

## SECTION 3.

# RESPONSIBILITIES AND GENERAL PRINCIPLES FOR LOCATING EQUIPMENT

### 1. GENERAL.

1.1 To provide the accommodation requirements in communication buildings, co-operation is essential between the Buildings Branch and the Engineering Division. To assist in this direction the relevant responsibilities are set out hereunder.

#### Buildings Branch:

- (i) Acquisition of site.
- (ii) Standardisation of building structures and provision for future extensions.
- (iii) Determination of the most suitable and economic type of building construction and architectural treatment.
- (iv) The provision of electrical and mechanical utility services within buildings.
- (v) Protection against fire and flood hazards.
- (vi) Any other matters which are related to the procurement and provision of a building which will satisfy the Engineering Division requirements.

#### Engineering Division:

- (i) Desirable location and characteristics of site.
- (ii) Floor loading design details.
- (iii) Requirements in floor area.
- (iv) Required ceiling heights.
- (v) Suitable width of building.
- (vi) Selection of the correct position of cabling holes.
- (vii) Inter-relation of equipment types.
- (viii) Access to various services.
- (ix) Design and requirements of U.G. cable entry.
- (x) Other information affecting access to and layout of equipment such as locations and size of entrances, windows, air conditioning duct and partitions; any other matter which has a telecommunication engineering aspect apart from the design associated with the structure and services of the building.

To assist in the discharge of the responsibilities of the Engineering Division details set out hereunder indicate the various influencing factors.

### 2. FUNCTIONAL DESIGN.

2.1 The functional design of a building is influenced by the co-ordination of all essential facilities in the building, including provision, wherever possible, of rectangular areas for equipment, the correct location of the main distribution frame, power battery and air-conditioning rooms, and the economical inter-linkage of electrical services, etc. The amenities block, offices, stores, together with the location of lifts, stairs and entrances, should be arranged to reduce to a minimum waste time in staff movement.

2.2 Location of M.D.F. The location of the M.D.F. in a standard building is controlled by the design requirements for the U.G. cable entry. U.G. cables may be terminated in conventional cable chambers or tunnels below the M.D.F., on floor or wall type racking adjacent to the M.D.F. or in a separate cable entry room. The salient points in determining the location of the M.D.F. and its co-ordination with the design of the U.G. cable entry are summarised here -

- (i) The distance between the entrance manhole and the M.D.F. should be kept to a minimum.
- (ii) For standard type building construction, the M.D.F. must be capable of extension and the direction of growth shall be away from the point of entry of U.G. cables and should coincide with the direction of the building extension. In the case of a prefabricated building or buildings, using similar principles of construction, the M.D.F. is sited, in some instances, across the width of the building.
- (iii) For prefabricated type buildings and some standard buildings, a special type of stepped cable entrance may be used.
- (iv) The internal cable runs between the M.D.F. and the equipment racks must be kept to a minimum.
- (v) The spacing of the passageways surrounding the M.D.F. should be in accordance with the details set down in the relevant sections of the E.Is.

### 2.3 Location of Power Equipment.

- (i) Internal plant charging equipment. In considering the requirements for locations of internal plant charging equipment, the following points should be taken into account.

In a single purpose building the internal plant charging equipment should be in a single room.

Where more than one type of communication equipment may be installed, it may be desirable, for economic reasons, to place separate internal plant charging equipment and associated batteries on selected floors, that is, a separate power plant can be provided for an automatic exchange, long line equipment or trunk switching equipment which are located on different floors of the building provided economic considerations favour this method.

- (ii) Emergency power plant. Where emergency power plant is provided in a single-purpose building, it should be so located that the most economical linkages with the various classes of charging plant are arranged.

Where emergency plant is installed in a multi-purpose building it should always be placed in the basement or lower ground floor.

Where the emergency plant provides power for more than one internal plant charging installation, it should be located in the lower portions of the building.

- (iii) Commercial supply. Where a commercial substation is included in a multi-purpose building the Building Branch will arrange for it to be sited near the entry of the commercial supply leads and are allocated for the standby power plant.

2.4 Location of Battery Rooms. Where power and batteries are provided for individual types of equipment on separate floors of a building the battery room should be adjacent to the power room.

The E.I. Power Plant Batteries L 2010 includes layouts for storage batteries of various capacities.

2.5 Location of Exchange, Long Line, Auto Trunk Switching, and Manual Equipment in Buildings. Single, dual or multi-purpose buildings may be used for the installation of:-

- (i) one type of equipment,
- (ii) combinations of any two types, or
- (iii) various combinations of equipment.

When single storey buildings are used for one of these groups the power plant and staff rooms are generally located in the low ceiling height rooms, and the M.D.F. in the high ceiling height area.

When two or three storey buildings are used the power plant and staff rooms should be located on the ground floor in low ceiling height rooms and the M.D.F. in either a high ceiling height section of the ground floor or on the first floor depending on the method of entry for the underground cable.

Where multi-storey buildings are used low ceiling height rooms in the basement, sub-basement, ground floor, mezzanine floors or floors of low ceiling height provided external to the high ceiling height sections should be used for power and battery rooms, staff amenities, administrative offices, etc. The M.D.F. should be erected in a high ceiling height portion of the building suitably positioned to provide economy in the cost of providing for the underground cable entry. The first, second and other floors should be used for the installation of:-

- (i) the equipment racks in rooms of high ceilings and,
- (ii) manual exchange equipment in rooms of low ceilings on one of the upper floors of the building.

Small manual exchange installations in buildings of two or more storeys may be located on the ground floor. Where manual installations require a larger switchroom and association with automatic switching equipment however, it may be desirable to include the manual switchroom in portion of the high ceiling height areas allocated for the long line or trunk switching equipment or alternatively to provide floor areas with low ceiling heights on the same floor level.

In general the following practices should be followed in locating various classes of equipment -

- (i) Auto Exchange Equipment should be located -
  - (a) in such positions, that provision can be made for future extension,
  - (b) in high ceiling height rooms,
  - (c) adjacent to the M.D.F.,
  - (d) with the power and battery rooms placed to avoid waste time in subsequent maintenance.

- (ii) Manual Exchanges should be located -
  - (a) in low ceiling height rooms,
  - (b) close to amenities and staff rooms,
  - (c) near public entrances in smaller installations, or
  - (d) in selected areas in the larger installations, adjacent to trunk switching equipment or long line equipment racks.

When condition (d) applies, ample provision should be made for the public to obtain access to the operator by the installation of multi-coin public telephones in the entrances to the building, or in selected positions on other buildings.

- (iii) Long Line Equipment should be located -
  - (a) as one group,
  - (b) in high ceiling height areas,
  - (c) in such positions that expansion can be arranged in the new building areas,
  - (d) where possible in close proximity to the manual switchroom equipment racks.

Automatic Trunk Switching equipment should generally be sited in such positions as to provide for linking between the automatic exchange equipment and the long line equipment.

- (iv) Minor Equipment areas including storage, amenities, power and battery rooms should be positioned -
- (a) to provide a minimum waste of time in staff movement,
  - (b) for ease of maintenance,
  - (c) generally in the rooms of lower ceiling height.

### 3. FUNCTIONAL PLANS.

3.1 The functional plans for Single Purpose Buildings which may be single storey, two storey or more than two storey buildings should be developed from the details in these E.Is, for such items as aisles, passageways, ceiling heights, etc, for various classes of equipment.

3.2 Dual Purpose Buildings may be of one, two or more storeys for -

- (i) Metropolitan, and
- (ii) Country Areas,

3.3 Metropolitan Dual Purpose Buildings should be designed as basic units in which the major space allocation and the design of the buildings is related to automatic subscribers equipment. The design of these buildings should be based on the standard layouts in Section 4.

Where additional plant, including such items as long line equipment, junction carrier equipment, trunk switching or manual switchboards, is to be installed in these buildings, the areas required for these additional services should generally be located in positions which do not disturb the standard layouts. See paras 3.5-6 for the best arrangements of equipment.

3.4 Country Buildings require further consideration in the allocation of floor areas for all classes of equipment, since these buildings require the provision of space for manual exchanges, long line equipment and automatic trunk switching equipment. Each of these classes of equipment are important units and a composite design is involved. See Sections 4 and 10 for layout grouping, which should be considered in determining the most suitable arrangements of floors and location of equipment.

3.5 Multi-Storey Buildings primarily designed for equipment purposes in city areas have often in the past been built to the maximum height permissible under local building regulations and have included a number of light load office floors. To reduce costs the present tendency is to confine construction to the number of floors required for equipment purposes. In order to avoid subsequent disturbance to working equipment one or two floors over and above the 20 year plant requirements are generally provided. These are designed to carry future equipment loads and are used temporarily for other purposes. In some cases where the building is on high ground the desirability of providing for radio point to point working may influence the designed height of the building.

The constructional practices applied to multi-storey buildings generally provide for basement or sub-basement floors of low ceiling height, a ground floor of a suitable ceiling height for the inclusion of a maximum capacity type M.D.F. (see Section 18) standard ceiling heights to suit rack equipment on all equipment floors above the ground floor and low ceiling heights on the top floors where staff amenities are to be provided or where manual switch rooms are to be included in the building.

When it is necessary to provide additional accommodation for the future installation of a particular type of plant, then this area should be on the floor immediately above that on which the initial installation will take place.

Where a high ceiling is provided to permit the installation of a maximum height main distributing frame, a mezzanine treatment of the remainder of the floor remote from the area occupied by the M.D.F. may be arranged. A typical treatment is shown in Fig. 1.

3.6 A Typical Allocation (see Fig. 1) for a Large City Building is as follows:

Automatic Exchange Equipment should be installed on the floor immediately above the M.D.F. to provide cabling economy between the equipment and the M.D.F. Where extension in automatic exchange equipment is planned for the future, the next floor or floors should be allocated for that purpose.

Long Line Equipment is best located on the floor immediately above the floor or floors allotted for the installation of exchange equipment and should be below a floor allotted for automatic trunk switching equipment.

Automatic Trunk Switching Equipment should be installed on a floor immediately below the floor allocated for manual switch rooms. The selection of this position is related to the cabling between the automatic trunk switching equipment and the semi-automatic manual positions, the cabling requirement between automatic trunk switching and long line equipment being a smaller quantity. Where long term planning indicates that growth in either long line or trunk switching equipment may be involved, a buffer floor should be sited between the two floors accommodating long line and automatic trunk switching equipment if such can be arranged in the building.

Manual Exchange Rooms should be sited immediately above the automatic trunk switching equipment. Where the requirements of a manual trunk exchange necessitates more than one floor, a practice of providing for staff amenities on a floor between the two manual switch rooms should be followed. This grouping of the amenities and switch room floors will provide for a minimum loss of time when staff is coming on or off duty and will reduce the use of lifts, etc., during staff changes. This allocation brings about higher initial cabling costs but this is more than offset by the continual losses and associated costs brought about by waste of staff time. When studying the sketch plans for multi-storey buildings, the location of lifts, entrances and staff rooms should be determined by the suitability for staff movement throughout the building.

The foregoing points are covered in greater detail in the sections entitled "Metropolitan Exchange Buildings" and "Country Exchange Buildings".

4. EXTENSION TO BUILDINGS.

4.1 When sketch plans for extensions to a building to provide for additional equipment areas are being examined, the following points should be considered:-

- (i) Floor levels in the new and the old portions of the buildings should be carefully checked. Ceiling heights should be adjusted and care taken to obtain the most economical alignment of the old and new equipment.
- (ii) The location of openings and size of the holes through the walls and floors must be carefully selected.

- (iii) The layout of the new equipment should be co-ordinated with the existing equipment positions.

5. INSPECTION OF PRELIMINARY SKETCH PLANS.

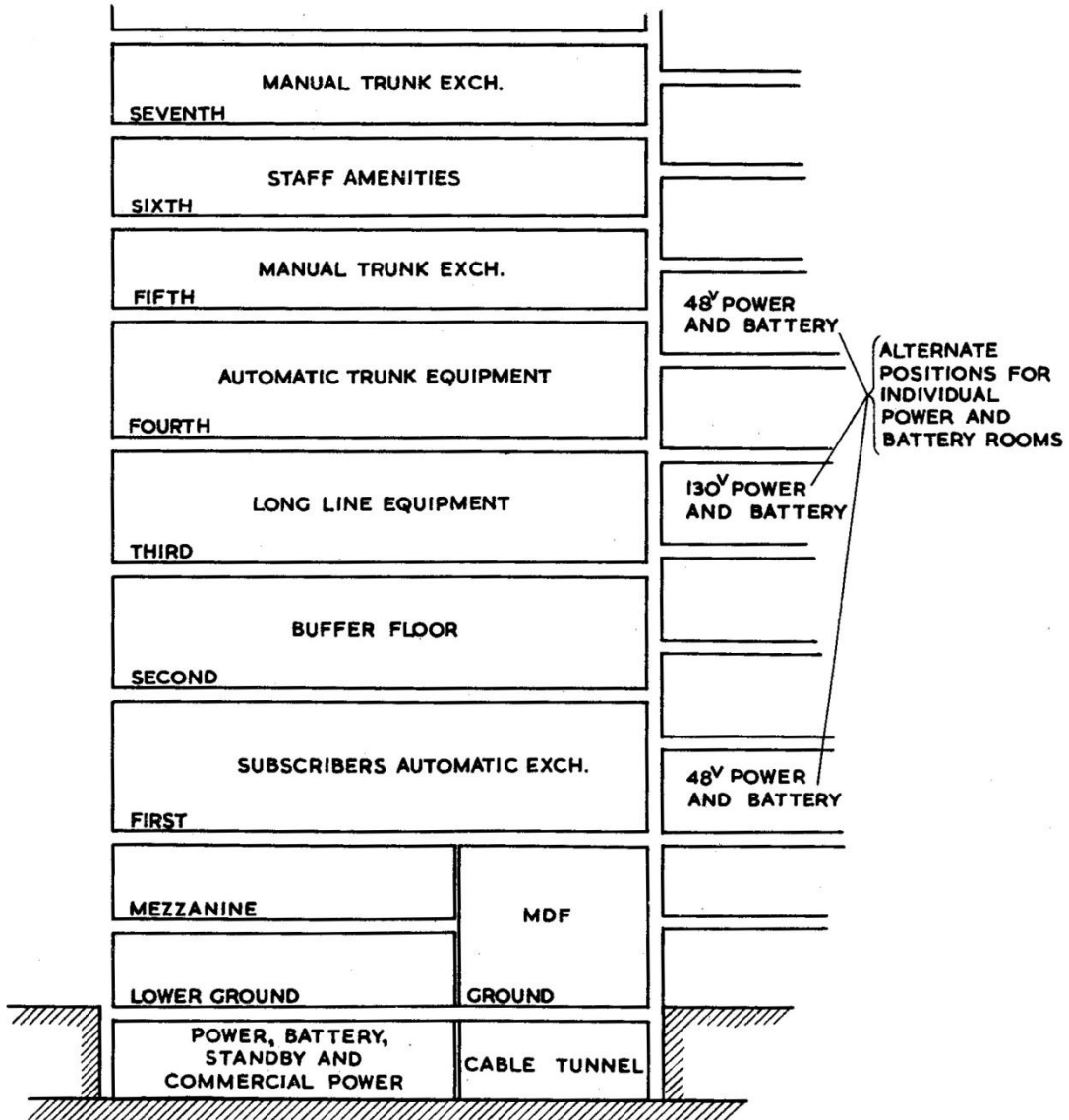
- 5.1 A subsequent inspection and co-ordination of preliminary sketch plans should be made to ensure that the plans provided conform with engineering requirements set out in the functional layouts supplied with the original request for the building.

6. WORKING DRAWINGS.

- 6.1 Approved building plans should be obtained from the Buildings Branch immediately after tenders for the erection of the building have been accepted and action taken to prepare detailed drawings providing for the location of equipment, passageways, outlines of the overhead ironwork and power distribution facilities. In the preparation of these drawings it is essential that the locations of passageways and aisle dimensions be as detailed in the other sections of this Instruction. In addition, the layout of the equipment should conform with the position of cable holes and columns provided in the preliminary sketch plans for the building, each of which has been co-ordinated to avoid possible obstruction due to duct work, other service facilities, etc.

The working drawings prepared by the Department of Works should not be revised in any way except where inspections disclose that departures from the floor dimensions, ceiling height etc. have been introduced after the preliminary sketch plans have been approved by the Engineering Division.

Take early action to bring any detected discrepancies under the notice of the Buildings Branch and take care to avoid, wherever possible, any alteration to the working drawings of the Department of Works, due to difficulties which can occur between that Department and its contractors.



## GROUPING OF EQUIPMENT IN MULTI PURPOSE BUILDING.

FIG. 1.