the different EEC countries.

2.1 The housing available in the various Community countries cannot be compared solely on the basis of time when built because the statistics were prepared on the basis of different periods of reference.

Moreover, information is not always available as to the types of building concerned.

Almost half the available housing is at least 50 years old.

2.2 In Belgium, France, Luxembourg and Italy approximately half the housing is fifty years old (43 %, 51 %, 49 % respectively).

The Federal Republic of Germany and the Netherlands are remarkable exceptions (29 % and 33 % respectively).

If we look at average age, France leads the field (60 years) followed by Luxembourg (58), Italy (57) Belgium (56), Germany (38) and the Netherlands (36).

2.3 Housebuilding has boomed since the second world war.

Enormous efforts have been made since the second world war to build new dwellings.

The Federal Republic of Germany leads the way. 54 % of existing housing was built since 1949. The Netherlands follow with 45 % since 1951, Italy with 37 % since 1946, Belgium with 34 % since 1948, Luxembourg with 29 % and France with 28 % since 1949.

The problem of modernisation arises particularly in the case of the oldest dwellings.

In countries with the lowest proportion of new housing, modernisation needs are greatest.

If we study the data on the age and gradual renewal of available housing we must admit that the problem of modernisation arises most acutely in France and Luxembourg and then in Belgium and Italy.

2.4 The construction of collective housing has expanded remarkably in the Community since the second world war.

Building of collective housing (apartments) is spreading. In France these account for half the housing total.

France and Luxembourg have the largest number of apartments (49.46 % and 49 %). But Germany has the greatest increase in the number of apartments (22 % in 1948, 56 % in 1971).

2.5 Four countries (Belgium, Germany, France and Luxembourg) have information on the development in amenities and convenience in housing. These relate to differing building periods so that any comparison can only be approximate.

Because of serious gaps in available information comparisons as to convenience must be made with great caution.

If we look at the provision of amenities since 1947 in connection with bathrooms or shower-rooms, we note the following improvements:

Great progress has been made since the second world war in the provision of bathrooms and central heating.

Belgium	+ 40.7 %
Germany	+ 47.6 %
France	+ 58.4 %
Luxembourg	+ 54.0 % (since 1920)

Progress is also appreciable in the matter of central heating:

Belgium	+ 25.2 %
Germany	+ 22.5 %
France	+ 48.8 %
Luxembourg	+ 77.5 % (since 1920)

No problem as regards electricity.

In the Community countries practically all dwellings are connected to electricity mains.

Greatest effort required in central heating in Netherlands and Belgium

If we look at efforts still to be made in the provision of amenities we must consider the following statistical information which is classified in order of need:

1/ Central heating is needed:

Netherlands	in 84 % of dwellings
Belgium	in 70 % of dwellings
Germany	in 70 % of dwellings
France	in 65 % of dwellings
Italy	in 46 % of dwellings
Luxembourg	in 21 % of dwellings

and in the provision of bathrooms in Italy and Germany.

2/ Bathrooms are needed:

Italy	in 71 % of dwellings
Germany	in 60 % of dwellings
Belgium	in 53 % of dwellings
France	in 57 % of dwellings
Netherlands	in 30 % of dwellings
Luxembourg	in 16 % of dwellings

Connection to drainage needed in Germany and France

3/ Connection to main drainage is needed:

Germany	in 43 % of dwellings
France	in 37 % of dwellings
Belgium	in 23 % of dwellings
Italy	in 11 % of dwellings
Luxembourg	in 8 % of dwellings

Connection to water mains needed in Italy and Belgium.

4/ Connection to water mains is needed:

Italy	in 13 % of dwellings
Belgium	in 12 % of dwellings
Germany	in 9 % of dwellings
France	in 9 % of dwellings
Luxembourg	in 2 % of dwellings

Oldest dwellings are those most deficient.

Although precise information is not available on this subject, the greatest number of deficiencies are certainly to be found in older housing.

2.6 The concept of modernisation covers different criteria from country to country.

Concept of modernisation varies from country to country. Standards and criteria differ.

While in most countries, age, dilapidation, lack of equipment and unsuitability from the town planning point of view are criteria governing the decision to repair or replace, in Belgium greater importance is attributed to physical defects which render a dwelling "insalubre".

Assessment of modernisation needed is generally less than actual requirements.

If we compare and contrast the data collected for the evaluation of modernisation needs and try to find a common denominator we find that

1) The number of dwellings assumed to be in need of modernisation is lower than actual needs.

2) Except in France, programmes do not reach the level of need assessed.

3) Except in Germany and Luxembourg, average annual modernisation activity remains much below need.

The gap between the number of dwellings modernised and those definitely in need of modernisation is clearly increasing.

A serious effort must be made to modernise dilapidated dwellings if we are to avoid the number increasing and those in worst condition degenerating into an unusable state.

This leads us to conclude that except in the Federal Republic of Germany, the modernisation of available accommodation in a state of dilapidation must be increased to a maximum if we are not to see the number of defective dwellings doubling in the next 20 or 30 years.

3. SUMMARY OF STANDARDS IMPOSED OR GENERALLY ACCEPTED

3.1 If we base ourselves on the common concepts of health, safety and amenities we may say that there are in the Community countries a large number of different standards and regulations applying to new buildings and conversions of older properties.

These differences appear in various fields:

- terminology and principles
- types and kinds of dwelling, contractors, owners, types of occupation, finance and financial aids
- technical standards and regulations
- authorities, administrations and public bodies.

3.2 Except in France and the Netherlands there are no legal obligations to apply standards and specific regulations of general scope to the improvement of older housing. Standards and regulations for new construction are applied as appropriate.

In the Netherlands, the law on housing (Wonigwet) makes it obligatory to include in the municipal housing code directives relating to fitness and length of life of housing. Various regulations have been made in consequence, since 1956, following a model approved by the Ministry of Construction.

3.3 In countries other than France and the Netherlands there generally exist standards and regulations in the laws and decrees governing either finance or the grant of aid for new building and conversions (modernisation and improvement). These regulations do not, incidentally, apply to all new buildings or buildings for conversion.

This is the case in Belgium and Luxembourg.

3.4 As in Germany, in Italy new buildings must satisfy strict standards, while conversions (or modernisation) are generally subject to the same regulations.

3.5 Regulations at present in existence in the countries of the Community show clearly that standardisation in the strict sense of the term is rarely required.

More often there are merely indications as to quality or other requirements. These do not allow of an objective assessment of the actual situation.

Subjective judgement by the person inspecting dwellings for modernisation sometimes determine the decision.

3.6 A general application of standard technical requirements is obligatory in the following countries:

Italy

Standard technical regulations are obligatory, for example, in respect of

- stability and durability of a structure:
  - structural steel work (CNRUNI 10,011)
  - loadings (CNRUNI 10,012)
  - structures in steel and reinforced concrete (CNRUNI 10,016)

- safety:
  - safety of lifts (CNRUNI 10,001)
  - safety of gas installation (UNI 7,129)
  - safety of liquified petroleum gas installations (UNI 7,131)

3.7 Assessment of the healthiness and habitability of a dwelling may be based on a certain number of criteria such as humidity, lack of air and light, size of rooms, total absence of amenities.

In France and in the Netherlands, the matter is governed by law. In Belgium the directives issued by the Institut National du Logement do not have the force of law.

The existence of directives for assessment of the healthiness of a dwelling does not exclude a certain subjectiveness in determining whether a dwelling is in a state of reparable or irreparable unhealthiness.

In France fixed values are allotted to each unfavourable element and assessment of unhealthiness is an overall matter, as in Belgium.

4. AIM AND SCOPE OF POLICIES

In all the countries of the Community intervention by the state to improve or modernise dwellings falls within the framework of general housing policy. Efforts here are not on the same scale everywhere and in some countries they are staggered in time.

Belgium

The general housing policy pursued for twenty or thirty years has three main aims:

- the availability of housing for ownership by those with low incomes
- the availability to those with low incomes of healthy and confortable housing to rent
- encouragement in the combatting of unhealthy living conditions.

The last aim may cover both the demolition of unhealthy dwellings which cannot be improved or the improvement of those which can still be improved.

It should be added that the government does not grant any financial aid for the modernisation of housing which has been designated unhealthy.

Federal Republic of Germany

Over the past ten years the Federal Republic of Germany has given a great deal of attention to the problem of modernisation. Nearly DM 45 million have been allocated for this purpose and it is proposed to give greater incentives to the modernisation of dilapidated housing so as to increase the number of decent dwellings available at a moderate rent. The next stage will involve the application of regulations in force to the general measures relating to modérate-rent housing.

Housing scheduled for modernisation is generally situated in the large cities which were spared destruction during the war, in medium-size towns and in rural areas.

France

In France policy on the subject of modernisation is set out in the aims of the Sixth Economic and Social Development Plan (1971 to 1975).

The implementation of this plan should make it possible to reduce the percentage of housing which does not have sufficient elements of comfort from 55 % in 1968 to 35 % in 1975. While the Fifth Plan aimed at 140,000 housing units per year the Sixth Plan seeks to improve 250,000.

Grand Duchy of Luxembourg

Legislation and regulations in the Grand Duchy have as their aims

1. To encourage owner occupation of new or existing housing
2. To encourage the improvement of housing, whether rented to tenants or owner-occupied, and the provision of amenities in existing housing.

The state gives financial aid to local authorities in order to compensate for their expenditure in improving slum areas.

Italy

In Italy the problem of modernisation of housing has been a topical subject for a few years thanks to a campaign to conserve and improve central districts of historic importance.

Government aid for modernisation is still limited to what is allowed under a policy for the protection of buildings and historic centres.

Netherlands

For some years there has been in the Netherlands a noticeable tendency for housing policy to lay stress on the preservation of old housing rather than on demolition for reconstruction.

Since 1953 the Netherlands authorities have granted financial aid for housing modernisation.

Since 1 January 1970 a new regulation has offered greater opportunities to owners of houses who wish to modernise the accommodation they occupy.

Special financial aid has been allowed since 1 January 1972 for the improvement of all or part of an old district.

Government financial aid for modernisation is in principle limited to housing built before 1945.

Since 1974, however, government subventions have been granted to improve thermal insulation in houses built after 1945.

Grants can also be made for the improvement of houses built after 1945 to remedy defects resulting from the use of industrialised systems of construction.

The government can equally subsidize the installation of central heating in housing for old or physically handicapped people constructed after 1945.

These grants have generally been increased and the conditions made more flexible in 1973 and 1974.

4.1 Laws and regulations encouraging improvement and modernisation of dwellings

Financial aid

In all countries of the Community where provision has been made for aid to owners of private housing, a system of subsidies applies which under certain conditions permits the government to assist in reducing the incidence of improvement costs.

As the following table shows, aid is basically in the form of grants, low-interest loans or a combination of both.

A.- GRANTS AND SUBSIDIES

Country	Basis on which grant is calculated	Maximum amount of grant	Remarks
Belgium	25 % of total improvement work carried out	maximum BF 25,000 + 10 % per dependent child	The dwelling must be unhealthy
	Applicant may choose between a once-for-all grant or grant in instalments with additional loan		All elements of unhealthiness must be eliminated by the work
			Only granted to owner-occupiers
	Local authorities can obtain a subsidy from the government for the improvement of old districts	65 % maximum of the amount of the subsidisable expenditure	
Federal Republic of Germany	Subsidy to afford relief on loans contracted by private individuals for the conservation and modernisation of dwellings	3 % per annum of amount borrowed	Owner-occupied dwellings or rented dwellings. Rent increases after improvement are controlled
France	Grants convertible into reduction in interest on special loans of Crédit Foncier de France	F 120 per square metre	Only to landlords and occupiers of housing in "secteurs sauvegardés" and within "périmètres de restauration"
	Lump sum subsidies from the Agence Nationale pour l'Amélioration de l'Habitat	25 % and 45 % of the average cost of work, depending upon nature	Given to owners or tenants of dwellings built before 1 September 1948 and whose rent is subject to an "additional" tax of 3.5 %
	Grant for the improvement of rural dwellings to owner-occupiers (farmers and farm labourers) for ten years	An upper limit is fixed for work carried out	The total grant per dwelling limited to F 850 per year
	Rent allowance: aid to tenants, particularly the old and infirm	Max.: difference between old and new rent after improvement	In grouped operations the rent increase is absorbed within the ceiling on rent allowances

Country	Basis on which grant is calculated	Maximum amount of grant	Remarks
Grand Duchy of Luxembourg	Dwelling improvement grant 25 % of cost for a first F 50,000 and 10 % for the difference up to a limit of F 165,000	maximum F 24,000 + 10% per dependent child under 18	Means test
Italy			
Nether-lands	(a) Grant for the improvement of individual houses (in principle only for houses built before 1945)	max. 7,560 florins (3,360 florins - government grant, on condition of a local authority grant of 4,200 florins) or 25 % of cost of works. Lump sum grant for certain amenities (shower, w.c.)	
	(b) Grant for the improvement of a group of houses (works carried by owners on a joint basis)	Average 4,200 florins per house and 1,500 florins per house for the improvement of the surrounding area	
	(c) for the improvement of a district, 30 % of the costs of modernisation approved by the Minister		
	(d) same incentives for the improvement of housing for old and physically handicapped persons	Works, ranking for grant, can include the installation of a lift or central heating	
	(e) Rent allowance for the tenant of a modernised house having an annual disposable income of less than 22,000 florins, if the new rent is too high in relation to income		
	Special (communal) financial aid can be granted for the improvement of groups of houses		

B.- LOANS

Country	Reasons	Conditions and amount
Belgium	For improvement of an improvable unhealthy dwelling. There is a choice between a once-for-all grant and a grant in instalments with additional loan.	See "Grants". Maximum amount of loan BF 175,000 + BF 17,500 per dependent child.
	Improvement of existing dwellings: possibility of loans from various official bodies.	Dwellings must be in the low-income housing category. Special conditions (and higher interest) for medium-income housing.
Federal Republic of Germany	Low-interest loan for the conservation and modernisation of private dwellings.	For rented accommodation and owner-occupied dwellings. For owners with low incomes limited to 15 % of the cost of modernisation (rate of interest 1 %, administration charges 0.5%, liquidation 5.5%).
France	Possibility of loan from "Caisses d'Allocations Familiales".	Maximum F 3,500
	Housing saving schemes of two kinds: planned saving scheme and saving pass book scheme.	The possibility of a loan which may be as much as F 100,000 (liquidated in a maximum of 15 years, interest 3.5%) is added to savings available which bear interest at the rate of 2.5% net of tax and a saving bonus (max. F 4,000).
	Loans from Crédit Foncier de France for restoration of property.	In "secteurs sauvegardés" or within "périmètres de restauration" -Maximum loan 2/3 of the cost of work within a limit per square metre of restored area. -Family occupation: period of 20 years, interest at 6% and 9% after 10 years. -Rented accommodation: period extended to 30 years, successive rates of interest of 4.75% (15 years), 6% (5 years), 9% subsequently.

Country	Reasons	Conditions and amount
France	Loans from the Caisse de Prêts for bodies providing moderate-rent housing for the acquisition and improvement of housing.	Maximum cost of purchase and modernisation allowed Period of loan 45 years Interest 1%
	Mortgage loans from Sociétés de Crédit Immobilier to owners and bodies corporate acting in a non-profitmaking capacity for the improvement, modernisation or repair of the housing.	Period of loan 25 years Interest 5% Maximum F 19,800 per unit
	Mortgage or other loans from the Sociétés de Crédit Immobilier to owner-occupiers of one-family houses for the purchase, extension, improvement or repair thereof.	Same as for improvement No mortgage guarantee required in certain cases.
	Loans from the Caisses d'Epargne for the modernisation of blocks of moderate-rent housing (at least 300 units).	Period of loan 30 years Interest 7% and 7.25% Maximum 50% of the cost of work
	Loans to salaried employees for the improvement of their housing by using employers' contributions for building (0.90% of salary paid)	
	Loans from the Crédit Agricole accompany the grant for the improvement of a rural dwelling.	The interest rate is reduced by the grant to about 2.75%
Italy	In implementation of the Law of 22 October 1971, loans are granted for works of conservation and restoration of buildings for residential use.	Only for certain historical centres in highly populated urban areas.
	The Law of 14 February 1963 allows investments for the repair and modernisation of workers' housing which while not unhealthy is gravely lacking in convenience.	
	Decree of 24 July 1973 (No.426) on modernisation, made law on 4 August 1973 (No.495) and Law of 22 December 1973 (No.841) extending the former.	
Netherlands	State participation involving the provision of additional finance which may be combined with an extension of loans not already liquidated.	

4.2 Obstacles to modernisation and constraints

Certain provisions of law or regulation and certain situations of fact are such as to prevent or slow down modernisation of dwellings.

4.21 Authorisations or permits required

Belgium

Under the Organic Law on Town Planning and Development, works of conversion of the internal or external structure of a building are subject to the granting of an authorisation.

Federal Republic of Germany

The agreement of the authority which will authorise or supervise works is required only in cases of demolition or alteration to structure, heating installations, garages, playgrounds. The same applies to the provision of new, or alteration of existing connections for water, gas, electricity, telephone or drainage systems.

France

Under the Town Planning Code, modernisation may be carried out in a dwelling without a permit as long as major works are not involved. Any work involving the outside of a building requires a permit.

In communes with less than 2,000 inhabitants a building permit is not required if the size and use of the building are not altered.

Grand Duchy of Luxembourg

A building permit from the local authority is required before any modernisation work can be commenced.

Italy

A building permit issued by the mayor is required for a new building, extension, conversion or demolition.

This permit is granted in accordance with local authority building regulations which relate specifically to safety (solidity of structure and fire prevention) and hygiene (lighting, ventilation, sanitation, drainage and rubbish removal and drinking water systems).

Netherlands

A local authority permit is required for conversion work. The purpose is to prevent the creation of structures which are not acceptable from a public health or technical aspect.

Thus, in all the Community countries, a permit for work must first be obtained. Only two countries, the Federal Republic of Germany and France have provided for an exemption for internal work in their legislation.

4.22 Fiscal disincentives

In Belgium the modernisation grant is only made against invoices subject to VAT.
The grant is also subject to an income limit.

In Germany the amount which may be deducted from the cost of work for tax purposes is lower in the case of modernisation than for new building.

In the Grand Duchy of Luxembourg and in Italy the disincentives are similar to those in Belgium.

In France there are no disincentives of a fiscal nature.

Nor are there any such disincentives in the Netherlands. It should, however, be pointed out that modernisation expenditure for a dwelling may only be deducted for tax purposes when maintenance costs may be deducted.

4.23 Disincentives of a legal nature

In Belgium an improvement grant is only given to owner occupiers who own only one dwelling.

In the case of Bois-du-Luc (one of the schemes included in the experimental programme) the mayor of Houdeng-Aimeries, in whose territory the Bois-du-Luc property is situated, issued between 6 September 1973 and 16 November 1973 two orders based on the decrees of 14 December 1789 and 16-24 August 1790. The purpose of these orders was to order the improvement work on each of the dwellings and to forbid the occupation of these dwellings beyond the date scheduled for execution of work. Having regard to the provisions of regulations in force (Royal Decree of 10 January 1966) and the regulations of the housing authority, these orders cannot be considered as "orders of uninhabitability" but rather as orders condemning the accommodation as unhealthy and requiring that works of improvement be carried out. As a consequence these orders do not permit the occupants to benefit from the grants payable under the Royal Decree of 10 January 1966.

In the German Federal Republic, the law which protects the tenant permits him, in the event of his opposition to modernisation planned by his landlord, to delay the termination of his tenancy agreement and leaving the house for the execution of the works.

He is however, bound by law to accept modernisation, when it is necessary.

Giving notice in these circumstances remains problematic, however, having regard to the law protecting the tenant against notice to quit.

A modification of the law on tenant protection is proposed.

In France the law of 12 July 1967 has done away with any legal obstacles.

In Italy a tenant may appeal against the carrying out of improvement and modernisation work if other adequate accommodation is not provided for him.

The Grand Duchy of Luxembourg has no legal obstacles.

In the Netherlands the Civil Code requires that a tenant must give his agreement to any work planned by the owner of the premises. The law thus affords the tenant a certain measure of protection. It is proposed to modify the law so that the tenant cannot refuse certain modernisation works.

4.24 Economic or other obstacles

Belgium — The improvement grant is only given for dwellings which are unhealthy by their nature or because they are occupied by too many people. The provision of amenities is only partly subsidised and the subsidy is paid on condition that the work is carried out with the improvements.

Federal Republic of Germany

The rise in building and modernisation costs which have made necessary increasing investment results in greater and greater increases in rents. In the case of certain modernisation work for which government aid is payable, such rent increases are subject to a ceiling or limit. Faced with a dwindling income, owners tend to sell their old houses, demolish them or convert them and relet them more profitably.

France — High rates of interest do not allow modernisation work to be carried out with a sufficient degree of profitability. Some housing built before 1 September 1948 is still the subject of rent controls.

The change of category or classification of modernised accommodation and the rent increases authorised do not always offset investment. Measures dating from November 1972 sought to give a new stimulus to the modernising and improving of large blocks of old apartments but it is still too soon to assess the results achieved.

Italy — The increase in rent resulting from modernisation cannot always be met by a tenant. He should then be able to obtain financial assistance.

Grand Duchy of Luxembourg

No disincentives of an economic nature exist.

Netherlands

In the moderate-rent housing sector, modernisation or conversion work is difficult to execute because tenants cannot or will not pay the new rents.
In the private sector, the wide variety of accommodation to be dealt with prevents the evolution of a solution of general application to problems of modernisation.
In addition, there are many owners whose financial assets are limited. Some are tempted to change the use of the building in order to obtain a higher rent, such as setting up a hostel for foreign workers.
Lastly, investment in modernisation does not always produce an economic return.

5. CONCLUSIONS

5.1 The quality of housing varies considerably in the various Community countries.
The assessment of quality and the desire to remedy disadvantages are influenced by the way of life, domestic arrangements, economic situation of the countries and the financial possibilities of the owners and public authorities.

5.2 Criteria of unhealthiness and inadequacy differ from country to country but some are common to all.

5.3 The average age of property in the Community is about 50 years. At the end of 1960 some 63 million dwellings were available, of which at least 24 million were built before 1919. These dwellings no longer meet the requirements of modern living as regards habitability, hygiene and comfort.

5.4 Much still has to be done to ensure that all housing has certain basic conveniences.
While there is no problem about electricity and most accommodation is connected to the main water system, efforts must be directed at the provision of central heating installations, a bathroom and lavatory.

5.5 Improvements costs recorded in the various countries cannot be readily used to determine an average cost because they are influenced by too many factors.
Assuming an average cost of 1,500 u.a. (an absolute minimum) the total investment required for modernisation of housing built prior to 1919 would be 50,000 million u.a.

5.6 In most countries modernisation needs are under-estimated and the government funds allocated for this purpose are not sufficient for programmes.
In other words, the average level of activity in modernisation is insufficient. At the present rate, unhealthy or inadequate accommodation is on the increase.

5.7 While it is possible to note points in common in compulsory or generally accepted standards, one can also point out serious differences in their content, scope, the authorities which issue them and those which apply them.

5.8 In all Community countries, modernisation and improvement of housing is a matter of concern to the government. Initiatives and intervention are provided for in the general policy on housing but also often depend on the economic situation.
Government aid takes two forms: non-repayable grants and low-interest loans.
Maximum grants and loan ceilings generally depend upon the cost of the work, to which a limit is also generally set.
It is difficult in this connection to give average figures because the various factors involved are not always comparable.

5.9 It is normal that modernisation, like the aid given to it, should be regulated by the authorities, but by their very nature the conditions imposed will always tend to put a brake on the very activity it is desired to encourage.

One might, as in several countries, waive the requirement of building or planning permission whenever modernisation or improvement work does not affect either the outside or the structure of the building.

The calculation of aid from the government is generally based on the real cost of the work carried out and it would seem difficult to do away with the requirement of presentation of invoices to prove costs. What could be done, however, is to establish preferential tax rates.

In most countries a tenant may object to work which affects his normal enjoyment of the premises he rents. This is an obstacle to modernisation which could be done away with by amending the law.

In all Community countries the high cost of improvement or modernisation tends to put a brake on expenditure which cannot be recovered in the rents that are allowed.

In the moderate-rent housing sector, adjustments to rent must be limited because the principle of the accommodation is that it should be occupied by families in the low-income group. The spread of a rent-rebate system might be a remedy to this situation.

The last point to be made is how geographical dispersion of all housing and the protections which the law traditionally gives the landlords are obstacles to a systematic general campaign.

The regulations on financial aids obtaining in each country were applied to the schemes carried out under the ECSC Experimental Programme. The amount and principal characteristics of the aids obtained are set out in the paragraph on "Financing" in the technical description of the schemes annexed to this report.

Annex to Chapter II

LEGISLATION APPLYING TO NEW BUILDING

A.- LEGISLATION TO PROTECT THE HEALTH OF OCCUPANTS

a/ Protection against Damp

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	No decree contains general norms	-	-
	Technical conditions of structure must ensure protection against damp	State	Grant made for building, grant for purchase, rent subsidy
		(certain communes)	Police and building regulations
	The dwelling must not be damp	Institut National du Logement	Survey on housing standards
Germany	Compulsory application of DIN 4,117 "Protection against damp", etc.	Länder	For all buildings erected with public funds
France	Dwellings must be protected against rain and ground water	State - Decree of 14 June 1969	Under general regulations on house-building
Italy	Criteria for evaluating representative standards for heating and ventilation of buildings	State - Circular of 22 May 1967, No. 3151	General regulation on hygiene in buildings
	Dwellings must be protected against ground water	Certain communes	Communal building regulations
	Dwellings must be protected against rain and ground water	Gestione Case per Lavoratori	Policy for moderate-rent housing
	Provisions of building regulations vary from commune to commune	Communes	Communal building regulations
Nether-lands	Under the law on housing, communal regulations on building must include prescriptions concerning the prevention of damp	State Communes	Under the general law on housing

b/ Natural light and ventilation of dwellings

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	No decree contains general norms		
	Technical conditions of structure must ensure sufficient light and ventilation	State	Building grant, purchase grant and rent subsidy
	The main rooms, living and bedrooms, must have windows that open and a glazed area of at least 1/6 of the floor area	Institut National	Surveys on housing standards
France	Main rooms must have windows that open and with a sufficient glazed surface to the exterior	State - Decree of 14 June 1969	Under general regulations on house building
Italy	Regulations vary according to commune	Communes	Communal regulations on building
	All rooms must be provided with windows, which open and with a glazed surface to the exterior		
	Glazed areas lighted from exterior determined by floor area		
Nether-lands	Under the law on housing, communal building regulations must include prescriptions concerning light and ventilation	State Communes	Under the general law on housing

c/ Bathrooms

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There is no law or regulation requiring the provision of a bathroom	-	-
	The dwelling must have one room designed for use as a bathroom	State	Building grant and purchase grant
	The dwelling must be equipped with a bath or shower room	Institut National du Logement	Surveys on housing standards
Germany	Installation of bathroom obligatory	Länder building regulations	Under regional policy or policy on moderate-rent housing construction
France	Every dwelling must have a separate room with a bath (or shower) and wash basin Special regulations on ventilation	State - Decree of 14 June 1969	General policy
Italy	No decree or regulation makes provision of a bathroom mandatory in all cases		
	The house must be equipped with a bathroom lit and ventilated from the outside	Gestione Case per Lavoratori	Policy for moderate-rent housing
Nether-lands	Under the law on housing, communal regulations must contain prescriptions concerning the space reserved for baths and showers	State Communes	Under the general law on housing

d/ W.C.

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	A W.C. with flush is required for every dwelling. It must not communicate directly with the kitchen or with a living room	State Communes	Legislation on town planning (building permit)
	Every dwelling must have its own WC	State	Regulations governing building and purchase grants and rent subsidy
	Every dwelling must be equipped with an inside WC with flush	Institut National du Logement	Surveys on housing standards
Germany	Provision of WC compulsory	Länder building regulations	Under general policy or policy on moderate-rent housing
France	Every dwelling must be equipped with an inside WC. This must not communicate directly with the kitchen or living room	State - Decree of 14 June 1969	General policy
Italy	Each dwelling must be provided with an internal WC, which must not communicate with the kitchen or living room and be lit and ventilated from the outside	Communes	Communal building regulations (issue of building permits)
	One or two WC's depending on the number of rooms	Gestioni Case per Lavoratori	Policy for moderate-rent housing
Netherlands	Under the law on housing, communal regulations must contain prescriptions relating to WC's	State Communes	Under the general law on housing

B.- LEGISLATION ON SAFETY OF OCCUPANTS OF DWELLINGS; DURABILITY AND STABILITY OF A STRUCTURE

a/ Protection against risk of fire

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There are special regulations concerning fire precautions for high rise buildings	State	General police and building regulations
Germany	Compulsory application of DIN 4102 etc.	Länder building regulations	General policy or policy on moderate-rent housing
France	Safety regulations apply to all types of dwelling	State - Decree of 14 June 1969	General policy
Italy	Special fire brigade regulations Standards for safety and prevention of fire Special or individual regulations	State (Ministry of the Interior) State (Ministry of the Interior) Certain communes	Fire regulations General regulation on safety of buildings Communal construction regulations
Netherlands	The law on housing (Woningwet) stipulates that communal building regulations must contain prescriptions on fire prevention	State Commune	General law on housing (Algemene Woningwet)

b/ Safety regulations connected with water, gas and electricity supplies

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	No general safety regulations NB: The service companies observe all the appropriate precautions	-	-
Germany	Electrical installations - compulsory application of VDE regulations	Länder building regulations	General policy or policy on moderate-rent housing
France	Decree gives legal force to NF C 14,100 and NF 15,100 Special regulations for dwellings designed for the elderly Gas ducts must meet safety standards	State - Decree of 22 October 1969 State - Decree of 15 October 1962	General policy General policy
Italy	Communes can provide safety standards in their regulations, imposing the directives of CNR-UNI (Consiglio Nazionale delle Ricerche, Ente Nazionale di Unificazione) on drains and gas ducts CEI (Comitato Elettrotecnico Italiano) prescriptions mandatory for electrical installations	Communes	Communal regulations on construction
Netherlands	There are no standards imposed by the State, communes may in their regulations lay down such safety standards as are required or considered desirable Applications of standards NEN 1078 (1963) on gas installations, NEN 1010 (1962) on low voltage electrical installations, NEN 1081 (1961) on safety in relation to electric lifts	Communes State	Communal building regulations Regulations on building of subsidised housing

c/ Stability and durability of structures

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	No compulsory regulations on housebuilding	-	-
	For moderate-rent housing: technical specifications as to stability of main structure and materials used	Société Nationale du Logement and Société Nationale Terrienne	Regulations concerning moderate-rent housing
Germany	Compulsory application of DIN 1045 for steel and concrete structures, DIN 1053 for masonry, DIN 1055 for loads borne by floors and walls	Building regulations of Länder	General policy and policy on moderate-rent housing
France	The building must at the level of each of its elements withstand the combined effect of its own pressure, exceptional conditions and the normal foreseeable overload	State - Decree of 14 June 1969	General policy
Italy	Governed by construction regulations varying from commune to commune	Communes	Communal regulations
	Standards of construction materials	State - Royal Decree of 16 November 1939	General regulations on safety of buildings
	Technical standards for building and antiseismic regulations	State - Law of 26 November 1962 no. 1684 and Law of 5 November 1964 no. 1224	
	Standards for concrete, reinforced concrete and pre-stressed concrete	State - Law of 5 November 1971 no.1086, Decree of 30 May 1972	General regulations on safety of buildings
	Standards CNR-UNI CNR-UNI 10011/67 construction in steel CNR-UNI 10012/67 loadings CNR-UNI 10016/72 construction in steel and reinforced steel		
	Standards for prefabricated construction	State - Ministerial Circular of 11 August 1969	"
	Buildings must be constructed to ensure stability	Communes	Communal building regulations

c/ Stability and durability of structures (continuation)

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Netherlands	The law on housing stipulates that communal regulations on building should contain prescriptions on strength of foundations, walls, floors, stairs, ceilings and roofs	State Communes	General law on housing
	Application of NEN 3251 and 3298 on methodsof timber preservation	State	Regulations governing building of subsidised housing

d/ Other safety regulations

Country	Requirements of legislation	Authority or body issuing legislation	Reason
France	The passages inside or outside the dwelling must permit a person or stretcher to be carried Compulsory application of NF P 82,202 to lifts and hoists Protection against risk of accident Special regulations for windows, terraces and balconies of high-rise buildings Storage of fuel: special safety regulations	State - Decree of 14 June 1969 Decree of 14 June 1969	General policy
Italy	Communal building regulations varying from commune to commune Mandatory regulations on lifts Standards CNR-UNI 100061/63 for lifts	Communes State - Decree PR of 29 May 1962 no. 1497	Communal regulations General building construction regulations

C.- LEGISLATION ON OTHER FACILITIES AND AMENITIES

a/ Drinking water supply

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There is no regulation governing the supply of drinking water		
	In practice any dwelling whose building is subsidised by the authorities or which has been the subject of a grant must have a drinking water supply	State	Policy of moderate-rent housing
Germany	Compulsory application of recommendations on connections to the water system	Länder regulations on building	General policy and policy on moderate-rent housing
France	Every dwelling must have a drinking water supply	State - Decree of 14 June 1969	General policy
Italy	Provisions of general building regulations vary from commune to commune	Communes	Communal regulations
	Regulation on the supply of drinking water	Communes and Provinces	Communal and provincial regulations
Nether-lands	The law on housing stipulates that communal building regulations must contain prescriptions on the drinking water supply	State Communes	
	Application of Standard 1006 (1960) on drinking water supply systems	State	Regulations governing building of subsidised housing

b/ Waste water system

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	No general standards enforced	-	-
	Connection to public sewers obligatory in many communes	Communes	Regulations on building and police regulations
	Every dwelling should have a drainage system into a main drain or cess pit	Institut National du Logement	Survey on housing standards
France	Every dwelling must have a hermetically sealed drain for waste	State - Decree of 14 June 1969	General policy
Italy	Regulation on the evacuation of waste	Communes and Provinces	Communal and provincial regulations
Nether-lands	The housing law stipulates that communal building regulations must contain prescriptions on the drainage and evacuation of sewage	State Communes	General law on housing

c/ Specific-purpose rooms

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There are no general binding regulations	-	-
	In the case of subsidised building, every dwelling must have - a living room - a kitchen - one or more bedrooms	State - Ministerial decree of 28 March 1968	Moderate-rent housing policy
Germany	Compulsory application of recommendations on kitchen installations	State Länder	Moderate-rent housing policy
France	Every dwelling must have a kitchen with a sink with a drainage system	State - Decree of 14 June 1969	General policy
Italy	No universally applicable mandatory standards	-	-
	Public sector housing must include - a living room - a kitchen - one or more bedrooms	Gestioni Case per Lavoratori	Policy for moderate-rent housing
Nether-lands	The law on housing stipulates that communal building regulations must contain prescriptions on the use and accessibility of rooms	State Commune	General law on housing

d/ Sound insulation

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There are no general binding regulations	-	-
	Sound insulation must be as effective as possible (technical recommendations for the building of moderate-rent housing)	Société Nationale du Logement	Policy on moderate-rent housing
Germany	Compulsory application of DIN 4109 and 18.005 on the combatting of noise	Länder building regulations	General policy and policy on moderate-rent housing
France	Dwellings must be insulated so that noise does not exceed tolerable limits as defined by decree	State - Decree of 14 June 1969	General policy
Italy	Directives on sound insulation of housing	Gestioni Case per Lavoratori	Policy for moderate-rent housing
	Criteria for evaluating acoustic characteristics of buildings	Ministerial Circular of 30 April 1966	General building construction regulations
Nether-lands	The law on housing does not provide for any combatting of noise in dwellings	State	
	However, communes may in their own regulations on building give such directives as they think fit		
	Application of NEN 1970 (1962) on the combatting of noise in dwellings	State	Law on the building of sub-sidised dwellings

e/ Other norms on the subject of amenities and facilities

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	Every dwelling must have its own access to the public highway If the building contains at least four storeys of dwelling accommodation, it must have a lift for a minimum of three people and a waste disposal chute	State - Ministerial decree of 28 March 1968	Moderate-rent housing policy
Germany	Compulsory application of DIN 4108 etc. on heat insulation	Länder building regulations	General policy and policy on moderate-rent housing
France	The facilities and characteristics of the housing must be such that the inside temperature can be kept to at least 18°C A place for the collection of domestic refuse must be provided in collective housing Buildings with more than one dwelling must have a communal aerial with a sufficient number of possible connections to meet requirements	State - Decree of 14 June 1969	General policy
Italy	Facilities for kitchen waste must be provided in apartment blocks for the use of households Directions on lifts, amenities and fixtures in dwellings	Communes Gestioni Case per Lavoratori	General building construction regulations Policy for moderate-rent housing
Netherlands	Application of NEN 2247 (1960) to fitted hanging cupboards NEN 2246 (1960) on hanging cupboards and shelved cupboards NEN 2249 (1960) on kitchen cupboards NEN 1068 (1964) on the heat characteristics of dwellings	State	Regulations on subsidised housing

D.- DIMENSIONAL STANDARDS

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There are no dimensional standards of general application		
	Draft communal regulations on standard housing require minimum dimensions		
	Habitable rooms must have a free height of at least 2.30 metres below the ceiling	State - Ministerial decree of 28 March 1968	Regulations on the granting of purchase and building grants
	A bedroom for one person must have a minimum area of 6.5 sq.m., one for two must have an area of 10 sq.m. (8 sq.m. is sufficient for a married couple)		
	Accommodation for two people must have a living area of at least 53 sq.m. This figure rises as the structure of the household changes		
	Distance requirements exist in the case of multistoreyed buildings		
	For apartments these standards are slightly reduced		
	The total area of a dwelling must not exceed the living area by more than a third	State - Royal Decree of 10 August 1967	
	The various bodies involved in the construction and financing of dwellings all have their own dimensional standards which do not accord with one another	Housing fund of the "Ligue des Familles Nombreuses"	Policy on moderate-rent housing
		C.G.E.R.	
	The Institut National du Logement has formulated proposals for harmonisation	Société Nationale du Logement	
		Société Nationale Terrienne	

D.- DIMENSIONAL STANDARDS (continuation)

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Germany	Compulsory application of DIN 18011 and 18012 on living areas and the lay-out of dwellings	Länder regulations on building	General policy and policy on the building of moderate-rent housing
France	Composition, height, lay-out and size of buildings are generally regulated A dwelling must have a surface area of at least 14 sq.m. and a volume of 33 cubic m. for the first four occupants and this increased by 10 sq.m. and 23 cubic m. for each additional occupant	State - Decree of 14 June 1969	General policy
Italy	Height, may-out and capacity of buildings are generally subject to regulation by planning guidelines Ceiling height (in general 3 m) and area of rooms (minimum 8 sq.m. for Milan) are fixed by communal regulation Area of dwellings: - 3 persons 64 sq.m. - 5 persons 80 sq.m. - 6 persons 96 sq.m. - 8 persons 112 sq.m.	State - Law of 17 August 1942 No. 1150 and Law of 6 August 1967 No. 765 Communes Gestioni Case per Lavoratori	General policy Communal regulations on construction Policy for moderate-rent housing
Luxembourg	The dwelling must have a minimum useful area of 65 sq.m. and a maximum one of 140 sq.m. (75 to 120 sq.m. in the case of apartments) Ceiling height must be 2.50 m at least	State Ministerial decree of 3 January 1972	Regulations on grants for purchase or building
Netherlands	Application of NEN 3210 (1962) to areas and volumes NEN 3267 (1965) on dimensions and arrangement of kitchen facilities	State	Law on the construction of housing involving financial commitments by the central government or local authority

E.- STANDARDS CONCERNING THE UNHEALTHINESS OF A DWELLING

Country	Requirements of legislation	Authority or body issuing legislation	Reason
Belgium	There are no general norms governing the unhealthiness of a dwelling		
	Unhealthiness and uninhabitability are decreed by a mayor of a commune after enquiry into the state of the dwelling	In execution of the decrees of 1789 and 1790	As a contribution to public health and safety and to the fight against unhealthy and insanitary dwellings
	A declaration to this effect is made on the basis of a certain number of data: damp (general and permanent), lack of light and air, ceiling too low, poor quality of building structure, lack of basic amenities. The assessment is a global one.	Institut National du Logement	Advice on housing quality and on the decision to be given by the mayor
France	A dwelling is unhealthy if it is in itself a risk to occupants and neighbours or by virtue of its occupation	State - Public Health Code	Combatting of slum conditions
	The assessment is made on the basis of 12 basic criteria and 13 additional ones	Law of 10 July 1970	Combatting of slum conditions
	This is a global assessment and a fixed value is given to each unfavourable criterion		
Netherlands	The law on housing provides under Articles 33 to 46 a series of measures relating to the declaration of unfitness of dwellings	State Communes	General housing policy
	This declaration is made by the council of the commune if the dwelling cannot be improved		

CHAPTER III

TECHNICAL ASPECTS OF MODERNIZATION

Hitherto, work carried out with the object of improving an old dwelling has been the normal lot of small firms and individual tradesmen. The small size of each project and the ability of workmen to adapt to the individual requirements of each case and overcome the difficulties of the work by intelligent initiatives encourages them to do business in a field where larger firms were less inclined to venture.

Realising that work carried out on a small scale is generally badly organised and incomplete and is executed with less than maximum efficiency, the Commission of the European Communities decided to suggest to the promoters in its Third Experimental Programme research which would relate to the technical aspects of modernisation of older housing.

1. THE TECHNICAL OBJECTIVES OF THE EXPERIMENTAL PROGRAMME

In view of the present tendency for improvement projects on existing housing to increase both in number and scope and of the growing shortage of the labour required and the resultant increase in costs, it was decided that in order to reduce the time and inconvenience of the work and to render it more economic, use might be made of prefabricated elements which would improve efficiency and an effort be made to rationalise organisation of work at all levels.

The aims set have already been stated in the General Directives for the programme, viz. the introduction of new technical methods deriving from industrial techniques and a rational organisation of the work.

There are various technological aspects of modernisation. These range from the adoption of changes in the use of craft tools, the use of dry mounted prefabricated panels, and the creation of new structures within firms. The field of research is a vast one.

The promoters invited to take part in the Experimental Programme were each asked to suggest a modernisation operation for one hundred dwellings. They were guided in their choice by the Commission's General Directives.

It was necessary to eliminate those projects involving the grouping together of dwellings belonging to more than one owner as the problems met with were often difficult to resolve without legal constraints at one's disposal. Each project therefore had to cover old housing belonging to a single owner from the industries of the ECSC. The housing units had to be in a good state of maintenance and possess a life of at least twenty years so as to avoid any risk of a planning decision involving their demolition.

No work was to be carried out in individual operations and any interruption of the work was to be avoided.

Methods of procedure were recommended to the owners who were given the following advice:

1) First analyse the housing units to be modernised in order to decide, in the light of the quality aimed at, what new external or internal work would be required. By consulting the various authorities in these fields a decision should be reached as to which technical methods were appropriate. Was the work to be carried out by traditional methods and could items be prefabricated away from the housing and then be rapidly installed ?

2) Study critically the technical solution put forward in the light of such criteria as economics, quality, time taken in preparation and execution of work, cleanliness, flexibility of use etc.

3) Try to organise the work rationally so as to reduce the time spent overall and the time spent on each dwelling by eliminating time wastage and ensuring continuity of team work.

Promoters of schemes were to seek out the best method of dealing, with a single firm, with several covering several fields or only one. They were advised to approach only those liable to contribute ideas, reasearch institutes, architects, consulting engineers, industrialists, manufacturers and the like. These people could be freely associated with the project from the outset.

2. THE MEANS EMPLOYED

The nine modernisation projects in the ECSC Experimental Programme which have been studied and of which five have been completed or are nearing completion are summarised in the tables of technical details attached to this report.

Three projects in the Federal Republic of Germany have now been completed. The location of the project was

Dortmund
Hamm, Hessen
Herten Langenbochum

Two projects in France have been studied:

- The first at Hagondange is still in hand.
- The second at Lens Liévin (Cité Rollencourt) has not been carried out because the conditions proposed by the owners for execution of the project were not accepted.

One in Italy, Milan (Sesto San Giovanni), could not be undertaken because of the prices submitted by tender. The central heating planned has nonetheless been installed and the roofs refurbished as planned.

One in Belgium, Bois du Luc, the study of which has not been completed, was delayed by the previous purchase of the housing concerned.

One in the Grand Duchy of Luxembourg, Differdange (Cité de la Sauvage). The work proposed for dwellings which were about to be sold to their occupants was rejected by the latter.

One in the Netherlands has been completed: Heerlen.

All the owners, with the exception of la Minière et Métallurgique de Rodange in the Grand Duchy of Luxembourg, had their own technical maintenance departments who already had some experience in modernisation work. Thus Hoesch, responsible for the Dortmund project, had modernised 771 dwellings, Veba at Herten 750, the Neue Heimat in Düsseldorf 284, Mines de Charbon Réunies of Limburg in the Netherlands 382.

The two French owners had also acquired some experience and Houillères du Nord et du Pas de Calais were able to point, in particular, to the modernisation of both housing and surroundings in their Cité des Aviateurs at Bruay in Artois.

These technical departments were headed by engineers, architects or architectural engineers. The Autonomous Housing Institute of Milan, however, decided to consult an architect. La Minière et Métallurgique de Rodange which had its own fairly small building division for its property involved the engineer heading the department, a former architect with experience of modernisation work. In the Netherlands the firm responsible for the Heerlen project had no maintenance department; it did however have a number of members of the technical staff able to prepare plans and supervise the work. Since their contractors had already carried out improvement work on nearly 400 dwellings, it was decided to entrust them initially with the traditional work on four prototypes in the Maria Christina district under the direction of an architect.

For each operation, by a working party composed of the owners, the contractors and the appropriate national institute first decided upon the improvements to be made to the dwellings. The plans put forward by the contractors were first submitted to manufacturers and other firms likely to be interested in the solutions proposed.

Manufacturers were thus involved in the projects from the outset so as to help them design and find an outlet for their products. However, this was always done without any pressure on either side.

2.1 Quality required

The standard of quality required by each owner compares very closely with that of owners in the other countries. This can be seen by checking the points (marked in the following table by an asterisk) which it was considered necessary to deal with in order to meet the functional requirements of a dwelling.

Functional requirements	Dortmund	Heessen	Herten	Hagondange	Lens Liévin	Differdange	Heerlen	Milano
Sound level (noise insulation)	*	A	A	A	A	*	A	*
Heat level (heat insulation)	A	A	*	*	A	*	A	*
(central heating)	*	*	*	*	(1)	*	*	*
Lighting (windows)	*	A	A	*	A	A	*	*
Ventilation	*	*	*	*	*	*	*	*
Spatial factors: areas	*		*		*		*	*
size of rooms	*	*	*				*	*
arrangements	*	*	*	*	*		*	*
fitted cupboards		*			*			
Special rooms: shower or bathrooms	*	*	*	*	*	*	*	*
inside WC	*	*	*	*	*	*	*	*
Floor covering and repair of floors	*	*	*	*	*	*	*	*
Wall covering (paint and wallpapers)	*	*	*	*	*	P	*	*
Drainage waste water and sewage	E	E	E	E	*	*	E	E
Services: hot water system	*	*	*	*	*	*	*	*
improved power supply	*	*	*	*	*	*	*	*
TV aerial connections	*	*	*	*	*	E	*	*
Household equipment								
kitchen: sink unit	*	*	*	*	*	*	*	*
work surface	*	*	*	*	*	*	*	*
location for fridge	*	*	*	*	*	*	*	*
location for dish washing machine			*	*			*	
location for washing machine	*	*	*	*	*	*	*	*
Annexes in basement (provision)			*					
Surroundings: removal of redundant buildings	*	*	*	*	*	*	*	*
façades (painting or resurfacing)	*	*	*	*	*	*	*	*
access facilities	*				*		*	
enclosures	NR	NR	NR	NR	NR	NR	NR	NR
open spaces	*	*	*	E	*	N	*	*
playgrounds	*							*
parking areas or garages	*	*	A	*	*	A	*	*

(1) Not provided for under the Programme by the promoters.

(2) The Belgian project at Bois du Luc is not shown in this table.

A = adequate
E = existing
P = partial
NR = not required
N = natural

2.2 Improvements decided upon

As the table on the preceding page shows, the improvements decided upon were numerous, and various solutions were adopted. The occupants of the house were always consulted on any changes to the plan.

In order to enlarge the areas of houses, the solution adopted was sometimes very slightly to reduce the number of dwellings and sometimes to combine two small dwellings to form one of suitable size. External space was to be provided by using an overhanging structure or by extending at ground floor level.

The provision of bathrooms and WC's was to be carried out as part of a general review of space and distribution, adding an entrance where necessary.

Kitchens were to be improved by the provision of hot water, a sink unit, a work surface and places for the cooker (gas or electric), fridge or dishwashing machine. Ventilation was to be assured. The floors were to be given practical floor coverings and water-resistant wall coverings applied.

All dwellings were to be provided with central heating and a place was to be prepared for a washing machine. Where possible a sufficient number of storage cupboards of suitable size were to be installed at appropriate points.

In an attempt to improve the surroundings, thought was always given to the appearance of façades and the demolition of useless and ugly structures, the provision of parking lots, gardens, removal of traffic and provision of children's playgrounds.

At Dortmund the stove chimney was to be removed so as to reduce pollution of the air for the occupants. At Lens Liévin, Hagondange and Heerlen it was decided to remove or alter enclosures leaving only lower walls and hedges.

In the individual houses, annexes were to be provided to suit occupants' requirements, either at basement level or as outhouses suitably located in the garden. At Herten the occupants were even given various suggestions as to garden lay-out which some families followed.

Work on the surroundings carried out as part of the Experimental Programme had to be coordinated with improvement work carried out by or on behalf of the local authorities: reduction of redundant service roads, improvement of public lighting, drainage system, electrical mains, installation of district heating systems (Heessen, Lens Liévin, Bois du Luc, Milan, Differdange and Heerlen).

2.3 Industrialised products and methods used

2.3.1 Research into prefabricated elements

The methods used by the working parties in arriving at the use of prefabricated elements were fairly different from country to country, since one had always to bear in mind local prefabricating capacity.

The Grand Duchy of Luxembourg, where building has remained traditional, offered no possibility of examining prefabrication so that the Luxembourg working party studied the question of prefabrication in France (partitions, bathrooms) or Germany (central heating).

In the Netherlands the plan was first to rationalise the work of modernisation and to relate prefabrication experiments to the use of prefabricated structures. Then the working party realised that the existing accommodation could be expanded by prefabricating the extension walls.

In Italy the working party surveyed the manufacturers of prefabricated walls with a view to enclosing the bathroom and WC and cladding façades with light concrete panels.

In Belgium, in addition to using normal standard prefabricated elements such as windows, door units, kitchen equipment etc., consideration was given to the maximum use of prefabricated shelving for the Bois du Luc project, for which this was very suitable.

In France the working party approached manufacturers of light partitions of chipboard covered with laminate on both sides, manufacturers of partition walls with prefabricated pipings, manufacturers of prefabricated units, and manufacturers of sanitary equipment who had already attacked the problem of rapid assembly of prefabricated elements. Some thought had already been given in France to means of using prefabrication for house improvement but only within the context of work traditionally carried out by workmen of a single trade.

In the Federal Republic of Germany, too, attention had already been devoted to prefabrication. Since 1969, after a trip to the United States, the owner at Heessen has been impressed by the experimental work being carried out by the firm of Conrad in Harlem where two blocks of apartments had been modernised by introducing cell units (including bathrooms, kitchens, WC and air conditions systems) through the roof and stacking them one upon the other. Well-trained and coordinated teams had performed a remarkable task in returning the accommodation to the occupants after only one week. In order to bring this costly process to Europe, German engineers considered the use of heavy cells which did not suit the wide range of buildings for which they were needed. A sheath has to be built and demolished, thereby making the process too complicated. The idea was then conceived of introducing the various elements through the doors. At the same time, a study of a large number of old buildings made it possible to keep the size of the sanitary cells between 1.70 metres and 2.20 metres. One cell was installed in Hamburg. The ECSC Experimental Programme had the effect of speeding up development and the series production of this cell for the Heessen project.

The appearance of a new industrialised product which is the result of rationalisation and mechanisation and which involves the replacement of labour by machines requires study, successive development phases and the design of what may be a considerable amount of tooling. It should be remembered that the time

allocated for study and prefabrication allowed by the General Directives was only nine months from an agreement in principle to the decision on the operation.

The imaginative efforts of the engineers and manufacturers consulted in an attempt to design new components such as a completedly prefabricated bathroom were soon to come up against difficulties on the financial side as well as the time factor. The promoters who had favoured research in this field then turned to a used of materials and elements already on the market and devoted their efforts to the rationalisation of work, selection from among existing products those best suited to modernisation requirements.

2.3.2 Solutions adopted

Everything possible was done to ensure rapid completion with minimum mess and annoyance to occupants, and to reduce the time required for work, the price and the number of people employed. Interesting solutions were found and applied effectively in a number of very different fields.

However, one single promoter, at Heessen in Germany, succeeded in using a genuinely new product series-produced in a factory. This was a complete bathroom, the elements of which are assembled in a few hours in a house which needs little preparation to receive it. This bathroom would have needed three years of study and the ECSC Programme came at the right time for it to be tested.

We shall now look at the main solutions adopted by the promoters in resolving the problems raised by their various projects, the main aspects of which may be summarised as follows:

- Work on the main structure (façades, doors, windows and roofs)
- Partitions and inside doors
- Thermal and sound insulation
- Service connections for supply and evacuation, ventilation and chimneys
- Sanitary installations and heating
- Kitchen equipment and cupboards

- Electrical installations
- Floor coverings
- Work on surroundings

2.3.21 Main structure, façades, doors, windows and roofs

Façades and roofs

The problem of the partial removal of a façade was encountered in the Netherlands at Heerlen and at Sesto San Giovanni in Italy. In the former case the extension of the living room was achieved by erecting against the façade of the building a structure composed of prefabricated elements, after which the old living room wall was demolished.

The order of work was as follows :

- Foundation work (concrete base and brick masonry)
- Erection of side walls (double walls of WALL brickwork, standard blocks)
- Assembly of new façade panel of wood with a window basement clad with plastic. Fitting of door casing.
- Demolition of original façade wall.
- Positioning of roof (entirely prefabricated). This is composed of a layer of rafters resting on the metal edge beam of the new façade and also on a second metal beam constituting a lintel and supporting the upper part of the original façade which has been retained.
- The cover is composed of chipboard clad in a double layer of products assuring an effective seal. It includes an internal ventilating device and glass wool insulation.
- Once the roof is in position, the plasterboard ceiling is fitted.
- The floor is filled and tamped. A concrete slab is cast on a sheet of PVC.
- The entire ceiling of the living-room is given a coat of distemper.

This work took three days as planned. The new façades cost 878 guilders per dwelling, all-inclusive. It required twelve hours work at the factory, one hour's transport, twelve to eighteen hours of skilled labour for erection (minimum hourly wage Fl 13.25). The fitting of the door required an additional 1 hour and 45 minutes.

These figures are given by way of example without going into further detail since experiment showed that costs differed substantially according to the number of dwellings of the same type being worked upon. Repetition helped to reduce the price considerably.

Similar façade panels were used for some kitchens.

At Sesto San Giovanni near Milan the task involved enlarging kitchens in apartments in a large block. A new façade had to be made to extend as far as the unclad outside of existing balconies.

The operation involved securing to a light steel structure prefabricated façade panels made of expanded clay concrete. External joinery, of which there were two kinds, was of metal. The façade was covered on the outside surface with coloured granules of plastics material which were incorporated in the panels during prefabrication.

Prefabricated roofing included ready-assembled rafters and sheets of expanded clay concrete, insulation and a false ceiling. The tiles and guttering had to be positioned by hand.

HEERLEN — Foreground: construction of garages
— Background: track for crane used in enlarging living rooms and building terraces

The project was not in fact realised but after the planning stage had been completed the price of the work was comparable with that of a traditional façade with the added advantage of ease of assembly.

These two solutions demonstrate how various techniques involving the use of prefabricated elements may be employed. One idea which stems for them is the possibility in certain cases of extending a room by means of an outside structure supported by the dwelling wall, the wall of which are prefabricated. Work on site is thus speeded up without costs rising above normal and with the added advantage of restricting the inconvenience caused to occupants in the period during which the new structure is being attached to the old.

Apertures (doors and windows)

Generally the only work done in this connection was to repair the windows.

When replacements were necessary the new windows installed were of a more modern, prefabricated type. Thus in Dortmund kitchen windows are of the type able to pivot about two different axes and have sound-absorbent glass.

When a room is situated below a sloping roof it can be a very costly operation to provide a new window if the roof has to be interfered with. Double-glazed, pivot-type window units afford excellent vision and are very quickly installed. They were chosen for Hagondange and were also used at Bois du Luc in order to give light to some rooms with no existing windows.

At Sesto San Giovanni in Milan, prefabricated metal windows were used for rooms which had been enlarged.

2.3.22 Partition walls and inside doors

With the exception of the Milan project, for which it had been decided to use prefabricated partition walls made of expanded clay concrete, all those responsible for the various projects decided in favour of light timber-based partition walls. Existing doors were overhauled. For new doorways and where replacements were needed, metal-framed door units were fitted.

In Dortmund the prefabricated inside doors were made with a wooden frame and glass panelling. These were transported in three sections for assembly in situ and provide a connection between the kitchen and the dining recess in the living room through which light can pass.

Other partition walls were made by the studwall technique which is much used in the United States. They are composed of a timber frame filled with glass wool sandwiched between twostudded panels of plasterboard. The ease with which the size of the various elements is adjusted to the room dimensions using an electric saw and a pointed tool for scoring makes this process particularly suitable for modernisation work. The timber framing or additional crosspieces may be used as a mounting for electrical fittings, pipes etc. The joints are covered with strip and smooth-finished for painting.

DORTMUND — Prefabricated timber-framed partition walls sandwiched between plaster-board panels

While mentioning German solutions, we must not fail to mention the way in which at Herten doorways which were to be blocked up were closed with sheets of prefabricated plasterboard of the same height as the doors.

At Hagondange as at Differdange the contractors sought to gain the advantages of rapid assembly of partition walls requiring a minimum of finishing. The walls of the bathroom and WC and the trunking was made of standard-size chipboard panels matched together, 50 mm thick. The door units were built-in. These panels have the further advantage of being very adaptable since they are mounted on jacks. This makes it possible to correct non-alignment of the ceiling and floor. They are positioned rapidly in accordance with a detailed working drawing.

At Lens Liévin the same type of walls were used.

At Heerlen (Netherlands) the walls separating the living-room from the passage were constructed of plasterboard squares.

Most of the prefabricated elements used were cut to size in the workshop from panels supplied by the trade so that assembly and fastening on site was done with a maximum of speed and cleanliness. The same materials were used in different thicknesses for partitions and trunking and in a lesser thickness for false ceilings.

2.3.23 Sound and heat insulation

Sound insulation

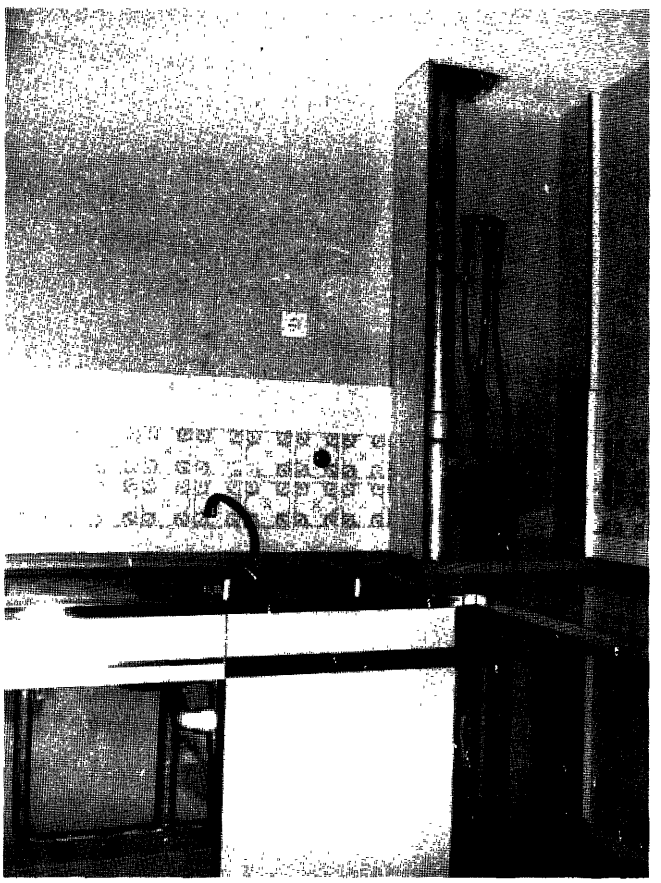
Where necessary, sound insulation was improved between adjoining apartments within a given building.

Although the outside walls of old buildings are often thick, the partitioning between two separate dwellings, which is of brickwork, is not sufficient for adequate sound insulation. At Differdange, for instance, very large apartments had already been split into two smaller ones by a very thin partition. Modernisation may also make necessary - as in the case of the Dortmund project - the insulation of a room used by a member of the family obliged to work at night.

To this end a prefabricated frame covered with plasterboard was filled with glass wool and fixed to the existing wall by means of flexible bonds. The gaps around the frame were carefully plugged.

Heat insulation

Studies of the central heating situation led to the wall insulation being overhauled. Despite the specified thickness of the outside walls of old houses (up to 60 cm), there are certain weak points and one cannot always rely on the accuracy of the building plans. A dividing wall with no windows may be specified as 40 cm thick but is in fact much thinner. In general, heat insulation below the roof was effected economically by placing glass wool on the floor of the attic. At Herten in order to take full advantage of the spacious attic, the heat insulation was covered by a thin sheet of concrete. In Dortmund the windows were double-glazed using prefabricated and prepainted frames and glazing. These windows were fitted in a separate stage from other interior work and the work was carried out quickly when operations first commenced.



DORTMUND — Grouping of vertical pipes in kitchen

2.3.24 Inlet and outlet pipes and ventilator ducts and flues

Inlet and outlet pipes

With a view to reducing the amount of drilling in floors which is particularly annoying in the case of reinforced concrete slabs such as were employed in Germany, every effort was made to group vertical pipes for the different service connections together. They were then placed within prefabricated trunking to conceal them.

It would be tiresome to describe all the solutions adopted which are based on the same principle. For example, in the Dortmund kitchens a length of prefabricated trunking was arranged at floor level near the group of sanitary fittings. This conceals the downpipes which were secured by means of feet welded on to them at the factory to the other pipes. This meant that only one hole had to be cut in the reinforced concrete floor. The drain connections were made with translucent plastic tubing which was force-fitted.

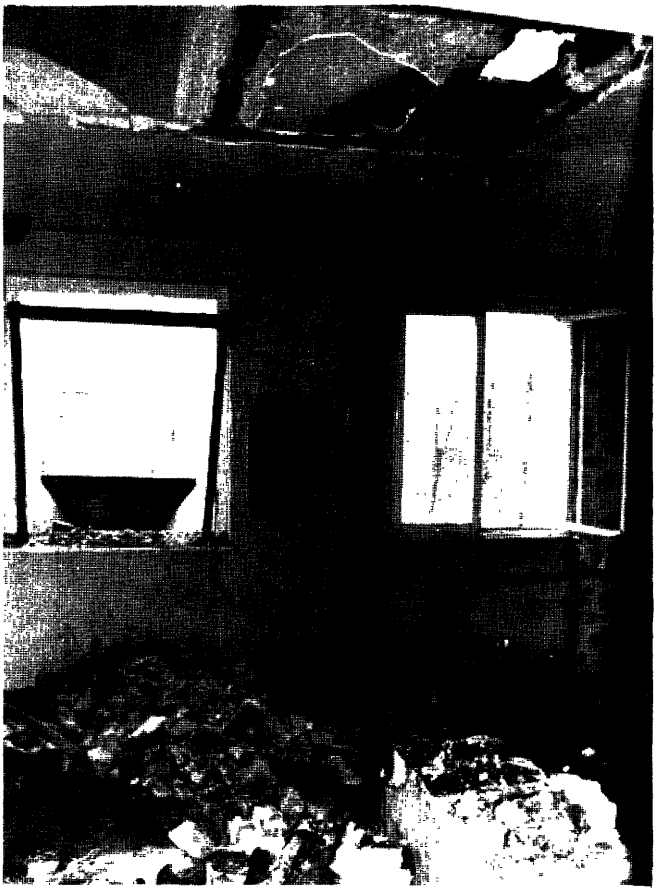
At Heessen, where the wall ready-equipped with pipe connections is a feature of the prefabricated bathrooms, the water and gas connections run across the ceiling in the basement and join the pipes in the prefabricated wall with small-diameter sleeves. The original pipes have simply been abandoned. Inside the prefabricated wall the pipes, which are concealed, are attached to one side of the wall at the factory by means of self-adhesive strip.

At Herten, for aesthetic reasons, risers for the heating system were embedded in the walls and it was generally impossible to avoid cutting horizontal passages for the radiator pipes of the central heating system.

The waste water and sewage drains are usually of PVC (Hagondange, Dortmund, Heessen, Herten and Sesto San Giovanni).

Ventilation ducts and flues

The former flues were either removed or used for ventilation. On some projects (Dortmund, Heessen, Hagondange, Sesto San Giovanni) the new ventilation ducts were prefabricated in PVC and air grilles made of plastics material.



HEESSEN – Internal demolition work before assembly of prefabricated bathroom and kitchen facilities

Since it would have been very expensive to dismantle the old outside chimneys and remove the rubble (Dortmund), they were left as they were unless the appearance of the buildings was too displeasing, as was the case at Lens Liévin.

At Hagondange prefabricated aluminium tubing of a single standard length was used for the evacuation of burnt gases from the boiler of the heating system. In the course of the operation, this tubing was replaced by a conduit of asbestos cement, the elements of which fitted into each other. This device is able to withstand the effects of cleaning and any impacts to the part which surfaces at attic level. Condensation water is collected in a drain tank fitted with a siphon valve and connected to the waste water system.

2.3.25 Sanitary fittings and heating

Sanitary fittings

The provision of a bathroom in an existing dwelling poses problems of more than a technical order.

Each individual has his ideas, which may be thought good or bad, about the arrangements which he would like. Experience gained at the La Sauvage estate in Luxembourg demonstrated how tenants wishing to acquire their accommodation preferred, for instance, a bathroom in the basement rather than take even 3 square metres off the bedrooms on the first floor where it had been planned to provide this convenience. One must also consider whether the accommodation is not too small for the family living there and whether the provision of a bathroom might not reduce the number of other rooms or result in an enlargement of the accommodation which might not be always possible or economical.

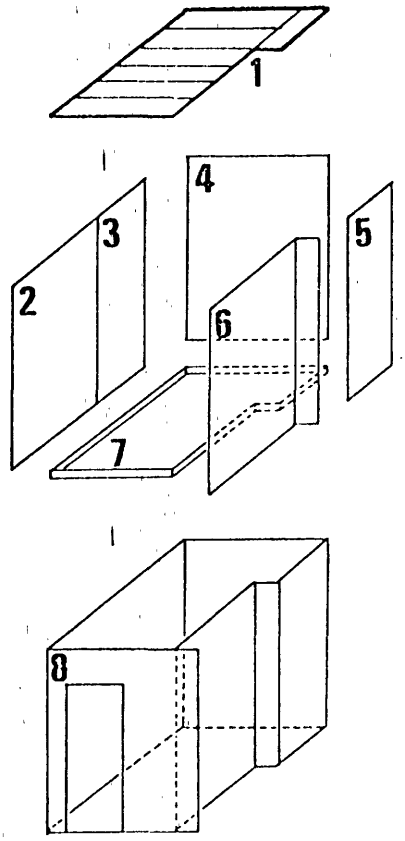
From another point of view, the ideal method of reducing the inconvenience to occupants and duration of work of modernisation is to concentrate this work as far as possible in one part of the dwelling, leaving the other part untouched. Time can be saved by using rapidly assembled prefabricated elements. This concentration of prefabricated elements may be achieved by separating the bathroom and kitchen by a prefabricated wall unit incorporating pipes shared by both. However, this solution, which was possible in the case of the Heessen project, is not always feasible.

Two project supervisors attempted to use this solution in their projects since it also involves great financial savings. However, the resulting plans must ensure normal access from the bedrooms to the bathroom without affecting the privacy of the accommodation. During the work on the Experimental Programme, everything possible was done to ensure that this aim was achieved.

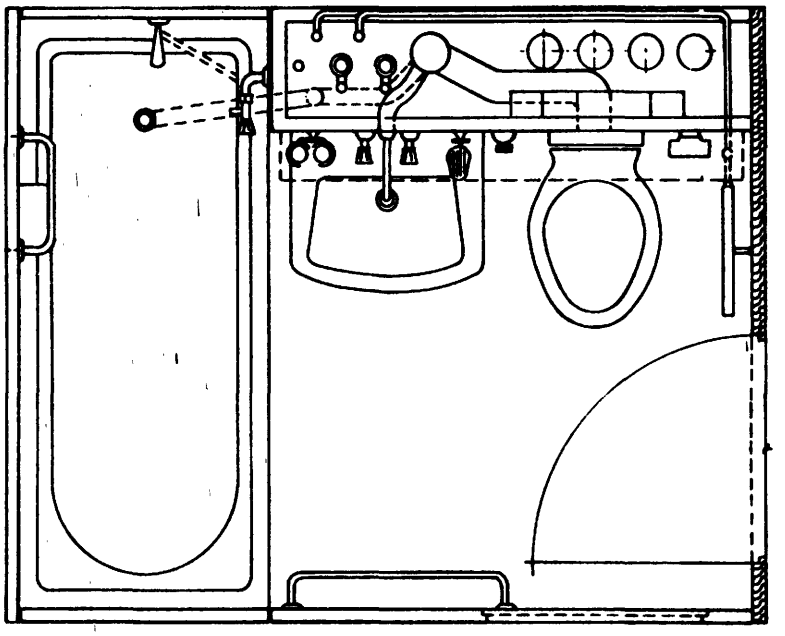
The bathroom was the subject of most of the plans for prefabrication prepared as part of the Programme. Various suggestions put forward included combined wall, door, floor and ceiling units with all fittings, including a lavatory, a wall ready-fitted with pipes and even toilet accessories such as mirror, shelves and the like.

Some thought was also given to the possibility of fitting an air heater into the ceiling (Hagondange) or a heated floor (Germany).

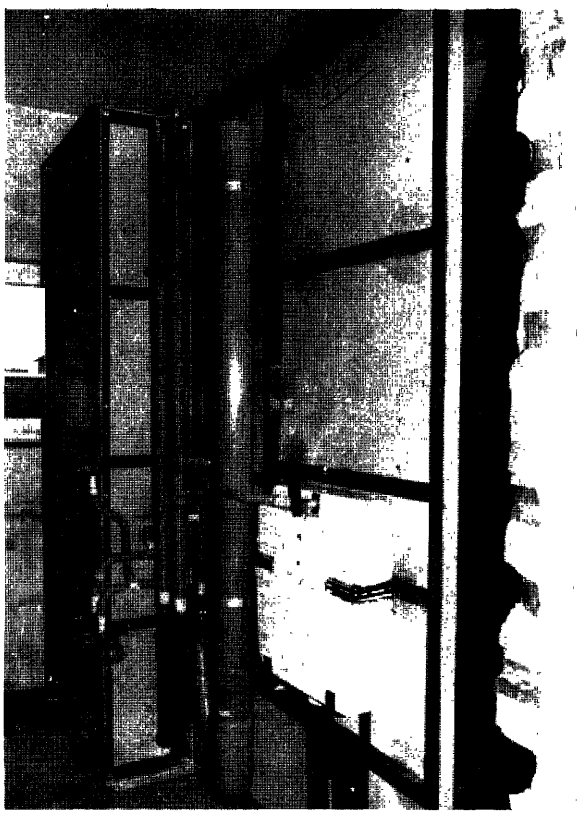
At Heessen in Germany an interesting result was achieved with a fully prefabricated bathroom from Neue Heimat. This bathroom is worth describing in detail.



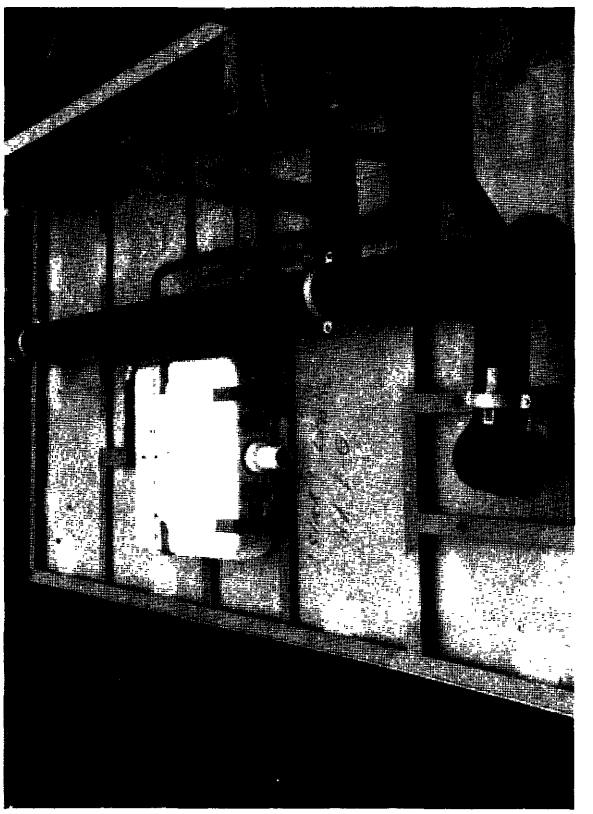
HEESSEN — Prefabricated units for the Heessen bathroom



HEESSEN — Arrangement of facilities in the prefabricated bathroom at Heessen



HEESSEN — Partition incorporating heating pipes separating bathroom and kitchen



HEESSEN — Prefabricated partition in bathroom

Prefabricated bathroom from Neue Heimat installed at Heessen

This bathroom is built up of hand-transportable elements.

Its chief feature is the complete integration of all sub-components, all fittings, however small, and the result is a first-class bathroom: fitted bath of enamelled steel, washbasin and WC in porcelain, flush cistern operated by a pushbutton concealed in the wall, shelf, large mirror, fluorescent strip lighting, soap holder, bath handles, towel rail, toilet roll holder, heater, point for auxiliary heater. The mixer taps are fixed to the wall and the shower flex is attachable to the wall.

Sanitary equipment is secured to a single prefabricated wall containing ready-mounted pipes which is shared by the bathroom and kitchen. An inspection panel behind the cooker in the kitchen gives access to the trunking. This trunking may also be used for additional pipelines.

The vertical walls of the bathroom are six in number and are formed of light metal frame elements with are concealed and to which are secured panels of polyester held in position by self-adhesive strip coated in resin. Only the wall adjacent to the access door is a light timber partition with a cladding of laminate on each side. This contains the electrical wiring and supports the electrical equiment.

The opposite wall which in this particular case is applied against the main wall of the house, has an aperture which coincides with the existing window. This aperture is cut on site using a saw and is connected to the window.

The floor is of glass fibre reinforced polyester secured to a frame of angled sections of metal to which the vertical walls are bolted. The floor covering is of PVC and bonded. A bonded plastics skirting board completes the arrangement.

The ceiling is composed of washable troughs of enamelled sheet and is removable and washable.

The price of this bathroom supplied and installed was 5,443 DM. Without going into the many accessories provided, the arrangement has the advantage that part of the work of improving the kitchen is carried out at the same time.

The Hagondange bathroom

The original plans, which at first envisaged the use of a complete unit with a metal frame which could be installed on the spot, also looked at the uses of prefabricated walls with built-in piping and even solutions involving polyester. These various possibilities were rejected because of their unsuitability to the buildings, their price and the relatively high cost of transport to the site.

It was also decided to use fittings of a traditional type connected to pipes which were all prefabricated in the workshop. The partition walls, also prefabricated off site, took the form of solid 50 mm panels of chipboard.

The interior wall covering is all in one piece and of plastics material bonded to the edges of the room. The floor covering is also prefabricated and of plastics.

At Lens Liévin planners also endeavoured to use compact fittings or all-in-one bathrooms. The price was, however, prohibitive. The final decision was in favour of conventional equipment, although pipes were prefabricated, using wood and a built-in door unit.

At Differdange bathrooms were to be constructed in the same manner with partitions of chipboard panels clad on both sides with PVC and dry-mounted with a door unit. Existing units were to be clad with thinner panels (18 mm). One of the panels was equipped with shelf, mirror and a light above the washbasin. Existing floors were to be covered in plastics material bonded to chipboard panels which were screwed on to the older parquet flooring.

The sanitary fittings were an EPIBLOC suite comprising a fitted bath of enamelled steel with mixer taps and flexible-tube shower, and a washbasin. Equipment is fixed and connected to a block of pipes, the connections being made in twenty minutes to three threaded pipes for cold water, hot water and drainage.

LA SAUVAGE — Prefabricated sanitary installations provided for the Differdange houses

At Sesto San Giovanni the bathroom was to be equipped with a unit comprising a prefabricated wall incorporating pipes etc. and made of expanded concrete. This partition wall combines the inlets and outlets for the Bath, WC, washbasin, bidet, washing machine and kitchen sink. All pipes were to be prefabricated off site.

Of all the solutions adopted or studied by those responsible for plans, we may conclude that it is possible, without reducing the quality of the final bathroom, to substantially reduce the work of builders, those fitting floor tiles and ceramic walls, and painters and other tradesmen involved in finishing work.

The total time required by the teams of tradesmen of different kinds may thus be reduced, as may the number of people required in this team, by using tradesmen able to do more than one job. The example which should be mentioned here is that of the Heessen bathroom where a team of four workmen with a number of different skills succeeded in installing the prefabricated bathroom in eight hours.

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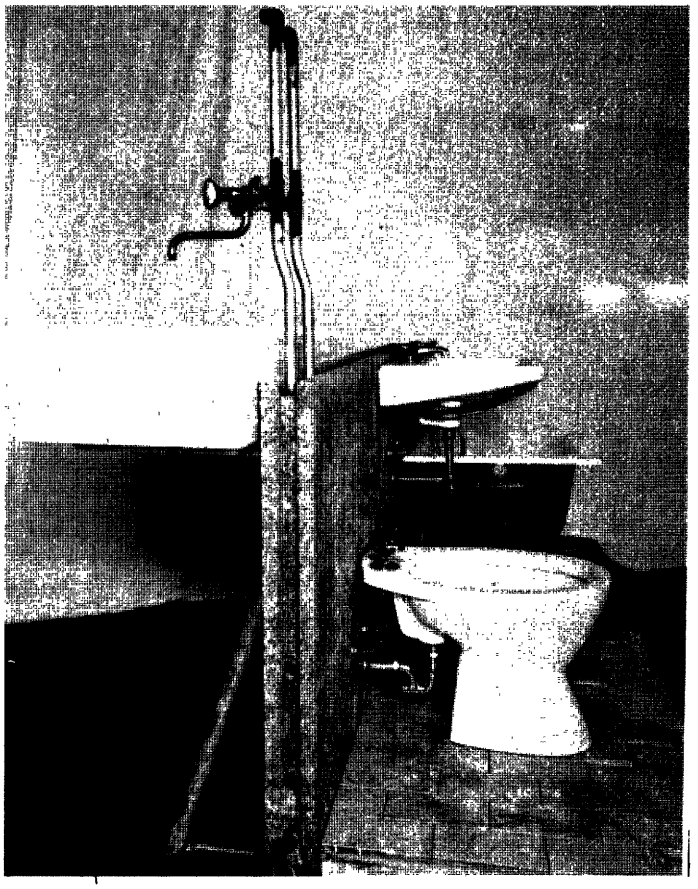

SESTO SAN GIOVANNI –
Example of prefabricated panel of expanded clay concrete provided for in the Sesto San Giovanni scheme

The prospect of completing work in such a short time means that plans can be made to keep occupants in residence and encourages them to put up with the work with better grace. And this without mentioning the saving involved for both them and the landlord in the avoidance of removal costs and loss of rent.

Hot water and heating systems

Every effort was made to devise solutions appropriate to local conditions.

Thus in order to heat the apartment Buildings in Dortmund and to provide them with hot water, a coal-gas fired central heating system was installed in a building in the yard of the block which

has formerly been used as a communal laundry. One might mention in passing the use here of a system of insulation of the heat distribution system in which continuity of insulation is ensured at the points of connection by a sliding sleeve filled with foamed plastic. Site welding was also avoided as a general rule. Pipes, including those inside the apartments, were prefabricated. Holes were cut with tools equipped with dust extractors. Radiators are fitted with thermostatic valves.

The dwellings at Heessen were connected to the district heating system by passing right through the basements of the buildings, feeders which went from party wall to party wall so as to avoid the public ways as far as possible. The heat exchangers which serve twelve apartments at a time, supply hot water at 80°C for domestic use and at 120°C for heating purposes.

In the Herten terrace houses, it was decided to use mixed generators burning town gas and feeding six dwellings each. These are installed in the spacious basements of the houses.

At Hagondange the contractors had initially considered using a pulsed air individual central heating system because this does not require pipes and radiators. The difficulty involved in installing the air ducts and the amount of noise produced by the generators resulted in this solution being rejected in favour of individual gas central heating. The mixed generator is located in the kitchen. This same system was provided at Heerlen and Differdange. The individual mixed generators at Differdange were to be supplied with propane from two large outside tanks. The distribution systems of these tanks were to be supplied and installed by the propane suppliers.

At Sesto San Giovanni it was decided to provide central heating for the entire district and the buildings are already connected up to the system.

At Lens Liévin, on the Rollencourt estate, studies on central heating produced no system that was entirely satisfactory. Les Houillères, the owners of the housing, consider themselves bound

by the miners' statute whereby a miner receives free housing and a certain amount of free coal for heating. The choice and installation of central heating systems are left to the initiative of the individual occupiers.

The supervisors therefore studied the modernisation of the dwellings from the point of view of leaving existing heating arrangements as they were, viz. inside chimneys and outside chimney stacks, one of which, which is particularly large, rises above the shed housing the kitchen. They agreed to look at the question of installing a modern heating system on the condition that the installation would be made at the initiative of the individual tenants and at their expense. The system decided upon in this connection was individual gas central heating.

If the project had ever been implemented, families wishing to instal central heating would have been forced to incur expense over and above that of the owners: water heaters of the storage type in the bathroom, gas water heaters in the kitchen and various building works relating to the inside chimneys which reduce the convenience of the rooms.

It should be pointed out in this connection that the installation of central heating makes it possible to do away with chimneys and flues

2.3.26 Kitchen equipment and cupboards

Kitchen equipment

All the promoters of the projects installed standard prefabricated sink units in stainless steel with one or two deep sinks. The size of the sinks varies from 1.20 metres to 2.10 metres. Within the sink unit used at Herten it is easily possible to fit a standard dishwasher. The connections and drainage system for the dishwasher are ready within the unit.

All the kitchens are fitted out with overhead cupboard units and prefabricated work surfaces.

There is little more to be said about these units which are a normal part of any modern kitchen, except that every care was taken to instal them rationally in a kitchen adapted to the way of life of the occupants, who were consulted in advance.

Fitted cupboards

As a general rule it was impossible to instal standard fitted cupboards. The families did not want these because they already possessed cupboards of their own (Differdange, Sesto San Giovanni) and because the cupboards are not easily adapted to existing rooms and to the nooks and corners available.

Few cupboards, even standard ones, were fitted but those responsible for the project nonetheless cleverly took advantage of the space available. It would seem that in this matter it will be necessary to leave to the occupants themselves the choice and realisation of the solution they find most suitable.

The cupboard problem was a different one at Bois du Luc. There the families without much furniture who live there will find large standard cupboards forming the partition walls of the apartment so that they will save the expense of buying furniture.

2.3.27 Electrical fittings

Almost everywhere the electrical systems had to be completely refurbished, not just because they were inadequate from every point of view, but because they were in bad condition and dangerous. It would not have been reasonable to be niggardly on this point and advantage was taken of the position to provide modern installations which allowed for future needs.

A minimum of one light connection was provided in each room (usually on the ceiling) and two electric points; a light connection was also provided above the kitchen work surface, another above the washbasin and two-way switches were provided in the halls and passages. In many places it seemed quite normal to complement these fitments with bracket lamps, fluorescent lights and diffusers - all items which have now become reasonable in price and help to "finish" the fitting out of a kitchen or bathroom.

At Dortmund a connection was even provided in the bathroom for an infra-red heater. The housing at Herten is provided with two connections for washing machines.

Everywhere the earthed connections were multiplied. At Hagondange all the bathroom fittings are earthed.

The present proliferation of electric domestic appliances led the project supervisors to follow without hesitation the General Directives issued by the ECSC in which they asked to meet the new needs that can be foreseen because the needs of users must increase in time and a modernised dwelling must remain suitable for years.

The electrical installations are sometimes prefabricated and contained in flexible tubing which is connected to the minor fittings (Dortmund, Lens Liévin, Differdange) or is not so connected (Hagondange, Sesto San Giovanni, Heessen, Herten).

At Dortmund, electrical wiring in plastic ribbon was fixed with studs to the brick walls from which the plasterboard had been removed and then embedded in new wall covering (lime, cement or plaster).

In Dortmund use was also made, in the upper part of passageways, of prefabricated plastic trunking which concealed the cables.

At Differdange and at Lens Liévin the fittings had to be embedded by mechanical means.

2.3.28 Floor coverings

For reasons of economy the old parquet flooring was repaired, sanded and in some cases even painted. Plastics floor coverings were used in the bathrooms and kitchens and sometimes in the living rooms but rarely in the bedrooms.

For the concrete floors of the kitchens in Heerlen in the Netherlands, a covering composed of coloured gravel coated in synthetic resin was cast on a thin layer of cement, all this being placed on a layer of bitumen-impregnated felt.

At Differdange the floor coverings for the bathrooms were composed of a plastic material which was welded and bonded to chipboard panels. A similar solution was adopted in Dortmund where the floor covering is of plastic felt bonded to strong plates which distribute stresses.

The popularity of textile coverings at reasonable prices led the project supervisors to be very cautious in the choice and cost of floor coverings for living rooms and bedrooms since it was found that families put moquette coverings on the new flooring.

2.3.29 Improvement of the environment

It might have been feared that faced with all the expense for work inside the dwellings the people responsible for the projects might have been tempted to put expenditure on the surroundings in second place, possibly considering this aspect rather superfluous. This was not the case. It was understood that this work was the necessary complement of interior work. Several owners even contributed additional finance for such work, using prefabricated elements to the maximum.

Examples of prefabrication are fairly numerous:

Sheds and garages
Paved areas and edges of foodpaths, parking areas and passages
Drains
Low enclosures of wood or concrete
Plinth walls on prefabricated bases, etc.

At Hagondange, the advice of a colour consultant was sought in an attempt to harmonise the façades of the estate. This not only made for a more rational organisation of work but enabled paint to be prepared on a quasi-industrial scale. The prices which resulted from following this procedure made the expense viable. The result is a successful improvement of the general appearance of the estate.

2.3.3 Rational organisation of work

Problems raised by the organisation of work

There are a number of reasons why modernisation work is difficult to organise. The occupants of the dwelling are in residence and they have to be assured of certain necessities such as water, electricity, gas and WC, and all this without risk of accident. Otherwise they must be temporarily rehoused.

Their furniture may prove an obstacle to work. It has to be moved or put in store. Families, however, are not as easy to move as workers who may be shifted from one dwelling to another in order to keep to schedule.

Hence one must not forget to allow in the schedule for removal delays. This time should be added to working time.

There are a number of requirements which must be taken into account before beginning to organise the work. These include the need to group all work of the same kind together so that it becomes repetitive and to assure continuity, observance of time schedules, requirements as to processes used, the equipment available to contractors, etc.

In this Experimental Programme manufacturers were called upon for assistance and problems of coordination of deliveries and work schedul had to be solved. Contracting firms had to be found which agreed to do th work which they did not by tradition do.

It was thought that it would be a difficult matter to find several firms or a single firm, and the implementation of the Experimental programme was to confirm that this was so, because medium-size firms hesitate to bind themselves for a lumpsum price and to given dates because the work involves considerable risk and the progress of work depends a great deal on the supervisor and on the cooperation of the occupants. What was to be done if a sick person would not leave his home on the day fixed for him to go or if a public department was behind with the provision of the drain needed for connection of a new WC?

We shall now look at the manner in which the supervisors of the projects and the contractors working on the Experimental Programme organised the work and how they solved the problems posed by occupants, the preparation of plans, the way work was handled, the manner in which time schedules were observed and the coordination of teams.

2.3.31 Problems posed by occupants

Although it was initially intended everywhere to leave the families in residence while the work was going on, this idea was very quickly abandoned in fifty percent of cases. It is only possible to leave occupants in residence if the amount of work inside the house is negligible. It would appear that the difficulties of rehousing are more easily solved than that of carrying out a substantial amount of work in a dwelling in which life has become impossible.

At Heessen, where dwellings were fairly small and rather overcrowded, it was possible to keep families in place by combining two jobs. In this way the family could for several days retire to the bedrooms while the prefabricated bathroom was being installed and the kitchen fitted out. After this, with the bathrooms ready, attention could be turned to installing the heating in each room in succession and in the living room. Optional work such as wallpapering, painting and positioning floor coverings can then be carried out.

At Heerlen, in the Netherlands, since there were four large rooms available, the tenants agreed to remain in residence for the eight weeks involved - the maximum period for which work can be accepted with little difficulty.

Storage facilities were obtained for furniture which was in the way. Some of the poorer families had to be rehoused temporarily free of charge and their removal costs paid.

At Sesto San Giovanni it was impossible to undertake rehousing. It would have been necessary to isolate the kitchen area and bathroom using prefabricated partitions while providing families with a mobile WC unit located on the balcony and a gas cooker.

At Differdange it was similarly impossible to rehouse tenants but the tenants who were buying their houses seemed willing to put up with the inconvenience of work and even to follow it from close by. They were ready to cope temporarily with the old kitchen on the ground floor while the bathroom was being installed and the new kitchen fitted out.

At Dortmund the scope of the work and the fact that the accommodation was to be newly allocated to skilled workers meant that occupants had to be rehoused. The owners, who had 2,000 dwellings in the town were easily able to relodge the occupants in batches of 32 dwellings at a time. Seventeen families left the district for good, thereby making the situation even easier.

At Herten the people were very happy that the work was being carried out and found accommodation for themselves with friends and even in tents when the weather was fine.

At Hagondange rehousing of tenants temporarily in ten dwellings which had been vacated was organised very carefully some considerable time in advance. In an initial stage two dwellings were modernised and served as prototypes or sample dwellings. Then ten dwellings of one and two rooms and kitchen which had become vacant were adapted to serve as temporary accommodation.

Seven large dwellings were made available for large families who had left accommodation which was too small for them and which it was intended to modernise. All the families moved had the advantage of free removal and new accommodation suitable for their needs and in good condition.

At Lens Liévin, where rehousing of families was difficult for psychological reasons, it was decided to ask for volunteers. The prolongation of the times allowed and the postponement of the completion of the work to a date too far distant was one of the reasons why the project was abandoned as far as the Experimental Programme was concerned.

2.3.32 Planning of projects and consultation of firms

Once those responsible for the project had prepared draft plans, the consultation of firms and finalising of plans was carried out as an integral process.

- Finally all the owners and supervisors considered it useful for various reasons to prepare prototypes. Before the final discussions on price, these prototypes were to serve as a basis for the work decided upon and provide a better source of information by direct observation of the quantities and prices involved and also as a basis on which to obtain the final agreement of the occupants.
- The owners and supervisors called for advice on firms larger than the small firms generally used for modernisation work but while preserving competition from the smaller firms. The choice of which firms to use was made on the basis of tenders from a limited number of firms.
- In the final stage of discussions, some preference was shown for firms offering the advantage of possessing workers of different trades and assuring the coordination of different types of work.

It should be pointed out that the use of teams of workers of different trades was preferred by the firms contracting for the work themselves. However, the coordination of these teams was often planned in close contact with the supervisors and realised by the technical departments of the owners. The aim was to reduce the time taken but also to reduce the inconvenience to the families concerned and the time of their removal from their home.

Account had to be taken of a number of limited factors, such as the logical order of the various tasks, the time they would take, the maintenance of water supplies, the need for electricity and drainage for occupants remaining in the dwellings to be modernised, the need to rehouse others, and possible removal dates, not to speak of any unexpected events of any kind which would affect prices.

It was necessary to determine quantities and contract prices as far as possible in advance. The methods adopted by the promoters of the projects to achieve this end differed very little from one country to another, each tried to obtain price estimates for well defined tasks and accepted a schedule of prices and contractual salaries for contingencies.

Thus at Heerlen the supervisors selected two firms who set to work on four dwellings. The cost analyses which they had to supply were discussed and served as a basis for the list of quantities and the unit prices. The firm offering the lowest prices was then selected.

At Heessen, where prefabrication played an essential role, the observation of prototype operations provided a means of checking the prices quoted. The firms approached had to state that they had studied on site the extent of the work carried out and the possible methods of doing it.

The prototypes executed in Rollencourt at Lens Liévin alerted the supervisors to the costs and led them to consult further and reduce the work to be carried out.

At Sesto San Giovanni the supervisor officially consulted three firms involved in the planning - one was a small firm, one a medium-size one and the third a large company currently utilising prefabrication. The quotations received were comparable and acceptable. Subsequently the prices were revised upward to a substantial degree. Owing to this and the fact that the Italian law does not accept variation in tender prices, the supervisors were forced to consult some forty firms. The price asked by the sole bidder led the supervisors to abandon the project in the light of the unfavourable economic situation.

At Herten and at Dortmund, promoters selected medium-size firms and after calling for quotations for special items, negotiated lumpsum prices, for which no revision was to be allowed. They were led to accept subcontractors and unforeseen work was carried out on the basis of a wages and cost schedule.

At Hagondange a choice was made after price discussions with 35 firms between the groups of firms under a coordinator and others. The risk of the latter underestimating work caused the choice to fall on a consortium of firms. The bill of quantities was prepared after a survey of ten dwellings and the additional work was confirmed on the spot before work on each dwelling commenced.

2.3.33 Time schedule and coordination of work

In drawing up the schedule of work the time requirements were fixed in advance by all the German supervisors. The draft documents were then adjusted in agreement with the firms in order to take account of particular requirements and in particular the removal of families. It was the role of the contractor to impose very strict discipline during the work.

At Heessen the owners appointed a technician to work under the site supervisor to be responsible for general coordination and control the coordination of work teams. At Dortmund the procedure followed was similar and every care was taken to ensure that the work of the various workers and their relationships with each other were very well defined. At Herten the schedule prepared by those responsible before price discussions took place was prepared without any down time and detailed plans on a scale of 1/20 were supplied. The general coordination was the responsability of the contractor.

In Heerlen in the Netherlands the organisation of work was discussed with the two firms approached in relation to the time requirements fixed in advance and the restrictions imposed by occupants. The firm which won the contract drew up the schedule and fixed the order in which 46 tasks should be carried out in a single dwelling by the various teams of workmen and then coordinated the work.

At Hagondange in France care was taken to leave as much as possible to the initiative of the controlling firm. This firm has permanently available dwellings made vacant by the owners. It prepared a schedule of work and is itself coordinating the work of the teams. The contractor is responsible for general coordination.

2.3.34 Duration of work in a dwelling and total duration of work

The duration of work on a single dwelling has varied roughly between two and thirteen weeks according to the site. This is also the length of time which a family must spend away from the dwelling or suffer the inconvenience of the work.

At the beginning of operations, the running-in period, the time required by firms for work proved to be longer. The normal rates of work expected were not reached until one and a half or two months after work started on the projects.

The schedule for work on one of the projects where progress was smoothest, Heessen, allowed for six working days of work with teams of workers of different skills.

One team was to instal the prefabricated bathroom made by Neue Heimat in eight hours while the others were to carry out the remainder of work within the dwelling.

When work was being done on the first dwellings, the occupants were found to be somewhat displeased since after three weeks of work the finishing operations were still being carried out. The lack of coordination due to the almost insurmountable difficulty in ensuring that each team works with perfect continuity and that everyone keeps the schedule, from the director of work to the very last workman, caused occupants to lose the advantage of a bathroom being installed so rapidly.

At Herten, as at Dortmund, the effort to organise the work bore fruit and the work of installing the various prefabricated units and equipment and all the other traditional tasks which were well prepared were carried out rapidly. However, a great deal of effort was expended on preparation and this influenced the cost. Everything had to be thoroughly planned and closely followed to ensure that everything went well. The work of each person was accurately defined and this in the opinion of those responsible was one of the main reasons for the success.

Contractors are willing, but failures on the part of personnel, suppliers and equipment may occur at any time and contractors fail to keep to schedule.

The mistakes made on this project were expensive ones. Thus at Dortmund it was thought that a general firm could carry out the work with only its own workers. This was not so and it proved necessary to accept subcontractors who in fact adapted very well to the rhythm of work on the project. The Dortmund housing was modernised down to the last detail in ten months, including external improvements to the surroundings. Interior work, which was carried out floor by floor, lasted between a month and a half and five months and an average of two months per dwelling.

At Herten where there was some delay on schedule, the 104 dwellings were modernised in fourteen months. The work on each apartment, which was supposed to last three weeks, in fact lasted a little longer. Some tenants, who had left their homes early, had to return later than intended. They accepted matters very well but some people were away as long as ten weeks.

At Heerlen in the Netherlands the hundred dwellings modernised as part of the Experimental Programme were the first of a project covering about twohundred dwellings. These were modernised completely in eight months. The work on each dwelling lasted an average of six weeks and tenants remained in residence but not without some inconvenience. The owners and supervisors consider that if the work had lasted any longer many of the tenants would not have accepted it so easily.

At Hagondange, after minute preparation work on the project launched in May 1973 did not proceed at a rate which enabled the dwellings to be handed over as scheduled at the end of four weeks. This rate of working was only reached after six weeks. The efforts of the firms and manufacturers called in to make good failures in supply made it possible to make good the two weeks which had been lost. The rate of working of 8 dwellings in 38 working days was then improved and raised to 8 dwellings in 24 working days.

Readers are referred to the attached tables which show the make-up of teams and the average time worked by labourers and craftsmen at Heessen and Hagondange.

To summarise what we have said, if we draw up a balance sheet of the organisation of work we find that the difficulties which had to be overcome were many. Work had to be carried out on dwellings which did not have identical characteristics. Account had to be taken of the requirements and wishes of the occupants. The owners found it difficult to find general firms and had to accept the idea of working with a group of firms using sub-contractors. The firms were reluctant to quote a lumpsum price and the price of additional work had to be agreed in advance and thus had to be inspected on site - a fact which involved many site visits. The firms were asked to adhere to strict deadlines when they suspected that their workers would have to wait for occupants to leave the premises or would find it difficult to work in houses which were occupied.

The difficulty of keeping teams of workers working continuously was one that it was almost impossible to overcome. It was practically impossible to get them to follow one another without interruption in work on a single dwelling and the rhythm of work had to be subordinated to the removal of tenants in order to clear them for work. When tenants remained in residence, the noise, dirt, lack of heating, etc. caused considerable inconvenience. Because of the full employment situation in the Federal Republic of Germany, firms had difficulty in supplying the necessary man-power. It was the lack of skilled workers that caused the schedule to be exceeded. In this country, as in France, the relationship between manufacturers and contractors were temporarily affected by the delay in supplying certain products.

In contrast to the difficulties and efforts expended, the reduction in time spent and in particular the ultimate satisfaction of the occupants of the dwellings largely made up for the effort put into organising the work by owners and supervisors and contractors, not to mention the national institutes whose suggestions and advice were always considered with interest and recognised as worthwhile.

3. CONCLUSIONS

Not all those responsible for projects under the Experimental Programme succeeded in moving from the planning stage to actually beginning work. However, neither the use of prefabricated elements nor the organisation of work, which were the two technical aims of the Programme, were at the origin of these difficulties.

Thus in Italy the market situation led to the quoting of prices which were considered too high by those concerned. In Luxembourg, the occupants who were purchasing their accommodation wished to impose mediocre ideas upon planners and were also not sufficiently numerous for the project to go ahead. At Lens Liévin the owners came up against costs which were too high and dates which it was impossible to guarantee. One of the difficulties was that the dwellings had to be connected to a drainage system whose construction was not under their control.

The results obtained on the five projects on which work was undertaken encourage all involved to continue their efforts in the future along the lines indicated by the General Directives of the Experimental Programme.

Year-by-year modernisation is not recommended by those responsible for the project who are convinced of the importance of modernising an old dwelling on condition that it is healthy and in a suitable state of repair, so as to improve amenities and comfort in a single operation and from all points of view. Those concerned are also convinced of the need to improve plans generally.

As far as accommodation in blocks is concerned, it is important that resurfacing of façades, maintenance work and work to improve the surroundings be synchronised with interior modernisation.

The psychological effect on families is much greater when the project implemented is wide-ranging and relates to the improvement of an estate, or a district, including the environment.

Starting with the idea that one can reduce the number of dwellings as required, combine two dwellings to form one or slightly increase the area of dwellings in order to adapt them to the needs of modernisation, the result will be dwellings which are more easily rented while the cost of work and the rent still remain acceptable.

It is the opinion of the project supervisors and the Directors of the National Institutes who followed closely the progress of projects in their countries that no difficulties of a technical nature were encountered that were unsurmountable in practice.

The first difficulty was that of finding firms capable of producing prefabricated elements while the second was that of finding firms that combined all the special skills.

Obviously, not everything could be prefabricated. It would appear that what should be done is to do away with heavy and expensive items and replace these with light elements which can be transported through the dwelling. The design and execution of a prefabricated structure such as the bathroom used at Heessen took several years and this same project also illustrates the possibilities of prefabrication and the need for first-class coordination of interior work in order to obtain the full benefit of the rapidity with which assembly operations may be carried out.

Owners and supervisors succeeded in producing substantial progress in traditional techniques by having prefabricated all those elements which could be simply conceived of before assembling them in series in the dwellings or outside in order to improve the environment.

It was possible everywhere to reduce the cutting of holes and to concentrate pipes and ducts and conceal them in prefabricated trunking as well as to cut down on the amount of welding.

The time taken, which was between twelve and thirteen weeks for such complete modernisation work, was a considerable improvement on the time usually required for partial improvement work of much less scope and which usually takes between three and five months.

The work was carried out at prices at least comparable with those of small firms who were never prevented from competing. It was found that the overall expenditure was less than that of similar improvements of a lower standard carried out in successive stages in neighbouring dwellings. The larger amount of work offered to the firms, their repetitive nature since a hundred dwellings might be involved, and the grouping of work at a single location helped to attract medium-size enterprises and by the effect of competition to reduce prices.

However, it must be admitted that the preparation of the rational organisation of work requires a considerable amount of work from the supervisor and the contractors. It is necessary to plan precisely the assembly operations and the time they will require while allowing for the need to alter the work of each firm if any unexpected difficulty arises. It is important to foresee and provide for the need in certain cases of having to call in other firms for a limited period or to ask for the help of additional teams of workers formed in advance.

In the opinion of various supervisors, the duration of the work must not, because of the disadvantages involved, exceed six weeks if they are to be well received by the occupants. The latter greatly appreciate the rapid and clean method of working and obvious organisation.

In the case of all projects, the quality of the products used and the finish was as good as in a new building. There was nowhere any impression of botched work.

The effort to organise work rationally, it must be emphasised, was everywhere given full support by firms. To them, however, the use of prefabricated elements and the development of new industrialised products seem to be linked to work of modernisation of older dwellings and this work still seems to be in its infancy in several countries. In any case, in their opinion much of the work will have to continue to be performed in the traditional manner.

ANNEX TO CHAPTER III

HAGONDANGE PROJECT (France)

Teams involved in work on the dwellings for 16 working days

(Days of 10 hours and Saturday of 5 hours)

Number of teams		Number of workers
1	Fabric of building	3
3	Joinery	2 each
1	Electricity	3
2	Sanitary installations	2 each
2	Heating	2 each
1	Roof	2
2	Floor and wall coverings (painting and wallpaper)	4 each
1	Sanding	2

Firms (contractors)	Work performed	Duration (days)	Hours worked
FABRIC OF BUILDING (two bricklayers, one assistant)	- Demolition, drilling, tilelaying, basement improvements	1.5	30
	- Treatment of chimney and heat insulation (loft)	1.5	30
	- Coatings, plastering, connections	0.5	4
JOINERY (one joiner, one assistant)	- Installation of partition walls and false ceilings, staircase	2	40
	- Doors, skirting board and finishes	2.5	50
	- Bathroom panelling		2
ELECTRICITY (two electricians, one assistant)	- Partial dismantling and renewal of installation including work in basement	3	90
SANITATION (one plumber, one assistant)	- Removal of inlet and outlet systems, mounting of installations, connections, tests	5.5	108
	- Installation of washbasin and removal of WC in basement		2
HEATING (one workman, one assistant)	- preparatory work, gas outlets, conduits, generator, radiators, tests	5.5	110
ROOF (one workman, one assistant)	- Velux frame and sealing joints	0.5	10
FLOOR AND WALL COVERINGS (three workmen, one assistant)	- Removal of wallpapers, painting radiator locations, bathroom covering, cleaning floors	6	240
	- Painting and wallpapering, including staircase		
	- Flooring (WC, bathroom, kitchen)		
SANDING FLOORS (4 workers, 1 assistant)		2	40
TOTAL NUMBER OF HOURS WORKED PER DWELLING :			756

HEESSEN PROJECT (Federal Republic of Germany)

Progress of work

Teams involved in work on the dwellings for 6 working days

Number of teams		Number of workers
1	Demolition	2
1	Sanitary installations	3
1	Installation of bathroom	6
3	Heating	4 each
2	Brickwork	2 each
3	Electricity	2 each
2	Joinery	2 each
3	Painting	2 each
1	Floor coverings	2

Firms (contractors)	Work performed	Work done during	Hours worked
DEMOLITION (three workmen)	Demolition of walls and removal of debris	1st day	6.5
INSTALLATION OF BATHROOM (six workmen)	Transport of elements, assembly, various additional work on the unit	1st day	18
HEATING (four workers)	Laying pipes inside building and and installing radiators (*)	1st, 2nd 3rd day	32
SANITARY INSTALLATIONS (two workmen, one apprentice)	Removal of existing sanitary fittings, drain, provisional connections, connections for bath-rooms	2nd day	8.5
BRICKWORK (two workmen)	Drilling holes in walls and ceilings, demolition	2nd day	18
ELECTRICITY (two workmen)	Part-removal of installations, installation of new ones, meeting and fittings	2nd and	19.5
JOINERY (two workmen)	Embrasure of windows in dining room, installation of a panel with pipes ready-installed for kitchen equip-ment, finishing bathrooms	2nd and 6th day	17.5
PAINTING (two workmen)	Preparatory work, painting, painted paper, varnishing	4th, 5th and 6th day	15
FLOOR COVERINGS	Coverings and bonded PVC	5th day	5
Total number of hours worked in each dwelling of 45 sq.m.:			140.0 =====

(*) Not including basement connection to district heating

CHAPTER IV

ECONOMIC ASPECTS OF THE WORK CARRIED OUT

1. INTRODUCTION

The economic aspects of improvement or modernisation of an old building may be expressed in terms of the relationship between the cost of work carried out and the value of the building.

It is therefore particularly important to be able to assess this relationship correctly and objectively. Various concepts of value are used as the basis of this calculation; they may be defined as follows:

1/ The "real value". This is the value which results from the technical characteristics of the work and of the land on the day of the calculation.

2/ The "yield value". This is the value objectively arrived at by dividing the estimated possible net income calculated in terms of the interest on capital (site and building).

3/ The "market value". This is the value objectively arrived at and representing the value of the land, with or without buildings, at the prices prevailing in the market.

4/ The "taxable value" which is the value that from the tax point of view derives from the "yield value".

Other concepts of value are used for mortgage loans, insurance, expropriation etc.

One can only judge the effect of modernisation after assessing, from the technical and economic point of view, the value of each building before and after modernisation. Since the values of the goods rented may be calculated on the basis of the "real value" as well as of the "yield value", one must first be well informed as to the state of the building and the local market.

In order to judge the economic aspects of modernisation under the ECSC Experimental Programme it is necessary to use values where the basic data are known. Use will be made of the yield values, which are determined on the basis of rent increases after modernisation, the expenditure involved and the interest on the capital invested.

2. ANALYSIS AND COMPARISON OF MODERNISATION COSTS

2.1 Breakdown of construction costs only

The work of modernisation carried out in the schemes selected in the various Community countries was done on the basis of very different data relating to the age of the buildings, their type and their state. The measures decided upon range from the improving of various parts of the structure which had become inadequate and with out-to-date equipment to the transforming of the design of dwellings by the removal of partitions and chimneys and the installation of new technical and functional facilities. At the time of writing, we unfortunately do not yet have all the final costs of the work actually carried out on all the projects.

We give below (2.4) a breakdown of construction costs worked out on the basis of the estimates available for certain projects.

2.2. Expense of moving occupants and rental losses

In contrast to what applies in the case of a new building, account must be taken in calculating modernisation costs of the additional costs which result from the need to clear the dwellings and rehouse tenants, to pay compensation or indemnities and to cover losses in rent.

At the time of writing, the information available on all these points is too fragmentary for comparisons to be possible.

At Dortmund, the owners paid removal indemnities to 44 families who had to leave. In round figures these amounted to DM 400 per dwelling or an average of DM 6.95 per sq.metre of living area.

At Heessen, the tenants received an indemnity of DM 250 per dwelling or DM 6.57 per sq.metre of living area. It was also necessary to pay a total of DM 4,600 as indemnities for different material losses suffered by some families.

At Heerlen, the loss of rental amounted to some Fl 208 per dwelling.

At Hagondange, the various definitive moves and the double moves caused by the need for most of the families to leave the premises temporarily and arranged by the owners are assessed at an average of F 1,000 per dwelling or at F 13.50 per sq.metre of living surface.

2.3 Planning costs

It would appear that these costs are normally higher than in the case of new building for the same cost.

A detailed report of the state of the old building is necessary in order to reduce the amount of unexpected work. The supervisor should solve the often very difficult problems of how to reorganise the lay-out of the dwelling. The planning, preparation and coordination of work were therefore given particular attention by supervisors.

It was not only because the promoters and supervisors of the Experimental Programme were asked to make a special effort in respect of the rational organisation of work required by the General Directives that they acted in this way. It was necessary for them to do so. It seemed obvious to them that the means of achieving such organisation were in fact available to them. They alone have some means of influencing tenants and contractors. They alone are in a position to find substitute accommodation, pay indemnities, coordinate the work of those taking part in the work of modernisation and act to solve the time problems liable to arise in the course of work.

All the costs involved were more or less covered by the promoters (generally by maintenance departments) who did the work themselves.

The costs of maintenance departments are basically covered by the income deriving from the management of the property and the demarcation line between costs of modernisation and of maintaining property is rather blurred. The uncertainty also stems from the fact that some of the costs of raising the necessary finance and the ill-defined additional costs are added to these expenses.

Overall, and remembering what has been said above, the costs involved in the ECSC Experimental Programme modernisation projects were, as far as we can judge from the information gathered, between 1.7 % and 11.4 % of the cost of work.

2.4 Comparative study of modernisation costs

The part played by each specialist firm in the modernisation work gives some idea of the relative importance of the work of the various trades involved.

In this context we must take account of the fact that modernisation means both the provision of new equipment and fittings and the doing away with or repair of out-dated items in almost all fields. Only when inside wall, ceilings or other structures are demolished can one decide the amount of work involved.

The following table is a comparison of the percentages or total work accounted for by the different categories of work on the various projects:

Type of work	Dortmund 40 dwellings	Dortmund 44 dwellings	Heessen	Herten	Heerlen	Hagondange
Demolition and removal of debris	1.31	6.98	4.32	4.74	5.10	1.22
Traditional operations	93.91	85.11	45.28	83.66	70.16	52.49
Assembly of prefabricated elements	4.78	7.91	39.75	11.60	6.87	28.68
Work on environment			3.44		10.92	17.61
Various additional work			7.21		6.95	
Total percentages	100.00	100.00	100.00	100.00	100.00	100.00

This table shows that the work of the various categories of traditional tradesmen remains very important, unless, as at Heessen, use is made of prefabricated bathrooms which account for a large proportion of the total cost or unless work is not strictly limited to the assembly of prefabricated elements.

Demolition work in all cases accounts for less than 7 % of the total cost, even if, as in Dortmund, the lay-out of dwellings is altered considerably by removing inside walls and chimneys.

Certain categories of so called "traditional" work account for a larger share of total costs than do others, thus

- sanitary fittings	7 to 26 %	of cost of construction work only
- heating	16 to 24 %	
- new doors and windows	13 to 20 %	
- brickwork where lay-out is altered	15 to 16 %	
- new floor coverings	12 %	

These percentages will no doubt require some adjustment when the final costs are worked out.

In the best of cases prefabrication hardly accounts for 40 % of construction work only. However, this is a fairly substantial figure if we consider that the rapid assembly of prefabricated elements is combined with the efforts to organise work, to reduce working time and to keep inconvenience to occupants to a minimum. The two projects with the shortest working time were Heessen (one week) and Hagondange (three weeks) and these were also the projects where the proportion of prefabricated elements was highest, viz. 39.75 % and 28.68 % respectively.

Work on improving the immediate surroundings accounts for a variable proportion of total costs, since everything is dependent upon the state of existing access roads. In the centre of town such costs are negligible but at Hagondange the promoters made a substantial grant of their own to raise the standard of this estate of individual houses.

3. EFFECT OF MODERNISATION ON QUALITY OF HOUSING

The nature and amount of expenditure on modernisation does not depend solely on the age and degree of dilapidation of buildings. It is more important to take into account the gap existing between the quality and inhabitability of the old buildings and that of new dwellings in terms of present-day requirements.

The quality and value of dwellings depend upon a great many other factors; their situation in the town, and nearness to shops, schools and transport facilities and to places of work. Other influencing factors are the size of the dwelling, its equiment and fittings, lay-out and its adaptability for furnishing and, in general, for living. Then again there are such matters as construction materials, weather-proofness, sound insulation and everything else that goes to make a house sound and pleasant to live in.

Because of the limits imposed by the nature of the work, it is not always possible when modernising to meet all modern standards of quality and inhabitability. Compromises have to be made in doing what seems advisable and sensible.

The additional value of the property as a result of modernisation should be quantifiable but it is unfortunately not an easy matter. Hence in a first experimental attempt to make the dwellings as comparable as possible with new dwellings, all that what done was to apply a few simple economic principles.

Owners and supervisors only dealt with buildings with a sound, usable structure. Plans were only modified to a certain extent as regards size and arrangement of rooms, their number and the number of doors and windows.

The speed with which work was carried out at Herten and Heerlen shows, for example, that at low cost it was possible to achieve a suitable room lay-out, change the use of rooms and meet families' present requirements.

It was always possible to improve and replace all interior equipment and fittings. New installations such as hot water systems, electrical fittings, central heating etc., were in line with all modern standards of safety. All wall and floor coverings newly provided were suitable

for their purpose. They offer the same qualities of easy maintenance as do those of new dwellings.

No problems were raised by the relatively low expenditure involved in improving heat insulation and sound insulation. Heating radiators were sometimes connected up to a district heating system and radiators or convectors were often the very latest models.

4. FINANCIAL ASPECTS OF MODERNISATION COMPARED WITH NEW BUILDING

The improvement or modernisation of older dwellings requires expenditure on planning, organisation, preparation and execution of work and also costs of financing which differ from those for new building.

It is not necessary to purchase and prepare sites, but the improvement costs proper are augmented by costs of demolition and debris removal, loss of rental and any compensation payable.

4.1 Effect of organisation of work on cost of modernisation

When modernisation work is carried out it is advisable, as the experiment showed, for housing to be empty. The inconvenience caused to occupants by the erection of supports when structures are cracked or new doors are put in, the welding, dust and noise are almost unbearable. The evacuation of tenants raises the problem of rehousing or provisional accommodation. The tenants may be legally obliged to agree to this. Thus it is not a practicable proposition to carry out modernisation solely from the point of view of technical organisation and efficient organisation aimed at lowering the cost of work. One must also take into account the time and dates of vacation of dwellings. It is often possible to ensure complete continuity of work, but not always.

From another point of view, the work of modernisation teams is closely interwoven in terms of both time and place and any disturbance has more serious consequences than in the case of new construction.

Owner's calculations of economic viability should therefore take account of more risks and costs attributable to lack of continuity, inefficient organisation and uncertainty of periods of work.

The length of time required for the various tasks shows that modernisation of individual housing takes more time than work on apartments. Thus

Dortmund	2 weeks per apartment with no alteration to plans, 8 to 13 weeks if plans changed
Heessen	between 1½ and 4 weeks for each apartment
Herten	6 to 10 weeks per house
Hagondange	3 weeks per house.

4.2 Effect of organisation of works, procedures and equipment on modernisation costs

One feature of the organisation of modernisation work is that it is rarely possible to use such equipment as cranes, hoists or belt elevators. Materials and prefabricated elements have to be transported to site by hand and lifted in small quantities using electric winches.

Generally speaking there is a shortage of space for storing materials and equipment. The duration and importance of work is relatively small. The teams of workmen using the same techniques as in new buildings are fairly small, particularly those concerned with brickwork, concrete and painting.

Before new elements are installed, it is often advisable to strip the old building. Prefabricated elements must match existing structures and fittings.

Almost all works of modernisation, therefore, involve the supplementary expense of adaptation to the existing structures. It is necessary, for example, to prepare surfaces to take the new wallfacings, taking account of constraints which may not be apparent in the course of modernisation.

In selecting material, one is limited to using easily-worked products such as plasterboard, rather than those which involve plastering or brick-laying.

The use of prefabricated units reduces and simplifies work on the site; in certain cases, as the prefabricated bathrooms at Heessen and the room partitions at Dortmund bear out, it can result in apparently higher costs than in traditional construction. In reality, however, no cost comparison based on a single prefabricated item has validity, since any such comparison must take into account the gain in time over the whole project and the greater facility for coordination and assembly. The final product can be better finished and function better.

Prefabrication has a role in improving productivity and reducing the time scale for modernisation by simplifying the organisation of work, but the increase in the amount of work in every project of modernisation for a similar end-product and the relative unimportance of the different elements of work in the whole is bound to be reflected in contractors' prices, which can be up to 30 % higher than for similar work in the field of new construction.

4.3 Comparison of modernisation costs for various operations

In order to be able to make a useful comparison of the costs of modernising various types of dwelling, it is first necessary to understand their initial state and the standard to which they have been raised by modernisation or improvement.

Modernisation of dwellings in Dortmund, Heessen, Herten, Heerlen and Hagondange has, to judge from the data available, involved the following expenditure as expressed in European units of account (u.a.) and national currencies.

This table shows the average cost of modernising a house varying from 4,355.73 u.a. to 8,062.98 u.a. per dwelling. These costs are not, of course, strictly comparable, since construction costs vary as between countries and within a single country. Furthermore, the arrangement of dwellings varies.

One may, however, observe that in one country, the German Federal Republic, and within the same modernised group of dwellings, average cost fell from 24,311 DM (6,642 u.a.) to 15,942 DM (4,355 u.a.) in dwellings of a similar superficial area (57.55 sq.m. and 55.50 sq.m.), if the design was only marginally modified.

OPERATIONS	AVERAGE LIVING AREA AFTER MODERNIZATION (sq.metres)	BUILDING COSTS PER DWELLING		ADDITIONAL COSTS		CLEARANCE OF DWELLINGS AND LOSS OF RENT	
		per dwelling	per sq.m. of area	per dwelling	per sq.m. of area	per dwelling	per sq.m. of area
DORTMUND 44 dwellings with modification of plan	57.55	24,311.00 DM 6,642.35 ua	422.47 DM 115.43 ua	2,674.00 DM 730.60 ua	46.47 DM 12.70 ua	681.82 DM 186.29 ua	11.85 DM 3.24 ua
DORTMUND 40 dwellings with no modification of plan	55.50	15,942.00 DM 4,355.73 ua	287.22 DM 78.47 ua	1,795.00 DM 490.44 ua	32.34 DM 8.84 ua		
HEESSEN 100 dwellings	44.73	17,440.00 DM 4,765.03 ua	389.89 DM 106.53 ua	307.00 DM 83.88 ua	6.97 DM 1.90 ua	294.00 DM 80.32 ua	6.57 DM 1.80 ua
HERTEN 52 one-family houses	73.00	17,750.00 DM 4,849.72 ua	243.15 DM 66.43 ua	2,096.00 DM 572.67 ua	28.71 DM 7.84 ua		
HEERLEN 106 (*) dwellings	99.80	29,188.00 Fl 8,062.98 ua	275.35 Fl 76.07 ua	1,312.00 Fl 362.43 ua	12.38 Fl 3.42 ua	208.00 Fl 57.46 ua	1.96 Fl 0.54 ua
HAGONDANGE 103 one-family houses	76.30	30,231.00 F 5,443.10 ua	396.21 F 71.33 ua			1,000.00 F 180.00 ua	13.10 F 2.36 ua

(*) Part of a scheme for simultaneous modernization of 240 dwellings

1 ua = 3.66 DM
5.554 F
3.62 Fl

This demonstrates the economic interest in modernizing, as far as possible, without modification of the structure or of internal partitioning and the need for a thorough search for solutions which satisfy the requirements of current patterns of living with minimum change in design.

In the same country, the lowest costs were incurred at Herten (17,750 DM or 4,849 u.a.'s per dwelling), where the houses were individual and relatively large (73 sq.m.), with expenditure calculated per square metre of only 66.43 u.a. as against 78.47, 106.53 and 115.43 u.a. for the other schemes.

When the superficial area is small, cost per square metre of living area appears relatively high, since certain costs of modernisation, for example the cost of improvements to bathrooms, WC's, kitchens, individual central heating, must be distributed over a smaller area. This was the case at Heessen - living area of 44.73 sq.m. - where the improvement of essential facilities represented the major part of expenditure.

In this project, nevertheless, the main objective of the Programme - the maximum use of prefabricated units and the rational organisation of work, but not at the expense of traditional solutions, where these are cheaper - has been plainly achieved. One can therefore state that it is more economic to modernize large dwellings.

It may also be noted, without prejudice to what has been already said about cost comparisons between countries that the expenditure on modernizing individual houses at Herten in the Federal German Republic and at Hagondange in France, where the living areas are closely similar (73 and 76 sq.m.), was of the same order (66.43 u.a. and 71.33 u.a. per sq.m.).

The houses at Heerlen in the Netherlands, with an average living area of 106 sq.m. after modernisation, were a little more expensive to modernize, 76.07 u.a. per sq.m. of living area. The explanation is to be found in the extra amount of structural work, the addition of a terrace adjoining the living room, the creation of garages, etc.

4.4 Justification of modernisation

If, having regard to the original situation and the costs involved in modernisation, the total of permanent charges, interest and servicing of capital invested, current maintenance costs and losses in rental turns out to be lower than the sum of similar expenses for a new building of equivalent type, the modernisation is economically viable.

If the value of the old building, including modernisation costs, is such that one has housing of a sufficiently high standard with permanent charges which are lower than in the case of a new building, the modernisation may be regarded as justified.

From the point of view of the legislation encouraging and regulating building work, these calculations may come into conflict with the ceilings fixed for permissible rents. Thus, in the Federal Republic of Germany, the amount of permanent charges acceptable for a new dwelling in the subsidised housing sector is limited by rent ceilings. If the rent calculated on the basis of real costs exceeds the upper limit allowed, the owner or administrator must reduce the amount of permanent charges to a degree where he does not obtain sufficient return on capital or has to seek other means of finance which require a lower rate of interest or he must cut back on the amount of work carried out. However, the economic viability of a new building is also dependent upon finance and its costs.

The following comments may be made on the modernisation work carried out under the ECSC Experimental Programme, on the basis of the following information:

Costs distributed over sq.m. of living area	DORTMUND with modification of basic plan	DORTMUND without modification of basic plan	HEESSEN	HERTEN	HAGONDANGE	HEERLEN
Cost of modernization works	422.47 DM (115.43 ua)	287.22 DM (78.47 ua)	389.89 DM (106.53 ua)	243.15 DM (66.43 ua)	396.21 F (71.33 ua)	275.35 Fl (76.07 ua)
Cost of construction of equivalent dwelling	from 850 to 1000.00 DM (232-273 ua)	800.00 DM (218.00 ua)	1000.00 DM (273.00 ua)	1000.00 DM (300.00 ua)	1570.00 F (283.00 ua)	from 475 to 615.00 Fl (130-170 ua)
Monthly rent before modernization	1.86 DM (0.51 ua)	1.70 DM (0.46 ua)	1.30 DM (0.36 ua)	1.97 DM (0.54 ua)	0.73 F (0.13 ua) rent ceiling 2.40 F (0.44 ua)	1.16 Fl (0.32 ua)
Monthly rent after modernization	3.32 DM (0.90 ua)	3.07 DM (0.87 ua)	2.69 DM (0.74 ua)	3.20 DM (0.87 ua)	by progressions from 2.65 to 4.50F (0.48-0.81 ua)	1.91 Fl
Rent of a new dwelling	3.65 DM (1.00 ua)	3.65 DM (1.00 ua)	3.65 DM (1.00 ua)	3.80-4.00 DM (1.03-1.09 ua)	min 6.55 F (1.17 ua)	2.00-2.90 Fl (0.55-0.80 ua)
Increase in annual rent as a percentage of cost of modernization	3.64 %	5.14 %	2.50 %	5.00 %	5.64 %	3.27 %
Total expenditure on modernization	480.79 DM (131.37 ua)	319.56 DM (87.31 ua)	403.43 DM (110.23 ua)	271.86 DM (74.27 ua)	409.31 F (73.69 ua)	289.69 Fl (80.03 ua)

It will be noted that the cost of modernisation, taken over all the schemes, represents from 22 to 49 % of the cost of construction alone of an equivalent new dwelling. The construction of new houses is therefore more than twice as expensive as modernisation, before one takes account of the costs of acquiring and servicing the sites.

Increases in annual rent after modernisation represent from 2.5 to 5.64 % of the costs of modernisation. The new rents are in all cases less than from 10 to 30 % of the rents of comparable new houses.

The capital involved is very much less than in new construction, especially if one takes into account the additional expenditure of acquiring and servicing the land.

Bringing old houses up to currently accepted standards is still very acceptable to the workers employed in the steel mills and collieries. This avoids the situation where the houses are left in poor condition and occupied either by people of modest resources or by people who have extremely modest housing aspirations.

5. CONCLUSIONS

The improvements to out-of-date houses carried out under the Experimental Programme have given them a value approaching that of new houses. The preservation of existing structures has undoubtedly limited improvements in design and layout, which might have been desirable, but it has been possible to satisfy all the requirements of hygiene and comfort in providing up to date fittings and amenities. From the planning point of view, these houses, situated close to work-places, schools and other amenities, have even acquired, after modernisation, a higher value than other more recent housing with a more peripheral situation.

The modernisation of older housing means spending money, and the expenditure is only productive if the sum of the value of the house in unimproved state and the cost of modernisation is less than the cost of constructing a comparable new house.

The number of old houses requiring demolition, because the costs of modernisation are out of proportion with the resulting increase in the value of the houses, will decrease and the number worth modernizing increase as one achieves a more rational organization of works of modernisation.

Now, these works of modernisation differ on more than one score from works of the same kind in the field of new construction.

In new construction, the usual methods of organisation, which rationalise the execution of the works, are as follows:

- complete and detailed forecasting of the various operations at the appropriate time
- use of long work runs or short work runs linked together
- uninterrupted use of workers and plant over a long period
- maximum coordination of work forces
- non-overlapping of different phases of the work.

In modernisation, it is more difficult to achieve these objectives. The conservation of parts of the building limits the possibilities and places obstacles in the way of continuity:

- each job is small in scale
- its execution requires numerous small operations
- the more workers are concentrated in a limited space, the greater the risk of their obstructing one another and the work of each depending on the work of the others
- the works are carried out in the most difficult conditions, where houses, which are cramped for space, remain occupied
- many operations involve the additional work of demolition or preparing working platforms
- not to mention local differences in working conditions, the procedures and methods used cannot always be determined simply on the basis of the most rational techniques
- the order and the time needed for the carrying out of the works cannot always be foreseen. A wall shown on the plans as a partition may turn out to be a bearing wall, ceiling joists may be discovered to have rotted, after the removal of ceiling plaster.
- in general, one works with only small amounts of equipment on the site, and full use cannot always be made of rational means of transport.

The most efficient methods cannot therefore be used, in every case.

From these considerations, one can deduce the following conditions for a rational organisation of works of modernisation:

- the promoters of schemes must encourage the greatest possible use of prefabricated units
- the owners must cooperate in encouraging the simultaneous modernisation of the greatest possible number of dwellings
- the contractors must take as large as possible a volume of work, which can be allocated in sizeable parcels
- the directors of works must make a particular effort in preparation, supervision and deployment of workers
- the manufacturers of plant and components should perfect products adopted to the work of modernizing houses.

The preparation of the Experimental Programme and its application have provided the conditions for a rational flow of work. Contractors have taken advantage of the possibilities offered.

It is worth emphasing the successful use of prefabricated units in different forms: windows, panels, door units, partitions, sanitary units; this has contributed to the avoidance of overlapping of works and saving time.

If success in shortening time schedules and reducing costs has not always been as expected, this is due, in some measure, to the experimental nature of the programme. Prefabricated units, such as the bathrooms at Heessen, were a novelty to the participants. There is still a need to develop rational working methods and to compare experience. That was one of the objects of the Experimental Programme. In comparing the costs of the Heessen bathroom installations, with those of a small scale artisan operation, one must take account of economies in time and man-power, and also the advantages of avoiding over-lapping of different operations. Doubtless, one must wait and see whether the installation of such units is particularly efficient and economic in houses, where a bathroom has not so far been provided.

In most works of modernisation, it has been difficult from the start to form working teams and to adapt them to obtain the smoothest possible work flow and the optimum rhythm and continuity of operations.

While each contractor did his best to find the most economic way of carrying out the work, the time taken on the site varied, in the event, from contractor to contractor. It was the function of those directing the works to select the most economic working methods for the scheme as a whole. In some cases, additional costs were incurred for one job, but with a profitable result for the whole scheme.

Examination of the works on site confirmed that most modernisation projects require more manpower than corresponding works in new construction. This is because of the unfavourable conditions already indicated.

If the householders continue to occupy the houses during the works, the precautions needed from day-to-day to avoid damage to furniture and effects and to allow domestic arrangements to function, constitute an obstacle to regular work in series. Even if the houses are empty, one has to take account of difficulties in the way of smooth working. Take, for example, the case where the occupant falls ill on the day when he is supposed to leave the house free.

This is why works of modernisation have generally been carried out under the direct supervision of the owner. The unforeseen difficulties are a risk, when payment is based on contract prices.

Given the greater difficulties in carrying out the work, modernisation demands a higher than average standard of organization and supervision. Numerous small jobs, taking only a short time to complete, were coordinated to make the best use of the resources of each work force, even if frequent changes had to be coped with on site. The preparation and organization of the work demanded much more effort than in the case of new construction. Cost estimates and working schedules were not fixed until precise data were available and after modernisation of a typical house.

By these methods, a rational flow of work was obtained, without dispute on the part of those contributing. Technical and chronological coordination were of greater importance where the works and the contractors were independent of one another, as was the case for sanitary installations, electricity, heating and painting. The necessary agreement is more easily obtained if firms, providing the whole range of expertise, are alloted different sectors of a scheme.

The study of work on the Experimental Programme schemes has, taken as a whole, provided useful lessons for rationalisation in modernisation. The field was quite new. This information can serve not only for in the rational improvement of older houses, but can even facilitate studies of cost-effectiveness.

The research carried out has shown that measures of rationalisation, valuable in new construction, could not always be used in modernisation without modification. This rationalisation is useful, for it shifts the economic dividing line between conservation and demolition of houses, in favour of the former.

Given that modernisation costs less than new construction and the rent charges for modernized housing are less, the results of the research would appear to have important consequences from the point of view of social policy. They point to a better use of the financial resources allocated to housing.

CHAPTER V

SOCIOLOGICAL ASPECTS

Any operation whose purpose is to modernize a group of dwellings must obviously be based on an exact knowledge of the situation; this includes the state of the buildings and the social situation of the people who occupy them.

Dwellings cannot be considered in the abstract but must be considered in their sociological context. The information that should be available includes the composition of the families, the age and industrial category of the heads of family, their income, etc.

In implementing the Experimental Programme this information was collected at the outset of each operation. It is presented in summary form in a series of tables giving the essential features of the dwellings dealt with.

Despite their obvious gaps, these tables immediately give an outline of the sociological problems involved and facilitate a comparison of various aspects of the projects.

It would be a useful exercise to have this data on the families and their accommodation analysed and studied in greater depth by experts in order to obtain useful information for initiatives of a similar nature.

The following pages are the fruit of an attempt to devise an initial approach to the sociological aspects of the Experimental programme and may give the reader material for reflection.

GENERAL TABLE showing the situation of the families involved in the ECSC Experimental Programme and giving the following percentage figures: number of persons in the household, age of head of family, category of employment, level of income in 1971.

	GERMANY Dortmund	GERMANY Heessen	GERMANY Herten	BELGIUM Bois du Luc	FRANCE Hagon-dange	FRANCE Rollen-court	LUXEM-BOURG La Sauvage	ITALY Sesto San Giovanni	NETHER-LANDS Heerlen
Number of families	92	100	60 in 104 dwellings	159	109 in 103 dwellings	90	88	110	235
Number of persons living in dwelling	single person married	couple with/ without children or with parents	couple with children or with children and parents			small families			usually couples with or without children
1 pers.				-	14 %		2 %	20 %	
2 pers.				-	14 %		25 %	34 %	
3-4 pers.				-	36 %		59 %	33 %	
+ 4 pers.				-	36 %		14 %	13 %	
Age of head of family	for the worker								
6-45 years	30-40 years	11 %	90 %	-	20 %	13.5 %	58 %	14 %	20 %
45-60 years		60 %	10 %	-	60 %	62.0 %	38 %	40 %	80 %
+ 65 years		29 %	-	-	20 %	24.5 %	4 %	46 %	-

GENERAL TABLE (continuation)

Category of employment									
Steelworkers	70 %	-	-	-	68 %	-	17 %	22 %	-
Retired steelworkers	23 %	-	-	-	18 %	-	-	32 %	-
Steelworkers' widows	7 %	-	-	-	8 %	-	-	11 %	-
Miners	-	71 %	100 %	67 % (*)	-	39 %	74 %	-	38 %
Retired miners	-	20 %	-	33 %	-	59 %	9 %	-	10 %
Reclassified (**)	-	9 %	-	-	-	-	-	-	35 %
Miners' widows	-	-	-	-	-	-	-	-	5 %
Others	-	-	-	-	6 %	2 %	-	35 %	12 %
Employment category									
Salaried employees	-	-	-	-	10 %	16.3 %	-	40.0 %	2 %
Skilled workers	93 %	71 %	100 %	-	64 %	74.4 %	58.5 %	31.0 %	15 %
Unskilled workers	-	-	-	-	-	7.2 %	28.0 %	6.5 %	83 %
Others	7 %	29 %	-	-	26 %	2.1 %	13.5 %	22.5 %	-
Income levels in 1971									
- 100 u.a.	-	-	-	-	-	14.7 %	-	30 %	-
1-200 u.a.	-	29 %	-	-	20 %	37.2 %	-	34 %	-
2-300 u.a.	-	71 %	5 %	-	70 %	38.6 %	33 %	14 %	-
3-400 u.a.	-	-	60 %	-	5 %	0.5 %	67 %	14 %	9 %
+ 400 u.a.	-	-	35 %	-	5 %	-	-	8 %	-

(*) The majority are foreign workers.

(**) Transferred from coal and steel industry to other occupations

STATE OF DWELLINGS in terms of size (number of rooms), average number of occupants per room, sanitary fittings, form of heating and domestic equipment

	Dortmund	Heessen	Herten	Bois du Luc	Hagon-dange	Rollen-court	La Sauvage	Sesto San Giovanni	Heerlen
Year of construction	1951-53	1954	1951-52	1855 kitchen added in 1925	1912	1920-24	1922-27 1946	1936-37	1943-46
Number of rooms (at present)	4 % : 1 9 % : 2 87 % : 3	48 % : 3 52 % : 4	3	5	4	4	81 % : 4 15 % : 5 4 % : 6	66 % : 2 31 % : 3 3 % others (not including kitchen)	5
(planned)	29 % : 2 56 % : 3 10 % : 4 5 % : 5 (not incl. kitchen)	48 % : 3 52 % : 4	5 number of dwellings will fall from 104 to 52	5	5	4	81 % : 4 15 % : 5 4 % : 6	62 % : 2 36 % : 3 2 % others (not incl. kitchen)	5
Number of occupants per type of dwelling	1r: 1 p 2r: 1-6 p 3r: 2-2 p	3r: 2 per. 4r: 4 per.	3 to 5 persons	-	4 persons	2 to 8 persons	4r: 3-5 p 5r: 2-6 p 6r: 5-8 p	2r: 2-5 p 3r: 2-5 p	4 to 5 persons
Average number of occupants per room	0.80	0.86	1.2	-	1	0.7	0.82	1.1	0.9

STATE OF DWELLINGS (continuation)

Sanitary fittings (at present)	WC, sink, shower, in 4 cases bathroom, in 88 hot water	WC, sink, mobile bathroom, solid fuel water heater	WC, sink, bathroom in basement with connection for washing machine	WC outside	WC, sink, occasionally washbasin	WC outside, sink	WC, stone sink	WC, sink and often washbasin	hot water connection for washing machine in cellar
	There is a WC in all dwellings of type 3B (one-third on ground floor, two-thirds in basement). Even in the apartments there is a bathroom in the cellar with solid fuel water heater.								
(planned)	complete bathroom, centralised hot water system, stainless steel sink, washing machine connection	complete bathroom, stainless steel sink	complete bathroom	complete bathroom, washing machine and dishwasher connection	complete bathroom, washing machine connection	bath, washbasin, in future bidet, washing machine connection in the kitchen	complete bathroom, washing machine connection	complete bathroom, washing machine connection wherever possible	hot water shower, connection for washing machine and fridge in the kitchen
Heating (at present)	coal-fired stoves	stoves	coal-fired stoves	-	coal and oilfired stoves, electric cooker	coal	coal and oilfired stoves	coal 19 % oil 63 % gas 18 %	-
(planned)	gas central heating	central heating	central heating	central heating	gas central heating	gas central heating	gas heating	central heating	individual gas central heating

Electrical appliances	-	-	-	-	washing machine, vacuum cleaner, cooker, TV, dishwasher, small electrical appliances	-	fridge 100% vacuum cleaner 80% washing machine 80% TV 100 %	large percentage have TV, fewer washing machines, some cookers	

1. THE URBAN CONTEXT

1.1 Proximity to town centre

Except in the case of the operation in the Netherlands, the town centre is fairly close to the dwellings modernized - less than 1,200 metres - and can be reached on foot. Moreover, large cities such as Dortmund or Milan, to which the Sesto San Giovanni conurbation is attached, have a fairly frequent public transport service.

In the Netherlands project, on the other hand, the town centre is four kilometres distant and the occupants of the dwellings being modernized generally use the public transport service.

1.2 Proximity to place of work

Generally speaking, the dwellings to which the various operations relate are situated between 500 metres and a maximum of ten kilometres distant from occupants' places of work.

In Germany, Belgium and France these distances do not exceed 2,000 metres and the miners or steelworkers go to work on foot. They sometimes use a bicycle or private or public transport.

In Italy, Luxembourg and the Netherlands, the centres of activity are further away and the distance is as much as six kilometres at Sesto San Giovanni, ten at La Sauvage and ten at Heerlen. There are very few workers who use their car, most preferring to use a bicycle or public transport.

1.3 Amenities

Shops

In every case, there is a minimum of small shops necessary for daily needs.
In addition, in Germany, France, Italy and the Netherlands there are several large shops or a supermarket in the town centres and within a maximum radius of three kilometres.

Education

There are in all cases elementary school facilities in sufficiency and there are even grammar and other secondary schools at Dortmund, Sesto San Giovanni, Lens Liévin and Herten.

Sport

Sports facilities are well developed in Germany and include sports grounds, swimming pools and tennis courts. In Belgium it is planned to provide a cultural and sports centre with an indoor basket ball court. In France there are a fair number of sporting facilities with football grounds, basket ball courts and tennis courts either being prepared or completed and awaiting the provision of swimming pools in the near future. In Italy and the Netherlands there are sports grounds and swimming pools near the dwellings. In Luxembourg there is a football pitch in the village of La Sauvage.

Health

Hospital facilities are everywhere adequate and in all cases there is either a first aid centre/clinic or a hospital, the distance in the least favourable case being less than ten kilometres.

Culture

Cultural facilities vary considerably. At Dortmund there is a museum, theatres and a large number of cinemas, in Italy there are leisure centres and libraries, in Belgium there is a leisure centre, at Luxembourg simply a hall able to accommodate 300 people. The arrangements in each case are, of course, in proportion to the size of the town or village but it is sometimes necessary to look far outside the immediate district for a hall, theatre or cinema, concerts or lectures.

This is true in the case of Hagondange in France where there is no local meeting hall.

Everywhere there are a sufficient number of religious buildings close to the buildings being modernized.

1.4 Environment

Apart from the dwellings at Dortmund and Sesto San Giovanni, which are right in the centre of the town, the housing is situated in quiet, open areas which are made more attractive by plentiful numbers of trees.

In the Grand Duchy, the housing is located in a natural wooded area which is varied and picturesque. The houses in the other projects are all near green spaces. In some cases, such as in Belgium and France, it is even intended to convert the natural open spaces adjoining the estates into parks and gardens and to combine these with open-air sports facilities including a swimming pool.

In the centre of Dortmund there is a large park a short distance from the housing. Near Sesto San Giovanni there are a great many small parks and a few secluded small green spaces.

2. SOCIOLOGICAL NEEDS OF TENANTS

2.1 Number and size of rooms

France

At Hagondange, as at Lens Liévin, the dwellings seemed fairly satisfactory before modernisation to the occupants as regards the number and size of rooms. The arrangement of the rooms, although open to criticism, was not the source of specific complaint.
The general situation seemed satisfactory to the occupants from the point of view of such aspects as good sound insulation with thick walls, privacy, fresh air, easy access to places outside town, etc.

Luxembourg

The number of rooms in the dwellings (generally four, one of which is a kitchen) was considered by the occupants to be sufficient. The same applied to the general lay-out, the size of rooms and their height. On the other hand, when the family numbered more than four persons it was considered that the degree of privacy was insufficient.

The defects most regretted did not lie in this quarter, however, because tenants wished to purchase the housing. They were, in order of importance, the inadequacy of the drainage system which often became blocked, the variations in electric current, the lack of a bathroom and the state of the roads which people were aware was due to be remedied in the near future.

Italy

The variety in the design of the apartments and the number of rooms was striking. It was found that special features appreciated in one type of dwelling were not available in another. Thus families composed only of an elderly couple or single persons considered their accommodation adequate and even large, whereas large families found more space was needed.
Everyone commented on the poor state of the buildings and the lack of protection against bad weather. For some this was a genuine problem.

Netherlands

No sociological survey was carried out among the tenants. The owners of the property based their considerations particularly on the experience gained in similar work in the centre of Heerlen.

Federal Republic of Germany

No sociological survey was made. At Dortmund the Works Council had to deal with any particular problems subsequently arising.

2.2 Sanitation and kitchen, central heating and general inside comfort and convenience

All the proposals made, particularly as regards sanitation and central heating, were well received as meeting needs already expressed.

At Hagondange once minor modifications had been made after completion of the sample dwellings, modernisation was unanimously approved by tenants, particularly as regards sanitations and heating.

In Italy a number of inadequacies were resented by the great majority of the tenants. These included the lack of central heating and normal sanitation, as that available was less than adequate. The result was that the project proposals were generally well received and accepted without difficulty. A number of people hesitated about the provision of a new kitchen opening directly into the living/dining room and the proposals for the bathrooms which were not to be ventilated directly from outside. These hesitations were largely due to the fact that many families had difficulties in understanding the plans and technical features of the project. It is probable that the modernisation of sample apartments, which had been intended, would have done away with this apprehension.

2.3 Improvement of immediate environment

Although tenants were later to appreciate the improvements made to the immediate environment, the need for such improvement was hardly ever mentioned beforehand.

What tenants did appreciate about the housing estate that gave it its advantages in their eyes were the distance from factories, lack of noise, sometimes a good location, say in the middle of fields and woods. However, they did not hesitate to criticise the state of roads, drains, street lighting and power supply.

In Italy tenants stated that they needed a meeting hall and that the inside courts of blocks of flats should be converted into green spaces and playgrounds.

They even discussed, with the author of the project, the possibility of creating residential centres for elderly couples and single people, but this suggestion was controversial.

The Italian project provided a positive response to the first need by providing for the construction of a community hall and improving inner courtyards. However, the proposal that accommodation should be provided for the elderly was not adopted because of the difficulties such people have in changing their way of life and becoming integrated in new surroundings.

3. TENANTS' INVOLVEMENT IN THE PROGRAMME

3.1 In all countries tenants expressed a certain degree of interest in the problem of modernisation. Initially they always welcomed the proposals made and contacts and discussions were arranged. When one of two sample dwellings had been completed they visited them and expressed their criticisms, wishes and subsequently their agreement.

In the case of the three German projects, tenants were consulted during the preparation and execution of the programme.

At Dortmund the Works Council did everything possible to inform tenants of what was happening and to solve individual problems.

At Heessen the owners and the Works Council maintained direct contact with tenants and possible solutions were submitted to them. They visited the sample dwellings from the outset. The first project was rejected and the tenants made a number of suggestions.

At Herten there was contact with families, small meetings and general meetings. The responsability for relations with the tenants developed upon those who were to discuss prices and on the Works Council which gave tenants active support. The first project was rejected, tenants put forward counterproposals which were used as the basis for modifications.

In France during the preparatory stage of the programme consultation of inhabitants was carried out very simply at Lens Liévin through the union representatives on the Works Council. The inhabitants and even the older people showed themselves very much in favour of the project but it should be emphasized that after modernisation, as before, the dwellings were to be rent-free in accordance with mining legislation. The occupants expressed the wish to be able to eat together in a kitchen large enough for the purpose rather than in a dining recess in the living room. Various modifications were made to plans after completion of the two sample dwellings. The difficulties of the operation, which for a long time stood in doubt, were finally removed but made it impossible to do as much as had been discussed with occupants.

The participation of the inhabitants of Hagondange was much more forceful and direct and took place through the housing department of the company owning the dwellings. The families were approached direct and contacts were assisted by the relationship that existed between the tenants and a department which is constantly affirming its independence of the company.

There was no general meeting of tenants but only meetings in small groups.

Contacts with families took place mainly through social workers who kept families informed and recorded their wishes. There was no survey or questionnaire but tenants were helped in their choice by building experts. Trade union representatives and families had complete freedom to examine the sample dwellings closely. In general proposals for modernisation met with a very favourable response. Initially 56 % of the families seemed interested, 17 % accepted the operation philosophically, 12 % were reluctant or hostile because they had already improved their own dwellings, 15 % were not interested because they were retired people intending to move to smaller accommodation.

As work progressed, tenants were given further possibilities of choosing, for instance, between a range of wallpapers.

Experienced household advisers took advantage of the opportunity to show families the different ways in which a home could be improved by logical changes which simplified work or enhanced living conditions.

In the Grand Duchy the owners from the outset organised direct contacts with tenants who were being given the chance to buy their dwellings. These discussions revealed numerous requirements.

Four general meetings took place with the owners' housing department. These contacts were made through a tenants' committee which had been formed spontaneously in the meantime and with trade union representatives. Solutions were discussed at length with no result. There was no sample dwelling because such work involved financial risks for the owner company which was mainly interested in selling its property.

Ten months of negotiation were fruitless and altogether between ten and twelve families agreed to the modernisation proposals which involved a complete redevelopment of the basement according to their ideas. The programme could not be put into effect for lack of support.

In Italy a working party was made responsible for sociological problems and very soon organised general meetings and meetings with smaller groups of tenants to explain the purpose of the programme as a whole and the scope of the project. Tenants were then grouped within an association which was later to play a very active role.

Each family was then visited separately in order to give those responsible some idea of their particular situation and to present plans and listen to their comments. This revealed what improvements families had made and disclosed whether they wished to move house.

General meetings were used to keep tenants regularly informed of the developments in the situation and gave them the opportunity to discuss the problems arising. These problems were the result of particular family situations and the arrangement of apartments. This made the situation very complex and difficult. There were elderly tenants for whom the work was a source of unpleasantness and of a substantial rent increase. These various meetings wakened fairly lively interest in the project and enabled tenants to say what they wanted, and to give guidance on the project. Some people were afraid they would be forced to seek new accommodation if the project were abandoned or if the number of apartments were reduced. Some families had carried out a considerable amount of work themselves and refused to allow their dwelling to be further altered.

Despite the difficulties it encountered, the working party was able to obtain the agreement of most of the tenants. However this intensive sensitisation, discussion and suggestion which found no concrete expression in modernisation work, was ultimately a negative social experience for a whole working community.

In the Netherlands the consultation of tenants was carried out by individual contacts, meetings in small groups, general meetings and written questionnaires.

The owners first asked occupants to appoint representatives for each group of dwellings who would take part in discussions with them and with the contractors. The tenants' committee asked the heads of families to give their opinion on the work planned. Of 226 letters sent, 213 were answered, of which 212 were negative.

The trade union representatives for their part actively supervised the activities of the owners and gave guidance to tenants. Religious organisations took a stand on social considerations and wrote to the families.

The problems which arose were dealt with by the owners and their staff, some of whom were seconded specially to the project.

In Belgium a tenants' committee was set up from the start at Bois du Luc to watch the interests of tenants. At the same time, a number of meetings were organised by the local authorities in order to ensure that those concerned were correctly informed as to the purpose and scope of the modernisation work.

3.2 Moving tenants

The real problem that had to be solved was that of moving the tenants as soon as this became necessary.

Thus at Dortmund the experience which had been gained in work on the sample dwelling made it possible to draw up a schedule of work and movement of tenants. In most cases the work was so extensive that the occupants had to move out during the major internal building work. Those families who remained in residence were charged a lower rent and the others had their displacement costs reimbursed. Most families returned to their former apartments and only seventeen people left for good, though with a very positive attitude.

At Herten the Works Council helped to find solutions to the problem of moving tenants out. Those responsible for the operation did everything to keep tenants where they were. Where this was impossible they were moved. Those who intended to return had no difficulty in finding accommodation with relations, friends or even in tents.

At Heessen the exemplary rapidity with which the work was carried out - made possible by the prefabrication and organisation of work - made it unnecessary for any families to move out. The inconvenience were mainly the result of inside demolition work and the lack of heating.

In France, on the Hagondange project, the initial survey showed that 67 % of families wished to move back into their dwelling after modernisation and that 18 % wished to change to another dwelling so as to avoid a double move.

Three-quarters of the families finally returned to their former accommodation while the other quarter obtained a different modern dwelling. These moves were accepted without difficulty, the only request of almost all tenants being that the work should be carried out while the weather was good. Speed of execution of work was considered the most effective means of reducing the period of unpleasantness.

At Lens Liévin plans had been made to leave the tenants in residence - a fact which pleased them very much. The provision of mobile cooking and toilet units had been considered but this was to prove impossible since the duration of the work, which was assessed at three weeks, made necessary the movement of tenants and their property to other available accommodation.

At Heerlen in the Netherlands the tenants were left in residence. There was no other option. The tenants themselves were not consulted on this particular point but it was hard to imagine that they would accept any movement, however temporary. In order to reduce the inconvenience, outside extension work was carried out before the orginal façades were destroyed so as to protect the occupants in bad weather.

In Luxembourg the project was planned so that tenants would remain in their accommodation - which was all the more acceptable to them as they were to purchase the dwellings.

If the work had gone ahead in Italy, the tenants would have been left in residence. The work had been planned in such a way that it would have been rapid and organised to a strict schedule. A mobile service unit was to be put up against the façades of buildings. A large number of families would have remained in residence in the same dwelling after modernisation. In order to increase the area of certain dwellings it would have been necessary to reduce the number of dwellings and in consequence move the families living there. In order to deal fairly in this matter, all the people involved had been questioned to find out whether any of the families wished to move.

The rehousing of these families and the moving of others within the estate to a more suitable dwelling were conditions which would have had to be met.

In Belgium consideration was given to storing the larger items of furniture in a warehouse for the period of work, which would have been a few days.

3.3 Participation of sociologists and social workers

Owners did not call upon sociologists to ensure awareness of the problems involved in modernisation and to make sure that occupants were participating in the work. It should be pointed out here that the owners of the property considered that they already had some knowledge of the people they were dealing with. They did not call in sociologists because the heads of families were working in their firm.

As work progressed, the wide range of contacts which proved to be necessary for the success of the operation resulted in some owners recognising the importance of bringing specialists in for this task. This was the case in France, at Hagondange, in the Netherlands and in Italy.

4. CONCLUSIONS

At the beginning of this chapter we stressed the importance of the sociological aspects of the Experimental Programme. A reading of the foregoing pages shows that the various problems were not always tackled with the desirable degree of preparation and the assistance of specialists.

The very different situations which presented themselves revealed the existence of important problems with common features.

In contrast to occupants of new dwellings, the tenants of dwellings requiring modernisation are mostly already in residence - or at least this was the case of those concerned in the Experimental Programme. It is possible to ascertain the extent to which dwellings meet requirements. By exercising the choices open to them the users have to play a more important role than the author of the project. They are the best judges of the dwellings in which they live and are entitled to state how they think their dwellings could be improved. It is thus advisable in an initial stage to establish a dialogue with tenants to ensure that any work carried out and which will necessarily possess common features in different cases, does in fact meet genuine requirements.

Obviously such a task cannot be effectively carried out without the assistance of specialists.

The Experimental Programme will have had the good result of showing that there is a fairly widespread interest in modernisation among tenants. Generally speaking they did not remain indifferent but by taking part in meeting and discussions and with the support of their associations and unions, they tried to play an active role in the operations.

It is not impossible that a lack of information and sometimes its complete absence may have sometimes discouraged what might have been a fuller participation. The quality of the information is particularly important in a modernisation programme. Only good information backed up by written documents, photographs and films can assist tenants to express themselves fully and responsibly.

A programme of modernisation should not only allocate a large proportion of the responsibility to users but also offer genuine choices. It should not merely be designed to repair buildings but to amend architectural designs having regard to sociological change. The study of these changes may produce a more thorough revision of housing structures, for example, by the provision of new joint services (refectory, small cultural centre, leisure accommodation for adults, playrooms for children, etc.) or shared accommodation for single people, particularly for the elderly. This latter need was made very clear by the work of the Experimental Programme, which involved a great many pensioners.

At the sociological level the way in which the work is carried out is not unimportant. It has to be decided whether to keep tenants in residence while work is being carried out or to move them temporarily to other accommodation. The decisions taken disrupt the daily life of families and relations with neighbours and may produce a variety of psychological and sociological reactions.

A study in greater depth of the sociological aspects of the Experimental Programme should deal with the stage following the completion of work, in order to collect other information and opinions which can only be expressed at this stage. These contacts with tenants are necessary in also to obtain material for a full assessment of the experiment and to see how the modernized accomodation matched up to the wishes of its occupants.

CHAPTER VI

ARCHITECTURAL ASPECTS

1. DEMAND CONSTANTLY EVOLVING WITH TIME

The accommodation involved in the Experimental Programme, which was of varying age, required modernisation for a number of reasons.

The most recently built was some twenty years old and situated in the industrial regions of Germany which had been devasted by the second world war. The oldest property was built in Belgium at the beginning of the industrial revolution, a little more than a century ago.

Some of the accommodation houses too many people because of a general level of poverty and is inadequate to modern needs in terms of size and has to be modified for normal use. Other dwellings, and these constitute the majority, are not adequate to modern requirements and are lacking in elements of convenience and comfort which are now required such as efficient heating, a bathroom, a garage, etc.

Demand is thus constantly evolving and it is safe to predict that new housing being put up will itself be requiring modernisation before the end of the century.

However requirements change in the course of time and whatever the degree of inadequacy, the architect's task in modernizing a dwelling remains the same.

What is needed is to install new facilities, or improve the existing ones, improve space distribution and dimensional relationships in order to make living conditions more pleasant and harmonious. The environment is a fundamental aspect of life since we are all sensitive to pleasant surroundings. The aesthetic appearance of buildings must be improved.

We shall thus examine the projects in succession from the point of view of

- equipment
- internal distribution of space and living conditions
- the aesthetic point of view (dimensional relationships)
- immediate surroundings.

2. RECENT DEVELOPMENTS IN QUALITY OF FACILITIES

2.1 Heating

There has been a considerable change in heating systems. Since 1945 central heating has become a normal feature of moderate-rent housing. The most usual system is still that of a boiler which supplies heat to radiators suitably placed within a dwelling, building or group of building. This greatly enhances the comfort of a dwelling and also helps to improve the condition of buildings.

All the projects covered by the Experimental Programme provided central heating, except that at Lens Liévin where the owners left this installation to the initiative of the occupants.

2.2 Lighting

Occupants generally express the wish for more light and contact with the outside world, particularly in the case of living rooms. This was made particularly clear at Heerlen where occupants were strongly opposed to any alteration of the aspect of their living rooms. These rooms were extended by means of a veranda which opened out on to a terrace. The same people refused to permit any alteration to the contact of the kitchen with the outside environment.

At Lens Liévin the kitchen window was enlarged while at Hagondange new windows were put in.

There have also been developments in artificial lighting. In almost all housing, the light hanging in the middle of the ceiling is giving way to a more varied lighting system, standard and table lamps, bedside lamps, focussed lights and tubes above working surfaces and washbasins, etc.

To improve the situation in a satisfactory manner one needs to provide more electric points and check the original arrangements. There is no doubt that new methods of lighting are better adapted to actual needs and give a house more comfort and intimacy.

2.3 Ventilation

There are many old dwellings which do not have suitable ventilation systems. Existing systems depend upon the direction of the wind, the weather and the occupants themselves who often block up the ventilation apertures intentionally, particularly in kitchens with gas stoves. The generalised use of a mechanical system of ventilation would represent a great step forward.

All the authors of modernisation projects under the aegis of the Experimental Programme have been concerned with this problem. In some cases flues rendered superfluous by the installation of central heating systems were utilised for ventilation.

2.4 Sanitation

There is hardly need to mention the progress which has been made in this field. It is no longer regarded as sufficient in even the humblest dwelling to have only a kitchen sink, a bath in the cellar and slop-pails in the bedrooms. At least one internal WC is needed, a bathroom near the bedrooms and in larger dwellings a second WC for children. This is the present minimum and demand is moving towards a very considerable improvement in the quality and quantity of sanitary fittings. All the projects of the Experimental Programme took this trend into account.

In all the German projects, improvements are logical and rational both from the point of view of the location of fittings and from the point of view of the techniques employed. One might, however, express regret that in some cases the sanitary installations are some distance from the bedrooms.

In France after some discussion it was decided that the best solution was a separate WC on the ground floor and a bathroom on the same floor as the bedrooms - a logical solution for the kind of dwellings involved.

In the Netherlands the old bath was replaced by a shower or bath with seat. The WC was separated off. After a survey involving consultation with all the users, this solution was adopted. This is a particular case which should be stressed.

In Italy occupants preferred the hip bath which is much in demand in that country. They unanimously refused bathrooms with artificial ventilation and lighting. This is regrettable as the quality of the plan suffered greatly from this refusal. This attitude may be explained by the recent peasant origins of many of the Italian workers living in this housing.

In Luxembourg occupants did not agree to the rooms on the first floor being reduced in size in order to provide the room strictly necessary for a bathroom. Used as they were to washing in the kitchen on the ground floor, they readily requested that a bathroom be installed in the basement. It is a fact proved by experience that the bathroom is best situated near the bedrooms but all efforts at persuasion proved vail. The project was abandoned in view of the small degree of success which modernisation proposals had and the occupants preferred to keep their unsatisfactory older installations.

2.5 Kitchen

This room is generally the centre of family life in moderate-rent housing. Whether this comes about for reasons of economy, rural tradition or simply out of a habit of keeping the living room clean for formal purposes is a question which it is not easy to answer and there may be more than one reply.

At Lens Liévin in France, as in Luxembourg, the occupants of the housing asked that the plans for modernisation be altered in order to provide a kitchen with a large enough area for the family to be able to eat meals together.

The new kitchens are much more fully equipped than they used to be and there is a choice between electricity and gas for cooking, a fridge, a dishwasher, shelving and storage space well adapted to its purpose. Kitchens in which equipment has gradually been modernised over the years by the purchase of more or less suitable items are generally in need of further improvement to give each piece of equipment its most efficient place.

Certain features provided under the Experimental Programme are fairly spectacular in kitchen modernisation. In Dortmund the kitchen floors were even covered in synthetic moquette.

2.6 Storage space

In many countries movable storage units such as cupboards, chests of drawers, etc. are gradually being replaced by built-in cupboards (wall-cupboards etc.) for specialised purposes such as wardrobes, hanging cupboards, family storecupboards, etc.

An analysis of the modernisation projects of the Experimental Programme as proposed to the occupants of dwellings shows that developments in this field have varied considerably from country to country.

Thus in France, where the requirement is generally that 4 % of the area of a dwelling should be allocated to storage, care was taken to install the fixed storage units desired at suitable places. The same did not hold good in the other Community countries which are still accustomed to using movable storage units.

As it is becoming more and more usual in our society to move from one place of residence to another, it would be advisable to make such moves easier by avoiding the need to transport storage units which are not always suitable for the new accommodation.

It was not always easy to locate storage units where it was most desirable in the dwellings modernized in the Experimental Programme.

The location of storage cupboards within the dwellings varies considerably. In Dortmund they were systematically located in the bedrooms and in Hagondange in the hallways. It was not a matter of choosing between extreme solutions; the true solution derives from a serious study of each particular case in terms of local usage and the dwelling involved. But it is certainly important that these fixed storage areas should be available.

3. INTERNAL ARRANGEMENT AND LIVING CONDITIONS

There has been a great change in the living conditions of occupants of moderate-rent dwelling over the past few years. Among the causes of this change are, doubtless, the rise in the standard of living, the greater use of cars, television, domestic appliances and also the change that has taken place in relationships between parents and children which have been studied in greater depth. The result is that parents and children are more independent of each other and this independence increases with age.

The effect which all this has on housing is obvious. The ideal would be for children to have their own area with a room for work and play and their own bedrooms, even if these are small. We are still a long way from this ideal in both new and modernized housing. The provision of central heating does much to bring the ideal nearer.

The whole living area comprising the room in which meals are prepared, the eating area and the living room tends to be differently organised from some years ago. The kitchen is still often the main room for family contacts and its position in the dwelling is of basic importance. It may be:

a) in the kitchen, in which case the latter must be of a sufficient size and not affect the work of the housewife.
b) in a separate room set aside for this purpose and connected with the kitchen to make serving easier. It may open either into the kitchen or into the living room or into both.
c) in the living room, when there is no other possibility.

The solutions put forward for the Dortmund project are very good in this respect and should be more widely adopted. However in most cases the living room has become simply a rectangular room of limited area. It is then difficult to improve and its use indefinite. The ideal living room is one composed of various areas which allow all the members of the family to carry on with their own activities near the others - reading, sewing, playing - or to meet together to discuss and exchange ideas, watch television, listen to music, read something together, etc. None of the projects provided any solution to this requirement. There is still a great deal of work to be done in this field before the ideal is achieved.

4. AESTHETIC ASPECT: DIMENSIONAL RELATIONSHIPS AND IMMEDIATE SURROUNDINGS

All the authors of the modernisation projects under the Experimental Programme sought to improve the aesthetic aspect of dwellings and buildings. Although the results achieved vary, the progress made is obvious.

Mention should first be made of Heerlen where the results are all the more remarkable since the solution adopted was that of annexes which it was difficult to harmonise with existing buildings.

Within the dwellings the relationships between the areas of the various rooms have been distinctly improved over the original situation. The living room is larger with generous windows and looks out on to a terrace. When the project was still being discussed, the users asked for a passage and an exit to the garden. Fortunately this arrangement, which would have meant a substantial reduction in the width of the living room, was ultimately rejected after discussions with tenants.

In Dortmund the improvement in the distribution and proportion of rooms is again evident. This was achieved by converting two dwellings of approximately equal area into one big and one small dwelling.

At Lens Liévin, the living room, which was too small, was enlarged by opening up the room next door and is now more suitable for use by the family. The extension of the living room was all the more necessary since the kitchen was too small to be used for family meals.

Everyone is to some extent aware of improvements in dimensional and volumetric relationships. It is regrettable that sensitivity here is often sacrified by a taste for the bright and rich whether inside or outside the dwelling.

Since 1945, when the use of cars became popular and spread, it has been necessary to find somewhere to put the car which had not originally been provided for. In many cases, a structure was been provided by the occupier with whatever materials were available and the result is hardly aesthetically pleasing.

Occupants have also erected other annexed structures. This was particularly true in Hagondange, Lens Liévin, Heerlen, Bois du Luc and La Sauvage. These were put to uses which the modernisation plans had taken account of.

Starting from the wishes expressed by the tenants themselves, it proved possible at Heerlen to produce a functional and aesthetic arrangement of all the annexed areas.

At Lens Liévin garages were not provided but sheds were put up for tools, etc.

In a large town such as Dortmund it was impossible to build garages within acceptable price limites. No garage was built in this project where space was in any case restricted.

In all other operations outside parking spaces were provided. At Hagondange a site is at present being prepared for the construction of a number of garages.

Generally speaking, the work resulted in the elimination of a good number of weak points in the immediate environment by reorganising open spaces, doing away with ugly and permanent enclosures and replacing them with hedges and by arranging common lawns and playgrounds for children around the area. Simply painting the outside wood or metalwork or a complete re-coating of the outside walls of buildings in a district helped to change their appearance (Dortmund, Hagondange).

5. CONCLUSIONS

A great deal of effort was put into the Experimental Programme.

From the architectural and functional point of view the results achieved are very variable. Should the results have been better ? Were better results possible ? It is difficult to answer that question. Experience has shown that before undertaking any modernisation it is vital to carry out a very detailed analysis of the situation from every point of view.

One cannot but admit, for example, the excellent results achieved in the modernizing of the houses at Heerlen. This is largely due to the fact that the situation was carefully analysed before plans were drawn up.

The occupiers sometimes have the opportunity of altering their dwellings to suit their own requirements but they generally do so with the limited means at their disposal. The result is almost always inadequate and unaesthetic.

However, these alterations represent the answer to needs which the author of the project must help them to express correctly and to carry out having regard to all the limitations of a financial, technical and social nature that apply. It is certainly possible to arrive at a result which is both practical and aesthetically satisfactory.

Is it fair to expect modernized dwellings to be as useful as new ones ? The answer is in the negative but results obtained in this Experimental Programme show that on many points they tend to run the new dwelling very close. This is an encouragement to us to pursue so useful a task.

CHAPTER VII

SOCIAL AND ECONOMIC CONSIDERATIONS ON MODERNISATION (*)

After 1945 the emphasis in Europe was on the building of new housing and we were slow not only to modernize existing old dwellings but in devising criteria which govern the decision to modernize or not to modernize. Until fairly recently, economists more or less ignored the specific problems of housing. In view of the scope of the problem of modernisation of housing and the cost involved whether in terms of capital invested or labour required, the criteria which govern it should be the subject of deep reflection. It is impossible to deal with this subject exhaustively in a mere few lines but what can be done is to spotlight the most important aspects of the problem.

1. VIABILITY

Generally speaking, one should only make an investment if the net return is at least equal to the original investment.

By net return should be understood the actual value of all annual returns less maintenance charges, administrative charges, etc.

When there is a choice between various solutions, the investment chosen is that which, all other things being equal, gives the highest yield.

Once an investment has been made, one always has to aim for the highest possible income and if, contrary to expectations, the investment does not look like being successful one does not normally withdraw unless the difference between the annual income and costs (excluding financial costs) which was a positive sum, becomes negative. As long

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(*) Although limited to some considerations on the social and economic aspects, this chapter presents a complementary character which ought to be emphasized.

as this difference remains positive one is recovering part of the investment. In other words, the loss is being reduced (*).

In the general case of property and particularly in housing, it would be ill-advised to go out of business as soon as income becomes less than costs (excluding financial costs) because a not inconsiderable part of the investment - the site - may be made profitable again.

In discussing property, it is instructive to make a distinction between parts of an investment, that in the land and that required for the building work and various installations.

From the strictly micro-economic point of view, demolition is a logical choice where the value of a site less the cost of clearing the building and demolition, is greater than the net income which can still be obtained from the building.

If the business is to give a reasonable return, the total net income received must be at least equal to the value of the site after deduction of the costs of clearing and demolition.

Modernisation, therefore, may have the effect of postponing demolition. This is the case when the present value of net income expected after modernisation exceeds the market value of the site plus the cost of modernisation.

However, this condition is not sufficient from the micro-economic point of view. A second condition would appear necessary. This is that the return on the modernisation, bearing in mind the market value of the land at that time, is greater than or at least equal to the return on a new building operation, the expenditure on which would include both the market value of the site and the cost of demolition of the old building.

(*) In this connection the American economist TAUSSIG designated as "quasirent" the income from a given investment. As the income from farm land, quasirent is dependent only on the market price at a given moment and not on the price which the owner paid for either an object of investment or for the land.

These are the micro-economic criteria for decision-making by private investors.

$$(1) \qquad \frac{V^{11}{}_{r-c} - (T + C_r + M)}{T + C_r + M} \qquad \frac{V^{1}{}_{r-c} - (T + C_r)}{T + C_r}$$

$$(2) \qquad \frac{V^{11}{}_{r-c} - (T + C_r + M)}{T + C_r + M} \qquad \frac{V^{111}{}_{r-c} - (T + C_r + D + N)}{T + C_r + D + N}$$

$V^{1}{}_{r-c}$ = the present value of net income still receivable

$V^{11}{}_{r-c}$ = the present value of net income after modernisation

$V^{111}{}_{r-c}$ = the present value of net income from a new dwelling

T = the market value of the land

M = modernisation costs

D = clearance and demolition costs

N = cost of building and equipping a new dwelling

2. INFLUENCE OF VARIOUS FACTORS

As in most decision-making models relating to investment, the "present value of income" is based on estimates of income and expenditure over a certain number of years and the conclusions reached are worth as much as the estimates.

Changes in the price of land may exert a market influence on the decision taken. Even when the increase in the market value of the site is capable of directly influencing business results by producing an appropriate increase in rent, the choice between the various possible decisions (to continue business with or without modernisation or rebuild after demolition) is not greatly changed. Moreover, in practice the usual thing is that an increase in the value of land only occurs if a building is demolished and a new one built. The land acquired additional value after the event. The increase in this value has a real influence on the decision of a private investor. Apart from general inflation, an increase in value may well result from a growth in urban or suburban population and from a general increase in revenue - it can thus have the effect of hastening either demolition and reconstruction or modernisation.

One must also ask how and to what extent inflation is an incentive to decision-making. In itself inflation does not affect the conditions set out above but it complicates calculations considerably. In order correctly to determine the effect of inflation it is necessary to make one's calculations on a "replacement value" basis in respect of the portion of construction and servicing costs which have not yet been recovered.

Obviously in taking the market value of the site one should disregard the purchase price and take the market value at that time.

In the case of continued inflation at a high rate, finance by way of loan would be expensive because of the high rates of interest charges. However, if there is a gradual increase in income, the real cost of repaying the loan declines with the years.

Grants given for modernisation and new building may also play an important role in influencing the decision taken. If new building is the subject of substantial aid in one form or another whereas modernisation is not, there will be a greater tendency to decide, all other things being equal, in favour of demolition and reconstruction.

The measures decided upon by the public authorities in the matter of rent-fixing, both in respect of old and new dwellings, also play an important part in decision-making.

The fact that lessors are not free to terminate a lease also affects a decision relating to modernisation. From the purely economic point of view one should remember the situation of the market after 1945. In a period of great housing shortage such as was the situation in the Netherlands until a few years ago, with an inadequate building industry, older dwellings continued to be rented and are still rented beyond the time when the investment has been completely paid off. The small landlord cannot afford to finance a rebuilding project and may in fact prefer to continue letting even if modernisation or rebuilding would seem to him more profitable but requiring a greater investment. It is very possible, too, that owner-occupiers take the same attitude.

Then again, the influx of foreign workers in certain areas, regardless of the moral and social aspects of the problem of housing, makes it possible for old dwellings to be let profitably until they reach their extreme limit of use.

None of these factors affect the decision-making model which we gave at the beginning but some of the factors might certainly influence the figures used and consequently the decision itself. It should not be forgotten that among the factors mentioned in the study, such as the grave shortage of housing, insufficient building capacity, controlled rents, etc. some which have been influential in the past will probably be much less important in the future.

3. SOCIAL AND ECONOMIC ASPECTS

Micro-economic considerations, however useful they may be, rarely result in decisions which are reasonable from the social point of view.

This remark also applies in the field of housing. If we wish to take into consideration the social and economic aspects of housing we must direct out attention to two points:

1) Scale effect - The situation is different depending upon whether the choice between continued renting in its old state, modernisation and rebuilding is to be made for a single dwelling or for a large number of dwellings and owners.

2) Overall social advantages and costs - These will differ according to the type of owner.

The scale effect per se does not affect the decision-making criteria which have been given but it may influence certain factors and thus the decision. As a result, the situation will differ according to whether the modernisation being considered relates to a single building or a complete district, or a street. When there is no rent control, the income from a building which alone of the buildings in a street has been modernised will be less than if the modernisation has been extended to the whole district. This is because the income from a dwelling does not depend solely upon its size and conveniences but also, and sometimes even more, from its surroundings. One is also entitled to expect the cost of modernising a dwelling will be less if carried out as part of a joint operation.

It may thus be said that the same decision-making criteria apply but that the values of the variable factors which affect the decision will depend upon the organisation of the modernisation or rebuilding work planned.

On an even larger scale there are other factors which may exert their influence but in a different sense.

Thus in a given region of a certain degree of saturation of the housing market is accompanied by a fall in the demand for old dwellings at reasonable rents and if, as a result, a large number of landlords start modernising, it is possible that the cost of modernisation work will rise, that the supply will become plentiful and the number of dilapidated dwellings decrease - thus possibly bringing about a new equilibrium. Similarly by increasing the supply demolition work carried out on a large scale may have a moderating effect on the price of land for building and to a certain extent play a corrective role.

Modernisation or reconstruction pursued on the large scale may have the effect of reducing the availability of old dwellings at reasonable rents. It then becomes impossible to assert a priori that the strict application of the decision-making criteria given will always produce an acceptable situation for the low-income groups who tend to look for fairly cheap accommodation. The class of the population which earns low incomes is by its nature less mobile and those concerned will thus only be able to find accommodation which is above their means unless they are themselves too far from accommodation within their possibilities. We shall return to this point when looking at the social costs and advantages.

When a decision is made to modernize on a large scale rather than demolish and rebuild, the decision taken will lead during a certain time to the minimum use of any investment funds available. Modernisation generally requires less money than rebuilding. Although it is often true that a modernized dwelling has a shorter life than a new one, this is because all that has been done is to postpone its demolition. The modernized dwelling will be replaced at the end of fifteen to twenty years and it will then be necessary to use the investment funds required to replace it.

The modernisation projects studied within the context of the ECSC Experimental Programme show that the investment required for modernisation which is capable of extending the life of a dwelling for twenty or thirty years and in certain cases even longer, amounts to 20 to 40 % of the investment required for a new building.

It is possible that in the long term a rational, continued policy of modernisation might have the effect of reducing the overall amount of capital necessary as compared with what a more rapid renewal of housing would require. It is also possible that a slowing down in modernisation might speed up the process of deterioration and loss of capital. A detailed analysis carried out region by region of the increase in building costs, the prices of building and rents would seem to be essential if we are to come to a better understanding of these phenomena.

4. SOCIAL COSTS AND BENEFITS

From the social and economic point of view it is very important to ask oneself whether one should not take some account of the costs or advantages which have not been mentioned from a strictly micro-economic point of view.

More generally we should ask ourselves whether the analysis of costs and profits carried out from a micro-economic point of view will lead to the same conclusions as one based on social and economic considerations. We may say that in the ideal case of adequate legislation with norms to be followed laid down by the administration, anyone endeavouring to reach a decision on the subject of investment will always do so taking into account all the advantages and all the disadvantages, including social advantages and costs. This is, incidentally, what happens to a certain extent, even if it is not admitted that this is the case. It would thus seem to be necessary - and particularly in the matter of housing - for the government to study both the effects of socio-economic methods and those of micro-economics so as to adjust to trends.

It may happen that a certain number of factors which the private investor does not always take into account in his calculations may be included by means of legislation. Such might be the case of indemnities paid to tenants for the inconvenience caused to them by work, indemnities for compulsory moves and the contribution of owners to the improvement of the environment by the local authority (roads, parking facilities, parks and open spaces, playgrounds, etc.).

The situation is a very different one when the modernisation or reconstruction work forces the former occupants who until then had lived in private-sector accommodation to move into subsidised accommodation.

In many cases, too, it is necessary to take into account the cost of transport particularly the cost of public transport.

These are important tasks and it is always possible that the local authority will have to bear such additional charges that the operation is considered disadvantageous to it.

As we shall show later in detail, one may in principle plan to cover such social charges by a tax levied on landlords wishing to demolish accommodation for motives deriving from micro-economic considerations.

There is another element which it is difficult to allow for in calculations: the loss of capital which may result in the disappearance of older property. We might quote as an example existing businesses which lose their local outlets and can no longer be run profitably. On the other hand, a geographical shift in the population and hence in purchasing power may become a source of additional income in new districts, although it will generally be impossible to offset a loss at one place by additional future profits elsewhere.

Then again we must not forget to mention the problem of people forced by modernisation or new building work to pay more for their accommodation. Obviously it can be said that they will benefit from improved accommodation but what is to be done if the people concerned do not like the accommodation or do not consider the new dwelling an improvement ? (*)

The aims of the government's housing policy may indicate the extent to which it is intended to take these various aspects of modernisation into account.

As we have seen, one may to a large extent include in calculations on which rational decision-making is based, the value of the social costs and advantage of which micro-economics takes no account. In a certain number of cases this is done by incorporating these elements in the values already referred to. Removal indemnities, for example, where required, may be considered as forming part of the cost of modernisation proper or costs of demolition and clearance. Contributions to costs of improving roads, parking, etc. may also be included in modernisation costs. Any increase in rental income which is the result of this work may be included in the estimate of future income.

(*) "pay more for their accommodation" may mean "pay extra transport charges".

In principle one may include in the income an element which represents taxes levied to offset social costs. It is also necessary to take into account certain profits of a social nature relative to the increase in revenue from land taxes.

Revenue from taxes levied to offset social costs, in the event of demolition followed by rebuilding or in the event of modernisation, can be ascertained.

These correcting factors will make it possible to calculate the profitability from a socio-economic point of view, whether in the case of a single project or of projects relating to a large number of old dwellings. In the latter case, the various values used may be adjusted by the scale effect.

It is a good idea to make these profitability calculations without prejudging the matter of a decision imputing the social costs to owners of buildings involved.

5. THEORY AND PRACTICE

Before entering into a detailed study of the real or possible effects of the action of the authorities on the future of existing housing, we must ask ourselves to what extent the economic and socio-economic criteria discussed are applied in practice.

At first glance it would seem that they are not applied in the moderate-rent housing sector where generally all that is done is to calculate the rent on the basis of maintenance and administration costs and the servicing of capital, including interest.

It is rare to see any attempt to devise the best procedure in the case of modernisation and the possibility of increasing the value of a site by demolition is rarely considered. In the sphere of moderate-rent housing, the improving of comfort and the possibility of covering the cost of this improvement less any subsidies received by a heigher rent is sufficient to justify modernisation. In this sector calculations are generally based on the principle that modernisation should be carried out if the present value of the expected future income is not less than the sum of the residual value of the initial investment and the cost of modernisation.

The possibility of the site's increasing in value does not often come into the considerations. Factors of a social nature and the desire to produce dwellings which are accessible to the lower income groups play the main role.

The situation is completely different in the private sector. For the commercial exploitation of property the possible profits, which are decisive here, must be calculated taking into consideration the increased value of the site, the residual value of the building and the various possible investments.

We shall leave aside here certain phenomena which tend to discourage long-term action (*).

Whereas in the moderate-rent housing sector the main aim is to cover costs by combining the subsidies received with the income or with a reduction in the investment, in the commercial sector the main aim is to achieve optimum profits. In the social sector modernisation is generally regarded as justified when the total amount of income just covers the costs of modernisation, investments not yet recovered and the market value of the land. In the commercial sector, the difference between the two amounts should be as great as possible. The yield is compared with the yields of other possible operations, such as new building or continued exploitation in its existing state. Unless there is some specific ruling on this subject, such as the requirements to allow for the indemnities to be paid to people who have to be rehoused before demolition, the social costs do not affect the calculations.

It will be appreciated that decisions in the two sectors are very different. From the socio-economic point of view there seems to be no attempt to make the best use of available funds.

To gain a more accurate idea of the situation some attempt should be made to discover whether it might not be better to take account of all social costs in both the social and commercial sector rather than treating the subject as superficially as is done at present.

A great deal of research is needed here.

(*) Such as the lack of capital or initiative of small landlords.

6. ACTION BY THE AUTHORITIES

We have several times mentioned the possibility which the authorities have of influencing decisions relating to housing. This may be done in different ways. In fact, the authorities almost always influence decisions but generally in a minor way and we might wonder whether the effects are noticed in good time.

By means of prohibitions the authorities can avoid certain possibilities quite apart from any concern with socio-economic profitability.

The prohibition of demolition or alteration of buildings because of their historical or architectural value is one example which is encountered in the old quarters of some cities in the Netherlands.

The application of minimum standards in the matter of hygiene and building, such as exists everywhere, may prevent people adopting solutions justified only by economic considerations. Thus certain dwellings are not allowed to be rented, even if it would be economically viable in the eyes of the owners.

Similarly, the decisions of owners may be made dependent upon certain requirements relating to architecture and hygiene.

The public authorities may, as we have already emphasized, exercise considerable influence on the value of land. This value will largely depend upon the purpose allocated to it where this is controlled by regulation. The allocation of land for the construction of housing has quite a different influence on the price of land than does the authorisation to build offices.

Space does not permit a full discussion of this subject. We shall therefore simply point out that there are numerous practical and theoretical methods which do not provide an exact determination of the price of land.

The influence of subsidies, to which we have already referred, would seem to be more easily ascertained. Depending upon their size and regardless of whether they are combined or not, these aids to building and modernisation may influence decisions one way or another.

It is important to realise the real effect of aid granted in respect of older housing. The various regulations on this subject tend to have come into existence for various reasons and lead to results which are different from those hoped for.

Among the mains used by the authorities to encourage or discourage modernisation or rebuilding, mention should be made of certain forms of rent control, the fixing of rents by the authorities and measures designed to protect the tenant and measures designed to prevent the termination of tenancies. In general it is advisable only to have recourse to these measures if one wishes to prevent modernisation or building.

If one wishes to encourage modernisation as part of a rent control policy, it will be necessary to authorize relatively high rent increases after modernisation. If, on the only hand, one wishes to discourage modernisation, such authorisations must be very few. We shall not go here into the desirability of such methods of compulsion which are all the less advisable when more account is taken of social costs.

The authorities may also experience some difficulty in producing an effect of encouragement or disincentive by fiscal means.

If the measures are designed to encourage modernisation they should take into account the fact that the existing old housing is the property of a multitude of individual people. These landlords, and particularly the older people among them, do not have either the initiative to modernize their dwellings or the necessary funds.

As we have already mentioned, modernisation holds little attraction for a small landlord who is not sure that others will follow his example. By taking the initiative and grouping such efforts, the local authorities will certainly be able to overcome this difficulty. Consideration might be given to the grant of technical assistance, finance in the form of loans and to the improvement of the environment but should not exclude the possibility of using other measures such as a condemnation of property as unhealthy and expropriation. So far there is little experience of such methods.

7. CONCLUSIONS

In their action concerning existing housing, the authorities often have to try to solve the dilemna of whether to try to improve the housing of the whole population or prevent too active a policy of modernisation and reconstruction from resulting in a shortage of suitable accommodation for the lower income groups. Obviously, one possible solution is rent subsidies as long as these can be paid on a sufficient scale. Because too little attention has been paid to the standard of old housing since 1945 the most desirable policy on modernisation is still not very clear and there are a good few areas of doubt.

These observations may, perhaps, have succeeded in showing that modernisation is not something which should be considered for housing which is more than fifty years old. A critical attitude should be adopted and attention paid to the quality and purpose of existing housing. In certain well-defined cases modernisation every fifteen or twenty years might well provide an efficient solution to the housing problem.

Attention should be given to the taking into consideration of social costs and advantages in the process of decision-making. The methods described here must be further refined.

CHAPTER VIII

GENERAL CONCLUSIONS IN THE FORM OF RECOMMENDATIONS

Despite the failure to complete four of the nine projects undertaken, what has been learned from the ECSC Experimental Programme will be of use to all those interested in problems of how to improve or modernize older dwellings. The difficulties which prevented certain of the projects from being carried out are also instructive.

Although it happens all too often that an experiment is completed and never followed up, this is certainly not the case of the ECSC Third Experimental Programme. The owners of thousands of housing units who carried out work on the various projects are now convinced of the worth of the methods tried and have resolved to use them in future modernisation work.

Thus the Immobilière Thionvilloise in France has followed the operation at Hagondange with the modernisation of 236 dwellings in the same town, putting a little more stress on the improvement of the environment. This operation is designed to replace that of Charbonnages de France which was included in the Experimental Programme.

In conclusion we shall summarize in the form of recommendations the procedure to be followed in modernizing a group of dwellings.

For psychological and economic reasons it is desirable that operations should be of wide scope, i.e. estates, or a district, including environment.

An attempt must be made to synchronize maintenance work, internal modernisation, resurfacing of outside walls, improvement of environment and amenities or demolition work carried out by the local authorities.

Interior improvements carried out at random and in succession over the years must be abandoned and similar dwellings should be grouped together which are sound and in a suitable state of repair in order to improve them in a single operation from all points of view so as to meet all present requirements and also those which can be foreseen.

The first thing that must be done is to make a full analysis of the situation.

Users should be consulted so that their legitimate wishes may be met. Specialists are useful since the occupants' interest in modernisation is not always well expressed and they need help in expressing their requirements. Once they have been provided with sufficient information they will become more active, particularly if they are offered choices.

Sample dwellings have the advantage of making it possible to obtain a definite agreement from the occupants of dwellings scheduled for modernisation but the study of each site will enable the owners and **contractors** the better to assess the difficulties and costs.

The elements of comfort and convenience introduced should not allow us to forget that it is important to adapt the housing to present patterns of living, modifying the distribution and volume of rooms, doors and windows, sound and heat insulation, etc. where necessary.

Under the heading of environment, consideration should be given to the provision of new common services which would meet community requirements.

Prefabrication demonstrated its efficiency as regards speed and economy. There are many jobs which can be carried out using elements which are light and simple in design and prefabricated and pre-assembled away from the dwelling. These include heating units, water pipes, gas pipes, electric wiring, drains, partitions, floor coverings, not to mention commercially marketed units such as kitchen equipment, windows and door units.

The use of complex prefabricated installations such as the bathroom at Heessen will save time and labour which must be consolidated by site discipline which prevents delays occurring in other tasks. Their price should be competitive if we consider all the advantages they offer and the future will confirm this if competitors move into the field.

The owner of the property should organise the work rationally and in great detail in close collaboration with the firms involved.

Groups of manufacturers should be called in and associated with the search for technical solutions.

Thought must be given on the one hand to the moving out of families as necessary and to the need to make full use of the teams of workmen set up. Every effort should be made to ensure that work proceeds without interruption.

The decision to leave the occupant in residence will only be taken if the inconvenience caused is reduced to the point where it is bearable and for a maximum period of six weeks.

If families have to be moved out, even their temporary accommodation should be planned with them and everything should be done to ensure that it is acceptable.

If a family moves away permanently, the new dwelling should be prepared for another family - whether a large family at present in accommodation too small for it or a household, no longer including children. Low-income families should be helped by removal indemnities and the like.

Only the owner of the property is authorized to intervene with families and firms in order to ensure that the schedule is adhered to. His responsibility shall extend to all operations and his organisation must be sufficiently flexible to be able to avoid any letdowns on either side by holding some dwellings in reserve and by having personnel ready to step in. The results are much appreciated by the occupants.

The operations of the Experimental Programme have shown that modernized housing can be obtained in a pleasant environment at a cost normally amounting to less than 40 % of the cost of building a new dwelling of comparable type with the same area and same facilities. The modernisation of small houses appears relatively more costly than that of houses of a greater habitable area. Since it is more difficult to recover expenses by increasing rent, some owners have decided to take this fact into account in their selection of houses to be modernized.

In view of the financial assistance from the ECSC and the normal government grants provided, the rent increases were found to be bearable; they never reached the authorized ceilings.

The economics of modernisation should, however, be made the subject of an in-depth investigation. The authorities should give some attention to the taking into consideration of the social costs and advantages of modernisation.

The ECSC Experimental Programme has shown that it is not necessary to wait for fifty years and more to modernize houses ill-adapted to present-day living conditions.

Government aid, which is generally in the form of subsidies or loans at a low rate of interest might be further improved by the elimination of any obstacles that still exist and, in the case of low-income families by the generalised use of rent allowances or subsidies.

ANNEX A

ECSC EXPERIMENTAL PROGRAMME

1970 - 1972

'MODERNIZATION OF DWELLINGS'

General Directives

COMMISSION OF THE EUROPEAN COMMUNITIES
Directorate of Social Affairs

Brussels, 30 June 1970

CONTENTS

A.- INTRODUCTION

Within the framework of the 7th programme of financial help for the building of dwellings for the workers of the ECSC industries, the carrying out of an experimental programme is planned. This programme will be concerned with the modernization of dwellings, in particular with the search for and application of technical methods of an industrial nature which also tend to mechanize, to rationalize and to simplify the execution of the work and to save labour.

Reasons for the experimental programme on the modernization of dwellings

Since 1945, housing policy in the countries of the European Communities has aimed at making available to all families dwellings which come up to normal standards of habitability for a reasonable price.

After twenty-five years, this objective has not been attained, either from the quantitative or from the qualitative point of view. The financial, technical and material resources available do not allow enough new dwellings to be built within an acceptable period to:

- catch up with the accumulated backlog,
- meet the annual increase in quantitative requirements,
- replace all slum dwellings,
- meet, following the requirements resulting from the general improvement in living conditions, the demand for dwellings qualitatively better than many dwellings built before 1945.

It is necessary to take appropriate measures to prevent this qualitative difference between existing dwellings, especially so-called 'social' housing, and new dwellings from increasing still further. If this is not done, the old dwellings which at present time still house a great part of the population will rapidly become slums with, as a result, a disintegration of the region or of the district, thus causing an enormous loss of capital to the national economy.

Old dwellings are numerous. It can be said that, roughly speaking (1) of all the dwellings existing in 1968, there were in Germany 50 %, in Belgium

(1) On the basis of data from the statistical returns of 1960-62 - United Nations: The Housing Situation and the long-term Perspectives of Housing Needs in European Countries (February 1968) - These percentages have been calculated after extrapolation of the dwellings built according to the statistical returns up to 1968, without taking account of dwellings demolished from 1960-68.

71 %, in France 72 %, in Italy 54 %, in Luxembourg 60 % and in the Netherlands 54 % which were built before 1945.

The corresponding figures for dwellings built before 1914 are: for Germany 33 %, for Belgium 47 %, for France 54 % and for the Netherlands 28 %.

Old dwellings are, for the most part, not adapted to modern standards, are badly arranged and are not sufficiently comfortable. Ten years ago it was noted, in a survey in the Community (2), that 91 % of the dwellings occupied by workers in the ECSC industries and built before 1945 were without bathroom or shower, 72 % without inside WCs, and 97 % without central heating. It can be assumed that this situation has not since undergone any decisive development.

Apart from the renewal (3) of whole districts, there is another possible way, rapid and not very onerous, of raising the level of habitability of the whole housing stock; it consists in a large-scale attack on the modernization of existing dwellings.

Modernization in the housing field consists in increasing the useful properties of the original building and it is thus distinguished from the concepts of maintenance and repairs. By alterations and additions, it brings additional elements of health and comfort to the building, to the arrangement and to the equipment of the dwelling (4).

Some figures derived from recent surveys and statistical returns illustrate the magnitude of the problem:

- In Belgium, 400,000 dwellings can be considered as slums to be demolished and 600,000 dwellings, to avoid becoming such, should be improved and modernized.
- In Germany, seven million dwellings out of ten million built before 1948 are to be modernized or replaced.
- In France, in 1968 the number of dwellings no longer meeting the elementary requirements of modern comfort was estimated to be seven and a half million. The objective of the 5th Plan was to reach, as from 1970, an annual rate of improvement of 200,000 old dwellings.

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(2) Housing Situation of the ECSC workers - Social Statistics No.2 - 1961 - Statistical Office of the European Communities.

(3) Renewal means demolition of the old dwellings and building dwellings in the same place.

(4) Central heating, bathroom, WC, fitted kitchen, extra room, better arrangement, etc.

- In the Netherlands, out of 1,900,000 dwellings built before 1946, 350,000 are to be considered as slums and 250,000 as dwellings which could be improved.
- In Italy, existing dwellings capable of modernization number several million.

The prospect of having to keep in service for many years a high proportion of existing dwellings which are distinguished by an annoying degree of discomfort, is an incentive to a general effort of modernization. That is the only way to improve, rapidly and cheaply, the living conditions of the humblest part of the population. Modernization actually creates dwellings by transforming into better housing the premises in which the families were resigning themselves to living. It has on housing effects similar to new building in that it hastens the day when the whole population of a country can be decently lodged.

In comparison with new construction, this putting into a habitable condition is much less costly and is socially more effective, the rents even when increased after the work has been done remaining more within the reach of the least favoured social categories.

The member States of the Community have an increasing interest in the modernization of dwellings the economic aspect of which is no less important than the social aspect. The economic interest is obvious since it is possible to modernize a dwelling at a cost definitely less than that of a new dwelling. In addition, the carrying out of a programme of modernization could be used as an instrument of policy in case of a recession in building.

If the housing market reaches saturation from the quantitative point of view in a given region, modernization will raise the general level of dwellings, will prevent dilapidation, whilst new building could be oriented towards regions where there is a shortage. When industries are created in a region, it is the quality of the existing housing which makes the workers decide to come. When the activities of an industry cease, it is again the quality of the existing housing which makes the workers decide whether or not to remain and other industries to establish themselves. For all industries housing always remains a deciding factor in relation to the recruitment of staff.

Objectives of the experimental programme

The economic interest of modernization can be increased by placing at the disposal of those interested: governments, public authorities, building

owners, foremen and those carrying out the works, the results of an applied investigation on a Community basis in the field of the methods to be used.

The aim of the investigation is the introduction of new technical methods deriving especially from industrial methods, such as the use of mass-produced prefabricated components and rational organisation of the works. This should tend to improve productivity and the quality of the modernization works and hence to a reduction of the cost of modernization.

That is the main objective and these are the means which the Commission of the European Communities (EEC) has laid down for the third experimental programme.

The work which it has set itself to carry out and the financial facilities which it is granting on the occasion of the programme devoted to the modernization of the dwellings occupied by the workers of the ECSC industries in the six countries of the Community, should make it possible, on the European level, within a framework of international collaboration, to make a contribution to the study and to the development of the modernization of housing in the Community.

With the financial help granted by the EEC, under the head of the ECSC, it will at the same time be possible to experiment and to achieve more than is at present possible by normal methods. The EEC will in fact participate in the financing of modernization operations carried out within the framework of national legislations and methods of financing, by loans on very favourable conditions.

The research results of this third experimental programme will be published and therefore accessible to all interested.

B. NATURE AND SCALE OF THE PROGRAMME

Within the framework of the experimental programme, to provide the conditions for an industrialization effort, isolated operations will be avoided. Modernization will be applied only to grouped housing schemes allowing rationalization of the works and the application of industrial methods capable of improving quality, productivity and economy.

In each country, operations, limited in number to two or three, each comprising about a hundred old dwellings chosen from those occupied or to be occupied by workers of the ECSC industries, should bring these dwellings to a level of quality approaching that required for new dwellings. It is

necessary that, after modernization, they can in general be considered as usable for twenty years.

The environment will be conserved and improved.

It is a question of showing what can be achieved in the favourable cases of sound buildings, normally maintained, and not at all of transforming slums and ruins. The principal aim of the experimental programme, that of seeking new technical methods allowing the modernization of dwellings in general, implies that cleansing or renovation, especially of historic districts, are foreign to it.

As a guide, the modernization undertaken is concerned with:

- fittings (sanitary, heating, electricity, storage ...)
- functional alterations (heat and sound insulation) with reorganization of the arrangement (joining or subdivision of spaces), the addition of a new room
- improvements of the structure (elevations, roof)
- improvements of the small-scale environment (fencing, parking areas, lawns, games, lighting ...).

Problems concerning the actual structure of the building should however be avoided.

The improvement of the environment conditions that of the dwelling, since the environment is the indispensable complement of the dwelling and each scheme will indicate how the district will be replanned, subject to the limitation that only works concerning the immediate environment will be carried out.

It is therefore recommended that schemes should be chosen where the environment of the dwellings is satisfactory and, if it is not, the necessary improvements should be made within the framework of existing legislation. This will be the occasion for making public authorities appreciate the interest of carrying out simultaneously the improvements which they have to make.

Full advantage will be taken of the facilities afforded by housing concentrations (increase in the volume of works of a repetitive kind). Groups of houses built at the same period and having similar features favour the repetition of structural parts of the same dimensions to be produced under the same conditions.

The residents will be encouraged to take an interest in the works and invited to become aware of the problems which the modernization of their dwellings presents. They will be consulted on what they lack, and also on the possibility of working in the dwelling while it is occupied or on the necessity of being temporarily rehoused in a hostel or elsewhere.

Modernization normally involves an increase in rents the amounts of which should be calculated and the residents informed.

Note will be taken of the consequences of the fact that the improvement of a dwelling often involves a decrease in its capacity through a reduction in the number of rooms. Nevertheless the modernized dwelling could be useful to another family or, if it becomes too cramped, to elderly persons, for example.

C. INVESTIGATIONS OF THE EXPERIMENTAL MODERNIZATION PROGRAMME

The main aim of the programme being to throw up new technical methods, to use prefabricated components, to rationalize the works, it goes without saying that the main theme of the Experimental Programme will be concerned with the development and application of technical methods and on the rational organization of the works.

But other aspects of the modernization operations: requirements to be met, legislative, economic, architectural and sociological aspects cannot be neglected, even if only to be able to link, in these different fields, the results obtained to the context of each operation. As against the technical theme on which all efforts should be brought to bear, the recording of the different aspects quoted above will be of secondary importance. The facts recorded and the experience acquired in this field within the framework of the programme will be the subject of a critical examination and will be set down in the final report as documentation.

C.I. - TECHNICAL METHODS AND ORGANIZATION OF THE WORKS

The main investigation will be concerned with:

- an analysis of the dwellings to be modernized,
- the internal and external jobs to be done (definition and inventory) to meet modernization requirements,
- the search for technical methods appropriate to the jobs, by calling on professions concerned (architects, technicians, industrialists, manufacturers, contractors, etc.),
- the critical examination of the technical methods put forward and adopted,

- the methods of work organization applied and their advantages and disadvantages,
- the methods of negotiation, with a single contractor or several contractors, general or specialist,
- the execution of the works.

The National Research Institutes will collect information on the actual costs of the works and the analysis of these costs. Information will be given about the amounts of labour used.

The maximum of information relevant to the comparison of and the formulation of a judgment on the technical methods used will be recorded (times of preparation and of execution, quality of materials and finishes, durability, etc.)

The flexibility of the methods or the limitations on their use, such as the size of the equipment on which they depend, the fields of use and possible extensions, the economy secured over present methods will be investigated.

C.I.a Search for and application of technical and industrial methods

The modernization of old dwellings, like maintenance work, is the great consumer of skilled labour, sometimes with a wide range of skills. The works which are designed for each special case and are carried out in isolation, leaving to chance the possibilities of working inside or of vacating the dwellings, are done by small firms and by craftsmen.

The investigation will deal with different ways of carrying out modernization works with the least possible expensive labour, by increasing productivity, by reducing time on the job and the inconvenience to the families in occupied dwellings.

To this end, different means such as those indicated below should be used.

The investigations of the programme will be centralized and all those who can contribute ideas (research institutes, architects, design offices, manufacturers, industrialists and contractors) will be called upon.

From the outset, industrialists, manufacturers, contractors, or the contractor who is to be entrusted with the works, could be brought into the planning of the investigations.

A selection will be made of repetitive works, or of those capable of

being made so in the execution, whilst making efforts subsequently to ensure continuity of working.

Common solutions will be studied taking account of the interest in a standardization of dimensions and of joints, with a view to future maintenance or replacement (use of modular components).

Recourse will be had to industrialized methods using plant and machines. Workshop or factory prefabrication of components or of complete structural parts easy to transport and to install inside dwellings in very short times should be encouraged whilst considering possible further developments.

On sites, plant specially adapted to the works will be provided for and developed.

Replacement, and possibly also infill, materials the cost and installation of which definitively achieve an overall economy, will be sought for and used.

C.I.b Rational organization of the works

The present difficulty of coordinating the activities of small firms and of craftsmen in a single dwelling, makes completion periods uncertain, causes expensive losses of time, multiplies journeys and prolongs the inconvenience to occupiers.

A special effort will be made over the planning and coordination of work inside the dwellings, as a whole and in a single dwelling. It is necessary that preparatory work should be at least as thorough as in new building operations.

The work should be carried out by specialist teams, suited to the nature of the works, operating with appropriate mechanized equipment and in such a way as to ensure cleanliness of indoor working areas.

Even the ways of negotiating contracts could be varied insofar as they can assist coordination of the execution of the stages of the scheme and definitively improve its economy. It would be an advantage to approach firms, large or small, showing an intention of organizing themselves for a specialist execution of modernization work.

C.II.- OTHER ASPECTS OF MODERNIZATION

Level of quality required

If there are absolute requirements in the basic criteria for new buildings,

they are those which deal with health and safety. Other requirements vary from one country to another and with time, these are the comfort requirements. If it appears admissible for a modernized building to have comfort qualities that are not equal to those of new dwellings, it should attain the same level in the fields of health and safety.

The modernized dwelling, required to last for years during wich the standards required of dwellings cannot but rise, should therefore attain initially an adequate technical level, allowing, should the occasion arise, new needs to be met.

The method of fixing minimum requirements, their level, the experience acquired in the matter in the course of the programme will be recorded.

Policy of modernization, means of promoting this policy, regulations

National data will be collected on:

a) the quality of the housing stock (statistical returns, surveys),
b) modernization needs

and brief mention will be made of:

c) present modernization activity,
d) the policy of public authorities and their interventions to promote modernization: direct or indirect aid (subsidies, financing, tax exemptions), modernization programmes,
e) the approvals required for modernizing a dwelling,
f) fiscal policy: fiscal charges on modernization works and fiscal advantages connected with modernization,
g) the legal obstacles which residents can put in the way of the execution of the works.

Economic aspects, cost, value for money

The economic interest of modernization will in general be assessed on the basis of its cost, in comparison with the cost of new building, of the interest on money, of the difference in rents between new building and modernized building, of the expectation of life of the modernized building, etc. There is a level of cost which it would not be value for money to exceed:

a) The critical examination of types of financing. - Conclusions will be drawn about the systems for encouraging modernization by public financial help used in the operations of the programme and it will be indicated whether they are satisfactory.

b) The critical examination of the fixing of rents in relation to modernization. - During the programme, the effects of the modernization upon rents will be examined.
The results of the fact that the improvement of dwellings sometimes leads to a reduction in the number of rooms will be noted.

c) The accuracy of forecasts. - The operations of the programme will give the opportunity to observe the accuracy of forecasts of expenditure and it should be possible, should occasion arise, to observe the results of the inaccuracies.

Sociological and psychological aspects of modernization

It is planned to deal briefly with:

- the identification of the problems which modernization poses in the sociological and psychological fields, including those of informing the residents and of their participation in the preparatory work which it demands.
- the process whereby the residents become aware of the problems posed by the new concept of the "habitat", that is to say of the dwelling and of its environment.
- the methods of lodging the residents during the works.
- the reactions of the residents to the modernization.

Architectural and functional aspects

When the programme is put into effect reports will be made on the experience obtained on the following :

- balanced integration of the elements of comfort,
- assessment of the architectural quality of the modernized dwellings and, if appropriate, the improvement effected in the environment.

A critical examination will be made of the plans before transformation, bringing out the aims sought, and a fresh critical examination after transformation.

D. STAGES OF THE EXPERIMENTAL PROGRAMME

Stage I - Drawing up of the General Directives

The present document which defines the conditions of the experimental programme has been drawn up by the International Council of Experts and agreed upon by the Commission of the European Communities (EEC).

Stage II - Choice of schemes

The National Institutes will be consulted about the choice of the promoter, of the location of the scheme and of the contractor. The promoter of the scheme would be able to nominate the contractor only with the written agreement of the National Institute concerned. The contractor should unite in his person or with his assistants the special skills required.

The promoters of schemes taking part in the experimental programme and wishing to benefit from the financial help of the EEC will prepare (cf. Directives) working documents which the Institutes will analyse and will report on to the International Council of Experts after investigation and a preliminary visit to the sites. The decision rests with the EEC.

- Composition of the dossier accompanying the request for help

There will be supplied for each operation:

a) Data on the local situation
   - Plan of the locality and of the district, showing the dwellings to be modernized,
   - Future employment prospects in the locality,
   - Table of the housing situation in the locality,
   - Planning arrangements - essential characteristics of the urban infrastructure.

   It should be specified that no planning conditions make it possible to foresee demolition within the next twenty years and in any case before the complete amortization of the expenditure involved.

b) Overall data about the people occupying the dwellings to be modernized (socio-professional categories, state of occupation of the dwellings, rents and charges).

c) Data about the dwellings to be modernized
   - the building owners,
   - number of dwellings to be modernized and their distribution by types of building, type plans and if useful typical details of the dwellings, years of construction, general condition, technical condition, maintenance carried out, observed deficiencies,
   - indication of the improvements envisaged, the main jobs to be done with an overall estimate of costs,
   - a note on the method and organization of the investigation particularly among manufacturers and contractors, the principles on which the work will be organized, the method of obtaining tenders,
   - the possibility of letting tenants remain during the works and the arrangements envisaged if this is not possible,
   - the owners and the sitting tenants.

d) Financing plan

Each operation should be balanced making maximum use of the aid possibilities offered in each country by the public authorities, contributions from owners, from employers, from the tenants. The financing will be completed by the financial help from the EEC.

The financing plan giving an estimate of the expenses anticipated from the nature of the works will be detailed per dwelling to be modernized.

e) A note on the conditions of financing and on the value-for-money of the investment

Account will be taken especially of the probable period of use, of the different sources of finance and of interest and amortization charges, of other charges, of the rents that can be carried after modernization.

The building owner will be free whether or not to use, to meet these specifications of the information to be supplied, the forms and dossiers that may have already been prepared for his own national administration.

Stage III - Agreement in principle of the ECC and methods of financial help

On the motion of the International Council of Experts, an agreement in principle will be given to the proposed operations, fixing provisionally the methods of providing financial help from the EEC for the modernization.

Stage IV - Definitive dossier

Drawn up by the building owner following the arrangements of the agreement in principle, the definitive dossier will be presented by the National Institute to the EEC.

The technical Secretariat should check that it is in conformity with the whole of the motions previously approved. This detailed technical and financial dossier will comprise:

1) The scheme for the execution of the works, with plans, specifications and estimates of quantities and costs.
2) A note giving reasons for the technical arrangements adopted (organization, industrialization, etc.).
3) The reasons for the form of contract for the works.
4) The definitive financing plan. (This will specify in particular the measures adopted for the housing of the tenants while the work is being done and their financial consequences).

5) Calculations of the new rents in conformity with national legislation in force and the value-for-money calculations.

Where a scheme departs from the objectives laid down by the General Directives of the programme, the International Council of Experts shall be consulted and called upon to decide on the motion of approval or rejection to be put up to the EEC. The schemes should receive the definitive approval of the EEC by a letter addressed to the National Research Institute.

Stage V - Drawing-up of contracts

If the contractor was not brought in at the design stage, the building owner should proceed to consult with contractors, with a view to obtaining the most favourable prices. The latter should enter into a commitment on the prices, the measures of organization and the methods of building planned within the framework of the applied investigations.

The contractor shall be designated, in agreement with the National Institute, at the conclusion of the consultations on prices.

Stage VI - Execution of works

The building owner shall make sure, in good time, of the administrative consents.

The progress of the works shall be followed by the National Institute. Its representatives shall periodically meet the building owner, the foreman and the contractor. The latter shall, each in his own field, help him to observe the works from the point of view of the investigation and also with the collection of data and of the results.

The National Institute shall prepare regular reports on the progress of the works for the Technical Secretariat.

The Technical Secretariat will periodically submit reports to the International Council of Experts and to the EEC.

Stage VII - Final report

As soon as possible after the completion of the works, each Institute will set out its observations and the results of investigation relating to the operations in its country in a final report which will give an account of the technical experience acquired and will specify to what extent the introduction of technical methods deriving from industrial

practices and a rational organization have effectively contributed to the economy of modernization works.

The conditions in which the modernization works are carried out will be specified and the results obtained will be examined under the following different heads by each of the Institutes:

1) The requirements on the level of quality (minimum standards of habitability of modernized dwellings)
2) Policy and legislation in the matter of modernization
3) Economic aspects, cost, value for money, exactitude of forecasts
4) Sociological and psychological aspects.

These reports will be drawn up:

For Germany, by the Institut für Bauforschung, Hanover
For Belgium, by the Institut National du Logement, Brussels
For France, by the Centre Scientifique et Technique du Bâtiment, Paris
For Italy, by the Associazione per la Promozione degli Studi e delle Ricerche per l'Edilizia, Milan
For the Netherlands, by the Bouwcentrum, Rotterdam
For Luxembourg, (still to be agreed).

Architectural and functional aspects will form the subject of a report drawn up by Mr. DUBUISSON, an architect representing the International Union of Architects (IUA) on the International Council of Experts.

TIMETABLE OF THE EXPERIMENTAL PROGRAMME

The dates for completion of the various stages of the programme are fixed as a function of the date J of the General Directives.

Stage I	Distribution of the General Directives	J
Stage II	Choice of operations and presentation of applications to the European Communities Commission	J + 6 months
Stage III	Agreement in principle	J + 9 months
Stage IV	Presentation of the definitive dossier	J + 15 months
Stage V	Drawing up of contracts	J + 18 months
Stage VI	Execution of the works	J + 30 months
Stage VII	Drawing up of final report	J + 34 months

E. INTERNATIONAL COLLABORATION AND TEAM WORK

The carryingout of the programme requires the collaboration of many people (landlord, building owner, consulting engineer, contractor, residents' representative, representatives of national or local authorities, national institutes and the EEC).

The National Institutes which will proceed to the examination of the schemes, should pay special attention to stimulating and organizing an effective collaboration on the international plane and on the national plane.

To promote collaboration on the national plane, the setting-up of a working group to work as a team is envisaged.

This group will be set up on the initiative of the National Institute whose representative will be chairman. It may include anyone able to make an effective contribution to the success of the programme including a residents' representative. A deliberative body, it will promote, by mutual consultation, good coordination of the investigations and of the works.

F. ROLES OF THE ORGANIZATIONS AND INDIVIDUALS CONCERNED

F.1. - Role of the EEC

The EEC has taken the initiative in formulating and carrying out the programme. It has designated a council of experts which will help it in this task. It will intervene decisively in the financing of the programme, reserving to itself the right to decide in the last resort on all matters of such a kind as to have a bearing on the success of the programme. It will also preside over the above-mentioned International Council of Experts. When the work is finished, it will publish a report on the experience gained and on the results of the programme.

F.2. - Role of the International Council

The EEC has designated an International Council of Experts to help it in drawing up and carrying out the programme. This consists of the representatives of the EEC , of the National Research Institutes, of the representative of the International Union of Architects (IUA) and of the representative of the COFACE (*).

The National Research Institutes are respectively:

For Germany	:	the Institut für Bauforschung, Hanover
Belgium	:	the Institut National du Logement, Brussels
France	:	the Centre Scientifique et Technique du Bâtiment, Paris
Italy	:	the Associazione per la Promozione degli Studi e delle Ricerche per l'Edilizia, Milan
the Netherlands	:	the Bouwcentrum, Rotterdam
Luxembourg	:	the Société Nationale des Habitations à Bon Marché, Luxembourg.

3. - Role of the Technical Secretariat

The Technical Secretariat should help the International Council and the ECC Services in carrying out the programme. Its duties are to prepare and draw up all the working documents for the meetings of the International Council, to act as technical adviser in the preparation and carrying out of the programme in the countries of the Community, to present progress reports and to help the EEC in drawing the conclusions of the final report on the experimental modernization programme.

4. - Role of the National Institutes

The National Institutes should guarantee that the directives of this programme are observed. They will also correlate the activities of all the parties concerned.

They will present the dossiers asking for help, with their opinion, to the International Council of Experts. They will be responsible for following the various pre-planning and planning stages before bringing the latter before the International Council of Experts.

These tasks will for the most part be carried out within the working group set up for each scheme. The National Institutes will take on both the chairmanship and secretariat of the group.

The National Institutes will also act in their countries as representatives of the International Council of Experts.

They will report to the EEC and to the International Council of Experts on the work done in their countries in the course of the programme. The reports will normally be presented to the EEC through the intermediary of the International Council of Experts in which the National Institutes are represented.

F.5. - Role of the representative of the International Union of Architects

Mr. DUBUISSON, representing the International Union of Architects, will intervene twice during the investigations as consulting architect to the National Institutes in his capacity as a delegate of the International Council of Experts:

1st before the agreement in principle of stage III

2nd during stage IV and before the definitive approval of the scheme by the ECC.

F.6. - Role of the building owner

To the building owner will fall the duty of carrying out the scheme which forms the subject of the programme. He will be required to observe these General Directives and the obligations on him which derive from them and also to see that the General Directives are observed by the contractor to whom he will communicate them.

F.7. - Role of the contractor

The contractor who plays an important part and on whom to a great extent the success of the whole programme depends, will discharge his duties by observing these General Directives and the obligations on him which derive from them.

(*) COFACE = Comité des Organisations Familiales auprès des Communautes Européennes
(Committee of Organizations concerned with Family and Home under the European Communities)

ANNEX B

TECHNICAL DESCRIPTION OF THE PROJECTS CARRIED OUT IN THE VARIOUS COMMUNITY COUNTRIES

TECHNICAL DESCRIPTION OF THE BOIS-DU-LUC PROJECT

The information provided is incomplete, reflecting the state of progress in preliminary studies, when this report went to press.

Location	: Bois-du-Luc
Owner	: Société des Charbonnages de Bois-du-Luc (Prospective owner: Société Nationale du Logement)
Responsible for scheme	: Société Nationale du Logement
Number of dwellings	: 222 one-family two-storey terrace houses
When built	: 1855 (kitchens were added in 1925)
Number of families before modernisation	: 222
Number of families after modernisation	: about 220

A third of the dwellings are occupied by families of old-age pensioners, the rest by families of miners, the majority of foreign nationality.

1. LOCATION

1.1 The complex of dwellings to be modernised is situated in the commune of Houdeng-Aimeries, with an extension into Trivières, between Charleroi and Mons, and about 40 kilometres to the south of Brussels. 159 dwellings make up four blocks, served by two intersecting streets and a peripheral road; 63 dwellings form a crescent-shaped extension to these blocks.

The whole complex is one of architectural interest, characteristic of the efforts of more than a century ago, when the collieries were first opened, to house the families of workers in a colliery settlement.

The miners pay very modest rents at the present time - of the order of 170 to 525 Belgian francs monthly.

The collieries ceased production in 1973 and are ready to sell their houses, which are still needed, since there is ample employment available in new steel-based industry and good future prospects. Since, however, industry does not wish to invest in these houses, within the framework of industrial conversion, only acquisition by a single owner can preserve their character, as low-cost workers' housing, and guarantee modernisation.

The Société Nationale du Logement, in definitely deciding to acquire the houses, has examined the possibility of having the whole complex administrated by one of its regional societies, which would use it to house families of steelworkers. This society would be able to take advantage of all the State benefits and measures in favour of low-cost housing for rent.

All public amenities are sufficient and provided close to the housing.

The dwellings are provided with water and electricity, but some services, such as sanitation, are lacking, and others, such as public lighting, need to be improved.

The general surroundings are particularly agreable, the estate being sited in a gentle depression, surrounded by open fields and woods.

1.2 Structures are in reasonable condition. Main walls, in brick, are sound and damp-proof, but with some deformation due to subsidence of former mine workings. Framing and wall-coverings are well-maintained. The ground floors over the cellars are supported on brick vaults between metal joists. The dwellings are of various types with average-sized rooms. In general, there are three rooms on the ground floor, one with direct access to an internal staircase. At the rear, a kitchen and WC have been built as an annex.

The facilities are quite inadequate. In each house, there is only one water supply point (in the kitchen) and no sink. Wastes are disposed of by gutters and WC's, which are non-flushing, are built over a trench. Inadequate electrical installations need to be renewed. Ground-floor windows no longer open. The inner area of the estate is occupied by untended vegetable gardens and miscellaneous outbuildings. Roads are made up with schist rubble and the public lighting system is rudimentary.

2. PLANNING OF THE SCHEME

At the outset, the Institut National du Logement intended to make a feasability study, drawing up the technical objectives of the Experimental Programme, suggesting outline plans for modernisation, fixing cost limits in terms of provisional estimates and providing for a financing plan, which would assure the viability of the operation.

Householders would be associated with the project, by means of general consultations and also specific inquiries to find out the wishes of each family involved and their ability to pay higher rents following modernisation. A model house is envisaged.

The following measures are anticipated to reduce annoyance to householders during the works:

(a) storage of furniture locally
(b) rearrangement of certain houses to provide temporary accommodation
(c) allowing small families and single persons to remain in their houses during modernisation.

3. GENERAL PLAN OF AREA)
(
)
4. PLAN OF HOUSES BEFORE MODERNISATION (
) see plans and
(
5. EXTERNAL ASPECT OF HOUSES BEFORE MODERNISATION) photographs
(
)
6. ENVIRONMENT OF HOUSES BEFORE MODERNISATION (

7. DESCRIPTION OF PROJECT

7.1 Principal modifications

The distribution of space is improved within the dwellings. An entrance hall with cloakroom is created on the ground floor. On the first floor, bedrooms are made separate from one another. The parents' bedroom and the bathroom are lit by hinged sky-lights with shutters.

A bathroom is provided, with WC and cupboards. On the ground floor, the kitchen will be fitted with a sink unit and provided with an electric or gas cooker, a washing machine and a dish-washer.

A WC with flushing tank, is installed beside the kitchen. Individual central heating with radiators is provided for, supplying hot water to the kitchen and bathroom.

Electrical installations are replaced and modernized. Provision of built-in furniture will reduce the cost of furnishing for low-income tenants.

Floor coverings, paint-work and wall coverings are renewed.

The environment is improved by

- the repair of external paintwork
- the putting in order of private gardens, with lawns and vegetable plots
- the provision of parking spaces and access paths
- the opening of an entry in each of the four blocks to give access to a communal garden, which will be laid out for childrens' games and sports facilities.

7.2 Prefabrication

The distribution of rooms will be altered by the use of prefabricated partitions, door units and prefabricated panels, all dry-fitted and assembled in situ.

The kitchen will be modernized, using prefabricated units. New doors and windows, with prefabricated frames, will be inserted on the garden side of the dwellings. Piping will be manufactured in the workshop.

7.3 Works carried out by traditional methods

All other works.

7.4 Works outside the Experimental Programme carried out as modernisation of public amenities

- Connections to public severage system
- Partial refurbishing of the road system (5,200 sq.m.), including pavements (3,300 sq.m.)
- Renewal of underground electrical cables (1,800 metres)
- Installation of public lighting
- Installation of gas mains (1,800 metres)
- Planting
- Cleaning out of "Tirian du Luc", tidying up of banks and of the access road to the estate, restoration of kiosk and surroundings
- Creation of parking space

The whole operation will be carried out in three phases:
- acquisition of the dwellings
- modernisation of the dwellings
- improvement of the surroundings.

The works of modernisation are expected to take two years from the date of acquisition of the dwellings. Since tenders have not yet been arranged for, no contractors have so far been appointed.

8. ESTIMATED COSTS OF ACQUISITION AND MODERNISATION OF THE DWELLINGS

8.1 Estimated global cost for 222 dwellings

acquisition	100,000 FB x 222	=	22,200,000 FB
expenses of modernisation	400,000 FB x 222	=	88,800,000 FB
			110,000,000 FB

This estimate does not include expenditure on public facilities (sanitation, roads, electricity, public lighting, extension of gas mains, tidying up of surroundings, laying out of communal space and planting).

8.2 Analysis of average cost per dwelling in FB (Belgian francs)

Living area before modernisation : 60.44 square metres
Living area after modernisation : 74.37 square metres

Demolition	
WC, redundant structures, filling in of trench, works related to access to internal communal space	10,000
Masonry	
Cleaning, chimney stacks, opening of bay, opening of windows, outside door sills, coping-stones, closing of vents	20,720
Roof	
Overhauling, opening for placing of sky-lights, gutters	13,726
Ceilings	
Repairs and ceiling over terrace	10,000
Partitions	
Internal partitions	12,592
Joinery	
Replacing of window frames, laying of frames for hinged sky-lights, replacing of doors	74,000

Sanitary installations	
WC, wash-hand basin, bath, drains	15,000
Kitchen equipment	
Inox sink unit and kitchen shelving and furniture	20,000
Connections to gas and electricity mains	10,000
Electrical installation	18,000
Gas installation	4,000
Central heating	63,000
Floor coverings	
Tiled floor in kitchen, vinyl tiles and carpeting	19,500
Cupboards	
Wardrobes in bedrooms and cloakroom cupboards	23,500
Paintwork	
External paintwork	5,700
Façades	6,400
Façades	
Sanding	6,600
	332,738

Internal paintwork, wall papering and home decoration are left to the occupants.

Total	332,738
V.A.T. at 14 %	46,583
	379,321
Reimbursement of V.A.T. (8/14)	26,619
	352,702
Contingencies and miscellaneous	47,298
Total cost of modernisation	400,000 FB

9. FINANCING PLAN

To the E.C.S.C. loan of the order of 10,000,000 FB (Belgian francs), must be added a State loan specially arranged to cover the global cost of the project.

10. RENTS AND PROFITABILITY CALCULATION

Average monthly rent before modernization: 400 FB

Average acceptable rent after modernization has been estimated at 1,300 FB and the probable length of life of the dwellings at at least thirty years.

The State has been asked to provide supplementary assistance matched by loan servicing conditions which ensure that rents will not exceed the level of 1,300 FB acceptable to the tenants.

Monthly heating charges of 550 FB fall to be added to rent.

BOIS DU LUC — Central crossroads of the estate to be modernized

BOIS DU LUC — Dwellings to be modernized, facades overlooking a square

BOIS DU LUC — View from within a block of houses

ECSC EXPERIMENTAL PROGRAMME

HOUSING MODERNISATION — FRANCE

TECHNICAL DESCRIPTION OF THE HAGONDANGE PROJECT

Location	: Hagondange
Owner	: Sacilor S.A.
Promoter	: Housing Department of Sacilor S.A.
Contractor	: Planning - M. Moulinier, Architect Execution - M. Sabatier, Engineer
Number of houses	: 103 of which 56 semi-detached and 47 terraced, all two-storey
Year of construction	: 1912
Number of families before and after modernisation	: 103

The houses are rented to families of steelworkers active in the industry (68 %), retired steelworkers (18 %), widows of steelworkers (8 %) and various others (6 %). Average number of occupants: 4.1 per dwelling.

86 % of the active steel workers are skilled.

1. LOCATION

1.1 The houses form part of an estate of 950 one-family dwellings, at least a kilometre from the centre of Hagondange.

The future of the area is assured by the presence within a radius of three kilometres of the most important factories of Wendel Sidelor (Hagondange, Rombas and Sacilor). New industries, implanted on the Moselle, about three kilometres distant, will employ 20,000 workers.

The road system and other services are in good order. Shopping facilities, including four grocers and, in close proximity, a supermarket, are adequate. There are two primary schools in the estate. It is intended to build a leisure and sports complex, with swimming pool. Planning requirements do not envisage any demolitions within the next twenty years.

1.2 The modernized dwellings include two similar house-types VIII and VIII-A with four rooms and kitchen.

They are of sound timber construction, with brick supports and tiled roofs. Flooring and boarding are in good condition.

In the basement-cellar, laundry and WC. There is no bathroom, WC or central heating.

The improvement of the area requires the removal of miscellaneous structures: woodsheds, motor-cycle sheds, garages rigged up with no concern for appearances. Metal fencing needs to be replaced with privet hedges. It is intended to put the road system in order for handing over to the local authority.

2. PLANNING OF THE PROJECT

The Housing Department of Sacilor administers 25,000 houses, of which 18,000 belong to the firm, and disposes of competent administrative and technical staff.

Having built 6,500 new houses, it has begun to direct its efforts towards the modernisation of houses, in introducing a modest level of comfort.

Skills called for, teamwork, methods applied

The Housing Department undertook the research with manufacturers and contractors, in collaboration with the Centre Scientifique et Technique du Bâtiment.

Having decided on a rigorous planning of the work and the maximum use of prefabricated elements which could be carried through the house, approaches were made to engineering firms connected with the steel industry and to firms in the region open to new ideas on prefabrication and accustomed to assembly line methods.

Faced with problems of price, interest tended to be concentrated on the use of components employed in new construction. Their maladjustment to existing houses reduced the options to certain specific industrialised items: prefabricated adjustable partitions, door units.

Sanitary installations assembled in series, inlet and outlet pipes manufactured in the workshop. It was decided to go for a large measure of competition between firms and consortia of firms.

Association of householders with the project

Householders were satisfied with living in one-family houses, which were individually lacking in facilities, and paying lower rents than they would in recently-built apartment blocks. Some families would even lose their housing allowances, if they moved there. There was, however, a demand for garages and bathrooms.

The Experimental Programme was presented to the Staff Committee by social workers. A brochure was distributed and a visit arranged to two modernized houses.

Out of the 103 dwellings, 20 % were badly adapted to family size:

- ten were occupied by widows or retired workers
- three by active workers and also by widows
- seven by families of more than eight persons.

Ten small vacant houses were completely rearranged to take the ten widows and retired workers. These people, who had been well briefed by the social workers, were happy to accept the move, since it cost nothing and the houses were put in order.

Seven vacant houses, of larger size than average, were renovated for the large families.

A survey, with preliminary explanation, was carried out by the social workers, by calling at 50 homes. Six families were prepared to give immediate agreement to the carrying out of workers of modernization.

The work of persuasion was undertaken by social workers and housing advisers. These last, provided with brochures in the language of each worker, saw individual householders, with a technical expert present, when they visited the model houses.

Temporary rehousing was assured in ten houses which had been vacated, removal expenses being borne by the owners.

3. OVERALL PLAN OF ESTATE)
4. PLANS OF DWELLINGS BEFORE AND AFTER MODERNIZATION) see plans
5. APPEARANCE OF DWELLINGS BEFORE AND AFTER MODERNIZATION) and photo-
6. SURROUNDINGS BEFORE AND AFTER MODERNIZATION) graphs

7. DESCRIPTION OF THE PROJECT

7.1 Principal features adopted for the housing and the environment

The project envisages:

1/ improvement of thermal insulation

2/ improvement in the distribution of rooms

3/ installation of a bathroom with bath, wash-hand-basin and ventilation on the first floor

4/ installation of a second WC on the ground floor

5/ fitting out of the kitchen (sink unit, protective wall-coverings, installation of washing machine, gas and electricity connections)

6/ natural gas central heating with boiler supplying hot water to bathroom and kitchen sink

7/ complete refurbishing of electrical installation, with a view to future requirements

8/ general refurbishing of paintwork and wall-papering.

7.2 Prefabricated products

- The bathroom, WC and technical sheathing are assembled with prefabricated components based on composite panels 50 mm thick.
- Adaptation to existing floors and ceilings is achieved by insulating shoes (floor) and clamping at different levels (ceiling), using a compensating system of jacking.
- the false ceiling of the WC consists of a reinforced sliding panel 16 mm thick.
- Door units in prepainted metal framing are assembled with the partitions.
- Drains and ventilation outlets are in plastic.
- The panelled sink unit includes a sink in enamelled stoneware.
- Radiators in fine steel are prepainted and mounted on prefabricated piping units.
- Prefabricated sheaths of uniform length, made of flexible inox tubing, evacuate the gas wastes.
- Prefabricated window frames, 134 cm x 98 cm, with insulating glazing, are inserted in the roof.

7.3 Works carried out by traditional methods

- Demolition of partitions and opening of floors to take pipes.
- Demolition of the sink and its connections.
- Installation of a ventilation aperture in the kitchen and basement.
- Connection to main drainage.
- Outflows in roof for gas wastes and ventilation.
- Lagging the attic with insulating material.
- Provision of a new bay.
- Gas connection from basement to boiler and kitchen tap.
- Installation of grilles and ventilation shafts in kitchen and bathroom.
- Installation of boiler with capacity of 20,000 calories with taps and hood for ventilation incorporated.
- Electrical works.
- Plastering sink surround, walls, ceilings and angle-mouldings.
- Recovering of kitchenwall in earthenware tiles.
- Removal of rubbish and cleaning.

7.4 Works carried out as maintenance, outside the Experimental Programme

- Paintwork on walls, woodwork and ceilings and hanging of wallpaper in old as well as new parts of the house.
- Sanding of floors.
- Refurbishing of façades and immediate surroundings.

8. THE EXPERIMENT

8.1 Arrangements for carrying out the works

Restricted tendering permitted a choice between individual tenders and those of consortia.

The final project, the schedule and the solutions to the problems of prefabrication were put into shape with the contractor responsible for coordination.

8.2 Execution of the works

Direction

Direction of the work was the responsability of Immobilière Thionvilloise.

Manufacturers of prefabricated units

Drymounted partitions, floor panels and ceilings	: Etablissements Rougier 104, rue Saint Symphorien 79 Niort
Door units	: EDAC 214, avenue de Paris 79 Niort
Windows	: VELUX 18, rue Charles Michel 79 Niort
Baths	: FRANCEMAIL 13, boulevard Malesherbes Paris 8-ème
Wash-hand basins, sinks	: Villeroy et Bosch 77 La Ferte Gaucher
Cisterns	: CEBERIT 24, avenue Jean Jaurès 92 Gentilly

Boiler	: Saunier Dural 17, rue Guillaume Tell Paris 17-ème
Radiators	: Société Lorraine d'Equipements de Chauffage 1, rue de Wendel 57 Hayange
Flues	: WESTAFLEX 21, rue du Luxembourg 59 Roubaix
Electrical apparatus	: Legrand 82, rue Robespierre 92 Bagnolet

8.3 Time schedule

Works were carried out simultaneously in the ten houses vacated by families rehoused temporarily. In each house, 16 working days were required to carry out the modernisation. For the entire scheme, the duration of works was eight months.

9. THE RESULTS OF THE EXPERIMENT

9.1 Cost price of the works for the entire 103 dwellings: 3,113,728 F

Average cost price per house: 30,231 F

Living area (square metres)	Type VIII	Type VIII-A
before modernisation	76.30	78.86
after modernisation	75.11	77.72

9.2 Analysis of the cost of an average house of 76.30 sq.m.

Nature of the works	%	Average cost in F	
		per house	per sq.m. of living area
A. Demolition			
Demolition and removal of redundant materials: partitions, floors, tiling	1.21		
Total	1.21	368.00	4.82
B. Works carried out by traditional crafts			
Masonry	2.67	807.00	10.58
Plastering	0.37	111.00	1.45
Timberwork, surfaces, roof covering	2.60	787.00	10.32
Electricity	5.39	1,628.00	21.35
Gas connections	0.61	185.00	2.42
Piping and sanitary installations	12.06	3,646.00	47.78
Boiler heater	9.08	2,744.00	35.96
Joinery	0.44	135.00	1.77
Wall-facings and kitchen	1.25	379.00	4.97
Painting and wall paper	17.24	5,209.00	68.27
Thermal insulation	0.78	237.00	3.11
Total	52.49	15,868.00	207.98
C. Assembly of prefabricated units			
Partitions, door units	8.96	2,710.00	35.52
False ceiling	0.09	300.00	3.93
Wall facings bathroom	0.06	205.00	2.69
Heating, piping and radiators	15.02	4,542.00	59.53
Windows	0.07	229.00	3.00
Kitchen furnishing	1.63	495.00	6.49
Prefabricated flues	0.06	184.00	2.41
Total	28.66	8,665.00	113.57
D. Environment			
Refurbishing of façades and various improvements	17.63	5,329	69.84
Total	17.63	5,329	69.84
Works of construction only	100.00	30,230.00	396.21

10. FINANCING PLAN

a) Loan from the Banque Fédérative de Crédit Mutuel de Strasbourg, operating on behalf of the Commission of the European Communities — 2,300,000 F

b) Grants from the Agence Nationale pour l'Amélioration de l'Habitat (ANAH) (a global amount allocated to several improvements in the estate) — 813,734 F

3,113,734 F

11. RENTS AND PROFITABILITY CALCULATION

Average monthly rent before modernisation (legal of 188 F) rent ceiling — 56 F

Average monthly rent after modernisation, starting at — 202 F

after five years — 344 F

(the legal rent ceiling of 344 F will be reached by successive half-annual increases of up to 6 %)

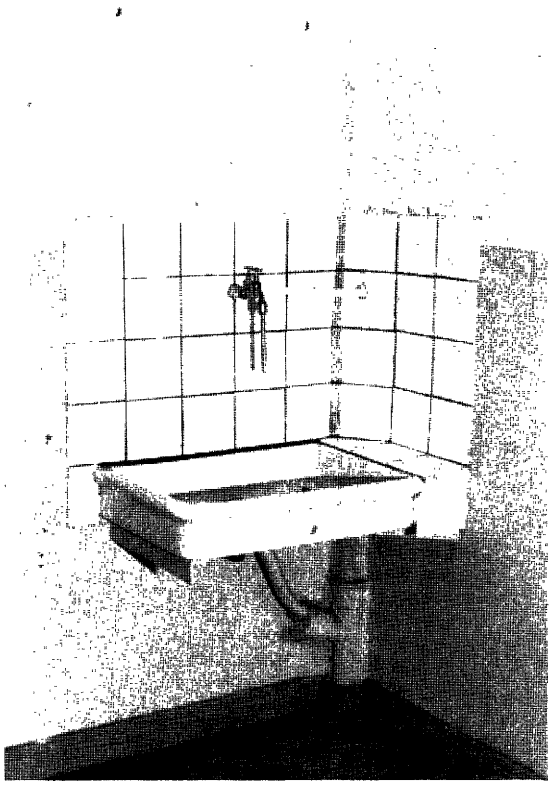
Probable length of life of houses: more than twenty years.

Origin of funds	Amount per house of 76.30 sq.m.	Interest rate	Period of repayment	Annual charges per house	Monthly charges per house
Loan from the bank repayable in 40 equal half-annual instalments, interest payable half-annually	22,330 F	4.3/8 %	20 years	decreasing from 1,983.00 F (first year) to 1,153.00 F (20th year)	from 165.25 F to 96.09 F
Grants from ANAH	7,900 F	-	-	-	-
	30,230 F				

HAGONDANGE — Terraced houses before modernization — External aspect of houses

HAGONDANGE — Environment of houses before modernization

HAGONDANGE — Environment of houses before modernization

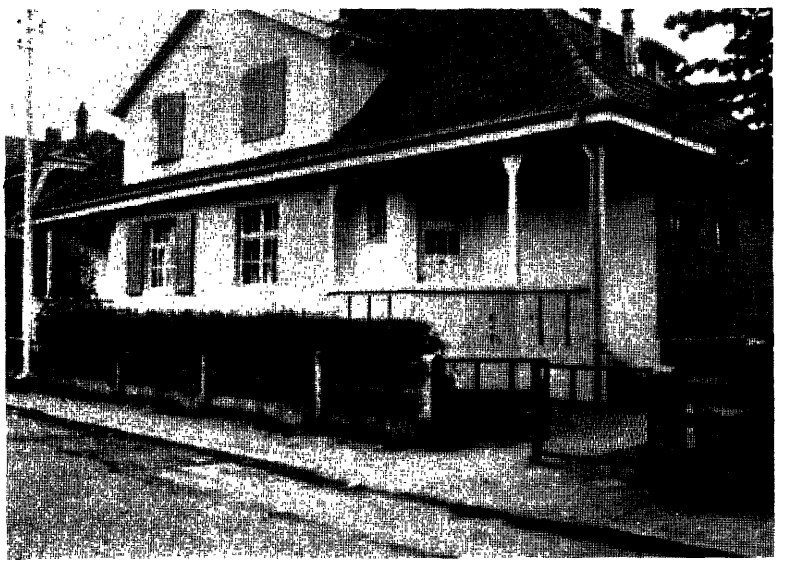


HAGONDANGE —
Kitchen facilities before modernization

HAGONDANGE — New kitchen facilities
with spotlight over the sink

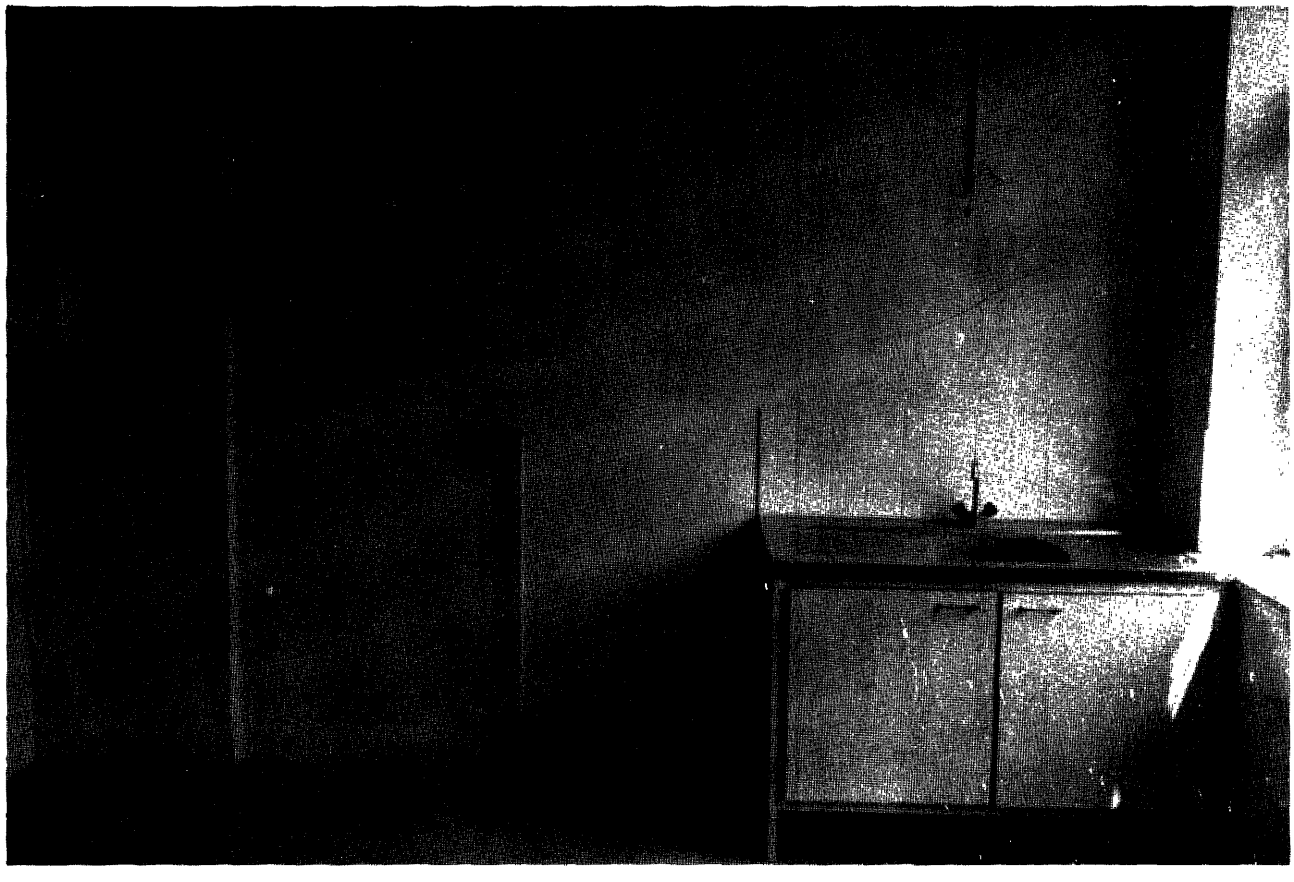
HAGONDANGE –
Modernized terraced houses
(plastering and external paintwork matched by the colour consultant)

HAGONDANGE –
Individual modernized house
(note the prefabricated frame which opens, lighting the bedroom)

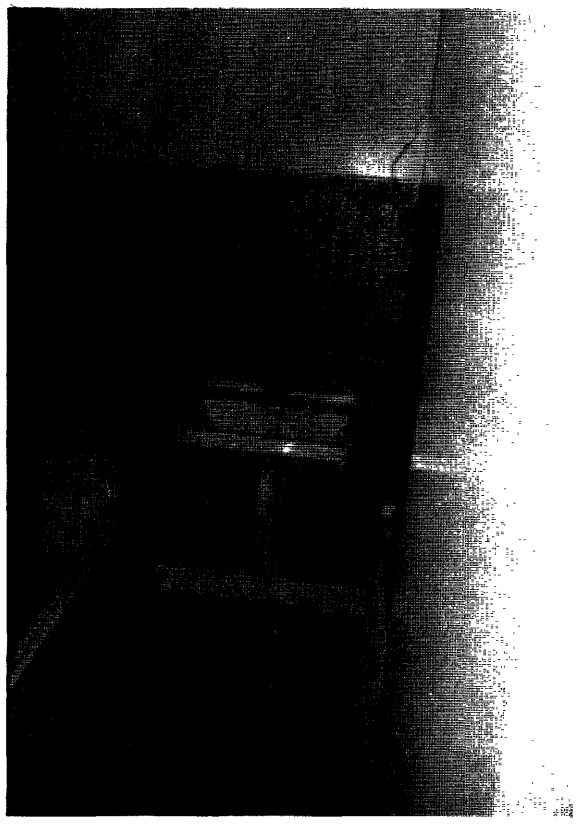


HAGONDANGE –
Modernized house
External aspect

HAGONDANGE — Living-room after modernization

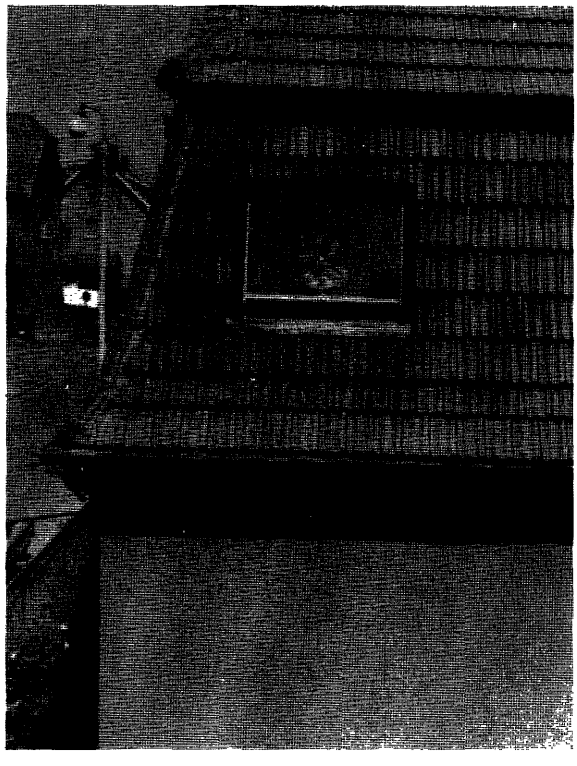


HAGONDANGE — New kitchen facilities

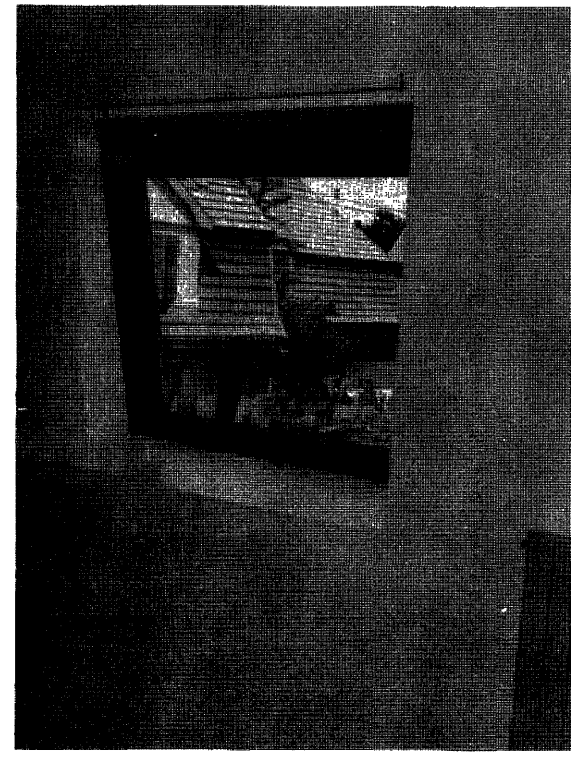


HAGONDANGE –
Prefabricated frame which opens

HAGONDANGE – Restored entrance



HAGONDANGE –
Lighting an attic bedroom



HAGONDANGE –
Lighting an attic bedroom

HAGONDANGE — Modernized houses — boundary fences will be progressively rayed to the level of plinth walls

HAGONDANGE — The task of improving the environment extends equally to the existing green spaces in the estate

TECHNICAL DESCRIPTION OF THE ROLLENCOURT PROJECT

Location	: Rollencourt estate, Lens Liévin
Owners	: Houillères du Bassin du Nord et du Pas de Calais
Supervisors	: Direction Immobilière des HBNPC 20, rue des Minimes 59500 Douai
Contractors	: Etudes Techniques et Réalisations Ingenierie 2, route de la Bassée 62301 Lens
Number of dwellings	: 90 in single-family houses on two floors, built in pairs
When built	: 1920 - 1924
Number of families before and after modernisation	: 90

The accommodation is occupied free of charge by families of miners who are still in active employment (39 %), retired (59 %) and by some people not connected with the firm (2 %).

5 % of workers are senior operatives while 33 % are skilled workers and labourers. Of those who have retired, 48 % were mineworkers and 11 % salaried employees.

The average age for heads of family is high. 62 % are between 45 and 65 years old and 25 % more than 65. There are few children and the average number of occupants per dwelling does not reach 2.8.

1. LOCATION

1.1 The Rollencourt estate is composed of individual houses and forms part of the Lens Liévin agglomeration, which has 60,000 inhabitants. The miners who live there are not at risk from a recession in the coal industry.

A new industrial zone nearby gives promise of new jobs over and above those in the wire rope and cablemaking industries and in the car industry which already exist or are planned. There is a keen demand for housing and a joint development zone is being created near the Rollencourt estate which enhances its value. All the communal facilities needed are available, such as schools, colleges, grammar schools, shops, open spaces and a hospital.

1.2 The accommodation takes the form of four rooms spread over two floors with a kitchen in an extension on the ground floor. They are built of bricks or rough blocks with walls 35 cm thick.

The buildings are sound and well-maintained and have tiled roofs but no WC or bathroom or any other means of heating except stoves. The kitchen only contains an old-fashioned sink and a cold water tap.

The gardens are cluttered with a variety of unattractive buildings - sheds and shelters with corrugated iron roofs, enclosures built of rough blocks with no surfacing, metal grids and concrete blocks.

2. PLANNING

The housing directorate of Houillères du Bassin du Nord et du Pas de Calais initially thought of achieving the aims of the Programme by the development of a three-dimensional cell which was to be prefabricated and was to form an external structure which gave modernisable housing such amenities as were missing (bathroom, WC, shed, etc.)

This cell proved in the case in question to be difficult to produce and expensive. When provided at ground floor level it was badly adapted to the needs for which it had been devised, as the bathroom was not accessible from the bedrooms on the first floor except by passing through the living room and kitchen.

The housing directorate of HBNPC therefore asked the firm of consulting engineers ETR (Etudes Techniques et Réalisations) in Lens to study the question of the modernisation of the Rollencourt housing.

Modernisation plans for two similar types of housing were drawn up (types I and III) with the idea of achieving a better layout of rooms and a standard comparable with that of moderate-rent housing of the HLM type.

Two pilot dwellings were modernised by the work being carried out in a traditional manner by the personnel of the Houillères housing department. Occupants were consulted on the plans through their trade union representatives on the works council. These were against the creation of accommodation of type III with a kitchen of 7 sq.m. which was judged too small for the family to have meals together.

The overall project was made the subject of invitations to tender sent to a large number of construction firms and manufacturers of prefabricated elements.

The importance of the modernisation work in each dwelling, which had a time allowed for it of three weeks, resulted in the temporary rehousing of families in accommodation vacant among the 5,600 housing units owned by Houillères at Liévin.

Once tenders had been received, it was found that modernisation costs for the housing was high, particularly in the type III units, because of the large amount of traditional work involved.

Because of this, the owners decided intially to limit the work under the Experimental Programme to 90 type I dwellings which were apparently less expensive to modernize.

The date by which the work on the drainage system to which the modernized dwellings had to be connected, would be completed was impossible to determine, so that the supervisor was forced to reckon with delay to the whole modernisation project which went beyond the limits set for completion of the Experimental Programme. The result was that this project was eliminated from the Programme.

7. DESCRIPTION OF THE PROJECT

7.1 Main aims

- improvement of room layout
- creation of an entrance hall with a hanging cupboard, access to the dwelling being moved to the back of the building
- extension of the living room by the creation of a free area between the living room and the former ground-floor bedroom
- the main bedroom on the first floor was to be made independent
- the kitchen lighting was to be improved by enlarging the window
- provision of a complete bathroom with electric storage heater for hot water, wash basin, mirror, shelf, towel holder, and ceramic wall covering over most of the wall surface
- provision of a new kitchen with stainless steel sink unit with two sinks, 1.20 metres in length, two work surfaces, ventilators, lamp brackets and walls covered in pottery tiling
- the remaking and improvement of the electrical system (earths, flush switches and other fittings, lights with switches in more than one place, 16 amp and 10 amp sockets with earth for fridge, washing machine, dishwasher, etc.).
- prefabricated fitted cupboards when existing furniture of the occupants did not make them superfluous
- on the outside there was to be a cement-floored area

- Gardens were to be improved and fencing to be constructed of concrete posts and smooth timber planks, patios, levelling work, laying of concrete slabs at intervals of 10 cm, flowerbeds with edging of cast concrete and prefabricated garden huts arranged in twos.
- The access roads generally were to be improved while a drainage system was to be constructed by the municipal authorities as a first step.

7.2 Solutions involving prefabrication and new products

- inside partition walls of chipboard panels with finished appearance, easily and quickly drymounted
- doors, windows and frames
- lintels of reinforced concrete for all new or enlarged doorways and windows
- electrical system (plastics coated flexible tubing and fittings)
- prefabricated drain piping
- the work on the surroundings was to make great use of prefabricated elements: cast concrete sheds, edging, slabs and enclosures
- the sheds planned were to be composed of prefabricated, vibrated reinforced concrete elements bolted together with a plastic layer between each block to improve appearance and make for water tightness.

7.3 Traditional work

All other work: demolition, cutting and drilling, brickwork, coatings and surfacings for walls, plinths and mouldings, tiling and floor joints, paint joints, etc.

7.4 Extra work carried out under the heading of maintenance

None, since buildings were regularly maintained and in excellent condition.

8. THE EXPERIMENT

8.1 Approach to the work

Working on the basis of a project prepared so as to facilitate the use of a number of different techniques which had been put forward (dry partition walls, light panels, sanitary fittings of a type which made for quick assembly, etc.), those responsible launched a wide call for tenders.

Firms were asked to present their ideas as to both traditional solutions and those involving prefabrication. They were to keep cutting and drilling work to a minimum and group downward conduits together. No exit was to be permitted through the cellar walls. Drain connections of two houses built together should be combined.

Coordination of the work of individual firms was to be the responsability of the Houillères services and building department.

Prices were the results of invitations to tender and the most interesting solutions submitted were basically acceptable both in terms of price and technically.

8.2 Execution of work

Under the direction of the building and services department of Houillères, work was to be carried out by the following firms:

Main structure

(preparation of site, demolition, cutting, brickwork, surfacing, steel frames, roof, zinc work, drains, wall surfacing, floor surfacing, joinery, doors, windows, partition walls, fitted cupboards, enclosures, removal of debris and general clearing and cleaning)

Société Artésienne du Bâtiment et Matériaux (SABEM)

Electricals

Entreprise Lefranc Gérard
rue de Condé
62160 Bully les Mines

Sanitary fittings

Entreprise Ducatez
33, rue des Visages
62000 Arras

Sheds : Entreprise Jean René Brunon
19, rue du Dragon
75006 Paris

8.3 Schedule of work

The work schedule shows that the total amount of time allowed was twenty working days per dwelling. Five teams of workmen were to be involved:

Team 1	Number of da
- joinery (doors, windows, frames) removed with care	1.5
- outbuildings (brickwork, roof removed with care, filling work)	1
- apertures (doors, windows and fitted cupboard) including positioning of lintels	1
- low air inlets, ventilator grids	0.5
- flue in kitchen, fixing small block	0.5
- drains for sewage and rainwater - earthworks, drain, pipeline, connection to main drain	4
	8.5

Team 2 (beginning work on 5th day)	
- brickwork (partial blocking up of spaces and kitchen duct)	2
- concrete supports and thresholds	1
- access roads	3.5
- tiling joints	1
- coatings and surfacing (various wall surfacing and retouching)	1
	8.5

Team 3 (beginning work on the 7th day)	
- dry prefabricated partitions	2
- joinery, glazing, ventilation, painting	3.5
- shelves and cupboards	2
- work surfaces	8.5
	16.0

Team 4 (beginning work on the 12th day)	Number of days
- pipelines and sanitary fittings	6.5
- cleaning	1
	7.5

Team 5 (beginning work on the 11th day)	
- electricals	8.5
	8.5

Teams were to pass on from one dwelling to another without interruption.

9. RESULTS OF THE EXPERIMENT

9.1 Cost of work on all dwellings: 2,403,000 F

Cost per dwelling: 26,700 F

9.2 Analysis of average cost per dwelling

Nature of the works	Francs
A. Demolition	
Demolition and removal of debris	1,349
Total	1,349
B. Traditional work	
Brickwork and surfacing	2,410
Cement flooring etc.	92
Roofing / zinc work	264
Sanitary equipment	3,528
Joinery	794
Wall surfacing	394
Painting and glazing	61
Total	7,543

	Francs
C. Assembly of prefabricated elements	
Partition walls	1,382
Sanitary equipment (pipelines)	2,326
Windows	2,758
Electricals	2,631
Concrete sheds	2,940
Total	12,037
D. Surroundings	
Enclosures, walkways, patio	3,516
Concrete slabs for shed	118
Total	3,634
Cost of clearing dwellings	
(costs borne by occupants who do not pay rent)	0
Planning costs	2,086
Total cost per dwelling for a living area before and after modernisation of 70 sq.m.	26,649 to 26,700

10. FINANCING

Income:

a) Contribution from the employer and owner		
(loan at rate of 8 % for twenty years)	F	103,000
b) Aid from ECSC		
(loan at rate of 4-3/8 % for twenty years)	F	2,300,000
Total:	F	2,403,000

11. RENT AND PROFITABILITY CALCULATIONS

Under the mining statute, the accommodation is rent-free before and after modernisation.

The life of the accommodation will be more than twenty years.

Interests and repayment charges for finance related to a dwelling with a living area of 70 sq.m.

Source of funds	Amount	Interest rate	Period of loan	Annual charge	Monthly charge
ECSC loan per dwelling	F 25,555	4-3/8 %	20 years	F 1,944	F 162
Additional loan	F 1,145	8 %	20 years	F 117	F 10
	F 26,700	Total interest and repayment charges:		F 2,061	F 172

ROLLENCOURT –
Example of house capable of modernization in the Rollencourt estate

LENS LIEVEN The Rollencourt estate Condition of the environment

ECSC EXPERIMENTAL PROGRAMME

HOUSING MODERNISATION — ITALY

TECHNICAL DESCRIPTION OF THE SESTO SAN GIOVANNI PROJECT

Location	: Sesto San Giovanni (Province of Milan) Rovani District Via Fratelli Bandiera 200/202
Owners	: Istituto Autonomo per le Case Popolari della Provincia di Milano (IACPM) Viale Romagna, 26 20133 Milano
Supervisor	: Guido Veneziani, Architect Via San Simpliciano, 2 20121 Milano
Number of dwellings	: 103 apartments in two blocks, three and four floors
When built	: 1936 - 1937
Number of families before and after modernisation	: 92

The apartments are rented to families of workers in the steel and engineering industries. These workers are in part still in employment (22 %), the remainder being retired (32 %). There are also widows (11 %). There are also some families of civil servants still in employment (9 %) or retired (13 %), people in business (6 %) and various others (7 %).

The two-room apartments are on average occupied by two people and those of two and three rooms by 2.5 people.

A survey of all employed workers, not only heads of family, shows 40 % salaried workers, 31 % skilled workers, 6.5 % unskilled workers and 22 % in various forms of employment.

The age of heads of family is high: 46 % are over 65 years old and 40 % between 45 and 65.

Income breaks down as follows:

- less than Lit 75,000	30 %
- from Lit 75,000 to 150,000	34 %
- from Lit 150,000 to 225,000	14 %
- from Lit 225,000 to 300,000	14 %
- over Lit 375,000	8 %

1. LOCATION

1.1 The town of Sesto San Giovanni (approximately 90,000 inhabitants) forms part of the suburbs of Milan and is developed in the same way as that city.

The Rovanni district has 723 inhabitants and the workers living there are employed in the Sesto factory, Breda (900 metres), Marelli (1.5 km), Falck (3 km) and at Crescenzago in the Marelli factory there (6 km). They use various forms of transport: public transport (46 %), bicycle (30 %), cars (10 %), motorcycles (5 %) and the remainder go on foot.

The communal amenities are well distributed about the centre of the town: schools, libraries, supermarkets, gardens, public playgrounds, sports facilities, swimming pools and tennis courts, hospitals and dispensaries, religious buildings. All main services are available. There is no development plan threatening the housing to be modernized.

1.2 The buildings are of brick and were constructed by the employer with government aid. They are sound and attractive in appearance. They are in a passable state generally. The balconies need weather-proofing.

There are three types of dwelling:

	Monthly rent
- one-roomed (living area 28 sq.m.)	about Lit 2,000
- two-roomed (living area between 31 and 41 sq.m.)	from Lit 2,000 to Lit 4,000
- three-roomed (living area between 45 and 52.5 sq.m.)	from Lit 4,000 to Lit 4,500

These rents are the result of legal provisions (T.U. 28 April 1938 No.1165, Law of 23 May 1964 No.655) - Decree of 24 July 1973 No.426 on modernisation, which became Law of 4 August 1973 No.495 and Law of 22 December 1973 No.481 extending the foregoing.

The monthly charges vary between Lit 1,200 and 3,600 without heatir (Lit 45,000 to 60,000 per year).

The apartments have high ceilings but medium-size rooms, kitchens that are too small (1.8 to 3.3 sq.m.) and bathrooms which are ill-equipped (1.4 to 2.5 sq.m.).

Kitchens are equipped with gas, running water and a sink but have no fitted cupboards. The electrical fittings are insufficient and not reliable. Heating is by stove (oil 63 %, coal 19 %, gas 8 %). There is only one flue serving all the rooms.

The common dustbin areas are enclosed and without ventilation and are in bad condition. There is nowhere to put bicycles or prams. Cars are parked outside. Only ten dwellings on the ground floor have a small yard measuring between 30 and 40 sq.m.

The outside lighting is inadequate.

2. PLANNING

A working party was set up by the owners, the architect and the National Institute (AIRE). The future standard of the apartments was laid down and research immediately set in hand among manufacturers and contractors.

Since it was planned to enlarge the kitchens by an annex research was directed towards manufacturers of light façade panels made of expanded clay concrete and for the bathrooms and WCs towards manufacturers of prefabricated walls with built-in connections.

From the outset occupants were kept informed as to the aims of the Programme by means of a number of general meetings of the tenants and then in smaller meetings with their representatives. These meetings made it possible to gather information as to the state of the dwellings, the requirements to be met as priority and to receive suggestions as to the arrangement of rooms. Once planning had been made possible, the families concerned were all interviewed and the data of a sociological nature which was collected on record cards included information on families, work already carried out (amounts and dates) and the result of the discussion of the proposals.

The attention of occupants was concentrated on two aspects of the work planned: the installation of district central heating and the fitting out of kitchens and bathrooms. Attitudes were positive as far as the heating was concerned because of the expense involved for inadequate heating. Occupants were less forthcoming on the other points because retired people with low incomes were very much in fear of increased rents.

Occupants were to be left in residence while the work was being done. The kitchen and bathroom were to be isolated from the rest of the house so that work could proceed without affecting the other rooms. Tenants approved there arrangements. Each apartment was to be provided with a cooker with a bottle of liquid gas. The power was not to be cut off in the various rooms during work. Hot water was to be provided through a provisional connection to a sink installed on the balcony or inside the house. Mobile WCs were to be connected to the main water and sewage systems.

3. OVERALL PLAN OF SITE

See plans and photographs.

4. PLAN OF DWELLINGS BEFORE AND AFTER MODERNISATION

5. APPEARANCE OF DWELLINGS BEFORE MODERNISATION

6. SURROUNDINGS

} See plans and photographs.

7. DESCRIPTION OF THE PROJECT

7.1 Main aims of the project

- To enlarge the kitchen and equip it with a sink with drain.
- To provide a connection for a gas cooker and one for the fridge.
- To provide hot water at the sink and sanitary fittings.
- To instal a bathroom with hip bath, wash basin, bidet, WC, washing machine connection and mechanical ventilation system giving twelve renewals of **air** each hour.
- The central heating was to operate by means of radiators and be connected to the district heating provided in 1972 by the Autonomous Institute for People's Housing for all accommodation owned by it in the district.
- The existing flues are to be replaced by a duct for the water heater, which was to operate on gas, and another duct in the kitchen.
- The opportunity was to be taken to replace some of the woodwork, and the risers and horizontal conduits for water and electric wiring, as also the internal gas pipes as far as the actual appliances. Outlets were to be remade and modernized.
- In the common parts of the buildings, stucco on the walls was to be replaced by coatings of plastics material. The inside and outside woodwork was to be repainted.
- The heat insulation of the roof was to be improved.
- The area of the refuse area was to be enlarged and the floor and walls redone.
- The lighting in the cellars was to be improved and the floor and wall coverings partly renewed. One third of the floors of cellars and passages was to be brought up to standard.

- The common area serving as a laundry was to be converted into a meeting room. Old sheds were converted into bicycle and pram sheds.
- Provision was to be made for drying clothes by the equipping of three basement rooms with heater fans and aspirators.
- Outside playgrounds were to be provided for children and the courtyard lighting improved.

7.2 Solutions requiring prefabricated elements

- The bathroom was to be equipped with a unit composed of a prefabricated wall with pipes built-in, made of expanded concrete and containing the inlet and outlet pipes for bath, WC, wash basin, bidet, washing machine and kitchen sink.
- The annexes to the kitchen were to be made of light prefabricated panels of expanded clay concrete and metal frames. The decorative coating already incorporated in the concrete was of coloured plastic granules.
- The prefabricated roof components were to be of expanded clay concrete.
- The pipes were to be prefabricated with ventilator pipes and outlets in PVC.

7.3 Traditional work

Everything else.

7.4 Extra work carried out under the heading of maintenance

Repair, restoration and maintenance work is included in the work planned under the Experimental Programme.

8. THE EXPERIMENT

8.1 Approach to the work

The planning work was carried out on the basis of budget forecasts calculated using the prices of the IACPM of the Milan Chamber of Commerce with special analyses of certain items.

The following were the conditions stipulated for the firms doing the work:

a) tenants to be kept in residence during work
b) kitchen and bathroom to be separated from the remainder of the apartment using prefabricated partitions
c) temporary supplies of water and liquid gas, common WCs to be provided in the courtyard or individual WCs on balconies.

The solution of WC cabins with connected sinks which could be moved on scaffolding from one staircase to another was to be adopted.

The total time was fixed at twelve months, six of which were to be devoted to inside work on apartments and stairways. The architect was to be responsible for coordination.

8.2 Execution of work

The architect launched an official call for tenders from a small firm, a medium-size enterprise and a large firm using prefabrication techniques. The quotations were acceptable but Italian law does not allow variants in public invitations to tender. The revision of prices and acceptance of variants would therefore have placed the supervisor in a difficult position since the work was put out to tender on 24 January 1972. The initial estimates of Lit 260 millions had risen to nearly Lit 500 millions so that the supervisor decided to abandon the project.

The prices asked may be explained as follows:

- The particular situation of the Italian building market (continued rises in price from the start of the project early in 1971).
- Fear on the part of firms to enter into a new project of which they had no experience and because tenants were to remain in their homes during work.
- Refusal by the local authorities to accept any deviation from the regulations in favour of bathrooms and WCs in a central position in the apartments with indirect or forced ventilation.

The difficulties encountered, the work involved and the delays which occurred had a cumulative effect on prices, which rose. Although the project was abandoned, tenants benefited from being connected to the district heating system and the repair of their roofs.

8.3 Schedule of work

The work was to fall into three stages:

- work in cellars and basements
- work inside the buildings
- outside work, provision of playgrounds and parking areas.

The total time scheduled was one year. The first three months were reserved for:

- organisation of the site
- obtaining materials (panels, prefabricated walls with built-in pipes for bathrooms, structural panels, etc.)
- work on the two sample apartments and provision of communal amenities in the courtyard laundries
- work on the roof
- erection of steel structures to support the prefabricated panels
- provision of loggias in apartments with no balconies, to the right of the kitchen
- the provision of water pipes in the basement
- connections to main drains in the cellar
- the provision of toilet facilities and sinks on the balconies of the first block of apartments to be dealt with (including necessary connections).

The following six months were scheduled for work inside the apartments (provisional toilet facilities and sinks):

- demolition work
- positioning of prefabricated walls with built-in pipes and connections to sanitary equipment
- risers for water, downpipes, secondary ventilation ducts, ventilation of bathrooms and kitchens
- renewal of electrical system in the bathroom and kitchen and connection to the meter
- plastering and doors

- final gas connections
- installing of main wall panels and outside joinery work
- provision of outside wall coverings and tiling
- removal of provisional partitioning, fittings of doors and sanitary equipment.

The last three months were allowed for:

- the remainder of the work to be carried out inside the apartments
- modernisation of façades
- modernisation of staircases, electrical cables and communal TV aerial
- modernisation of cellars and refuse areas
- provision of sheds for bicycles and prams and equipping of drying rooms
- improvement of courtyards (lighting, drainage of rainwater, paving, gardens).

9. RESULTS OF THE EXPERIMENT

9.1 Cost of work on all apartments

Since the tenders were not successful, we shall base figures here on the original estimate of Lit 260,000,000.

9.2 Analysis of average cost per dwelling

	Lit
- general organisation of work	48,900
- work inside apartments	1,121,700
- repair of roof and extension	217,400
- general pipe systems, demolition and renewal of flues, mechanical extractors, heating	663,000
- modernisation of staircases	87,500
- modification and resurfacing of façades	110,900
- surroundings, meeting hall, drying room, parking areas and gardens	196,200
- bicycle and pram sheds, unforeseen expenses and price revision (15 %)	380,400
Total	2,826,000

Average living area before modernisation: 41 sq.m.
after modernisation: 48 sq.m.

10. FINANCING

Finance was assured by an ECSC loan of Lit 125 million and a subsidy from the owners of Lit 136 million, which together covered the estimated cost of the work.

Because tenants were all in the low income group and included many retired people, it was necessary to ensure that the monthly rent should not rise above Lit 4,000 per room. To ensure this the owners agreed to make an additional annual contribution amounting to 25 % of the amount due for repayment and interest on the ECSC loan for twentyfive years. This in practice meant that the period for repayment of the ECSC loan was extended to 35 years.

Hence tenants were only to be asked to bear a rent increase of 75 % of the charges of servicing the ECSC loan.

11. RENT AND PROFITABILITY CALCULATIONS

Average monthly rent in Lit	per sq.m.	per room	average apartment
before modernisation	80	1,097	3,830 (41 sq.m.)
after modernisation	161	2,200	7,680 (48 sq.m.)

Other monthly charges after modernisation	Lit
- water, lighting, waste disposal, drainage, concierge	2,780
- heating	2,920
- total other charges	5,700

Cost of interest and repayment of various sources of finance expressed in terms of average apartment of 48 sq.m. living area.

Source of funds	Amount per average dwelling Lit	Rate of interest	Period of repayment	Annual charge Lit	Monthly charge Lit
ECSC loan	1,358,696	1 %	25 years	61,960	5,164
IACPM subsidy	1,467,391				
IACPM contribution of 25 % to cost of repayment and interest charges on ECSC loan, deduct				15,490	1,291
Total charges covered by rent increase				46,470	3,873

SESTO SAN GIOVANNI — Apartment blocks included in the experimental programme of modernization

SESTO SAN GIOVANNI — Apartment blocks included in the experimental programme of modernization

TECHNICAL DESCRIPTION OF THE LA SAUVAGE PROJECT

Location	: La Sauvage estate in the commune of Differdange
Owners	: Minière et Métallurgique de Rodange, Rodange
Supervisors	: Minière et Métallurgique de Rodange, Rodange
Contractors	: Marcel Jeannot, ex. architect, engineer Avenue Clémenceau 78170 La Celle Saint Cloud (France)
	: Paulin Niederkorn, Staff engineer with Minière et Métallurgique de Rodange, Head of "Buildings" Department.
Number of dwellings	: 88 on two floors in terraced housing
When built	: between 1922 and 1927, and 1946
Number of families before and after modernisation	: 88

The accommodation, which is let to families of workers in the iron or mines (85 %) and steel industry (15 %) is the property of Minière et Métallurgique de Rodange. The average number of children is 1.5 per household.

1. LOCATION

1.1 La Sauvage estate

La Sauvage, a small settlement of 520 inhabitants, is situated on the French frontier five kilometres from Rodange in a very attractive wooded district.

The terraced houses were built between 1880 and 1946, as were a school, a church and a number of shops. Minière et Métallurgique de Rodange, owner of the 121 dwellings, decided to hand them over to their occupants. Tenants pay rents of between 300 and 600 LF (Luxembourg francs) on average for a house with three rooms, garden and garage. The company has also arranged to hand over to the commune of Differdange the roads and collective amenities in its possession.

1.2 Accommodation and surroundings

The accommodation is generally of three rooms with rustic kitchen and the houses are built of stone with walls between 40 and 60 cm thick. Some roofs are in need of preventive maintenance. The wooden floors are in good condition. The cellars have concrete floors. The rooms are of medium size, stairways are narrow and steep. There is no bathroom or central heating.

The natural surroundings are excellent.

There is also a series of 56 identical houses with three rooms (type B) with two floors with a raised basement at the back because of the steep slope of the land.

The inhabitants expressed their desire for their accommodation to be modernised and asked for a bathroom, kitchen modernisation and a better power supply. Some of them had made some attempt to improve matters themselves.

The roads, water mains, drainage, electricity and street lighting were in need of substantial overhaul, the estimated cost of which was LF 23,500,000.

The Ministry of the Interior, the Commune and the Société Minière et Métallurgique de Rodange declared their readiness to share the expense.

Having collected firm undertakings to purchase, Minière et Métallurgique de Rodange approached the ECSC as a source of favourable finance for its employees in order to enable them to purchase the property.

Since it did not seem advisable to encourage the purchase of accommodation which was in a state of disrepair and without modern amenities, the Experimental Programme was to provide the means of modernizing the accommodation.

2. PLANNING

The 121 dwellings at La Sauvage could not all be dealt with. The bad state of some of the houses, the improvements which some families had already made of their own accord and the fact that there was an underground mine in the vicinity reduced the number of dwellings worth modernising to 88. It was decided to test out industrialised methods of modernisation on the series of 56 identical houses.

Consultation with experts

The owners of the property have a Building Department with an engineer in charge and a New Building Department which was concerned with the new building of offices and mechanical installations.

A technical expert, who was also a former architect, assumed the role of supervisor and worked with the Head of the Building Department.

In the absence of any national building research institute, the Centre Scientifique et Technique du Bâtiment in Paris was consulted on the project.

Teamwork

The only firms in the locality were small firms working on a small scale. It was therefore found necessary to approach manufacturers and firms in neighbouring countries. The little importance of the project, with no possibility of extension, did not attract industrial firms to develop new techniques or new commercial structures. With the help of the CSTB, manufacturers with some interest in the modernisation of housing were sought out.

There were very few manufacturers who had already produced prototype or pre-series models of new products meeting the requirements of speed of assembly, cleanliness, economy and flexibility.

A first group of two manufacturers was chosen. One of these was a producer of sanitary installations and was just about to launch a compact bathroom which could be connected up to the mains in a matter of minutes. The second was a manufacturer of chipboard and plywood, both of which are materials particularly suitable for interior walls, kitchen furniture, work surfaces and fitted cupboards, linings, cladding, etc., and had a large design studio.

Procedures followed and methods used

The two manufacturers were asked to present complete units or prefabricated elements which could be installed with a minimum of labour force. They were not asked to work only with the La Sauvage project in mind but to experiment on this project with products which were very flexible in use. The supervisor was to do everything possible to facilitate the use of such products.

Local firms were suggested by the manufacturers for the actual installation work. The number of firms involved was to be reduced to two. A direct agreement was to be signed with these firms and the Building Department undertook to be responsible for any work of coordination.

Involvement of tenants

The two operations of purchase and modernisation were suggested to the families by the owners.

It was advisable to offer miners who were earning good salaries of between LF 18,000 and 20,000 per month but not saving much, a plan of financing which did not involve a lumpsum contribution on their part. The monthly expense of a combined interest and repayment of capital which could be borne was in the region of LF 2,000 per month.

The first meeting held to inform tenants of the project was an uproar. Two newspaper headlines give some idea of how the news was understood in some quarters: "The village of La Sauvage is for sale" and "One hundred families thrown out of homes".

A tenants' defence committee was set up with staff representatives known for their realistic and constructive outlook. They made a number of points, among which was the fact that the houses had long ago paid for themselves and that the price was too high. The problem of repairs was raised. Many occupants maintained that they could do the modernisation work themselves with less expense.

Minière et Métallurgique de Rodange agreed to be responsible for repairs to the roofs and for engineers' fees.

A second meeting resulted in 50 % of those present voting in favour of the project. The first plans put forward were criticized in that the families already owned large cupboards and did not want prefabricated fitted cupboards. Some people criticized the location of the bathroom on the first floor because it reduced the bathroom area.

Families (*) wishing to gain extra space in their houses used as a kitchen the enormous basement which looked out on to the garden. They like this arrangement despite its depth of two metres below ground and wanted the bathroom to be installed there.

(*) These were subsequently to turn out to be 30 of the 56 families

Although it seemed reasonable to provide a kitchen with dining facilities on a level with the garden, which meant lowering the ground floor one storey, it was difficult to accept the idea of the bathroom low-down in the house, damp and, especially, difficult to reach. To get there would involve going down two floors and crossing the hall.

In the course of a third meeting the plans were explained and the position of the bathroom was the subject of some discussion. The families concerned had obviously no experience of such things, some of them were accustomed to washing in the kitchen and this, as we have mentioned, was in the basement.

The project supervisor pointed out that experience had shown that people appreciated a bathroom near the bedrooms. Although the parents might see things one way, their children and future would-be purchasers of the houses would see things differently and the value of the houses would be reduced.

The people prepared to purchase their houses hardened in their attitude so that the Commission of the European Communities, anxious to assist the families living in this isolated and enclosed environment, decided to leave the choice of modernisation plans to the purchasers and the question of the complete redevelopment of the basement to make it habitable with the possibility of one day bringing the bathroom up to the first floor was given consideration.

The tenants' representative committee met without the project supervisor being present so that they could talk freely. At most a dozen of the purchasers favoured one or other aspect of the project and all that the supervisor could do was to record the situation which make the carrying out of the programme impossible.

Leaving occupants in residence

With the project planned as it was, it was not intended to move the occupants from their homes while work was going on.

The latter were aware that everything possible would be done to keep annoyance to a minimum and if the basements had been converted, there would have been no difficulty in the families taking their meals in the original kitchen on the ground floor.

3. OVERALL PLAN OF SITE

4. PLAN OF DWELLINGS BEFORE AND AFTER MODERNISATION

5. APPEARANCE OF DWELLINGS BEFORE MODERNISATION

6. SURROUNDINGS

see plans and photographs

7. DESCRIPTION OF THE PROJECT

7.1 Main aims of the project

The only project approved provided for

1/ the installation of a prefabricated bathroom on the first floor

2/ the extension of the landing and the provision of a door to make a separate room

3/ the provision of three fitted cupboards occupying a total of 2 sq.m. of floor space

4/ a kitchen-diner to be provided with a stainless steel double-sink unit, an electric point and a gas connection for a gas cooker, a connection for a washing machine and upper and lower ventilators

5/ individual propane gas central heating with cast iron radiator, the boiler to provide the hot water for the sink and bathroom

6/ the overhaul of the houses' electrical system with, in each room, a light connection on the ceiling, two electric points, connections for domestic appliances, a light above the wash basin and above the kitchen work surface.

Propane was to be supplied from two communal tanks with a capacity of 50 cubic metres and 30 cubic metres respectively which were to be installed by the firm contracting for the supply of gas.

The second project which met the wishes expressed by the occupiers of the houses involved the complete overhaul of the basement premises, the depth of which was to be increased to give it a height of 2.20 metres, a kitchen diner with an area of 15 sq.m., fully equipped, the replacement of the door to the garden by a glass door, the creation of a cellar and of a bathroom with WC. The basement staircase was to be provided with a ramp.

7.2 Prefabricated products and new techniques

The compact bathroom provided for is a unit comprising a wash basin measuring 56x42 cm with a mixer tap and a built-in bath of enamelled steel, 1.60 metres long and with a mixer tap and flexible shower attachment. All these items are connected to a mains unit. This is installed when the room is finished.

It has three connections, the first to a threaded cold water tap, the second to a threaded hot water tap and the third to the drain.

The walls of the bathroom were to be of prefabricated elements based on chipboards panels with a finished thickness of 50 mm. These are covered in PVC and are dry-mounted and secured to the door unit. The existing bathroom walls are clad with 18 mm thick panels with a shelf, a mirror and a light above the wash basin.

Wallcupboards were to be prefabricated of chipboard panels covered in laminate.

The bathroom floor was to be covered with welded plastics material bonded to panels of chipboard screwed to the parquet.

The kitchen was to be equipped with a stainless steel sink 1.50 metres long mounted on a laminated clad unit.

7.3 Traditional work

- demolition of first floor inside walls
- drilling and cutting
- installation of radiators and pipes
- installation of the mixed boiler with incorporated tank and expansion vessel
- installation of propane conduit system for the boiler and washing machine
- various minor items of joinery
- electrical work.

7.4 Extra work carried out under the heading of maintenance

Repair of various roofs.

8. THE EXPERIMENT

8.1 Approach to the work

The manufacturers invited to cooperate in the research work for the project were themselves two groups of firms. These groups were to be made to compete with local firms.

The firms engaged would have had to draw up the schedule, keeping it within a period of five months. The period of work on each house was to be two weeks.

If the second project, which involved a considerable amount of traditional bricklaying and masonrywork had been adopted, the time taken would have been considerably longer.

9. RESULTS OF THE EXPERIMENT

9.1 Cost of work estimated for 88 dwellings: LF 13,500,000

Average price per dwelling: LF 153,400

Living area before modernisation: 61.15 sq.m.

after modernisation: 60.85 sq.m.

(The variant with converted basement would have increased the living area to 84.50 sq.m.)

9.2 Analysis of average cost per dwelling

Type of work	Luxembourg Francs
A. Demolition	
Demolition and cutting work	8,800
Total	8,800
B. Traditional work	
Brickwork and concrete (cement joints)	4,100
Distribution of propane	900
Electrical installation	19,800
Hot and cold water pipes	2,000
Heating	69,300
Joinery : doors	2,900
: various	4,000
Painting (joints)	1,000
Total	104,000
C. Assembly of prefabricated elements	
Inside walls and cladding	15,000
Floors and plastics flooring	2,300
Sanitary equipment	9,900
Door unit	3,000
Kitchen sink unit	9,000
Fitted cupboards	2,000
Total	41,200
Total costs of planning and fees	6,000
Total costs per average dwelling	161,000

10. FINANCING

The Caisse d'Epargne (savings bank) normally grants loans of 60 % of the purchase price at a rate of 5.5 % for a period of twenty years. The combination of the financial aid from the ECSC and the possibilities offered by the Caisse d'Epargne were to result in a loan amounting to 90 % of the total cost (purchase and modernisation) for a period of twenty years at a rate of interest of 3.5 %. Minière et Métallurgique de Rodange were to guarantee the extra loan from the Caisse d'Epargne.

The Luxembourg Government makes grants for the purchase of a family home in the region of LF 50,000 and improvement grants of the order of LF 20,000. These grants will depend upon the composition of the family.

Minière et Métallurgique de Rodange assumed responsability for the fees of the supervisor and the costs of planning incurred by its own departments.

11. RENT AND PROFITABILITY CALCULATIONS

Rent before modernisation: from LF 300 (two rooms) to LF 600 (five rooms)

Probable life of dwellings: more than twenty years.

Interest charges and cost of paying off the various means of finance expressed in terms of an average dwelling of 62 sq.m. living area:

Source of funds	Amount in LF	Interest rate	Period of loan	Annual charge	Monthly charge
				Luxembourg Francs	
Mixed loan from Caisse d'Epargne and ECSC partly guaranteed by Minière et Métallurgique de Rodange	300,000	3.5 %	20 years	21,000	1,750
Subsidies:					
Average government purchase grant	30,000				
Average government improvement grant	25,000				
Société Minière et Métallurgique de Rodange planning costs and fees	6,000				
	361,000				
Total interest and repayment costs to house purchasers:				21,000	1,750

LA SAUVAGE –
La Sauvage estate
Houses on two levels to be modernized
Street facades

LA SAUVAGE –
Houses on two levels to be modernized
The basement, at garden level, is made habitable

LA SAUVAGE –
Other types of houses to be modernized

ESCS EXPERIMENTAL PROGRAMME

HOUSING MODERNISATION — NETHERLANDS

TECHNICAL DESCRIPTION OF THE MARIA CHRISTINA PROJECT AT HEERLEN

Location	: Heerlen, "Maria Christina" district of Heksenberg
Owners	: Jointly owned fund of two miners' associations (AMF and BFM)
Supervisors	: Union of Mining Companies of Limburg
Contractors	: M.G. TUMMERS, Akerstraat 92, Heerlen
Number of dwellings	: 106 one-family houses on two floors. (The dwellings of the Experimental Programme form part of a project regrouping all the owners' modernisation work on dwellings in the district, in all 240 dwellings)
When built	: 1943 - 1946
Number of families before and after modernisation	: 106

The dwellings are occupied by families of miners still employed (38 %), of former miners who have transferred to other industries (35 %), retired miners (19 %), miners' widows (5 %) and some families of labourers in the steel industry (3 %). Heads of families are of fairly advanced age. 80 % are between 45 and 65 years of age and 20 % are less than 45. These are mainly unskilled workers (83 %).

There are a few skilled workers (15 %) and very few salaried workers (2 %). About half the workers are employed by ECSC industries, the number of occupants per dwelling averages 4.25.

1. LOCATION

1.1 The Maria Christina complex forms a part of a fairly isolated part of the town of Heerlen (75,000 inhabitants) in Limburg. The dwellings to be modernized are linked to the centre, which is three kilometres away, by a bus service. The tenants are between two and ten kilometres from their places of work. They have in the immediate vicinity of their homes all the collective amenities necessary: elementary and secondary schools, shopping centre, sports facilities indoor and outdoor, swimming pools, theatre, cinemas, two museums and natural parks. Employment prospects are good and the community is expanding.

Communal amenities are becoming more plentiful and it is not planned to demolish any buildings for town planning purposes for the next twenty years.

1.2 The one-family houses are attractively designed and were built of bricks during the last war by the Algemeene Volksvestiging N.V. of The Hague, and after the liberation were completed by the National Mining Company and the Orange Nassau Mining Organization. They became the property of the Mining Foundation which used them as low-rent housing.

Because of the housing crisis tenants were obliged to accept co-tenants for some time. To assist in this arrangement, the bathroom was converted into a kitchen and the WCs were shared by both families.

Accommodation is of three types, the appearance and general characteristics of which are similar:

		monthly rent
Type RE I.5	: 6 rooms with a living area of 79 sq.m.	Fl 110
Type RE II.6	: 6 rooms with a living area of 71.5 sq.m.	Fl 110
Type RE III.6	: 6 rooms with a living area of 67 sq.m.	Fl 110

Their general state was unsatisfactory. Although the main structure and the tiled roof were in a good state of repair, the maintenance of the dwelling left something to be desired.

The living room (18 sq.m.) was too small in relation to the area of the four bedrooms. The kitchen was poorly equipped with a cumbersome draining board at an awkward height and a cast-iron sink. The bathroom was equipped with a small wash basin and an old fashioned bath. The heating was by means of coal or gas-fired stoves. Windows were divided into small squares with numerous panes difficult to clean. Some opened outward.

Electric wiring was in need of renewal and lighting points and electric sockets improved.

The vast basement area was only accessible from outside and could not be used easily for children's prams and bicycles. Some tenants had been forced to build lean-to sheds.

There was no place for dustbins.

Behind the dwellings the private gardens were used for vegetables or cluttered with pigeon-houses and incongruous huts.

There were no parking or garage facilities.

2. PLANNING

Consultation with experts

Prefabrication was not much known in the district, with the result that the owners and supervisor and the National Institute fixed as their main objective the rationalization of modernisation work. They also had to take into account the commune's wish that the outside of buildings should not be altered.

It was decided to entrust the work to two firms chosen because the work could be divided between them.

All the work was to be ultimately made the responsability of a single firm. The installation of central heating was entrusted to a plumbing firm because of the favourable price quoted.

Involvements of tenants

The four sample dwellings were modernized with the cooperation of their occupants. In the course of various discussions, they were shown the plans and account was taken of any requests for changes to the living room. The work was approved with the exception of bathroom and outside sheds.

A survey with written replies was organised to obtain the opinion of all occupants on a proposal for individual gas central heating.

During a meeting of the Dutch Catholic Trade Union, Heksenberg section, which was attended by a large number of the tenants, the final plans were discussed and rent increases formulated. Government subsidies available for improvements to dwellings and districts were referred to.

Independently of the Experimental Programme, tenants were informed of the decision to remake the entrance doors and windows.

Tenants were informed of the modernisation individually and the supervisors set up an information centre of which 90 families took advantage.

A committee of tenants assisted by religious institutions and trade union organisations summoned meetings which were attended by nearly 160 tenants and points agreed to were recorded.

Steps were taken to keep tenants in residence during the work. The enlarging of the living room which was to involve the removal of the rear wall of the house was separated from the part of the house being lived in and furniture storage facilities were made available. Only one tenant asked to terminate his lease.

An empty dwelling was made available to those who for special reasons of age, health or family could not stay in their own homes.

3. OVERALL PLAN OF DISTRICT

See plans and photographs.

4. OVERALL PLAN OF DWELLINGS BEFORE AND AFTER MODERNISATION

5. APPEARANCE OF DWELLINGS BEFORE AND AFTER MODERNISATION

6. SURROUNDINGS BEFORE AND AFTER MODERNISATION

See plans and photographs

7. DESCRIPTION OF THE PROJECT

7.1 Main aims of the project

- Enlargement of living room by adding an extension to the rear of the building.
- Equipping of kitchen with stainless steel sink unit 1.70 metres long with three doors, fitted cupboard hung on wall with two doors. Protection of walls, largely with ceramic. Provision of connection for washing machine and possibility of one for dishwasher.
- Replacement of bathroom by a room with shower cabinet and wash basin. A WC was installed in the new shower room.
- Provision of individual gas central heating with mixed generator for hot water supply for bathroom, to be located in the basement.
- Demolition of existing annexes. Construction of garages behind buildings with new access road. Paved walkways, kerbs, concrete and wooden separations between houses to improve the appearance of the surroundings.

7.2 Solutions involving prefabrication and new products

- Living rooms were enlarged and a number of kitchens provided by erecting an outside extension to the main building using prefabricated elements. The floor of these rooms was a sheet of reinforced concrete.
- The roof was composed of woodwork covered with plastics material with glass wool insulation. Metal lintels were inserted beneath the bearing walls for the open façades.

- The outside walls were composed of wooden joinery and light metal elements, the external surfaces of which were plastic-coated. One inside wall was made of squares of plasterboard.
- The kitchen was equipped with a prefabricated sink unit and wall-hung fitted cupboard.
- The kitchen floors were covered with a coating of bonded plastics material with small stones in different colours embedded in resin.
- Garages and sheds were prefabricated.
- Walkways were made using prefabricated slabs and enclosures with prefabricated elements of concrete or wood, as most suitable.

7.3 Traditional work

Brickwork, plumbing, central heating, electrical installations and painting.

7.4 Extra work carried out under the heading of maintenance

Replacement of doors and windows.

8. THE EXPERIMENT

8.1 Approach to the work

Once the price had been discussed on the basis of the costs involved for the work on the four sample dwellings, the owners placed orders with one or two firms who were in competition.

The prefabrication techniques were adopted whenever their cost was no higher than that of tradition methods.

The organisation of the work and its coordination was discussed with the firms. It was decided to use a travelling crane able to move between lines of houses so as to serve the rear of twelve houses at a time. This system helped to reduce the total working time on a single dwelling to six weeks.

8.2 Execution of work

The contractor was responsible for coordinating 46 successive operations by his various teams.

The work on the 240 dwellings took a total of eighteen months.

The 106 dwellings covered by the Experimental Programme were the first ones commenced and were completed according to schedule in a total of ten months.

9. RESULTS OF THE EXPERIMENT

9.1 Cost of work on 240 dwellings

A. Construction work

92 dwellings type RE I-5 à Fl 29,433 =	Fl 2,707,850
43 dwellings type RE II-6 à Fl 29,786 =	Fl 1,280,830
104 dwellings type RE III-6 à Fl 28,890 =	Fl 3,005,560
Caretaker's accommodation	Fl 11,760
	Fl 7,005,000

B. Additional costs

Planning, consultations and supervision - Various expenditures and loss of interest during work	Fl 315,000

C. Loss of rental

during work on twenty dwellings and reimbursement to occupants of one month's rental	Fl 50,000
TOTAL:	Fl 7,370,000

9.2 Analysis of average cost per dwelling

Average living area before modernisation: 72.50 sq.m.
after modernisation: 99.80 sq.m.

Type of work	%	Cost in Fl	
		per dwelling	per sq.m. living area
A. Demolition			
Demolition and removal of debris	5.10	1,488.00	14.04
Total	5.10	1,488.00	14.04
B. Traditional work			
Brickwork and concrete	17.35	5,062.00	
Joinery	4.87	1,421.00	
Roofing	0.75	218.00	
Coatings/coverings	1.24	362.00	
Plumbing	0.68	201.00	
Gas supply	0.53	155.00	
Power supply	3.62	1,057.00	
Water supply	3.34	976.00	
Drainage	4.11	1,200.00	
Sanitary equipment	0.55	159.00	
Heating	18.23	5,322.00	
Windows	0.21	62.00	
Doors	0.68	199.00	
Wall coverings	4.11	1,200.00	
Painting and glazing	8.32	2,430.00	
Metal doors	1.02	295.00	
Earthworks	0.55	158.00	
Total	70.16	20,477.00	193.18
C. Assembly of prefabricated elements			
Inside walls	3.77	1,099.00	
Doors	0.82	241.00	
Kitchen equipment	1.72	497.00	
Façade panels	0.58	169.00	
Total	6.87	2,006.00	18.92
D. Surroundings			
Roads and walkways	1.08	317.00	
Terraces	2.45	715.00	
Sheds	7.39	2,156.00	
Total	10.92	3,188.00	30.08

E. Accessory work

Removal of debris	0.46	134.00	
Cleaning	0.27	79.00	
Out-buildings	0.27	79.00	
Unforeseen	5.95	1,737.00	
Total	6.95	2,029.00	19.14
Building costs only	100.00	29,188.00	275.35
Additional costs		1,312.00	12.37
Loss of rental		208.00	1.96
Total modernisation costs		Fl 30,708.00	Fl 289.68

10. FINANCING

a) E.C.S.C. loan	Fl 724,000
b) Private capital from pension funds of AMF and BFM	Fl 6,647,000
	Fl 7,371,000

11. RENT AND PROFITABILITY CALCULATIONS

Average monthly rent before modernisation: Fl 123.00
after modernisation: Fl 203.00

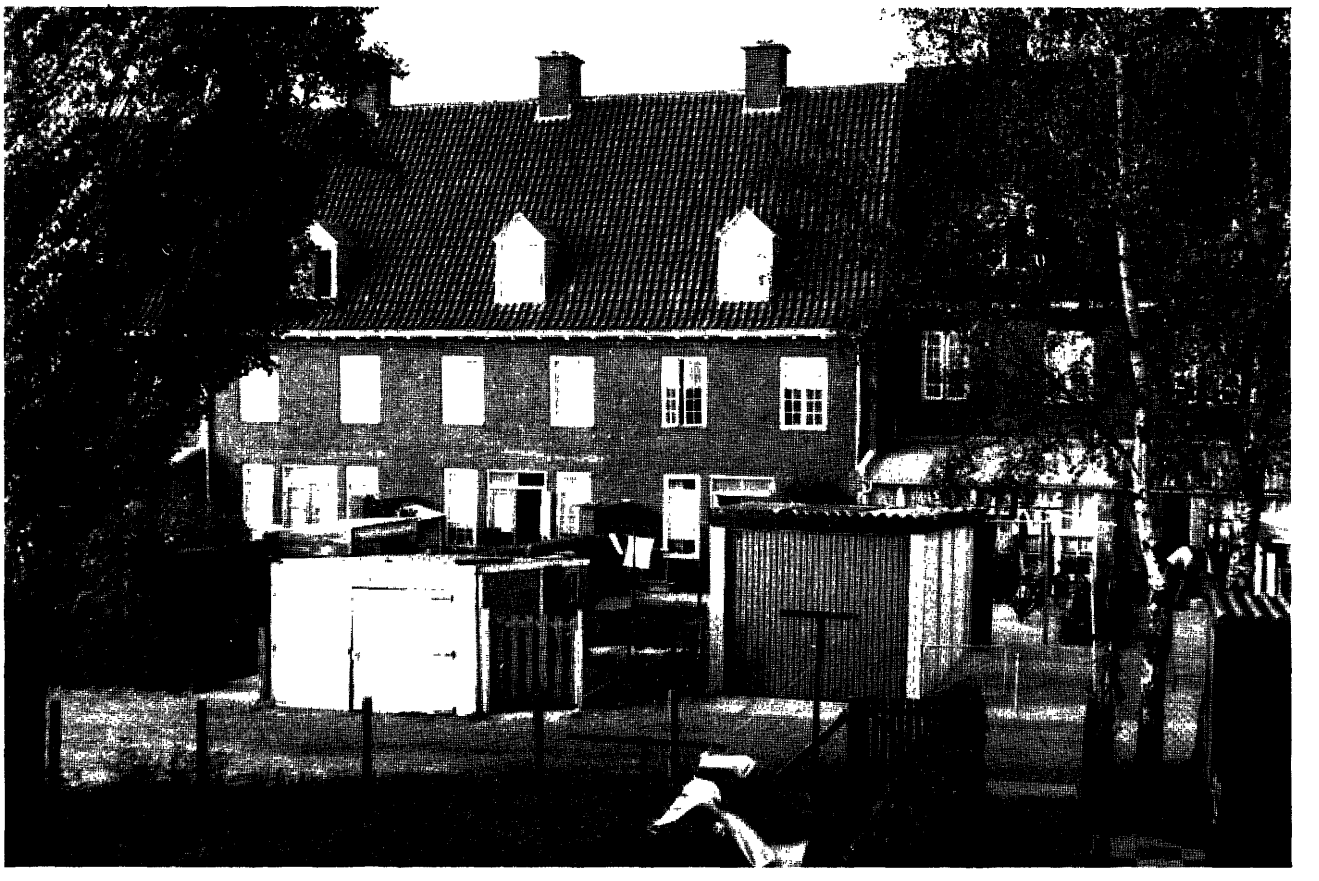
Probable period for which dwellings will be rented: over thirty years.

Interest charges and cost of paying off the various means of finance expressed in terms of an average dwelling:

Source of funds	Amount in Fl	Rate of interest	Period of loan	Annual charge Fl	Monthly charge Fl
ECSC loan	724,000	1 %	25 years	137.60	11.50
Capital of AMF and BMF Foundations for installation of central heating	1,257,420	7-3/4 %	20 years	526.20	43.90
Capital of AMF and BMF Foundations	5,479,580	7-3/4 %	20 years	2,102.40	175.20
					230.60
Loss of rental estimated as					3.40
Total of monthly charges to be covered by rent increase					234.00
The Netherlands Government grants an annual subsidy equivalent to 7 % of the cost of work of modernisation of dwellings - estimated at Fl 26,400 per dwelling, thus reducing the monthly charges given above by					154.00
The rent increase is thus limited to					Fl 80.00

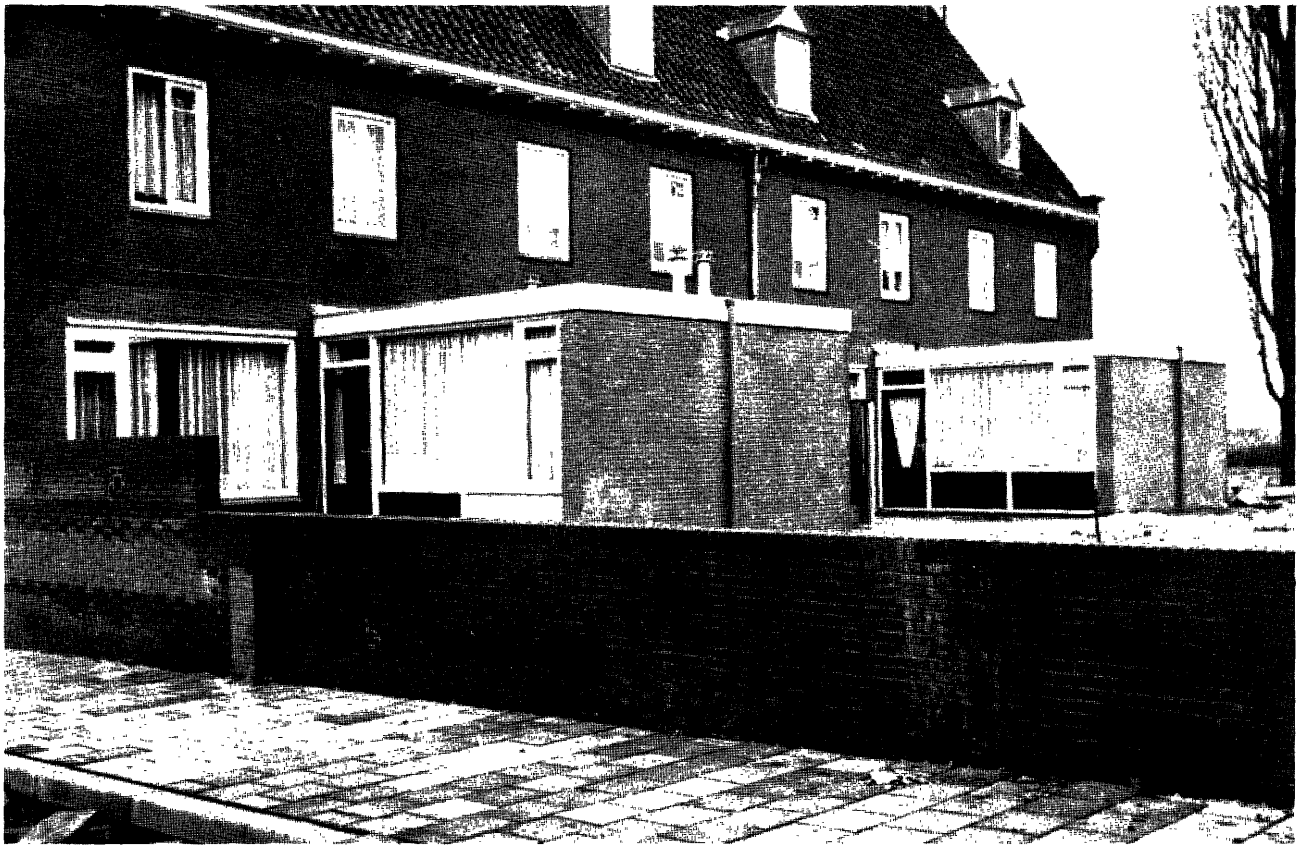
The government subsidy is reduced by 10 % a year so that in the eleventh year the rent is brought up to the full amount of loan charges.

HEERLEN — The Maria Christina complex



HEERLEN — Garden side of houses: former condition

HEERLEN – The new living-rooms with terrace extension (prefabricated facades)

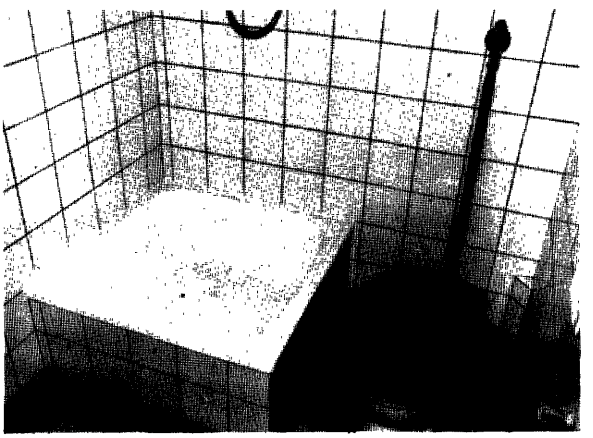


HEERLEN – The new kitchens added to the main structure of the building (prefabricated facades)

HEERLEN — Enlarged living room

HEERLEN — New kitchen

HEERLEN — New shower-room



TECHNICAL DESCRIPTION OF THE DORTMUND PROJECT

Location	: Dortmund
Owners	: Hoesch Wohnungsgesellschaft mbH, Dortmund
Supervisors	: as above
Contractors	: Hoesch AG, Dortmund, Abteilung Bauhof
Number of dwellings before modernisation	: 95 (11 buildings of 4 and 5 floors)
Number of dwellings after modernisation	: 84
When built	: 1951 - 1953
Number of families before modernisation	: 92
Number of families after modernisation	: 84

The apartments are rented to steelworkers in the employ of Hoesch. They include 70 % of workers still employed, 23 % retired and 7 % steelworkers' widows. The average number of occupants per apartment before modernisation was 2.25.

1. LOCATION

1.1 Location, population, work, accommodation requirements

The buildings are located one kilometre from the centre of Dortmund in the centre of the town and eight hundred metres from their work.

They are blocks of apartments located in the Dreherstrasse, Schlosserstrasse, Stahlwerkstrasse and Borsigstrasse. They were built in 1951 to 1953 as part of the official housebuilding programme to provide accommodation for steelworkers.

The demand for accommodation remained substantial in Dortmund where employment prospects are excellent for the next twenty years.

Infrastructure

The district is fully developed. Shops are available in the immediate vicinity and the centre offers additional facilities. Within a radius of 600 metres there are five schools, two churches, a sports complex with three sports grounds, open-air swimming pool, cycle track and tennis courts.

Museums, theatres and the Hoesch park are all nearby.

Trams and bus services make the journey to the main station in ten minutes.

1.2 Apartments and surroundings before modernisation

State of the structure

These were buildings in a good state of repair and normally maintained.

Apartments were small (three main rooms, 50 square metres).

In order to increase their rental value and the chances of letting them in future it was important to eliminate the following disadvantages:

- an arrangement of rooms which was not adequate to needs
- stove type heating

- unsatisfactory kitchen and bathroom equipment (bath on feet, coal-fired heater for bathwater, kitchenette in main living room)
- inadequate electrical system not up to standard
- in 28 cases inadequate sound insulation.

2. PLANNING

It was decided to make improvements that did not affect the structure and plans were worked out by the engineers of the Hoesch building department in collaboration with the Institut für Bauforschung.

A sample apartment was modernized, trying out various solutions in line with the technical aims of the programme. These included prefabricated sleeves for inlet and outlet pipes, prefabricated walls, prefabricated electrical installations and, in order to avoid cutting and drilling, prefabricated heating pipes which are quick to lay.

It was decided to choose one firm which would coordinate all the work.

Once it was decided what was to be done, the materials had been chosen and the best schedule decided upon and lists drawn up, a lumpsum contract was signed with a general contracting firm.

The tenants were consulted through the Hoesch housing committee who approved the arrangements made.

It was at this stage that a great organisational effort was made. Working on the basis of the pilot projects, a schedule of work and removal of tenants was prepared. The extent of the work led to apartments being vacated before time - seventeen tenants left their homes for good. Most of the tenants returned after the modernisation work had been carried out.

3. OVERALL PLAN OF THE DISTRICT

4. PLANS OF APARTMENTS BEFORE AND AFTER MODERNISATION

see plans and photographs

5. APPEARANCE OF APARTMENTS BEFORE AND AFTER MODERNISATION

6. SURROUNDINGS BEFORE AND AFTER MODERNISATION

see plans and photographs

7. DESCRIPTION OF THE PROJECT

7.1 a) Improvement of layout of rooms by combining two apartments. Some extended apartments are more suited to their purpose, while others are made smaller. The total number of apartments was reduced from 92 to 84.

b) Installation of district central heating with coal-gas boiler located in a building in the courtyard formerly used as a laundry.

c) Improvement of bathrooms with new fittings, ceramic wall covering, hot water from the central heating system. New floor coverings.

d) Installation of stainless steel sink units measuring 1.20 m, wall-hung cupboards and flooring.

e) Increasing of the power supply by strengthening internal cables and renewing fittings (many earthed sockets).

f) Replacing kitchen windows by windows pivoting about two axes with filter-glass panes.

g) Double glazing.

h) Inside connection for TV aerial.

i) Improvement of common open spaces with playgrounds, lawns, benches and gardens.

j) Painting of outside woodwork apart from any surfacing.

7.2 Solutions involving prefabrication and new products

- Improvement of the lay-out of rooms by the use of prefabricated walls (translucent screen between kitchen and dining room).

- Covering parquet flooring with plastic felt bonded to thin panels of wood.
- Double glazing using prefabricated glazed panels. Fitting of prefabricated windows in the event of replacement.
- In the kitchen a prefabricated sheath is located close to the sanitation and contains ventilator ducts and drains. The latter are fixed by means of feet welded to the pipes beforehand.
- Stainless steel sink units with cupboard beneath (connection to drain in flexible plastic, translucent tube which is force-fitted).
- Wall-hung cupboards and work surfaces, one of which is arranged so that it can be used for placing a baby beneath an infra-red lamp.
- Prefabricated electrical cables covered in plastics ribbon and secured by studs to the walls before being embedded beneath the wall covering.
- Prefabricated plastics sheath for electric cables placed near ceiling of passages and containing all horizontal cables.
- The bathroom is complete: fitted bath, porcelain shelf, wall mirror with fluorescent tube above, towel holder, soap holder, handle at side of bath, and mosaic type floor. Beneath the wash basin are the connections for a washing machine.

7.3 Traditional work

- Demolition work (only one vertical cut through the floor in each apartment).
- Recoating
- Coverings for kitchen and bathroom walls
- Outside paintwork of windows
- Inside paintwork generally and hanging of wall-papers in the living rooms and passages
- Provision of garden
- Garages

7.4 Extra work carried out under the heading of maintenance

Repair or replacement of landing and front doors of building.

8. THE EXPERIMENT

8.1 Approach to the work

The work was discussed from the point of view of price with various firms. They were assessed on the list of unit prices fixed in advance and the unforeseen work was to be carried out under supervision.

Among the requirements made of the firms, mention should be made of the reduction in down time, so as to ensure that the work on each building should be completed in the shortest time possible.

It was not possible, as had been hoped, to have the work carried out by a single firm only using its own workforce and authorization had to be given to bring in subcontractors.

8.2 Execution of work

- Direction of work	Hoesch Bauhof
- Prefabricators:	
. Prefabricated elements for installations	Sonfit system made by Steffen KG of 46 Dortmund-Hombruch
. Partition wall elements	Mero - Dr.Ing. Mengeringhausen 87 Würzburg
. Sheaths for electric cables	Tehalit GmbH Essen-Altenessen
. Prefabricated radiator elements	Baufa system made by Steffen KG 46 Dortmund-Hombruch
. Prefabricated chimney elements	Selkird & Metalbestos Wallace-Murray GmbH 522 Waldröl

- Firms carrying out the work:

• Demolition, building, roughcasting and concrete	HaWeGe, Dortmund
• Heating system	Steffen KG, Dortmund
• Sanitation	Steffen KG, Dortmund
• Joinery	Hoesch Bauhof
• Electrical work	Hoesch Bauhof

8.3 Schedule of work

Apartment	Commencement of work	End of work
Dreherstr. 4	1. 5.72	1. 7.72
Dreherstr. 6	1. 6.72	15. 8.72
Dreherstr. 8	1. 7.72	1. 9.72
Dreherstr. 10	15. 9.72	1.11.72
Borsigstr. 52	1.10.72	31.12.72
Dreherstr. 12	1. 9.72	15. 2.73
Stahlwerkstr. 39	25.10.72	31.12.72
Stahlwerkstr. 41	1.11.72	31.12.72
Schlosserstr. 6	15.11.72	15. 1.73
Schlosserstr. 8	20.11.72	30. 1.73
Dreherstr. 2	30.12.72	15. 2.73

Ten months elapsed between the beginning and end of works. This period included the time needed for the provision of open spaces.

The owners had undertaken to keep 32 apartments permanently empty. This was possible because of the number of housing units owned by the company in Dortmund - more than two thousand. The first two buildings to be evacuated (seventeen tenants) made temporary rehousing possible.

8.4 Progress of different works

Work proceeded along two different lines, depending upon the amount of conversion work required in an apartment.

Order of execution:

Important work	Less important work
Dreherstr. 4 to 12 Stahlwerkstr. 39 Borsigstr. 52	Dreherstr. 2 Stahlwerkstr. 41 Schlosserstr. 6 and 8
- demolition and cutting - removal of old sanitary fittings - installation of new fittings - electricity - removal of windows - fitting of new windows - glazing - brickwork and surfacing - tiling - interior joinery - heating - painting - renewal of flooring - finishing of brickwork - kitchen equipment	- removal of old windows and replacement of new ones - improvement of existing electrical system - changing sanitary fittings - heating - tiling - surfacing - painting - kitchen equipment

9. RESULTS OF THE EXPERIMENT

9.1 Cost of work for all apartments : DM 1,926,872

Thus for average apartment of 56.60 sq.m. after modernisation:

- work only	DM 20,326
- additional costs	DM 2,255
- removal costs and loss of rent	DM 358
	DM 22,939

9.2 Analysis of cost per dwelling

9.2.1 44 partments modernized with change of room layout

Type of work	Cost in DM		
	%	per dwelling	per sq.m. living area
A. Demolition			
Demolition and removal of debris (walls and chimneys)	6.33		
Cleaning cellars and lofts	0.63		
Total	6.98	1,697.72	29.50
B. Traditional work			
Brickwork and concrete	15.09		
Preparations of plasterboard	3.36		
Joinery	4.39		
Painting	3.92		
Tiling	5.04		
Sanitary plumbing	17.10		
Electricity	5.62		
Glazing	0.22		
Repair of roof	1.60		
Installation of heating	15.65		
Scaffolding	0.31		
Fitting of windows	12.81		
Total	85.11	20,693.18	359.57
C. Assembly of prefabricated elements			
Kitchen equipment	2.14		
Door units	3.08		
Chimney (proportion)	1.00		
Sanitary fittings	1.69		
Total	7.91	1,920.45	33.37
Building costs only	100.00	24,311.36	422.45
Additional costs		2,674.00	46.47
Removal costs and loss of rental		683.00	11.85
Total modernisation costs		27,669.36	480.77

9.2.2 40 apartments modernized without change of room layout

Type of work	%	Cost in DM per dwelling	Cost in DM per sq.m. living area
A. Demolition			
Demolition and removal of debris	1.31		
Total	1.31	207.50	3.74
B. Traditional work			
Brickwork and concrete	2.82		
Joinery	0.53		
Painting	4.34		
Tiling	7.68		
Sanitary plumbing	26.09		
Electricity	8.58		
Installation of heating	23.88		
Scaffolding	0.47		
Fitting of windows	19.52		
Total	93.91	14,972.30	269.74
C. Assembly of prefabricated elements			
Kitchen equipment	3.28		
Chimney (proportion)	1.50		
Total	4.78	762.50	13.74
Building costs only	100.00	15,942.30	287.22
Additional costs		1,795.00	32.34
Total modernisation costs		17,737.30	319.56

10. FINANCING

a) Loan from the Land of North-Rhine Westphalia
(Westdeutsche Landesbank)
DM 6,000 per apartment x 84 apartments — DM 504,000
Reduced interest of 3.5 % for five years
Normal interest rate 7.5 %
Repayment rate 1 %
Repayment of 94 %

b) Additional loan from the Land of North-Rhine West Westphalia — DM 182,800
Rate of interest 7.5 %
Repayment rate 1 %
Repayment of 94 %

c) E.C.S.C. loan — DM 590,000
Rate of interest 1 %
Rate of repayment 4 % (for 25 years)
Repayment 100 %

d) Contribution from Hoesch Wohnungsgesellschaft — DM 650,072

DM 1,926,872

11. RENT AND PROFITABILITY CALCULATIONS

Monthly rent before modernisation: DM 1.70/sq.m. (28 apartments)
DM 1.86/sq.m. (64 apartments)
Thus for an apartment of 56.6 sq.m.: DM 101.00

Monthly rent after modernisation : DM 3.07/sq.m. and
DM 3.32/sq.m.
Thus for an apartment of 56.6 sq.m.: DM 180.00

The calculation of the addition rent payable is governed by law.

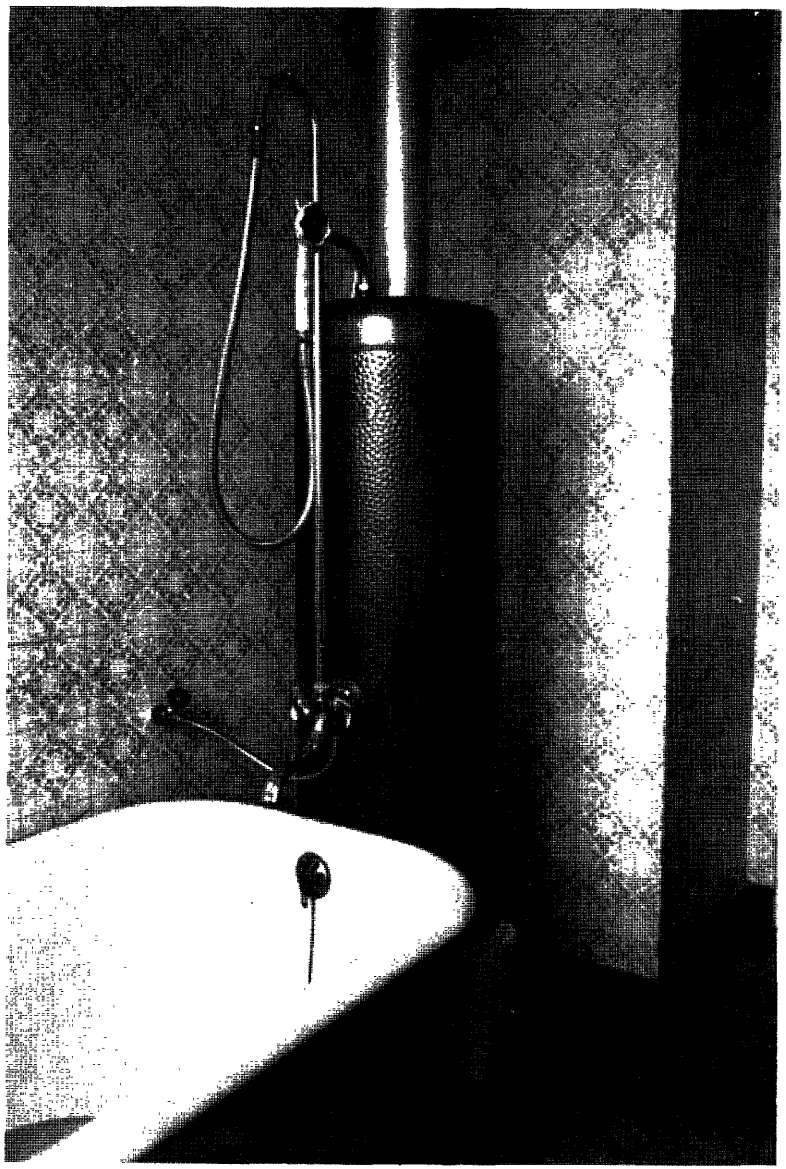
Interest and repayment of various forms of finance in terms of an average dwelling of 56.6 sq.m.

		Annual charges	Monthly charges
Interest and loans		474.00	39.50
Repayments		363.00	30.25
Additional maintenance charges (central heating)		17.00	1.40
Additional running costs		33.00	2.75
Loss of rental (2 %)		18.00	1.50
	DM	905.00	75.40

Additional rental DM 1.37 and DM 1.46/sq.m./months (not including heating).

DORTMUND — Modernized blocks

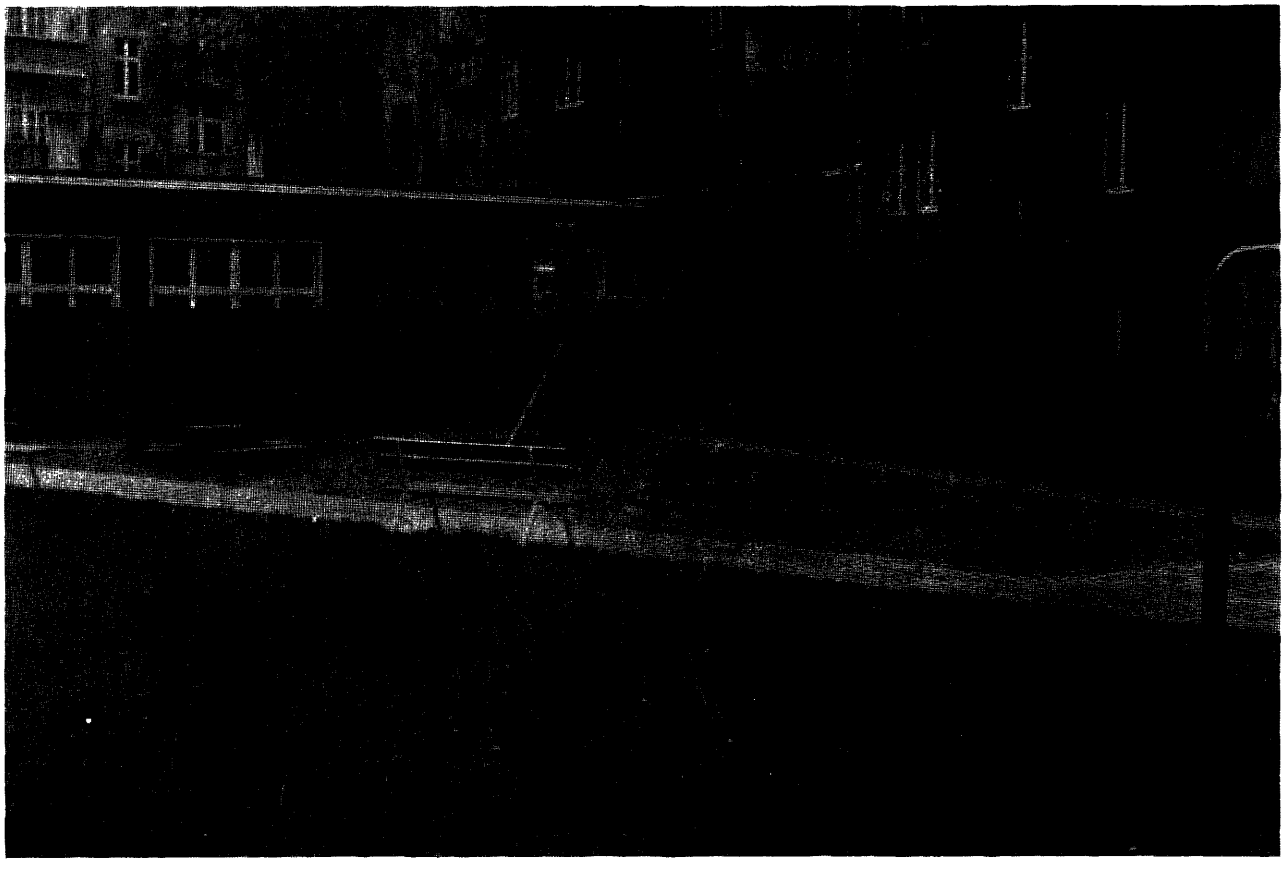
DORTMUND — Modernized blocks



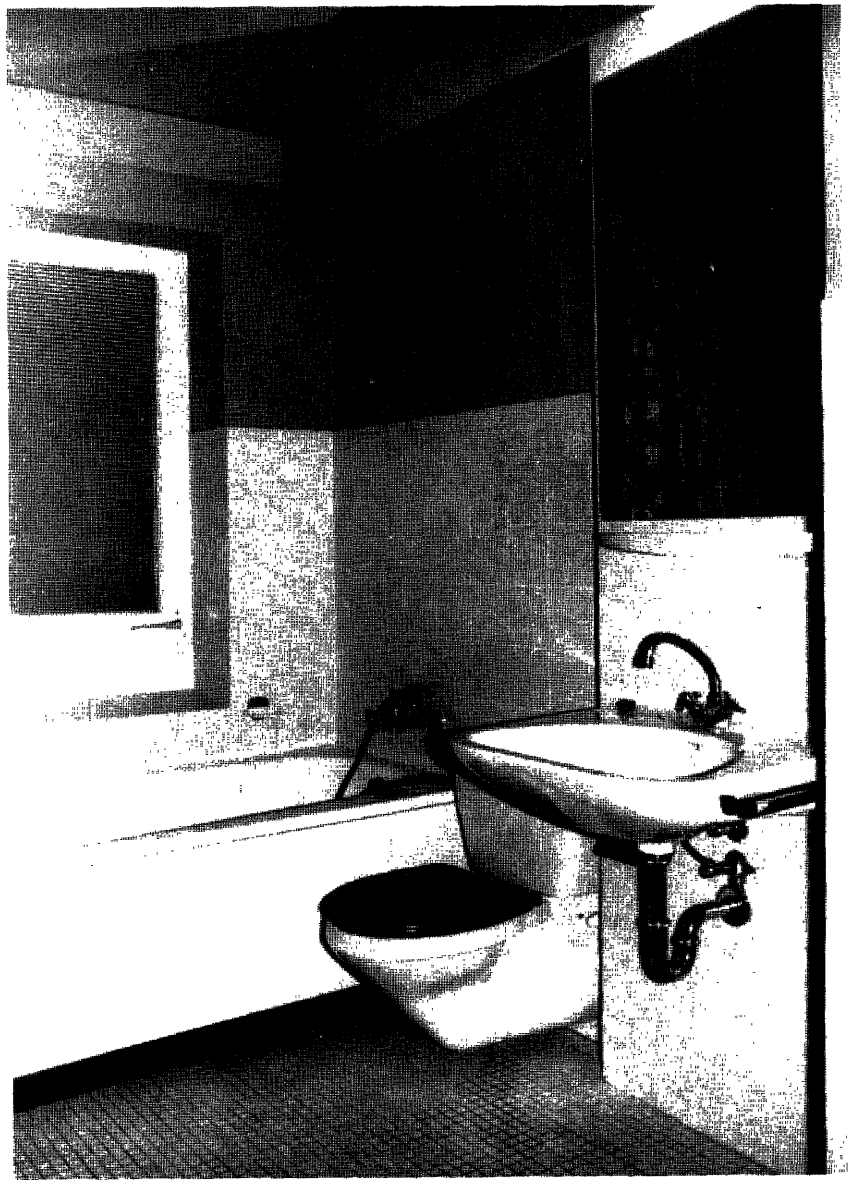
DORTMUND — Sanitary installation before modernization

DORTMUND — Sanitary installation before modernization

DORTMUND — Arrangement of an interior garden court

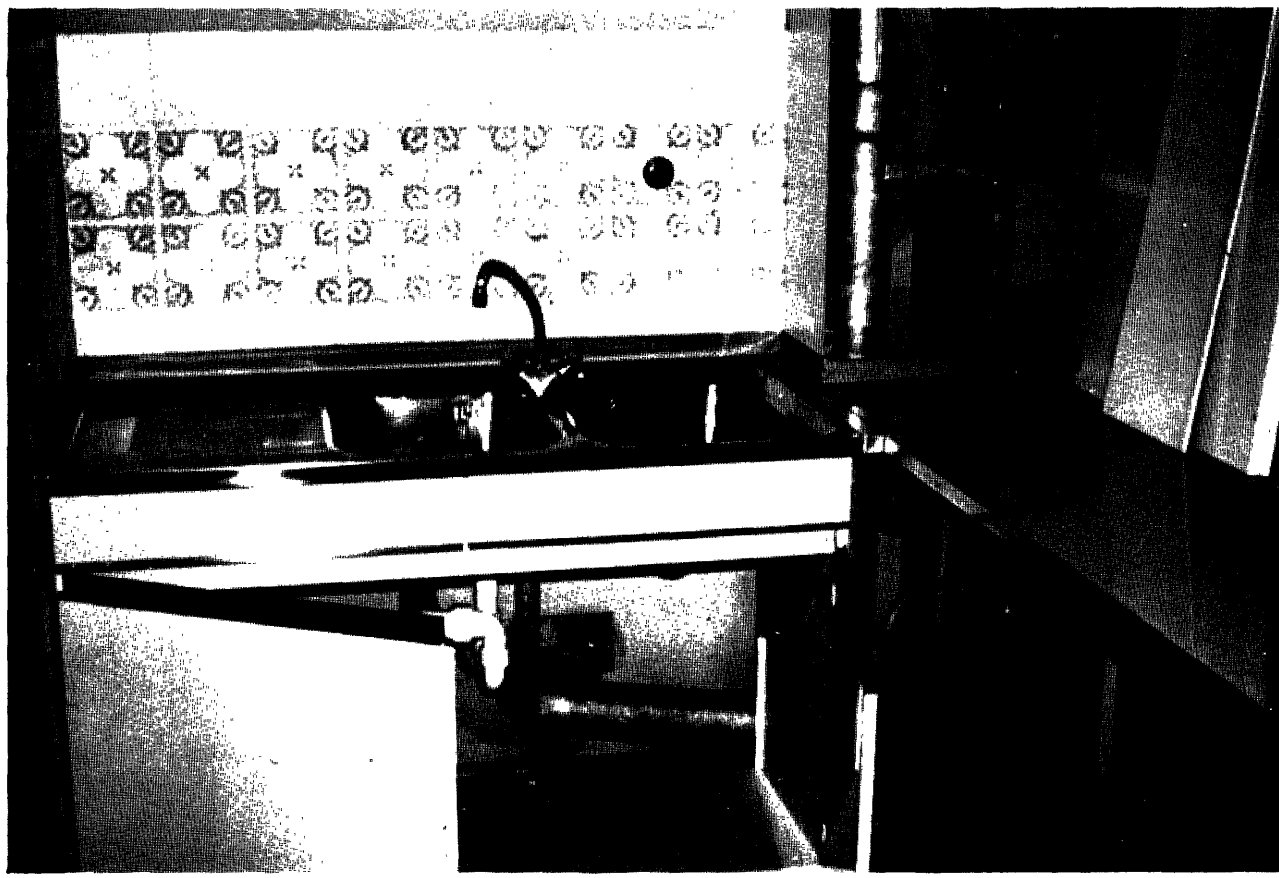


DORTMUND — Children's play-space laid out beside the former laundry transformed into a central heating chamber



DORTMUND — New bathroom

DORTMUND — Translucent prefabricated partition between kitchen and dining space



DORTMUND — New kitchen

TECHNICAL DESCRIPTION OF THE HEESSEN PROJECT

Location	: Heessen
Owners	: Neue Heimat Nord-Rhein Westfalen, Gemeinnützige Wohnungs- und Siedlungsgesellschaft mbH, Düsseldorf
Supervisors	: Neue Heimat
Contractors	: Neue Heimat
Number of dwellings	: 100 { 7 buildings of two floors, 52 dwellings, { 4 buildings of two floors, 48 dwellings
When built	: 1954
Number of families before modernisation	: 100
Number of families after modernisation	: 100

Before and after modernisation the dwellings were rented to families of workers in the Zeche Märkische Steinkohle mines. 71 % of heads of families are still in employment and 20 % are retired; a further 9 % have transferred to other jobs. 29 % of heads of families are 65 years of age or more.

The average number of occupants of 50 sq.m. dwellings is four and that of 40 sq.m. dwellings two persons.

1. LOCATION

1.1 Locality, population, work, accommodation needs

The town of Heessen (population 16,000) is basically a working-class area and the 100 dwellings which were modernized are situated in an area of one-family houses on either side of a very quiet road near the town centre. This situation is all the more favourable since Heessen is in the suburbs of the industrial town of Hamm. The places of work are one and a half kilometres distant.

Local shops are sufficient for normal needs. There are four schools, a hospital and a church. The parks and sports grounds are plentiful and their is an open-air swimming pool. The district heating system was extended to the district in the course of modernisation work.

There are no official plans for the district which might threaten the existence of the dwellings.

Mineworkers would seem to be assured of employment for twenty years. If transfers to other industries are possible, the town of Hamm, with a population of 87,000, offers jobs in a number of different industries.

The housing available is much less than the demand.

1.2 Accommodation and surroundings

Accommodation, which was built with the aid of the government, the employer (Bergbau AG), banks and Neue Heimat, are solid parpen structures which have been well maintained. They were built to strict standards after the war and are of two types:

- 52 dwellings each of three main rooms and a living area of 48.95 sq.m. (living room, kitchen, two bedrooms and bathroom with lavatory)
- 48 dwellings with two main rooms and a living area of 40.63 sq.m. (living room opening directly on to the kitchen, a bedroom and bathroom with lavatory).

The kitchen equipment was simply a cold water supply with a stone sink without a drain. There was no gas supply. The electrical fittings were insufficient and did not meet present-day standards. The bathroom was equipped with a water-heater which was coalfired and a small washbasin.

Apartments were heated by stoves.

The wooden floors were parquet and expensive to maintain.

The private gardens were not well-maintained. There were no garages or parking facilities and no sheltered playgrounds.

2. PLANNING

The owners, the Neue Heimat, had in 1970 and 1971 modernized 284 dwellings and had competent technical services available. They worked out the plans of the project with the assistance of the Institut für Bauforschung, Hanover.

Two pilot dwellings were modernized and tenants invited to inspect them.

It was possible to leave tenants in their own homes as a result of the general use of industrialised techniques which speeded up the rate of work. There were two areas of work on the dwellings. One concerned the bedrooms, into which the families retired for a few days, and the other the remainder of the dwellings. The work on the bedrooms, some items of which were optional (painting and wallpapering) was carried out after the families had been provided with newly equipped bathrooms.

There was a high degree of prefabrication involved because of the decision to instal a prefabricated bathroom unit with a wall ready-equipped with connections to be shared with the kitchen.

3. OVERALL PLAN OF ESTATE
4. PLANS OF DWELLINGS BEFORE AND AFTER MODERNIZATION
5. APPEARANCE OF DWELLINGS BEFORE AND AFTER MODERNIZATION
6. SURROUNDINGS BEFORE AND AFTER MODERNIZATION

see plans and photographs

7. DESCRIPTION OF THE PROJECT

7.1 Main plans for dwellings and surroundings

1/ Minimum modification of arrangement of rooms so as to make the kitchen independent of the living room and accessible from the hall.

2/ Installation of a bathroom equipped down to the last detail.

3/ Installation of a conventional central heating system connected to the district heating system.

4/ Equipping of the kitchen with stainless steel sink unit, work surface, gas supply, waste disposal and connection for washing machine.

5/ Modernisation of the electrical system (more and better placed earthed points).

6/ PVC flooring in bathrooms.

7/ Communal TV and FM aerials.

8/ Provision of children's playgrounds with sandpits and benches.

9/ Small, concreted parking areas.

7.2 Solutions adopted requiring prefabrication and new processes

The bathroom with its prefabricated wall connections was developed by Neue Heimat, the supervisors of the project, for the modernisation of old houses generally.

The installation of this unit involved the use of prefabricated wall elements, piping, electrical wiring, drains, heating pipes and door units, all of which were completely prefabricated.

Kitchen equipment, such as the stainless steel sink unit, wallhung kitchen cupboards, work surfaces, etc. were prefabricated.

7.3 Traditional work

- demolition and brickwork
- coatings and painting
- electricals
- central heating
- connections to main services.

7.4 Extra work carried out under the heading of maintenance

Outside painting of doors and windows. Repairs to staircase and front doors.

8. THE EXPERIMENT

8.1 Approach to the work

The extent of the work to be carried out, the materials to be used and the prefabricated elements which would be required were determined on the experimental basis of the pilot dwellings. These served as a model for calls for tenders and for checking the bids made.

The firms consulted were fairly numerous and well known and had to state that they had visited the site and assured themselves of the methods of working possible and the scope of the work.

Neue Heimat, who supervised the work, drew up the work schedule with the various firms whose services were employed and specified the shorter times and the details of the work. Adherence to schedule meant that work on site had to be very strictly organized.

8.2 Execution of work

The supervisor appointed an engineer to work permanently on site and be responsible for the direction and coordination of the work of individual firms.

The prefabricated bathroom elements were developed by Neue Heimat with the collaboration of Société Suisse EBO AG, 8134 Adliswil (Switzerland) while the complete prefabricated units were supplied by the firm J.E. Dechow of Hamburg.

8.3 Schedule of work

The work of demolition and installation of the new bathrooms decided the timetable for all other work.

There were approximately 50 workers employed on site. These were divided into 12 teams who had to commence and finish their work at fixed dates since any failure to do so would have the effect of lengthening the total work time.

Because of a temporary failure on the part of the heating engineers and painters to keep the schedule, there was a delay of several days in the case of a number of dwellings.

The order of work may be explained by quoting the example of 65 Amtsstrasse:

		between
Day 1	- demolition work	6.00 and 16.00 hours
	- installation of bathroom	10.30 and 20.00
	- installation of heating system	14.00 and 18.00
Day 2	- sanitary fittings	7.00 and 17.00
	- masonry work	10.00 and 18.00
	- electricals	7.00 and 16.00
	- installation of heating system	8.00 and 14.00
Day 3	- joinery	7.00 and 14.00
	- part-painting, wall coverings	8.00 and 13.00
	- installation of heating system	7.00 and 18.00
Day 4	- preparation of surfaces for painting	14.00 and 18.00
	- electricals	7.00 and 12.00
Day 5	- painting	7.00 and 12.00
	- floor coverings	13.00 and 16.00
Day 6	- installation of kitchen	9.00 and 12.00
	- finishing of bathroom	7.00 and 10.00
	- painting	7.00 and 20.00

9. RESULTS OF THE EXPERIMENT

9.1 Cost of work for all dwellings: DM 1,804,070

Cost of work per average dwelling of 45 sq.m.:

- work	DM 17,440.00
- additional costs	DM 307.00
- loss of rental	DM 294.00
	DM 18,041.00

9.2 Analysis of cost per average dwelling of 45 sq.m. of living area

Type of work	%	Cost in DM per dwelling	Cost in DM per sq.m. living area
A. Demolition and removal of debris			
Internal wall and doors	2.48		
Chimneys	1.28		
Wash basins	0.28		
Transport of debris	0.28		
Total	4.32	753.00	16.83
B. Traditional work			
Brickwork and concrete	4.66		
Heating	15.26		
Roof	1.90		
Painting	2.53		
Floors	1.74		
Electricals	8.52		
Sanitation (connections)	1.80		
Sanitary equipment	5.61		
Joinery	3.26		
Total	45.28	7,898.22	176.58
C. Assembly of prefabricated elements			
Bathroom	28.05		
Inside walls	4.69		
Kitchen equipment	3.88		
Door units	3.13		
Total	39.75	6,932.05	154.98
D. Surroundings			
Gardens, walkways, access roads, small areas, 40 parking lots and 5 playgrounds	3.44		
Total	3.44	599.46	13.40

E. Various			
Tents	0.21		
Night watchmen	0.12		
Connection to distric heating	6.88		
Total	7.21	1,256.96	28.10
Building costs only	100.00	17,439.70	389.89
Additional costs		307.00	6.97
Loss of rental		294.00	6.57
Total modernisation costs		18,040.70	403.43

10. FINANCING

a) E.C.S.C. loan

DM 7,000 x 100 dwellings — DM 700,000

Interest at 1 %

Rate of repayment 4 % over 25 years

b) Mortgage loan for modernisation by public authorities (Savings Banks)

DM 6,000 x 100 dwellings — DM 600,000

Rate of interest 6.75 % with an interest bonus of 3.5 % for five years

Rate of repayment 10 %

Repayment of 94 %

c) Contribution of owners — DM 504,000

Rate of interest 4 %

DM 1,804,000

11. RENT AND PROFITABILITY CALCULATIONS

Monthly rents before modernisation:

3 rooms (49 sq.m.) : DM 64.00

2 rooms (41 sq.m.) : DM 54.00

viz. an average rent of DM 1.30 per sq.m.

Monthly rents after modernisation:

3 rooms : DM 132.00

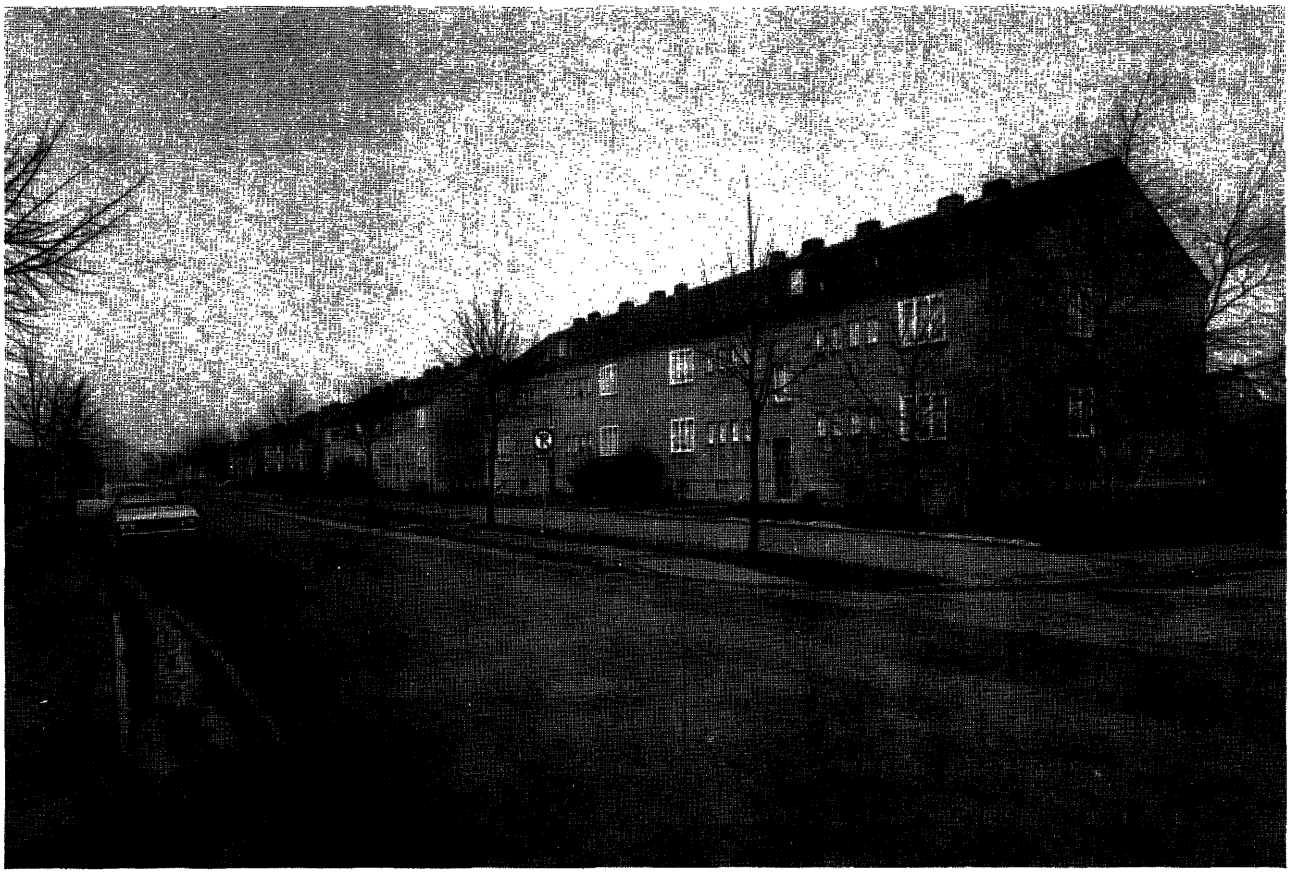
2 rooms : DM 110.00

viz. an average rent of DM 2.69 per sq.m.

Interest charges and cost of paying off means of finance in terms of average dwellings of 45 sq.m. during three first years:

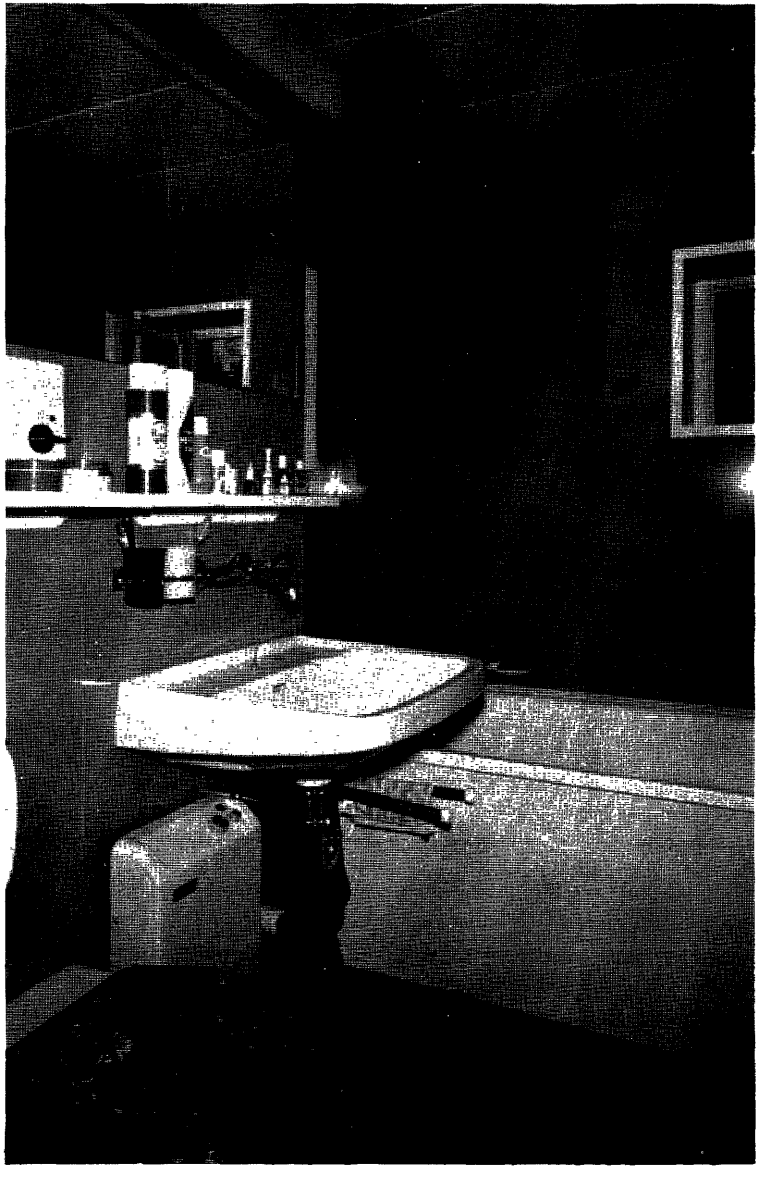
		per year	per month
Interest (1.00 % of A 3.25 % of B 4.00 % of C)		461.00	38.41
Repayments		260.00	21.67
Maintenance of heating (DM 0.30 per sq.m.)		13.49	1.12
Loss of rental (approximately 2 %)		14.98	1.25
	DM	749.47	62.45

Plus costs of district heating.



HEESSEN — Modernized houses

HEESSEN — Improvement of the surroundings — children's play-space



HEESSEN — Prefabricated bathroom — interior view

HEESSEN — Kitchen adjoining prefabricated bathroom

TECHNICAL DESCRIPTION OF THE HERTEN PROJECT

Location	: Herten-Langenbochum
Owners	: Veba-Wohnungsbau GmbH
Supervisors	: Veba-Wohnungsbau GmbH
Contractors	: Veba-Wohnungsbau GmbH
Number of dwellings before modernisation	: 104 apartments in blocks of ten storeys (ten buildings)
Number of dwellings after modernisation	: 52 in two storey blocks
When built	: 1951
Number of families before modernisation	: 60 families, with some occupying two apartments
Number of families after modernisation	: 52

The apartments are let to families of miners in employment, and skilled workers working at the Recklinghausen mining company which is less than a kilometre away. These families are young, 90 % of the heads of family being under 45. There are no pensioners or widows. Before modernisation, the density of occupation in the smaller apartments was substantial because of the many children (1.2 persons per room).

1. LOCATION

1.1 Locality, population, jobs, housing requirements, general planning

The modernized buildings are at Herten (50,000 inhabitants) near Gelsenkirchen. The apartments are two kilometres from the centre.

There are 52 houses in terraces on two floors, each with two apartments. There are no plans which threaten their existence because they are relatively new.

They were built with a financial grant from mines and corporations for mining personnel.

In the town jobs will partly depend upon the future of the coal mining industry whose prospects at the moment seem favourable. It is not planned to train miners for other industries. There is a substantial demand for accommodation and existing accommodation is often outmoded.

1.2

The modernized accommodation is located in the midst of a green area half the way between Herten station and Langenbochum, which is where the people work (900 metres).

The surroundings are excellent - airy, trees and quiet roads (Herten castle and Resser Mark forest).

There are shops in the immediate vicinity, an open-air swimming pool and Katzenbusch stadium, the St Elisabeth hospital, a primary school and a grammar school, as well as a college and trade schools which are within walking distance. The district is served by trams.

The houses are well built, are in a good state of repair and connected to various services.

However, the largest apartments with three main rooms only have a living area of 36.50 sq.m. The kitchen equipment in the common room is not adequate. The common bathroom in the basement has no hot water.

Heating is by means of stoves. The heat and sound insulation is generally good.

The vast basements with cement floors are sound. There are lofts with an area of 30 sq.m.

There are inside WCs.

Behind the buildings there were small private gardens of 65 sq.m. and a piece of common land for children.

The ideal plan seemed to be to create one good dwelling on two floors by combining the two apartments surrounding the same staircase. The result would be a one-family house with garden, loft and basement.

The distribution of rooms was in need of alteration and there was obviously a requirement for a new kitchen, a bathroom and central heating. Floors needed renewal and outside the private and common open spaces were in need of improvement.

2. PLANNING

Research for planning purposes was carried out by the technicians of Veba Wohnungsgesellschaft with the help of the Institut für Bauforschung, Hanover.

It was initially intended to create on the ground floor a large living room separate from the kitchen with a small room for eating and a lavatory.

On the first floor was to be the parents' room, children's room, a bathroom, a WC and a large linen room with space for the washing machine.

The occupants involved in the project dismissed this proposal in discussions with the works council. Their opinion, which was different, resulted in the final project, with a living room associated with a larger kitchen provided on the ground floor. There is also a WC here. On the first floor there are two children's rooms instead of just one and the washing machine has been placed in the basement where it is possible to wash, dry and iron.

The district heating planned has been replaced by a small collective heating system serving six houses at a time.

Most of the occupants adopted the type of garden suggested.

When the plans had been prepared, they were discussed with the firms who had been consulted.

The work was contracted for on a lump sum basis and the contracts awarded according to each specialist category.

A schedule which eliminated any wasted time was prepared with the firms to ensure completion of the work on each house within eight weeks. The original purpose was to keep tenants in their home. This proved impossible and a certain number of families had to be rehoused.

3 - 6 OVERALLPLAN, PLANS AND APPEARANCE OF DWELLINGS, etc. BEFORE AND AFTER MODERNIZATION

- see plans and photographs

7. DESCRIPTION OF THE PROJECT

7.1 Main aims of the project in terms of accommodation and environment

The new accommodation of 73 sq.m. comprises five rooms, a well equipped kitchen with cupboards and work surfaces, a bathroom and a WC.

In the basement, there is provision for washing, drying and ironing. However, the old sinks have been left and a door gives access to the garden.

On the ground floor a door separates the entrance from the staircase.

The WC has been provided with a wash basin. The two main rooms have been merged to form a large living room with windows on two sides, a dining recess and a serving hatch.

On the first floor the bathroom is provided with a second WC. The bedrooms have been made completely independent of one another.

Gas central heating was installed with a common boiler located in an area taken from a cellar. This provides hot water for sinks and bathrooms.

The electrical systems have been modernized to meet the requirements of a modern household and two TV aerials have been provided, one in the living room and the other in one of the bedrooms.

The garden has been extended to 350 sq.m. with in some cases a flower garden and in others a vegetable garden or common open space.

7.2 Solutions involving prefabrication and new products

- Stainless steel sink unit with two sinks, 2.10 metres. Some of the shelves are removable to make space for a dishwasher.
- The kitchen flooring was covered with PVC slabs bonded and welded together, the same flooring is used upstairs.
- Prefabricated door units were used.
- Central heating was installed using prefabricated pipes connected to steel convectors.
- The door and window apertures which are no longer required are covered with prefabricated panels of plasterboard.

7.3 Traditional work

- Demolition, brickwork, inside walls and surfacing
- Ventilation and flues
- Interior joinery (including repairs to doors)
- Ceramic wall coverings in the kitchen, bathroom and WCs.
- Sanitary fittings
- Electrical work (ceiling mountings and wall brackets, safety points, connections for fridge and washing machine and for dishwasher, TV aerials, etc.)
- Outside paintwork (windows and doors) and all interior paintwork
- Repairing front steps

8. THE EXPERIMENT

8.1 Approach to the work

The supervisors began by approaching a limited number of specialist firms for quotations and then appointed a single firm to be responsible for coordination of subcontractors.

Work was carried out on the basis of a unit price list which was not subject to revision and which was drawn up by the project supervisor. Unforeseen work was carried out under the supervisor's control.

Continuity of work and the minimum time possible (three weeks per dwelling) were asked of the coordinating firm.

8.2 Execution of works

Work on the heating system, sanitary fittings and kitchen proceeded without interruption thanks to the close cooperation at the preparatory stage between the supervisor and the firms involved.

Detailed working schedules were prepared to assist rapid working.

The Veba-Wohnungsbau directorate of works was responsible for the general coordination of the teams of workmen and watched that schedules were kept to.

Manufacturers

Convector elements	: Amberg-Werrit-Kunststoffwerk W. Schneider GmbH 8450 Amberg
Radiator elements	: Aluminium- und Metallwarenfabrik J. Reiert GmbH 8832 Walldorf
Bathroom elements	: Kaldeweh Ahlen
Uncoated sheets of plasterboard	: Knauff Castrop-Rauxel
Kitchen elements	: Wetterkamp Möbelwerk Castrop-Rauxel

Firms

Eight different firms were involved in the work.

8.3 Schedule of work

The schedule of one on one house extending over a period of three weeks was prepared by the Veba-Wohnungsbau directorate of works. The work was carried out in fourteen months with periods varying between six and ten weeks per house.

The temporary rehousing lasted for similar periods.

9. THE RESULTS OF THE EXPERIMENT

9.1 Cost of work on all dwellings: DM 1,032,000

Cost per dwelling: building work only	DM 17,750
additional costs	DM 2,096
	DM 19,846

9.2 Analysis of average cost per dwelling of 73 sq.m. after work

Type of work	%	Cost in DM per dwelling	Cost in DM per sq.m. living area
A. Demolition			
Demolition and removal of debris	4.74		
Total	4.74	840.38	11.51
B. Traditional work			
Brickwork and concrete	15.84		
Joinery	4.98		
Sanitary plumbing	7.13		
Heating	18.87		
Gas supply	6.01		
Power supply	4.91		
Painting	6.71		
Floors and heat insulation	12.24		
Tiling	5.42		
Various	2.55		
Total	83.66	1,485.00	203.43
C. Assembly of prefabricated elements			
Equipping of bathrooms	1.74		
Radiators	6.50		
Sink units (kitchen)	3.36		
Total	11.60	2,059.62	28.21
Total building costs only	100.00	17,750.00	243.15
Additional costs		2,096.00	28.71
Total		19,846.00	271.86

10. FINANCING

a) Mortgage loan from the Land of North-Rhine Westphalia

DM 6,000 x 52 dwellings — DM 312,000

Interest rate 8 %

Reduced interest rate 3.5 % for five years

Repayment rate 1 %

Repayment of 94 %

b) Additional mortgage loan from the Land of North-Rhine Westphalia — DM 200,000

Rate of interest 8 %

Rate of repayment 1 %

Repayment of 96 %

c) E.C.S.C. loan — DM 360,000

Rate of interest 1 %

Rate of repayment 3.54 %

Repayment of 100 %

d) Contribution of Veba Wohnungsbaugesellschaft — DM 160,000

DM 1,032,000

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11. RENT AND PROFITABILITY CALCULATIONS

Monthly rent before modernisation : DM 1.97 per sq.m.

Thus for two dwellings of 36.5 sq.m. : DM 142.00

Monthly rental after modernisation : DM 3.204 per sq.m.
within five years :

Monthly rental for a dwelling of 73 sq.m. : DM 234.00/month
within five years : DM 252.00/month

Interest and repayment charges in relation to the dwelling

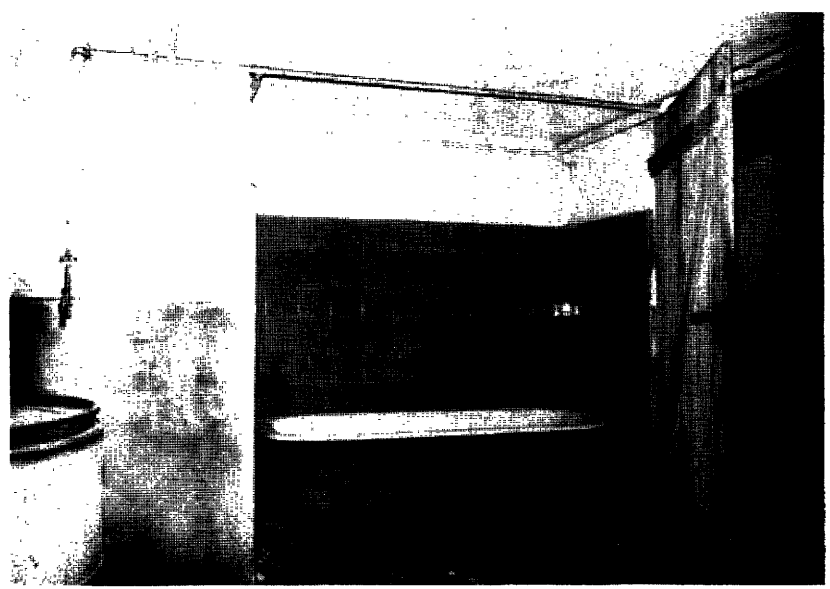
		Annual charge	Monthly charge
Interest on loans		770.00	64.17
Repayments		365.00	30.41
Additional maintenance costs		22.00	1.84
Reduction in costs of administration as a result of reduced number of dwellings		- 100.00	- 8.33
Loss of rental (2 %)		22.00	1.84
	DM	1,079.00	89.93

Other costs : heating extra.

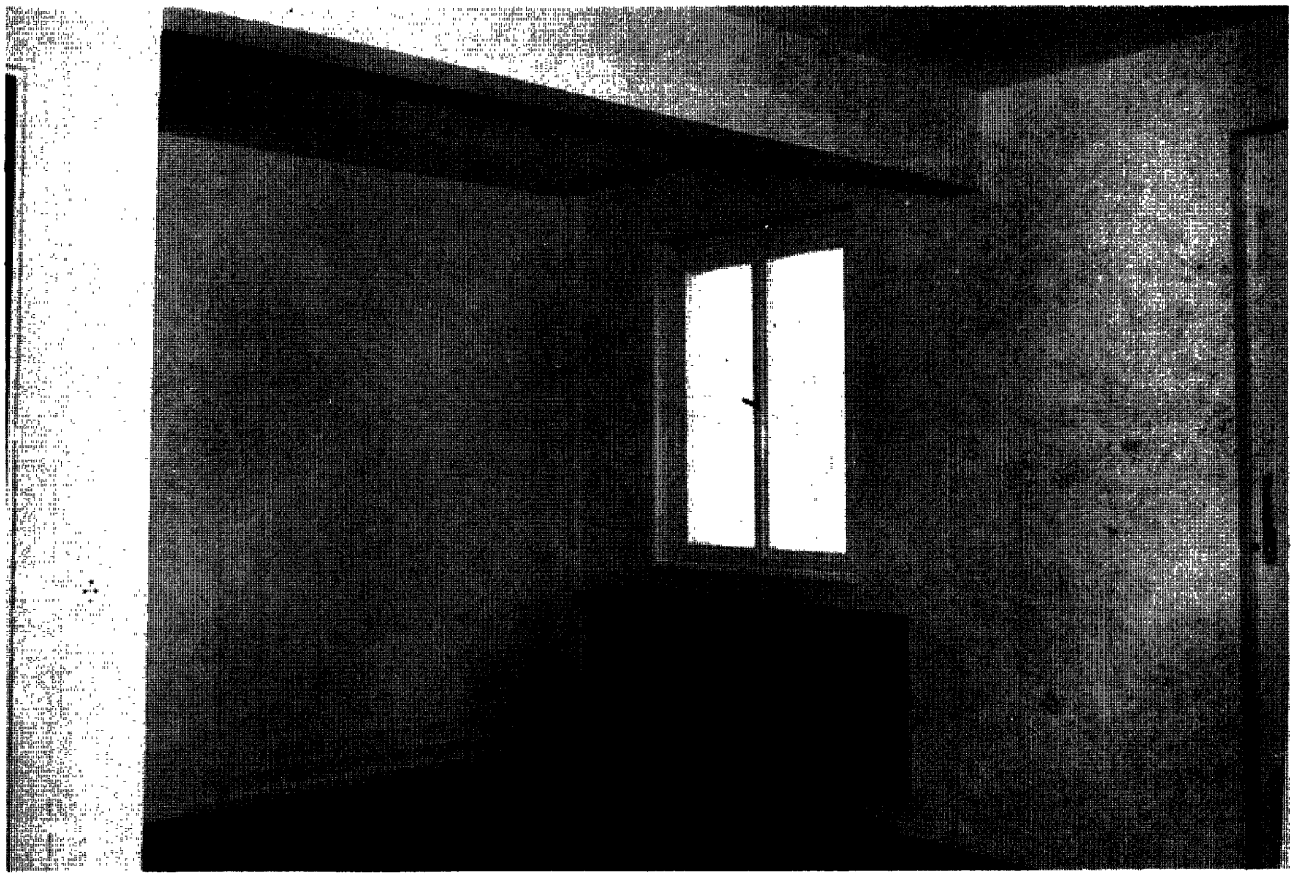
HERTEN — Modernized house — Street facade

HERTEN — Modernized house — Rear facade

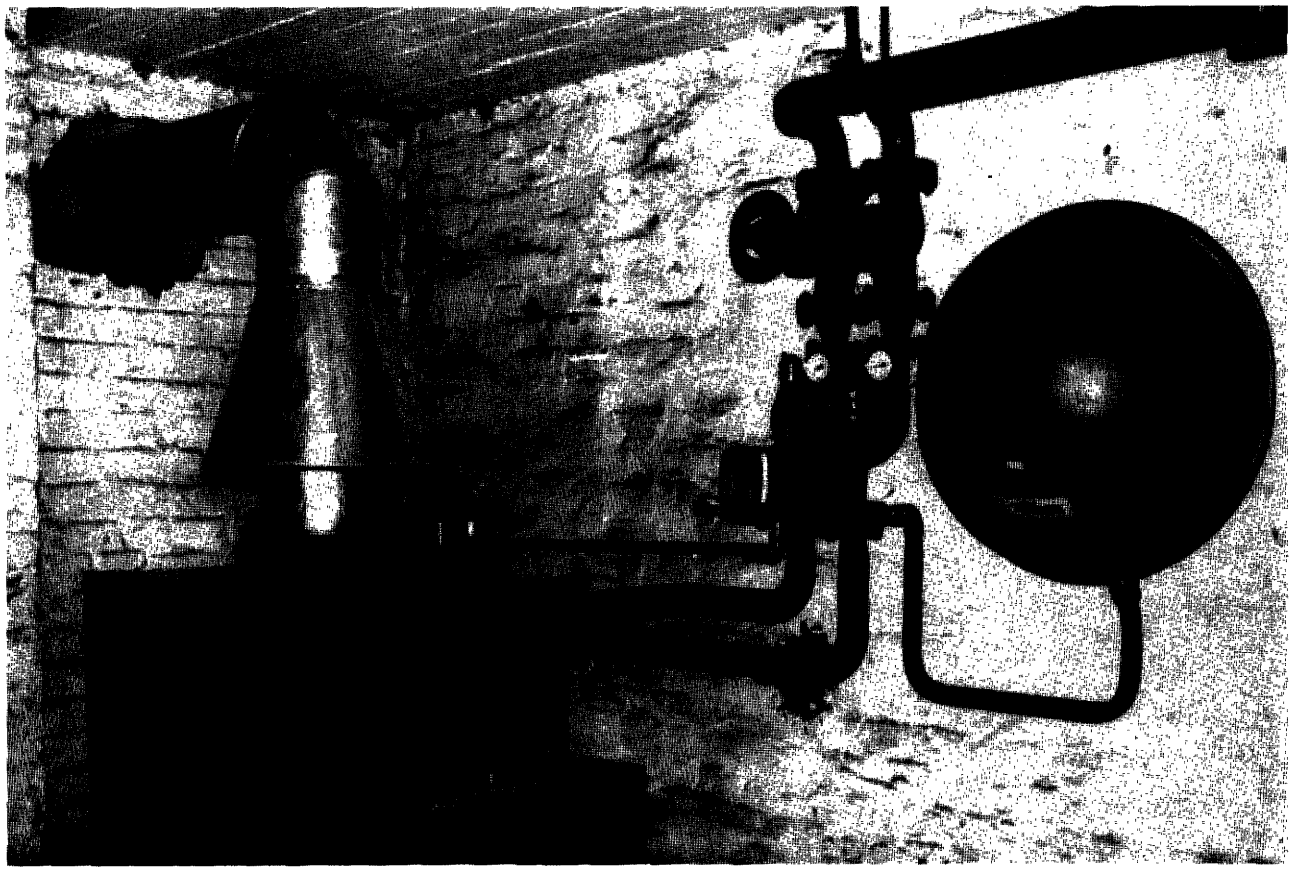
HERTEN — House before modernization — External aspect



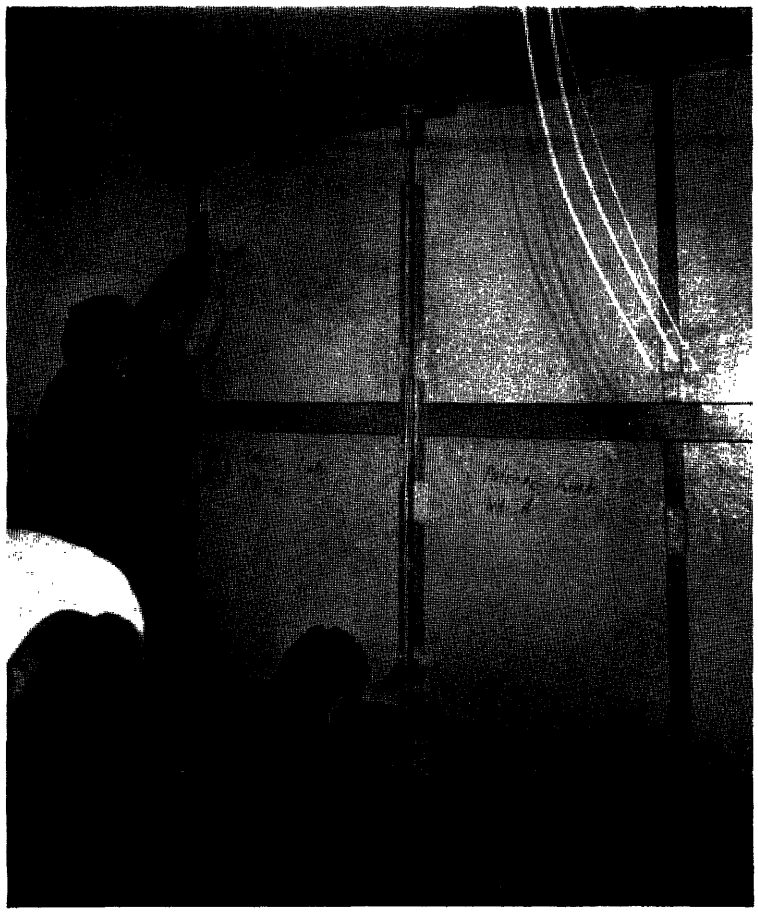
HERTEN — Before modernization — bathroom in basement



HERTEN — New living room



HERTEN — After modernization — Small gas heating installation shared by six dwellings



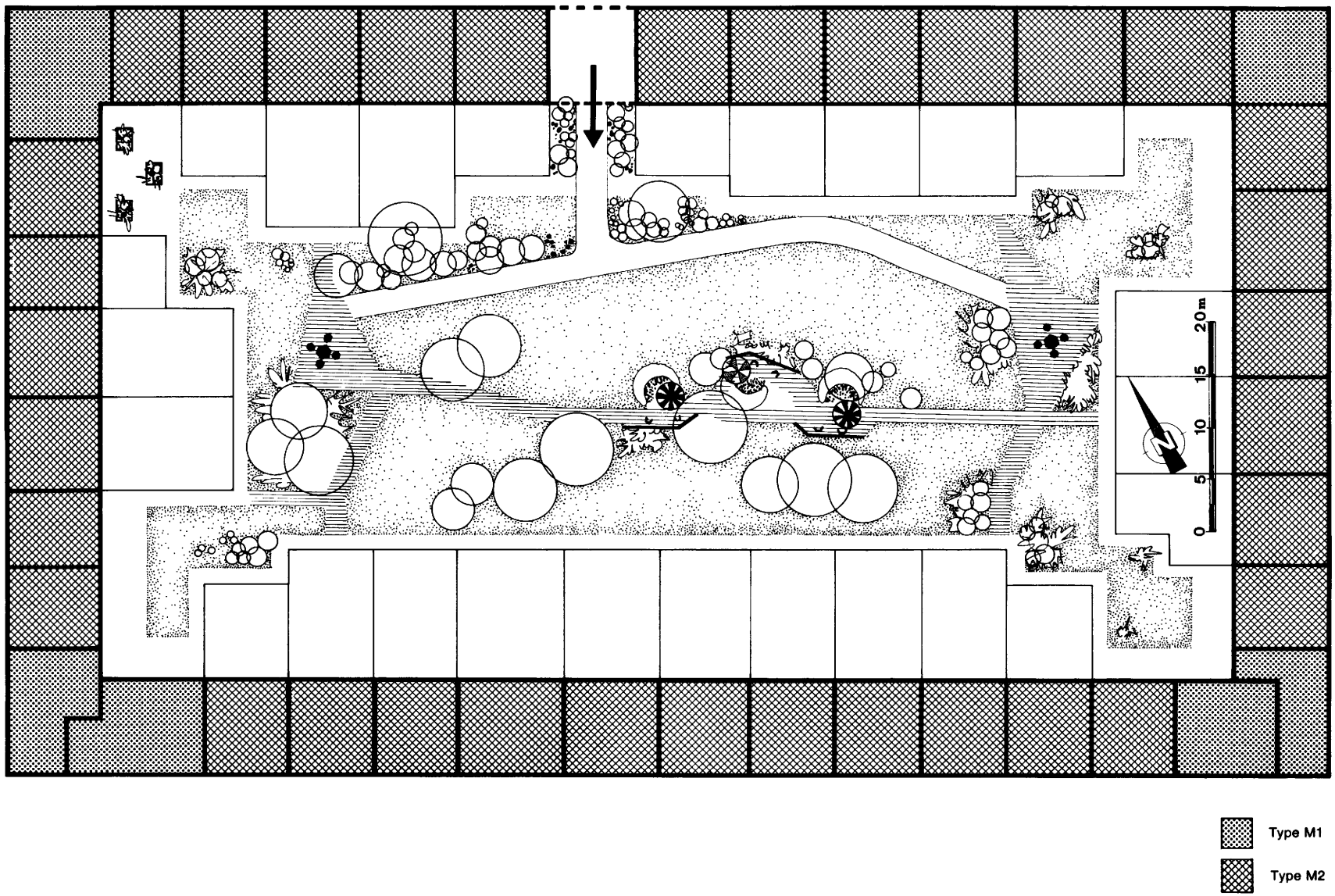
HERTEN –
Plasterboard panelling to cover up redundant door and window apertures

HERTEN – New kitchen

PLANS

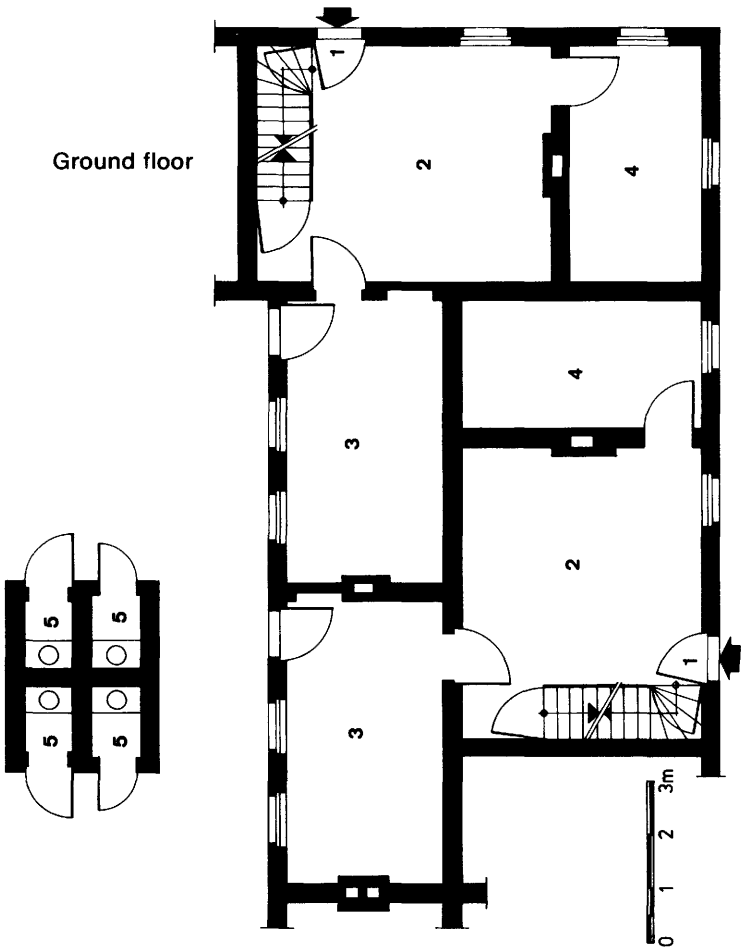
BELGIUM – BOIS DU LUC – General plan

BELGIUM — General plan of a block of houses showing arrangement of common space

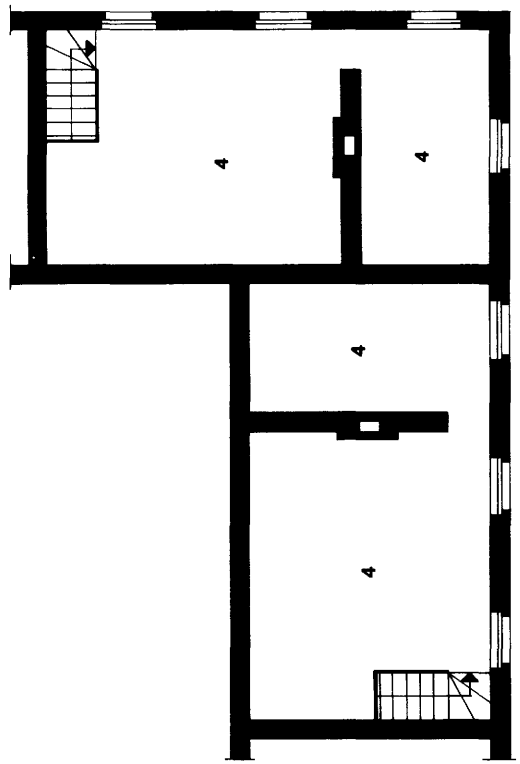


BELGIUM — Plan showing distribution of type M1 - Situation before modernization

Ground floor



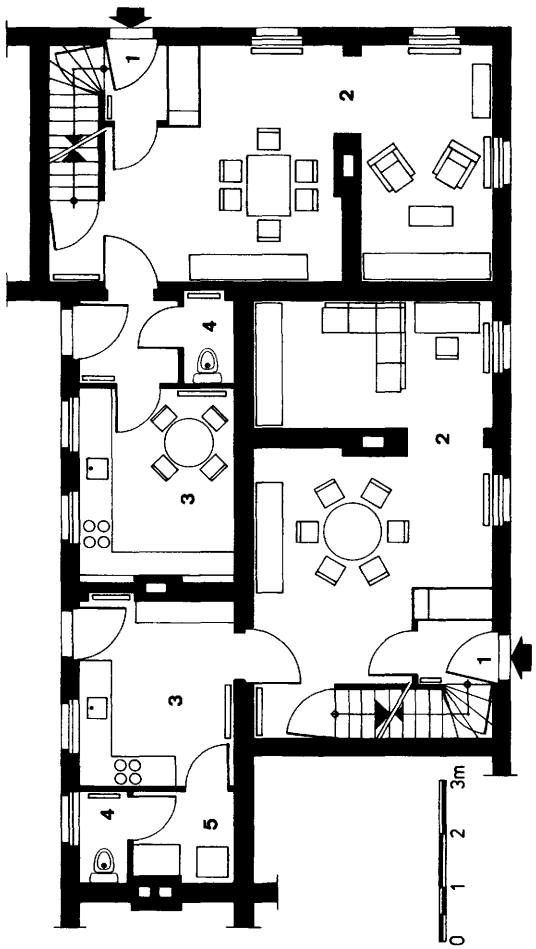
First storey



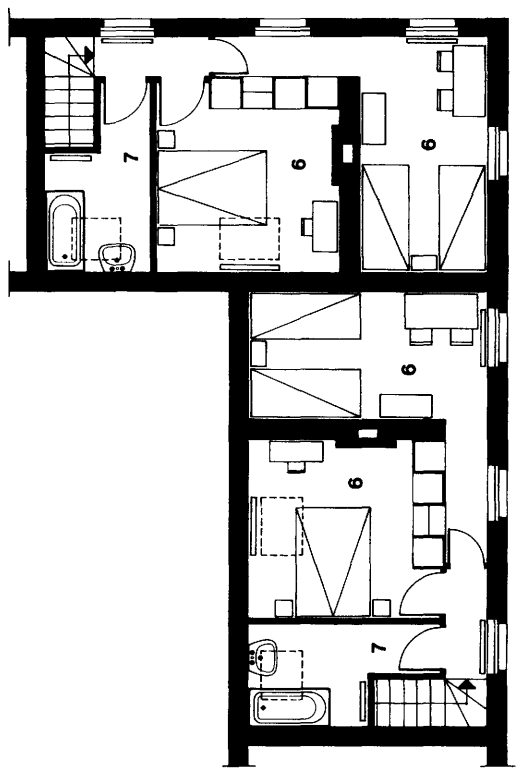
1. Entrance
2. Living-room
3. Kitchen
4. Bedrooms
5. W.C.

BELGIUM — Plan showing distribution of type M1 - Situation after modernization

Ground floor



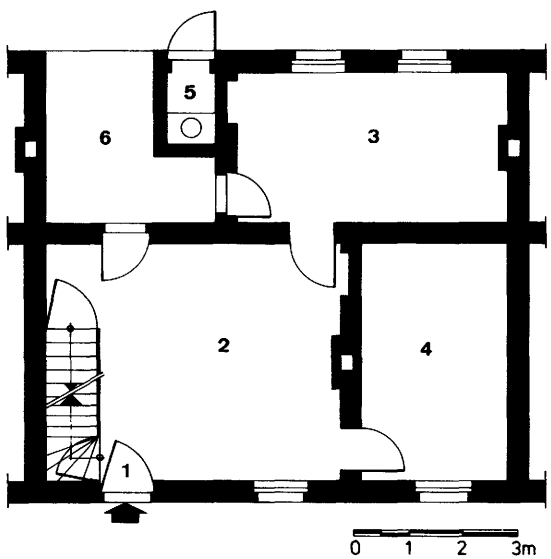
First storey



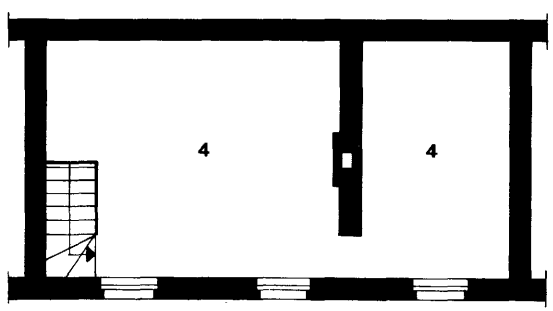
1. Entrance
2. Living-room
3. Kitchen
4. W.C.
5. Laundry
6. Bedrooms
7. Bathroom

BELGIUM — Plan showing distribution of type M2 - Situation before modernization

Ground floor



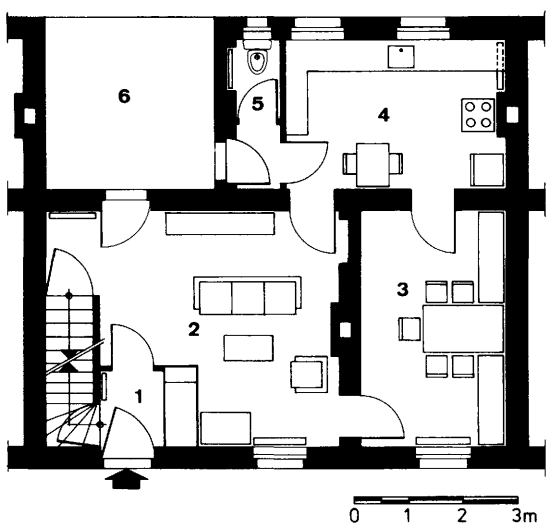
First storey



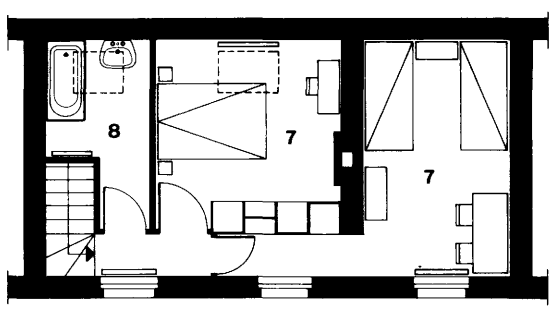
1. Entrance
2. Living-room
3. Kitchen
4. Bedrooms
5. W.C.
6. Yard

BELGIUM — Plan showing distribution of type M2 - Situation after modernization

Ground floor

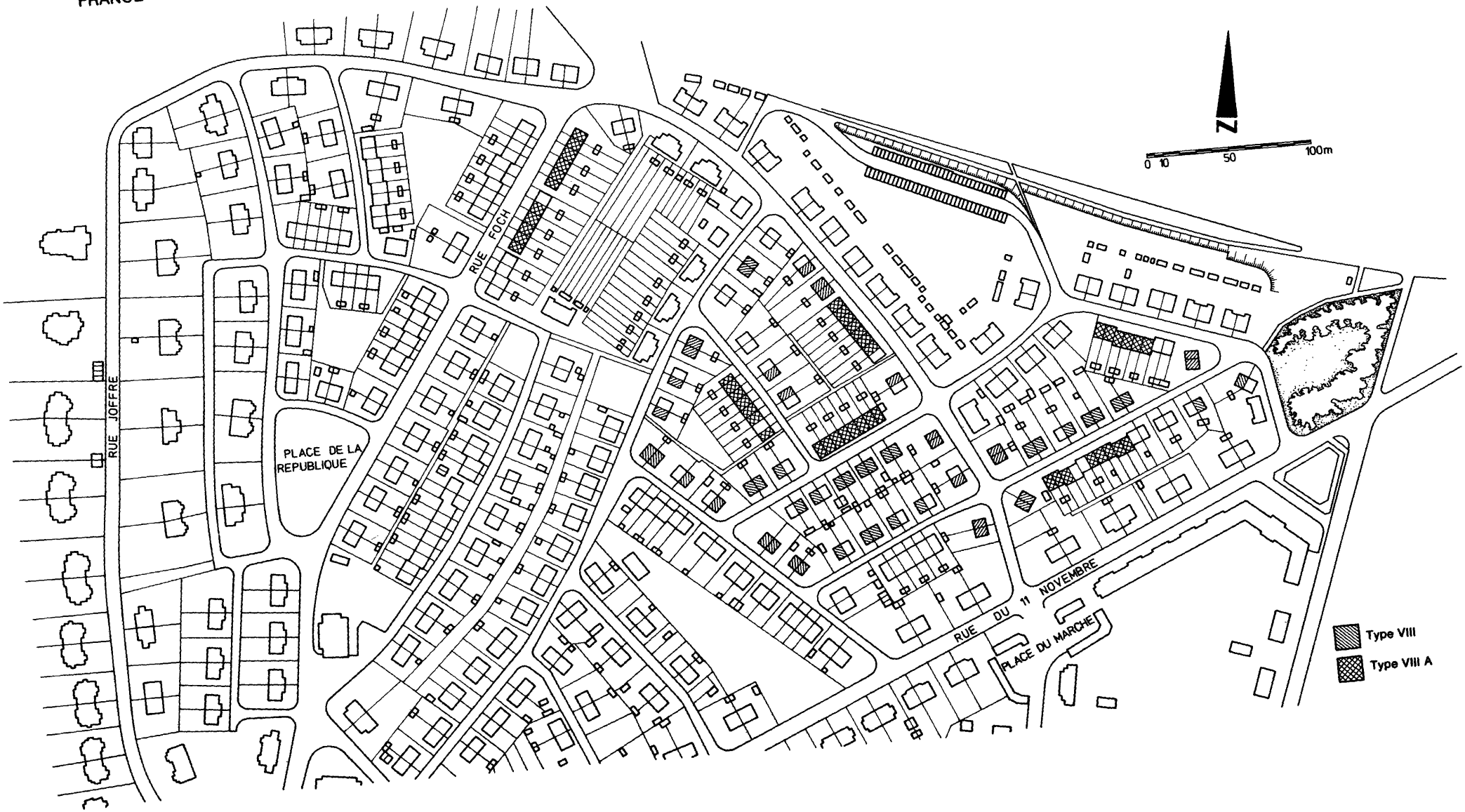


First storey



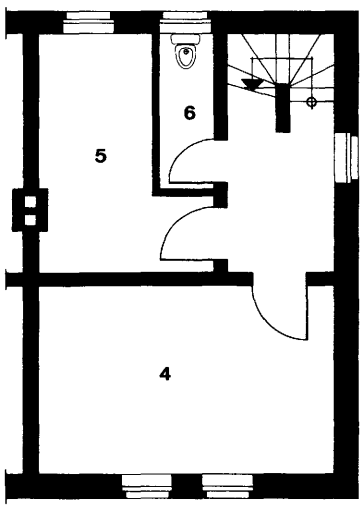
1. Entrance
2. Living-room
3. Dining
4. Kitchen
5. W.C.
6. Yard
7. Bedrooms
8. Bathroom

FRANCE – HAGONDANGE – General plan

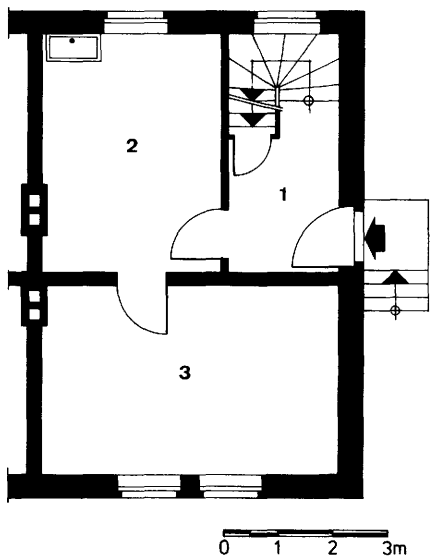


HAGONDANGE — Plan showing distribution of Type VIII - Situation before modernization

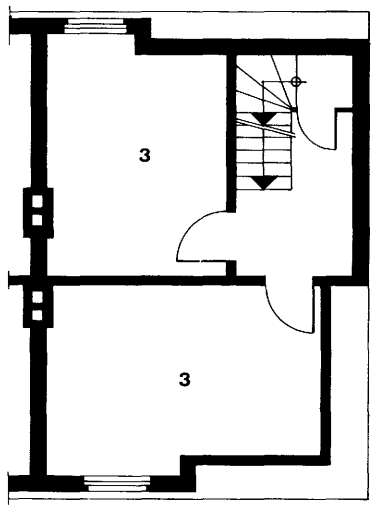
Basement



Ground floor



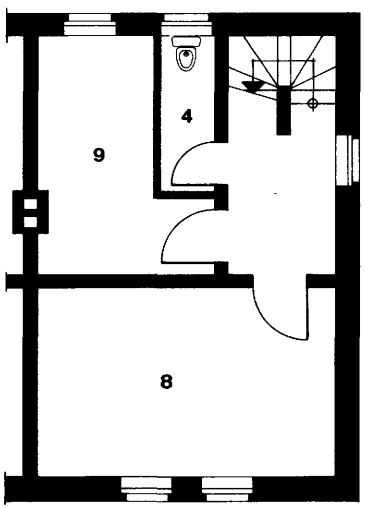
First storey



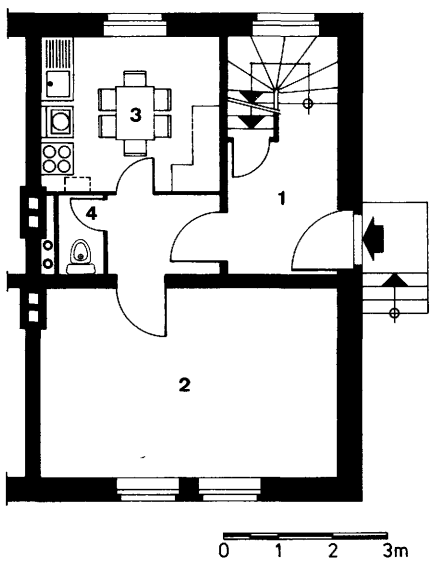
1. Hall
2. Kitchen
3. Bedroom
4. Cellar
5. Laundry
6. W.C.

HAGONDANGE — Plan showing distribution of Type VIII - Situation after modernization

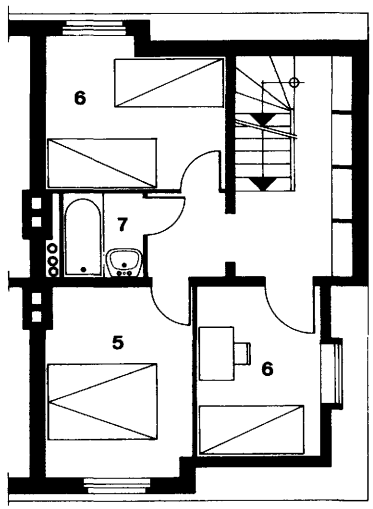
Basement



Ground floor



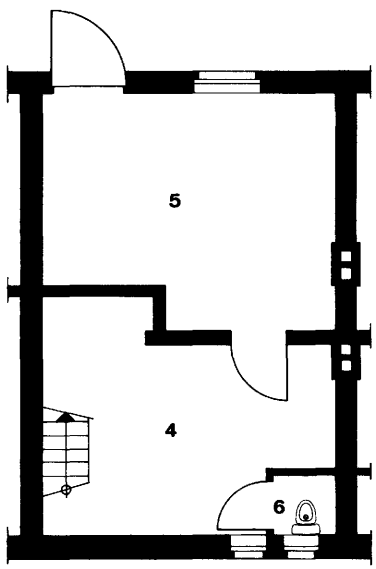
First storey



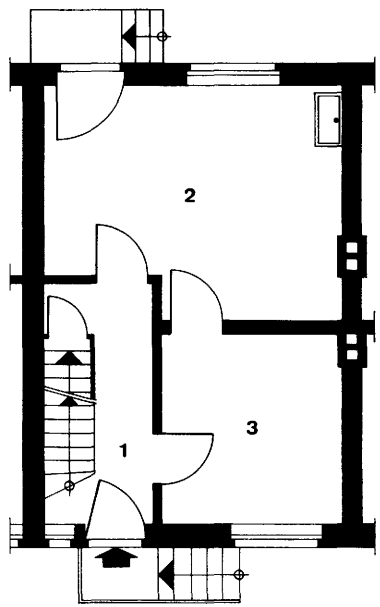
1. Entrance
2. Living-room
3. Kitchen
4. W.C.
5. Parents' bedroom
6. Children's bedroom
7. Bathroom
8. Cellar
9. Laundry

HAGONDANGE — Plan showing distribution of Type VIIIA - Situation before modernization

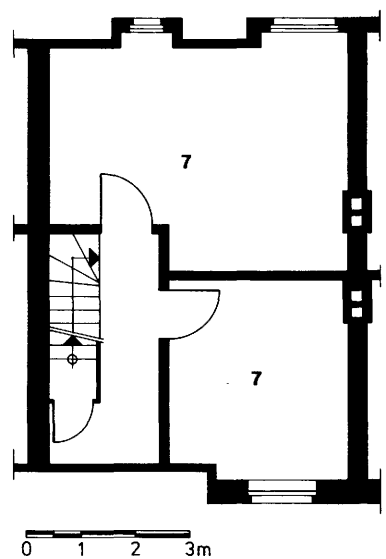
Basement



Ground floor



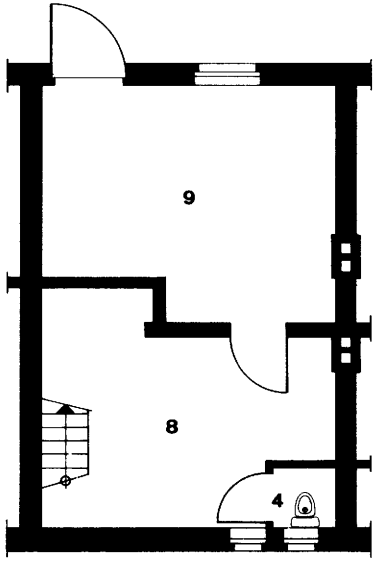
First storey



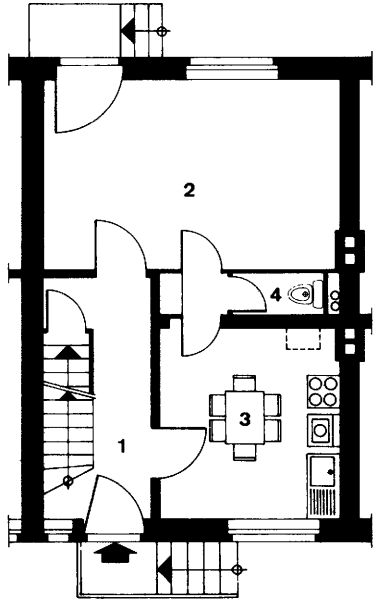
1. Entrance
2. Kitchen
3. Bedroom (or living-room)
4. Cellar
5. Laundry
6. W.C.
7. Bedroom

HAGONDANGE — Plan showing distribution of Type VIIIA - Situation after modernization

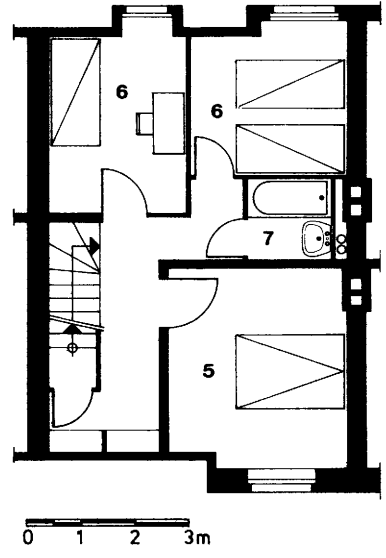
Basement



Ground floor



First storey

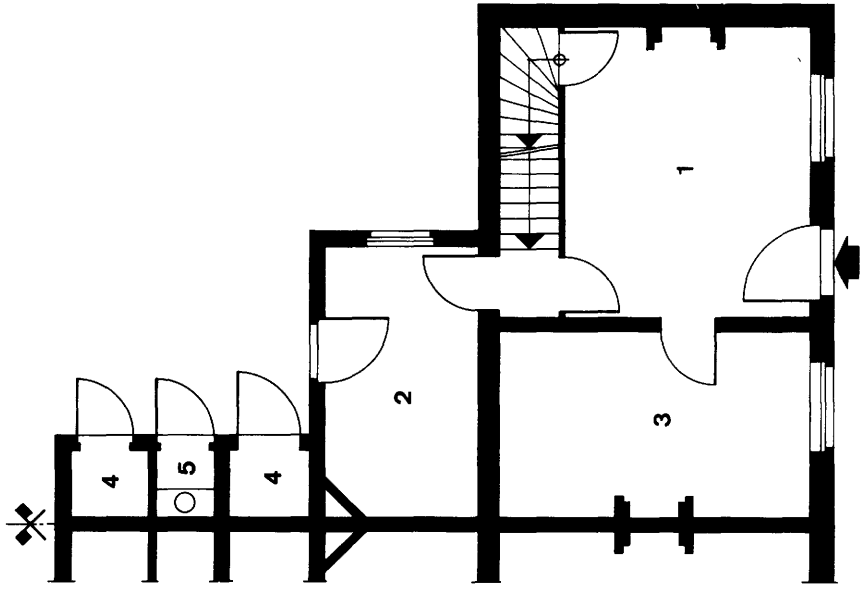


1. Entrance
2. Living-room
3. Kitchen
4. W.C.
5. Parents' bedroom
6. Children's bedroom
7. Bathroom
8. Cellar
9. Laundry

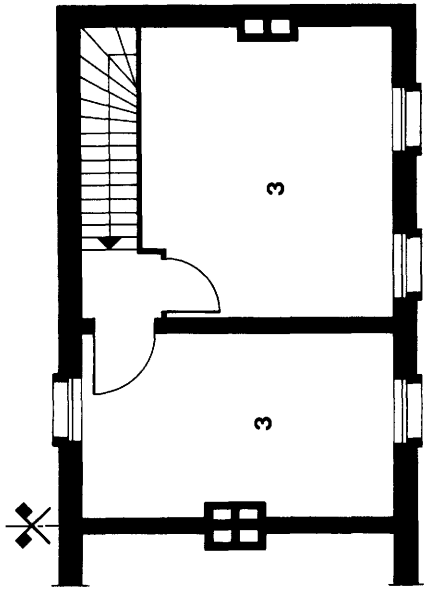
LENS-LIEVIN – General plan

LENS-LIEVIN — Plan showing distribution of Type I - Plan 13803 - Situation before modernization

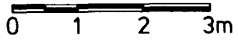
Ground floor



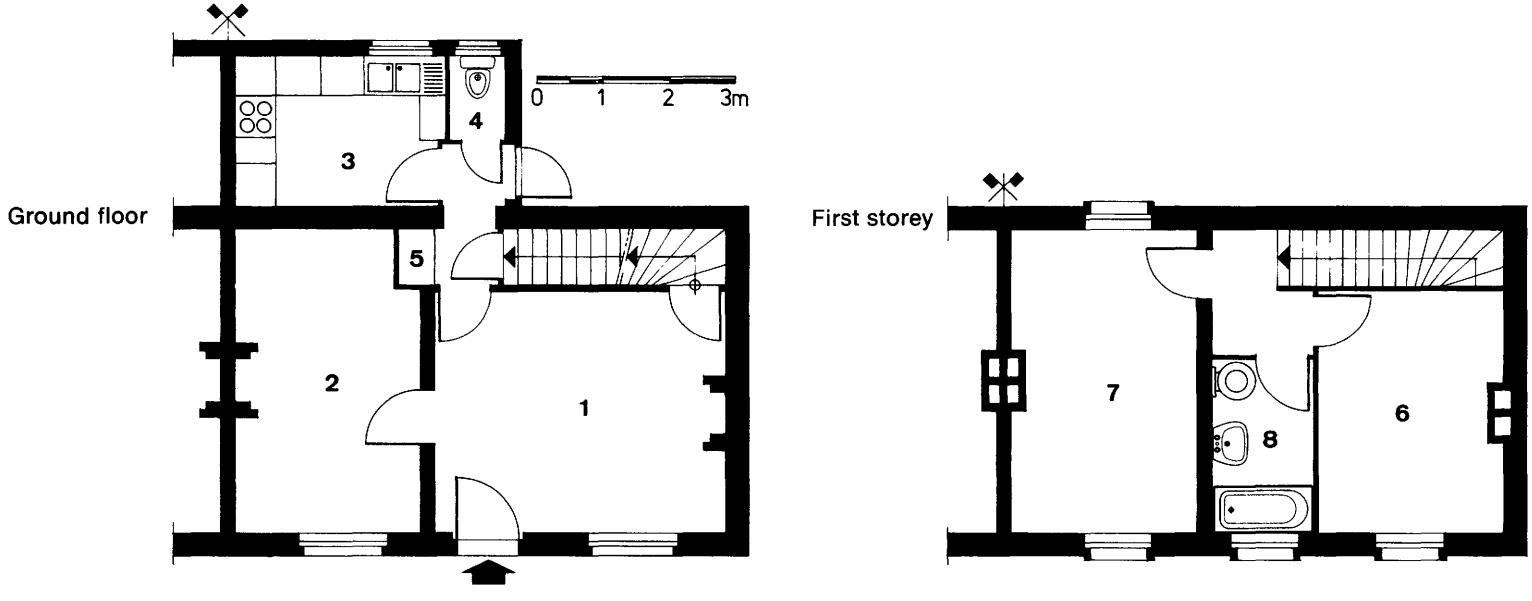
First storey



1. Living-room
2. Kitchen
3. Bedroom
4. Store
5. W.C.

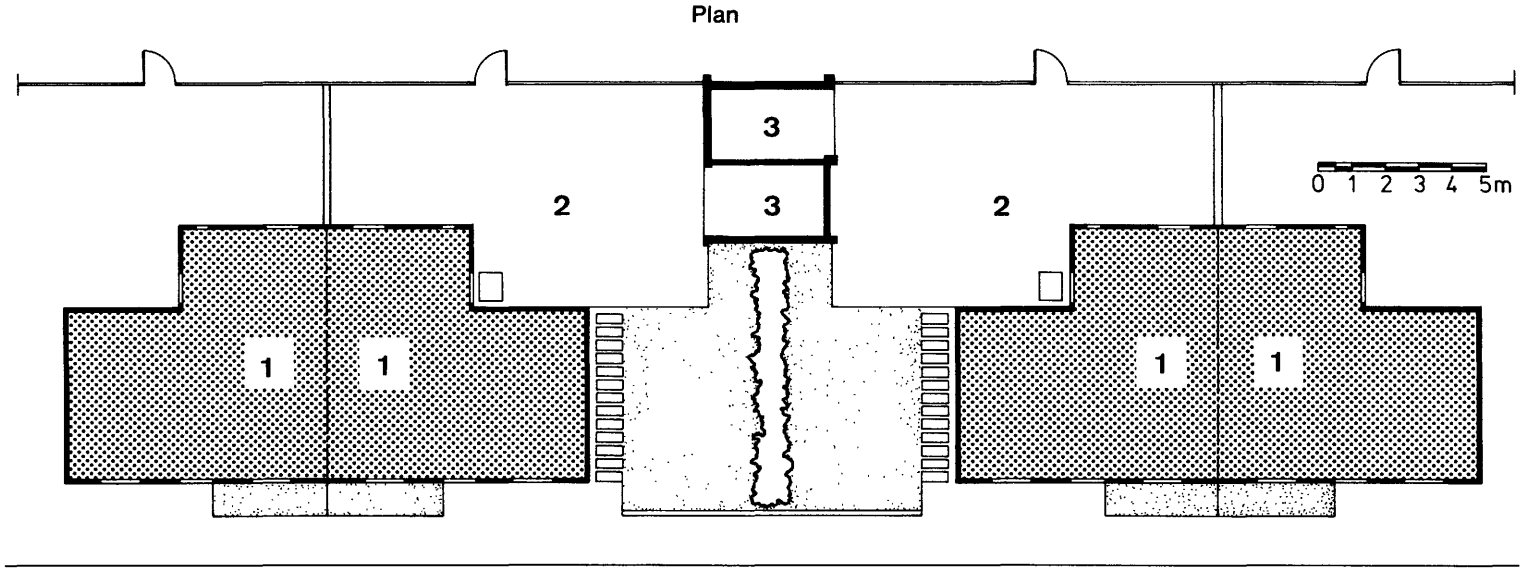


LENS-LIEVIN — Plan showing distribution of Type I - Situation after modernization



1. Dining room
2. Living-room or bedroom
3. Kitchen
4. W.C.
5. Cloakroom
6. Parents' bedroom
7. Children's bedroom
8. Bathroom

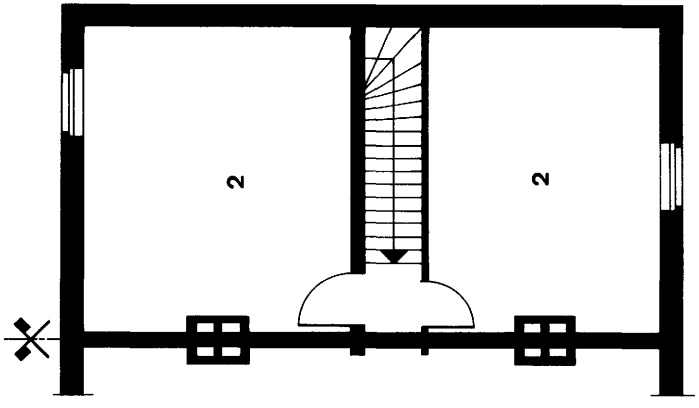
LENS-LIEVIN — Plan of surroundings of houses Type I



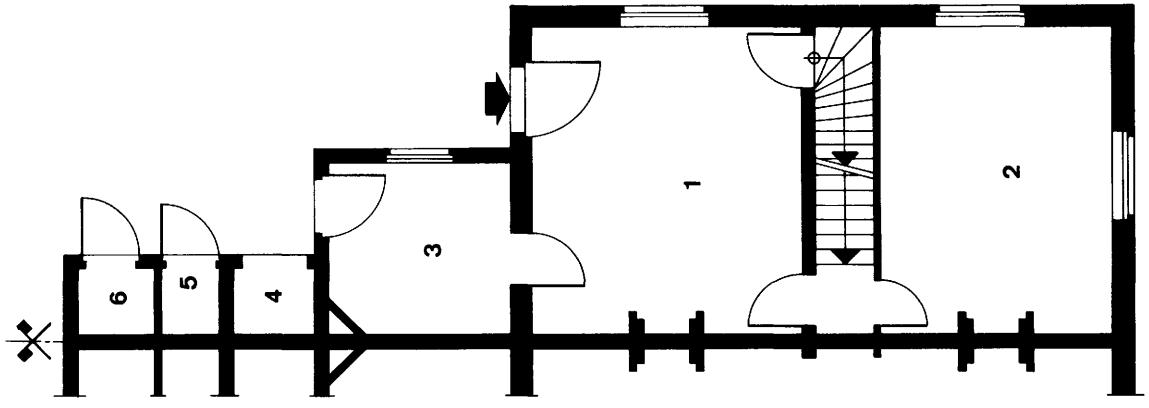
1. Houses Type 1
2. Patio
3. Shed

LENS-LIEVIN — Type III - Plan 13804 - Situation before modernization

First storey



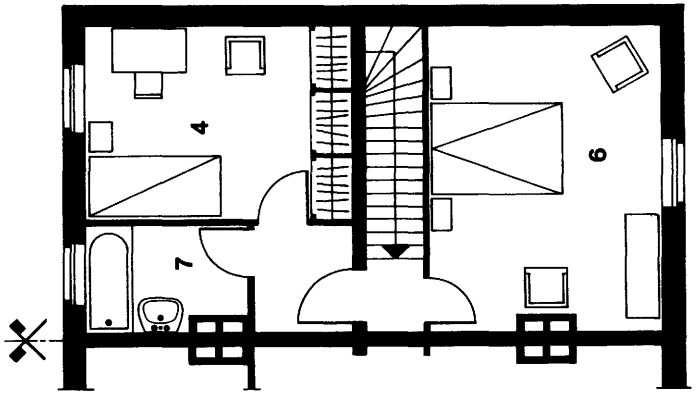
Ground floor



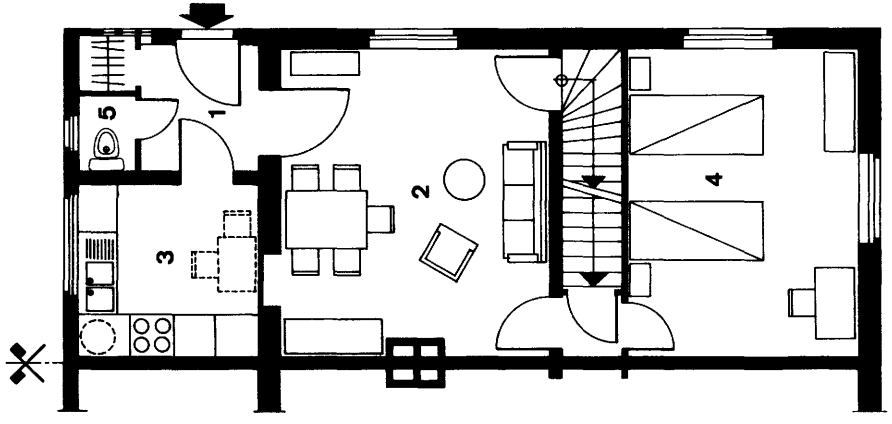
1. Living-room
2. Bedroom
3. Laundry
4. Store
5. W.C.
6. Shed

LENS-LIEVIN — Type III - Plan 13804 - Situation after modernization

First storey



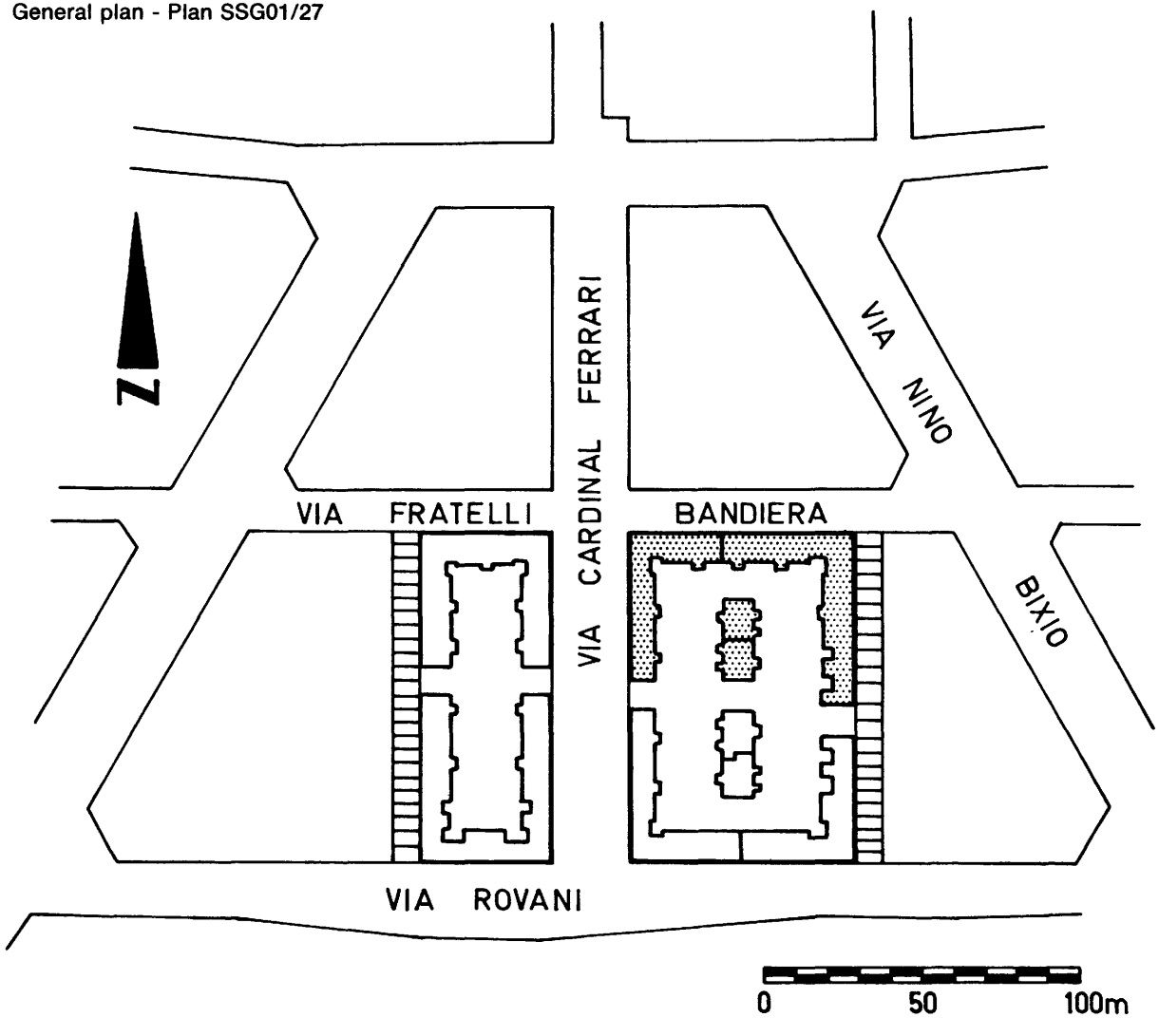
Ground floor



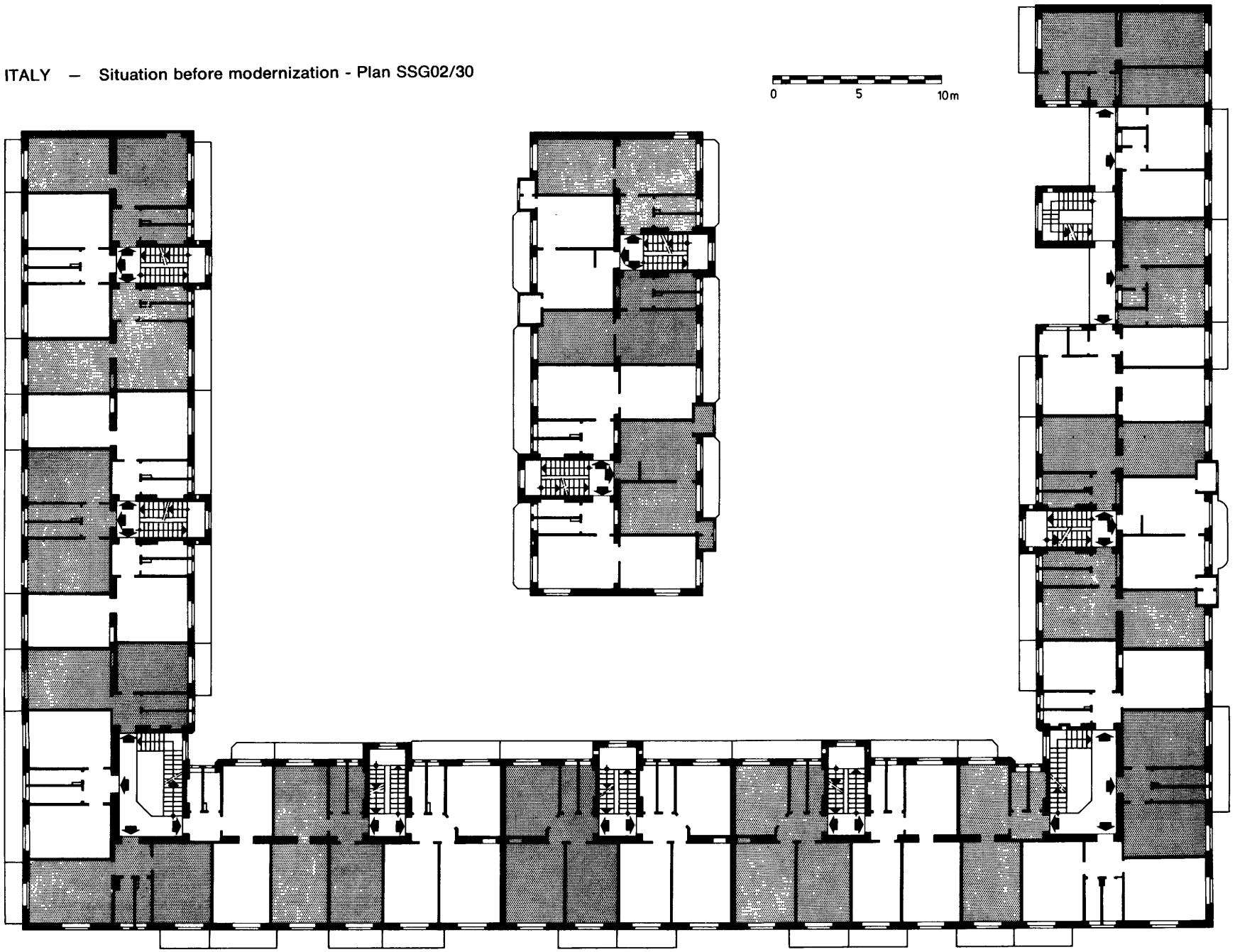
0 1 2 3m

1. Entrance
2. Living-room
3. Kitchen
4. Children's bedroom
5. W.C.
6. Parents' bedroom
7. Bathroom

ITALY — SESTO SAN GIOVANNI — General plan - Plan SSG01/27

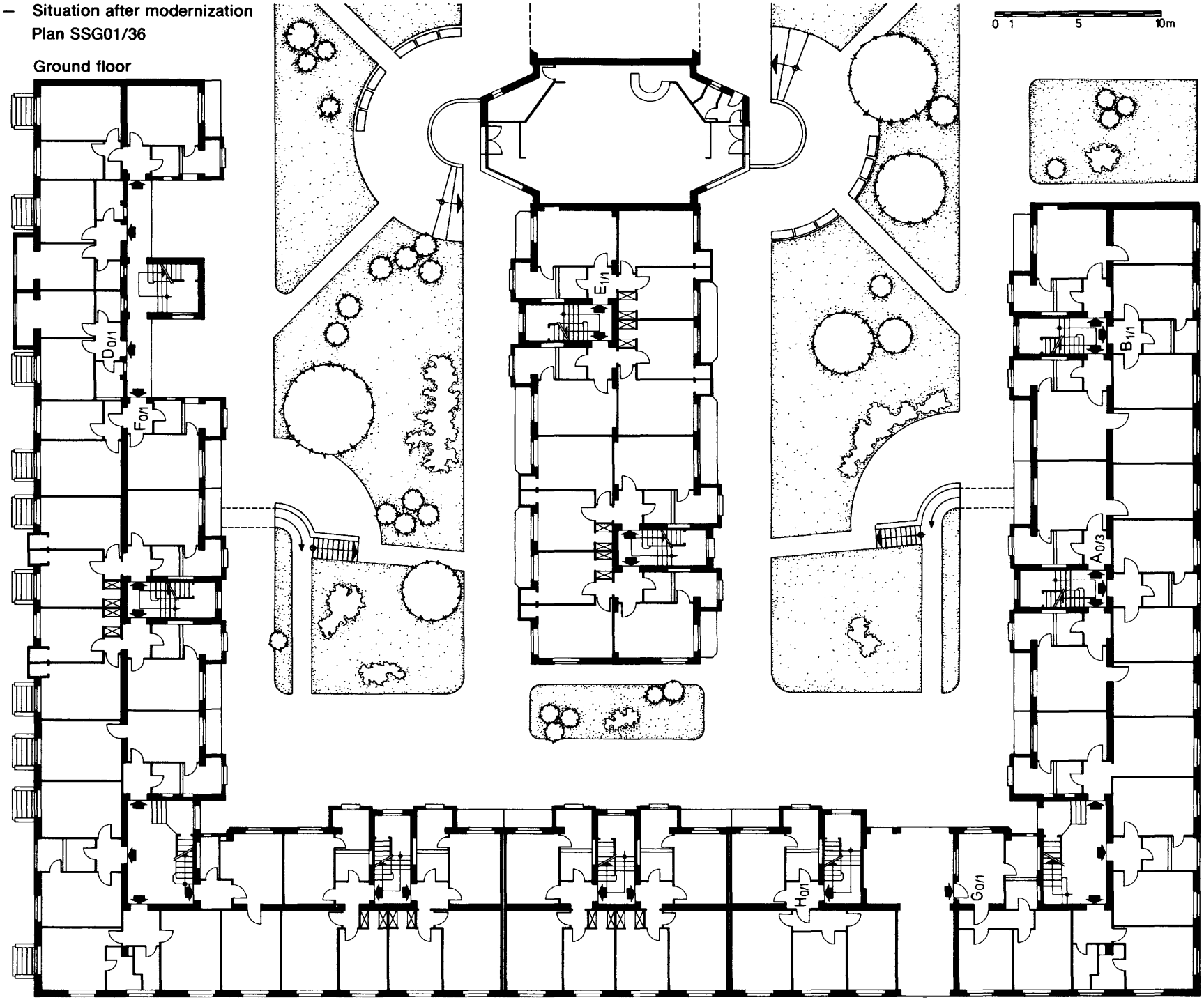


ITALY — Situation before modernization - Plan SSG02/30

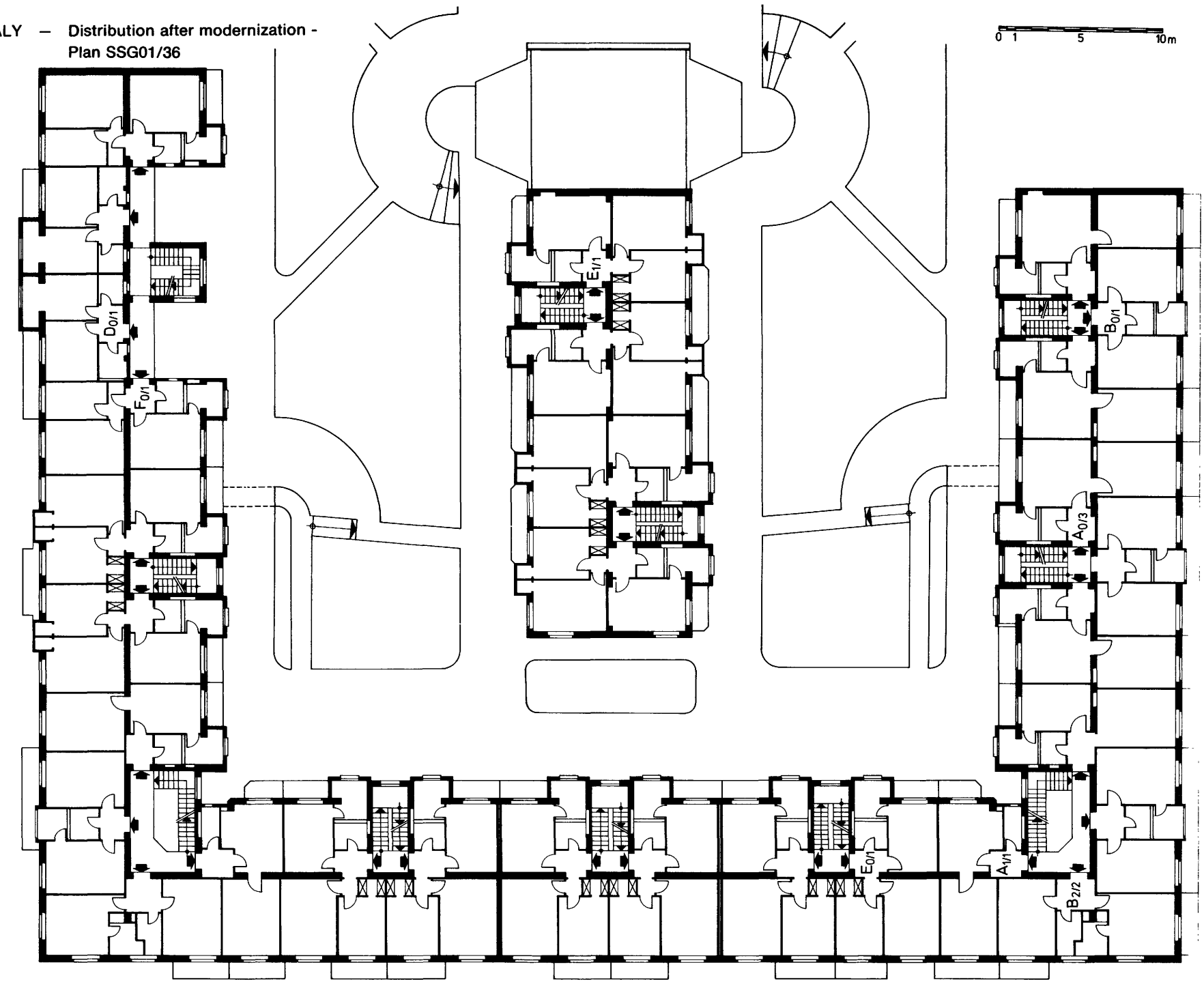


ITALY — Situation after modernization
Plan SSG01/36

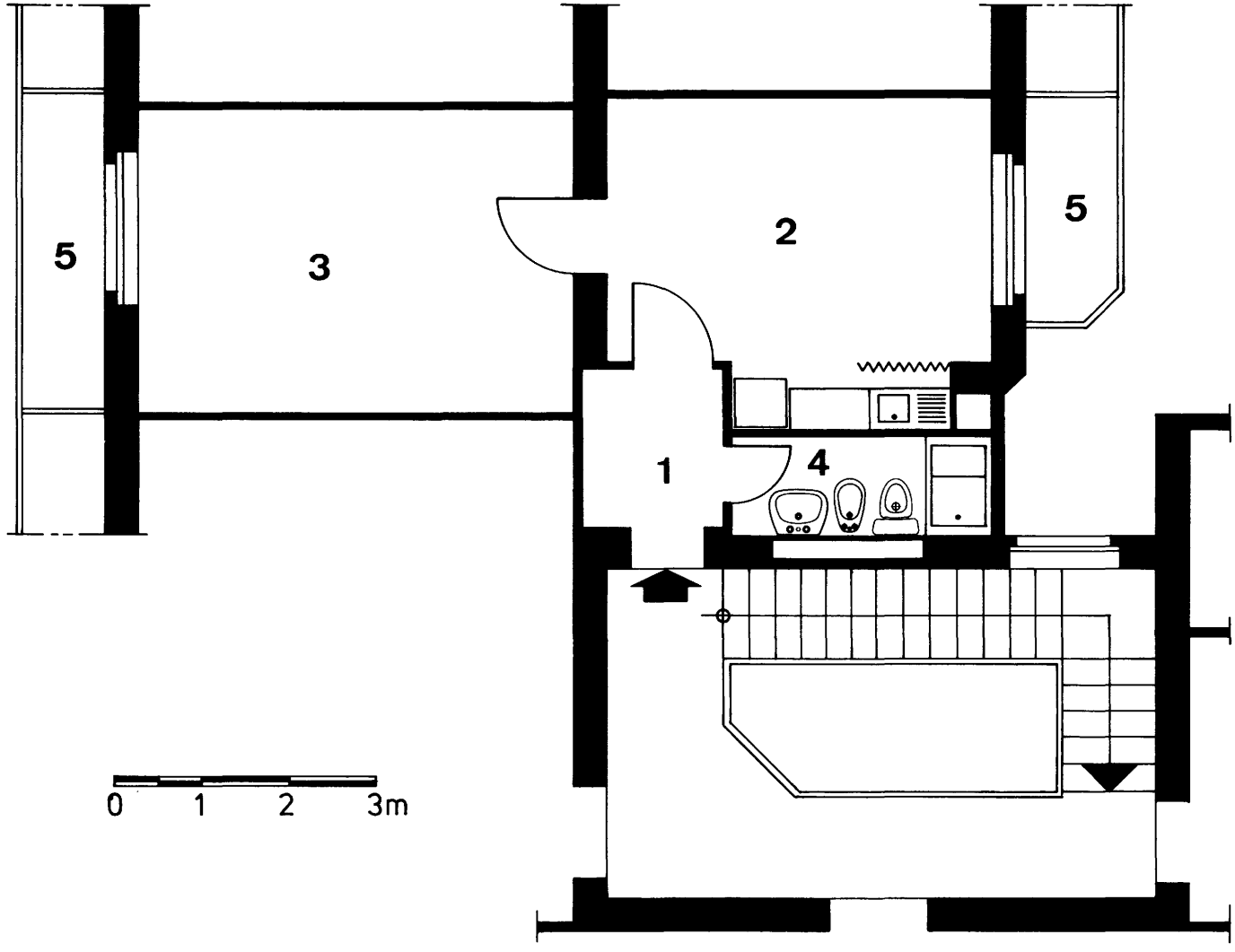
Ground floor



ITALY — Distribution after modernization -
Plan SSG01/36

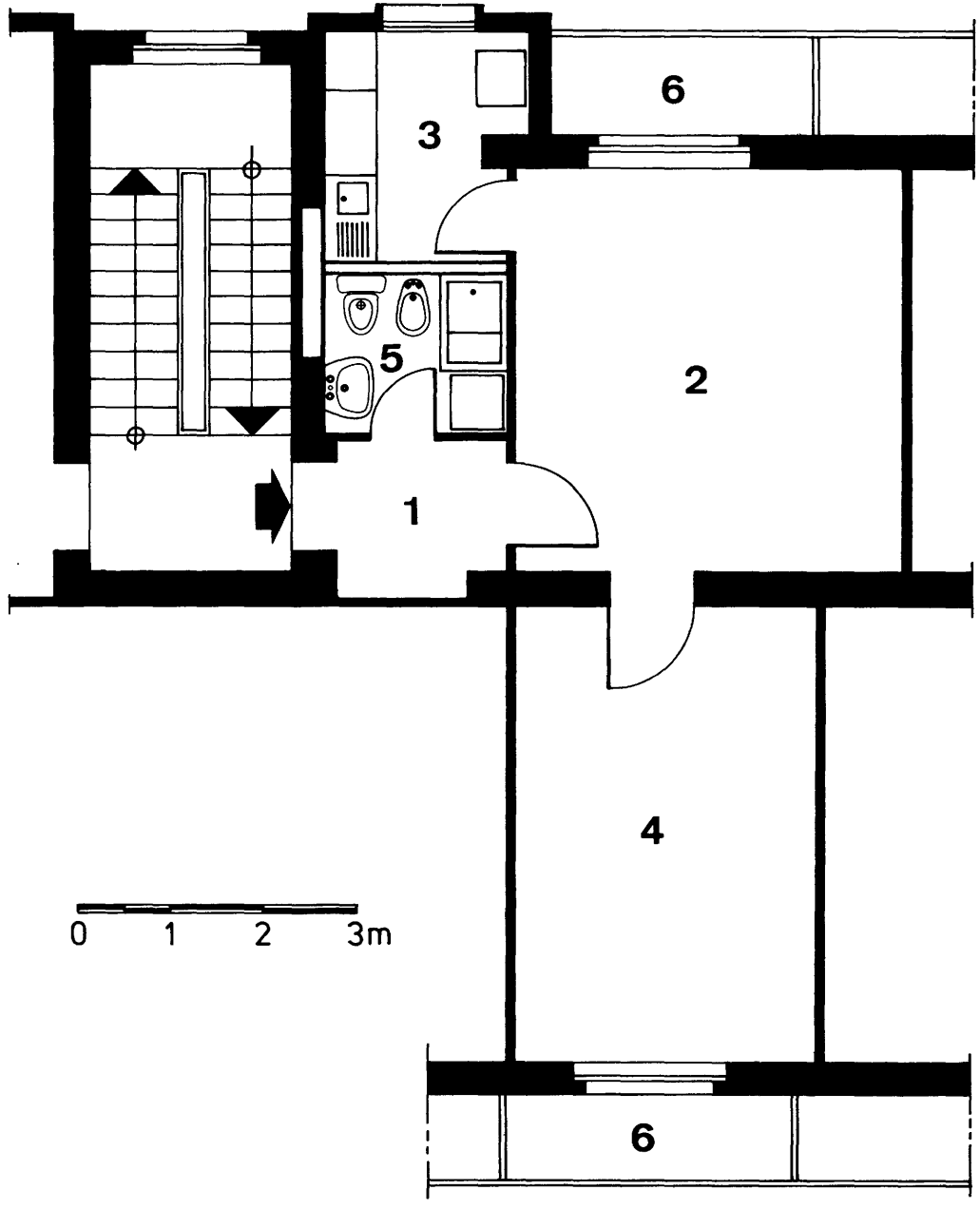


ITALY — Apartment Type A 1/1 - Plan SSG01/40



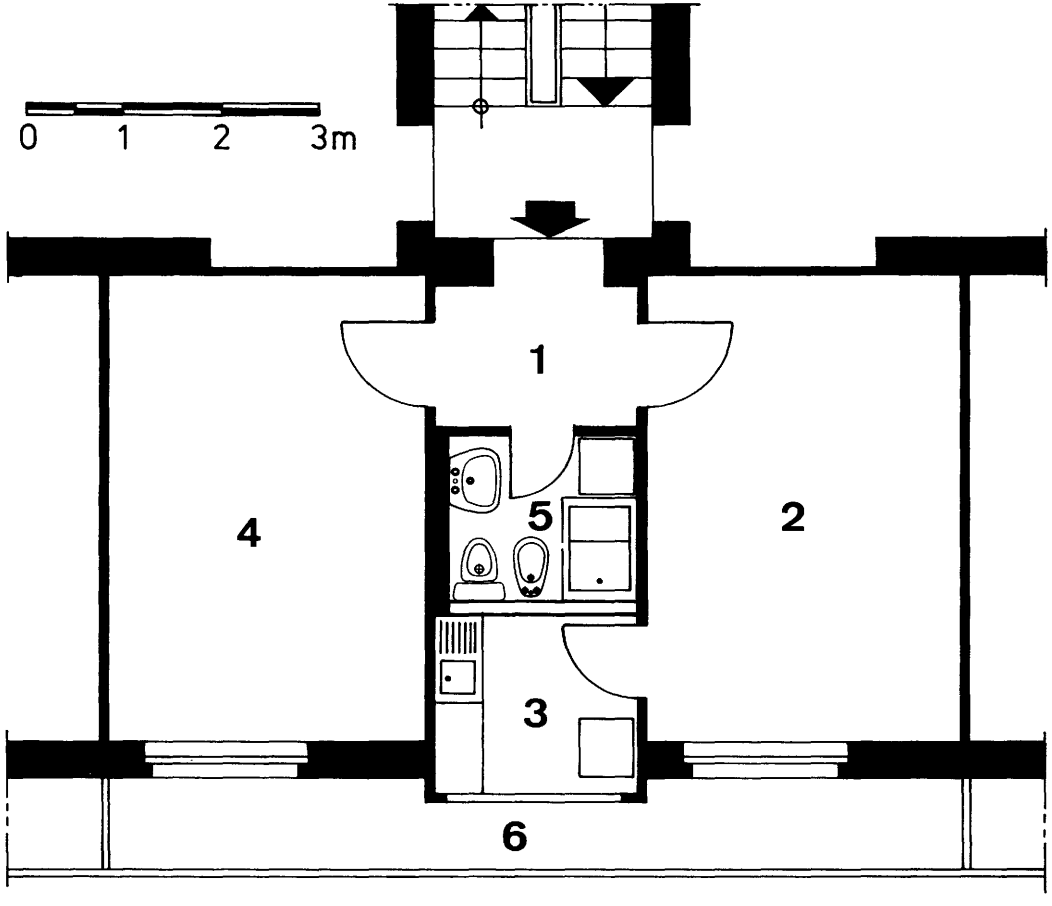
1. Entrance
2. Living-room + kitchen
3. Bedroom
4. Bathroom
5. Balcony

ITALY — Apartment Type A 0/3 - Plan SSG01/40



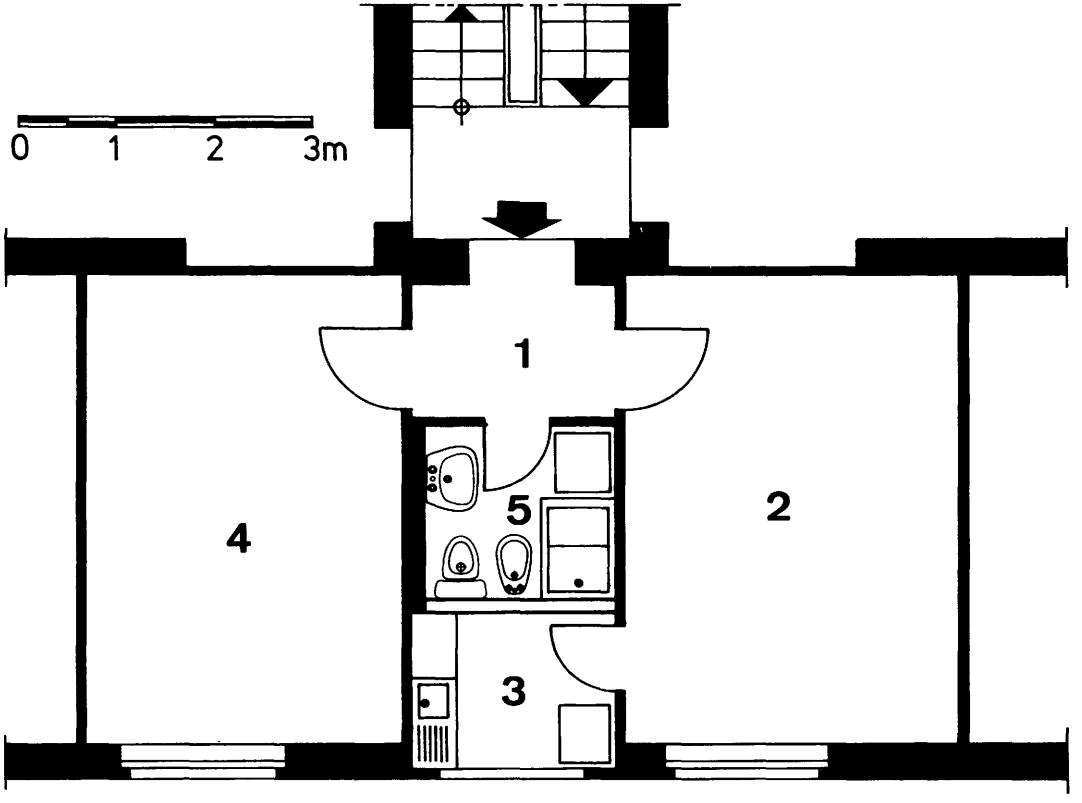
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Bathroom
6. Balcony

ITALY — Apartment Type B 0/1 - Plan SSG01/40



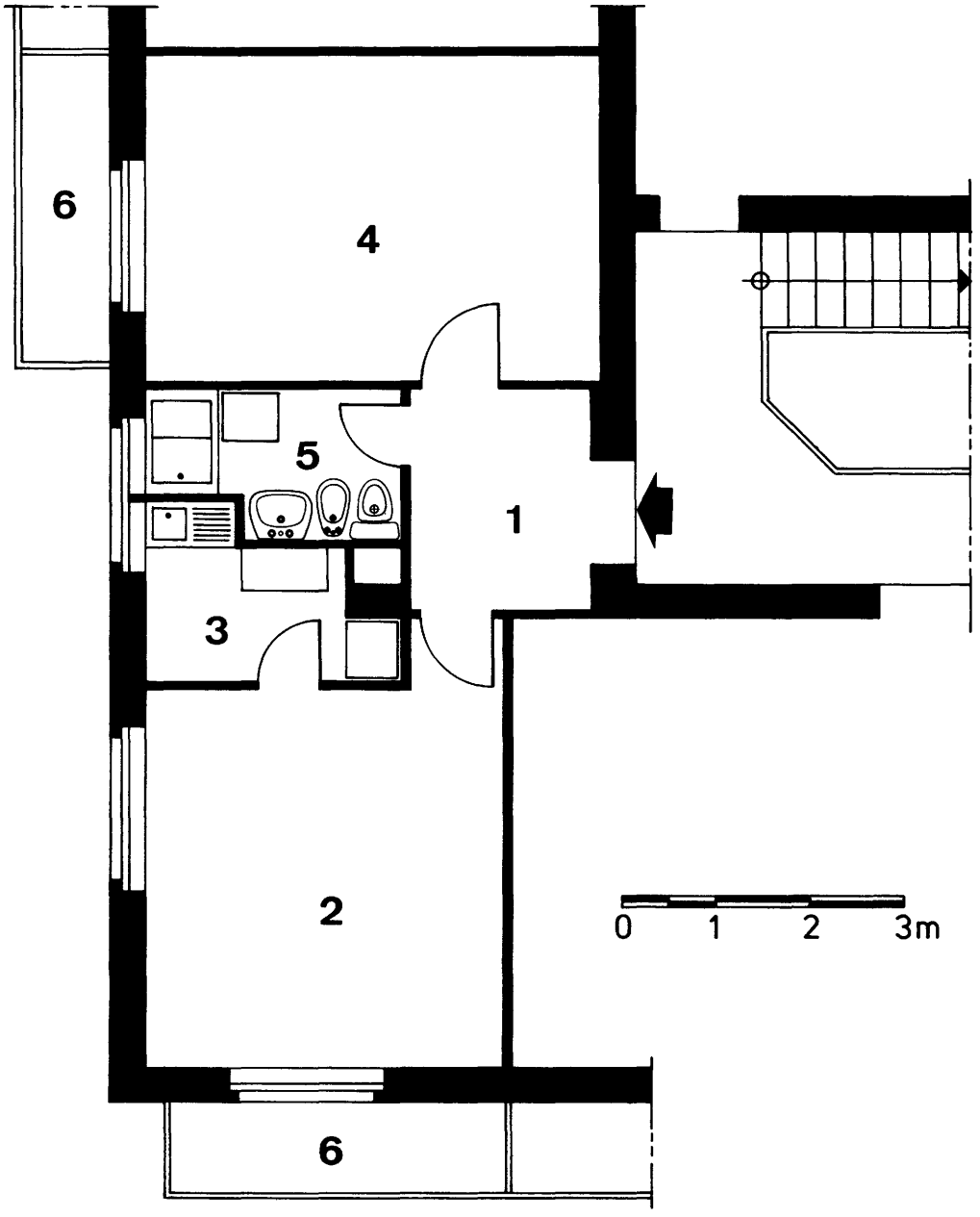
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Bathroom
6. Balcony

ITALY — Apartment Type B 1/1 - Plan SSG01/40



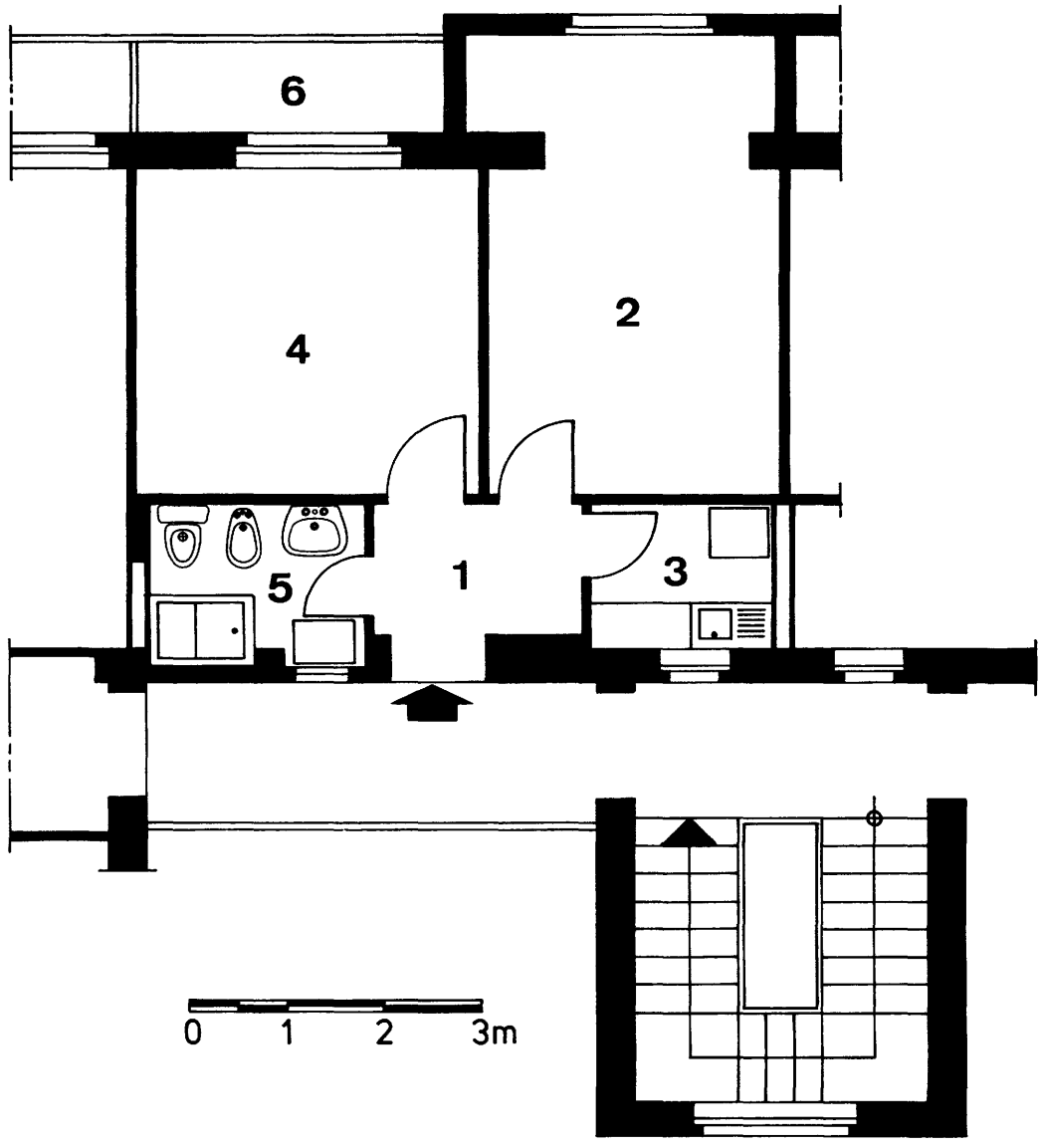
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Bathroom

ITALY — Apartment Type B 2/2 - Plan SSG01/40



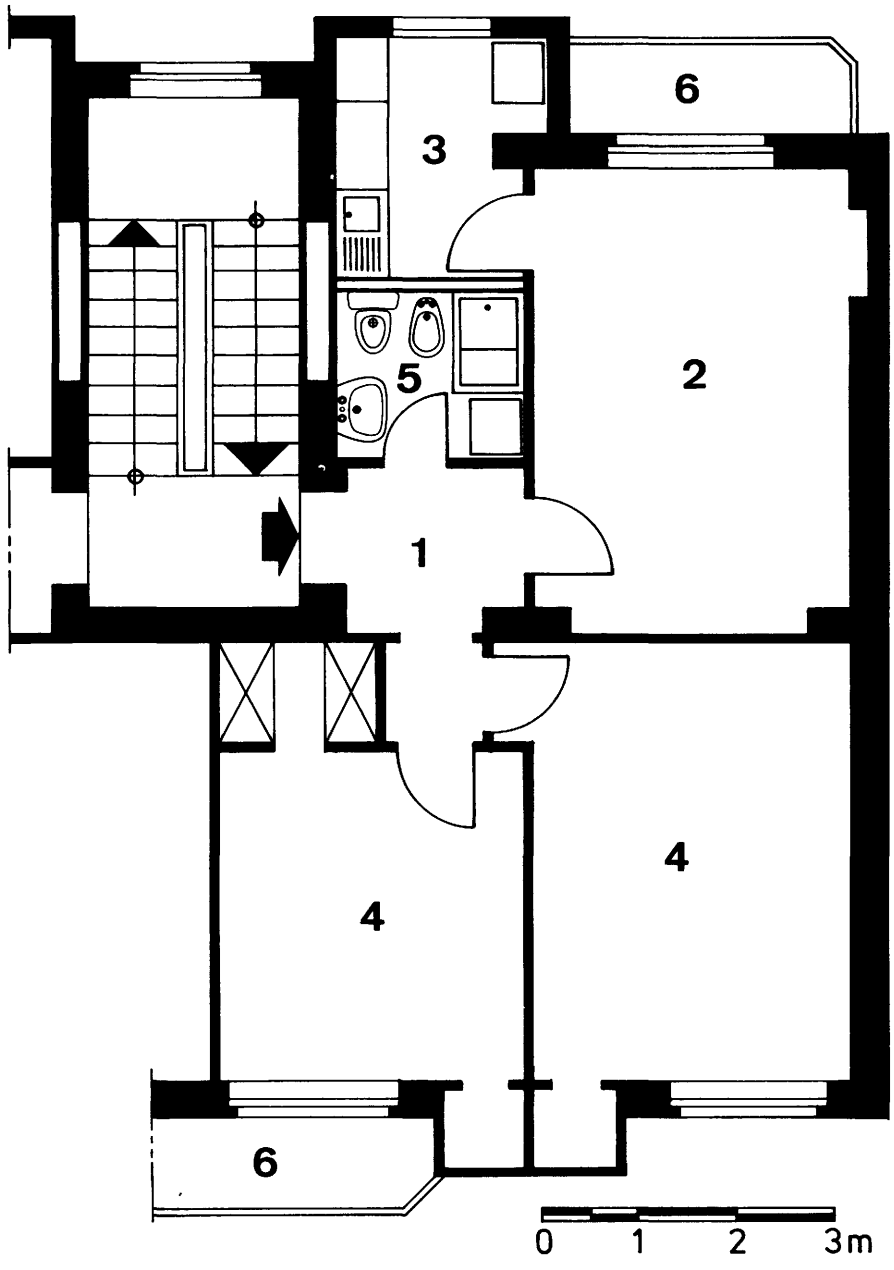
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Bathroom
6. Balcony

ITALY — Apartment Type D 0/1 - Plan SSG01/40



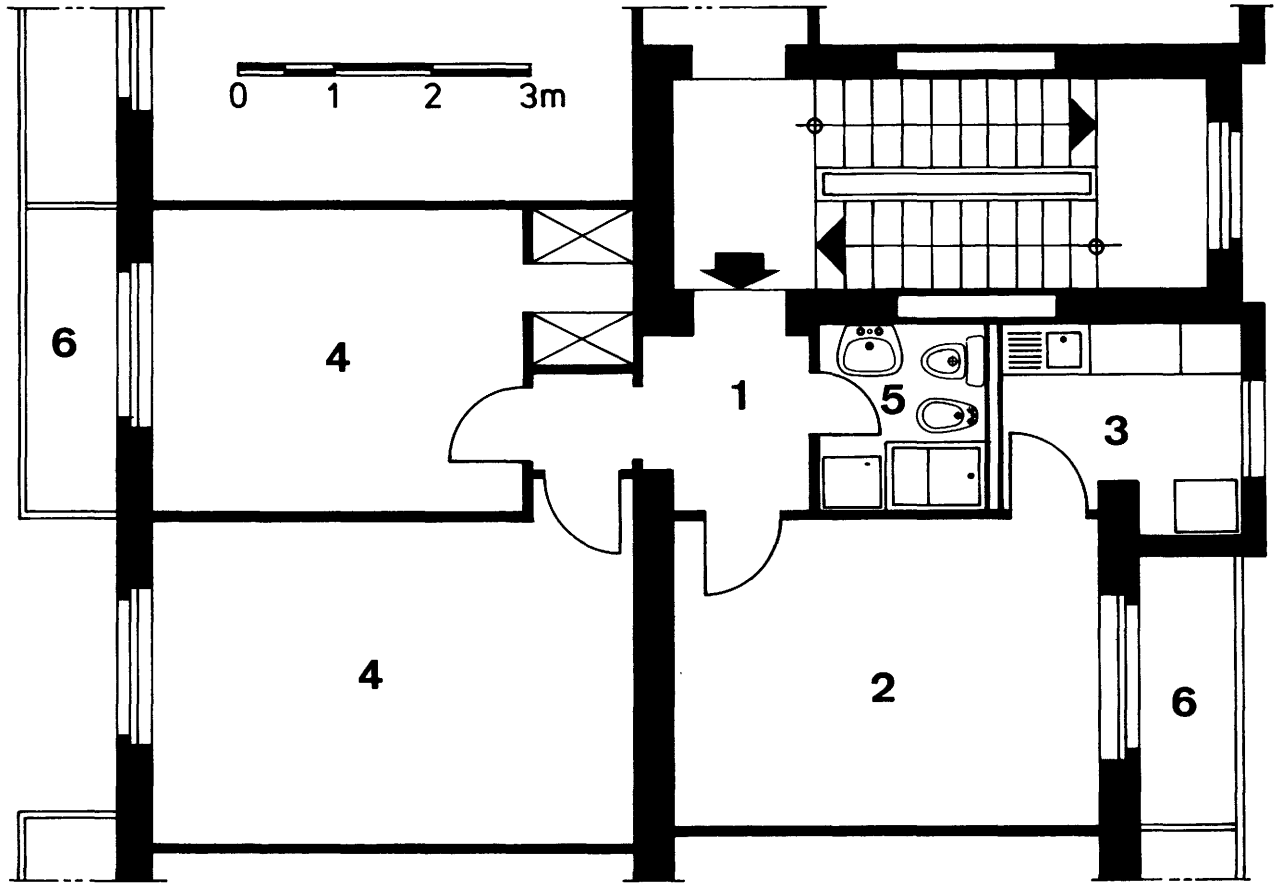
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Bathroom
6. Balcony

ITALY — Apartment Type E 1/1 - Plan SSG01/41



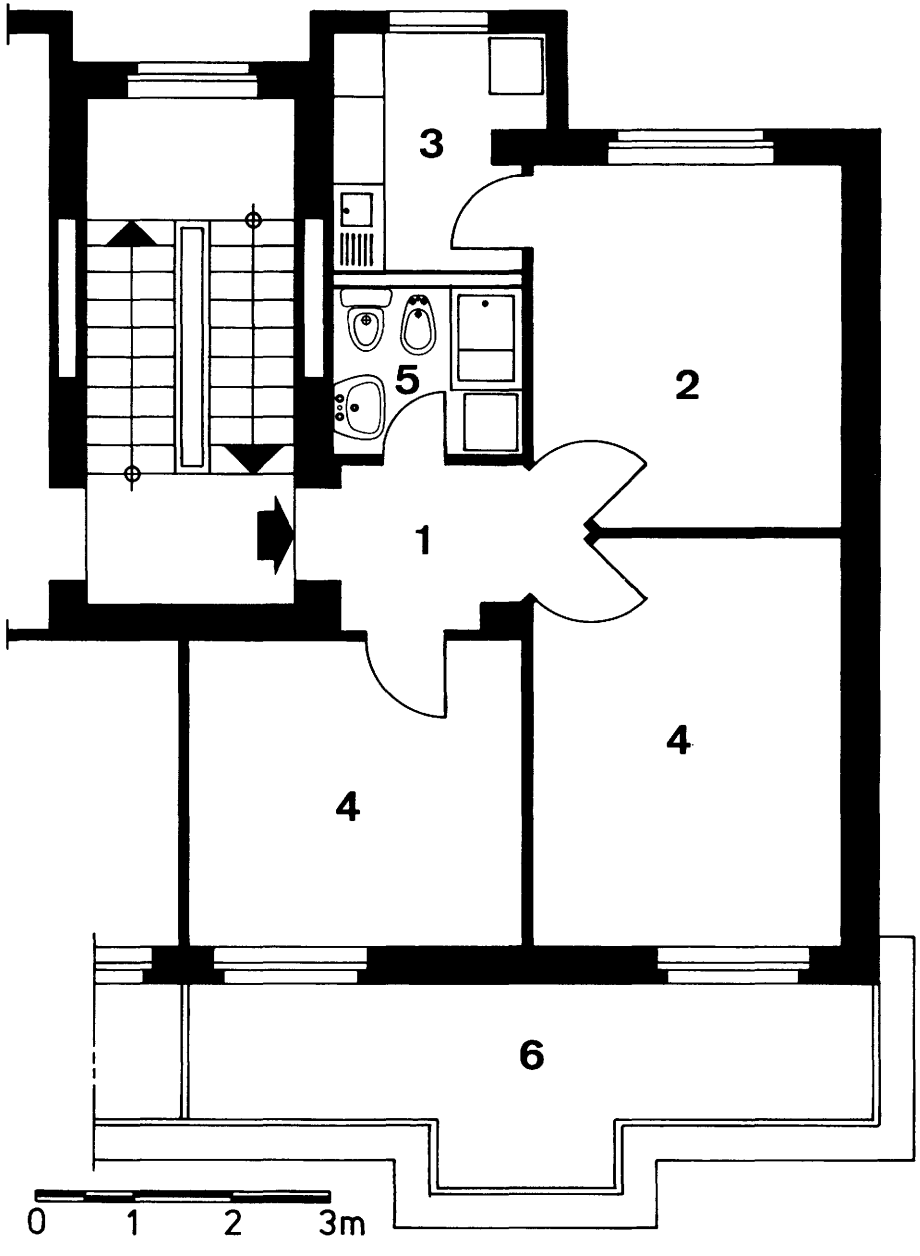
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Bathroom
6. Balcony

ITALY — Apartment Type E 0/1 - Plan SSG01/41



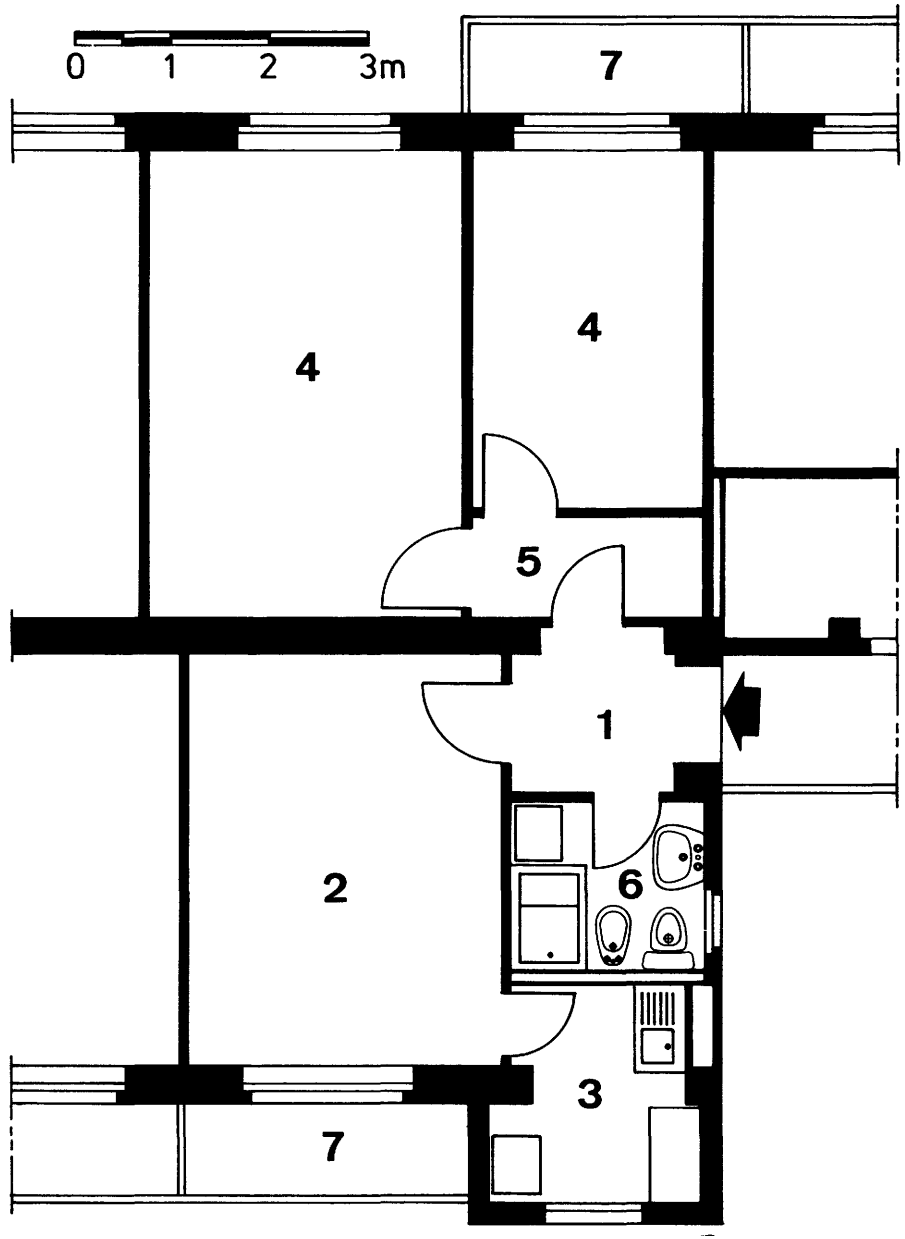
1. Entrance
2. Living-room
3. Kitchen
4. Bedrooms
5. Bathroom
6. Balcony

ITALY — Apartment Type E 2/1 - Plan SSG01/41



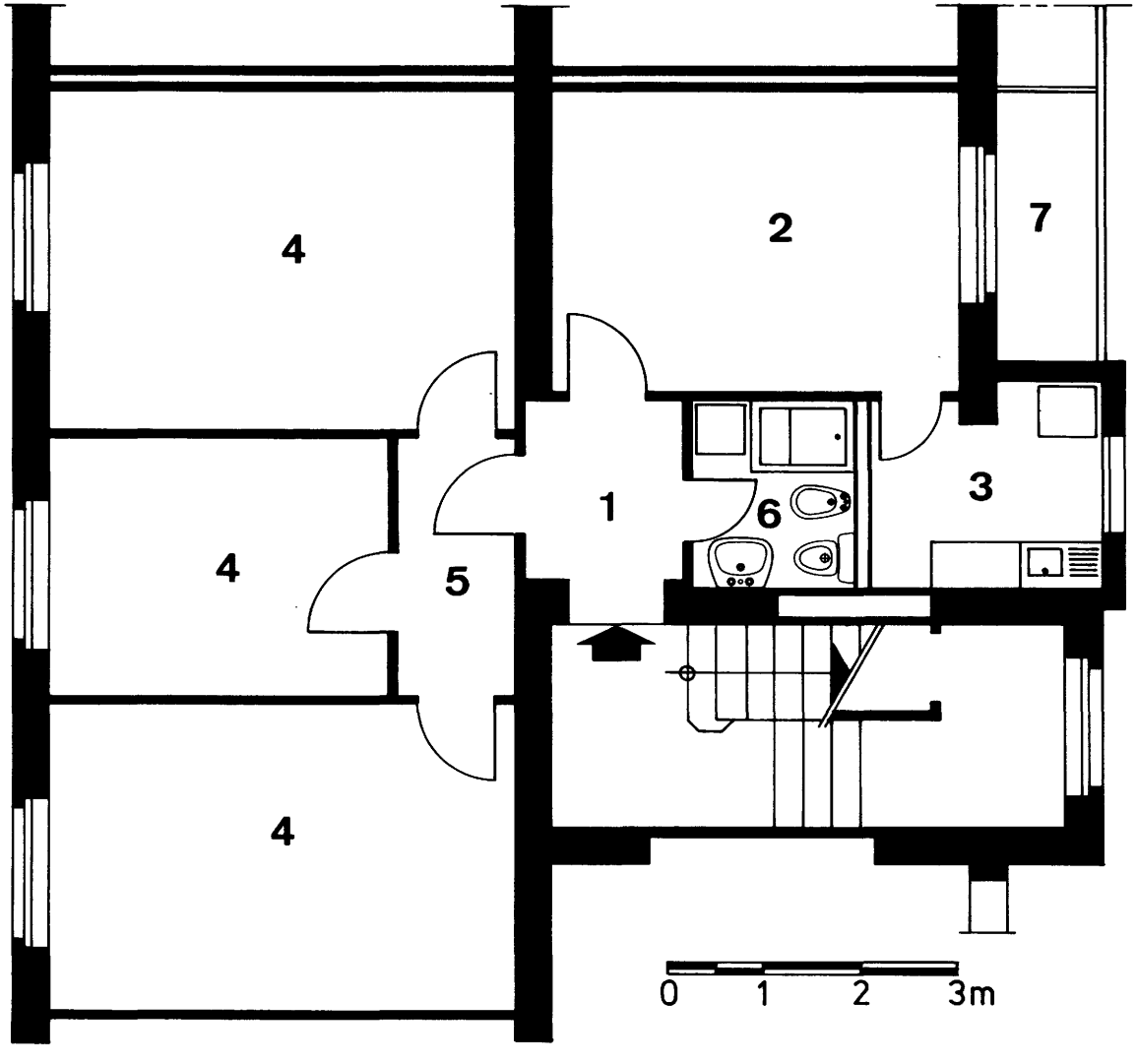
1. Entrance
2. Living-room
3. Kitchen
4. Bedrooms
5. Bathroom
6. Balcony

ITALY — Apartment Type F 0/1 - Plan SSG01/41



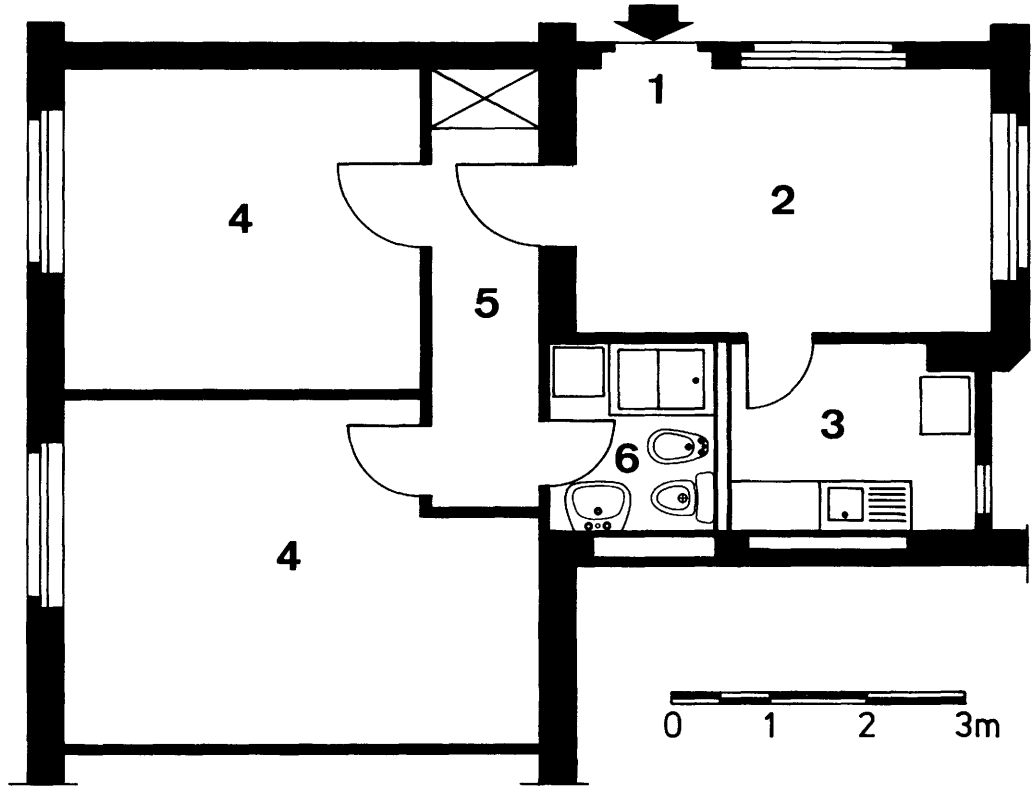
1. Entrance
2. Living-room
3. Kitchen
4. Bedrooms
5. Circulation
6. Bathroom
7. Balcony

ITALY – Apartment Type H 0/1 - Plan SSG01/41



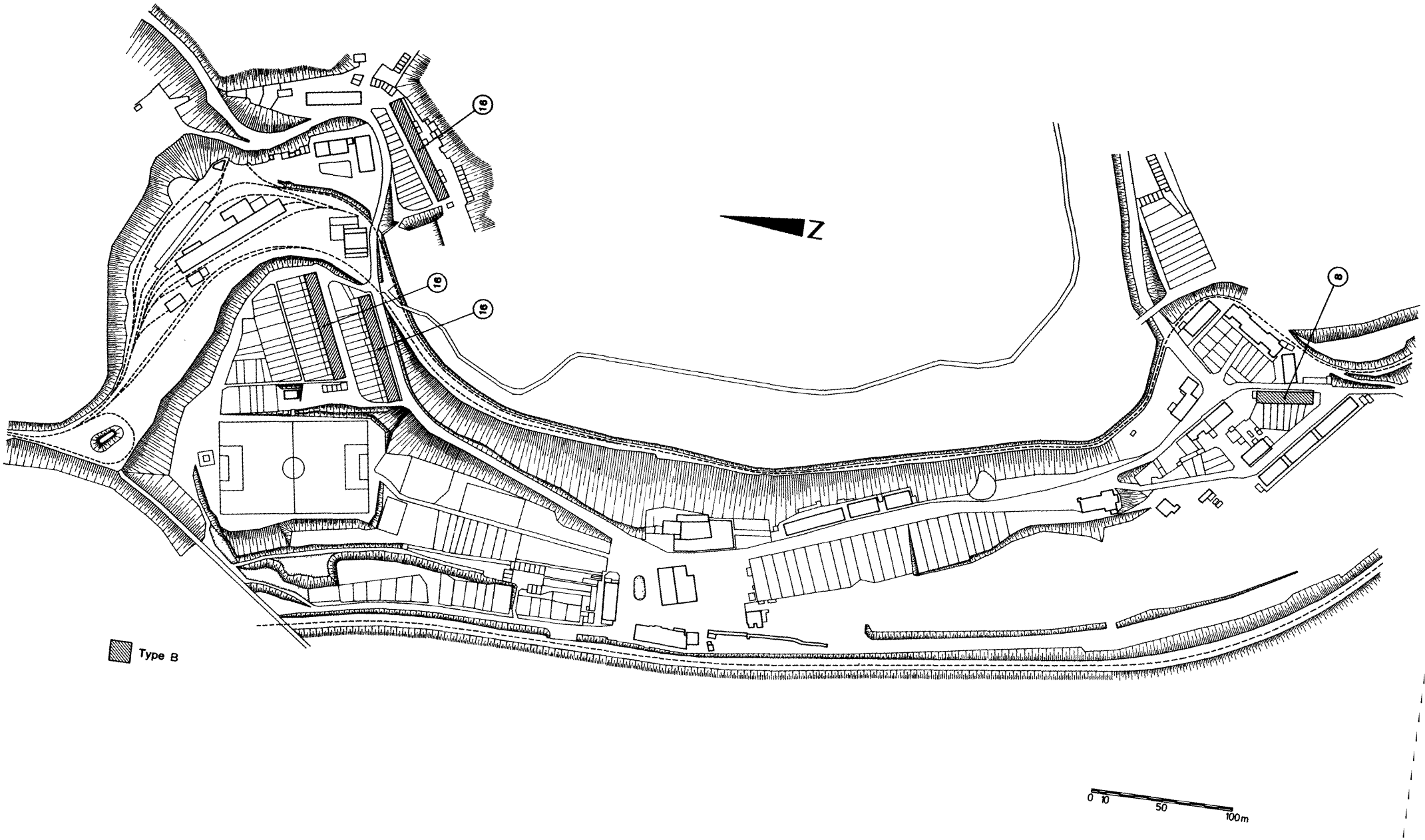
1. Entrance
2. Living-room
3. Kitchen
4. Bedroom
5. Circulation
6. Bathroom
7. Balcony

ITALY — Apartment Type G 0/1 - Plan SSG01/41

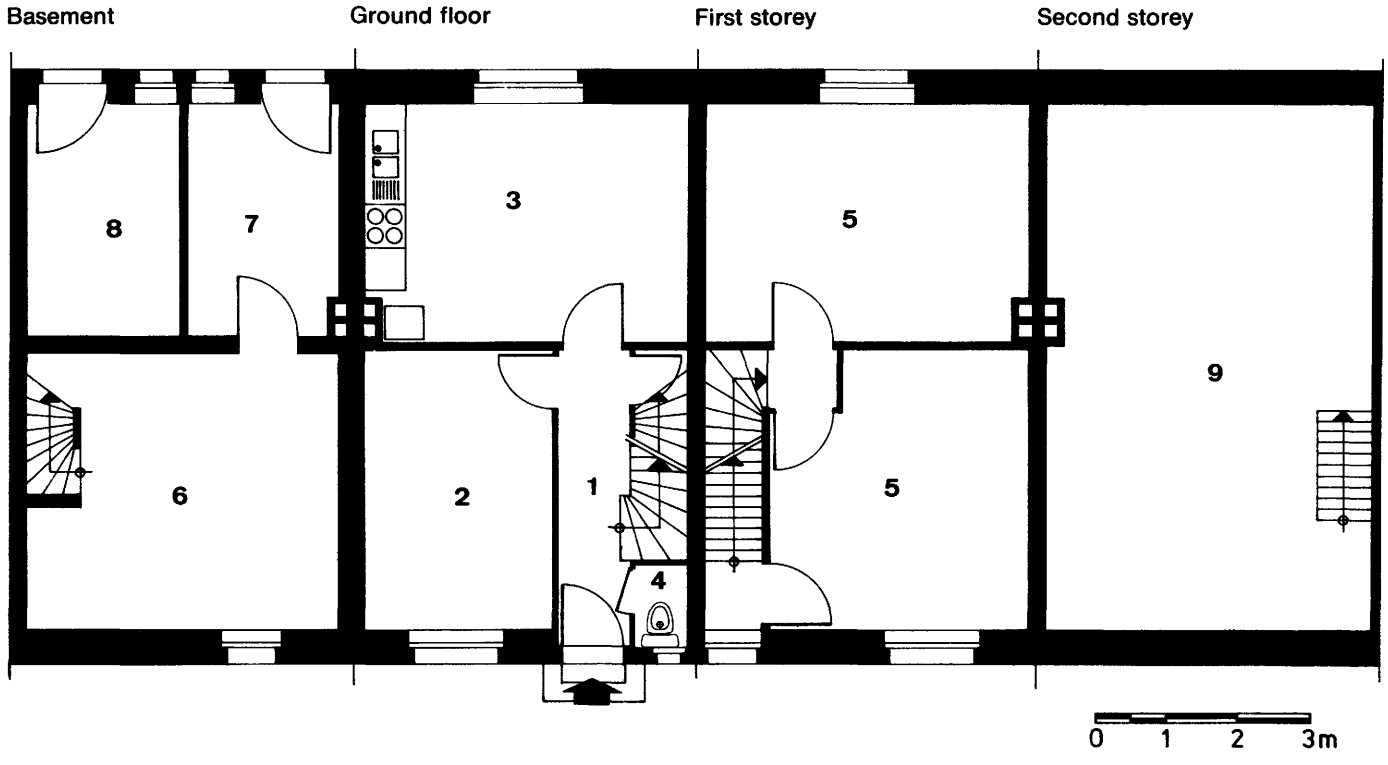


1. Entrance
2. Living-room
3. Kitchen
4. Bedrooms
5. Circulation
6. Bathroom

LUXEMBOURG – General plan of "La Sauvage" estate

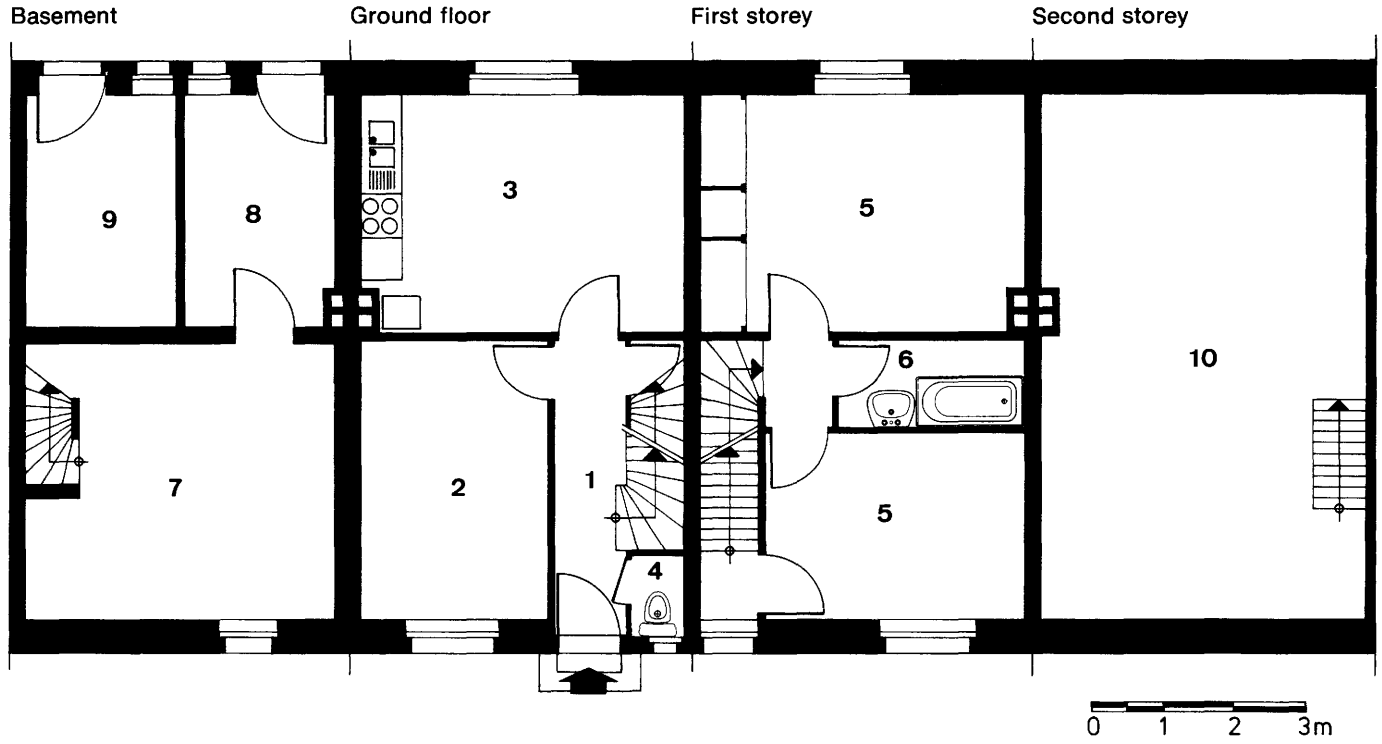


LUXEMBOURG — Situation before modernization - Type B



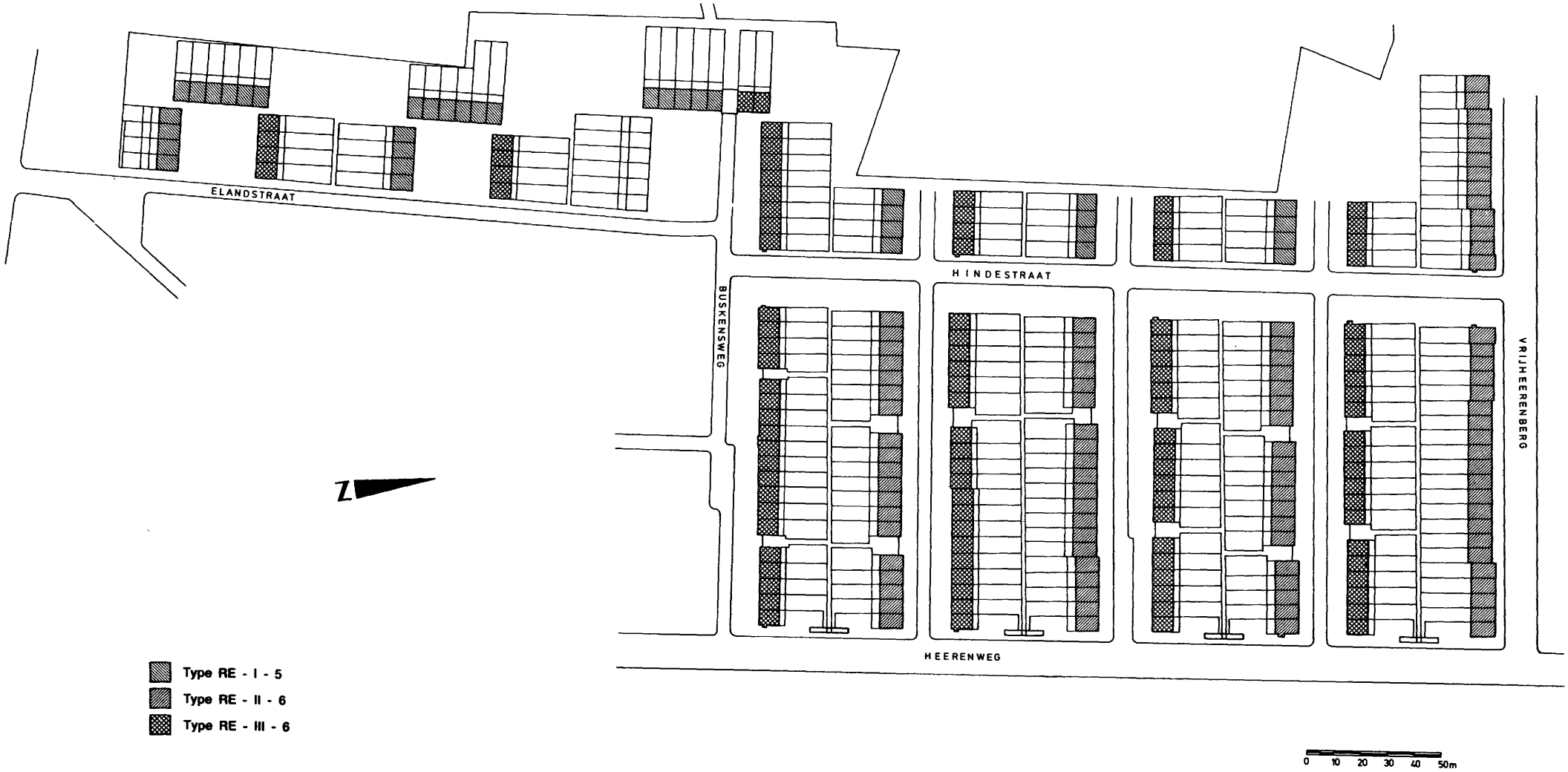
1. Entrance
2. Parlour
3. Living-room
4. W.C.
5. Bedrooms
6. Cellar
7. Laundry
8. Shed
9. Attic

LUXEMBOURG — Situation after modernization - Type B

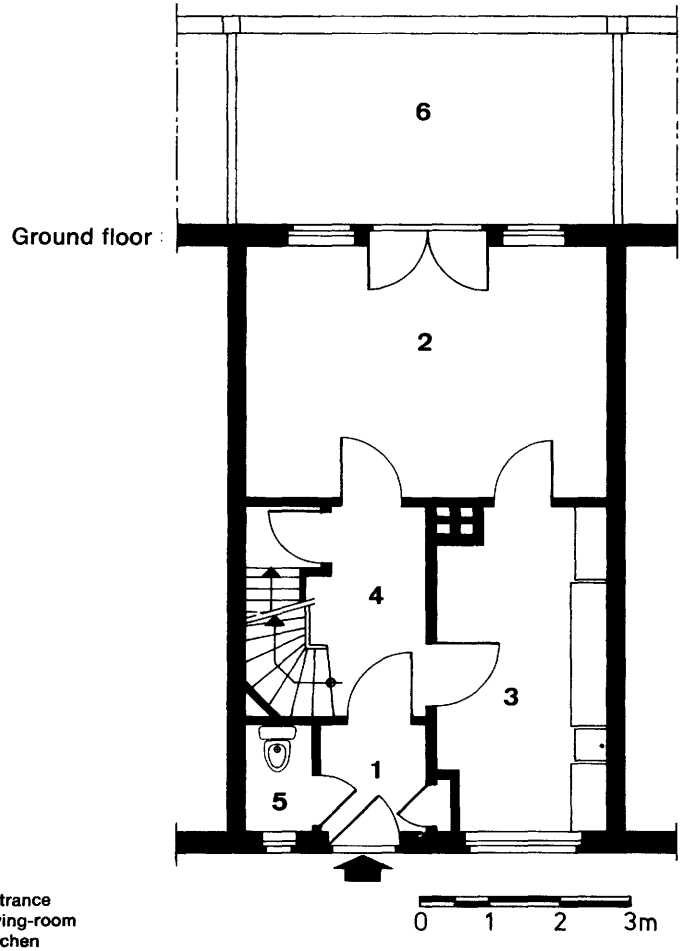


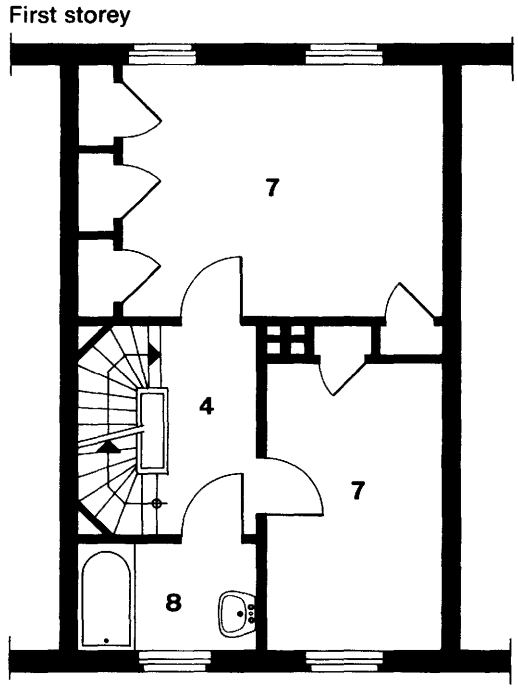
1. Entrance
2. Studio
3. Living-room
4. W.C.
5. Bedrooms
6. Bathroom
7. Cellar
8. Laundry
9. Shed
10. Attic

NETHERLANDS — General plan



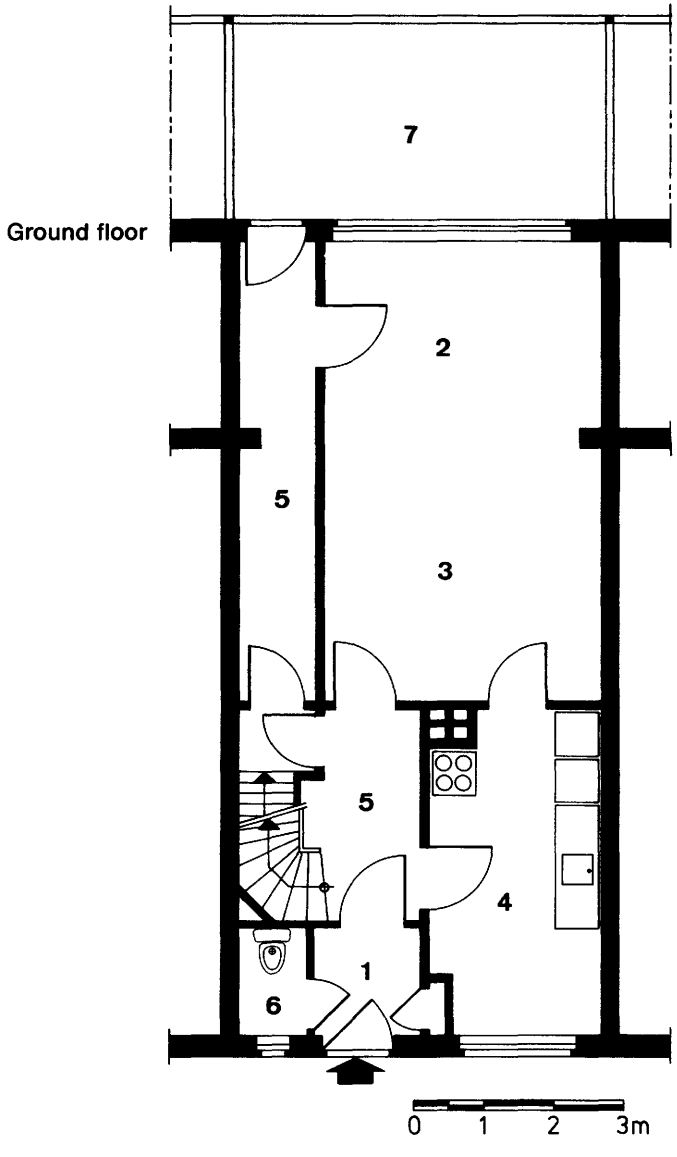
NETHERLANDS — Type RE - I - 5 - Situation before modernization

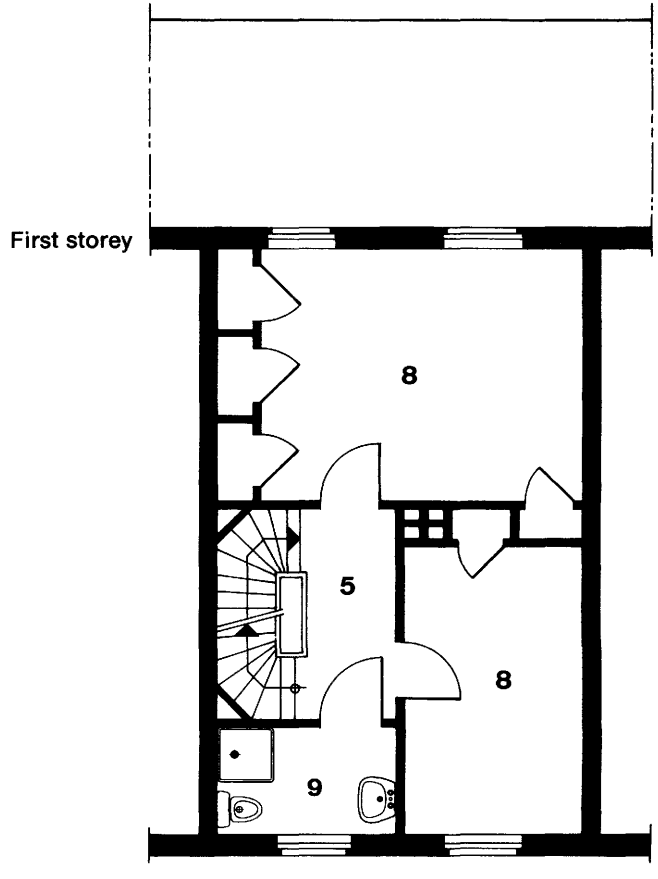




1. Entrance
2. Living-room
3. Kitchen
4. Circulation
5. W.C.
6. Terrace
7. Bedrooms
8. Bathroom

NETHERLANDS — Type RE - I - 5 - Situation after modernization

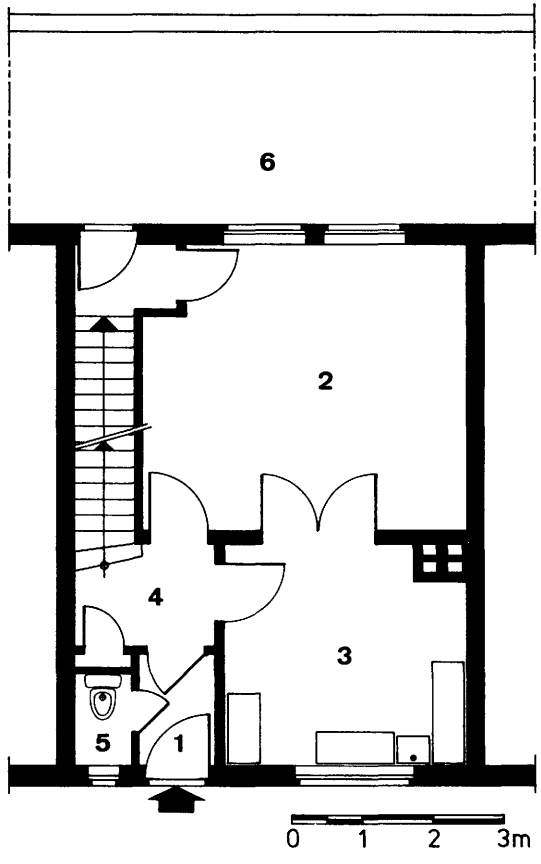




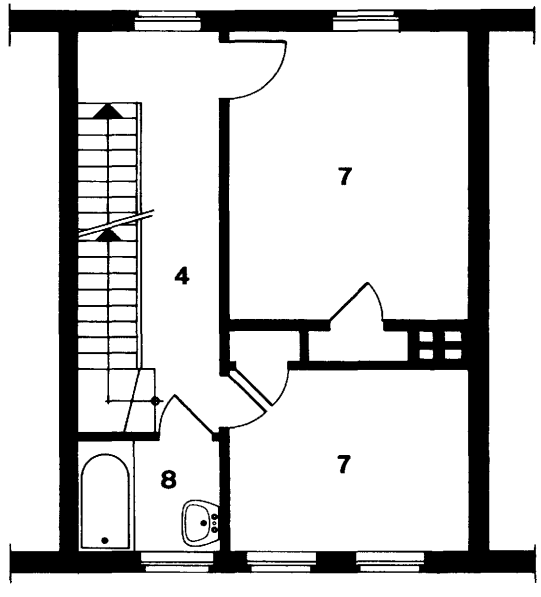
1. Entrance
2. Living-room
3. Dining-room
4. Kitchen
5. Circulation
6. W.C.
7. Terrace
8. Bedrooms
9. Bathroom

NETHERLANDS — Type RE - II - 6 - Situation before modernization

Ground floor



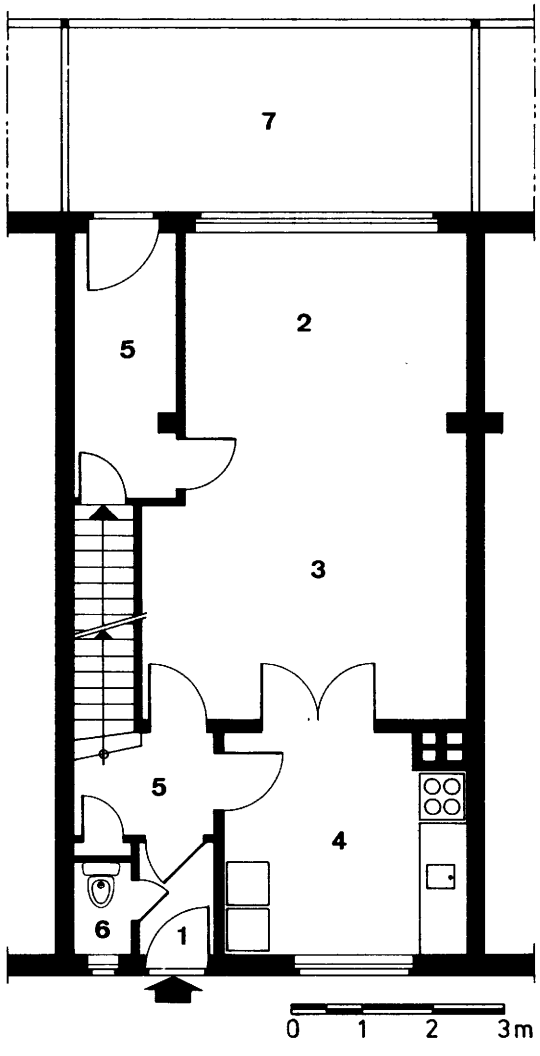
First storey



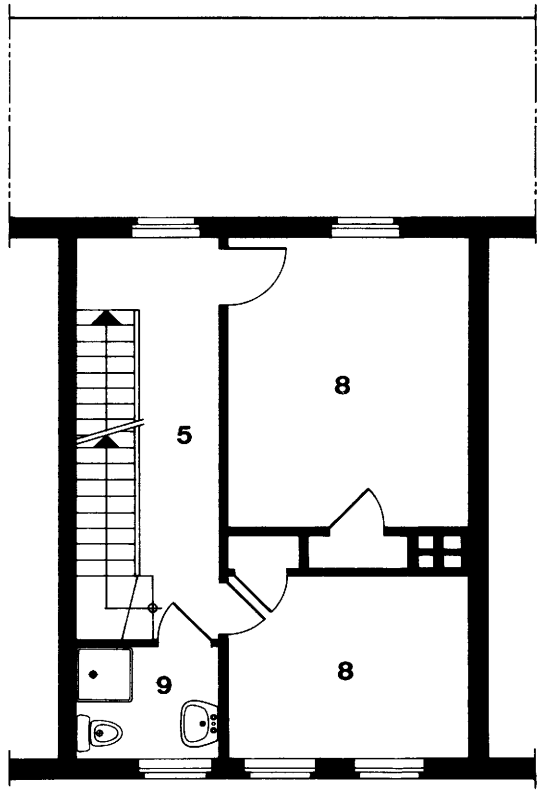
1. Entrance
2. Living-room
3. Kitchen
4. Circulation
5. W.C.
6. Terrace
7. Bedrooms
8. Bathroom

NETHERLANDS — Type RE - II - 6 - Situation after modernization

Ground floor



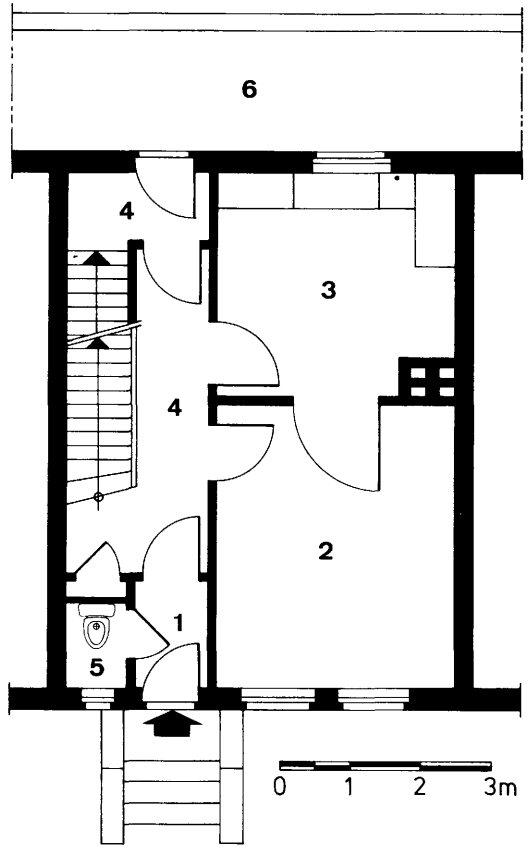
First storey



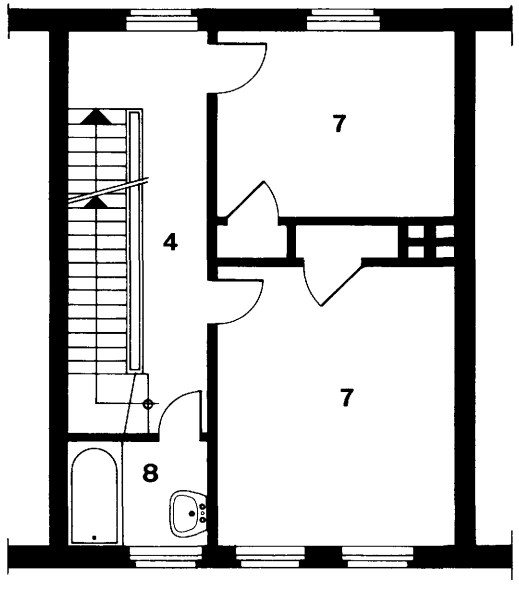
1. Entrance
2. Living-room
3. Kitchen
4. Circulation
5. W.C.
6. Terrace
7. Bedrooms
8. Bathroom

NETHERLANDS — Plan Type RE - III - 6 - Situation before modernization

Ground floor

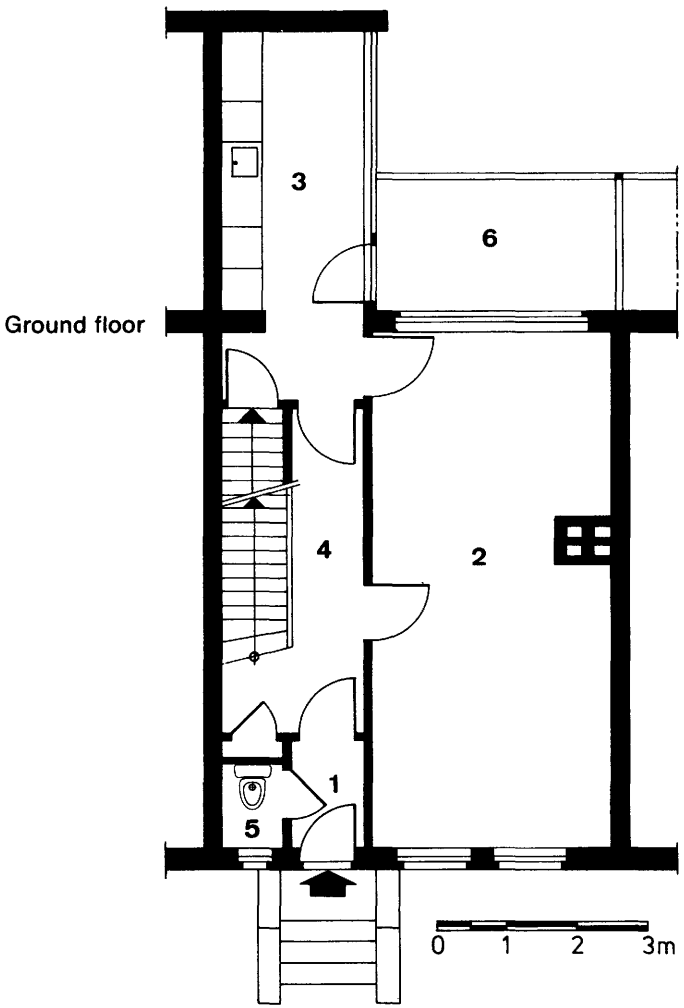


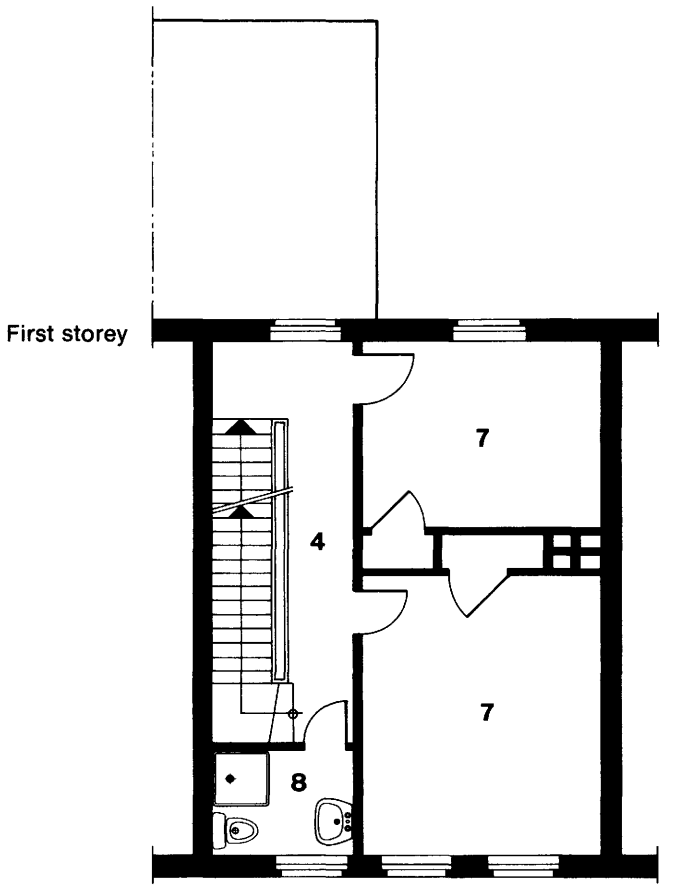
First storey



1. Entrance
2. Living-room
3. Kitchen
4. Circulation
5. W.C.
6. Terrace
7. Bedrooms
8. Bathroom

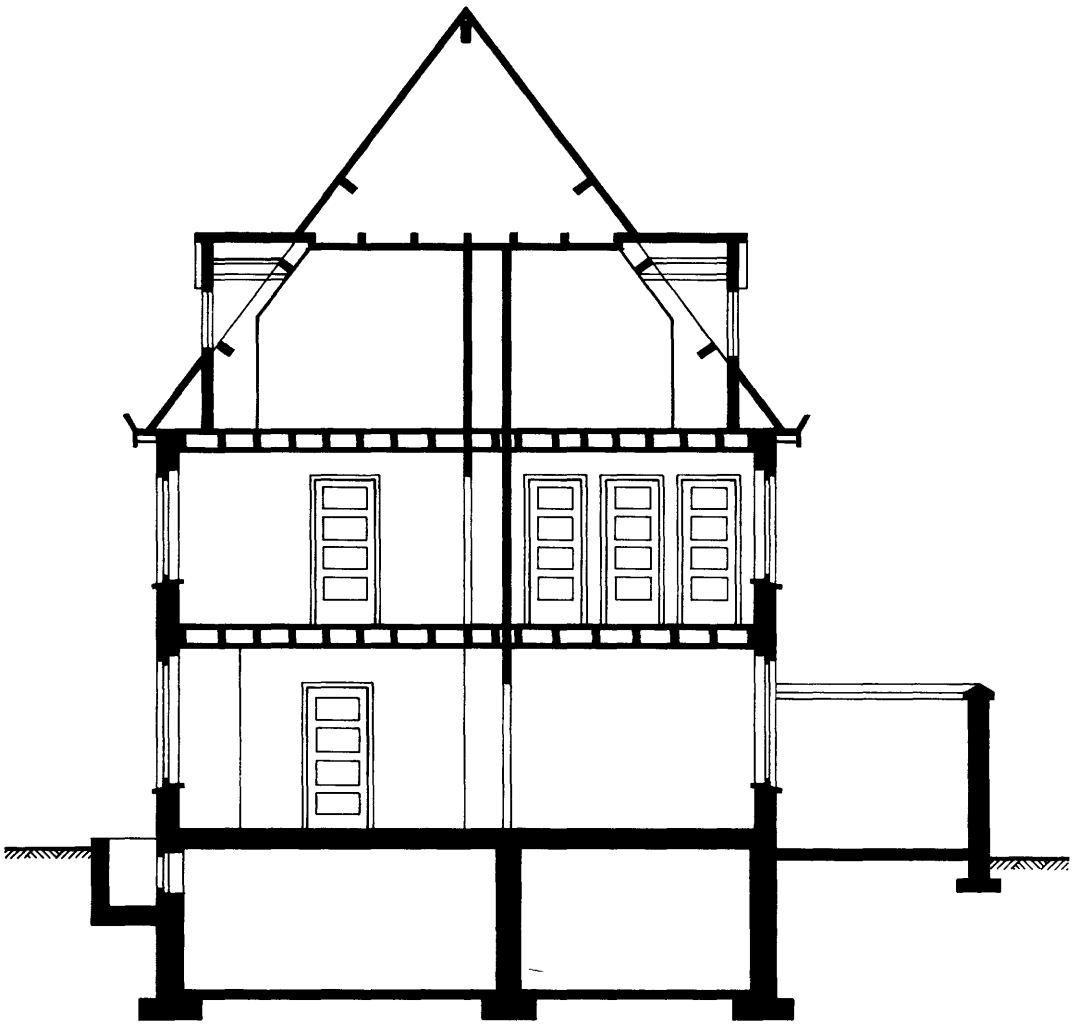
NETHERLANDS — Plan Type RE - III - 6 - Situation after modernization



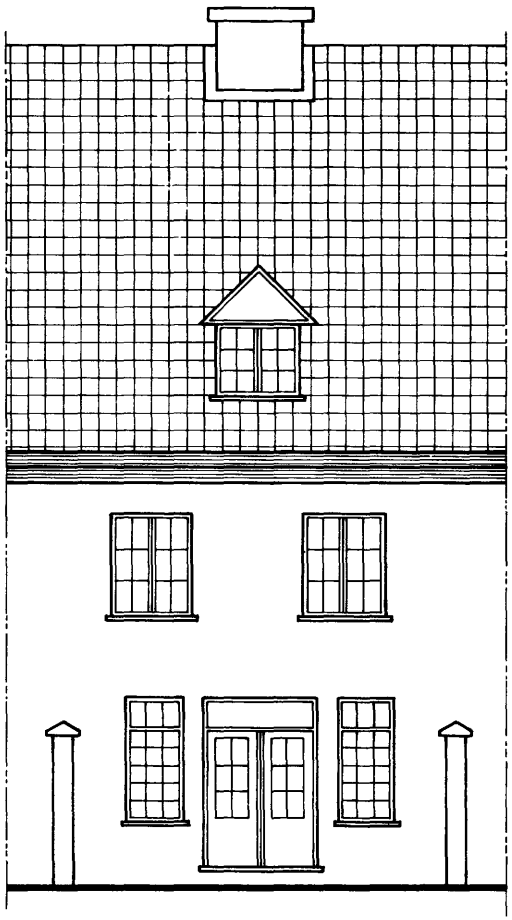


1. Entrance
2. Living-room
3. Kitchen
4. Circulation
5. W.C.
6. Terrace
7. Bedrooms
8. Bathroom

NETHERLANDS — Plan Type RE - I - 5 - Situation before modernization

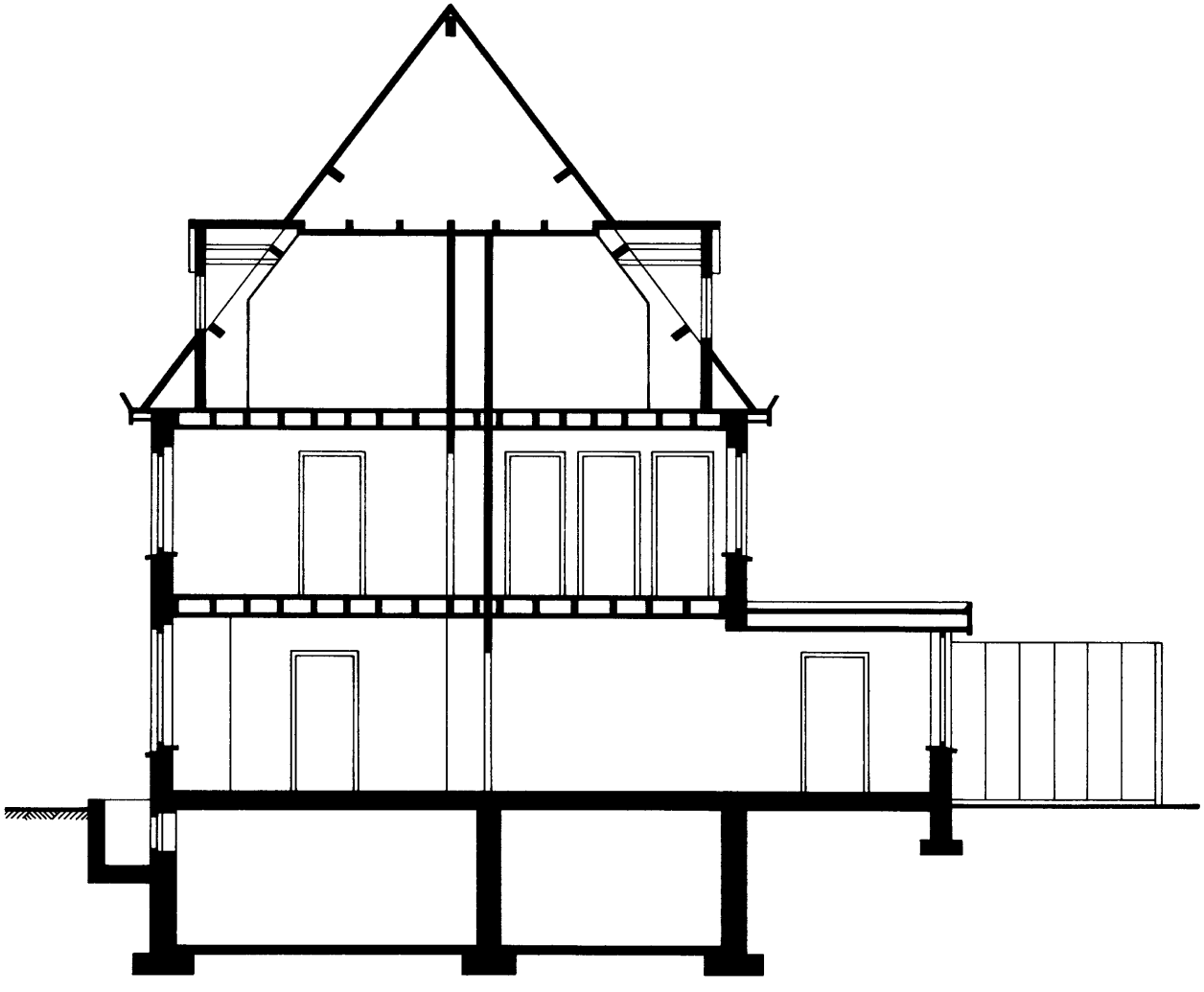


Section



Rear facade

NETHERLANDS — Plan Type RE - I - 5 - Situation after modernization



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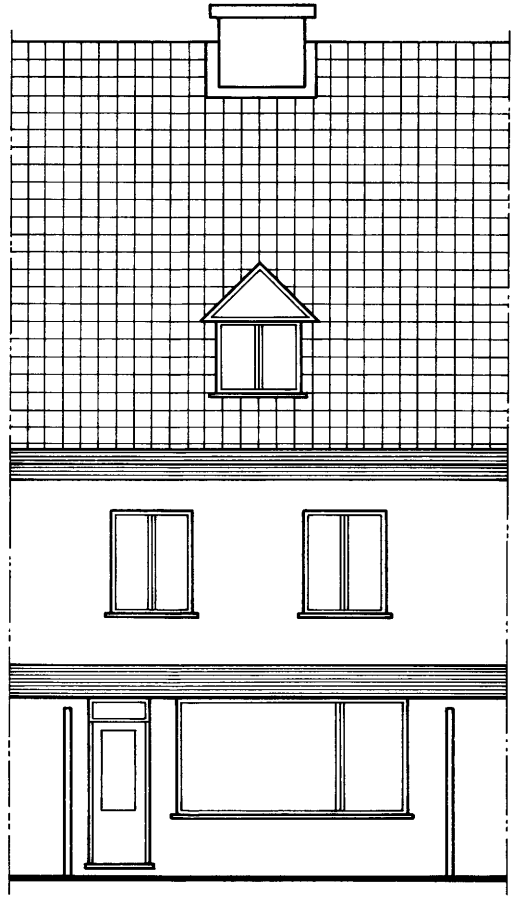
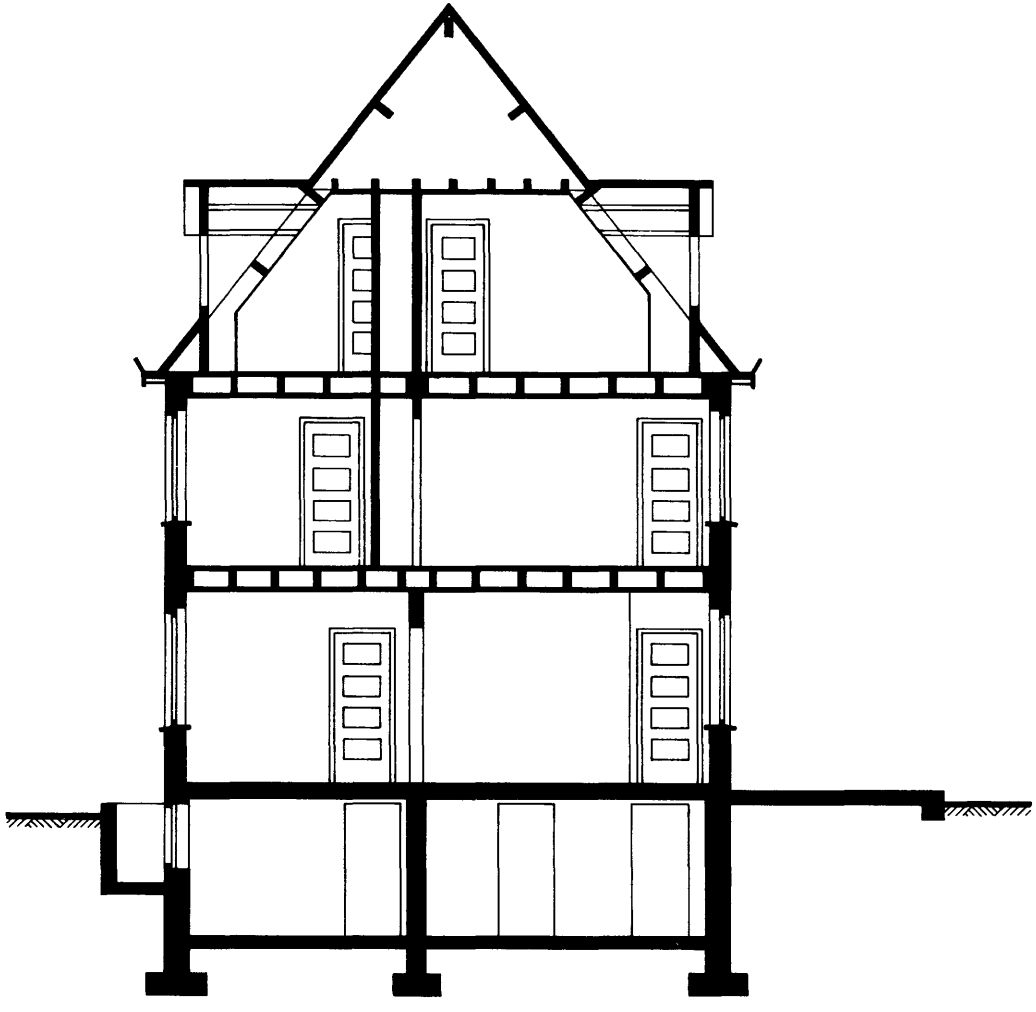


Rear facade

NETHERLANDS — Plan Type RE - II - 6 - Situation before modernization



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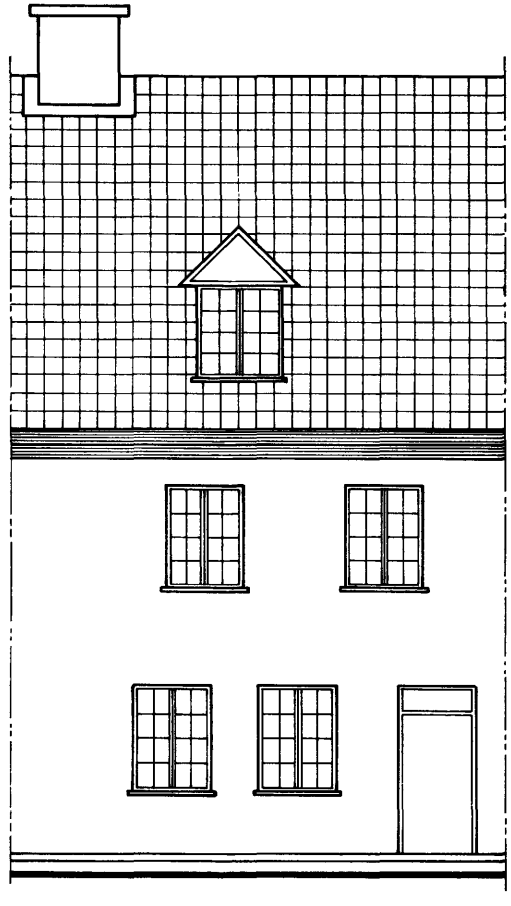
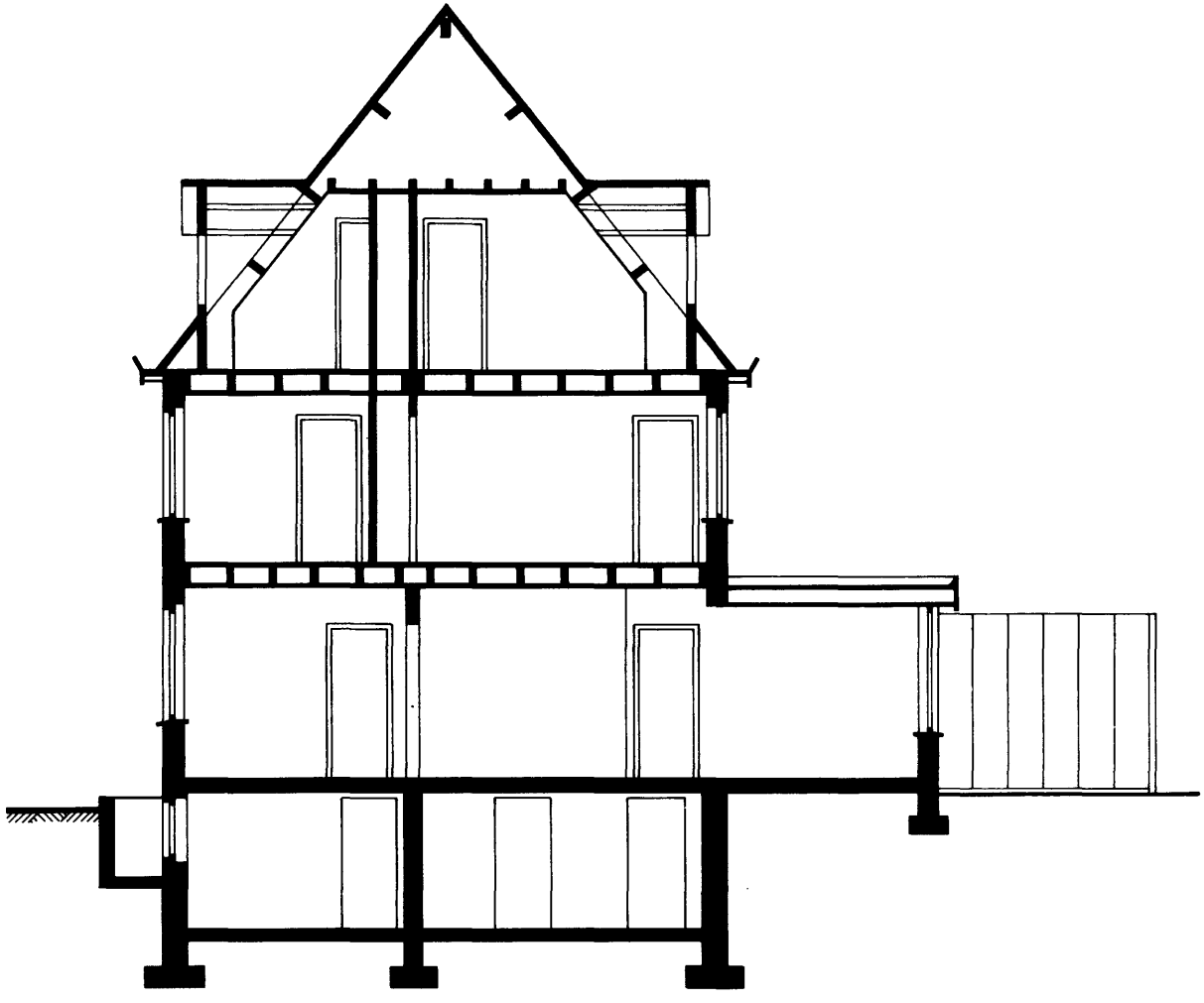


Rear facade

NETHERLANDS — Plan Type RE - II - 6 - Situation after modernization



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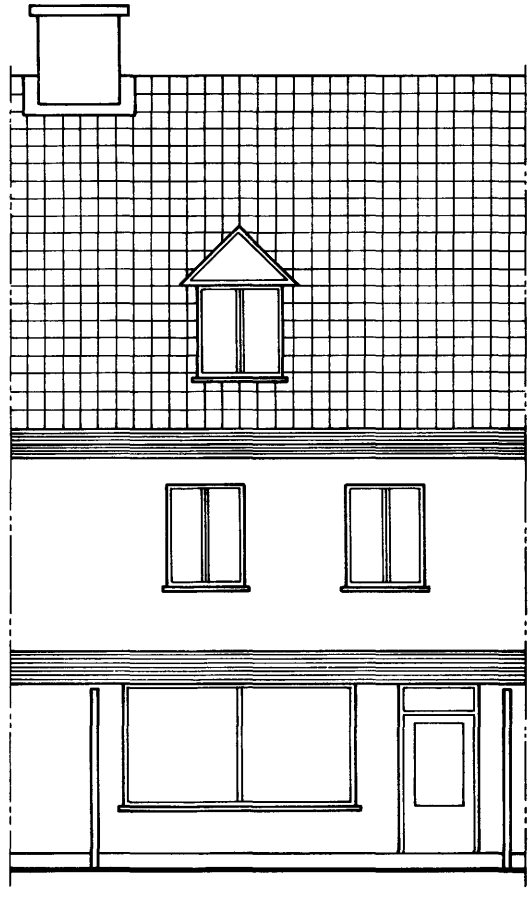
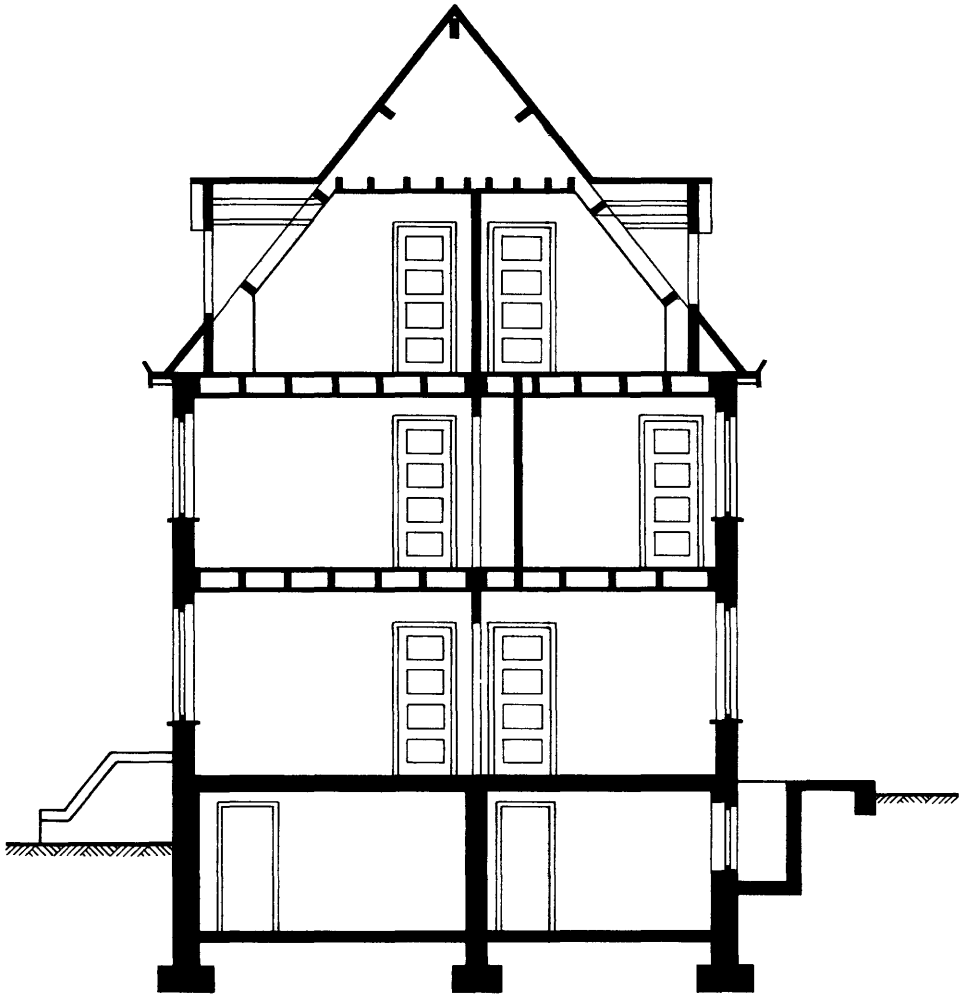


Rear facade

NETHERLANDS — Plan Type RE - III - 6 - Situation before modernization



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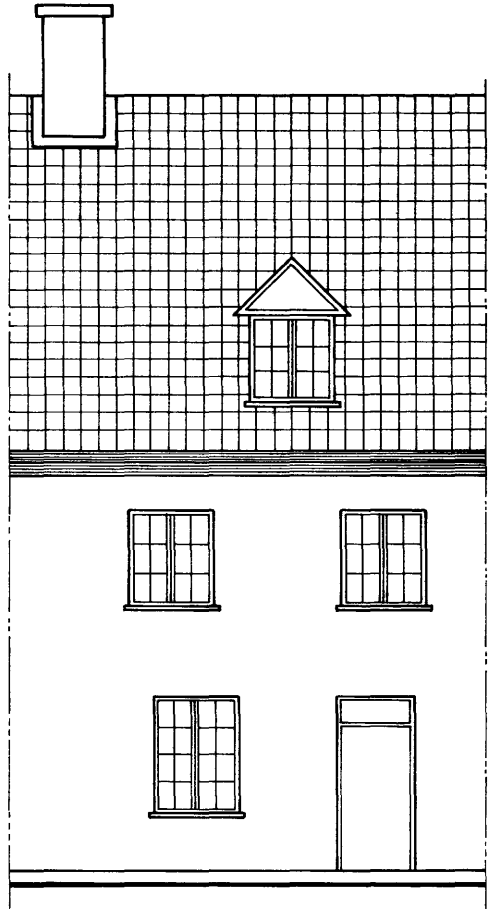
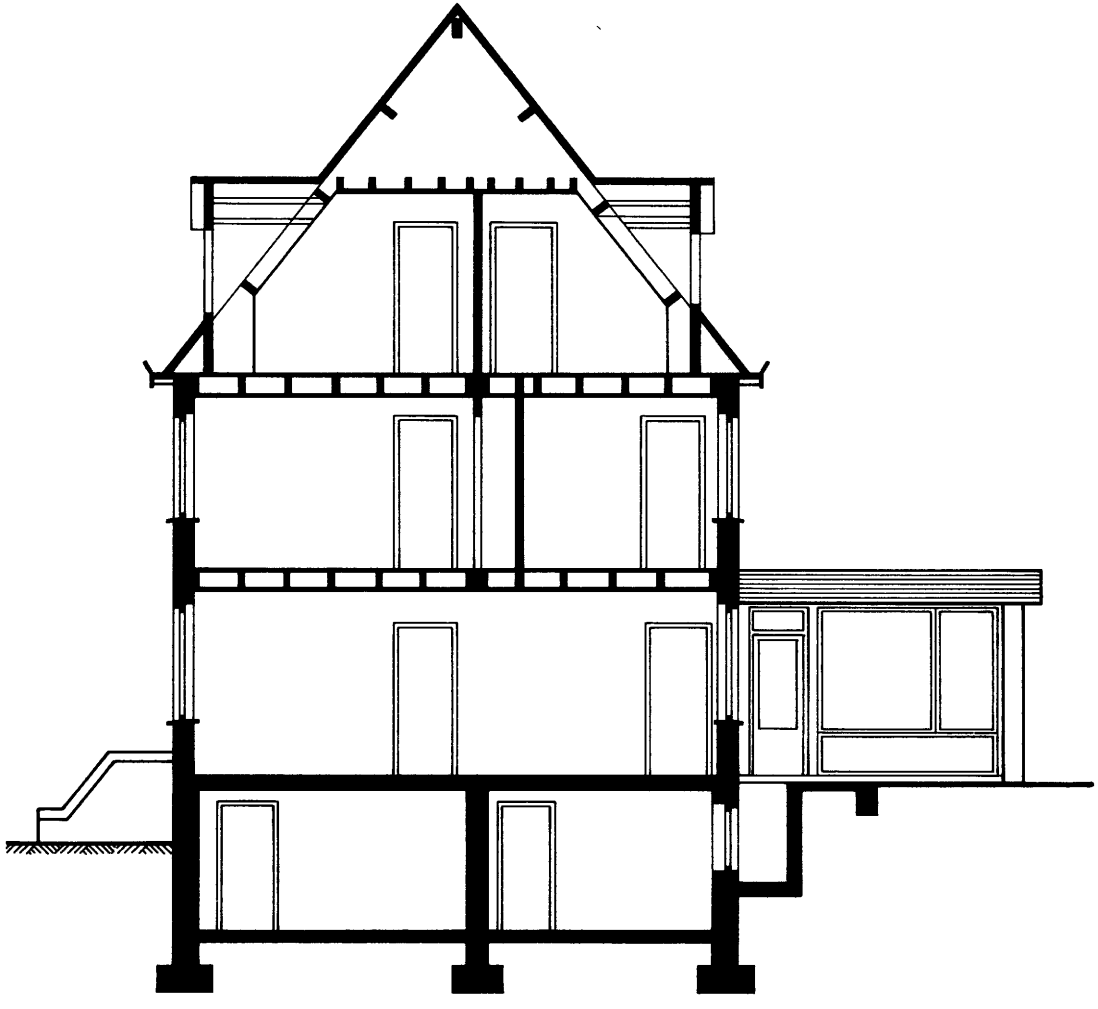


Rear facade

NETHERLANDS — Plan Type RE - III - 6 - Situation after modernization



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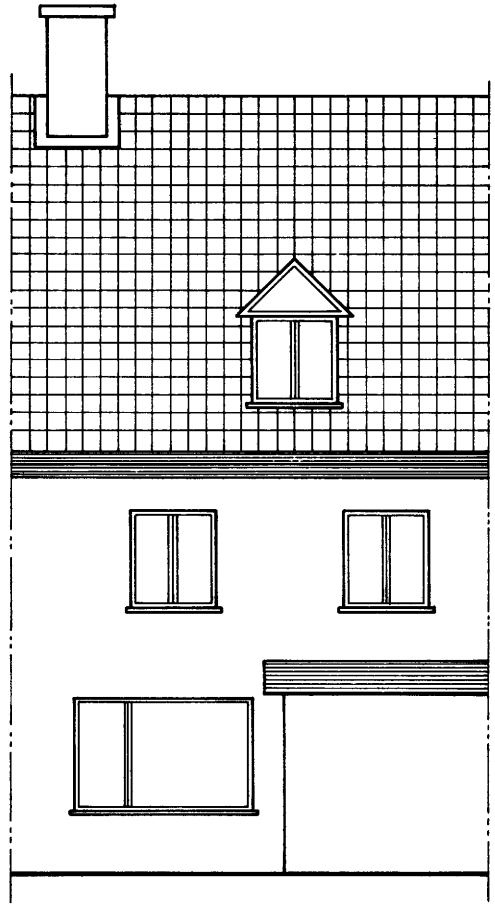
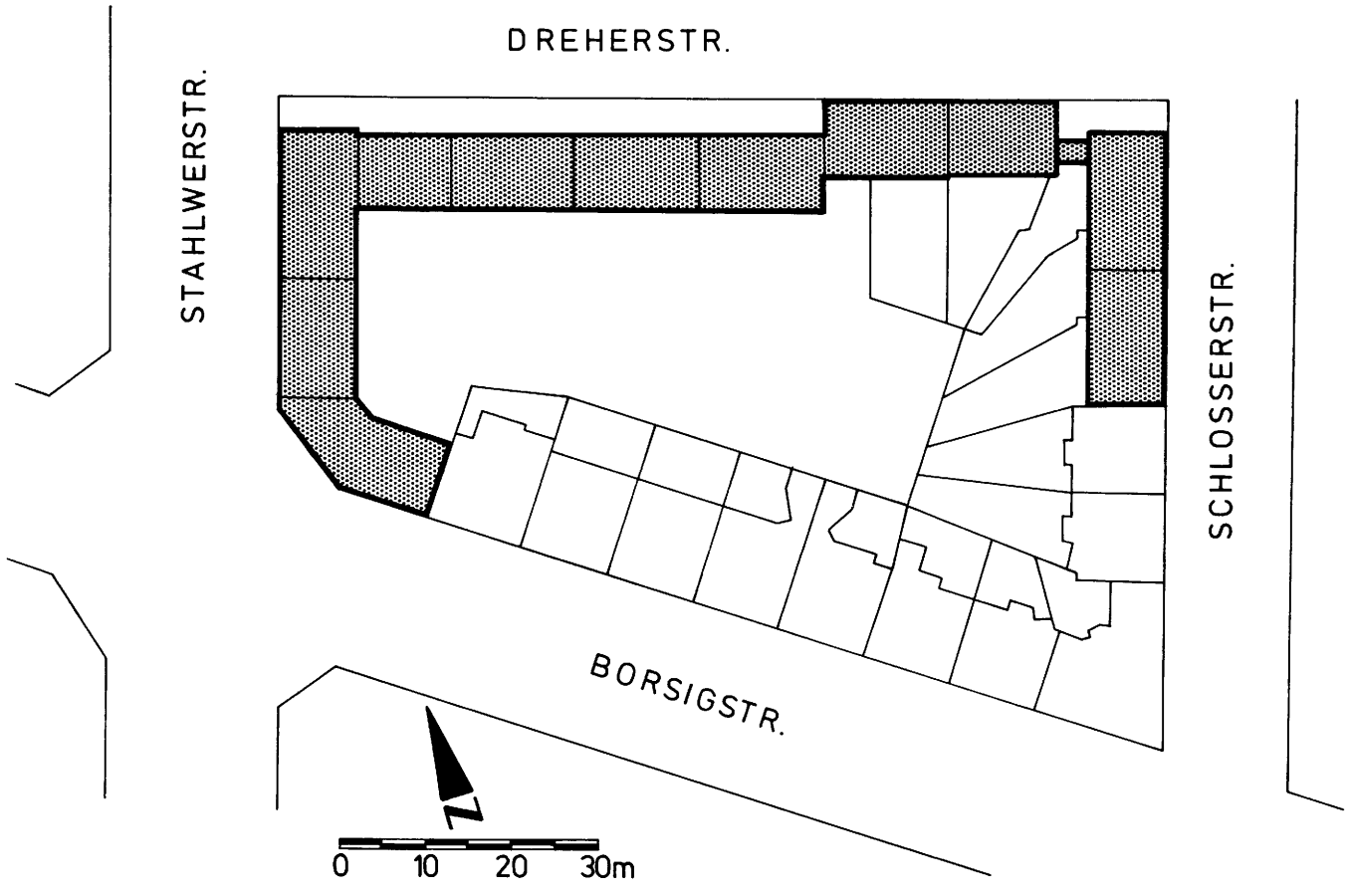
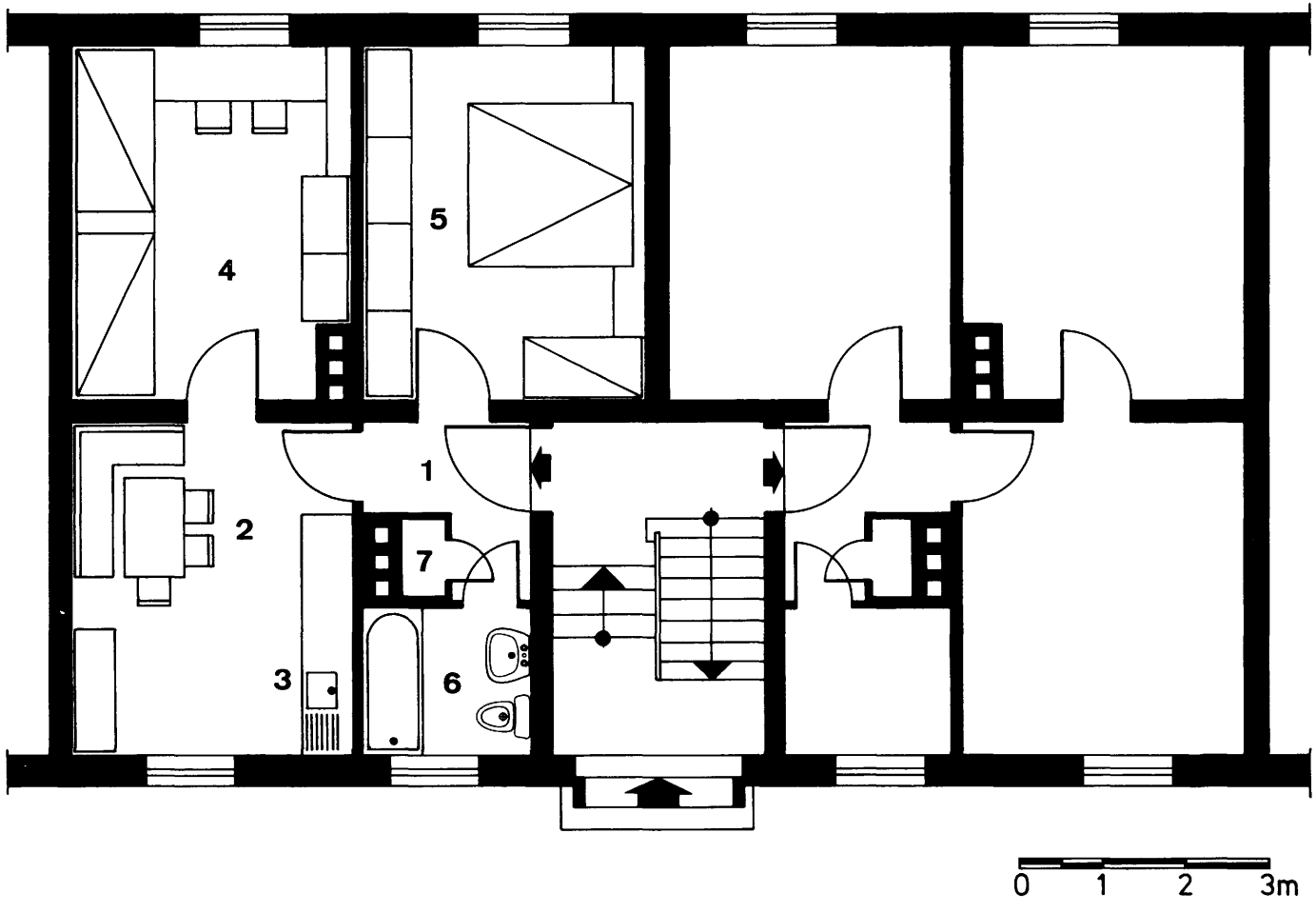


Rear facade

GERMANY — DORTMUND — General plan

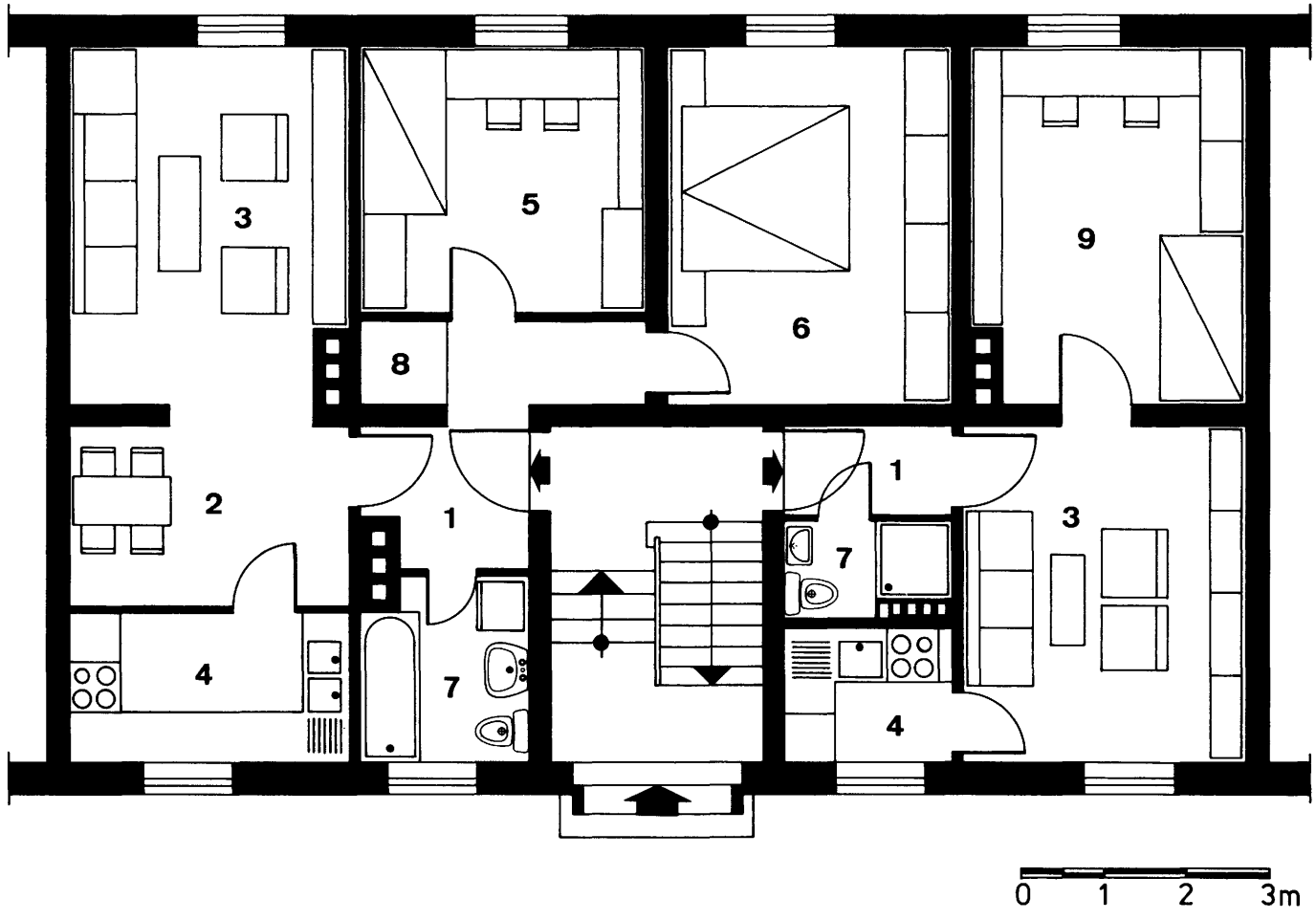


DORTMUND – Situation before modernization - Plan MU 72/3



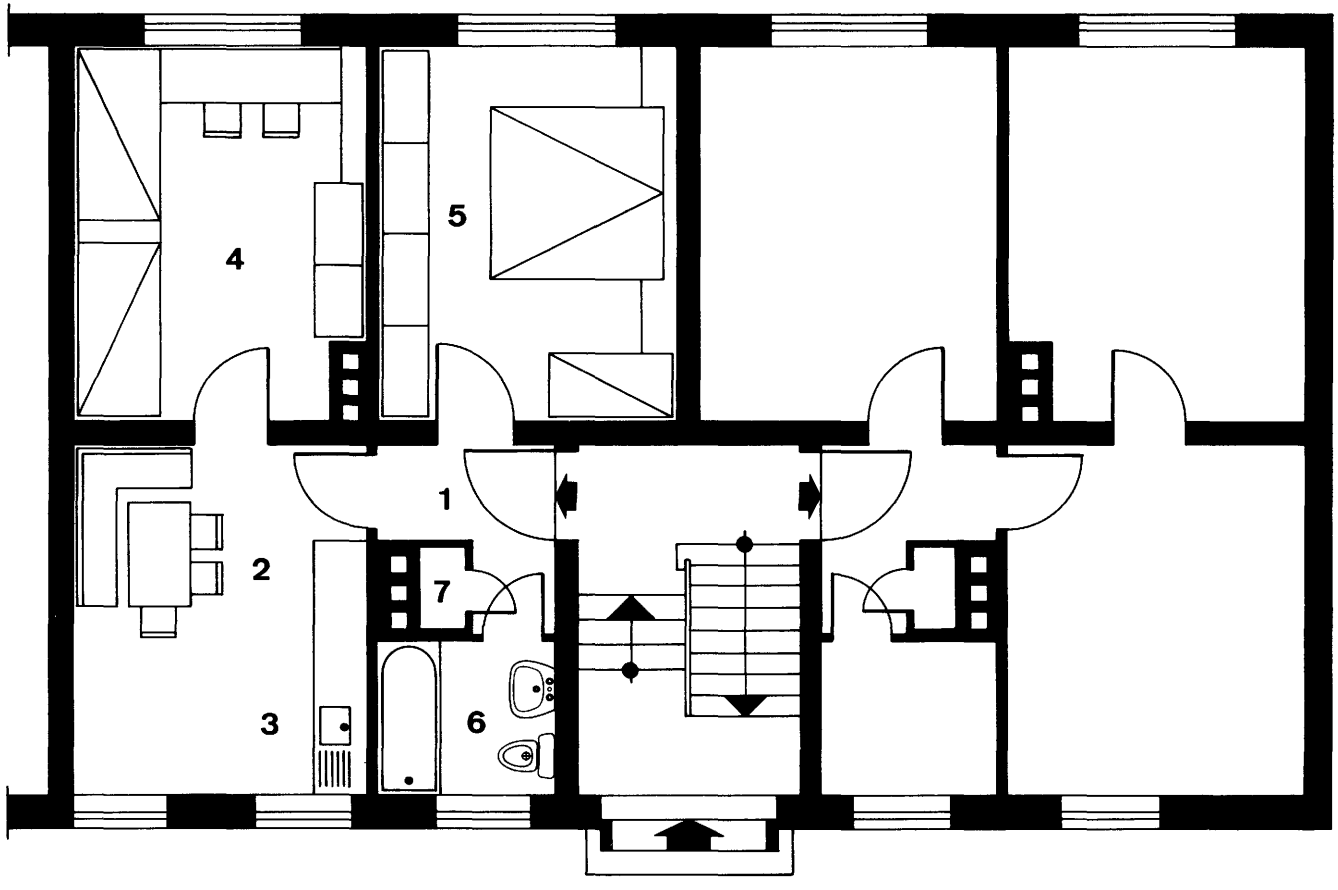
1. Entrance
2. Dining
3. Kitchen
4. Children's bedroom
5. Parents' bedroom
6. Bathroom
7. Cloakroom

DORTMUND — Situation after modernization - Plan MU 72/3



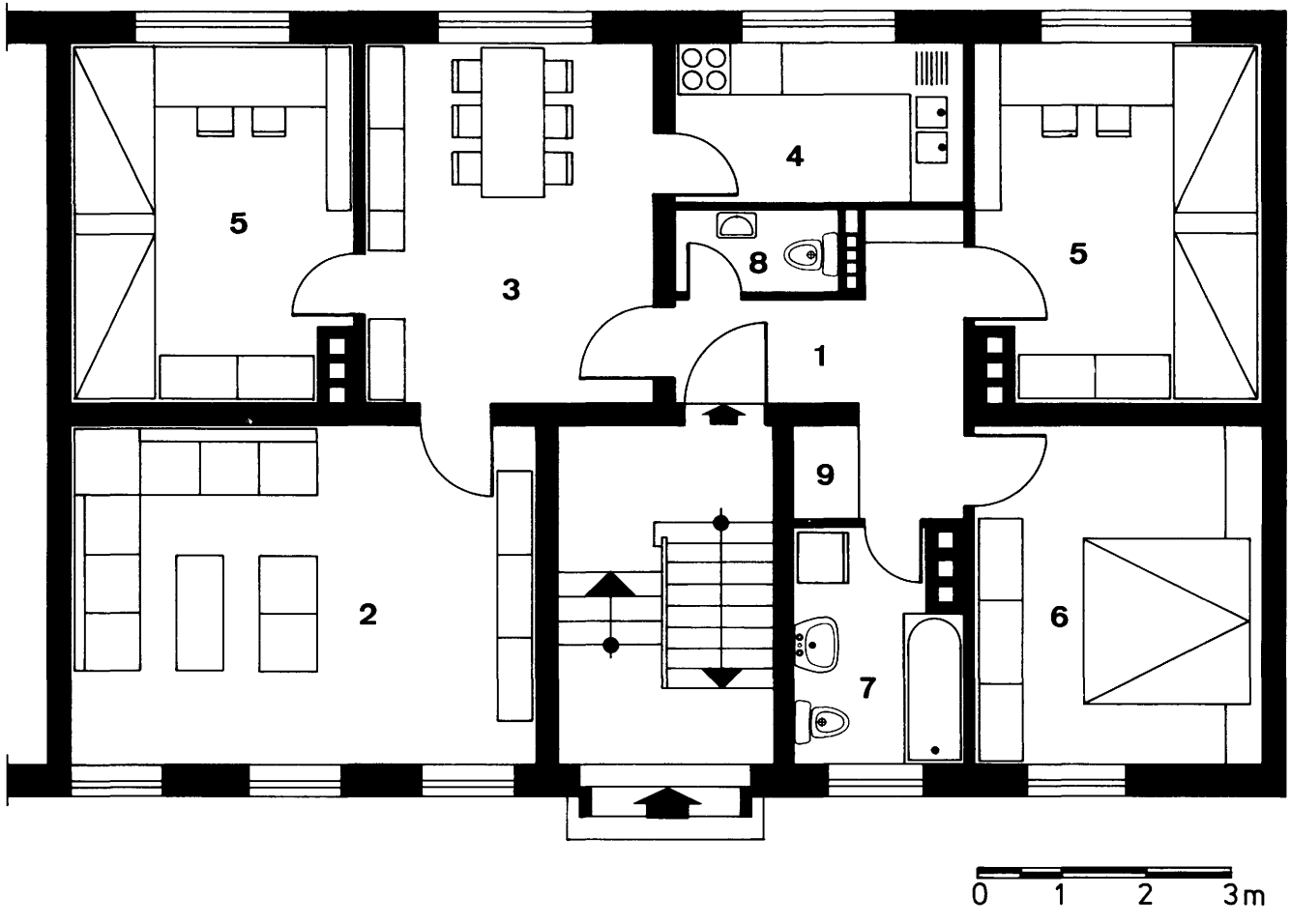
1. Entrance
2. Dining
3. Living-room
4. Kitchen
5. Children's bedroom
6. Parents' bedroom
7. Bathroom
8. Cloakroom
9. Bedroom

DORTMUND — Situation before modernization - Plan MU 72/4



1. Entrance
2. Dining
3. Kitchen
4. Children's bedroom
5. Parents' bedroom
6. Bathroom
7. Cloakroom

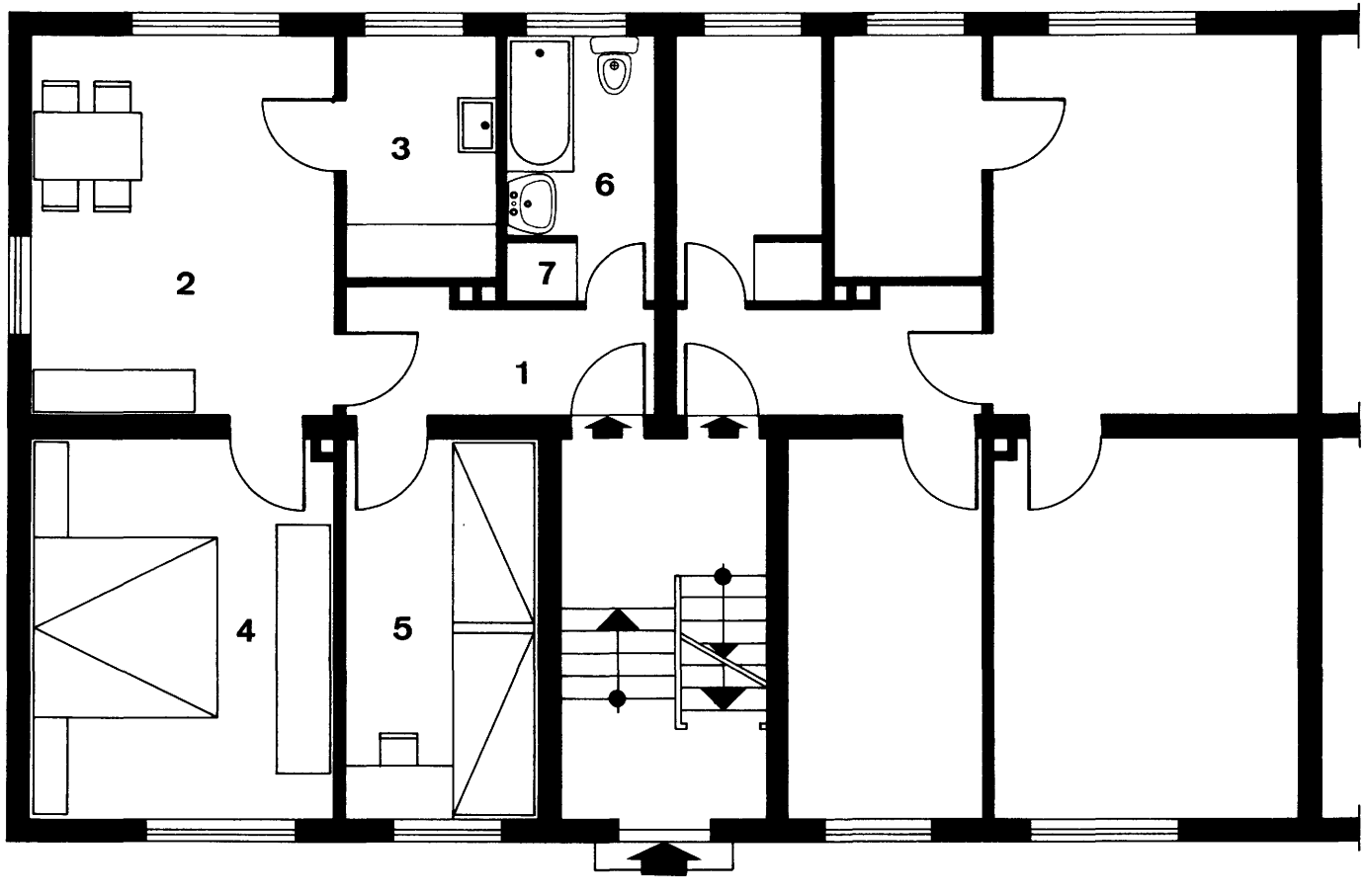
DORTMUND — Situation after modernization - Plan MU 72/4



1. Entrance
2. Living-room
3. Dining
4. Kitchen
5. Children's bedroom
6. Parents' bedroom
7. Bathroom
8. W.C.
9. Cloakroom

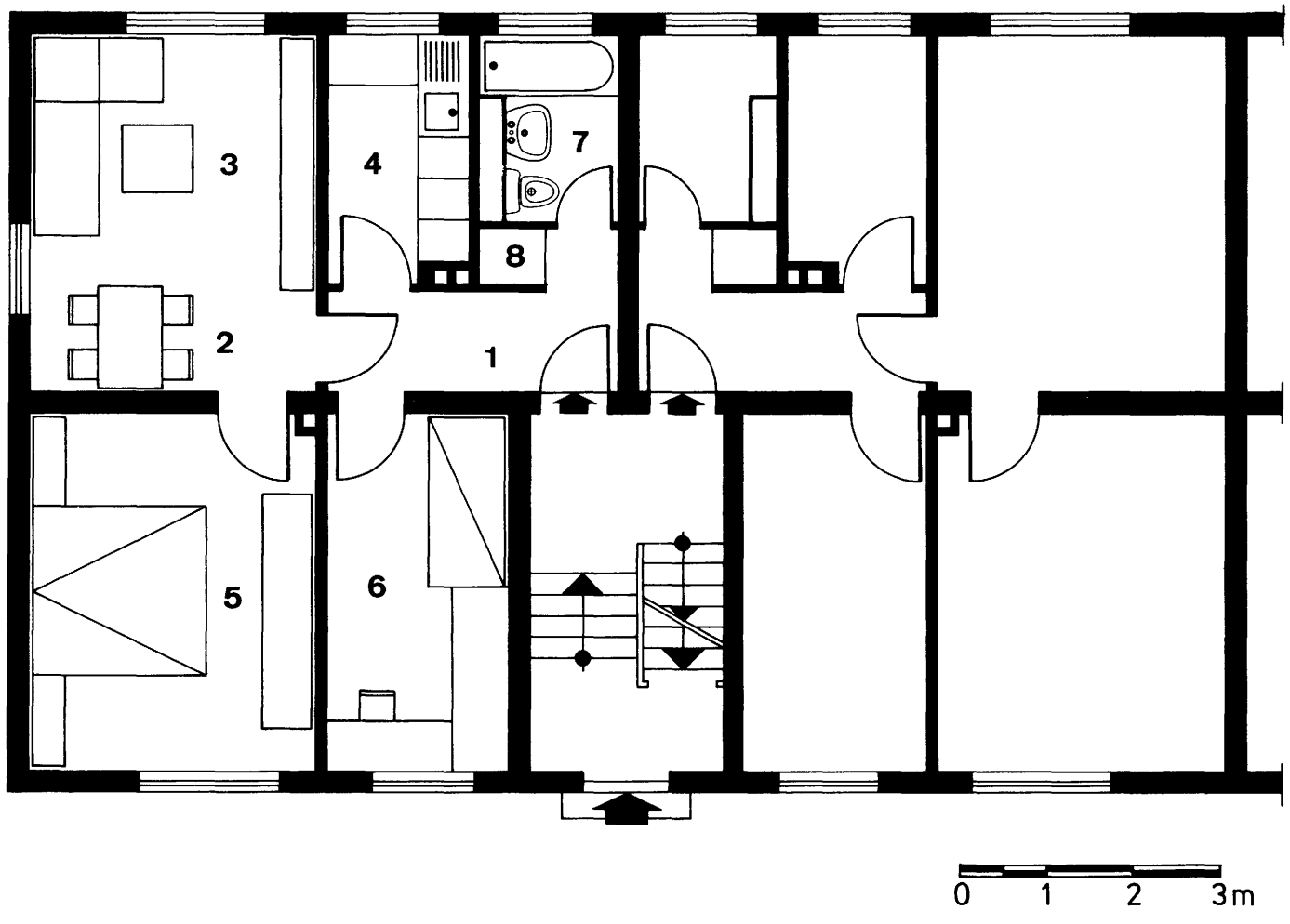
HEESSEN – General plan

HEESSEN — Situation before modernization - MU 72/2



1. Entrance
2. Dining
3. Kitchen
4. Parents' bedroom
5. Children's bedroom
6. Bathroom
7. Cloakroom

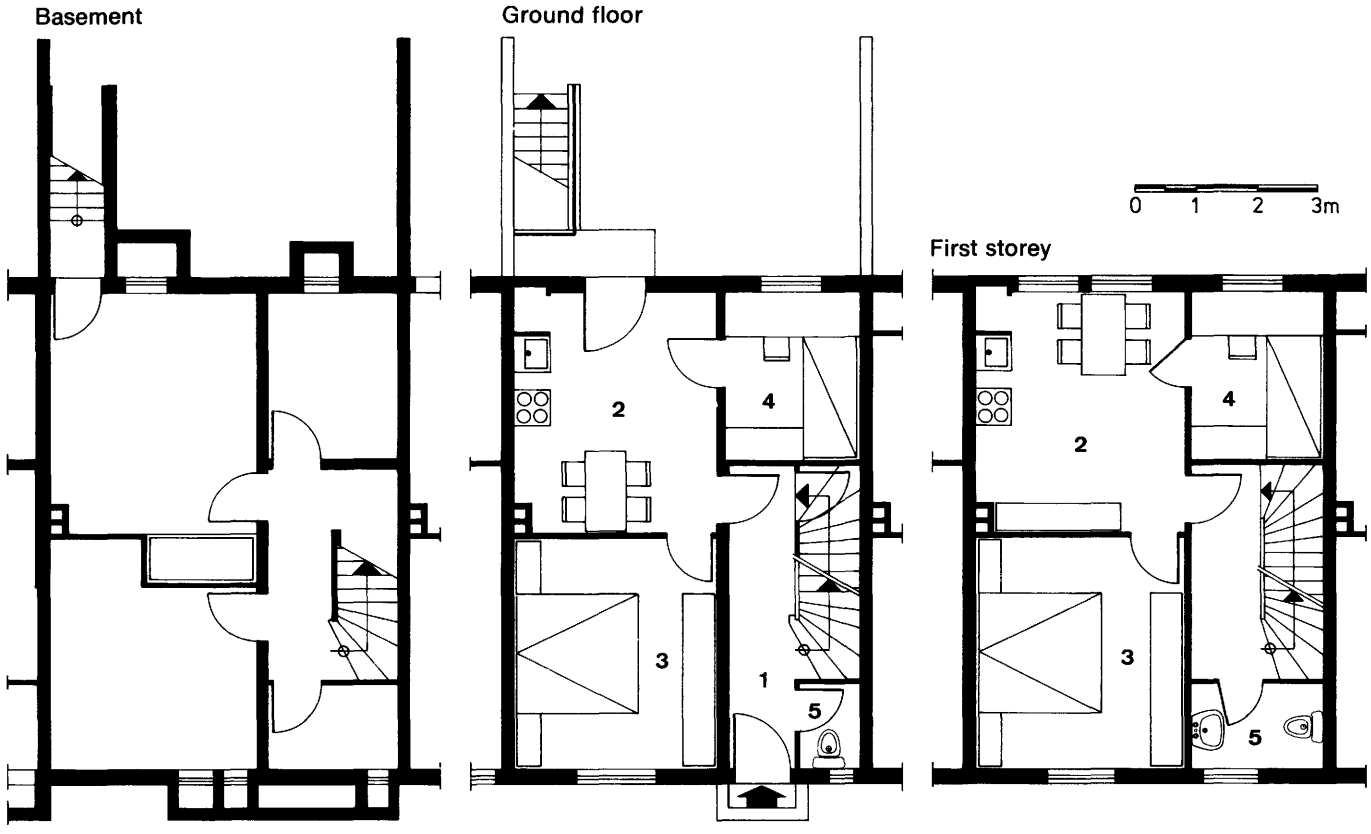
HEESSEN - Situation after modernization - MU 72/2



1. Entrance
2. Dining
3. Living-room
4. Kitchen
5. Parents' bedroom
6. Children's bedroom
7. Bathroom
8. Cloakroom

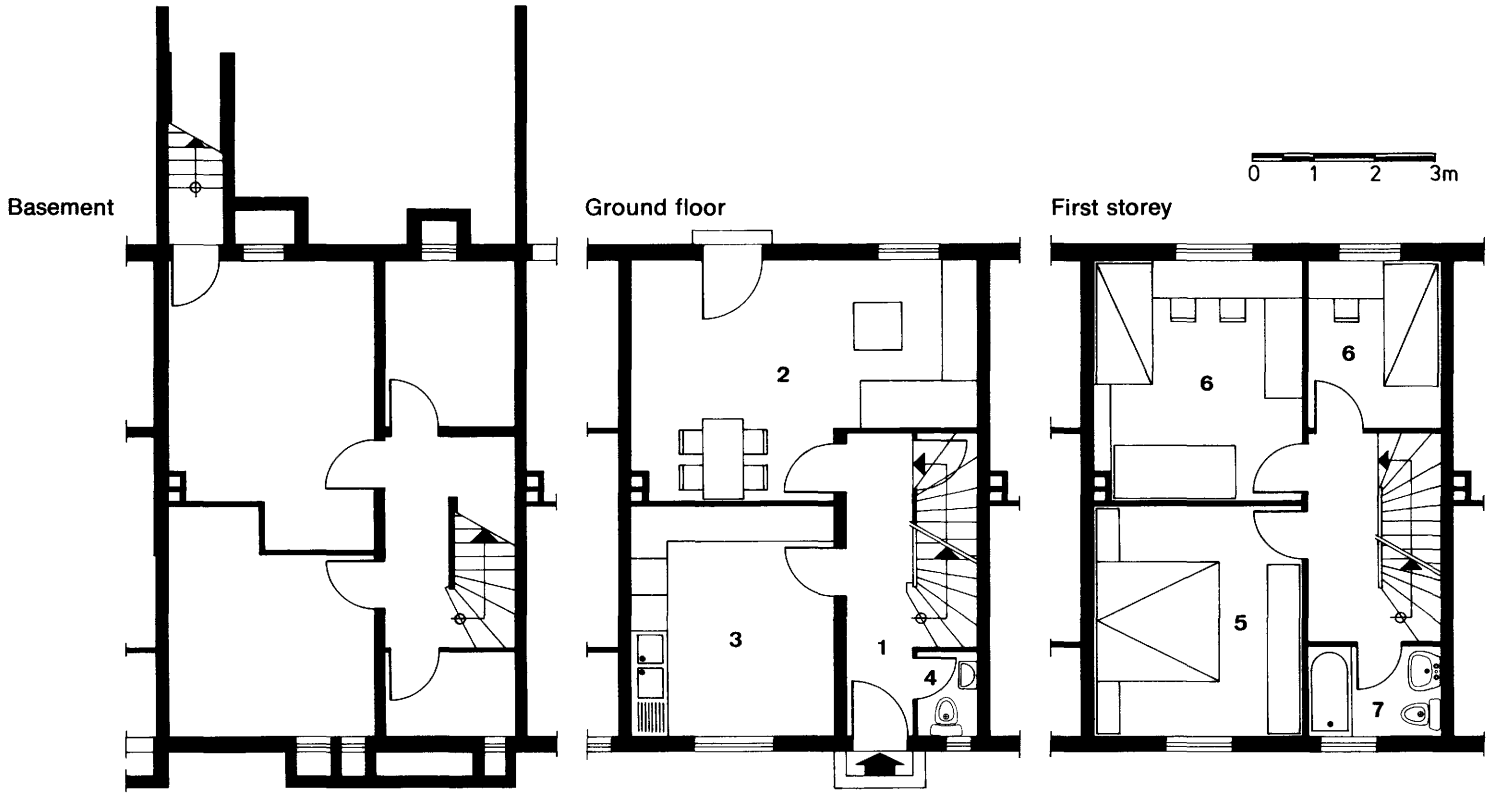
HERTEN –
General plan

HERTEN — Situation before modernization - MU 72/1



1. Entrance
2. Kitchen + dining
3. Parents' bedroom
4. Children's bedroom
5. W.C.

HERTEN — Situation after modernization - MU 72/1



1. Entrance
2. Living-room
3. Kitchen
4. W.C.
5. Parents' bedroom
6. Children's bedroom
7. Bathroom

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