

Lecture 05 - Floors, Ceilings & Partitions

Advanced Technology Module Code: 5CTA1140

Semester A: Weeks 10 - 24

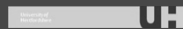
Credits: 15

Course Leader: Ilona Hay

Module Co-ordinator: Brian Murphy

Lecturer: Sonia Tong

19th November 2019



Quote of the day

"Architecture is an expression of values"

Norman Foster, Architect



Semester A Programme

See Canvas Files and Announcements for latest Programme

Today's Lecture

Basic principles for:

- Floor Construction
- Ceiling Construction
- Partition Construction



Floors



First Principles

Function of a floor:

- Provides structural support for the contents of a room, its occupants and the weight of the floor itself
- Provides resistance to the passage of moisture, heat and sound
- Contributes to the look and feel (and also acoustics, depending on finish) of a space



Statbibliothek Library, Stuttgart, Vi Architects

Key Building Regulations

The Building Regulations 2010

Fire safety

APPROVED DOCUMENT

B

VOLUME 1 – DWELLINGHOUSES

- B1 Means of warning and escape
- B2 Internal fire spread (linings)
- B3 Internal fire spread (structure)

The Building Regulations 2010

The Building (Approved Inspections etc) Regulations 2010

Resistance to the passage of sound

E

APPROVED DOCUMENT

- E1 Protection against sound from other parts of the building and external sources
- E2 Protection against sound from external sources

The Building Regulations 2010

Site preparation and resistance to contaminants and moisture

APPROVED DOCUMENT

C

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- C1 Site preparation and resistance to contaminants
- C2 Resistance to moisture

The Building Regulations 2010

Conservation of fuel and power

APPROVED DOCUMENT

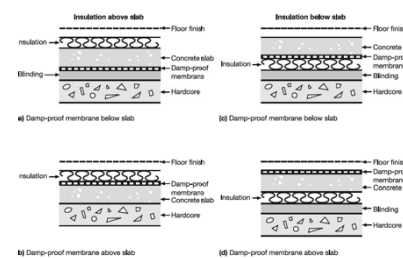
L1A

APPROVED DOCUMENT

- L1A Conservation of fuel and power

Ground Supported Floor

NB Insulation thicknesses are out of date with current Part L



Excerpt from Approved Document C

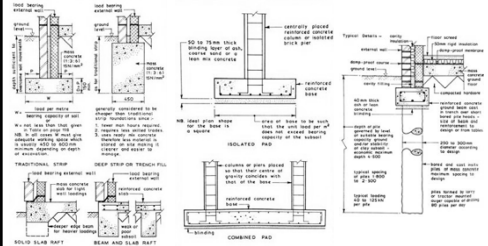
Ground Supported Floor



Ground Bearing Floor Site photo

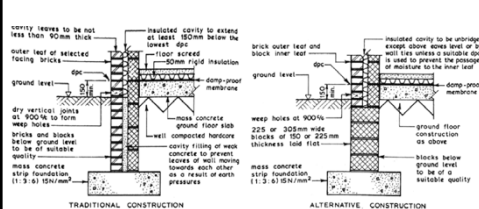
Ground Supported Floor: (Some) Foundation Typologies

NB: insulation thicknesses and thermal bridges are out of date with Part L
Avoid notes including 'or similar' or 'or suitable' do use 'or equivalent' and police it



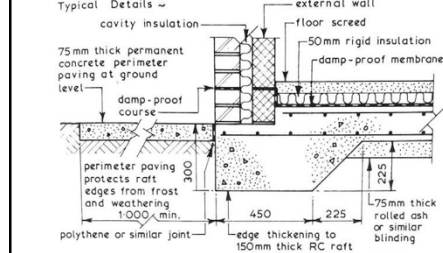
Ground Supported Floor: Traditional Strip Foundation

NB: insulation thicknesses and thermal bridges are out of date with Part L
Avoid notes including 'or similar' or 'or suitable' do use 'or equivalent' and police it



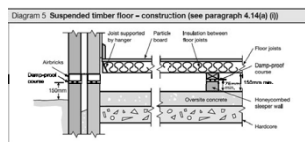
Ground Supported Floor/Raft Foundation:

NB: insulation thicknesses and thermal bridges are out of date with Part L
Avoid notes including 'or similar' or 'or suitable' do use 'or equivalent' and police it



Suspended Timber Floor

NB: insulation thicknesses and thermal bridges are out of date with Part L



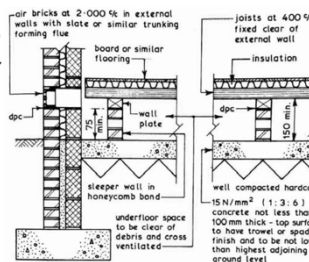
Suspended Timber Floor



Example suspended timber floor

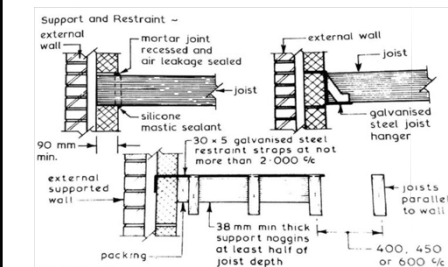
Suspended Timber Ground Floor: Typical Components

NB: Insulation thicknesses are out of date with Part L U values, thermal bridges, airtightness. Avoid notes including 'or similar' or 'or suitable' do use 'or equivalent' and police it



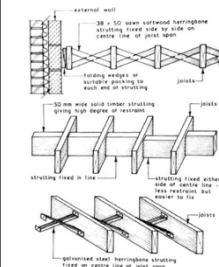
Excerpt from Building Construction Handbook

Suspended Timber Upper Floors:



Excerpt from Building Construction Handbook

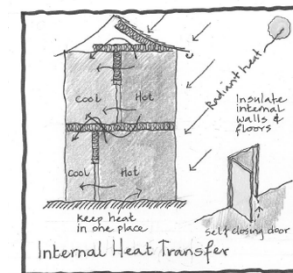
Suspended Timber Upper Floors



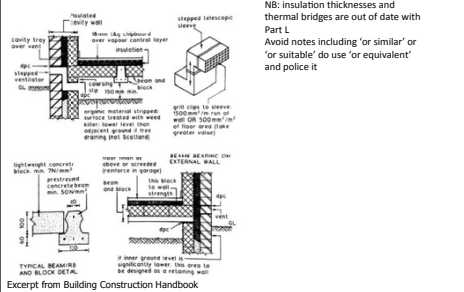
Excerpt from Building Construction Handbook

Internal Heat Transfer

Keep heat in its place of arrival
Maintain safe refuge on the cooler side
Insulate internal floors and partitions
Self-Closing doors
Promoted by BedZED



Suspended Concrete Ground Floor: Domestic/Light Commercial use



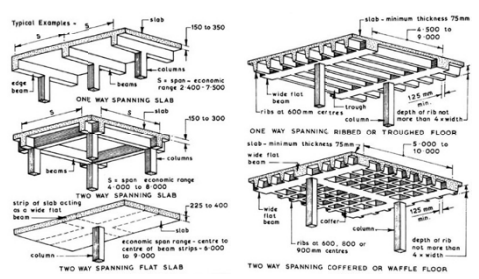
Excerpt from Building Construction Handbook

Suspended Concrete Floor: Beam and Block Floor



Example suspended concrete floor

Suspended Insitu Concrete Floor: Non-Domestic Commercial uses



Insitu Suspended Concrete 'Waffle' Slab: Non-domestic and Commercial use



Interior Royal National Theatre, London, Dennis Laidon

Suspended Light Steel Framed Floor: Domestic and Non-Domestic use



Example suspended steel floor

Hybrid Upper Floor: Non-domestic and Multiple Domestic

Fire protection of steel not installed yet



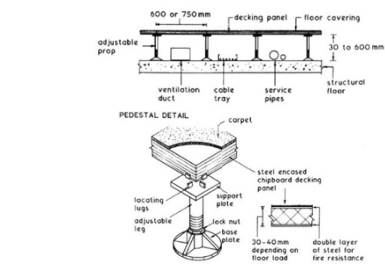
Example Steel Frame carrying Concrete Floor Deck

Raised Access Floor: Office and non-domestic



Raised Access Floor Site Photo

Raised Access Floor: Floor as Service Zone:



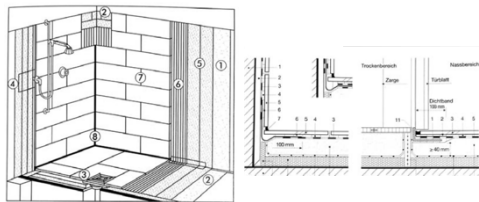
Excerpt from Building Construction Handbook

Floor as Service Zone: Under Floor Heating



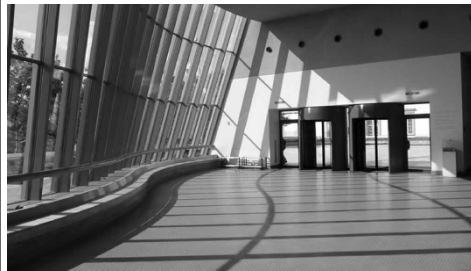
Under Floor Heating Site Photo

Wet Room Floors



Excerpt from Baukonstruktions-Lehre

Floor: Rubber



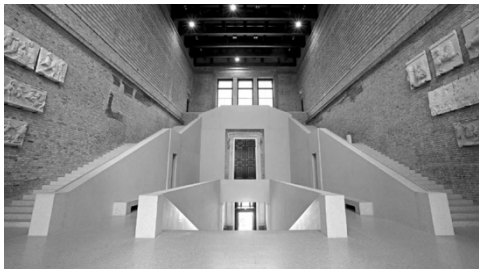
Rubber Flooring, Staatsgalerie Stuttgart, Stirling Wilford

Floor: Polished Concrete



Tate Modern, London, Herzog de Meuron

Floor: Terrazzo



Neues Museum, Berlin, David Chipperfield

Floor: Timber



Refugee Camp, Mannheim, Students of the University of Kaiserslautern

Ceilings



First Principles

Functions and key considerations of ceilings:

- As the underside of a floor or roof, ceilings contribute to the look feel (and acoustics, depending on finish) of a space

- Provision of service zones or plenums (depending on MEP strategy)

- Provision of a surface from which to hang or fix architectural, engineering and MEP components



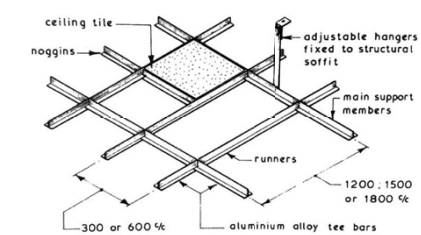
Ely Cathedral, Cambridgeshire

Key Building Regulations

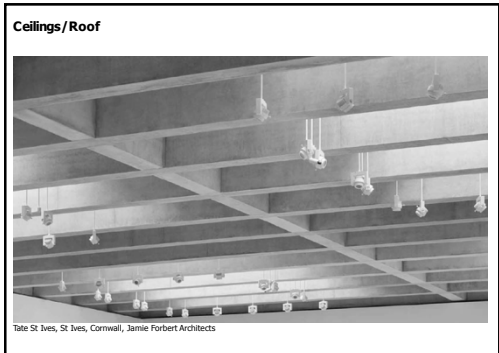
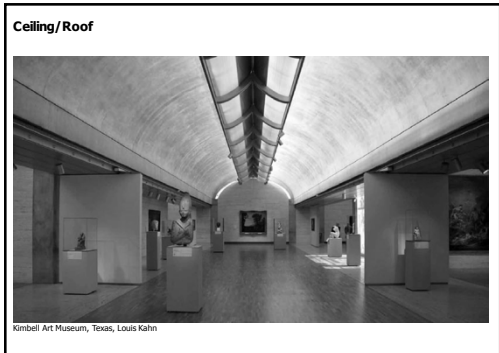
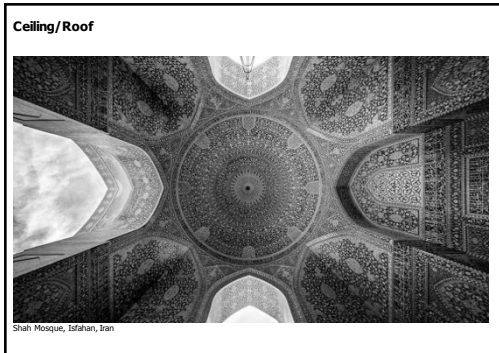
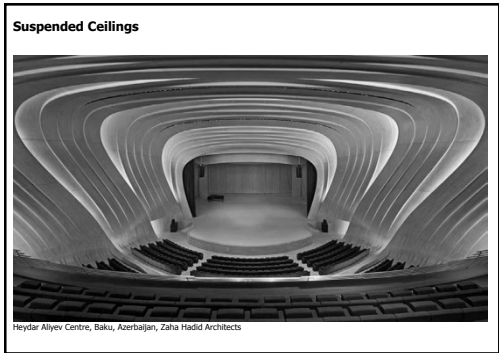
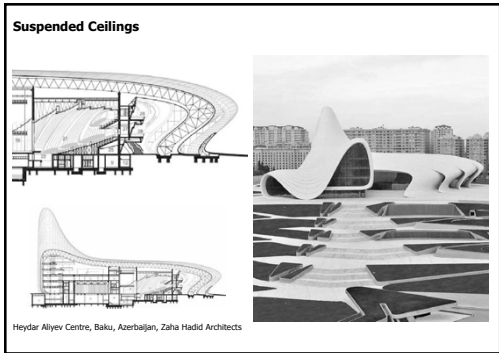
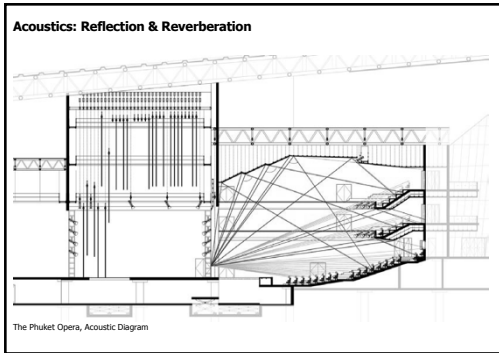
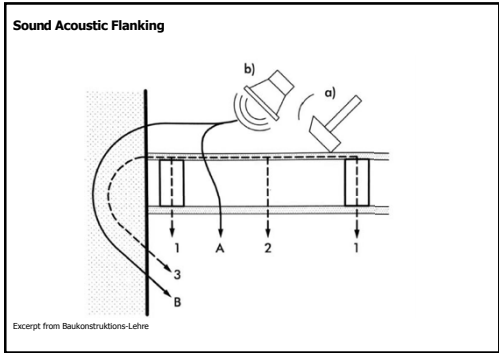
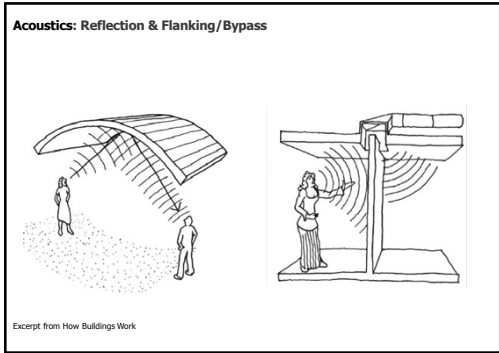
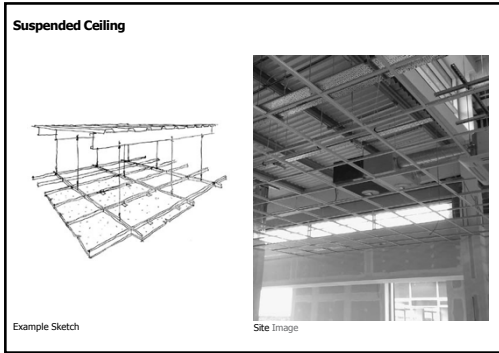
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APPROVED DOCUMENT	
L1A	
L1A Conservation of fuel and power	

Suspended Ceiling

Typical Suspended Ceiling Grid Framework Layout ~



Excerpt from Building Construction Handbook



Ceiling/ Roof



Scottish Parliament, Edinburgh, Enric Miralles

(22) Internal Partitions

- G14 Light Steel Frame,
- G20 Light Timber Frame,
- H13 Structural Glass Assemblies,
- K10 Plasterboard linings and partitions and ceilings,
- K30 Panel partitions
- K32 Toilet Cubicles
- K33 Terrazzo Toilet Cubicles

Partitions /Loadbearing Internal walls, Solid Wall Solutions



First Principles

Function of an internal wall

- Physical space separation
- Isolation of certain activities
- Fire protection
- Thermal insulation
- Sound control
- Support internal fittings and fixtures
- Pleasing appearance colour and texture
- Structural (depending on structural strategy)

This only scratches the surface



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The construction of buildings is a complex task, involving the integration of a number of different disciplines. This book provides a comprehensive guide to the design and construction of buildings, covering a wide range of topics from the basic principles of design to the latest developments in building technology.

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Partition Actions

- Gravity: downward pull, self weight, Furniture and Lining loads
- Dynamic forces: Human impacts, wheeled furniture impacts
- Internal Wind Pressure Buffeting: Pressure, Rattling, Motive, Destructive, Penetrative
- Moisture vapour: permeation, condensation, moisture mass, moisture moderation, insulation impaired, hygroscopicity, material degradation
- Sun: Temp variation, thermal movement, heat gains, Chemical decomposition
- Dirt and Dust: infiltration, deposition, surface pollution
- Chemicals: corrosion, disintegration, decomposition
- Sound: Noise nuisance, from within
- Attack: Manual, Ballistics, Bomb Blast
- Thermal: Solar heat gains/loss, thermal mass, phase change, stack effect, Electromagnetic radiation: sickness for susceptible occupants

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Partition Reactions

- Gravity: Support & restraint
- Wind pressure buffeting: rigidity, resilience, sealing, air tightness layers and detailing
- Moisture vapour: resistance, hygroscopicity, permeability, breathing, moisture mass
- Sun: movement joints, insulation, shielding, invulnerable materials
- Dirt and Dust: repulsion, exclusion, shielding, cleaning
- Chemicals: invulnerable materials, exclusion,
- Sound: Insulation, absorption, acoustic mass, separation, isolation,
- Attack: toughness, lamination, edge restraint, edge protection
- Insulating: thermal insulation, thermal mass,
- Electromagnetic radiation: Absorbs, shields

Partition properties

- Wall Categories
 - Partition, Party/Separating walls, Compartment walls
- Systems
 - Brick/block units, Monolithic, frame and sheet, sandwich panels
- Appearance
- Structural strength and stability
 - Loadbearing, non-loadbearing
 - Wind pressure buffeting post, stability stiffening posts, head and abutment restraint, joint reinforcement
- Fire Protection
 - Fire resistance, spread of flame
 - Stability, integrity, insulation
- Durability and maintenance
- Thermal performance
 - Insulation, thermal mass, cold bridge avoidance, air tightness
- Acoustic performance:
 - Noise barrier, sound absorption, flanking sound,

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Partition Properties

- Movement: Thermal, structural, moisture
- Security: Prevent Entry, Resist Attack, Restrain occupants
- Party walls: Structural fire precautions, structural stability, Condensation and Insulation, sound control
- Compartment Walls:
- Fixed Partitions: Relocate able Partitions, Demountable partitions
- Mobile Partitions
- Retractable, Sliding, Folding, Cubicles

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Key Building Regulations

The Building Regulations 2010

Fire safety

APPROVED DOCUMENT B

VOLUME 1 - DWELLINGHOUSES

Part L
Internal partitions not normally regulated
Insulate to restrict overheating to sunny side

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Resistance to the passage of sound

APPROVED DOCUMENT E

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APPROVED DOCUMENT L1A

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Internal Heat Transfer

Keep heat in its place of arrival
Maintain safe refuge on the cooler side
Insulate internal floors and partitions
Close doors
Promoted by BedZED

© 2008 - 24th August 2008 - Benbrook & Hill

Partitions: Structural, Fire and Acoustic Configurations

Excerpt from Baukonstruktions-Lehre

Typical ('demountable') Internal Partition Components

Demolish able: British Gypsum made Demountable, nobody specified it and it was withdrawn

Example Horizontal Wall Sections /Partitions

Single stud
Partial acoustic insulated
Double layers lining

Timber Stud Partitions
Double staggered stud
Two layers acoustic insulation
Thicker linings

Acoustically broken stud
Thicker full insulated
Acoustically isolated linings

Partitions

END OF LECTURE - QUOTE

*"I prefer drawing to talking.
Drawing is faster, and leaves less room for lies"*

Le Corbusier, Architect