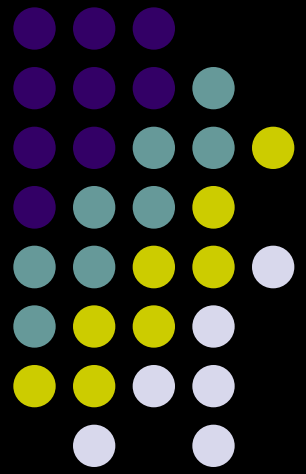
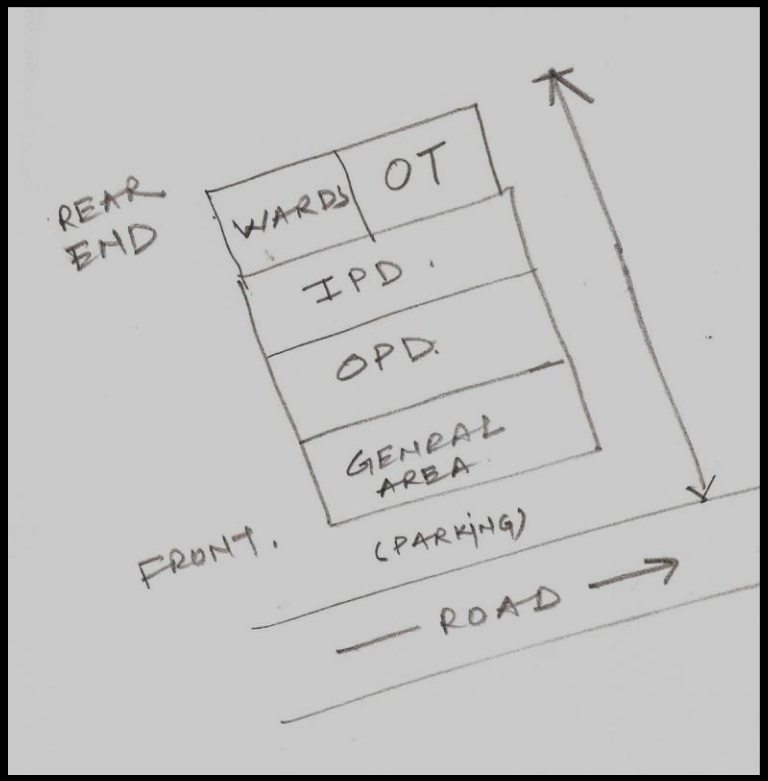
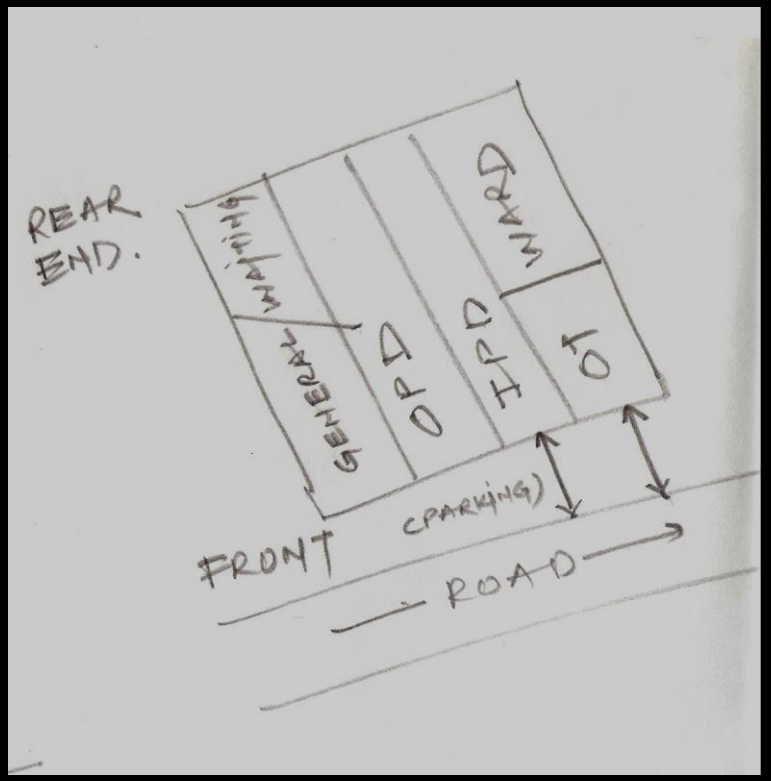
ACOUSTICS IN ‘HOSPITALS’

- **Subject: Building Services – III**
- **Topic: Acoustics In Hospitals**
- **Presented by: Ar. Kavita Nagpal**



BLOCKING CONSIDERATION





Design Precautions

BUILDING PLANNING

- There is a very large number of unit and room classification in hospital design and in planning the units in relation to each other and to the common services, (such as *X-ray departments*, operating theatre suits and main kitchens), noise reduction in the sensitive areas *should be weighed carefully against other design factors.*

- Special care in overall planning and internal planning against noise is required in the planning within the building of units which are themselves potential noise sources, for example, ***children's wards and outpatients' departments, parts of which require protection against noise.***

- Unloading bays, ***refuse disposal areas, boiler houses, workshops*** and laundries are examples of service units which should be *as far from sensitive areas* as possible.

- Sensitive areas such as **operation theatres, Doctors' consultation rooms, intensive care units (ICU)** require special consideration against noise control. Apart from outdoor noise, a common problem is the transmission of sound between the consulting room and the waiting room. *To ensure silence, a sound reduction of **45dB**(A)* between the rooms shall be provided. If the doors are directly connected by a single communicating door it will not be possible to achieve these values of insulation. *To obtain 40-45dB insulation between communicating rooms is necessary to provide two doors separated by an air gap, such as a lobby or corridor.*

- The kitchen is a constant source of both air-borne and structure-borne noise and should preferably be in a separate building away from or screened from the sensitive areas. If this is not possible and the main kitchens must form part of a multi-storey building, noise control is easier if they are placed below and not above the wards and other sensitive rooms so as to facilitate the insulation of the equipment and machinery in order to reduce the transmission of structure borne noise to a minimum.

REDUCTION AT SOURCE

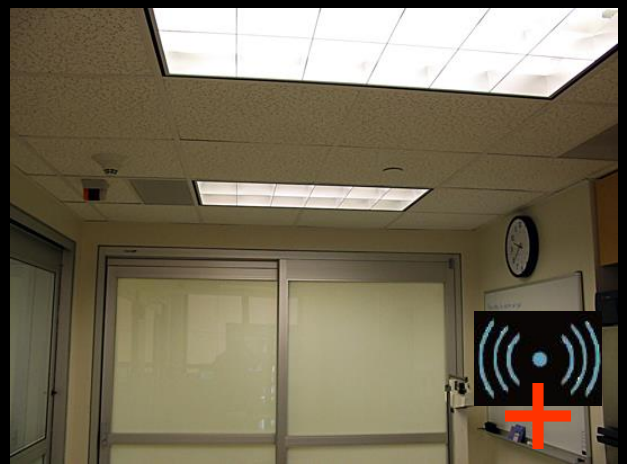
- ***Mats of rubber*** *or* ***other resilient material*** on draining boards and rubber equipment will greatly reduce noise from utility rooms, sluice rooms and ward kitchens.

- The use of plastics or other resilient materials for sinks, draining boards, utensils and bowls would also reduce the noise.

- Many items of equipment especially mobile equipment, such as trolleys and beds, may be silenced by means of rubber- tiered wheels and rubber bumper and the provision of resilient floor finishes. The latter also reduces footstep noise.

- Silent type curtain rails, rings and runners should be used.

- *Lift gates and doors should be fitted with buffers* and silent closing gear. Fans and other machinery should be mounted on suitable resilient mountings to prevent the spread of noise through the structure.



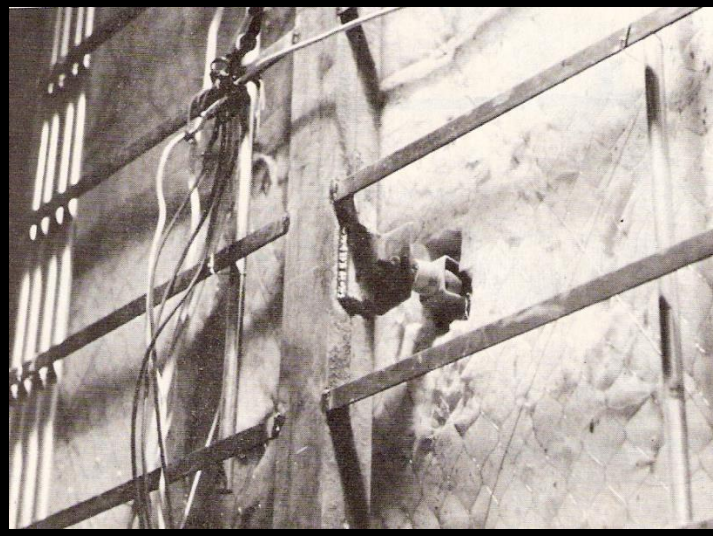
- Noise from water or heating pipes may be reduced by installing systems which operate at comparatively low pressures and velocities.

- Silencing pipes and *specially designed flushing* action reduce water closet noise at source and make structural measures easier to apply.

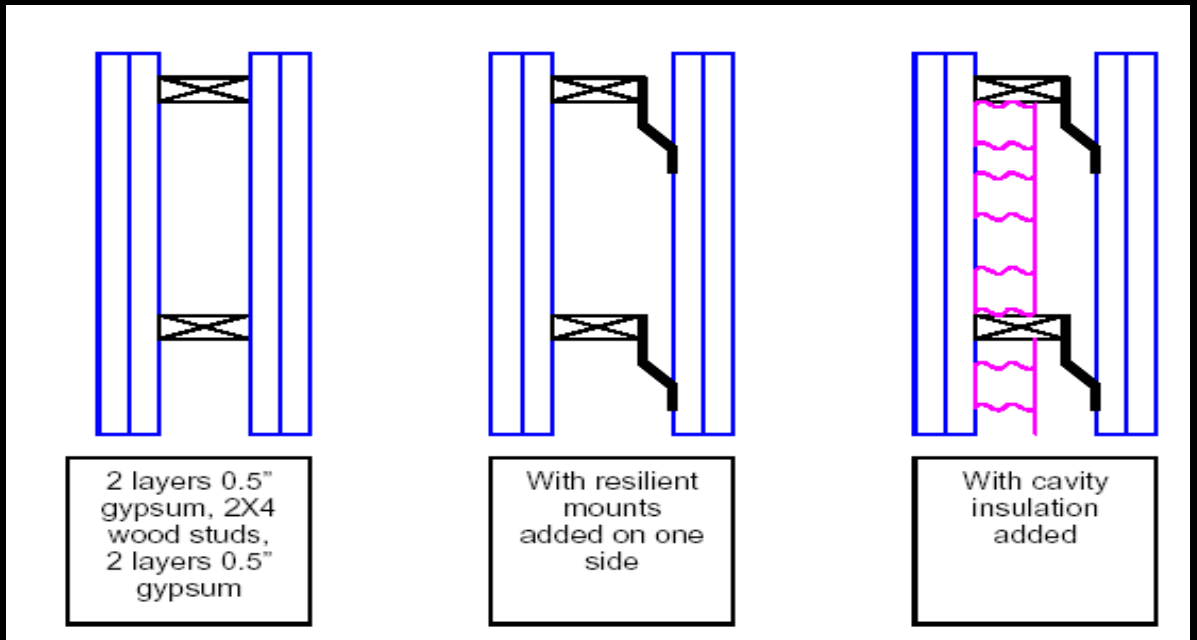
- The *ventilation system* should be designed so as *not to create a noise* problem. Silent closers should be fitted to doors.

Reduction by structural means

Since the various departments or units may be planned in many ways, only general guidance on the **INSULATION VALUES FOR WALLS AND PARTITIONS** are given as below:-



- *It is recommended that walls or partitions between rooms should normally have an insulation value of at least 40 dB.* Higher values of insulation of at least 45 dB are necessary where a noisy room is adjacent to one requiring quiet.



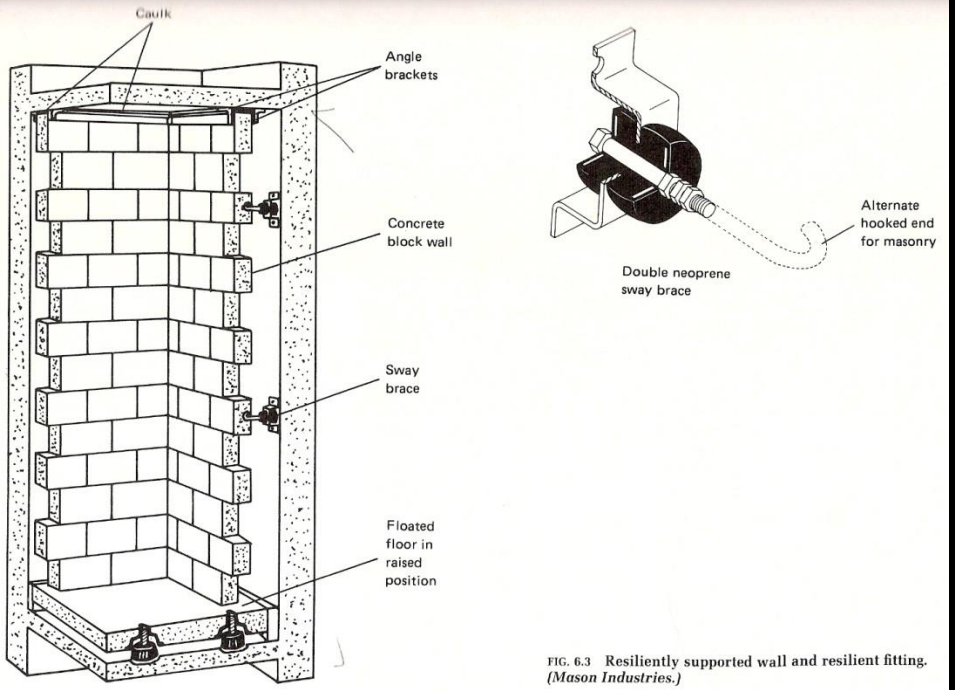
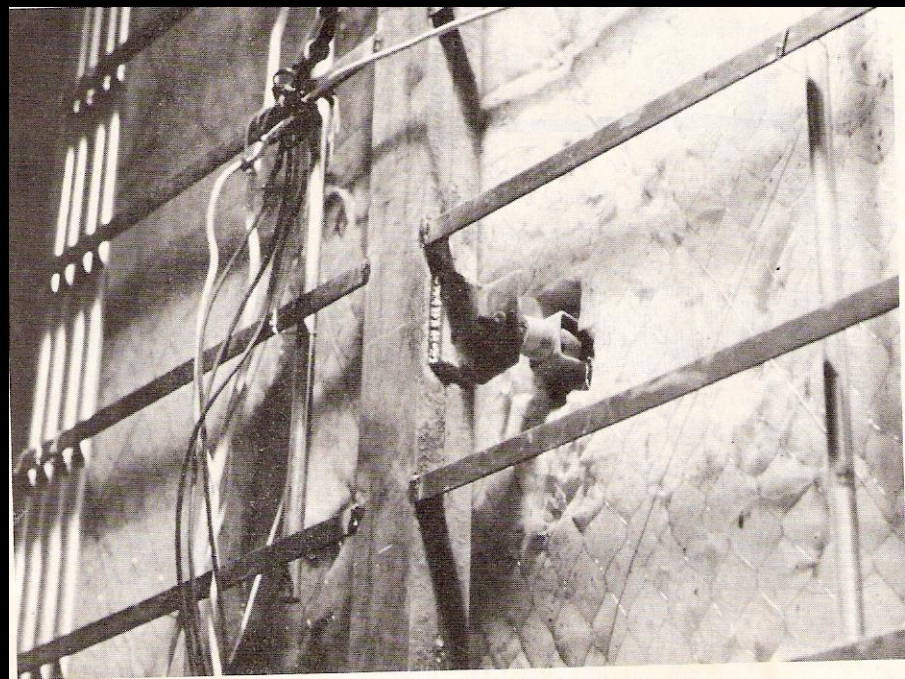


FIG. 6.3 Resiliently supported wall and resilient fitting. *(Mason Industries.)*

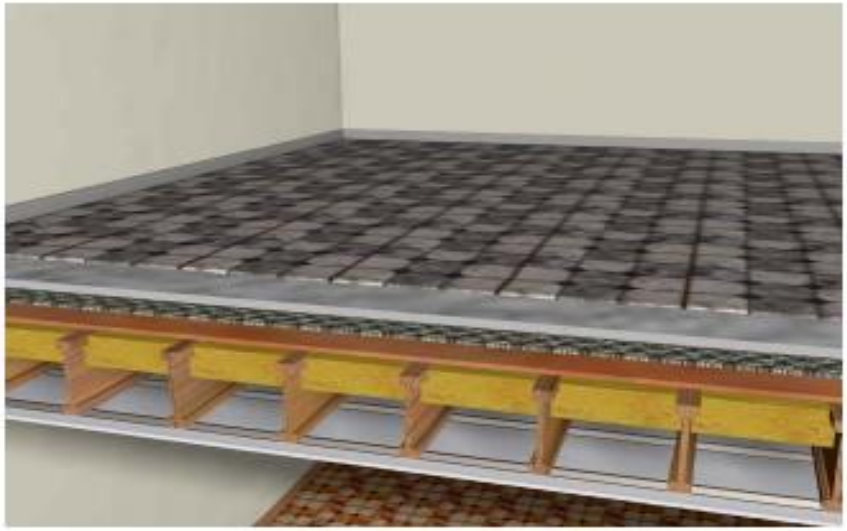
INSULATION FOR WALLS AND PARTITIONS

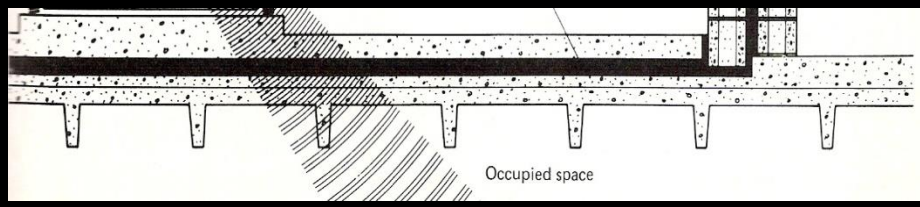


Solid floors with *floating finishes* and resilient surfaces are necessary particularly between wards and other parts of the building. Ordinary timber board on joist floors should never be used.

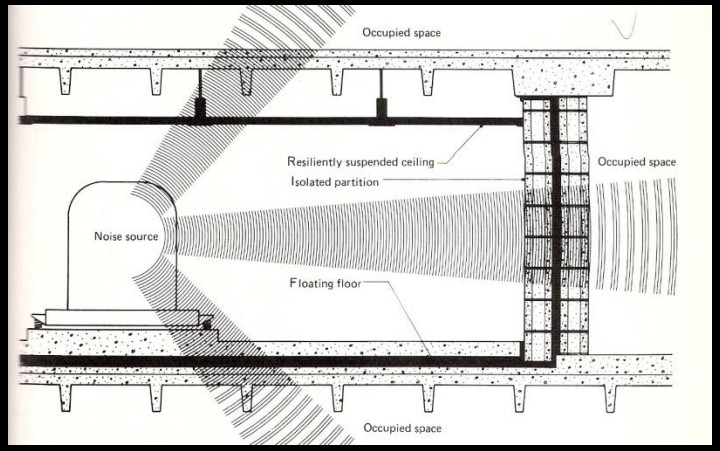
Conduits, ventilation ducts, chases, etc, should be constructed so as not to form easy by-pass for disseminating noise about the building, and should be provided with sufficient sound insulation.

Pipe ducts should be completely scaled around the pipes where they pass through walls or floors. Ducts carrying waste or *water pipes* should be lined with *sound insulating material* to prevent noise from the pipes passing through duct walls into the rooms through which they pass.

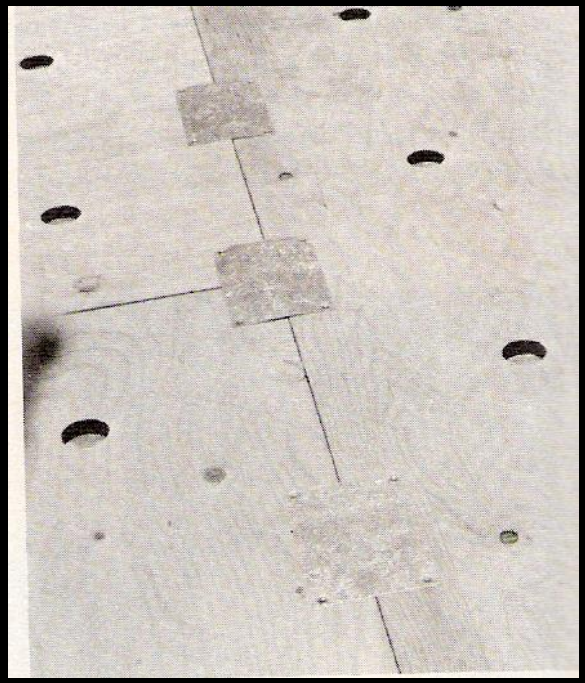




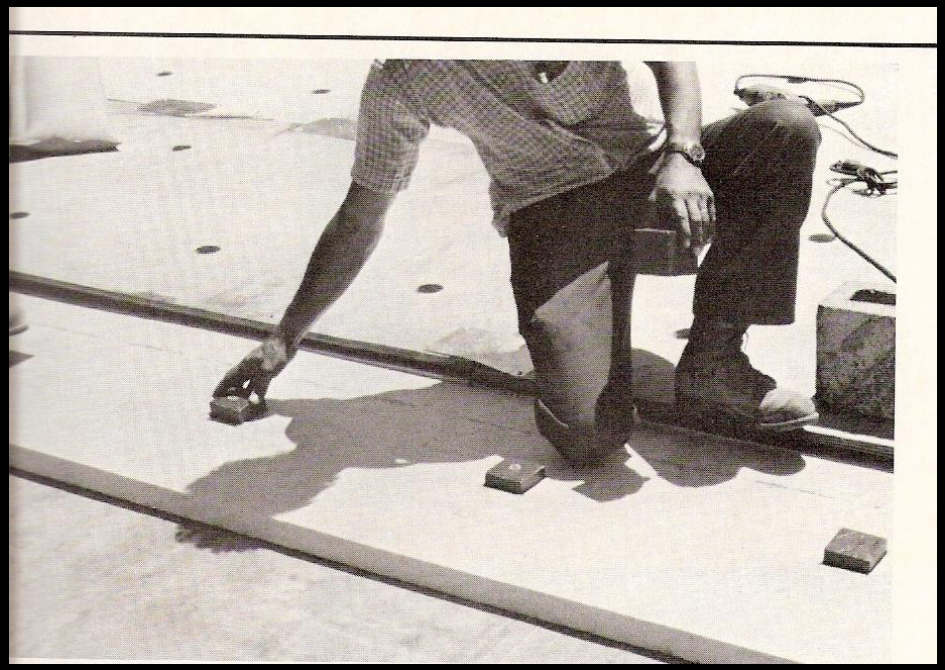
- Most surfaces in hospitals should be easily cleanable, so as to prevent the build-up of bacteria which may cause cross-infection. Many sound **absorbent** materials of a soft nature and difficult to clean are unsuitable for use in some hospital areas and lose much of their effectiveness, if painted for hygienic reasons.

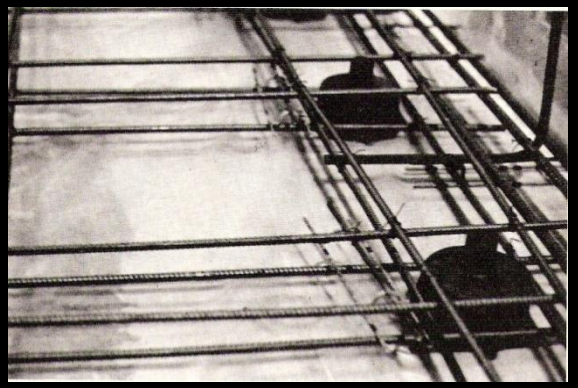


- Some porous materials with very thin nonporous coverings (like mineral wool covered with thin plastic sheets) have good sound absorption and when covered with a perforated sheet metal facing can be used in most areas requiring a washable acoustical treatment. In noisy areas, *such as corridors and waiting rooms, however, a wider* choice of absorbents is available.

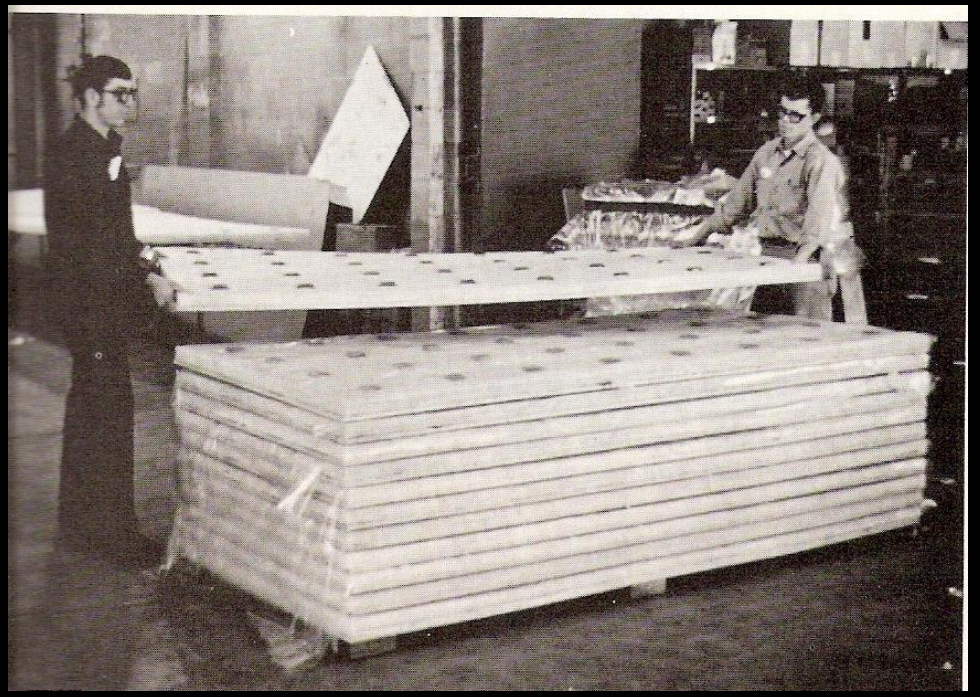


- In the ward, bed curtains, window curtains, etc. add to the absorbent properties of the room and help reduce reverberation in otherwise hard surfaced surroundings.

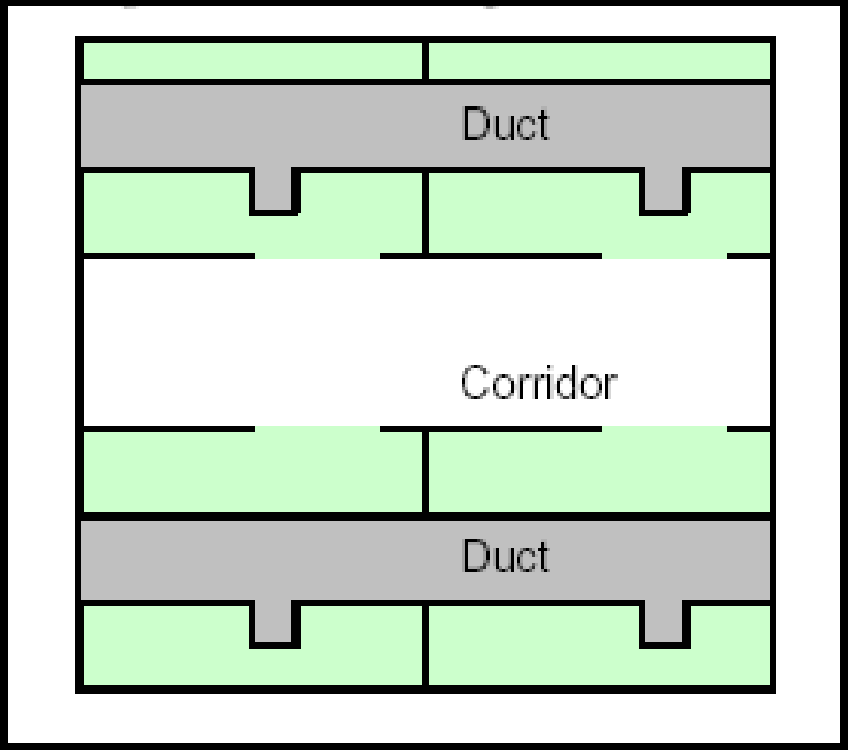




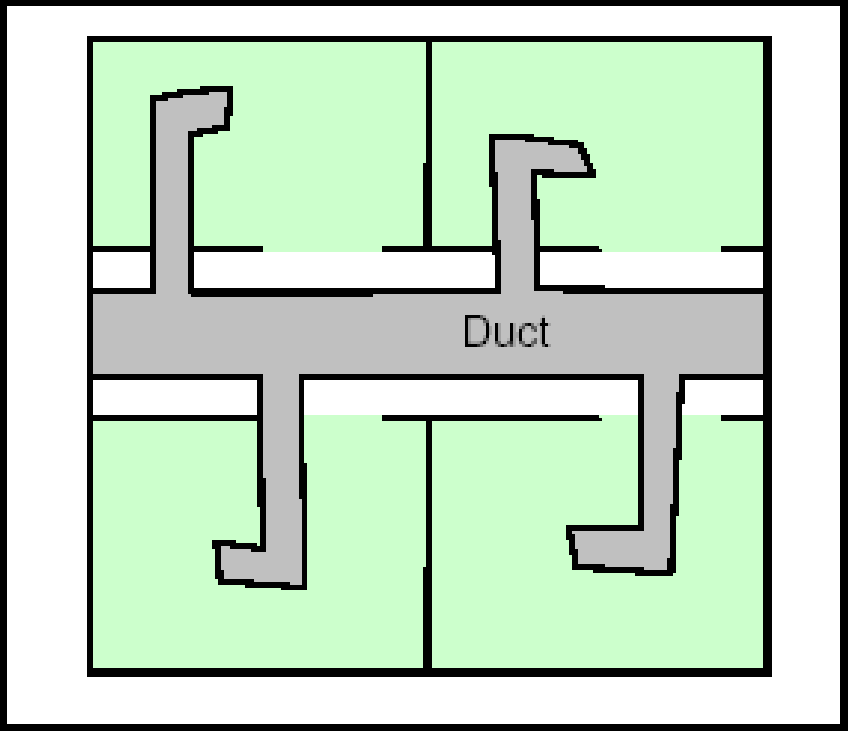
Impact resisting and absorbing floor



HVAC ducts can be excellent movers of noise from one room to the next, they can be conduct sound for over a mile. Therefore , it is best line ducts as much as possible and to run the main line through corridors rather than between rooms.



Bad way



Better way

- Doors should be solid with close fitting in the frames.

- There is little insulation value in double swing doors and where these are fitted to a noisy room the opening should be planned so that it is screened from areas requiring quiet by a baffle lobby lined with absorbent material.

- According to a study the impact of modifying room sound-absorbing ceiling tiles of an intensive care unit (ICU) on patient and staff outcomes. During the good acoustical conditions (when sound-absorbing ceiling tiles were installed), pulse amplitudes were lower among patients. They were also more satisfied with the care provided by the staff during the good acoustic conditions.