CHAPTER 3

Modular Grids And Planning

Modular Coordination entails the employment of a space reference system. This is expressed in the plans and sections of the building with controlling planes and lines. This chapter introduces the Basic Module and different modular grids and the applications in horizontal and vertical planning. The dimensions recommended here are in modules and sub-modules for the various practical reasons and functional requirements.

Recommended Modular Dimensions

Basic Module	:	**1M** = 100mm
Structural Grid	:	**3M** (**1M** as the second preference)
Horizontal Multi-Module	:	**3M** (**1M** as the second preference)
Vertical Multi-Module	:	**1M** (**0.5M** as the second preference)
Doors	:	Multiples of **1M** (width and height)
Windows	:	Multiples of **1M** (width and height)
Sub-modular increment	:	**0.5M** and **0.25M**

3.1 Applications

3.1.1 The basic module

The basic module is the fundamental unit in **Modular Coordination**. It is represented by the letter **M** and is adopted internationally. The unit **M** is 100mm. The symbol **nM** (or **n'M**) represents multiples of **M.**

Multiples of				
3M	**6M**	**9M**	**12M**	**15M**
3				
6	6			
9		9		
12	12		12	
15				15
18	18	18		
21				
24	24		24	
27		27		
30	30			30
33				
36	36	36	36	
39				
42	42			
45		45		45
48	48		48	
	54	54		
	60		60	60
		63		
	66			
	72	72	72	
				75
	78			
		81		
	84		84	
	90	90		90
	96		96	
		99		
				105
		108	108	
			120	120
			etc.	etc.

Table 3-1: Series Of Recommended Multi-Modular Sizes For Horizontal Controlling Dimensions

3.1.2 The structural grid

The recommended structural grid is **3M** or multiples of **1M**.

3M is chosen as most materials like the precast floor slabs are in multiples of this dimension.

3M also fits into the carpark lots of **24M** x **48M.**

3.1.3 Horizontal multi-modules

In selecting the planning module, the designer will have to take into consideration the function of the building and the components to be used. See Table 3-1.

In the selection of the sizes from the table, preference should be given to the series of the larger multi-modules compatible with the functional requirements and economic design.

For practical considerations, a second preferred module of **0.5M** is introduced to supplement the primary module. This allows for more design flexibility.

3.1.4 Doors

Multiples of **1M** (width and height).
The measurements include the door frames.

3.1.5 Windows

Multiples of **1M** (width and height).
The measurements include the window frames.

3.1.6 Sub-modular increment

0.5M
0.25M

The thickness of many building components may be governed by economic and functional considerations. The sub-modular increment is to allow for this. The determination of the size for planning modules shall not be based on sub-modular increments.

3.2 Modular Grids

Plans, sections and elevations are expressed in two dimensions. These are horizontal and vertical projections of the modular space grid. Different modular grids may be superimposed on the same plan or elevation for different purposes. The advantage of using grids is that they provide a continuous reference system in a project, provided that the basic modular grid is kept uninterrupted throughout the building. The position of the components and their corresponding modular dimensions can thus be recognised by those preparing the drawings and also by those reading them.

3.2.1 Basic modular grid

This is the smallest planning grid used as a basis for developing other grids. The basic modular grid is normally shown only on small-scale drawings to clarify the relationships between components. Each square is **1M** by **1M** ie. 100mm x 100mm. These drawings are in the scales of 1:10 or 1:20. They also used in full scale detail drawings (Figure 3-1).

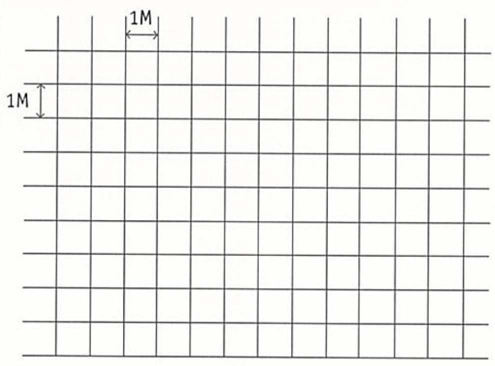

Fig 3-1: Basic Modular Grid

3.2.2 Multi-modular grid

The multi-modular grid is formed with the intervals being multi-modules. They can either be squares with same intervals in both directions (Figure 3-2a) or rectangular (Figure 3-2b). These grids are based on the recommended multi-modules. They are used in key plans, showing the layouts of building complexes, buildings and the positions of main buildings components. These drawings usually have scales of 1:50 and above.

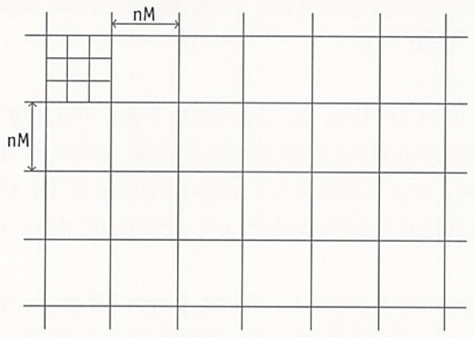

Fig 3-2a: Square Multi-Modular Grid

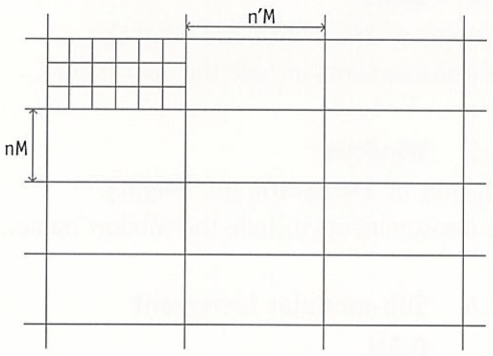

Fig 3-2b: Rectangular Multi-Modular Grid

3.2.3 **Tartan grid**

The tartan grid is an interrupted modular planning grid in which the intervals or bands of interruption are regularly spaced in both directions and are of different modular order to the general modular planning grid (Figure 3-3). This pattern may be used in very regular plans like those with columns at constant intervals throughout the floor (Figure 3-4).

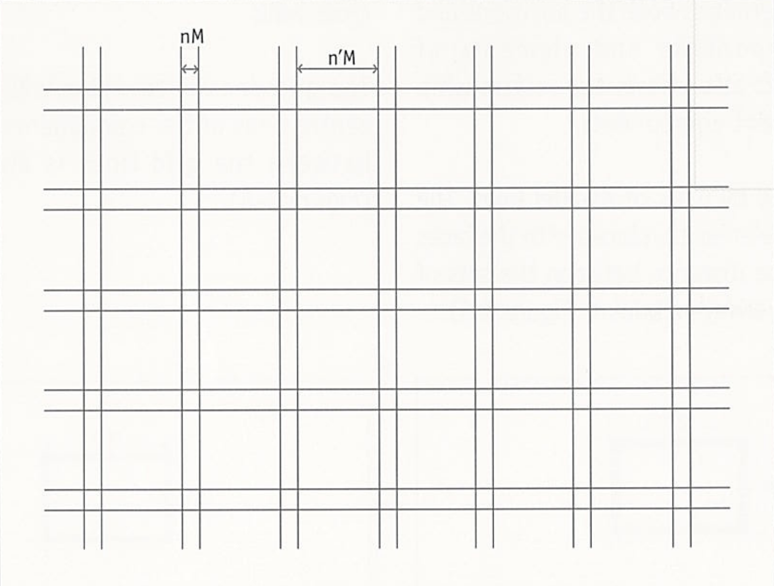

Fig 3-3: Tartan Grid

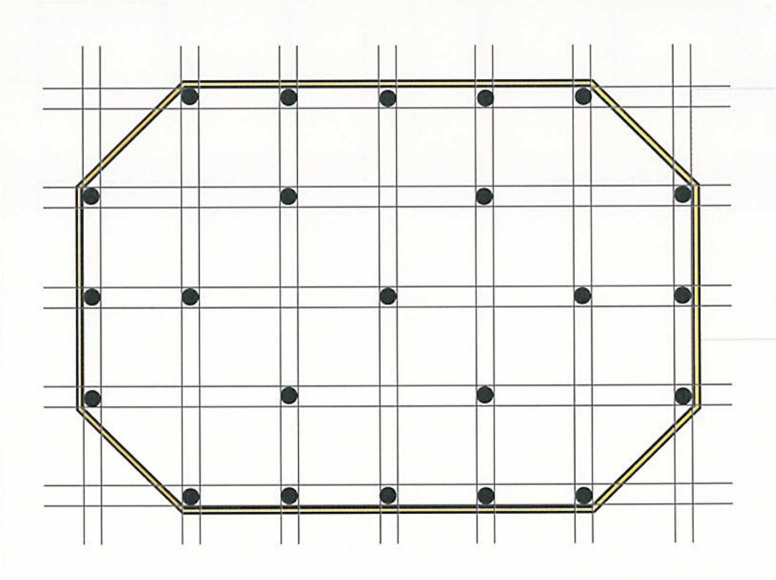

Fig 3-4: Grid For Regular Column Pattern

3.3 Planning Approaches

There are 2 basic approaches to planning in Modular Coordination.

3.3.1 Face planning

Face planning is used to position components and elements of construction in relation to the grid. It determines both the positions and sizes of components and elements of construction. It also shows the relationship between different components.

It is represented by pairs of parallel lines. The components or element is placed with the faces on the lines. The distance between the sets of parallel lines is always modular (Figure 3-5).

3.3.2 Axial planning

Axial planning normally determines the positions of major components e.g. columns, cross walls.

The grid lines in this plan will run along the centre lines of the components. The distance between the grid lines is always modular (Figure 3-6).

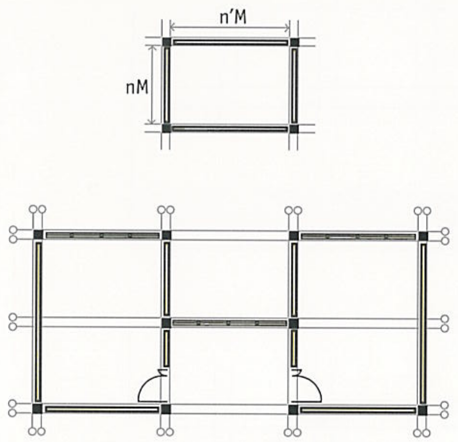

Fig 3-5: Face Planning

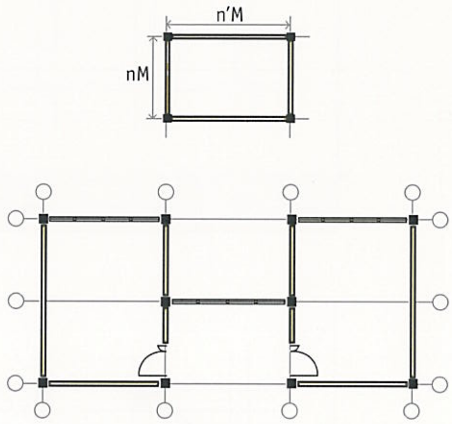

Fig 3-6: Axial Planning

3.3.3 Application

In practice, the 2 approaches of planning can be combined. In the planning process, it is easier to begin with the modular grid and determine the positions of the major elements using the **axial planning.** The **face planning** will then be introduced for the positioning and sizing of various components and also to design the joints (Figure 3-7, 3-8).

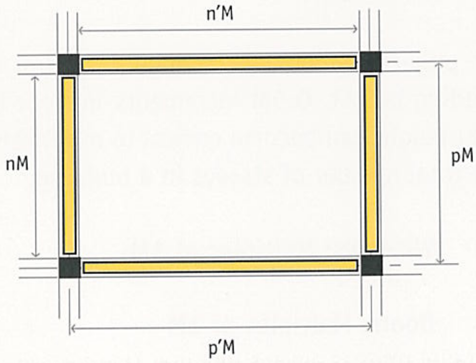

Fig 3-7

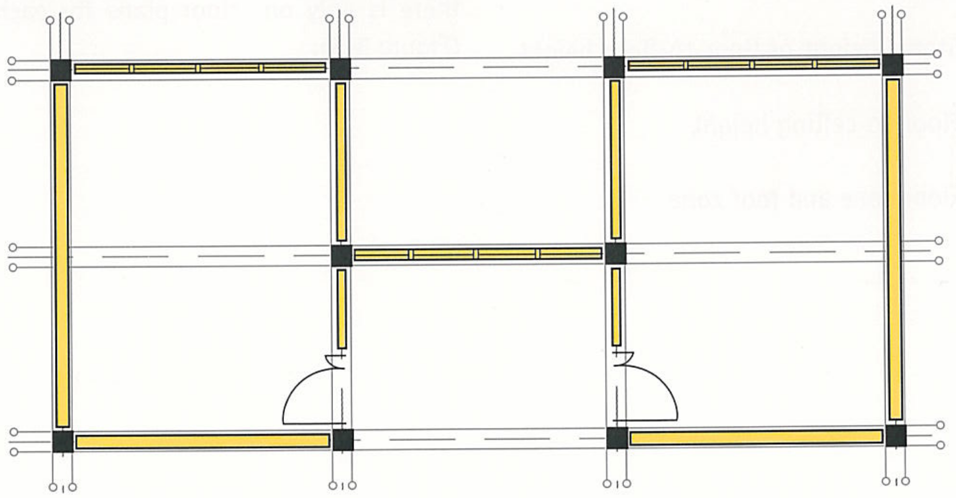

Fig 3-8: Combination Of Face And Axial Planning

3.4 Vertical Planning

3.4.1 Preferred dimensions

The preferred vertical dimensions are as follows:

(a) Vertical Planning: **1M** (**0.5M** as second preference)

For projects which face stringent control on building height, **0.5M** increments in floor-to-floor height can become critical in maximising the total number of storeys in a building.

(b) Windows: Multiples of **1M**

(c) Doors: Multiples of **1M**

3.4.2 Vertical controlling dimensions

The main vertical controlling dimensions, taken from coordinating planes in the reference system are:-

(a) Storey height or floor-to-floor height

(b) Floor-to-ceiling height

(c) Floor zone and roof zone

The intermediate controlling dimensions are:-

(a) Door head height

(b) Window head height

(c) Window sill height

The window head height may coincide with the lower coordinating plane of the floor above.

The door head height and window head height are usually the same.

The modular floor plane from which vertical coordinating dimensions are taken is a continuous horizontal plane over the whole of each storey of a building. This means that there is only one floor plane for each level (Figure 3-9).

Modular Grids & Planning

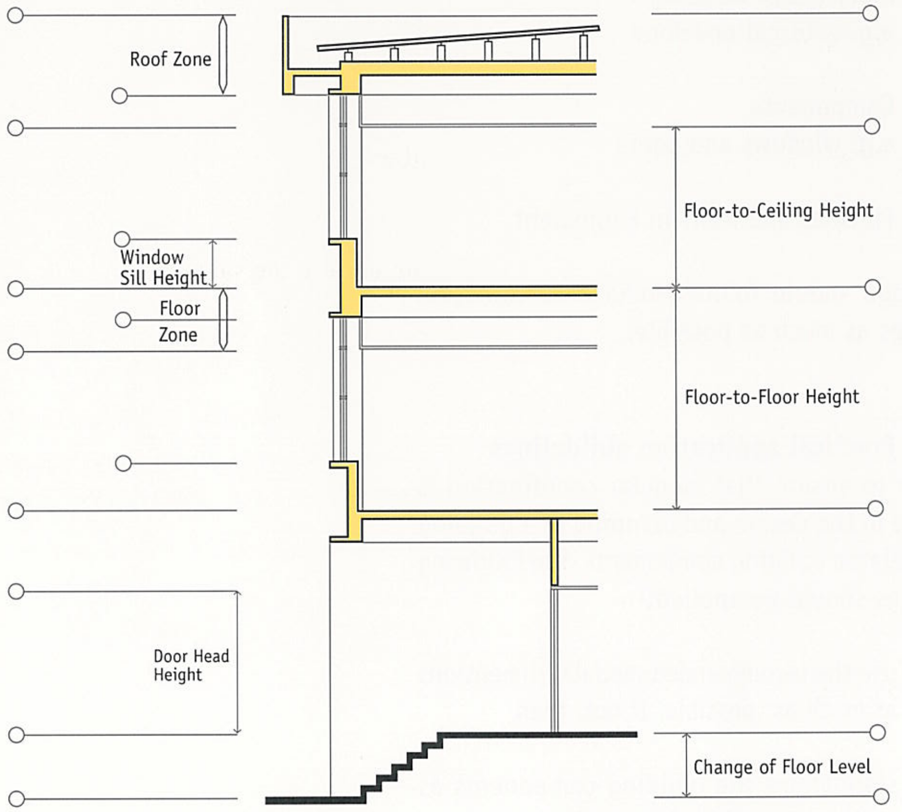

Fig 3-9: Vertical Controlling Dimensions

3.5 Hierarchy Of Planning

It may not be possible in practice to achieve a complete modular system using only preferred dimensions and sizes. In these situations, the order of priority should be as follows:-

(a) Planning Grid

(b) Elements of Building
e.g. external envelope

(c) Components
e.g. windows and doors

(d) Finishes and Built-in Equipment

The design should follow Modular Coordination principles as much as possible.

3.5.1 Practical application guildelines

In order to ensure that modular coordination is effective in the design and planning of a building and all related building components, the following guidelines should be applied:-

(a) use the recommended modular dimensions as much as possible. If not, then

(b) standardise the building components as much as possible. If not, then

(c) for the building components that cannot be designed in modules or standardised, choose a dimension that is proportional (subdivision/multiple) to the modular dimension and apply it consistently.

For example, use ½ (150mm), ⅓ (100mm), ¼ (75mm), ⅙ (50 mm) for the **3M** module. This will help to rationalise the dimensional system used for the whole project.