CHAPTER 4

Components And Finishes

When Modular Coordination is used, different parts of the building will be perceived as components. These include prefabricated components like doors and windows as well as those put up during the construction such as floor slabs and walls. The building process will then be seen as the assembling of different components. The influencing factors will be the positions and sizes of the components and the tolerances allowed between them and their corresponding coordinating spaces. The idea of components will therefore have to be conceived in the early stages of design as they will have a bearing on the planning grids and approaches.

This chapter suggests the ways the components fit into their coordinating spaces, both on plan and in section and their juxtaposition. The following will be discussed:

Structural Components

Columns
Beams
Floor Slabs
Walls
Stairs and Lift Cores

Architectural Components

Cladding
Partitions
Doors
Windows
Prefabricated Toilets
CD Shelter

Finishes

Ceiling finishes
Floor finishes

4.1 Structural Components

4.1.1 Columns

The recommended dimensions for columns are multiples of **1M** with **0.5M** as second preference.

This dimension fits into the **modular planning grid** of the building. When the columns are not modular, the distance between adjacent columns will be non-modular and will result in odd dimensions for the other infilling components. It may also pose problems if modular precast floor slabs or modular formwork are to be used.

The main concern of the structural engineer is the cross sectional area of the column. With the basic dimension of **1M**, there can still be columns with a range of cross sectional areas. There is also the possibility of using columns of different sizes (Figure 4-1).

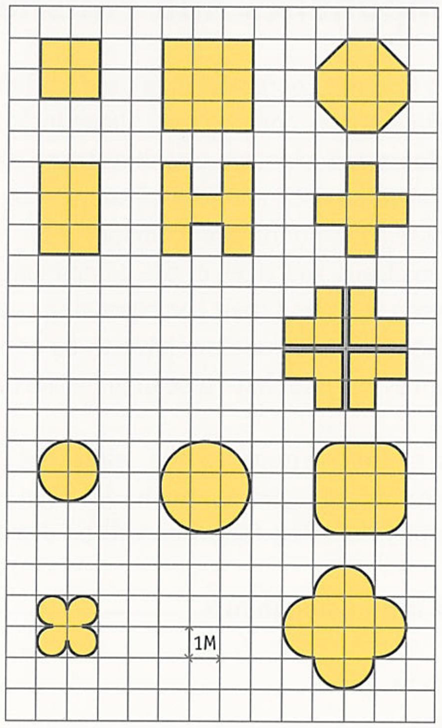

Fig 4-1: Column Sections

Non rectangular columns can also be fitted into the **face planning** and **axial planning grid** (Figure 4-2).

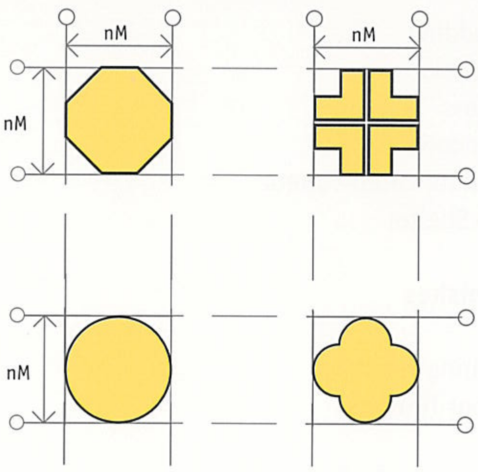

Fig 4-2: Controlling Planes For Columns

As non-rectangular columns are usually free-standing, there will not be any problem in the interface with other components. In situations where walls/partitions do butt against the columns, the junctions will be treated in the same way as with rectangular columns (Figure 4-3).

It should be noted that the dimensions given for the columns, as with other components are their finished dimensions. Allowances must therefore be provided for the thickness of the finishes to be used on the columns. In **Modular Coordination** where dimension coordination of elements and components is essential, a clearance of 5mm is to be allowed for construction inaccuracies. A **6M x 6M** column will therefore be 590mm x 590mm.

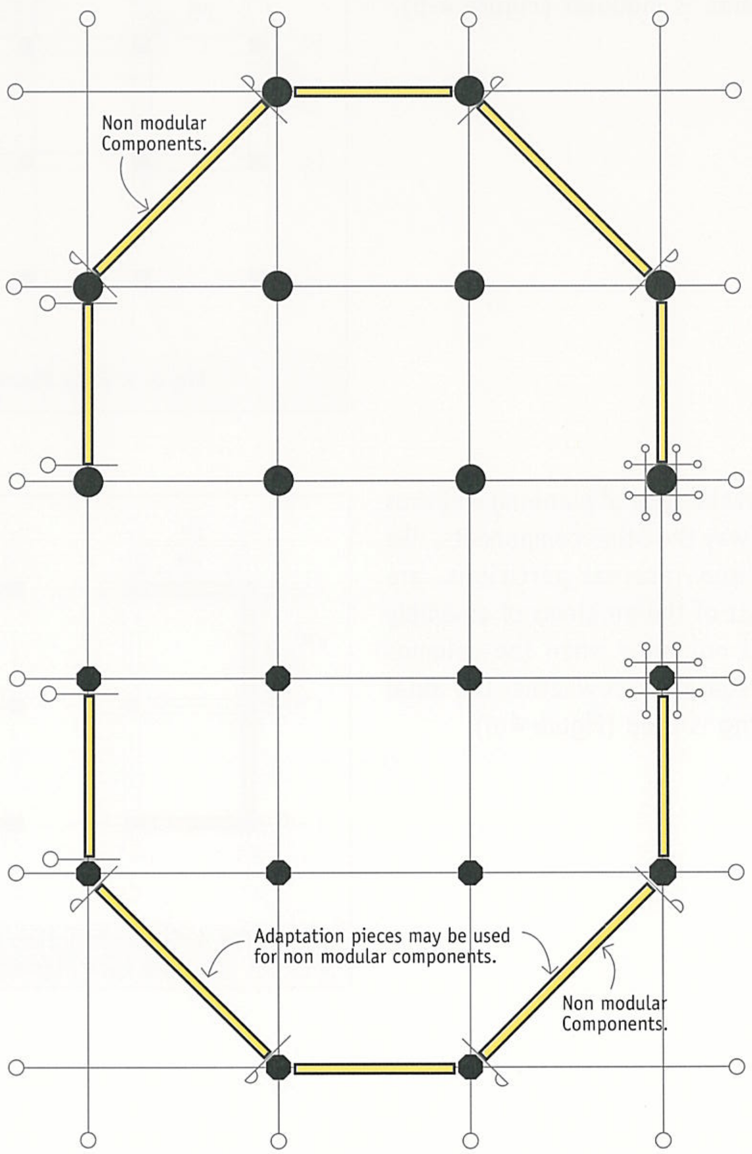

Fig 4-3: Non Rectangular Columns

In axial planning the centre to centre distance between columns is modular (Figure 4-4).

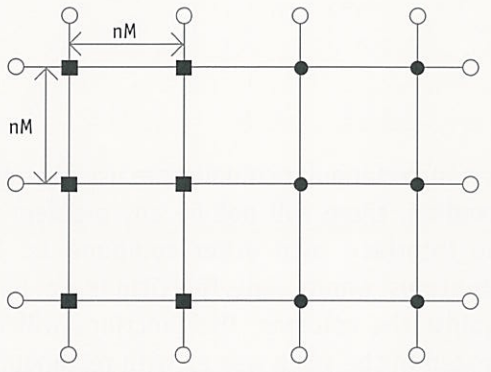

Fig 4-4: Axial Planning

In face planning, the distance between the faces of columns is modular (Figure 4-5).

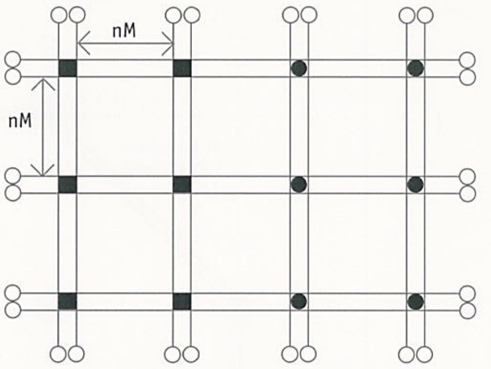

Fig 4-5: Face Planning

The selection of the type of planning will thus depend on the way the other components, like the cladding and internal partitions, are assembled. Most of the problems of assembly and sizing will not arise when the columns are **Modular**, regardless of whether the **axial** or **face planning** is used (Figure 4-6).

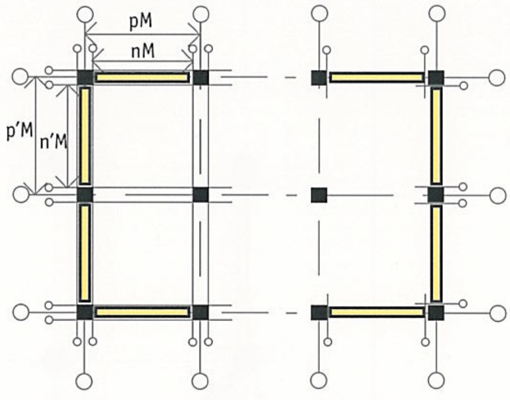

Fig 4-6: Combination Of Axial And Face Planning

4.1.2 **Beams**

The width of the beam generally has less implications on Modular Coordination design. The recommended depth for beams is in increments of **0.5M.**

In a building where there is false ceiling, the beam is accommodated within the floor zone and the depth of the beam would only affect the services and not the walls or partitions below (Figure 4-7).

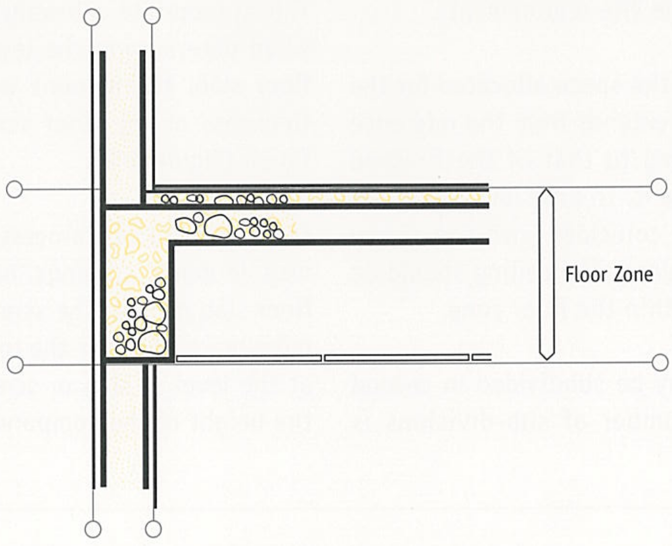

Fig 4-7: Floor Zone

In buildings where there is no false ceiling, the distance between the base of the beam and the floor slab must be modular so as to accommodate the components below (Figure 4-8).

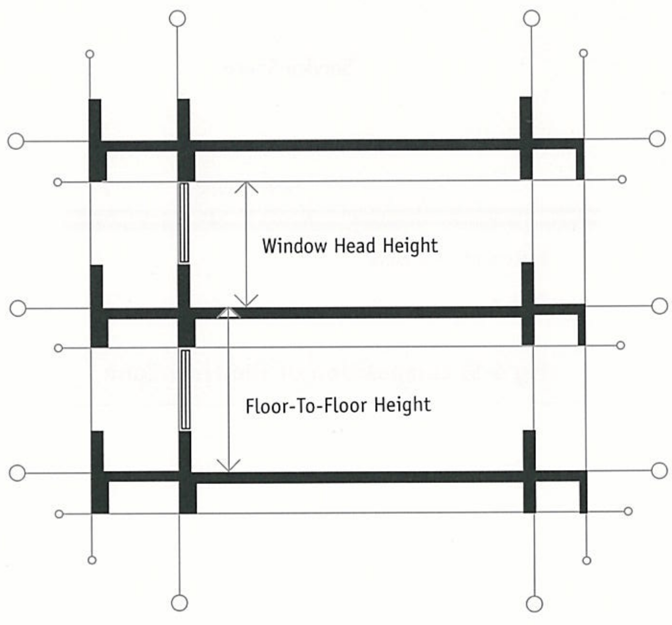

Fig 4-8: Floor Zone Without False Ceiling

4.1.3 Floor slabs

The depth of floor slabs will be in sub-modular increments of **0.5M** (50mm) or **0.25M** (25mm).

When precast slabs are used, they will be in the widths of **6M**. This dimension fits the structural grids and therefore there will be no wastage. The length of the precast slabs will be according to the site requirements.

The **floor zone** is the space allocated for the floor assembly. It extends from the reference plane of the ceiling to that of the finished floor surface above it. In principle, the upper face of this zone coincides with the storey height reference plane. The ceiling should be accommodated within the floor zone.

The floor zone may be subdivided in several subzones. The number of sub-divisions is determined by the composition of the floor and services and vary with different projects.

The top of the floor zone should be the top of the floor finish and the base of the floor zone the bottom of the ceiling of the floor below.

The appropriate allowances must be given when determining the level of the standard floor slab, the amount will depend on the thickness of the floor screed and the floor finish (Figure 4-9).

In the construction process, the wall/partition may, in many buildings, be erected from the floor slab or from the screed. It will then be more practical to fix the top of the floor zone at the level of slab or screed to ensure that the height of the component is modular.

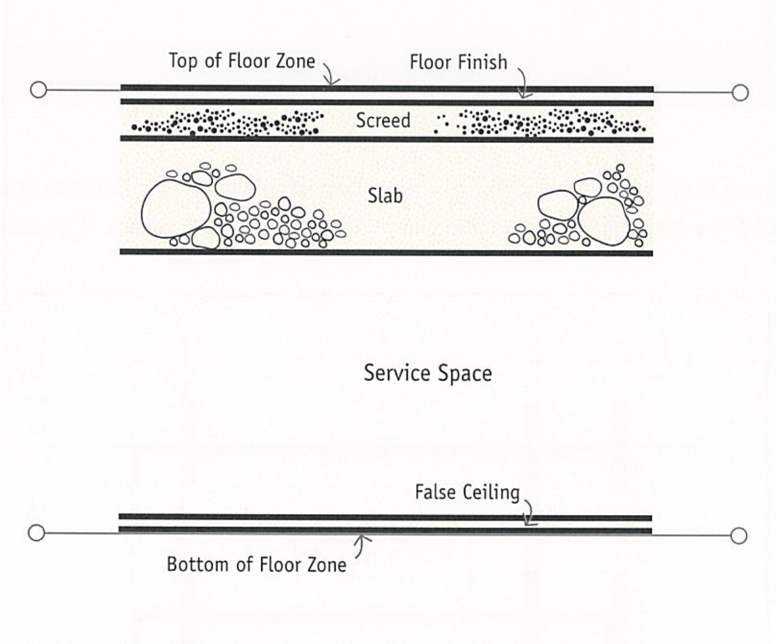

Fig 4-9: Composition Of The Floor Zone

4.1.4 Walls

The walls discussed in this section refers to cast-in-situ or precast load bearing walls. The length of walls will be determined by the chosen planning grid.

Sub-modular increments of **0.5M** and **0.25M** are recommended for the thickness of the walls if they are not modular. As in the case of the columns, the dimensions are for finished walls. Allowance must be given for the thickness of the finishes to be used.

In cases where the walls do not fill the whole wall zone, where the structure allows, the wall should line with one side of the zone to minimize the number of adaptation pieces (Figure 4-10).

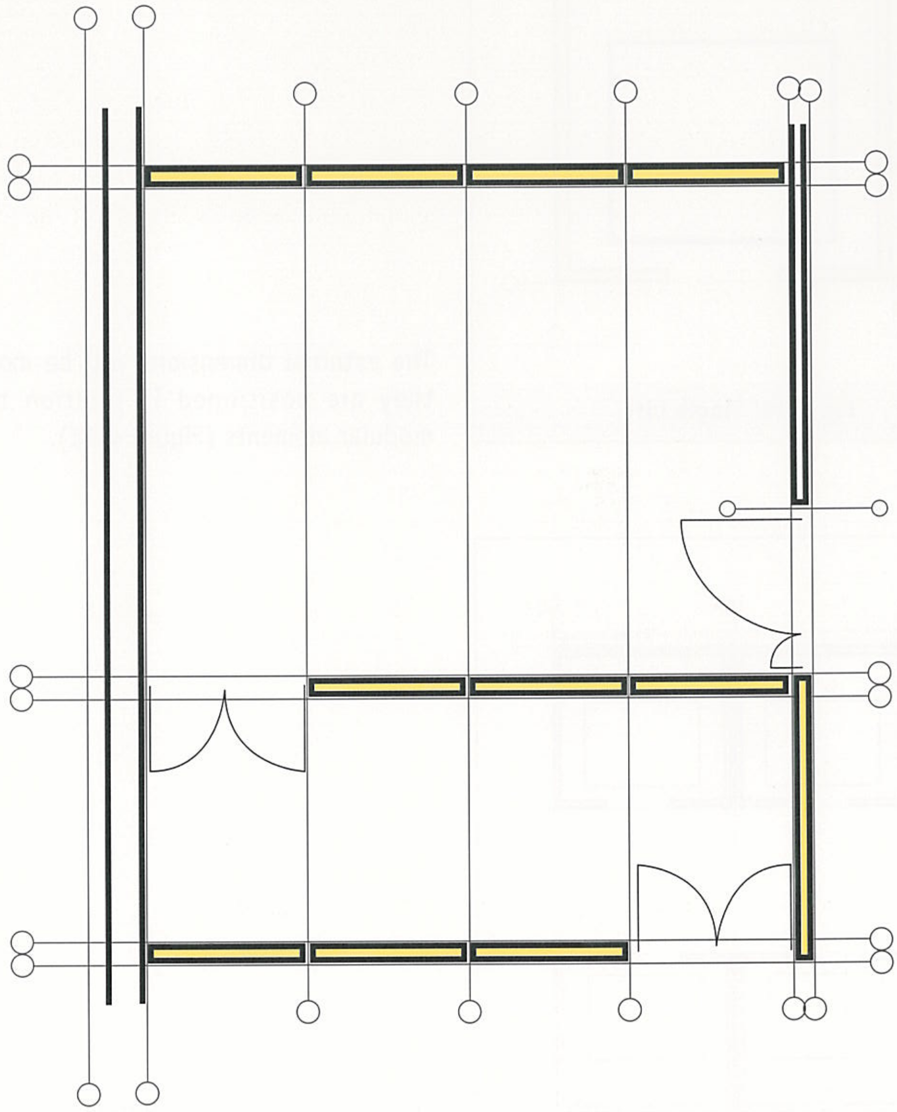

Fig 4-10: Component Walls

4.1.5 **Lift cores**

In the buildings with lifts, the internal dimensions of lift cores will be determined by the types of lifts and the sizes of the lift cars. They can be adjusted by multiples of **1M** with **0.5M** as second preference.

The size of the lift door will also be determined by the manufacturer, it is recommended that the opening be in multiples of **1M** to enable the neat laying of walls tiles/panels.

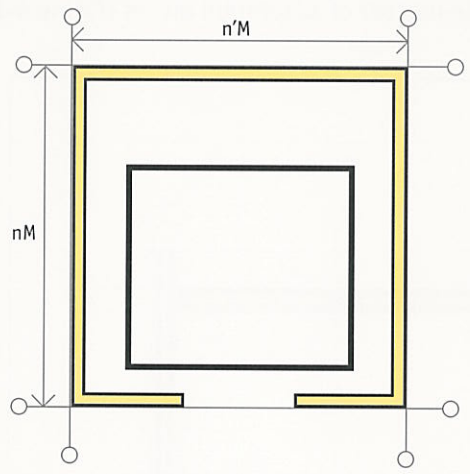

Fig 4-11: Single Lift

The external dimensions will be modular as they are positioned in relation to other modular elements (Figure 4-11).

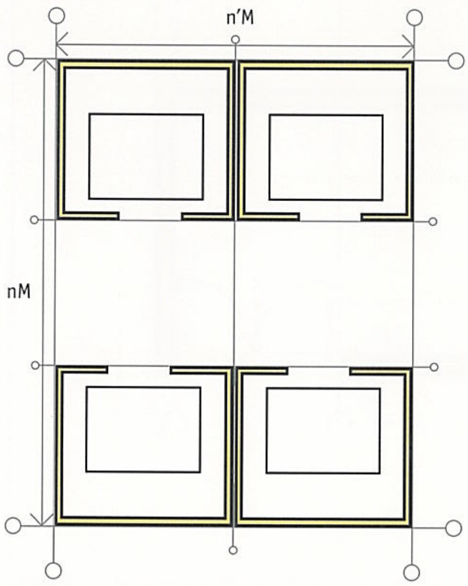

Fig 4-12: Lifts And Lobby

In cases where there are more than one lift, the whole assembly, including the lobby may be treated as one single element. The external dimensions will be multiples of **1M** (Figure 4-12).

In cases where the lifts and stairs are adjacent to one another, the recommended external dimension of the lift well is **24M**. The width of the stairs is **12M**, giving the overall dimension of **48M** (Figure 4-13).

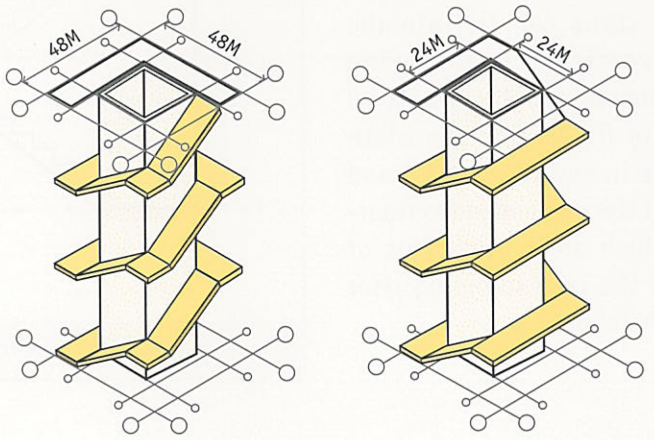

Fig 4-13: Lifts And Stairs

4.1.6 **Stairs**

On plan, the width of the coordinating spaces accommodates the two flights and the possible space in between. Both the length of the flights and the landing dimensions are modular. The goings, risers and widths of the flights and landings will be as required by statutory regulations (Figure 4-14).

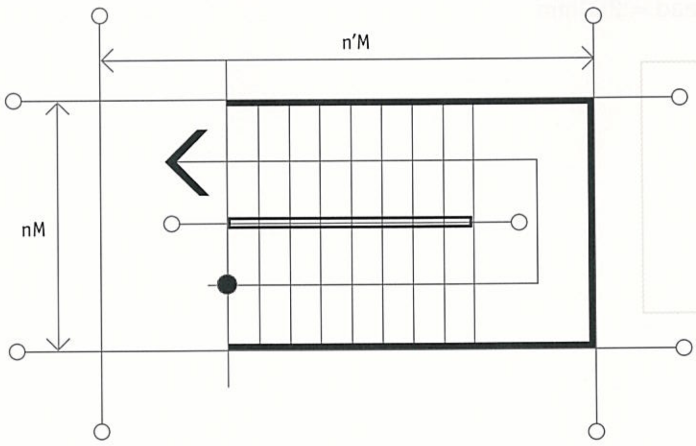

Fig 4-14: Plan Of Stairs

In section, the stairs will be located in between the floor coordinating lines. This means that the top of the stair will coincide with the top of the floor zone (Figure 4-15).

In order that the stairs can fit into the horizontal and vertical coordinating dimensions, the dimensions for the total width, the length of flights and the width of landings must be in multiples of **1M** and **0.5M**. A summary of the recommended floor-to-floor heights which are in multiples of **1M** and **0.5M** and the corresponding riser heights is shown in Table 4-1.

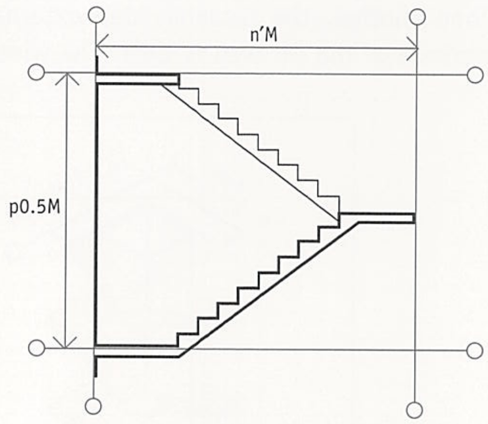

Fig 4-15: Section Through Stairs

	16 risers	18 risers	20 risers	22 risers	24 risers
Riser Dimesions (mm)	Floor-to-floor Height (mm)	Floor-to-floor Height (mm)	Floor-to-floor Height (mm)	Floor-to-floor Height (mm)	Floor-to-floor Height (mm)
150			3000	3300	3600
165			3300		
175	2800	3150	3500	3850	4200

Table 4-1: Standard Staircase Riser Heights And Floor-to-Floor Heights

Note: Size of thread = 250mm

4.2 Architectural Components

4.2.1 External Envelope

Cladding within structure

This form of cladding is commonly done for small buildings like houses, schools and other institutional buildings. It is important to maintain the modular spacing between the columns as this space usually has a band of windows running across it. **Face planning** is recommended for these types of buildings.

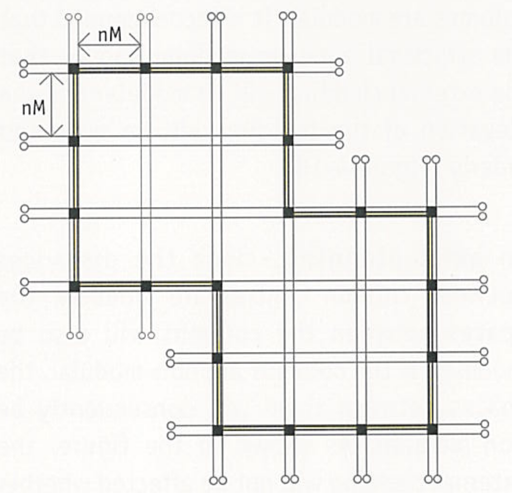

Fig 4-16: Cladding Within Structure - Face Planning

For **face planning**, the columns may be non-modular as the distance between the faces of columns are already so (Figure 4-16).

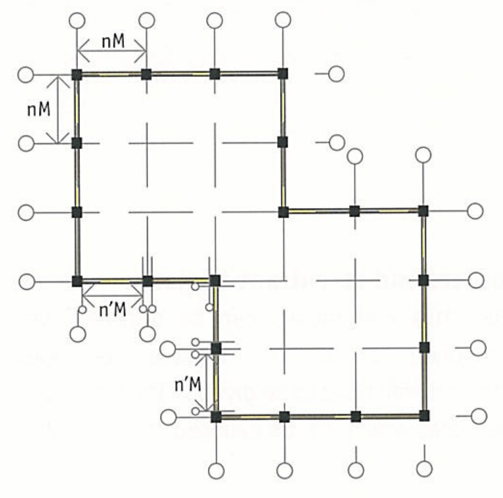

Fig 4-17: Cladding Within Structure - Axial Planning

In **axial planning**, the columns will have to be of modular dimensions to ensure that the modular infill cladding be fitted properly (Figure 4-17).

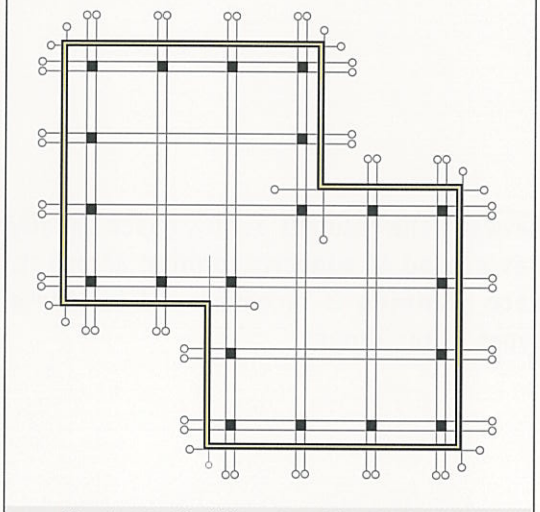

Fig 4-18: Cladding Outside Structure - Face Planning

Cladding outside structure

This usually applies to commercial buildings like offices and shopping complexes with free standing columns. The cladding can be curtain walls, independent from the columns. The areas to note are the corners, the building can still be planned with the elevation appearing consistent. For these types of buildings, **axial planning** is more suitable.

In **face planning**, the spaces between the columns will be modular, whether or not the columns are modular. It is recommended that the structural zone be modular too so that the external cladding will be modular and the elevation of the building will be neat and orderly (Figure 4-18).

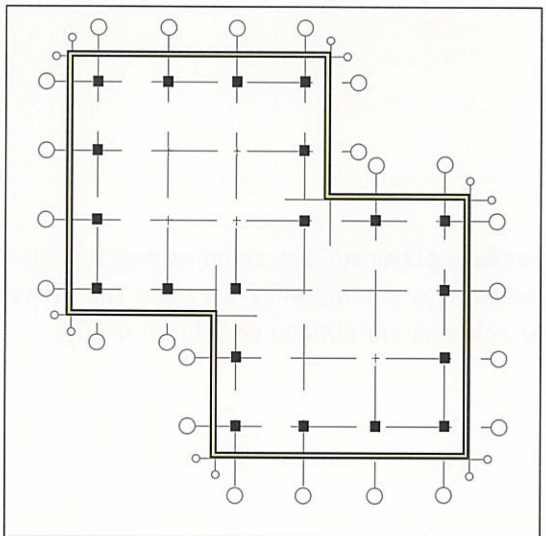

Fig 4-19: Cladding Outside Structure - Axial Planning

In **axial planning**, since the distances between column centres are modular, the spaces between the columns will also be modular. If the columns are non-modular, the spaces between them will consequently be non-modular. As shown in the figure, the external cladding will not be affected whether the columns are modular or not, but the internal partitions will be affected (Figure 4-19).

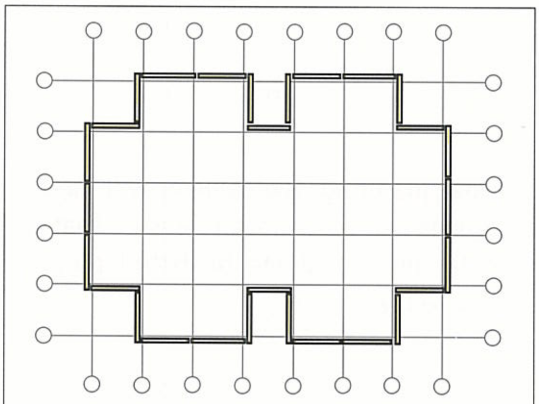

Fig 4-20: Corners And Re-entrant Angles

Corners and re-entrant angles

Balconies and niches can be detailed where components can still be of modular sizes. Special attention will have to be given in the treatment of the edges which will be exposed (Figure 4-20).

On a larger scale, there is no problem in buildings on **face planning** as the space between columns will be modular (Figure 4-21).

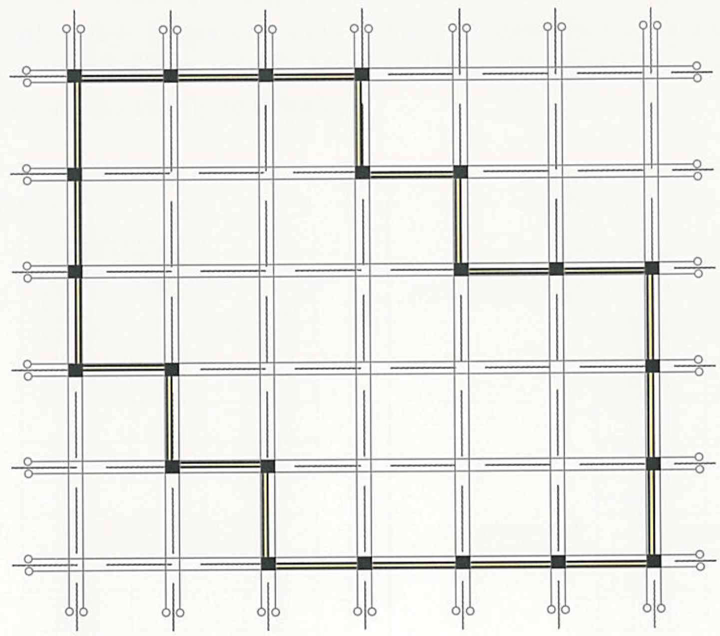

Fig 4-21: Corners And Re-entrant Angles - Face Planning

For buildings on **axial planning**, the space between the edge columns and the cladding can be adjusted so that each component is modular and the elevation still appearing consistent (Figure 4-22).

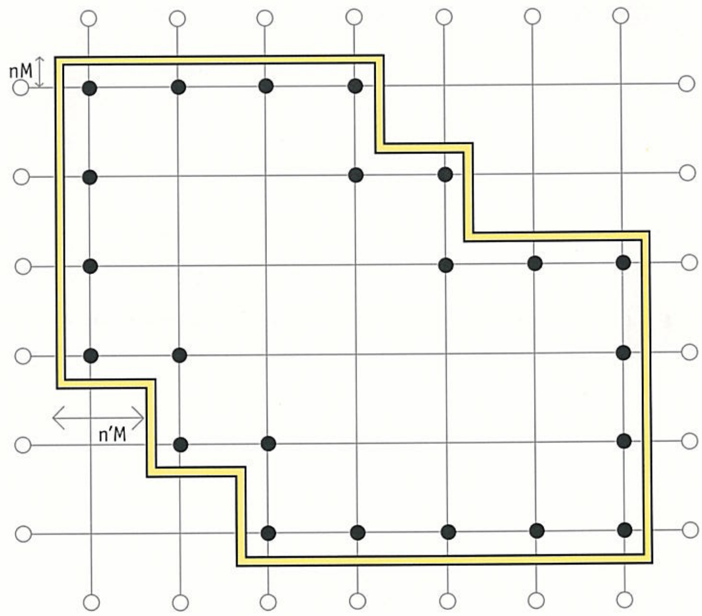

Fig 4-22: Corners And Re-entrant Angles - Axial Planning

4.2.2 Internal partitions

Internal partitions and walls are usually narrower than the **3M** grid. It is therefore important to have these partitions and components correctly placed on the grid so that the benefits of modular coordination can still be enjoyed. In most situations, the resulting spaces will still be possible to fall into the dimension of the second preference of **1M.** Internal partitions and walls of the thickness of **1M**, and **2M** can be arranged as in Figure 4-23 and Figure 4-24. In the case of the thicknesses not being in a multiple of **1M**, adaptation pieces can be used.

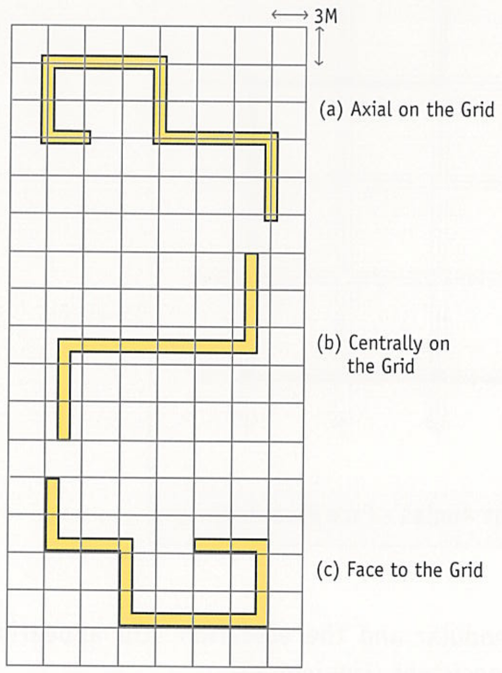

Fig 4-23: 1M Thick Partitions

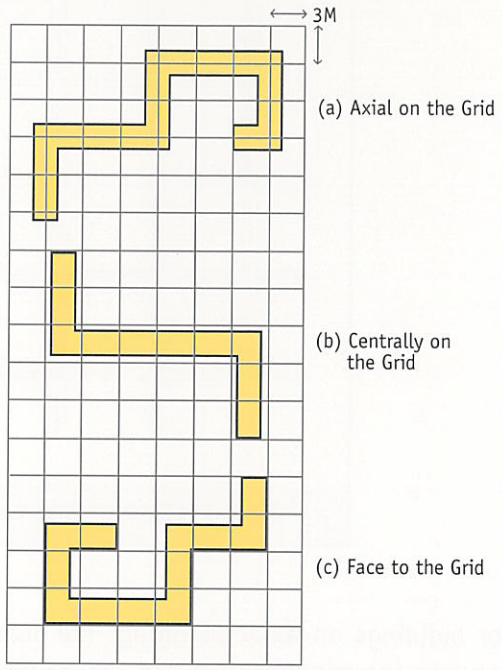

Fig 4-24: 2M Thick Partitions

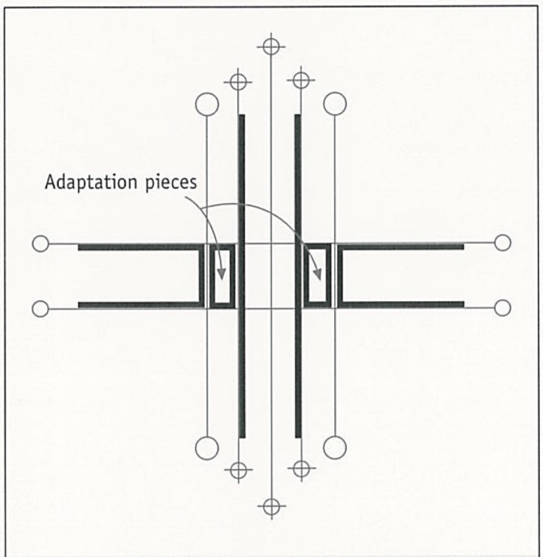

Fig 4-25: Adaptation Pieces

For walls, the face-to-grid arrangement is preferred as it ensures the modular dimensions for adjoining components.

In order to maintain the modular zones, non-modular elements are placed in the zone and the left-over space filled with adaptation pieces. The advantage of maintaining the modular zone is that all other dimensions will still be modular (Figure 4-25).

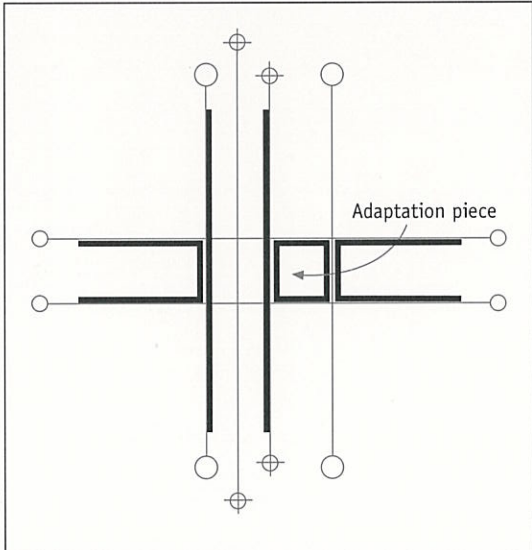

Fig 4-26: Adjusted Wall

In practice, if symmetry is not necessary, the wall should be placed at one edge of the zone and the adaptation need only to be done at one face and not two (Figure 4-26).

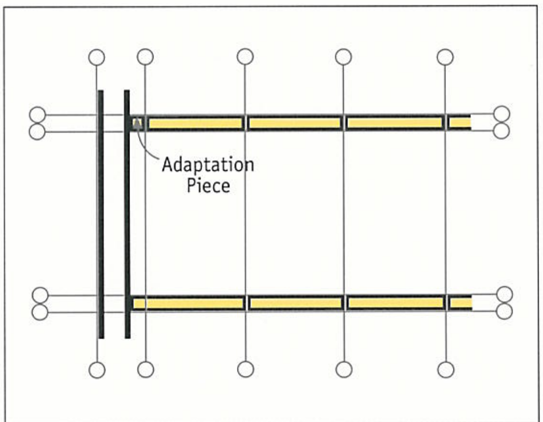

Fig 4-27: Component Assembly With Adaptation Piece

The adaptation piece need not be a separate component, it can, in many cases be an extension of one of the walls (Figure 4-27).

4.2.3 **Doors**

Width: Multiples of **1M**.
Height: Multiples of **1M**.
The second preference for doors is **0.5M**.
The measurements include the door frames.

The height of the doors are determined by the functional requirements.

It is important to note that the controlling spaces for the components like doors and windows be maintained as the preferred dimensions. This is to allow the components to be fitted without undue adjustments. The other adjustments, using adaptation pieces can be done in the walls or partitions (Figure 4-28).

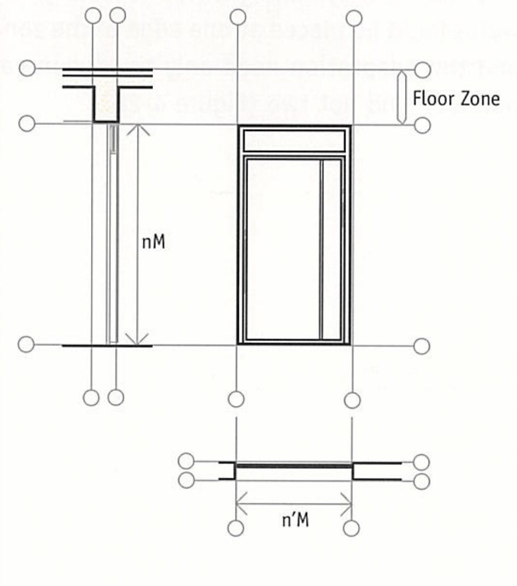

Fig 4-28: Door Component

4.2.4 **Windows**

Width: Multiples of **1M.**
Height: Multiples of **1M.**
The second preference for windows is **0.5M.**
The measurements include the window frames.

The types and sizes of the windows depend on the functional requirements. The recommended dimensions will apply for all window types.

In certain circumstances, the sill reference plane may coincide with the floor reference plane and/or the window head reference plane with the ceiling reference plane (Figure 4-29).

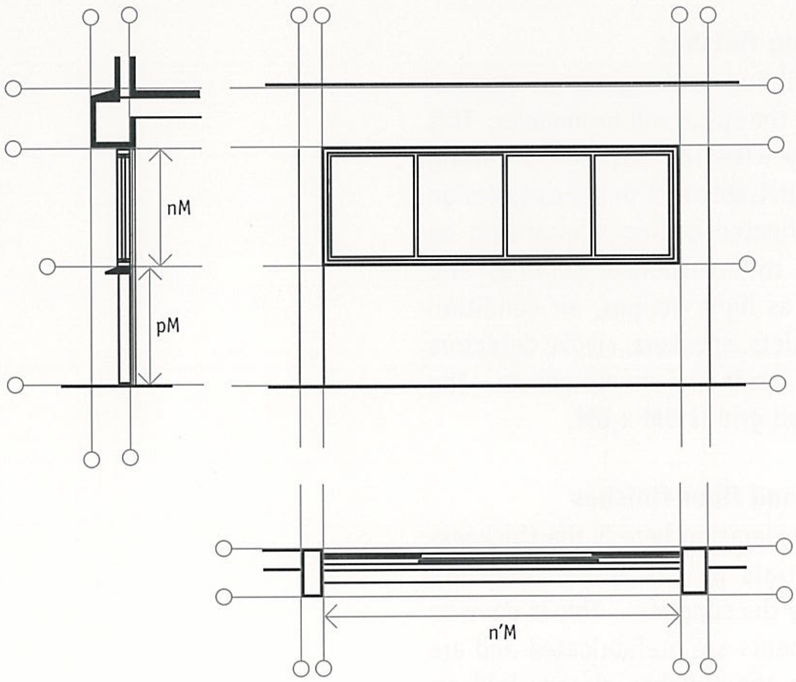

Fig 4-29: Window Component

4.3 Finishes

Most of the finishes are imported and unless the project is of a significantly large scale, the suppliers will seldom conform to the dimensions required by the designers. As finishes are usually done at the concluding stages of the construction process they are at the lower end of the hierarchy of Modular Coordination application. However, if the finishes are also modular, the appearance and interiors of the buildings will be enhanced.

4.3.1 Ceiling finishes

When the building is designed on Modular Coordination, the space will be modular. This fits in neatly with the suspended ceiling layout. It is advisable that in the early design stage, the reflected ceiling plan should be drawn so as to incorporate services and fittings such as light fittings, air condition inlets and outlets, speakers, smoke detectors and sprinkler heads and access panels. The commonly used grid is **6M** x **6M**.

4.3.2 Wall and floor finishes

The main consideration here is the thickness of the materials as the dimensions are determined by the suppliers. This is more so if the components are prefabricated and are installed with the finishes already laid on them. Allowances must be given within the column, wall or floor zones for the finishes to ensure that the remaining spaces between the zones are modular.