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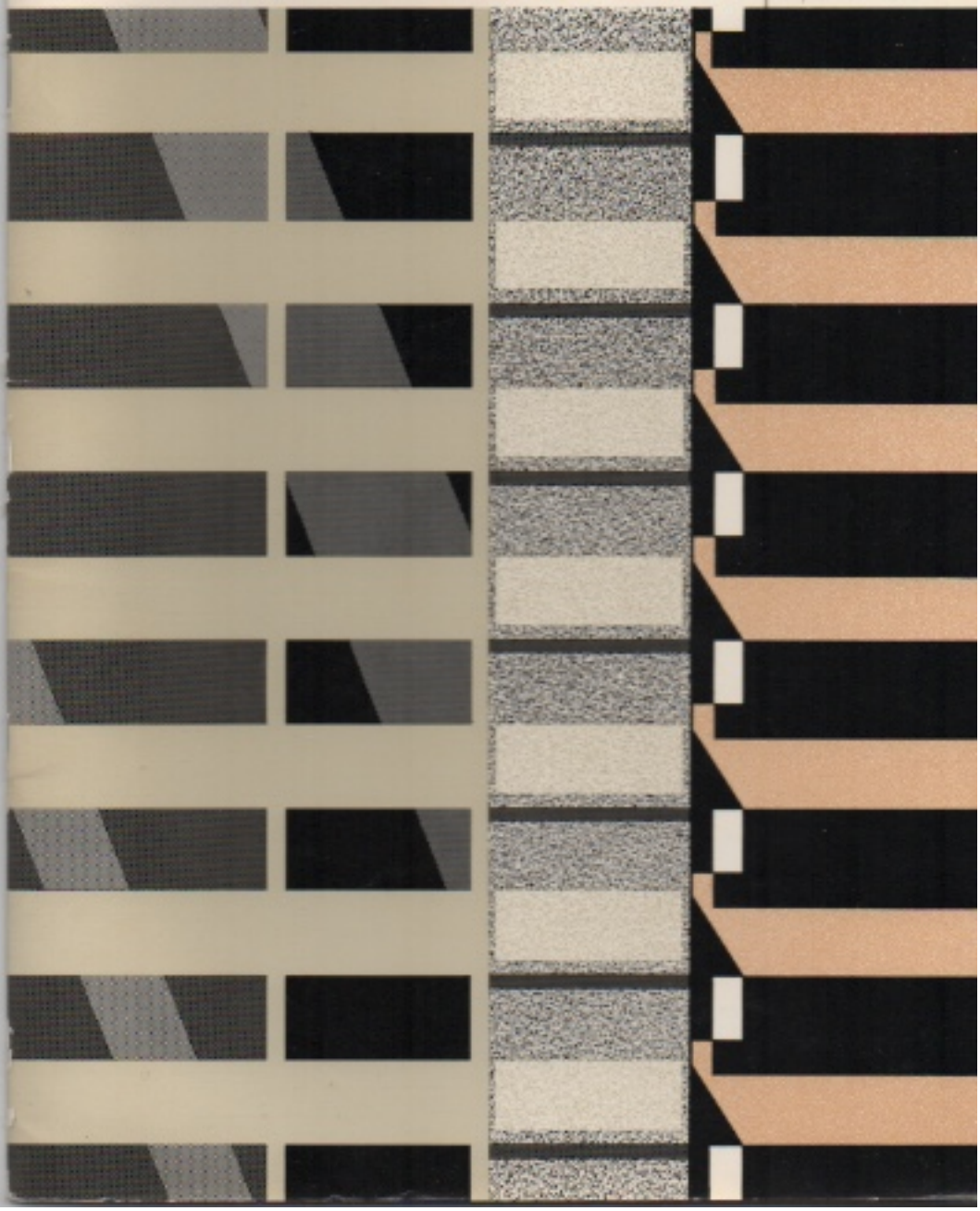
BISON

HIGH WALL FRAME

A SYSTEM FOR MULTI-STOREY FLATS

September 1970



THE BISON HIGH WALL FRAME SYSTEM FOR MULTI-STOREY FLATS

THIS BOOKLET describes the Bison High Wall Frame System for multi-storey flats and other similar buildings of eight storeys and upwards. The High Wall Frame System is additional to the Bison Wall Frame Construction for housing, which is for buildings of six to eight storeys and is described in a separate booklet.

The Bison High Wall Frame System is an advanced form of industrialised building for high flats. Heights are from eight to thirty storeys with four, six or eight flats per floor. The numbers and sizes of rooms are variable and there is great flexibility in design. Virtually any standard of accommodation can be provided and the system may readily be adapted for university halls of residence and nurses' homes.

It is manufactured in one or other of the nine permanent Bison factories and is economically available in all parts of the United Kingdom. Erection, which is by Bison construction teams, is rapid, there are no wet trades and no scaffolding. The results of many tenders submitted indicate that the Bison High Wall Frame System is the most economical form of building for high blocks of flats.

Contents

The Evolution of the System

The first block of flats with a Bison frame was built in 1956. It had precast columns and beams, with a certain number of internal walls cast in situ to give the necessary stiffness to the structure. As other blocks followed, improvements were made and soon the in situ walls were replaced by walls in precast concrete which, given adequate repetition, were cheaper than the equivalent columns and beams.

In 1958-59 a number of further blocks was ordered by clients for whom earlier blocks had been built. From experience thus gained, the opinion was formed that substantial further economies were possible by the following means:

1. Standardisation of precast structural elements. As compared with in situ construction a saving of 20% might well be produced.

2. Simple and carefully worked-out layouts. There had been differences of as much as £300 per flat between the economically best and worst schemes.

3. Decorative finishes applied direct to concrete surfaces. This envisaged concrete smooth enough to receive finishes, which themselves should be capable of concealing minor blemishes.

4. Reduction of site work on services by means of prefabrication and industrialisation.

It was known that a number of systems already in use on the Continent embodied development on these lines and it was, therefore, decided to study them in considerable detail.

First, it was found that on account of the very elaborate jigging and tooling employed in the manufacturing process, schemes of less than 2,000 dwellings were considered to be uneconomic.

Second, less stringent standards were acceptable for matters such as means of escape in case of fire, lifts, thermal insulation, sound resistance, plumbing and electricity.

Third, great advances had been made and there was much to learn from the techniques employed.

After most careful consideration the conclusion was reached that it might well be possible successfully to adapt Continental methods to schemes of 2,000 dwellings or more, but that this represented only a very limited field in this country, not only on account of the lack of sites, but also the general disinclination by local authorities to accept such a degree of stringent repetition. It seemed probable, however, that by means of careful research conducted jointly between architects and engineers it would be possible to produce a system better than anything so far seen in this country, and vastly more flexible than any of those on the Continent.

Architectural consultants, experienced in this type of work, were appointed in this country. Their brief was to work closely with Bison engineering staff and to develop, side by side with a standard precast concrete structure, a series of carefully prepared flat layouts. The plans were to have a maximum of flexibility. Services and finishes were to be taken into account at all stages, and elevational treatment was to be such as to allow a maximum of individual architectural expression. The Bison High Wall Frame System is the outcome of their work.

It is British throughout and subject to no overseas licence. By January 1970 over 20,000 flat units in 310 blocks for well over 100 Local Authorities throughout Great Britain had been completed.

Integrated structure and planning

The structure and planning potential of the Bison High Wall Frame System have been developed together, but neither one has been allowed to dominate the other.

It is in this bonding of structure and planning from which spring the outstanding economies of the system. For example, on the basic two-bedroom flat layout where there are four flats per floor, there may be as few as 24 precast concrete component parts in the structure per flat. It can readily be understood how this simplicity is reflected in every phase of the undertaking—design, estimating, manufacture, erection and organisation of labour.

Plumbing and electrical services have been most carefully considered, and substantial economies may be looked for in these trades on account of the straight-forward and repetitive layouts.

Advantages of the System

The advantages of the system may be summarised as follows:

1 Highly developed layouts to give maximum of usable floor space.

2 Great variability of planning while maintaining full economy of structure.

3 Wide scope in elevational treatment.

4 Sound resistant structural concrete walls between principal rooms.

5 High thermal insulation.

6 Wall surfaces left ready to receive immediate decorative finishes.

7 Highly economical and repetitive layouts for plumbing and electrical services.

8 Rapid erection on site.

9 Economic for single blocks.

10 Minimum time required for estimating and design, making possible an early start of the work.

11 Cost of structure can be reduced by as much as 20% as compared with equivalent individual design.

Adaptability of the System

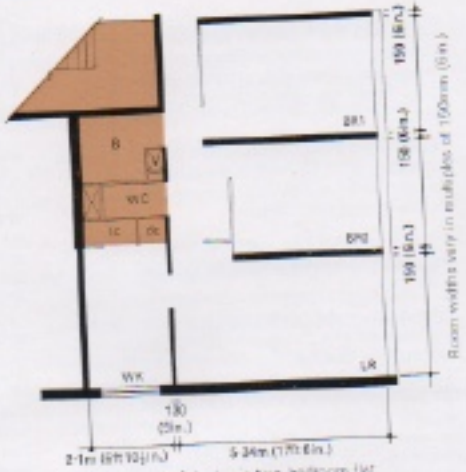


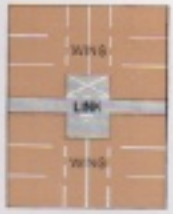
Fig. 1 The structure of the basic two-bedroom flat.

Fig. 2 The structure of the basic two-bedroom flat expanded to give a floor area increased by 16·75m² (180 sq. ft.).

The basic unit is a two-bedroom flat designed to meet the minimum requirements of the Ministry of Housing and Local Government (Fig. 1). There are no columns or beams and the crosswalls between the rooms, which are in concrete, support the structure. The spacing of these walls may be varied in multiples of 150mm (6in.) and so, by adjusting them, the area of the flat can be extended to give not only larger rooms but also space for additional amenities. In Fig. 2, the plan has been extended to give an additional area of 16·75m² (180 square feet) and it will be seen that this has been achieved by variations to the structure of only a slight increase in floor spans and a splice in a longitudinal wall.

It is on this same principle that the plan can be extended or contracted to give flats with three bedrooms or one bedroom, or other types of building such as university halls of residence or nurses' homes.

It will be noticed that irrespective of the planning the arrangement of the services remains standard throughout.



Two of these flats developed as required, side by side, form a "Wing", and it is this "Wing", together with the standardised stair and lift well "Link" areas, that are the basis of the various layouts. Thus, for four flats per floor, there are two "Wings" joined by a stair and lift well "Link" area. For six, eight or ten flats per floor, the same principle follows with the addition of "Link" plan flats.

The front walls are largely non-structural and may be either of the panel type with the window cast in, or the "spandrel" type, that is infill panel up to cill heights only, leaving the whole of the remaining area free for fenestration. Balconies may be added if so desired. End walls are of concrete and are available in a wide variety of precast decorative external finishes. There is, therefore, full scope for architectural treatment of the elevations.

The structure, which consists of a limited number of precast concrete walling and flooring elements, affords a maximum of repetition in manufacture, a minimum of design cost and very rapid construction on site by Bison erection teams accustomed to handling the units.

The Plans

The flexibility of the plans allows wide variation in the type of accommodation. Space can be given for the following extra amenities in any combination required:

1 Extra width to separate lavatory to give space for washbasin.

2 Dining/kitchen.

3 Balcony to kitchen, living room or bedroom.

4 Any type of heating can be provided.

5 Additional cupboards.

6 Larger hall space.

Figs. 3-6 give some indication of how these can be arranged. Fig. 3 is a plan based on theoretical minimum requirements. In practice, local authorities plan their flats to the standard recommended in the Parker Morris report.

Fig. 6 is intended for a luxury scheme suitable for a private developer. There are many more permutations on the same theme, and as long as the principles described are adhered to, the additional cost of the larger floor areas remains low and is very much less than would be the case in traditional construction.

Figs. 7 and 8 are examples of the plans extended to give three bedrooms, and Fig. 9 is a contraction of the plan giving a flat of one bedroom only.

In layouts of six and eight flats per floor, flats are included in the "Link" areas. These are similar to the others, but the degree of flexibility is limited as will be apparent from a study of Figs. 11, 12 and 13.

Layouts of ten flats per floor can also be constructed.

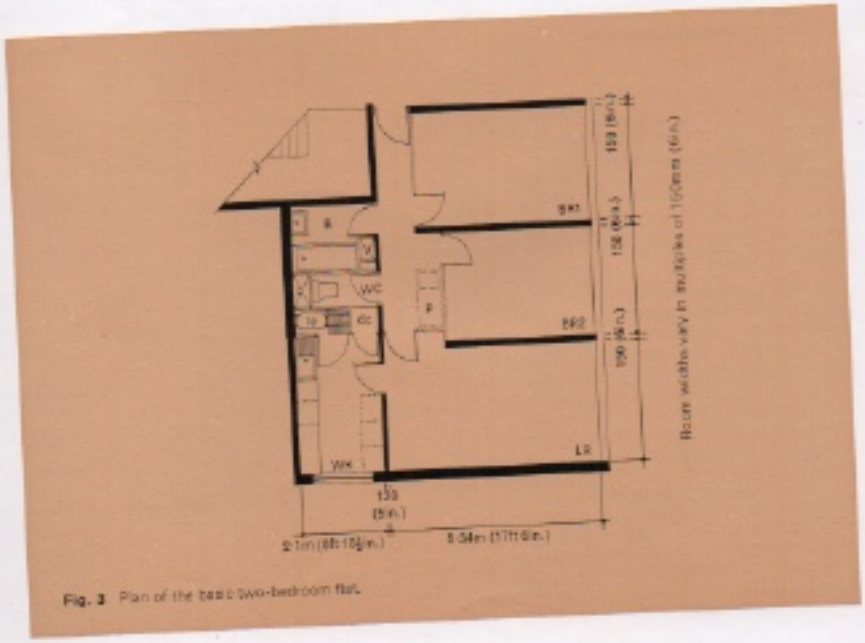


Fig. 3 Plan of the basic two-bedroom flat.

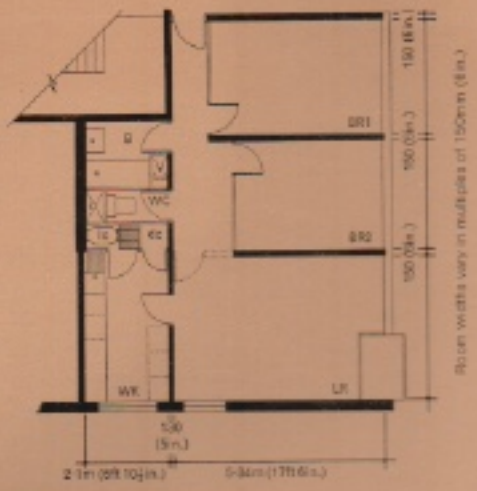
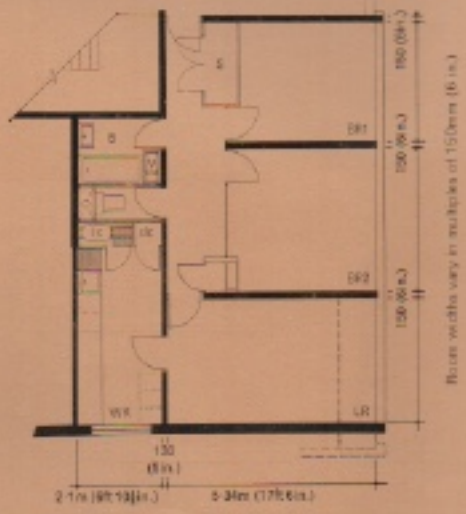


Fig. 4 Plan extended to give larger rooms and a balcony to the living room



Abbreviations

B	Bathroom
BR	Bedroom
LR	Living room
S	Storage
V	Vent
WC	Water closet
WK	Working kitchen
CC	Drying cupboard
H	Linen cupboard
P	Pram

Fig. 5 The plan developed to meet the recommendations of the Parker Morris report

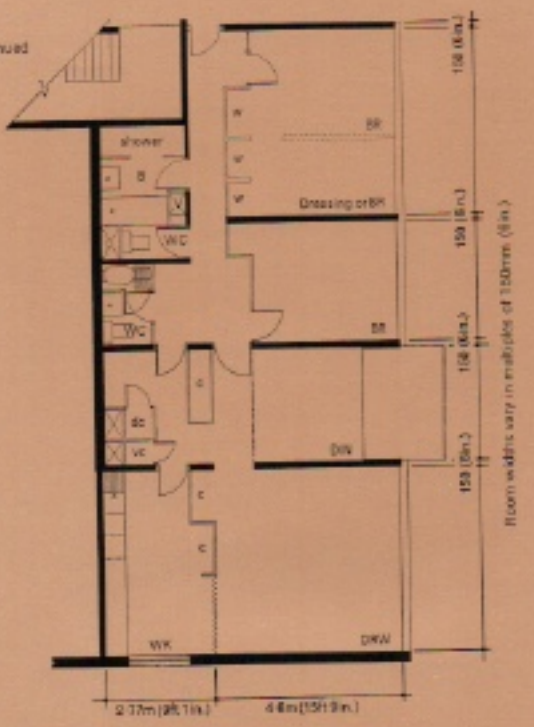


Fig. 6 Plan greatly extended to give luxury accommodation for private development.

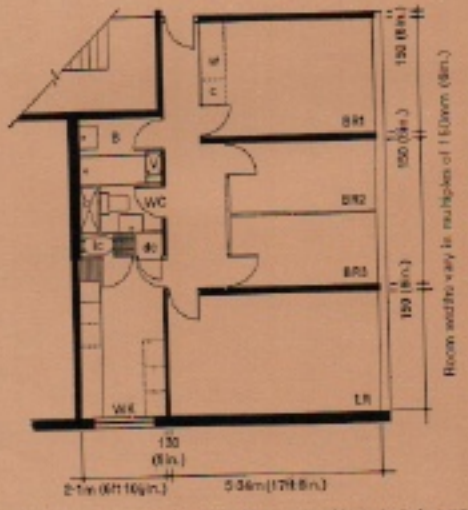


Fig. 7 Arrangement for a three-bedroom flat. The W.C. is made wider to include a washbasin.

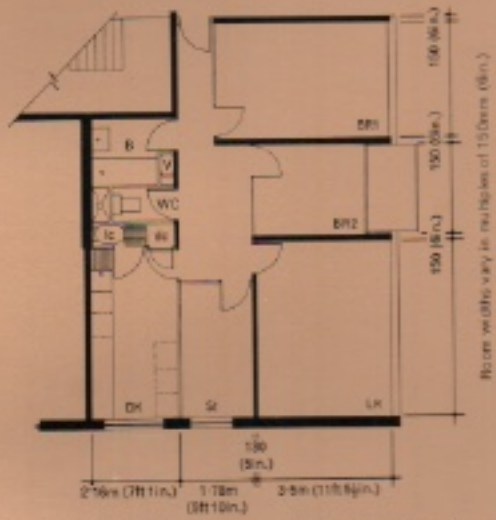
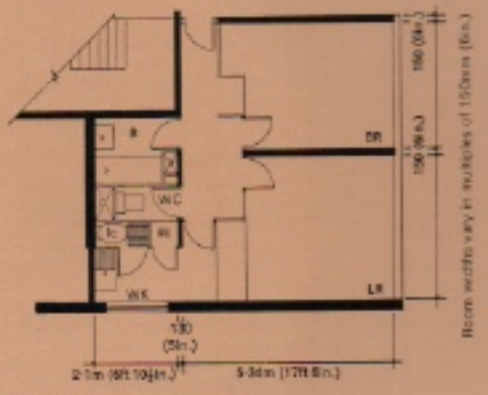


Fig. 8 An alternative arrangement to give two bedrooms, study and living room. The wall between the kitchen and study can be omitted or removed later in order to provide a large dining kitchen. As a further alternative the structural wall can be between the kitchen and study so that the partition could be removed to give a larger living room.



Abbreviations

B	Bathroom
BR	Bedroom
DIN	Dining room
DK	Dining/kitchen
DRW	Drawing room
LR	Living room
St	Study
V	Vent
WC	Water closet
WK	Working kitchen
c	Cupboard
dc	Dining cupboard
lc	Linen cupboard
vc	Ventilated cupboard
w	Wardrobe

Fig. 9 A one-bedroom flat.

Layouts

Abbreviations

B	Bathroom	WC	Water closet
BR	Bedroom	WK	Working kitchen
LR	Living room	DC	Drying cupboard
M	Meter cupboard	LC	Linen cupboard

The various layouts of the flats are based on the standard "Wings" and "Link" areas. While the floor area of the two flats in a "Wing" must be identical, one "Wing" need bear no relation to another in the same block. Thus one "Wing" might consist of three-bedroom flats and another of one-bedroom flats. A "Link" area contains staircases, lift shafts, ventilated lobbies, refuse chutes, etc., and in the case of six and eight flats per floor, they include "Link" plan flats in addition. Figs. 10-13 give the layouts for four, six and eight flats per floor respectively.

Ground floor

While it is extremely advantageous to carry all load-bearing walls directly down to the ground, to do so may cause planning restrictions at ground level. In order to overcome this difficulty at ground level, certain of the walls may be designed as frames, which will allow entrances to be planned with considerable variation. It is thus possible for the ground floor arrangement to consist entirely of flats, some being smaller than those on the upper levels, or alternatively a combination of flats and storerooms, or all storerooms. A limited number of garages can also be included.

Economic considerations

It may be interesting to note the economic effect of varying the layouts from the basic minimum designs shown. The figures given, it will be understood, are extremely approximate.

Every 0·93m² (10 sq. ft.) of dwelling will add about £10.

External cladding is expensive. Every increase of 300mm (1ft.) in the length of the perimeter adds from £8-£12 per floor level.

An increase of 150mm (6in.) in storey height may cost as much as £40 per flat.

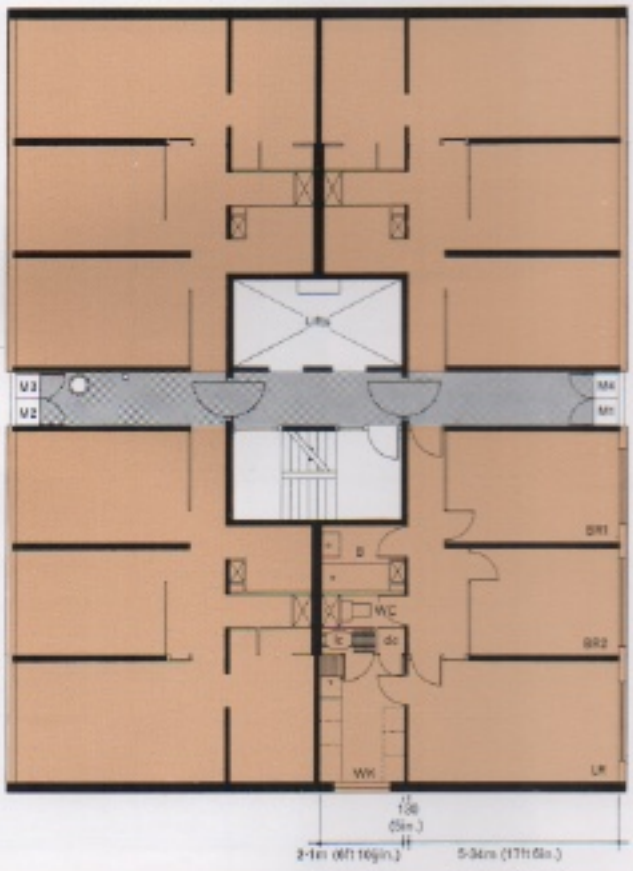


Fig. 10 Layout for four two-bedroom flats per floor. The "Wings" are rented and each could be two three-bedroom or two one-bedroom. In this drawing the internal planning of the flats is based on a theoretical minimum area. The spacing of internal structural walls is variable in multiples of 150mm (6in.).

Fig. 13 Layout for eight flats per floor based on Parker Morris recommendations. The "Wings" are tinted and each could be two two-bedroom or two one-bedroom.

Abbreviations

K	Kitchen	cc	Clothes cupboard
BR	Bedroom	d	Duct
LR	Living room	da	Drying cupboard
M	Meter cupboard	dr	Dry riser
V	Vent	lc	Linen cupboard
WC	Water closet	vc	Ventilated cupboard
WK	Working kitchen	w	Wardrobe
c	Cupboard