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The production of this document was jointly funded by the Scottish Executive Health Department and the NHSScotland Property and Environment Forum.



About this series

The Scottish Health Planning Note series is intended to give advice on the briefing and design of healthcare premises in Scotland.

These Notes are prepared in consultation with representatives of NHSScotland and appropriate professional bodies. Health Planning Notes are aimed at multi-disciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, alternative solutions are sometimes proposed. The intention is to give the reader informed guidance on which to base design decisions.

Acknowledgements

The Property and Environment Forum Executive thanks Mr Norman Raitt of Norman Raitt Architects for editing and compiling this publication for NHSScotland.



2. General functional and design requirements

Introduction

- 2.1 This Chapter contains guidance concerning aspects of function and design which are common to health buildings generally and which will need to be borne in mind when designing new buildings or upgrading existing premises.

Economy

- 2.2 The planning of hospital buildings requires design solutions, which not only satisfy functional requirements but also ensure maximum economy in respect of both capital and running costs. Due weight must therefore be given to the questions of space provision, maintenance (including cleaning), energy consumption and staffing requirements. Planning should ensure that spaces are used as intensively as possible and are not unnecessarily duplicated. Wherever possible spaces should be designed for flexibility of function, not only in their original use but also in terms of future change of use. Care should however be taken to ensure that the space provided allows for the activities required and is not reduced to the extent that infection control implications are compromised.

Alterations and extensions to existing buildings

- 2.3 Guidance for new build is not intended to apply retrospectively to alterations to buildings. Nevertheless, the principles are equally valid and they should be applied wherever practicable when buildings are altered* or extended. Applying the Building Standards (Scotland) Regulations to this type of work sometimes presents difficulties. The basic principle is that the Regulations apply to both alterations and extensions but not to unaffected parts of the building even if these parts do not conform to the Regulations.
- 2.4 The cost of alterations and/or extensions should be established in accordance with the guidance outlined in [Chapter 5](#). The estimated life of the existing building and the difference in cost between works to an existing building and that of a new building should be taken into consideration.
- 2.5 Before any decision is made to carry out such a project an option appraisal should be undertaken. Consideration must be given to the long-term strategy for the service, the space required for the new service and the size of the

* Alterations include upgradings and adaptations of existing buildings.



building. Regard must also be paid to the orientation and aspect of the building and the adequacy and location of all necessary support services.

- 2.6 If at first sight there is a case for upgrading, a thorough analysis of all functional and physical conditions of the existing building should be undertaken.
- 2.7 When comparing alteration and/or extension of existing buildings with new build, economic considerations will not be the only criteria to be considered. Attention should be paid to matters such as location, accessibility, staffing, etc. The check of physical and other aspects of existing buildings should include:
- availability of space for alterations and additions;
 - type of construction;
 - insulation;
 - age of the buildings, condition of fabric for example external and internal walls, floors, roofs, doors and windows, which can be determined by a condition survey;
 - life expectancy and adequacy of engineering services, ease of access and facility for installation of new wiring and pipework, if required. Managers and Design Teams should refer to HFN 26 – ‘Refurbishment for natural ventilation’;
 - the heights of ceilings (high ceilings do not necessarily call for the installation of false ceilings which are costly and often impair natural ventilation);
 - changes of floor levels to obviate hazards to disabled people;
 - fire precautions;
 - physical constraints to adaptation such as load bearing walls and columns.
- 2.8 Having decided that existing premises are suitable for upgrading or conversion, the main requirement will be to assess how best the accommodation can be planned to enable the practice of modern care.
- 2.9 This summary of the main aspects of upgrading is general in character. It is recognised that each upgrading project will present its own problems. In many instances compromises may have to be made between Planning Note standards and what it is possible to achieve. Alterations should be functionally sound, not merely cosmetic, and appropriate for the projected needs of patients and staff for a number of years to come. Extensions should be regarded as new build wherever practicable.



- 2.21 Outlets should be provided for fixed payphones for the use of staff and visitors only. Payphones for use by visitors should be located near to the visitors' accommodation and the waiting area, and should be fitted with an inductive coupler to assist people using a hearing aid. Guidance concerning the provision of telephone services, including the telephone internal cabling distribution and telephone handsets, is given in HBN 48 - 'Telephone services'. (Joint NHSScotland Property and Environment Forum/NHS Estates publication).

Patient-to-staff and staff-to-staff call systems

- 2.22 Patient-to-staff call systems should be provided in bed spaces and in all spaces where patients may be left alone temporarily, such as consultation/examination/treatment rooms and WCs. Staff-to-staff call systems should be provided in all spaces where staff consult, examine and treat patients. Terminals to the call systems should be located at the staff base or as otherwise directed.

Staff-to-patient call system

- 2.23 Project teams will need to consider how patients, including those who have visual and hearing impairment, should be called for treatment from the main waiting area. Patients may be given a number as they register. When required for treatment, the patient's number may then be displayed on a digital clock in the main waiting area. This system helps to maintain patient anonymity and to ensure that patients are seen in order. Other options include announcements:
- by a member of staff personally;
 - over a loudspeaker system;
 - using a visual display unit.

Security/control of access

- 2.24 Assaults on hospital staff and theft of NHSScotland property are recognised problems. The project team should discuss security with the officer in charge of the local Police Crime Prevention Department and the hospital or district security officer or adviser at an early stage in the design of the building. Fire and Security Officers should be consulted at the same time because the demands of security and fire safety may sometimes conflict. The attention of planners is drawn to NHS MEL(1992)35, about security and the revised NHS Security Manual to which it refers, NHS MEL (1994)93 and NHS MEL (1995)67 regarding maternity units. Reference should also be made to Scottish Office PAN 46 – 'Planning for crime prevention'.
- 2.25 Security needs to be considered from both the point of view of security from outside intruders and the safety and security of patients and staff. Buildings should be designed, fitted and equipped to a standard which reduces the risk of



injury to users. The creation of a homely, domestic environment will be of equal importance in certain departments.

- 2.26 Project teams should also consult HFN 05 – ‘Design against crime’. This recommends that only after making buildings as safe as possible by means of a number of design processes should consideration be given to the provision of security systems, such as electronic locking devices, closed-circuit television and other items of hardware. Consideration needs to be given to how the security of the building will interact with the therapeutic atmosphere.

Protection from intruders

- 2.27 Careful consideration must be given to the security of the department from outside intruders. There should preferably be only one point of entry to each department which should be staffed 24 hours per day or have CCTV surveillance. Special consideration should be given to fire doors on escape routes which are not part of the usual circulation, to ensure that they are used only for their proper function. The entrance door will need to be lockable at night. A bell push may be required at the entrance to the department and to any self-contained component part of the department.
- 2.28 Throughout the accommodation, except for ground floor windows looking onto courtyards, window openings should be restricted at the bottom to 100mm for security and to discourage intruders. On the ground floor, which is more vulnerable to intruders, the degree of restriction at the top of the window will be a matter for local decision, bearing in mind that the more a window can be opened the better the natural ventilation. On the first floor, some restriction of top opening is desirable but the amount should be left to local decision. However, in all sanitary and utility areas there should be restrictors to allow opening of windows 100mm at both the top and bottom. Similarly, casement windows, if used, should be restricted at the side. All restrictors should be tamper-proof.

Patient protection

- 2.29 Some patients may attempt to harm themselves or others and so some precautions need to be taken, though the overriding safety measures are good staff/patient relationships. In units for the elderly, particular attention should be paid to the problem of patients who 'wander'. Give thought to whether doors should be locked or suitably alarmed so that staff can be alerted if a patient wanders (see SE Development Department's *Building Regulation Note 8/2000* regarding locks on exit doors). It is necessary to lock doors of those parts of the accommodation which are not used 'out of hours' and at weekends. There should be no open stairwells. Domestic Service Rooms should be lockable because they may contain toxic materials.



Floor finishes

- 2.38 It is important to select a floor covering which contributes towards the creation of an attractive environment. It must be appropriate to the area and not present a hazard to disabled people or the movement of wheeled equipment.
- 2.39 Carpets, for example, may be suitable for use in offices, staff rest rooms and visitors' waiting areas. For further information on soft floor coverings see HTM 61 – 'Flooring'. In other areas floor finishes should be capable of withstanding harsh treatment, regular hard cleaning and should be slip resistant under wet conditions. Skirting should be coved for ease of cleaning. The Infection Control Team should be consulted on the use of soft floor coverings, particularly for patient access areas.
- 2.40 It is important that whatever floor covering is chosen it can be effectively cleaned, maintained and repaired. Rapid developments in soft floor covering technology have produced a wide variety of new materials. Floors should not present or appear to present a slip hazard. The patterning should not induce disorientation. Surface drag, static electricity, flammability and infection hazards are other factors which need to be considered.

Main entrance

- 2.41 The first impression gained by patients and visitors entering a hospital or department is of fundamental importance. The design and furnishings of entrance, reception and waiting spaces should be warm and welcoming with a carefully chosen decor, soft floor coverings, pictures and plants. This feeling of warmth and welcome should, as far as practical, be continued throughout the accommodation.

Shape of rooms

- 2.42 The shape and appearance of rooms have effects on people. Rooms, which are square or nearly square, are preferable for most purposes. Long, narrow tunnel-like rooms and rooms which are small, internal, badly lit or poorly ventilated should be avoided.

Windows

- 2.43 The design of windows must reconcile different needs as well as providing natural daylight and outside views. In addition to the various statutory requirements, the following aspects must also be considered:
- illumination and ventilation;
 - insulation against noise;



- thermal loss or solar gain;
- the prevention of glare;
- the provision of a visual link with the outside world;
- security (see [paragraph 2.24](#)).

2.44 Design must give cleaners easy access to the inside and outside of windows. Guidance on types of window and on the safety aspects is available in HTM 55 - 'Windows'.

Note: HTM 55 is not endorsed for use in Scotland and if referred to should be used with caution.

- 2.45 Safety should be considered in the specification of all windows and internal glazing, including vision panels, light fittings, pictures and mirrors. The minimum standard for any glazing is given in BS 6262 – 'Code of practice for glazing in buildings' 1982 and its subsequent revisions. Higher specifications should be considered because of the nature of the risks.
- 2.46 Upstairs windows should have restricted opening to prevent people climbing out. There have been a number of incidents involving people falling from windows, mainly from hospitals. The restrictors should be tamper-proof.
- 2.47 Where windows are located in the wall behind the bedheads, it is necessary to ensure that the space requirements for beds, bedhead services, etc are not compromised to the disadvantage of either patients or staff.
- 2.48 Windows provided in the areas where patients recover will contribute to the well-being of both patients and staff. Windows should, if possible, have a pleasant outlook.

Doors and frames

- 2.49 Doors and frames are particularly liable to damage from mobile equipment. Materials which will withstand this should be used. All double swing doors should incorporate clear glass vision panels. Privacy, safety, or other considerations may require that the panels should be capable of being obscured. Where necessary, doors, except fire-resisting doors, should be capable of being fastened in the open position. Any locked fire exit doors must have the capability of release on the activation of the fire alarm, or a local release facility of a type not likely to tempt patients to misuse it. Magnetic door retainers should not restrict the movement of traffic. Doors should be of an adequate width to allow for the safe passage of beds, trolleys and wheelchairs where necessary.



Natural and artificial lighting

- 2.55 Décor should be light and pleasant. Natural lighting is essential to the well-being of patients. The provision of a comprehensive artificial lighting installation is also essential; it makes an important contribution to the aesthetic appeal of a department. It should be possible to vary the level of illumination to suit functional activities. Task lighting of the required intensity with low-contrast glare-free background illumination should be provided.
- 2.56 Artificial lighting, as well as providing levels of illumination to suit particular activities, can make an important contribution to interior design. Designers should develop a lighting scheme that will help to promote a high-quality image of the service being offered and a non-clinical, soft environment in as many spaces as possible. Levels of artificial light can be varied easily by the use of dimmer switches.
- 2.57 Artificial lighting provided in patient assessment, treatment and recovery areas should enable changes to a patient's skin tone and colour to be clearly defined and easily identified.
- 2.58 Orientation is an important consideration in any development. Sunlight enhances colour and shape and helps to make a room bright and cheerful. Glare can be reduced by attention to the detail of window design, and can be controlled by curtains or blinds. The harmful effects of undesired solar gain can be mitigated by external screens – a costly solution – or by architectural detail of the shape of windows and depth of reveals. Properly controlled solar gain contributes to energy efficiency. Further guidance is given in CIBSE Lighting Guide LG 10 1999 – 'Daylighting and Window Design'.

Internal rooms

- 2.59 Internal rooms may contribute to economy in planning, but the resulting continuous need for artificial lighting and mechanical ventilation will add to both capital and running costs. Such rooms do not provide good working conditions and should be used only for activities of infrequent or intermittent occurrence or which demand a controlled environment. Rooms that are likely to be occupied for any length of time by staff or patients should have windows.

Privacy

- 2.60 The design of the accommodation must preserve the privacy and dignity of patients particularly where men and women are treated in adjacent areas and share certain accommodation and circulation spaces. This must be reconciled with the need for unobtrusive observation which is vital for the care of the patient.



- 2.61 Within the department there will be different levels of rights of access and privacy. This will range from very public areas such as the reception and dining room to patients' individual bedrooms where a very high level of privacy will be required. Between these extremes there will be activity areas where patients congregate and clinical areas where patients and staff hold confidential discussions. There will also be staff only areas. This gradient of access/privacy should be clear from the design, both between and within the functional elements.

Art in hospitals

- 2.62 Works of art and craft can make a significant contribution towards the desired standard of the interior of wards and day hospitals. This need not be limited to the conventional hanging of pictures on a wall. Every opportunity should be taken to include works by local artists, children and craftspeople. These may include paintings, murals, prints, photographs, sculptures, decorative tiles, ceramics and textile hangings.
- 2.63 Often it is works of art and craft which lend special identity and which help give a sense of locality.
- 2.64 Specialist advice should be sought regarding the effect of different types of art on the emotional state. Landscapes and seascapes are generally considered to be relaxing, while close-up views of animals looking directly at the observer are thought to increase stress. Viewers in a seated position should be considered when determining the height at which works of art are displayed.
- 2.65 When installing art in health premises, especially residential premises, it is always advisable to consult with users of the facility. This will increase the level of acceptance. Display of art created by the users themselves should be encouraged.
- 2.66 Advice should be sought from experts on:
- obtaining funding;
 - ensuring quality in all art and craft works;
 - appropriately locating art and craft works;
 - selecting artists and craftspeople.

People with a disability

- 2.67 It is essential to ensure that suitable access and facilities are provided for people who have problems of mobility or orientation or other special needs. This category includes, besides people who are wheelchair-bound, those who



for any reason have difficulty in walking, those with a sensory handicap such as visual or hearing impairment, and those whose first language is not English.

- 2.68 Readers should refer to SHFN 14 – Disability access. Project teams are reminded of the need to comply with the provisions of:
- The Chronically Sick and Disabled Persons Act 1970;
 - The Chronically Sick and Disabled Persons (Scotland) Act 1972;
 - The Chronically Sick and Disabled Persons (Amendment) Act 1976;
 - The Disabled Persons Act 1981;
 - The Disabled Persons (Services, Consultation and Representation) Act 1986;
 - The Disability Discrimination Act 1995.
- 2.69 Attention is drawn to BS 5810: 1979 Code of Practice for Access for the Disabled to Buildings. One of the effects of the 1981 Act is to apply this British Standard to premises covered by the 1970 Act, which includes those open to the public.
- 2.70 Project teams should refer to HBN 40 – ‘Common activity spaces’ and HBN/SHPN 40 Volume 5: Scottish Appendix, a set of five volumes which includes guidance and ergonomic data sheets on access, space and equipment relating to disabled users of health buildings. SHFN 14 – ‘Disability access’ and SHFN 20 – ‘Access audits of primary healthcare facilities’ may also be of interest to project teams. ‘Disabled People Using Hospitals’, published by the Royal College of Physicians in 1998, includes guidelines on the design of hospital buildings that meet the needs of disabled people. It also describes how a hospital’s provision for disabled people, including the physical environment, might be audited.
- 2.71 It is recommended that project teams consult local representatives of disabled people with regard to the planning of spaces used by patients and escorts.
- 2.72 In locations where public telephones are provided, the need for access to a telephone by people in wheelchairs must be considered. A telephone should be mounted at a suitable height. Fitting the handset with an inductive coupler will assist anyone using a hearing aid. A text-phone should be provided for deaf people, and staff should know how to operate it. Organisations should be registered with Typetalk to enable hearing people to communicate with text-phone users through an operator. All telephones should be clearly signposted. See also HBN 48 – ‘Telephone services’.
- 2.73 If a deaf person communicates by means of signing it is important that any interpreting is done by fully qualified personnel. Staff who are interested can be given the opportunity to learn British Sign Language, but it must be



- 2.79 Maintenance will generally be undertaken as part of a planned maintenance routine. Some repairs may need to be carried out promptly on an “as-needed” basis. There is evidence to suggest that leaving vandalism or damage unrepaired leads to further degradation of the environment.
- 2.80 Building elements that require frequent redecoration or are difficult to clean should be avoided. A compromise is sometimes necessary between items that have a low acquisition cost but are expensive to maintain and those with a high acquisition cost which are nevertheless relatively inexpensive to maintain. The life-cycle cost of the building elements, in these instances, should be analysed and used to assist the project team in their decision-making process when there is a choice of product available.
- 2.81 Special consideration should be given to corners, partitions, counters and other elements which may be subject to heavy use. Wall coverings should be chosen with cleaning in mind.

Guidance on these aspects is given in HTM 56 – ‘Partitions’, HTM 58 – ‘Internal doorsets’, HTM 61 – ‘Flooring’ and HTM 69 – ‘Protection’.

Provision for Automatic Data Processing (ADP)

- 2.82 Information technology has a central role in health management. The use of computers and telecommunications, and the rate of technological innovation, continues to increase. The implications for project teams are threefold:
1. A requirement for the housing of the computers.
 2. A requirement for the provision of ducts for transmission cabling.
 3. Sufficient space and adequate power supplies for modems, visual display terminals (VDUs) and printers, and associated software and stationery.

Even if the introduction of automatic data processing (ADP) is not proposed at the time that the project team completes its brief, it will be advisable to design in such a way that equipment can be introduced easily and quickly at some later date.

- 2.83 There are two principal matters of concern: visibility and noise. VDUs are now a familiar sight, and it will easily be appreciated that they cannot be reduced beyond a certain size. Consequently, sufficient and convenient space must be provided for them. Since the brightness of the letters displayed on the screen cannot exceed a certain limit, special attention must be given to the ambient lighting to ensure that the contents of the screen are legible. Additional space will be required in front of the screen for a keyboard. Printers are often noisy. Noise may not be too noticeable in bed areas during normal working hours but during quiet hours it will probably not be acceptable. If it is not possible to



position a printer at a site remote from patient areas, expenditure on a quieter printer or on means of quietening a noisy printer can be justified.

- 2.84 Computer expertise is now widely available in the NHSScotland. Project teams should ensure that, at an early stage, they inform themselves concerning current and projected local computing policies, and that their proposals conform with them.



3. Hospital clinical and operational policies

Catering

- 3.1 Every department should have facilities for serving meals to patients in accordance with the hospital's catering policy. These facilities should comply with current food hygiene and safety legislation, for example the 'Food Safety Act, 1990' and the 'Food Hygiene Amendment Regulation, 1990'.
- 3.2 Two common methods of meal delivery service are:
- **central tray service** – meals which have been assembled to the individual patient's requirements and delivered to the ward in a trolley. The food is kept hot by a heat retaining base under each plate or in a heated tray trolley. On arrival at the ward, meals are served at the earliest opportunity. Space should be provided to accommodate the delivery trolley without obstructing normal circulation.
 - **cook-chill service** – chilled meals which have been assembled to the individual patient's requirements and delivered to the ward in a trolley. This may incorporate a reheating compartment. A separate reheating unit may be provided at ward level or in a shared trolley holding room. Meals must be stored and heated under controlled conditions before being served to patients. Space, in addition to that needed for the bulky delivery trolleys, must be provided for activities associated with the controlled reheating process – for example temperature monitoring. An electric power supply will be needed.
- 3.3 Whatever the chosen system, it is important that patients have a choice of meal and that any specific dietary needs, including cultural or religious requirements, are catered for.
- 3.4 Further guidance on catering is contained in HBN 10 'Catering department'.
- 3.5 It is assumed that in most departments staff will attend the hospital staff dining room for main meals although facilities are required in each department where staff can relax, and prepare and consume snacks and beverages.

Domestic services

- 3.6 A domestic services manager (or equivalent if the service is contracted out) will be responsible for organising domestic cleaning services. Most of the work will



be carried out by domestic services staff based in the department, but some work may be carried out by a Whole Hospital team.

- 3.7 Accommodation is required where cleaning equipment can be stored and cleaned, and as a base for domestic services staff. The size and content of the space will be determined by the scope and extent of the services provided from it, as determined by the Whole Hospital policy. The type and number of items of equipment and materials to be stored will depend upon the finishes provided, the number and deployment of domestic services staff, and the frequency of cleaning.

Supply, storage and disposal

- 3.8 The concept of Materials Management involves the supply, distribution, storage and disposal or re-cycling of a wide range of goods and equipment essential to the efficient management of departments. The range of items is provided by a number of different hospital departments.

These include:

- Central Store;
- Sterilizing and Disinfecting Unit;
- Pharmacy;
- Laundry;
- Kitchen;
- Laboratory;
- Engineering Services.

The methodology adopted by the hospital to provide an effective Materials Management System requires detailed planning and co-ordination.

- 3.9 The consequences of supply, storage and disposal policies for capital, revenue and service all interact. Increasing space and stock increases both capital and revenue costs. Reducing space reduces capital outlay but demands an increase in the frequency of delivery, resulting in increased running costs. Insufficient stock can adversely affect patient care and nursing service. Staff are distracted by the need to seek or collect items required. An unreliable supply encourages defensive overstocking.
- 3.10 Project teams should give careful consideration to supply, storage and disposal systems. The quantity and distribution of storage space can only be specified in terms of known policies. Space will be required for various types of waste, allowing for proper segregation procedures as outlined in SHTN 3: Management and Disposal of Clinical Waste.



- 3.11 Project teams should consider:
- Whole Hospital materials handling: supplies, storage and disposal policies. The frequency of deliveries, the amount of storage space required in the department and the delivery and storage policy of the supplying department, are interrelated. The lower the frequency of delivery, the greater the capital outlay on working stocks. This is particularly significant in respect of items reprocessed by the sterile services department (SSD);
 - the types of items supplied, for example, sterile supplies, office supplies, catering supplies and clean laundry;
 - the delivery and collection points;
 - the volume and location of storage spaces (including spaces where items are held awaiting collection for reprocessing or disposal);
 - specialised storage requirements, for example, for pharmaceutical supplies (especially Controlled Drugs).
- 3.12 Suppliers should be encouraged to adopt good transport management principles as outlined in the Government's White Paper 'New Deal for Transport: Better for Everyone'. This includes route planning, full load delivery and driver training.
- 3.13 Control of stock, which may require computer support, increases efficiency and can effect appreciable or even substantial reductions in costs. The value of a departmental stores management system will be enhanced if it can be linked to an existing hospital materials handling system.
- 3.14 Organising an efficient and economical system for supply, storage and disposal is demanding and complex. Systems and timetables for ordering supplies, for delivery, and for disposal, should be devised and agreed with the managers of relevant hospital departments, including hospital stores, SSD, pharmacy, laundry, catering and portering services. Good working relationships and communications with other hospital departments are of fundamental importance.
- 3.15 Disposal of pressurised containers requires special attention - see SAB(88)79 - 'LPG Aerosol Containers: Risks arising from storage, use and disposal'. Specially constructed containers (see BS 7320:1990) should be used for "sharps", particularly needles. Use of sharps containers minimises the risk of injury to staff, particularly portering staff handling waste for incineration (see also [paragraphs 2.71 and 2.72](#)).
- 3.16 Further guidance on materials management is contained in HFN 29 – 'Materials management (supply, storage and distribution) in healthcare facilities'.



Information handling

- 3.17 Information management and technology (IM&T) is fundamental to the successful operation of a comprehensive health service. The system selected should offer a wide range of facilities, and be consistent with local and NHSScotland IM&T strategies. A national overview of the networking systems is contained in 'Building the Information Core: Implementing the NHS Plan' which may be obtained from the NHS Executive. More detailed guidance on local area networks (LANs) is contained in 'A handbook for IM&T specialists', which may also be obtained from the NHS Executive.
- 3.18 The IM&T strategy must operate for the whole mental health service.
- 3.19 Developments in telepsychiatry, and in computer-supported diagnostic packages, may produce a requirement for the transmission of video images between departments and centres of specialist expertise.
- 3.20 The choice of systems and matters such as the location of computer terminals, the functions to include on the system, and the levels of access to information, should be decided locally. Examples of data handling needs, which could be met by the installation of a comprehensive IM&T system, include:

Within a department:

- operating a patient administration system;
- maintaining the appointment system for day patients and out-patients;
- providing management information, including clinical audit;
- managing materials, including health and safety and environmental audits;
- managing statistical information, including feedback from patients, GPs and community nurses;
- the exchange of information between community nurses and other appropriate professionals;
- storing reference material;
- maintaining records.

With other health service departments/hospitals:

- operating a patient administration system;
- making out-patient appointments;
- receiving results from pathology departments;
- receiving radiology reports.



With GPs:

- advising on admission;
- advising on attendance and/or requesting follow-up visit;
- advising on discharge and confirming post-discharge care plan.

3.21 Project teams should:

- consider the IM&T needs of the service at an early stage;
- review current IM&T developments;
- check that proposals conform with local IM&T policies;
- ensure that sufficient account is taken in terms of space and engineering services at the design stage to meet the anticipated need for special power supplies, modems, visual display terminals (VDUs), printers and associated software, stationery, and conduits for cables;
- where necessary, and if a suitable space is not available elsewhere, ensure that a room is provided within the premises to accommodate the IM&T equipment. The space and environmental requirements should be obtained from the equipment manufacturer;
- ensure that VDU screens are sited so that the displayed text is not visible to members of the public (although it may be considered an advantage to be able to turn the screen to enable the person to check the accuracy of the information entered);
- ensure that where VDUs are to be used, the lighting is designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible. Further guidance is contained in the CIBSE Lighting Guide LG 3 and the Health and Safety (Display Screen Equipment) Regulations 1992;
- ensure that equipment noise is controlled within acceptable limits. The choice and use of quiet printers has a significant contribution to noise reduction;
- ensure that adequate provision is made for the security of data and devices.

Staff changing

3.22 Staff may change from outdoor clothes into hospital or department uniforms in changing accommodation located within the department, or elsewhere in the hospital, as determined by local policy.

3.23 If changing accommodation is located elsewhere, then it will be necessary to provide within the department:

- a staff cloakroom;



- small lockers for secure storage of small items of personal belongings;
- a shower;
- a WC.

3.24 It is essential that project teams assess as accurately as possible the expected local usage of staff change/locker rooms. The following issues require particular attention:

- the total number of users. Account should be taken of part-time as well as full-time staff;
- the greatest number of users present at one time;
- the number of “permanent” users and of “occasional” users;
- the proportion of the total contributed by each sex;
- the policy for the allocation of lockers (lockers should not be shared).

3.25 Experience suggests that it is advisable for permanently employed staff to be assigned personal lockers. If training courses are regularly held in the unit, then some lockers should be reserved for students.

Education and training

3.26 If it has been agreed that the teaching of undergraduate medical students will take place, and their number necessitates additional space, then the relevant accommodation should be increased. Reference should be made to ‘Teaching Hospital Space Requirements’ issued 22 April 1974 by SHHD/DS(74)99.

3.27 Teaching requiring special facilities should take place in a post-graduate medical centre, or in a hospital education centre.



4. Engineering services

Introduction

- 4.1 This Chapter describes aspects of engineering services which are common to health buildings generally. The guidance will acquaint the engineering members of the multi-disciplinary design team with the general design criteria needed to meet the functional requirements of the various departments of a DGH and of other healthcare buildings.

Model specifications

- 4.2 A series of model specifications including Scottish Supplements, for the specialised engineering services in healthcare buildings, is available from NHS Estates, England and is sufficiently flexible to meet local needs.

Economy

- 4.3 Engineering services are a significant proportion of the capital cost, and remain a continuing charge on revenue budgets. The project design engineer should therefore ensure:
- economy in initial provision, consistent with meeting functional requirements and maintaining clinical standards;
 - optimum benefit from the total financial resources these services are likely to absorb during their lifetime;
 - whole life-cycle costs to ensure that the most energy-efficient equipment is provided wherever possible – meeting the joint aims of reducing energy bills and harmful carbon emissions.
- 4.4 Where various design solutions are available, the consequential capital and running costs should be compared using the procedures outlined in the Scottish Capital Investment Manual.
- 4.5 The economic appraisal of various locations and design solutions should include the heat conversion and distribution losses to the point of use. Where buildings are located remote from the development's load centre, these losses can be significant.
- 4.6 Where the facility is part of a hospital complex, the energy management and accounting system should be part of the hospital building management system



(BMS), and should include metering of all services where practical. If a hospital BMS is not available, or if the facility is not located on the hospital site, the energy management and accounting system for the department should, where applicable, stand alone. It should be suitable for subsequent integration with a future BMS. Further detailed guidance is contained in SHTM 2005 – ‘Building management systems’.

- 4.7 The design proposals should be assessed at an early stage from an energy efficiency aspect, to obtain an Energy Efficiency Performance Indicator expressed in total energy consumption units of J/100m³/Annum. In view of the increasing cost of energy, the project team should consider the economic viability of heat recovery and combined heat and power systems (CHPs). Further guidance on CHPs can be found in NHS Estates ‘A Strategic Guide to Combined Heat and Power’. Designers should ensure that services that use energy are efficient and are metered where practicable.

Maximum demands

- 4.8 User demand on engineering services is often difficult to predict, but experience indicates that services designed for simultaneous peak conditions are seldom fully utilised in practice. The estimated maximum demand and storage requirement (where appropriate) for each engineering service will need to be assessed individually to take account of the range, size and shape of the functional units, geographical location, operational policies and intensity of use. The Property and Environment Forum Executive may provide estimates of the maximum demands and storage requirements for a specific project if required by the project team. Details of power consumption and load patterns of significant individual items of equipment must be sought from manufacturer and/or suppliers. The finding of this information will take place most commonly as part of the equipment tendering process. Designers must ensure that the electrical loads are balanced across the infrastructure network and that there is sufficient capacity to meet current and potential future demands.

Space for plant and services

- 4.9 The satisfactory performance of plant in healthcare buildings is particularly important and the building design should allow for:
- easy and safe means of access protected as far as possible from unauthorised entry;
 - frequent inspection and maintenance with sufficient access panels being provided for this purpose;
 - eventual removal and replacement of plant with particular attention being paid to the requirements of the Manual Handling Operations Regulations (1992) and succeeding legislation.



- 4.10 Recommended spatial requirements for mechanical, electrical and public health engineering services in health buildings are given in SHTM 2023 – ‘Access and accommodation for engineering services’. The information in this publication is specifically intended for use during the initial planning stages when precise dimensional details of plant are not available. It also makes reference to the Construction (Design and Management) Regulations.
- 4.11 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls and above ceilings. Where heat emitters take the form of wall mounted radiators or convectors, these should be contained within a 200mm wide perimeter zone under window sills and critical dimensions should be taken from the boundary of this zone. The 200mm zone includes the floor area occupied by minor vertical engineering ducts and is included in the building circulation allowance.
- 4.12 Services contained in the space above the false ceiling, with the exception of drainage should be confined to those required for the accommodation immediately below the false ceiling. Provision of satisfactory access should be provided to pipework, fittings and valves concealed in partitions, walls and ceilings.
- 4.13 Particular care should be taken to ensure that accesses for resetting fire dampers are not located in positions which would compromise fire doors and emergency circulation.

Control access

- 4.14 Devices for control and safe isolation of engineering services should be:
- located, where possible, in circulation rather than working areas to avoid disruption of clinical work;
 - protected against unauthorised operation, for example switchgear and fuseboards should be housed in secure cupboards and, where appropriate, water stopcocks and drain down valves should be designed/positioned to prevent deliberate flooding;
 - clearly visible to and accessible where intended for operation by the department’s staff;
 - easily accessible and visible to commissioning and maintenance personnel.

Activity data

- 4.15 Environmental and engineering technical data and equipment details are described in the Activity Data Base sheets. They should be referred to for space temperatures, lighting levels, outlets for power, telephones, equipment



details etc, and when positioning equipment and outlets. Any item that involves patient operation should be of a simple pattern and designed to prevent interference (see also [Chapter 6](#)).

Safety

- 4.16 Statutory duties are imposed on employers and designers to ensure, as far as is reasonably practical, that design and construction is such that articles and equipment will be safe and without risk to health at all times when being set, used, cleaned or maintained by a person at work. This is set out in the Health and Safety at Work etc., Act 1974 as partly amended by the Consumer Protection Act 1987, together with the Management of Health and Safety at Work Regulation 1999, the Workplace Regulations, the Work Equipment Regulations, the Construction (Design and Management) Regulations Amendment 2000 and the Provision and Use of Work Equipment Regulations 1998. Engineering components, e.g. pipework, terminals, etc, are covered by the term 'articles' and thus these duties apply to the designers of engineering services for non-domestic buildings.

Fire safety

- 4.17 Fire safety measures should not only meet the requirements of the Building Standards (Scotland) Regulations and be to the satisfaction of the local fire brigade, but should also conform with NHSScotland Firecode. Firecode gives design guidance and requirements for fire safety in healthcare buildings through a series of Scottish Health Technical Memoranda and Scottish Fire Practice Notes. Project team members should familiarise themselves with NHSScotland Firecode, which is part of "NHSScotland Fire Safety Management" suite of documents. This can be viewed on the Property and Environment Forum Executive web site.

Noise

- 4.18 Excessive noise and vibration from engineering services, whether generated internally or externally and transmitted to internal areas, or noise from other sources e.g. speech which can be transmitted by the ventilation system, can adversely affect the operational efficiency of the department and cause discomfort to patients and staff. In addition to designing for control of noise levels, there may also be a need to ensure speech privacy so that confidential conversations are unintelligible in adjoining rooms or spaces. This will be important in consulting/examination and treatment rooms, particularly where these are located adjacent to waiting areas. The noise limits and means of control advocated in SHTM 2045 – 'Acoustics' should provide an acceptable acoustic environment.



Engineering commissioning

4.19 It is essential that engineering services should be fully commissioned. Adequate test facilities and devices should be included in the design to facilitate flow measurement and regulation of all water, ventilation and gaseous services. The services should be commissioned in accordance with the methods identified in relevant Health Technical Memoranda. Engineering services for which a specific SHTM or HTM is not available should be commissioned in accordance with the following as appropriate:

- Engineering Commissioning published by The Institute of Healthcare Engineering and Estate Management (IHEEM).
- Engineering Services Commissioning Codes published by the Chartered Institute of Building Services Engineers (CIBSE).
- IEE Regulations for Electrical Installations (BS 7671) and associated Guidance Notes (current edition).
- Trade associations commissioning codes.

Commissioning should also be carried out and documented in accordance with the requirements of Scottish Hospital Technical Note 1 – 'Post commissioning documentation for health buildings in Scotland'. It is essential that full information regarding commissioning codes and test methods to be used are included in the specification for engineering services. Flow measurement and proportional adequate balancing of air and water systems require test facilities to be incorporated at the design stage. Guidance is also contained in commission code A and W published by the Chartered Institute of Building Services Engineers.

Mechanical services

General scope

- 4.20 Mechanical services include the provision of heating, ventilation/air conditioning, hot and cold water services and medical gas supplies. The distribution of all piped systems is deemed to commence at their point of entry into the accommodation and includes ductwork, pipework, fittings, controls and connections to equipment and outlets.
- 4.21 For environmental requirements in individual spaces reference should be made to the Activity Data Base sheets. Recommended room temperatures, air change rates, hot water service temperatures, etc are grouped under 'Technical Design Data' on each A-Sheet (see also [Chapter 6](#)).



Heating

- 4.22 It is recognised that space heating may be provided by a variety of techniques. However, the selected method should ensure that surface temperatures shall not exceed 43°C. Exposed hot water pipework, accessible to touch, should be insulated. Further guidance is contained in Scottish Health Guidance Note – “Safe” hot water and surface temperatures’.
- 4.23 Radiators should be easy to clean, should not harbour bacteria and should normally be located under windows or against exposed walls. There should be sufficient clear space between the top of the radiator and the window sill to prevent curtains reducing the output. With the exception of radiators fitted with full-length covers, there should be adequate space underneath to allow cleaning machinery to be used. Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric. Special care is needed when radiators are installed in rooms where unsealed or liquid radioactive sources are used. Protection of such fittings against radioactive contamination will be essential.
- 4.24 Radiators in toilet or bedroom areas used by people with physical and/or sensory disabilities should not be sited next to the toilet or bed and should be free of sharp edges. They should also have safety guards or be cool to the touch to prevent burns.
- 4.25 All radiators should be fitted with thermostatic radiator valves. These should be of robust construction and selected to match the temperature and pressure characteristics of the heating system. The thermostatic head, incorporating a tamper-proof facility for presetting the maximum room temperature, should be controlled via a sensor located integrally or remotely as appropriate. To provide frost protection at its minimum setting, the valve should not remain closed below a fixed temperature.
- 4.26 Radiators may also be used to offset building fabric heat loss in mechanically ventilated spaces.
- 4.27 Heating should be controlled by the building management system to “set back” temperatures to 10°C during “out-of-use” hours. A manual override should restore all plant promptly to full operational status.
- 4.28 Flow temperatures to heating appliances should be controlled by the BMS, where fitted, in accordance with space requirements and external temperatures. The system should be zoned to suit the building.



Ventilation (general)

- 4.29 Wherever possible, individual spaces should be naturally ventilated. Deep planned spaces may need mechanical ventilation. Planning should, therefore, seek to minimise the need for mechanical ventilation by ensuring that, wherever practicable, core areas are reserved for:
- rooms that require mechanical ventilation for clinical or functional reasons, irrespective of whether their location is internal or peripheral, for example, sanitary facilities, dirty utility and beverage preparation areas;
 - spaces which have only transient occupation and, therefore, require little or no mechanical ventilation, for example, circulation and some storage areas. In all instances the ventilation design must comply, as a minimum, with the standards set out in the current edition of the Building Standards (Scotland) Regulations.
- 4.30 Air movement induced by mechanical ventilation should be from clean to dirty areas, where these can be defined. The design should allow for adequate flow of air into any space having only mechanical extract ventilation, via transfer grilles in doors or walls. Such arrangements, however, should avoid the introduction of untempered air and should not prejudice the requirements of fire safety or privacy.
- 4.31 Fresh air should be introduced via a low-velocity system and should be tempered and filtered before being distributed via the appropriate outlet type for the particular application. Diffusers and grilles should be located to achieve uniform air distribution within the space, without causing discomfort to patients and staff.
- 4.32 The supply plant for ancillary accommodation should be separate from operating theatre plant.
- 4.33 A separate extract system will be required for “dirty” areas, for example sanitary facilities. It should operate continuously throughout working hours of the facility. A dual motor fan unit with an automatic changeover facility should be provided.
- 4.34 External discharge arrangements for extract systems should be protected against back pressure from adverse wind effects and should be located to avoid reintroduction of exhausted air into the project building or adjacent buildings through air intakes and windows.
- 4.35 Further detailed guidance is contained in SHTM 2025 – ‘Ventilation in healthcare premises: Design considerations’.



Ventilation (substances hazardous to health)

- 4.36 Local exhaust ventilation will be required where exposure by inhalation of substances hazardous to health cannot be controlled by other means. The Health and Safety Executive publication EH40, 'Occupational Exposure Limits', updated annually, sets limits which form part of the Control of Substances Hazardous to Health Regulations 1994 (COSHH).

Hot and cold water services

- 4.37 Guidance on the design and installation of hot and cold water supply and distribution systems is contained in SHTM 2027 – 'Hot and cold water supply, storage and mains services'.
- 4.38 All cold-water pipework, valves and fittings should be insulated and vapour sealed to protect against frost, surface condensation and heat gain.
- 4.39 The domestic hot water supply should be taken from the general hospital calorifier installation or from a stand-alone calorifier at a minimum outflow temperature of $60^{\circ}\text{C} \pm 2.5^{\circ}\text{C}$, and distributed to all outlets so that the return temperature at the calorifier is not less than 55°C . Outlet temperatures and fittings for sanitary equipment are shown in the Activity Data Base sheets. (See also Scottish Health Guidance Note - "Safe" hot water and surface temperatures.) Generally, the outlet temperature for domestic hot water should not exceed 43°C unless a higher temperature is required for functional reasons. The water temperature at all outlets accessible to patients should not exceed 43°C , or lower in certain circumstances. Thermostatic mixing valves should be of a type that has limited variation in temperature control with water pressure variation and which automatically closes the hot water supply if the cold water supply fails. The provision of one thermostatic mixing valve to serve a group of baths or showers is not acceptable. Guidance on thermostatic mixing valves is available in Scottish Health Guidance Note - "Safe" hot water and surface temperatures'.
- 4.40 The requirements for the control of legionellae bacteria in hot and cold water systems are set out in SHTM 2040 – 'The control of legionellae in healthcare premises – a code of practice'.

Piped medical gases and vacuum

- 4.41 Guidance on piped medical gas systems, anaesthetic gas scavenging and gas storage is contained in SHTM 2022 – 'Medical gas pipeline systems'.



Electrical services

General scope

4.42 The electrical installation includes:

- the main intake switchgear;
- lighting;
- power (including supplies to ventilation plant);
- system earthing and equipotential bonding of extraneous metal work;
- telephone wiring;
- wireways for data links;
- clocks;
- fire alarms;
- staff location;
- staff call;
- security systems.

The installation shall conform in all respects with BS 7671 – Requirements for electrical installations (current edition), IEE Wiring Regulation 16th Edition (and subsequent amendment), SHTM 2007 ‘Electrical Services – supply and distribution’ and SHTM 2020 – ‘Electrical safety code for low voltage systems’. Emergency electrical supplies shall be provided in accordance with SHTM 2011 – ‘Emergency electrical services’. Zonal earth circuit provision should be considered in consultation with equipment manufacturers.

4.43 Reference should be made to the Activity Data Base sheets for the recommended levels of internal illumination, disposition of outlets for power, telephones, call systems and clocks, etc in individual spaces.

4.44 The point of entry for the electrical supply will be a departmental switchroom housing the main isolators, the main distribution equipment and metering. The switchroom will also be the distribution centre of subsidiary electrical services. Wherever possible, all equipment should be mounted at a height to give easy access from a standing position. The switchroom should be positioned as close to the load centre as possible, to minimise the cost of cabling required to serve the accommodation. All distribution boards and main switches should be contained in secure cupboards, preferably in areas where there is normally a continuous staff presence.



Electrical installation

- 4.45 The electrical installation in occupied areas should be concealed in screwed steel conduit and steel trunking using appropriately insulated copper conductors – see SHTM 2007. In certain circumstances however metal sheathed or steel wired armoured (SWA) cables may be used. External installations should use screwed galvanised steel conduit with waterproof fittings. Plant areas should use screwed galvanised steel conduits and galvanised steel trunking. Steel conduits and trunking wireways for communications and data systems should also be concealed wherever possible.

Electrical interference

- 4.46 Care should be taken to avoid mains-borne interference, radio frequency and telephone interference affecting physiological monitoring equipment, computers and other electronic equipment used here or elsewhere on the site.
- 4.47 Electrical products, systems and installations should not cause, or be unduly affected by, electromagnetic interference. This requirement is in the form of an EC Directive on Electromagnetic Compatibility (89/336/EEC as amended by 91/263/EEC and 92/31/EEC). This Directive has been implemented in UK law by the Electromagnetic Compatibility Regulations 1992 (SI No 2372).
- 4.48 Guidance on the avoidance and abatement of electrical interference is contained in SHTM 2014 – ‘Abatement of electrical interference’.
- 4.49 Fluorescent luminaires should comply with BS EN 55015: 1996.
- 4.50 The Independent Expert group on mobile phones chaired by Sir William Stewart, produced a report published in April 2000 advising that mobile phones should be switched off within hospital premises and signage should be prominently displayed.

Lighting

- 4.51 Internal occupied spaces should, where possible, utilise daylight to enhance the environment. Colour finishes and lighting throughout departments should be co-ordinated to create a calm and welcoming atmosphere. Practical methods are contained in the CIBSE Lighting Guide LG2 – ‘Hospitals and Health Care Buildings’.
- 4.52 Architects and engineers (also artists and landscape designers if appropriate) should collaborate to ensure that decorative finishes are compatible with the colour-rendering properties of the lamp, and that the spectral distribution of the light sources is not adversely affected.



- 4.53 General lighting should be manufactured and tested in accordance with the requirements specified in the relevant sections of BS EN 60598. Their location should afford ready access for lamp changing and maintenance, but with the overriding requirement that the recommended standard of illuminance is provided to the task area.
- 4.54 The number and location of lights connected to a circuit, and the number of switches and circuits provided, should allow flexibility in the general and local level of illumination, particularly in areas away from windows, where daylight can vary significantly. Some areas of a department, which may be unoccupied for long periods, may also be suited to automatic/presence switching.
- 4.55 Generally, energy-efficient lights should be used wherever possible. Intermittently and infrequently used lights may be fitted with compact fluorescent or incandescent lamps.
- 4.56 Mobile examination lamps, where provided, should comply with BS EN 60598-2-25. They should also operate at extra low voltage (normally fed from an in-built step-down transformer), be totally enclosed and be equipped with a heat filter. The temperature of external surfaces should be such as to avoid injury to patients and staff.
- 4.57 Where visual display units (VDUs) are to be used, the lighting should be designed to avoid bright reflections on the screen and to ensure that the contents of the screen are legible and meet the Health and Safety (Display Screen Equipment) Regulations 1992, which came into force on 1 January 1993. The Regulations implement a European Directive, No 90/270/EEC of 29 May 1990, on minimum safety and health requirements for work and display screen equipment. Further guidance is contained in the CIBSE Lighting Guide LG3.
- 4.58 The lighting of corridors, stairways and other circulation areas, which generally are areas not covered by Activity Data A-Sheets, should be in accordance with the guidance contained in HBN 40 - 'Common activity spaces, Volume 4 – Circulation areas' and HBN/SHPN 40 Volume 5: Scottish Appendix.
- 4.59 Emergency escape and standby lighting should be provided on primary escape routes and identified rooms in accordance with SHTM 2011 – 'Emergency electrical services' and BS 5266.



Task lighting for activity spaces

- 4.60 Task lighting should be provided in activity rooms to provide adequate, shadow free illumination of working surfaces such as desks, workshop work benches and domestic room worktops.

Controlled drugs cupboard

- 4.61 A red indicating lamp should be provided on each controlled drugs cupboard and, where appropriate, outside the doorway to the room in which the cupboard is located and at a continuously staffed location. The lamps should be interlocked with the cupboard and alarm system to give visual and audible indication at the continuously staffed location of unauthorised entry to the cupboard.
- 4.62 An indicating lamp denoting that the circuit is energised should also be fitted to each cupboard. The supply circuits for the lamps and alarm system should be derived from essential circuits. The cupboards should comply with BS 2881. Further information is contained in HTM 63 – ‘Fitted storage systems’. More general information is contained in HC(77)16 and ‘Guidelines for the safe and secure handling of medicines, a report’.

Socket-outlets and power connections

- 4.63 Sufficient 13 amp switched and shuttered socket-outlets, connected to ring or spur circuits, should be provided to supply all portable appliances likely to be used simultaneously.
- 4.64 Switched socket-outlets should be provided in corridors and in individual rooms (where considered necessary) to enable domestic cleaning appliances with flexible leads (9 m long) to operate over the whole department.
- 4.65 Appliances requiring a three-phase supply, or those rated in excess of 13 amp single phase, should be permanently connected to separate fused sub-circuits. The sub-circuits should be fed from the distribution board and terminate at a local isolator. Fixed appliances, less than 13 amp rating, should be permanently connected to a double-pole switched 13 amp connector unit. The connector unit should contain an indicating light, where appropriate, and a suitable fuse.
- 4.66 Depending on local circumstances, consideration may need to be given to the quality of the electrical supply to computer and other equipment. Much equipment has over-voltage and surge protection built-in, but susceptibility to harmonics and other supply distortion should be discussed with the manufacturer to establish the parameters required.



- 4.67 Additional power-factor correction should be built in as required. Advice should be sought from manufacturers/suppliers at an early opportunity.
- 4.68 Disconnection switches should be provided adjacent to all engineering plant and equipment for use by maintenance staff.
- 4.69 The electrical supply connections to electro-medical equipment should comply with BS EN 60 601-1-2:1993.
- 4.70 Socket-outlets should be connected to essential circuits in accordance with the guidance contained in SHTM 2011 – ‘Emergency electrical services’.
- 4.71 The electrical supply connections and socket outlets to all medical electrical equipment should comply with BS EN 60 601-1-2: 1993 and current edition of BS 7671 – Guidance Note 7 Medical Locations and Associated Areas. These are identified by use of red toggle switches or switchplates.
- 4.72 An analysis should take place for at least 24 hours, during normal working hours to investigate surges, spikes, sags and electrical variation in the earth. The data collected should be reviewed with the original equipment manufacturer to ensure that it meets their specification in terms of tolerance values.

Emergency electrical supplies

- 4.73 Guidance on emergency electrical supplies is contained in SHTM 2011 – ‘Emergency electrical services’, and BS7671 – Guidance Note 7 – ‘Medical Locations and Associated Areas’. The grade of standby lighting provision is shown on the Activity Data Sheets. Safety lighting in accordance with SHTM 2011 and BS5266 should be provided on primary escape routes.
- 4.74 Requirements for connection of individual circuits and items of equipment to UPS and/or standby generation systems should be discussed with user and with equipment supplier. Items for consideration include potential discomfort and any medical implication for the patient, and the memory capabilities and reversion characteristics of the equipment.
- 4.75 The use of uninterruptible power supply units should also be considered for some units to protect against surges, spikes etc. Their use is advised where there may be a significant risk to the patient in the event of power failure or there is either a significant single point of failure, for example in a computer network, and the transient disruption of power services may have a considerable impact of the viability of the provision of a service.



Personal alarm transmitters

- 4.76 Local security policies should determine at the planning stage whether or not staff are to be issued with personal alarm transmitters. If personal alarm transmitters are not “self-contained”, conduits and accommodation for transmitting/receiving equipment and propagating devices, such as induction loops and/or aerials, will be required to suit the selected system.

Security alarm

- 4.77 A security alarm actuating switch or button may be required located unobtrusively at the reception desk and staff base. It should be connected to a continuously staffed area such as the hospital telephone switchboard on the porters’ room. Guidance should be sought from the project team and end-users.

Main entrance security systems

- 4.78 The main entrance and department entrances may need to be controlled by a door security and/or closed-circuit television surveillance system which provides for verbal communication with, and an electro-magnetically operated door lock to be controlled from, the reception desk. An intruder alarm system may be required for after working hours for part or all of a department, depending on location.
- 4.79 Further guidance is contained in Scottish Office PAN 46 ‘Planning for crime prevention’, and the NAHAT Security Manual.

Patient/staff and staff/staff call systems

- 4.80 The patient/staff and staff/staff call systems may be hard-wired or radio systems. Further guidance is contained in SHTM 2015 – ‘Bedhead services’. In all cases they must be electromagnetically compatible, taking account of electromagnetic interference likely to be generated.
- 4.81 Patient/staff call points should be provided in all spaces where patients may be left alone temporarily, such as consultation/examination/treatment rooms and patient WCs, showers etc. Each call unit should comprise a push button or pull cord as appropriate, reassurance lamp and reset unit. The audible alarm signal initiated by patients should operate for one second at ten-second intervals, with corresponding lamps lit continuously until cancelled.
- 4.82 Staff/staff call points should be provided in all spaces where staff consult, examine and treat patients. Call units should generally comprise a switch (pull to call, push to reset) and reassurance lamp. The audible alarm signal initiated



by the staff should operate intermittently at half-second intervals, with corresponding lamps flashing on and off at the same rate.

- 4.83 A visual and audible indication of the operation of each system should be provided at the staff base to give responding staff unambiguous identification of the call source, with a repeater unit in the staff room. Further guidance is contained in SHTM 2015 – ‘Bedhead services’.

Telephones

- 4.84 Where available, the central telephone facilities for internal and external calls should be extended to serve all departments. Telephones will normally be of the desk pattern. Wall mounted hands-free telephones should be provided in dirty areas.
- 4.85 Self-contained intercommunication systems are relatively inflexible and limited in the extent of their economic application. Any subsequent modification to them usually involves disproportionate cost. In only very rare instances can such systems be justified for functional or clinical reason.
- 4.86 A properly planned telephone system will provide prompt intercommunication facilities between all extensions. Abbreviated dialling can be used for a range of frequently called extension numbers. Consequently, reasons for providing a separate intercommunication system should be clearly shown.
- 4.87 Coin and/or card-operated payphones, depending on local policy, should be provided in the main waiting area.
- 4.88 Further guidance on telephone systems is contained in HBN 48 – ‘Telephone services’ (joint NHS Estates and NHSScotland Property and Environment Forum document) and HTM 2055 – ‘Telecommunications (Telephone exchanges)’.

Data links

- 4.89 Conduits will be required for cables to interconnect electronic equipment. The extent to which these conduits should link all workstations in a department and the main hospital system or elsewhere will depend on the local policy for automatic data processing. If a structured cable system is to be installed within the hospital, departments should be provided with all outlets wired and connected. Conduits may also be required to link closed-circuit television between seminar rooms and treatment areas.



CCTV

- 4.90 CCTV systems may be installed into waiting areas and connected to monitors in staff circulation areas such as staff rest rooms in order that staff are able to oversee people entering the department.
- 4.91 Security closed-circuit television provided within departments may be required to interface to the whole hospital system.
- 4.92 The interference to which CCTV may be subject should be taken account of, to ensure acceptable electromagnetic compatibility. Care should be taken in the positioning of monitors in order to preserve patient privacy.

Clocks

- 4.93 Clocks may be operated in conjunction with a master clock system. If such a system is not available, synchronous clocks may be installed using a common-clock circuit. The circuit should be suitable for future connection to a master system. Clocks should be installed only where they can be viewed by a number of staff, patients and visitors.
- 4.94 Alternatively, clocks may be battery/quartz type. The majority will be of a domestic nature.

Music and television

- 4.95 Conduits for television/video and background music system outlets should be provided in the main waiting area, and other areas as required.

Lightning protection

- 4.96 Protection of the building against lightning should be provided in accordance with SHTM 2007 and BS 6651:1992, with secondary effect protection of electrical and electronic installations as necessary.

Internal drainage

General scope

- 4.97 The primary objective is to provide an internal drainage system which:
- uses the minimum of pipework;
 - remains water and air-tight at joints and connectors;



- is sufficiently ventilated to retain the integrity of water seals; and
- indicates waste pipes which may contain radioactive waste or effluent.

Design parameters

- 4.98 The design should comply with the relevant British Standards and Codes of Practice, including BS EN 12056 and the current Building Regulations. Recommendations for spatial and access requirements for public health engineering services are contained in CIBSE guide G and SHTM 2023.
- 4.99 The gradient of branch drains should be uniform and adequate to convey the maximum discharge to the stack without blockage. Practical considerations, such as available angles of bends, junctions and their assembly, as well as space considerations, usually limit the minimum gradient to about 1:50 (20 mm/m). For larger pipes, for example 100mm diameter, the gradient may be less, but this will require workmanship of a high standard if an adequate self-cleaning flow is to be maintained. It is unlikely that pipes larger than 100mm diameter will be required within interfloor or ground floor systems serving a department.
- 4.100 Provision for inspection, rodding and maintenance should ensure “full bore” access and be located to minimise disruption or possible contamination. Manholes should not be located within a department.

Materials specification

- 4.101 The materials specified for the drainage system in a department will depend upon their location and the nature of the effluent being discharged. Waste pipework should as far as practicable be concealed. Although adequate for drainage requirements, UPVC may not always be acceptable to the fire officer and should not be installed above 'sensitive' areas, e.g. operating theatres, intensive therapy, radio-diagnostic, catering departments, electrical switch-rooms.
- 4.102 Maintenance problems may arise as a result of misuse of the system, for example, disposal of paper towels down WCs. Appropriate disposal facilities, therefore, should be provided. Warm-air hand dryers can reduce the problem.

Pneumatic tube transport

- 4.103 Pneumatic tube transport may provide a viable alternative to porters for moving specimens to the pathology department. Factors to be assessed will include:
- distance, time and cost of travel between the two locations;
 - time to process specimens in the laboratory;



- proportion of specimens which require urgent results;
- whether general post, etc, will be transported in the system.

4.104 The total capital and revenue cost of each option should be determined in accordance with the principles set out in the Scottish Capital Investment Manual. Further guidance on pneumatic conveyor systems will be contained in guidance SHTM 2009 – 'Pneumatic air tube transport systems'.

ARCHIVED (Oct 2014)



5. Building cost and revenue expenditure

Introduction

- 5.1 For all types of health buildings it is clearly of vital importance that building costs and revenue expenditure should be kept as low as possible consistent with acceptable standards. Within this general context Scottish Health Planning Notes provide a synopsis of accommodation for health buildings which NHSScotland recommends for the provision of a given service.

Scottish Capital Investment Manual

- 5.2 The Scottish Capital Investment Manual, published by the National Health Service Scotland Management Executive, provides detailed guidance for each of the main stages of capital schemes including those that may ultimately be delivered using private finance. It gives practical guidance on the technical considerations of the full capital appraisal process and also provides a framework for establishing management arrangements to ensure that the benefits of every capital investment are identified, evaluated and realised. Projects will not get Scottish Executive approval unless adequate project management arrangements can be demonstrated to be in place.
- 5.3 The Management of Construction Projects section of the Manual provides guidance on mandatory procedures and best practice for the planning and implementation of construction projects. It covers the stages of a project from the full business case through to technical commissioning and handover. The procedures are divided into six stages:
- full Business Case, leading to approval;
 - design;
 - tender and contract;
 - construction and equipment supply;
 - technical commissioning and handover;
 - post-completion.

Cost guidance

- 5.4 The NHSScotland Property and Environment Forum Executive no longer publish their Healthcare Construction Project Price Guide. Cost guidance should be obtained by reference to BCIS costing guides and, when appropriate, by the appointment of a cost consultant.



Equipment

- 5.5 The cost of Group 1 items should be included in the general building costs. Specific guidance on Group 2 and 3 equipment is available from the Common Services Agency's Scottish Healthcare Supplies.

Equipment is categorised into four groups:

Group 1:

Items (including engineering terminal outlets) supplied and fixed within the terms of the building contract;

Group 2:

Items which have space and/or building construction and/or engineering service requirements and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

Group 3:

As Group 2 but supplied and fixed (or placed in position) under arrangements separate from the building contract;

Group 4:

Items supplied under arrangements separate from the building contract, possibly with storage implications but otherwise having no effect on space or engineering service requirements.

Essential complementary accommodation (ECA)

- 5.6 ECA comprises activity spaces which are essential to the running of a department, but which in certain circumstances may be available in a convenient location elsewhere in the hospital.

Optional accommodation and services (OAS)

- 5.7 Where appropriate, Notes draw attention to other ways of providing services or facilities. This information will allow project teams to select solutions which are most suitable to their needs. The Optional Accommodation and Services are listed in the respective SHPNs.



Dimensions and areas

- 5.8 At the early stages of a project, designers should use the brief to make an approximate assessment of the total area of accommodation involved. Schedules of areas are given in individual SHPNs. It is emphasised that these areas are for guidance in assessing options and planning schemes only.
- 5.9 In determining spatial requirements, the essential factors are the critical dimensions, i.e. the minimum linear dimensions within which activities may be performed with reasonable efficiency. The area required for an activity space is the product of the critical dimensions. Reference should also be made to the ergonomic diagrams in 'Common Activity Spaces' HBN 40 Volumes 1-4 and HBN/SHPN 40 Volume 5: Scottish Appendix.
- 5.10 It is emphasised that the areas published do not represent recommended room sizes, nor are they to be regarded in any way as specific individual entitlements.
- 5.11 Efficient planning of the building may also necessitate variation of areas, for instance, in the refurbishment or conversion of older property:
- rooms tend to be larger than the recommended area;
 - some rooms may be too small or in the wrong location for efficient use;
 - circulation space tends to form a larger than normal proportion of the total area.

Circulation space

- 5.12 The circulation space comprises space for all corridors, a heating and ventilation zone adjacent to external walls, small vertical ducts and spaces occupied by partitions, walls and planning flexibility.

Communications space

- 5.13 Staircases, lifts and plant rooms, with the exception of electrical switch cupboards, are designated "communications space".

Engineering space

- 5.14 "Engineering space" is the space taken by mechanical and electrical service routes and for small vertical ducts. The space is included in the Schedules of Accommodation as part of the circulation provision.



6. Activity data and critical dimensions

Activity data

- 6.1 The Activity Data Base is a computerised information system developed by NHS Estates to help project and design teams by defining the users' needs more precisely.
- 6.2 The Activity Data Base is not designed for Scottish application and therefore, if used by an NHSScotland Trust, should be adapted with caution.
- 6.3 In particular, a number of Activity Spaces in common use in Scottish Hospitals may not be included in the Activity Data Base and the individual room activities, technical data and components may well be different in a Scottish context. Where this is the case Trust project teams can draw up sheets to their own requirements.
- 6.4 Further information about the use and preparation of activity data can be obtained from The Learning Centre, NHS Estates, Winsor House, Cornwell Road, Harrogate, HG1 2PW, Telephone 01423 857 203, Fax 01423 857 205.
- 6.5 It is unlikely that the NHSScotland Property and Environment Forum Executive will be publishing a Scottish version of the Activity Data Base.

Critical dimensions

- 6.6 Critical dimensions are those dimensions which are critical to the efficient functioning of an activity. The size of components, their position and the space around them may all be critical to the task being performed. Guidance on these dimensions for a particular activity is provided in the form of ergonomic drawings. These illustrate components, that is equipment, furniture and fittings, and provide ergonomic data on the space required for users to move, operate or otherwise use the component. Information about the component, for example fixing heights, and the users, for example reach, is also provided.

Ergonomic data

- 6.7 Ergonomic data common to the design of a number of departments is contained in NHS Estates publication 'Common Activity Spaces' HBN 40 Volumes 1-4 and HBN/SHPN 40 Volume 5: Scottish Appendix, to which reference should also be made.



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Given below is a list of all Scottish Health Planning Notes. This list is correct at time of publication of this Note. Refer also to the Health Building Notes and Scottish Health Planning Note Reference Guide published by NHSScotland Property and Environment Forum Executive.

- 03 **General design guidance.** NHSScotland Property and Environment Forum Executive 2001.
- 04 **In-patient accommodation: Options for choice.** NHSScotland Property and Environment Forum Executive 2000.
- 08 **Facilities for Rehabilitation Services.** NHSScotland Property and Environment Forum Executive 2001.
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- 35 **Accommodation for people with mental illness Part 1 – The acute unit.** NHSScotland Property and Environment Forum Executive 2000.
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Given below is a list of all Scottish Hospital Planning Notes. Those Notes which have to be read along with their counterpart Health Building Note (HBN) are marked with an *. This list is correct at time of publication of this Note, but refer also to the Health Building Notes and the Scottish Health Planning Note Reference Guide published by NHSScotland Property and Environment Forum Executive.

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