Lecture 03A – Low Rise buildings
Lecture 03B – High Rise Buildings

Lecturer: Brian Murphy

18th November 2019

This Presentation on GBE:

Low rise
https://GreenBuildingEcyclopaedia.uk/?P=
High Rise
https://GreenBuildingEcyclopaedia.uk/?P=

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>40 years into 1 Hour won't go

So I am providing links to other information if you want to know more. See Separate file…

Don't assume that I know everything
Tomorrow this might be out of date
I have cherry picked the best bits

Question Everything
Don't assume what your being told is the whole story
Some will hide what they don't want you to know

Do your best with what you know
When you know better
Do better

UH M Arch Lab 1 Links Schedule

GBE

Green Building Encyclopaedia

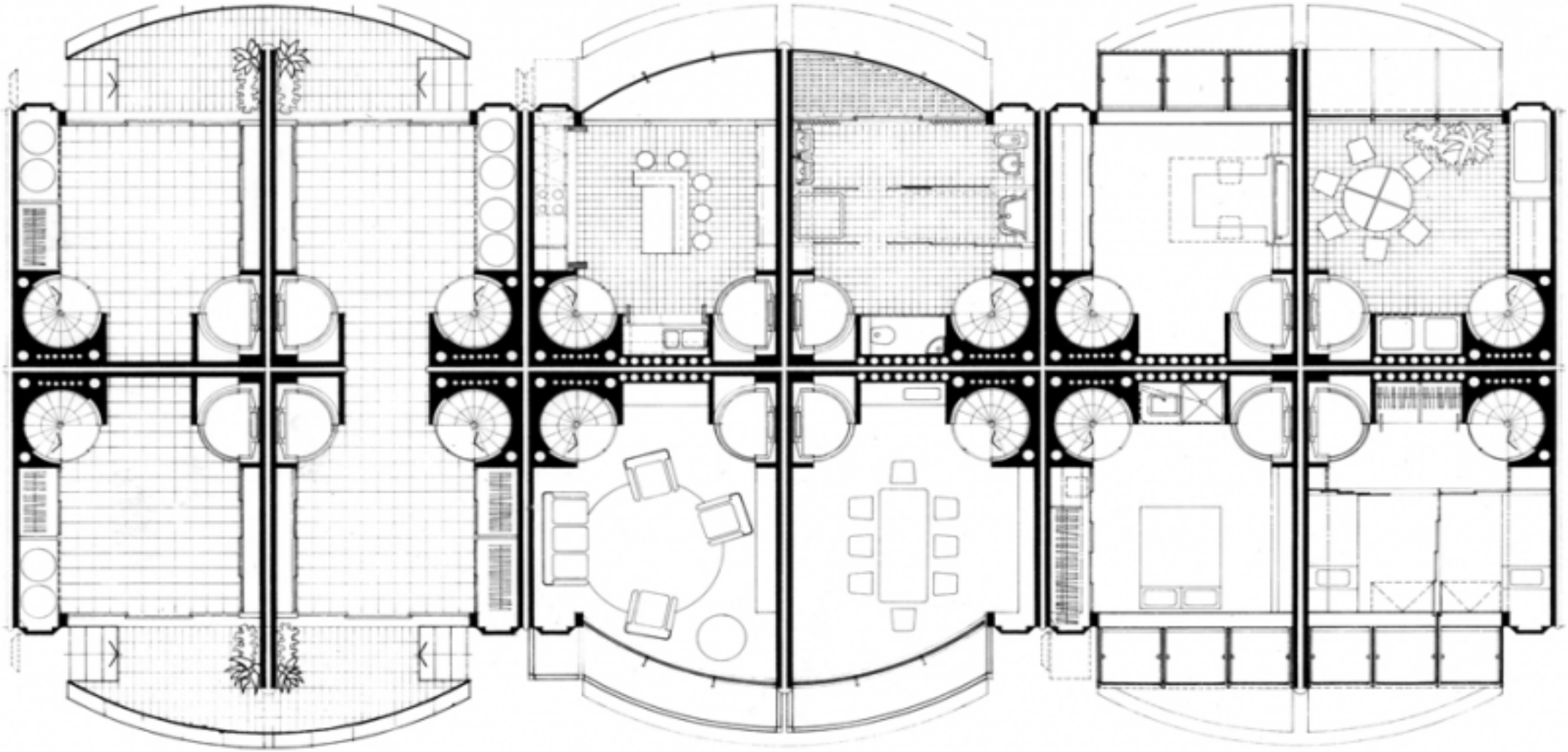
https://greenbuildingencyclopaedia.uk/?P=31406

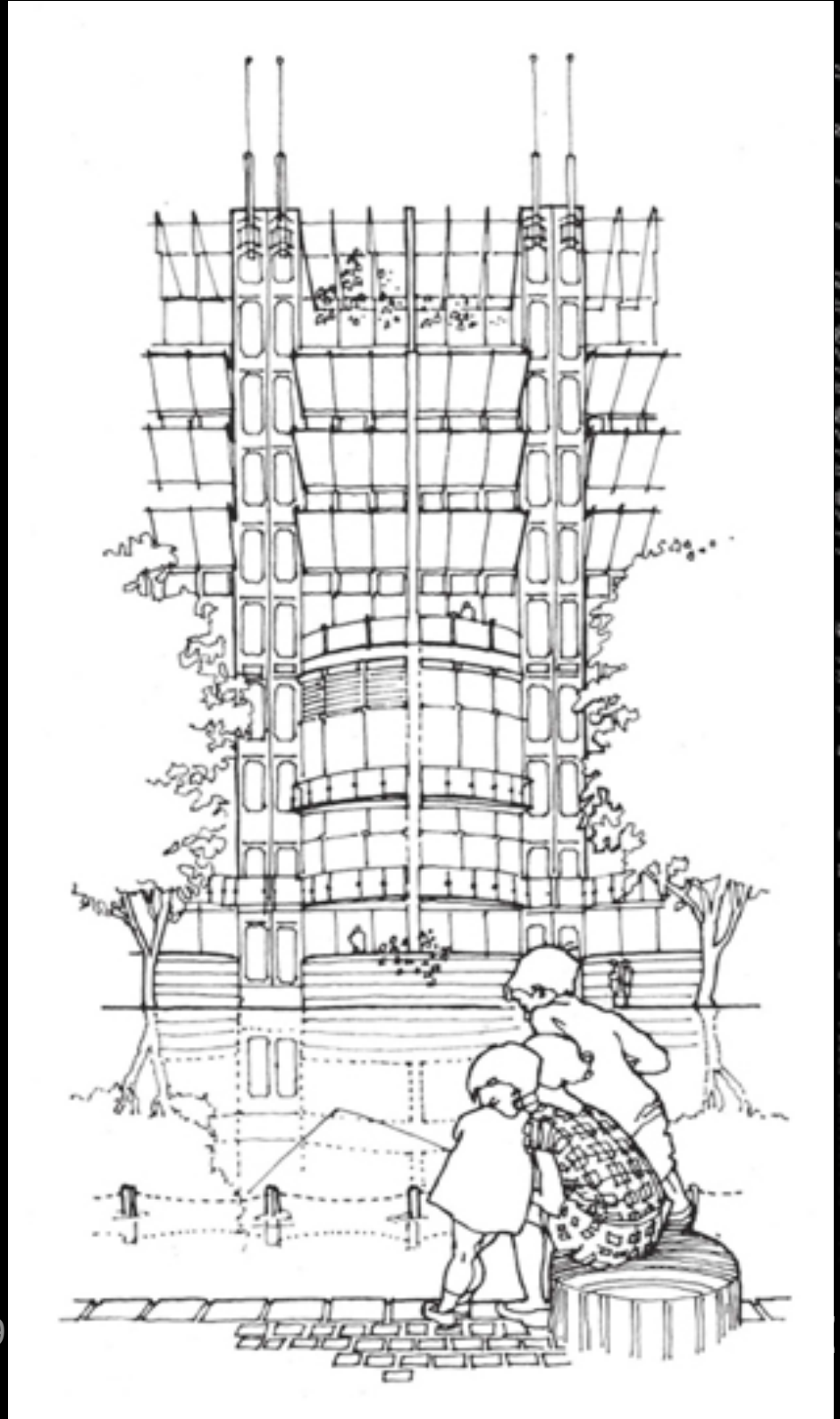
Task	Topic	Lecture/CPD	Books	GBE Website pages
0	The Whole Year	Future Systems: Technology: (P1Y2 Lecture) CAD BIM APPs	Architects Pocket Book	(~~Old~~ page)
			Environmental Design Pocket Book (Book)	G#
Lecture 1	Sustainable Introduction			
		Future Systems Sustainability (P1 Y2 Lecture)	Environmental Assessment Methods (Jargon Buster)	EAM (Jargon Buster) ~~Sbe~~ (Introduction PDF) DREAM Spear BREEAM LEED
			Energy Design Standards	Building Regulations AD L – Conservation of fuel and power ~~Passivhaus~~ ~~EnerPHit~~ Carbon Lite ~~Passivhaus~~ Carbon Lite Retrofit
			Water Standards	Building Regulations AD G – Sanitation, Hot Water safety and Water Efficiency 2015+2016 BRE CfSH Water AECB Water Standard
			Health and Wellbeing standards	~~Sbe~~ Higher Education WELL (USA) Building Biology Association https://buildingbiology.co.uk/what-is-building-biology-2/25-principles-of-building-biology/ IBN Course
		PAS 2035 CPD	Retrofit Standards	STBA Guidance Wheel PAS 2030:2019 PAS 2035:2019
		Designed to Perform & Detailing (P1Y2 Lecture)	Designed to perform (Tom Dollard Book)	HERACEY® (Jargon Buster)
		Principles of Element Design (CPD Lecture)	Principles of Element Design (Book)	Healthy (Jargon Buster)
				Environmental (Jargon Buster)
	Sustainable Strategy	HERACEY® (Jargon Buster	TBH Designer's Handbook	Resourceful (Jargon Buster)

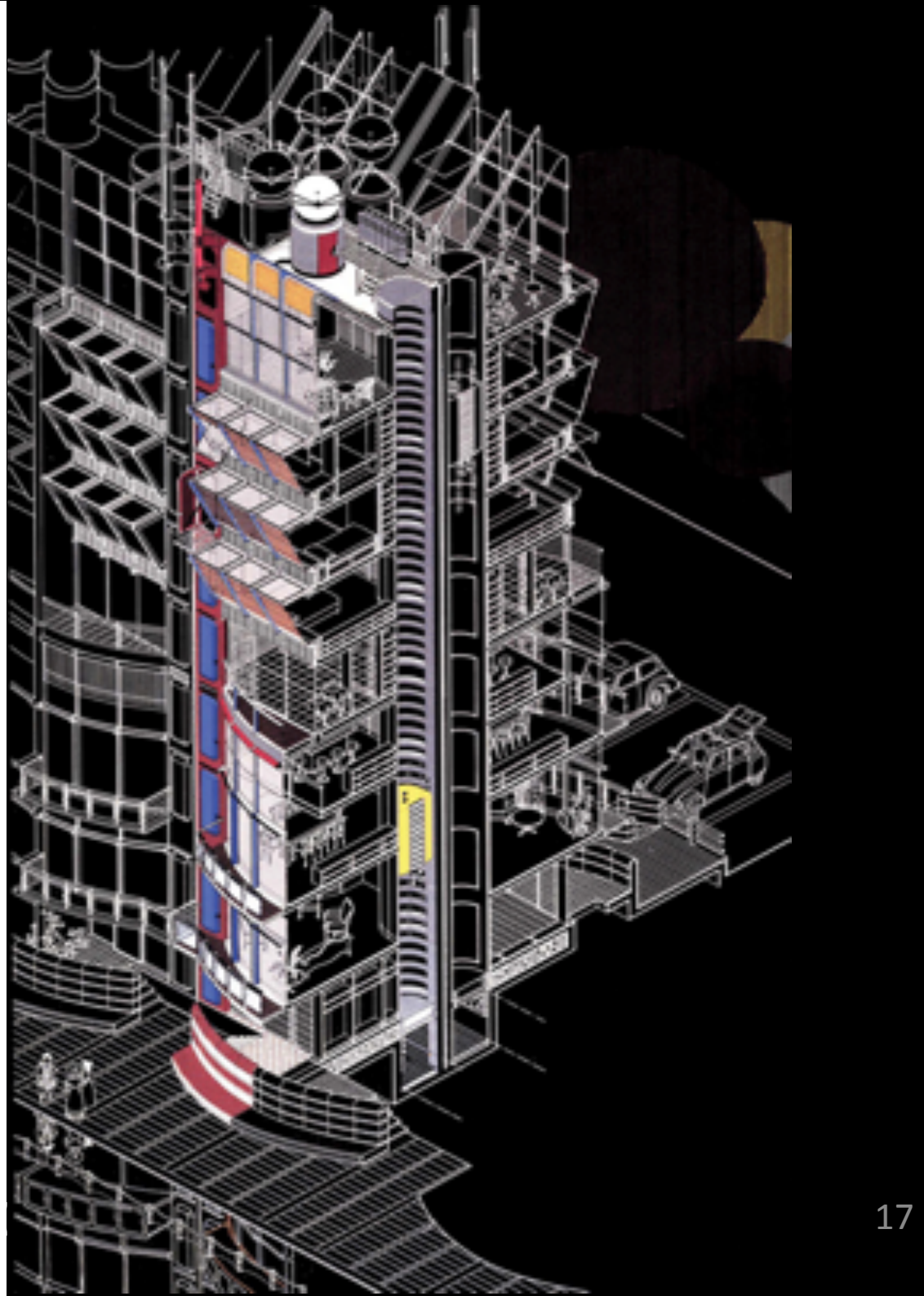
		CPD)		
		Matrix (Navigation)	Building Regulations AD L – Conservation of fuel and power	Appropriate (Jargon Buster)
		PHPP Passivhaus & EnerPHit		Competent (Jargon Buster)
			AECB Carbon Lite & Retrofit	Effective (Jargon Buster)
			CIBSE TM60 2018 Good Practice in the Design of Homes (Book)	Yardstick (Jargon Buster)
Lectures 2	Green or Violet materials	Thermal Insulation Definitions Properties	Principles of Element Design (Book)	G# Portfolio ~~Delicast~~ Clay ~~Delicast~~ F10 Brickwork (image folder) ~~Delicast~~ Tension Arch ~~Delicast~~ 3D printing ~~Delicast~~ CNC Milling Cutting ~~Delicast~~ Rentenpot ~~Delicast~~ Folded Plate Forms ~~Delicast~~ Laser Cutting ~~Delicast~~ Plaster ~~Delicast~~ M21 External insulated render ~~Delicast~~ Z11 Joinery ~~Delicast~~ Z11 Metals ~~Delicast~~ Rammed Earth (image folders)
.	Fixings Fastenings	Fixings Fastenings		~~Delicast~~ Z20 Connectivity (image folder)
Lecture 3A	Low rise building			Cavity Masonry Solid & Extruded Masonry Light timber frame Timber Post & Beam and Infill Light steel frame SIPS ISPS CLTP Hemp-Lime Rammed Earth Cob & 21stC ~~CobSauga~~ Insulating Concrete Formwork
		(16.4) Groundworks RC Raft Foundation (Lecture) G#2114	IBO Passive Houses New Build	Psi value calculator
	Wall Floor Foundation Junctions	(16.4) Foundation (Lecture)	Principles of Element Design (Lecture)	Calculators (Navigation)
	Floor	Ground Floor	Designed to perform (Book)	Elemental Assemblies ~~Spreadsheet~~
	External walls and openings	Timber External walls External wall Openings Window Door (P1Y2 Lecture)	Principles of Element Design (Lecture)	Calculators (Navigation)
		Masonry External walls External wall Openings	IBO Passive Houses New Build (Book) (Amazon)	Elemental Building U-value calculator

X10 Future of Lifts
Low to medium Rise

- Linear Induction Motors
  - Fastest when unoccupied, fast arrival
  - Call “lift” and it will be at the floor you are on before you reach the lift door
- Moves as fast as the occupant likes to accelerate, travel and decelerate
- Can be pre-programmed to know your preferences and recognise your voice
  - Call “Room name” or “floor number”
- Can be pre-programmed to know if you are permitted access to floors, rooms;
  - or will let you know if the room is already occupied
- Becomes feasible in Advance Technology House
  - Enables multiple storey house with 1 or 2 person lift (not 8P wheelchair)
  - (9 storey house UNESCO competition entry Avery Dawson Murphy)
- Winch and door on façade for bulky objects (Amsterdam style)







(24) Stairs Ramps +Slides

Diagonal circulation

Classification

CI/SfB: Information Library, Manufacturer's Literature, CAD layering, Drawing numbering

(24) Stairs Ramps

Stepped ramps, Walkways, Ladders, Bridges, Passerells

(24.9) Parts, accessories etc. special to stairs, ramps, vertical/diagonal circulation.

Balustrades, Handrails between floors/levels and at landings

(34) Secondary elements to stairs,

includes balustrades, handrails, etc.

(44) Finished to Stairs: floor, ceiling, nosings, etc

CAWS: Specification Work sections

L30 Stairs Walkways (Bridges) Balustrades

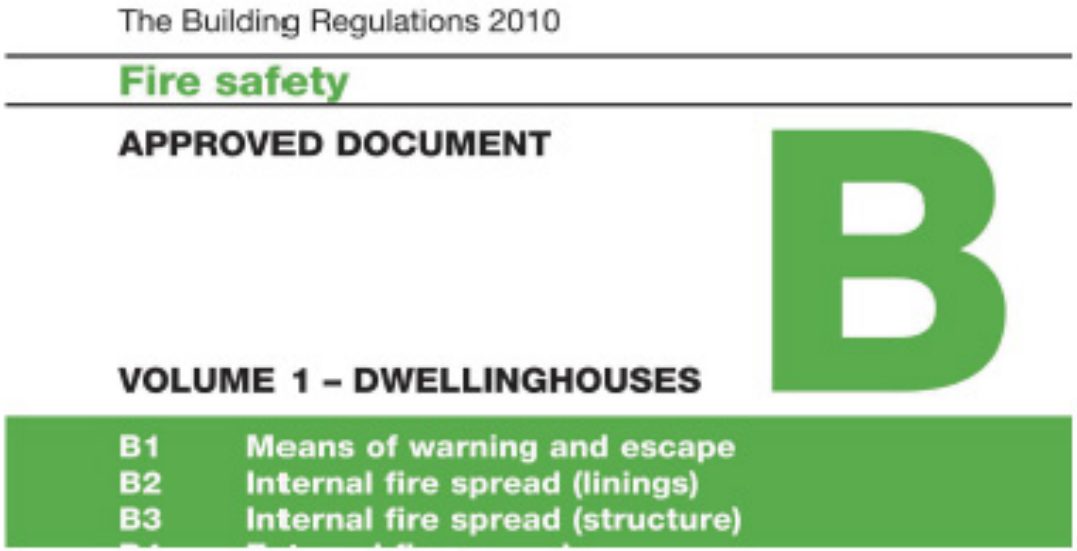
L35 Utilitarian Stairs/Ladders, Fixed utilitarian Access systems

Performance Requirements

Principles of Element Design

Planning Portal website PDFs free

Key Building Regulations



BRAD M Access for all
Don't forget
Approved Document A
Structural design

Approved Document M

M4(2)

Other communal doors

2.15 Every communal door, or gate, along the approach route should comply with provisions d. to k. of paragraph 2.14.

Communal lifts and stairs

Communal lifts

2.16 A wide range of people, including accompanied wheelchair users, should be able to access and use the lift. Every passenger lift that gives access to the dwelling should comply with all of the following.

a. There is a clear landing, a minimum of 1500mm long and 1500mm wide, directly in front of the lift door at every floor level.

b. The lift is equivalent to or meets the requirements of **BS EN 81-70:2003** for a type 2 lift.

c. The car is a minimum of 1100mm wide and 1400mm deep inside.

d. Doors have a minimum clear opening width of 800mm.

e. Landing and car controls are 900-1200mm above the car floor and a minimum of 400mm (measured horizontally) from the inside of the front wall.

f. The lift has an initial dwell time of five seconds before its doors begin to close after they are fully open.

Communal stairs

2.17 The principal communal stair that gives access to the dwelling should meet the requirements of Part K for a general access stair.

Diagram 5 **External steps and stairs – key dimensions**

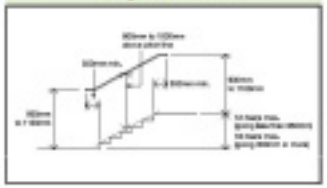
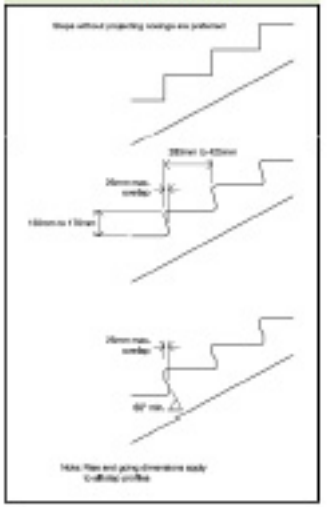


Diagram 6 **Examples of acceptable step profiles and key dimensions for external stairs**



k. the rise and going of each step is consistent throughout a flight;

l. the rise of each step is between 150mm and 170mm, except adjacent to existing buildings where, due to dimensional constraints, the case for a different rise is agreed with the building control body;

m. the going of each step is between 280mm and 425mm;

n. risers are not open;

o. there is a continuous handrail on each side of a flight and landings;

p. additional handrails divide the flight into channels not less than 1m wide and not more than 1.8m wide where the overall unobstructed width is more than 1.8m.

Note: In respect of 1.33(l) and (m), for school buildings, the preferred dimensions are a rise of 150mm, and a going of 280mm.

Handrails to external stepped and ramped access

Design considerations

1.34 People who have physical difficulty in negotiating changes of level need the help of a handrail that can be gripped easily, is comfortable to touch and, preferably, provides good forearm support.

1.35 Handrails should be spaced away from the wall and rigidly supported in a way that avoids impeding finger grip.

1.36 Handrails should be set at heights that are convenient for all users of the building and should extend safely beyond the top and bottom of a flight of steps, or a ramp, to give both stability and warning of the presence of a change in level. Consideration should be given to the provision of a second handrail on stairs in a wide range of building types, and particularly in schools, for use by children and people of short stature.

Provisions

1.37 Handrailing to external ramped and stepped access will satisfy Requirement M1 or M2 if:

Approved Document K

Section 1: Stairs and ladders

Scope

1.1 The guidance provided in this document covers internal and external steps and stairs when they are part of the building. Additional guidance is provided in Approved Document M when external stepped access also forms part of the principal entrances and alternative accessible entrances, and when they form part of the access route to the building from the boundary of the site and car parking. See Approved Document M Section 1 (for buildings other than dwellings) and Section 6 (for dwellings).

Steepness of stairs – rise and going

1.2 Measure the rise and going as shown in Diagram 1.1. (For steps with tapered treads, see also paragraphs 1.25–1.27.)

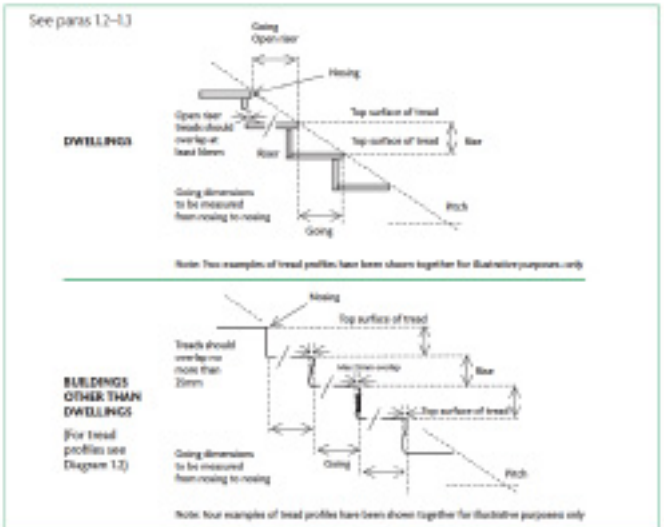


Diagram 1.1 Measuring rise and going

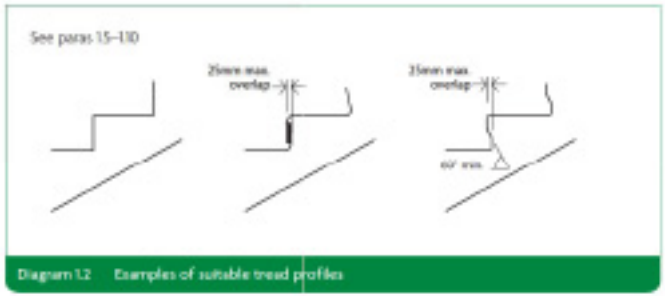


Diagram 1.2 Examples of suitable tread profiles

Headroom for stairs

For all buildings

1.11 On the access between levels, provide the minimum headroom shown in Diagram 1.3.

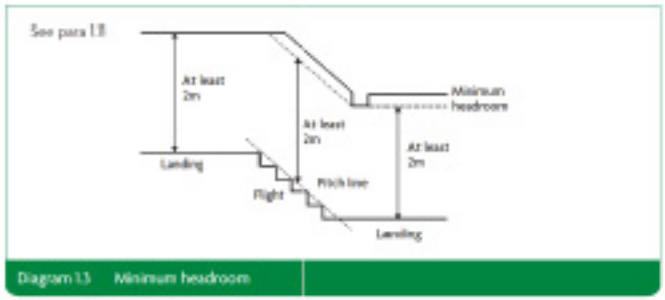


Diagram 1.3 Minimum headroom

For buildings other than dwellings and for common access areas in buildings that contain flats

1.12 Provide all means of escape routes with a minimum clear headroom of 2m, except in doorways.

Approved Document K

Consider children's reach: 2 handrails?
Internally illuminated handrails get hot
Spiral stair winders minimum 75 mm going

Handrails for stairs

For all buildings

1.34 Provide handrails in accordance with all of the following.

a. Position the top of the handrail 900mm to 1000mm from the pitch line or floor.

b. The handrail may form the top of a guarding if you can match the heights.

c. If the stairs are 1000mm or wider, provide a handrail on both sides.

For buildings other than dwellings and for common access areas in buildings that contain flats and do not have passenger lifts

1.35 Provide suitable continuous handrails, as dimensioned in Diagram 1.11 (for blocks of flats) and Diagram 1.12 (for buildings other than dwellings), in accordance with both of the following.

a. On each side of the flights.

b. On each side of the landings.

See paras 1.34–1.35

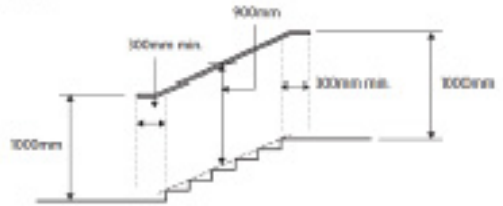


Diagram 1.11 Key dimensions for handrails for common stairs in blocks of flats

For buildings other than dwellings

1.36 Provide handrails in accordance with all of the following (in addition to paragraph 1.34).

a. Where there is full-height structural guarding, if you provide a second (lower) handrail, the vertical height from the pitch line of the steps (or the surface of the ramp) to the top of the second (lower) handrail should be 600mm.

b. Use a continuous handrail along the flights and landings of a ramped or stepped flight.

c. Ensure that handrails do not project into an access route.

d. Ensure that the handrail will contrast visually with the background against which it is seen, without being highly reflective.

See para 1.36

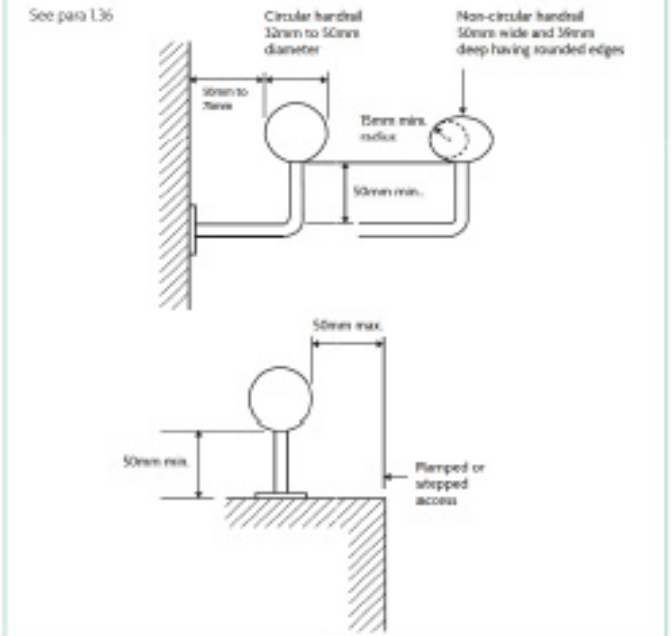


Diagram 1.13 Handrail design

Guarding of stairs

For all buildings

1.38 Design the guarding to be the height shown in Diagram 3.1.

1.39 In a building that may be used by children under five years of age, construct the guarding to a flight of stairs to do both of the following.

a. Prevent children being held fast by the guarding; ensure that a 100mm sphere cannot pass through any openings in the guarding.

b. Prevent children from readily being able to climb the guarding.

THIRD EDITION

PRINCIPLES OF element design

Peter Rich &
Yvonne Dean

Architectural Press

ARCHITECTURE/DESIGN

PRINCIPLES OF
element
design THIRD EDITION

Peter Rich & Yvonne Dean

- **Unique in its approach to detail design**
- **Invaluable for both students and practising architects, builders and surveyors**
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The construction of buildings is learnt through experience and the inheritance of a tradition in forming buildings over several thousand years. Successful construction learns from this experience which becomes embodied in principles of application. Though materials and techniques change, various elements have to perform the same function. **Principles of Element Design** identifies all the relevant elements and then breaks these elements down into all their basic constituents, making it possible for students to fully understand the given theory and principles behind each part. As all building projects are subject to guidance through the Building Regulations and British Standards, this book gives an immediate reference back to relevant information to help practitioners and contractors identify key documents needed.

Peter Rich AA Dipl (Hons) Architect, started his career with 14 years' experience as a qualified architectural technician. He then joined the AA School of Architecture, working with Bill Allen and John Bickerdike after his graduation, later becoming a partner of Bickerdike Allen Rich and Partners. He also taught building construction at the Bartlett School of Architecture, University College London, and architectural design at the Polytechnic of North London. He now acts as a Consultant.

Yvonne Dean B.A. (Hons) B.A (Dipl) RIBA, is an architect, energy consultant and materials technologist. She also has 15 years' experience as a lecturer, travels widely and is a guest lecturer at many universities. She pioneered an access course for Women into Architecture and Building, which has been used as a template by others, and has been instrumental in helping to change the teaching of technology for architects and designers.

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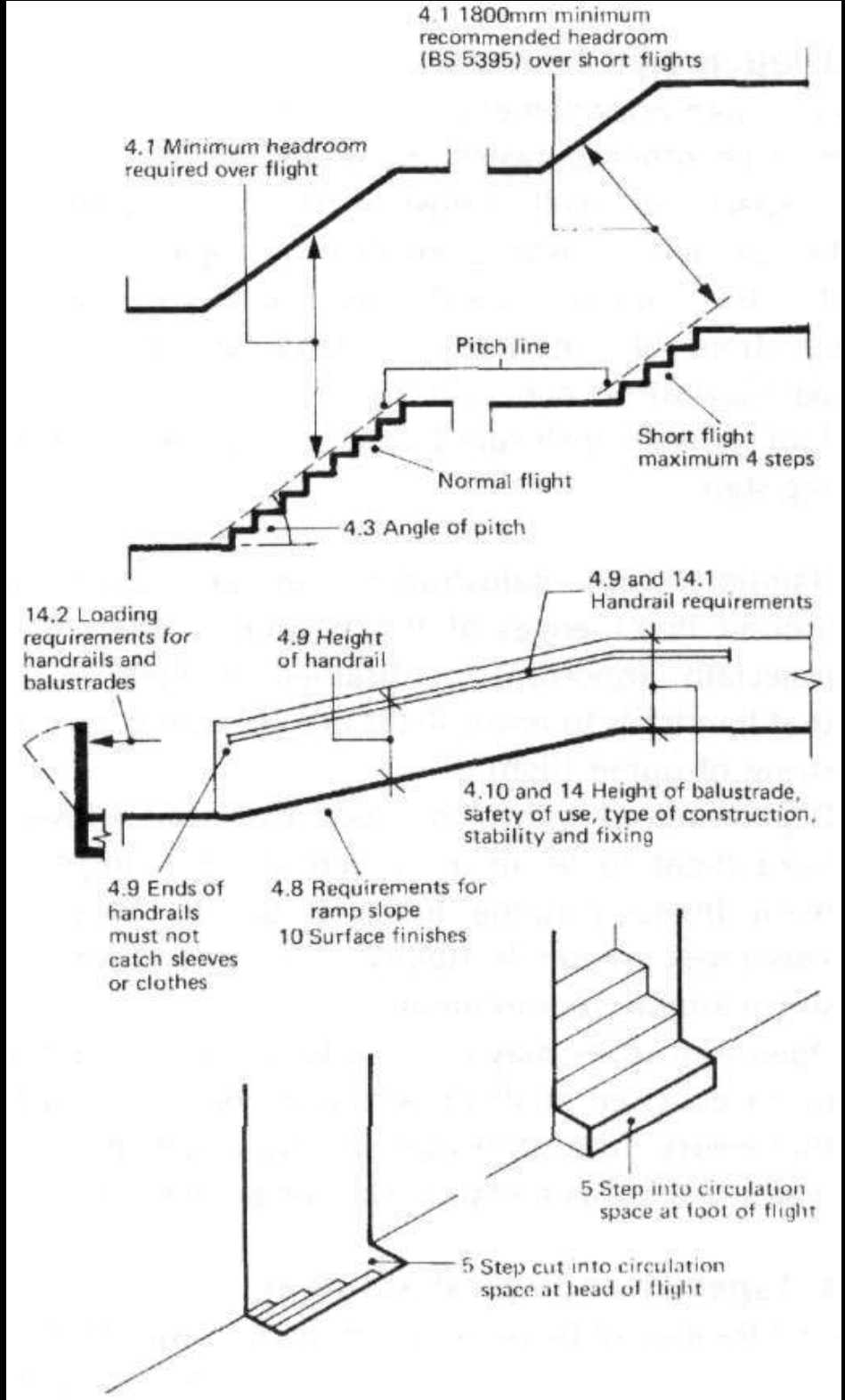
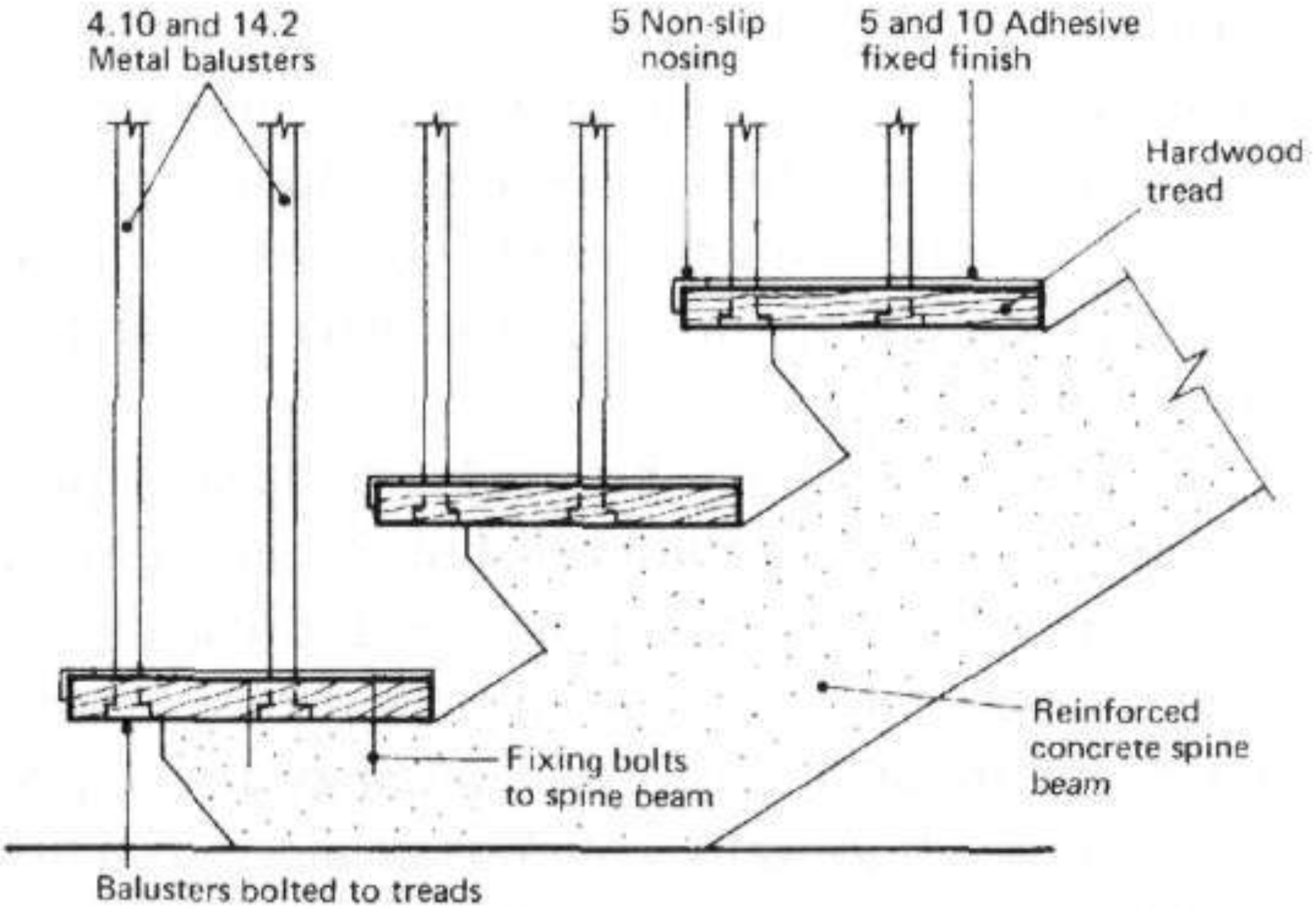
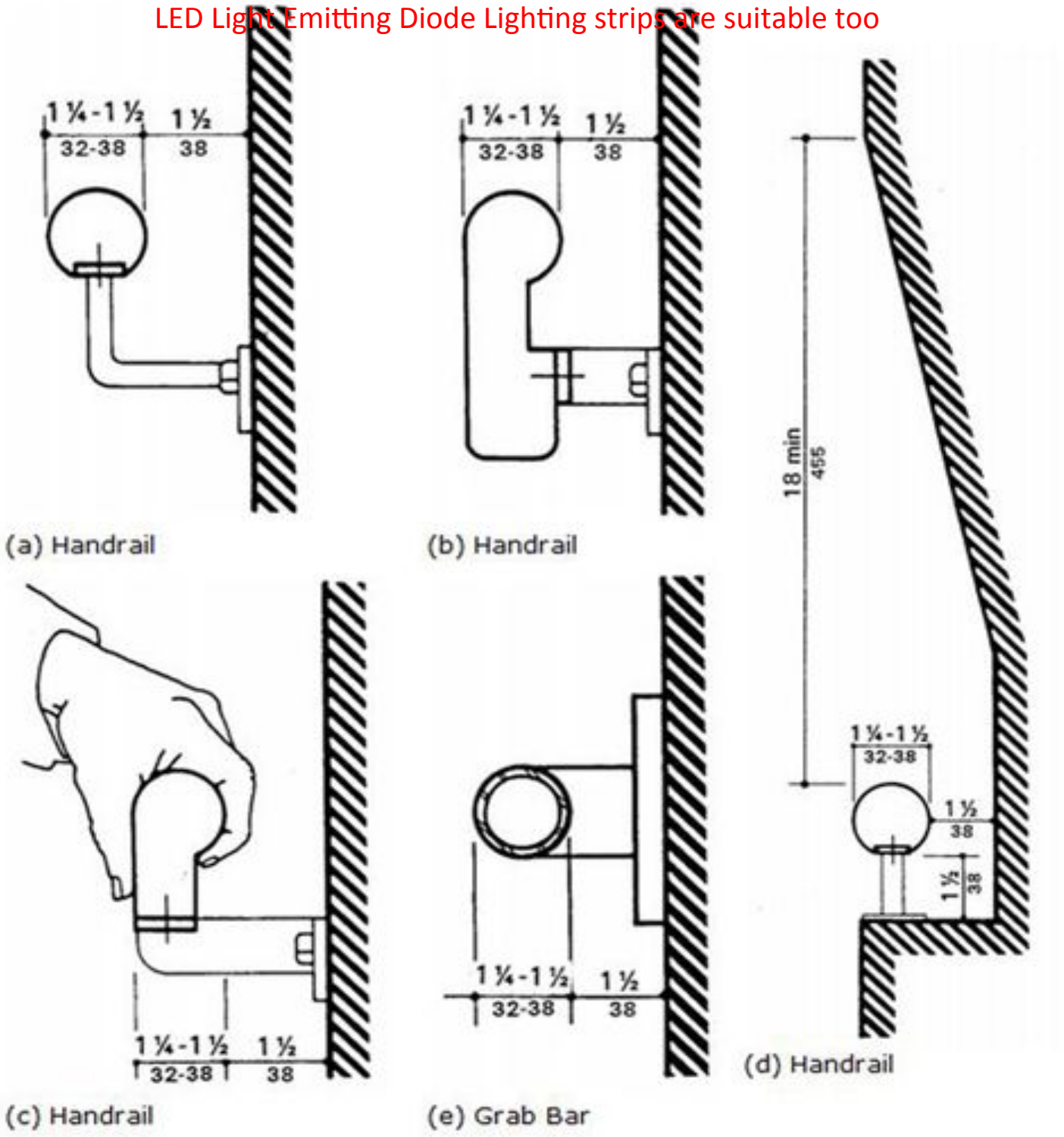

4.1 1800mm minimum recommended headroom (BS 5395) over short flights
4.1 Minimum headroom required over flight
Pitch line
Short flight maximum 4 steps
Normal flight
4.3 Angle of pitch
4.9 and 14.1 Handrail requirements
14.2 Loading requirements for handrails and balustrades
4.9 Height of handrail
4.10 and 14 Height of balustrade, safety of use, type of construction, stability and fixing
4.9 Ends of handrails must not catch sleeves or clothes
4.8 Requirements for ramp slope
10 Surface finishes
5 Step into circulation space at foot of flight
5 Step cut into circulation space at head of flight


4.10 and 14.2
Metal balusters
5 Non-slip
nosing
5 and 10 Adhesive
fixed finish
Hardwood
tread
Reinforced
concrete spine
beam
Fixing bolts
to spine beam
Balusters bolted to treads

Internally illuminated handrails can get hot Cold cathode ray tube are cooler
LED Light Emitting Diode Lighting strips are suitable too



L30 Stairwells as Life Savers

Means of escape stairs give

- occupants a way out in emergencies
- firefighters a way in to save them

They need to be:

- smoke free,
- isolated by smoke free lobbies, from flats or offices
  - Except top floor
  - with glazed door or screen to see and to trap smoke
- Within their own fire compartment isolated from the floors
- Fire and smoke doors with frames, seals and their ironmongery must be competent and maintained

They can be air pressurised to keep smoke out

They should never have gas pipes running up them

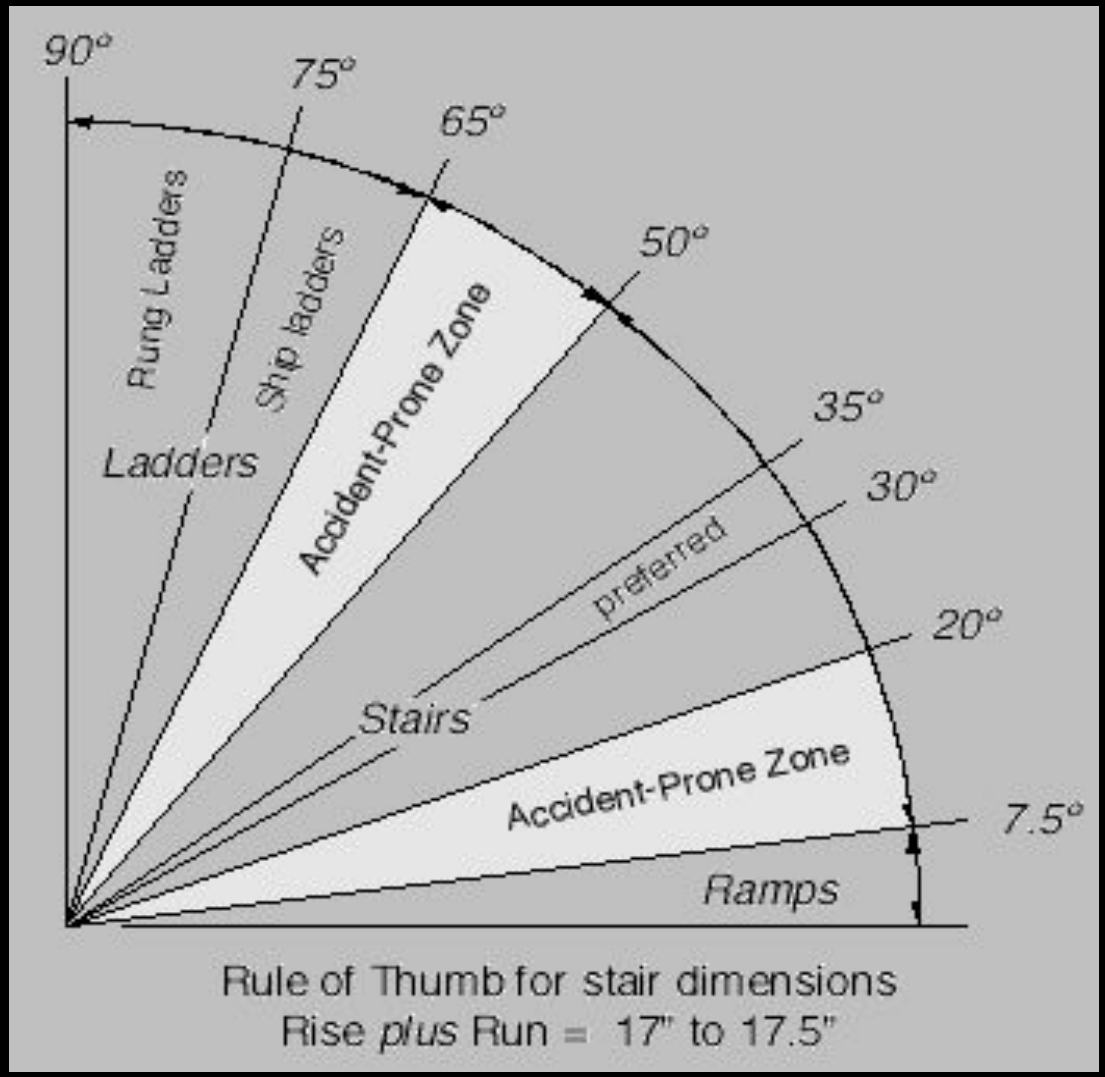
- Post-Grenfell discoveries in other tower blocks

Width as a life saver

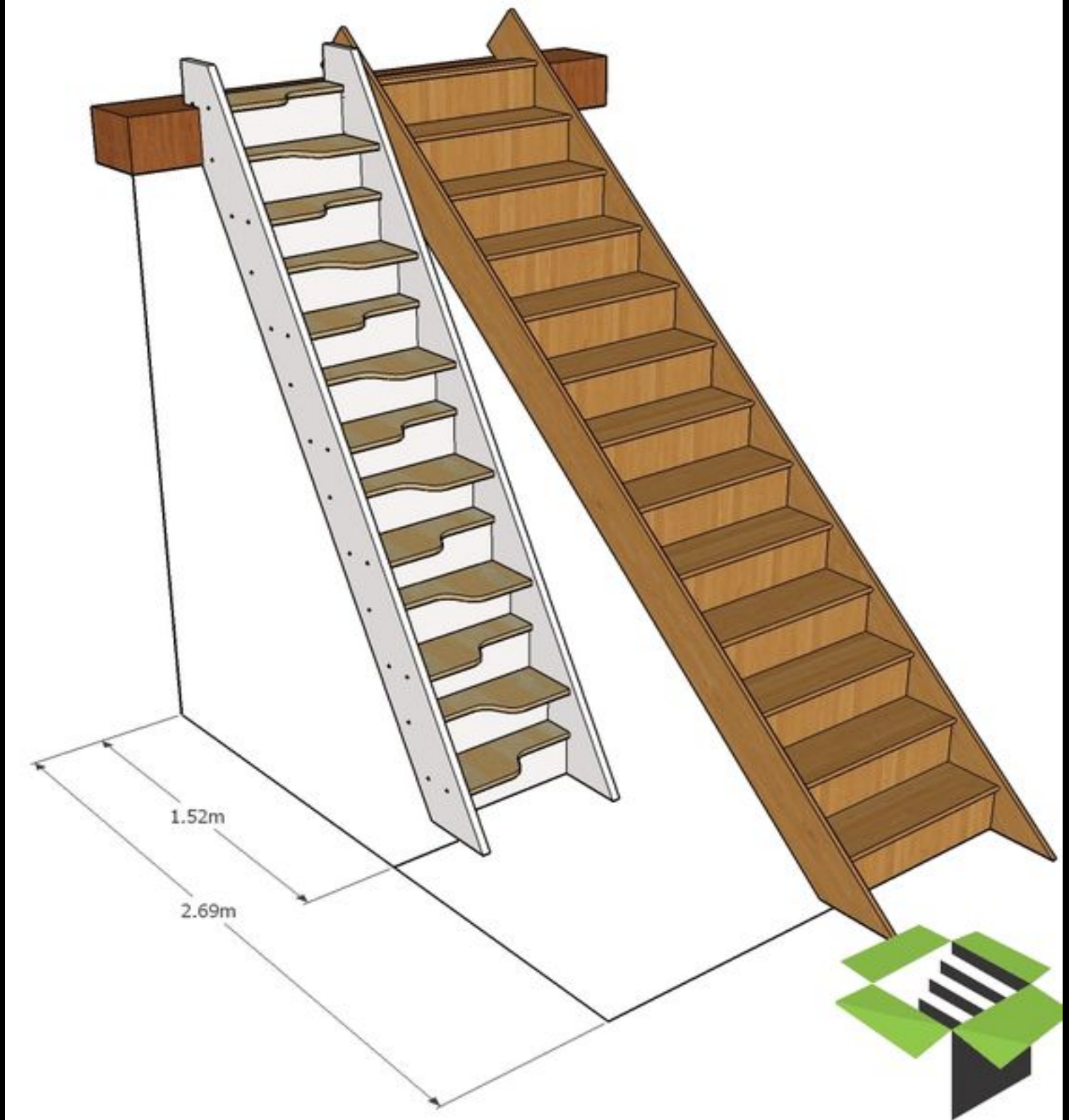
- Building Regulations Approved Document M/K
- Requires stair flights of a width to offer capacity for numbers of people on floor plates
  - Top flight only serves top floor
  - Bottom flight should serve all floors above
  - But BR AD M/K only requires one floor of people on any flight at any one time
  - Slugs of people from each floor travelling down passing each floor
  - But people travel at different speeds, especially in an emergency
  - Building Regulations requires no more than 16 steps in a flight
  - But landings in a straight flight (invisible in a crowd) cause legs to collapse and pile ups to occur
  - People climbing over each other raises them up the balustrade at higher risk
- 'Stay-put policy' then 'Phased evacuation' becomes important in competent high rise
  - Canary Wharf towers have 10,000 occupants
  - WTC Towers had 25,000 occupants and 5,000 visitors each

L30 Angle is everything
Countries have different rules

- Rung ladders
  - On-site were seen as essential, but unsecured are H&S risk
- Step Ladders: used by the navy
  - Frowned on in buildings, need to be hands-free
    - Carrying tools/materials very nearly impossible
    - Needs safety line attached, full body harness and connector to line
    - On-site stairs in scaffolding has become common practice now
- Avoid: 50-65 degrees, accident Prone
- Alternative tread stairs:
  - to only one room, not for general public use
- Stairs: 30-35 degrees
- Avoid: 8-20 degrees, accident prone
- Stepped Ramp (invented by UK B Regs?)
- Ramps: 1:12 max (UK B Regs AD M or K)
- Level floor or pavement



Rule of Thumb for stair dimensions
Rise *plus* Run = 17" to 17.5"


1.52m
2.69m

Tall Buildings

What changes when you go tall?

A Structure: High level Wind loading, Many floor loading, sway, exposed above urban mass, Foundation, Lightning protection
B Fire: Fighting, Servicing, Access, Means of Escape, Evacuation, passive fire protection competency, Fire doors, services, compartmentation
E Acoustics: External Weather noise, External envelope performance, Services passing through floors, Continuity of structure: structure borne sound
F Ventilation: Passive more difficult, Positive pressure Escape wells, air conditioning energy to waste
G Water: High level storage, gravity feed (Germany urinating rules after 21:00)
K Stairs and Escape
L Heating, U values, Thermal Envelope, Airtightness Thermal Bridges, weather performance of envelop
M Disability Access, Refuge, Escape
Net to Gross Ratios, Servicing, Lifts, Risers, stairs
Core size, Core costs, Core positioning
Thinness of external envelope, compartmentation, cores, stairs

High rise Definition

Over 18 m is beyond the reach of extending ladders on fire trucks

Beyond 19 floors is beyond standard breathing apparatus capacity

- Climbing 19 floors with a weight on your back gets fire fighters breathing harder
- Multiple cylinder breathing apparatus gives more time at the top and the top can be higher than 19 floors

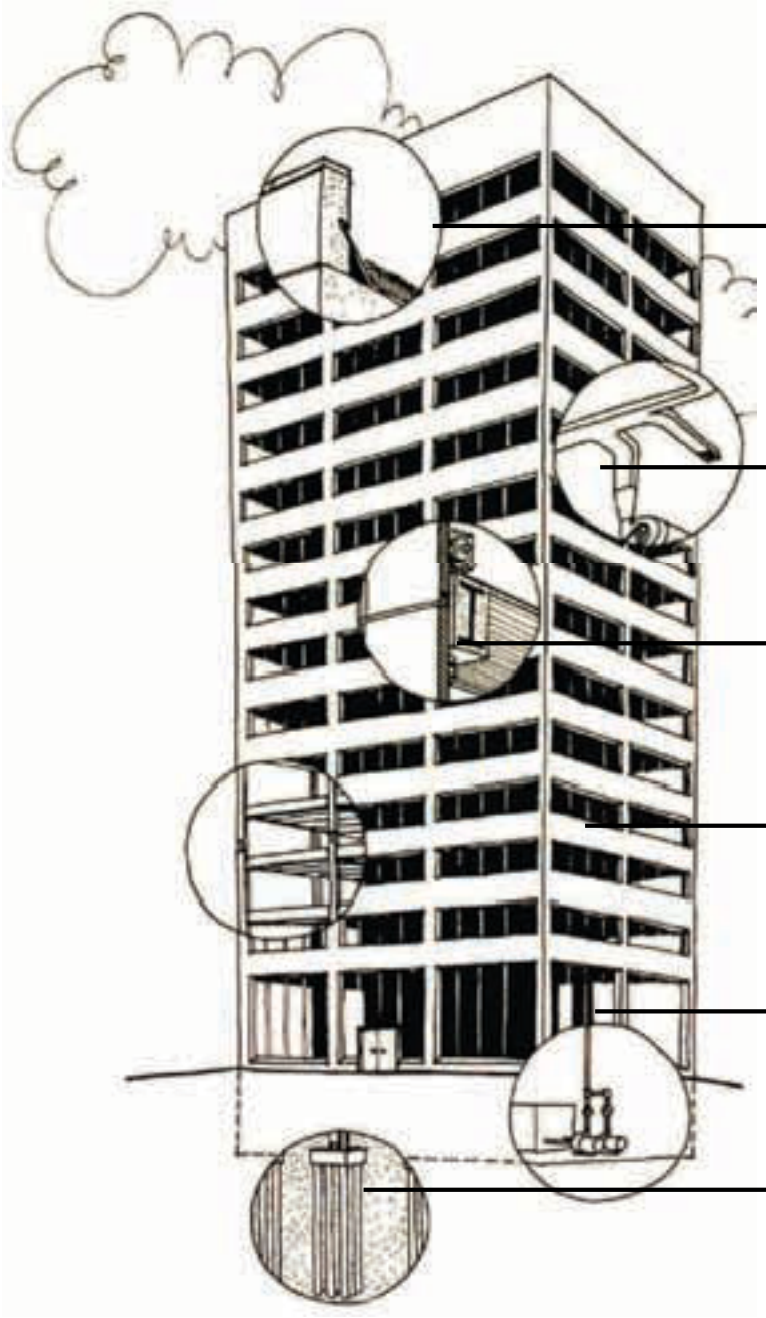
Grenfell had significantly less occupants and less floors than CWT or WTC

- But that fire was fuelled by combustible insulation

Non-fire resistant external envelope allowed fire to pass outwards and inwards

- Fire was inside then outside then inside at upper floors

Tall Building Parts



External ‘protective’ skin/cladding

Mechanical, Electrical and Plumbing (MEP)

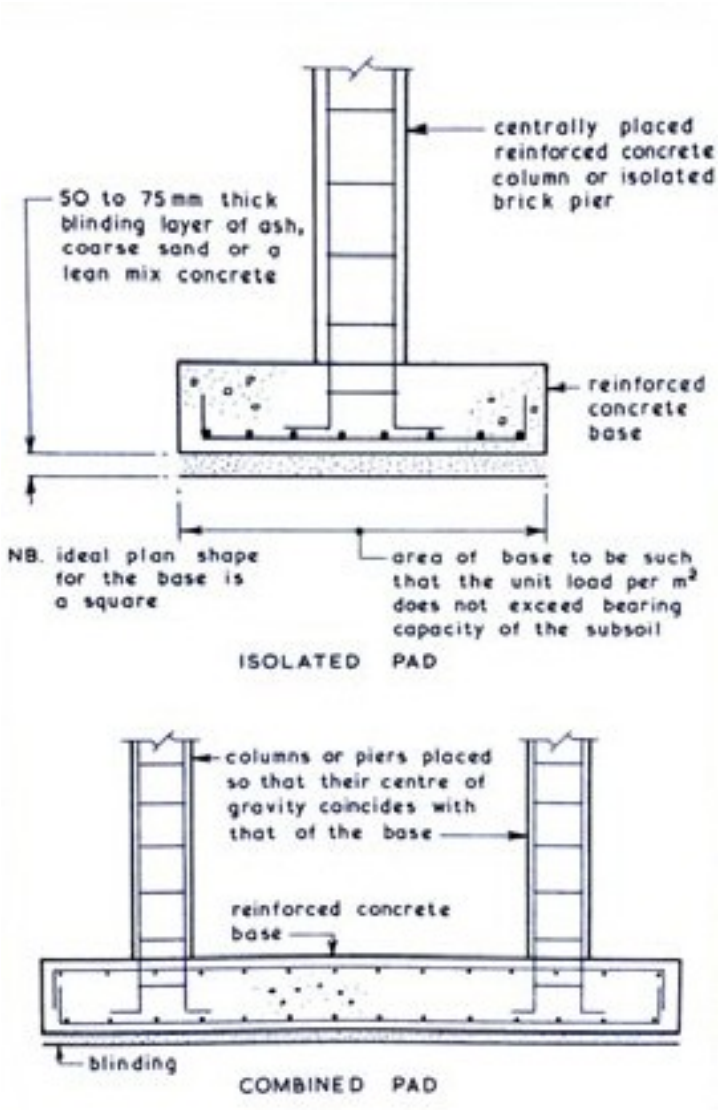
Building Frame (Super Structure)

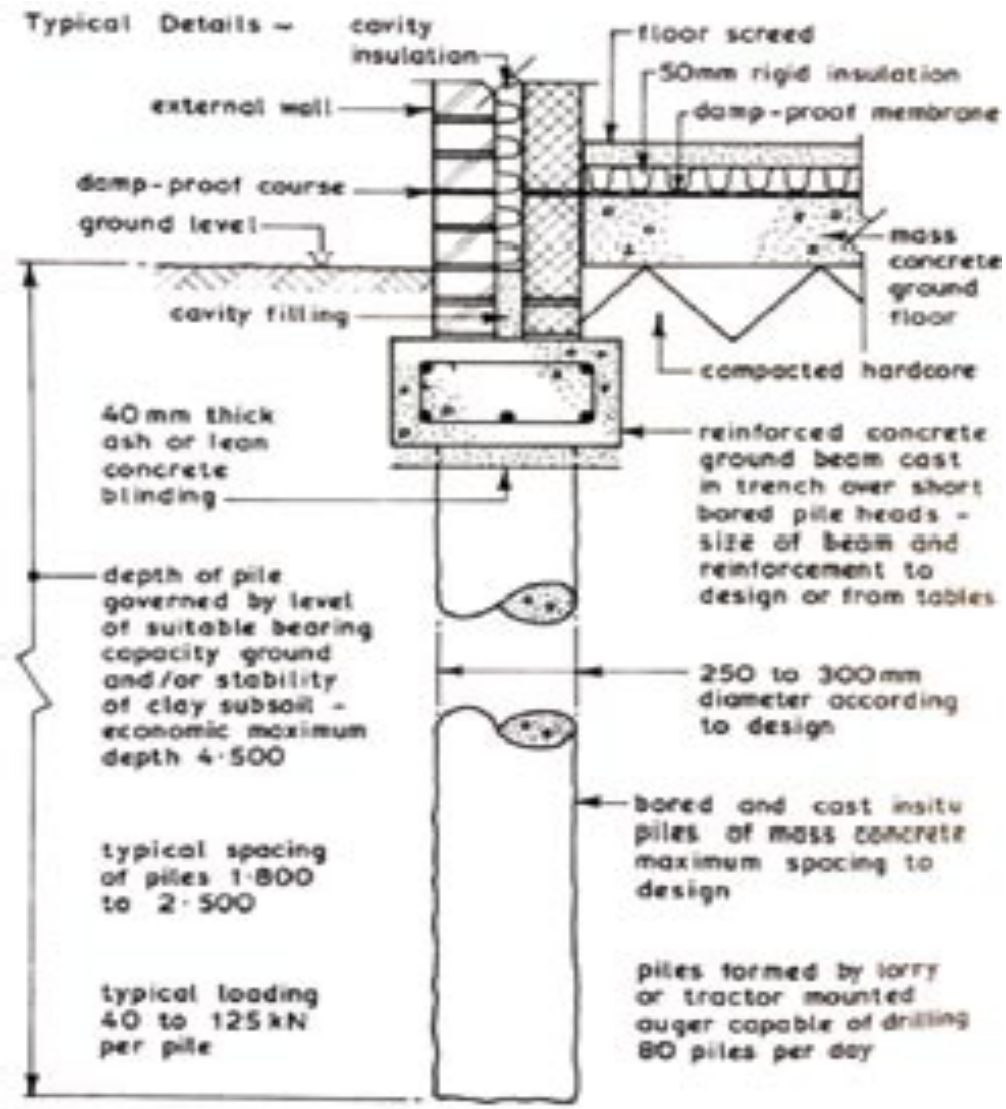
Internal Linings/Finishes

Furnishings Fittings Equipment (FFE)

Foundations (Sub-Structure)

Ground Bearing Concrete Floor & Foundation Types: High Rise





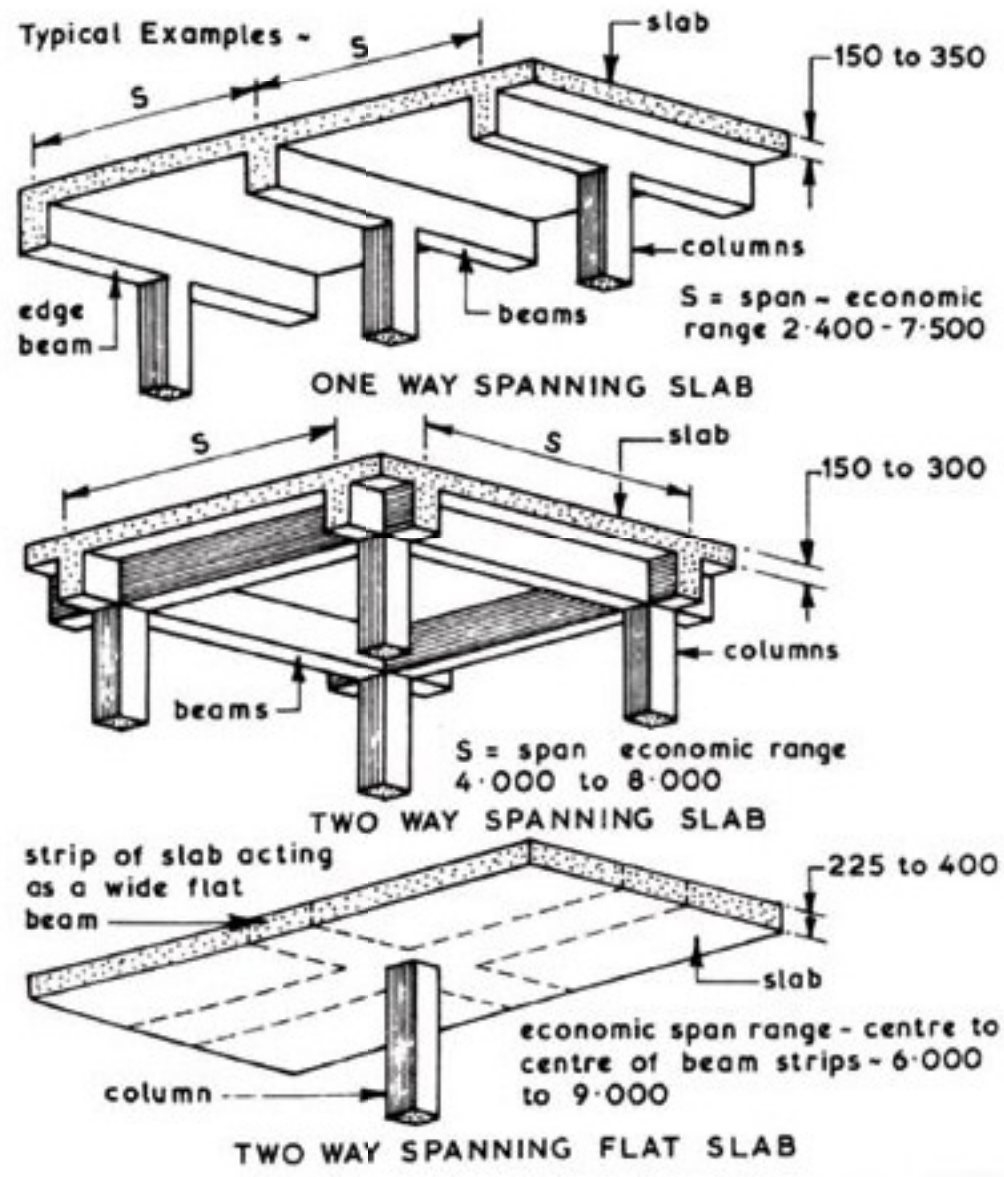
Excerpts from Building Construction Handbook

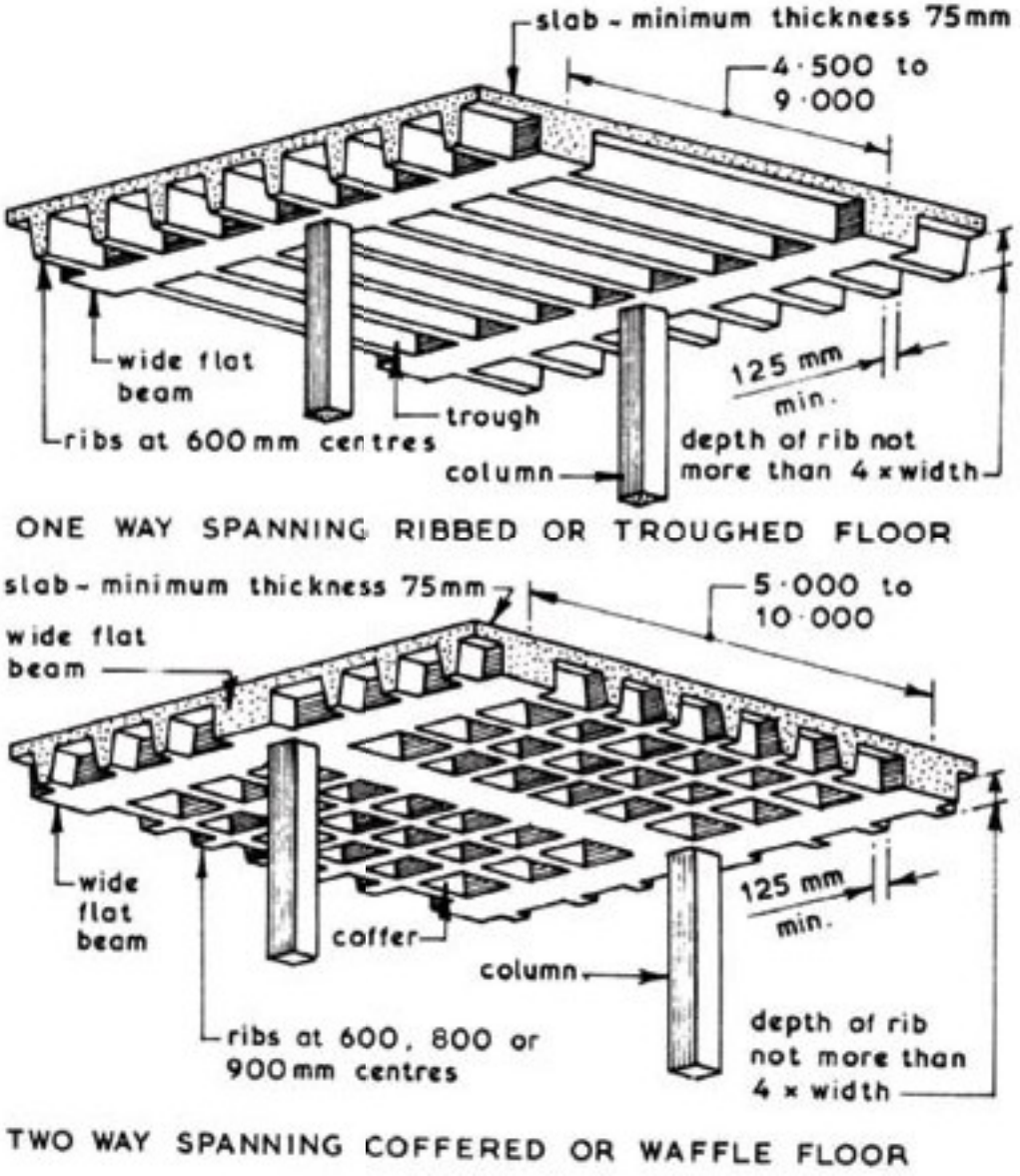
Tall Buildings: (23) Floors

(23) Floors
(27) Roofs
(43) Ceilings

Low or High Rise

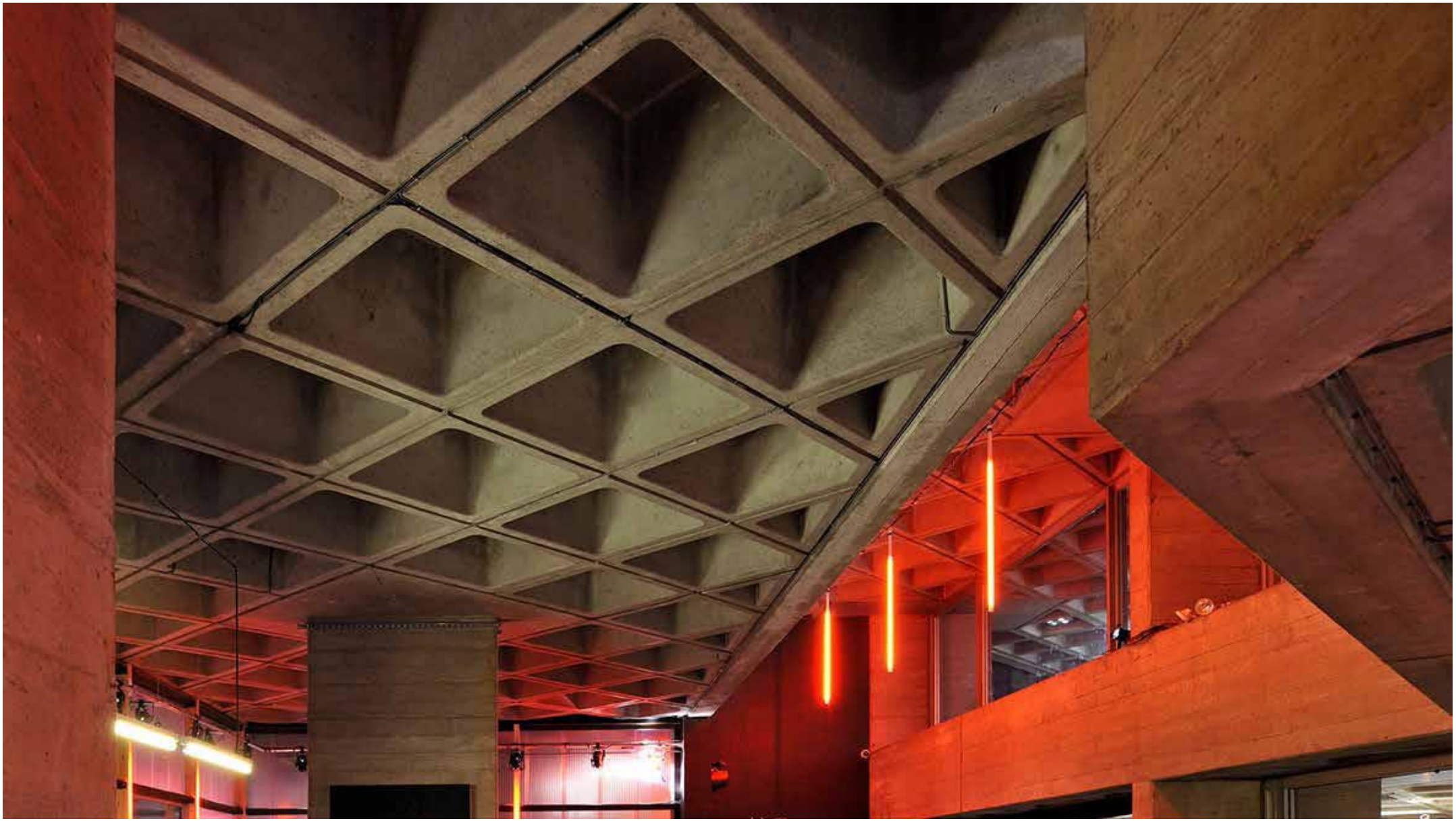
Suspended Concrete Upper Floor: Non-Domestic & High rise





Excerpt from Building Construction Handbook

Concrete ‘Waffle’ Slab: Non Dosmestic & Low and High Rise



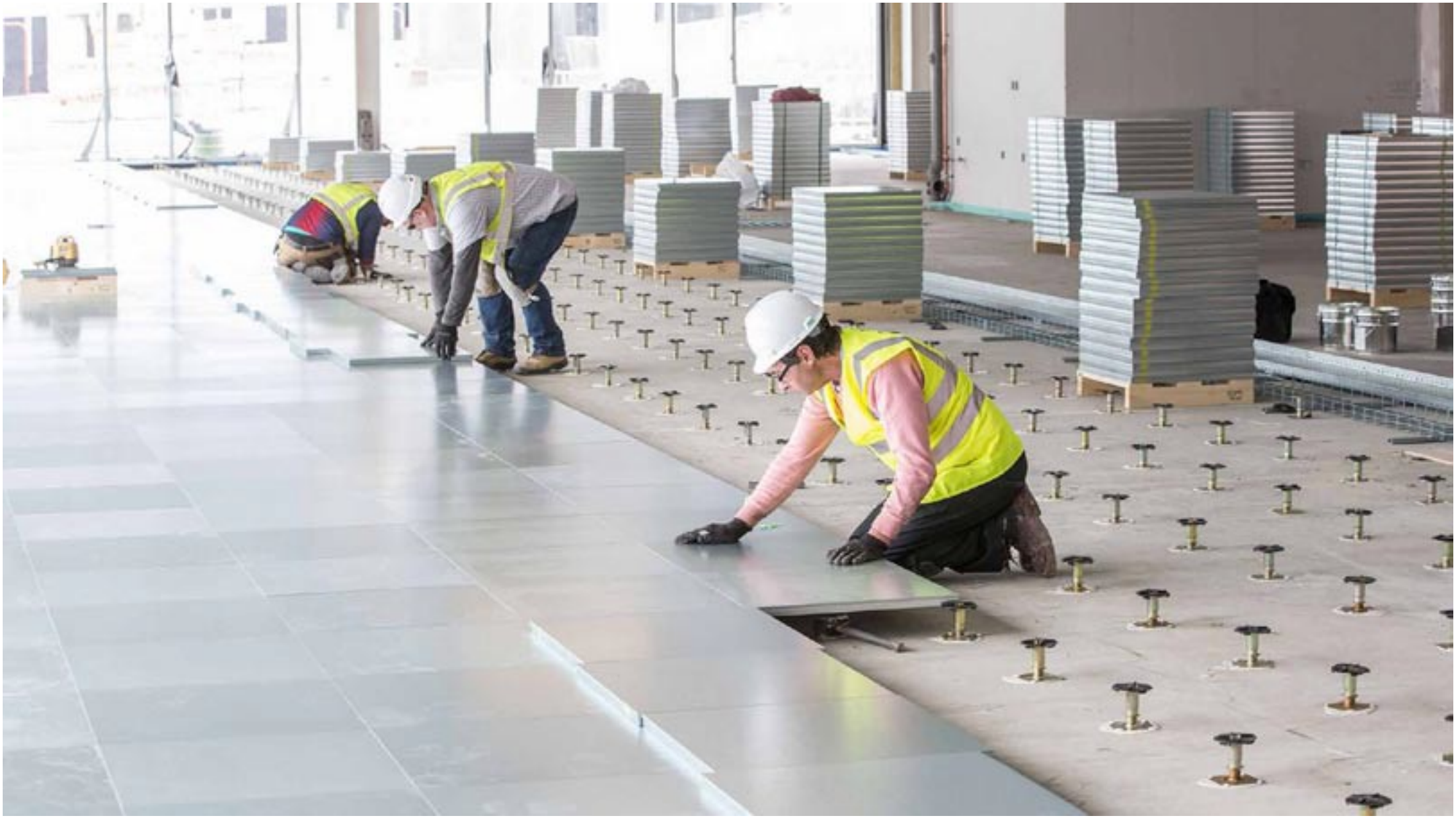
Interior Royal National Theatre, London, Denys Lasdun

Hybrid Steel Frame & Concrete Floor

Fire protection not fitted to steel frame yet

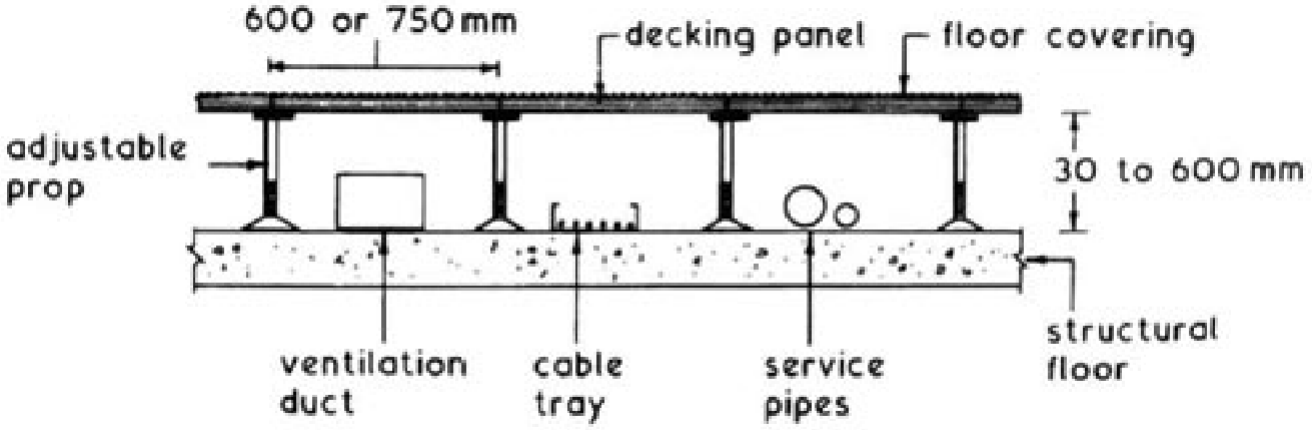
Example Steel Frame carrying Concrete Floor Deck

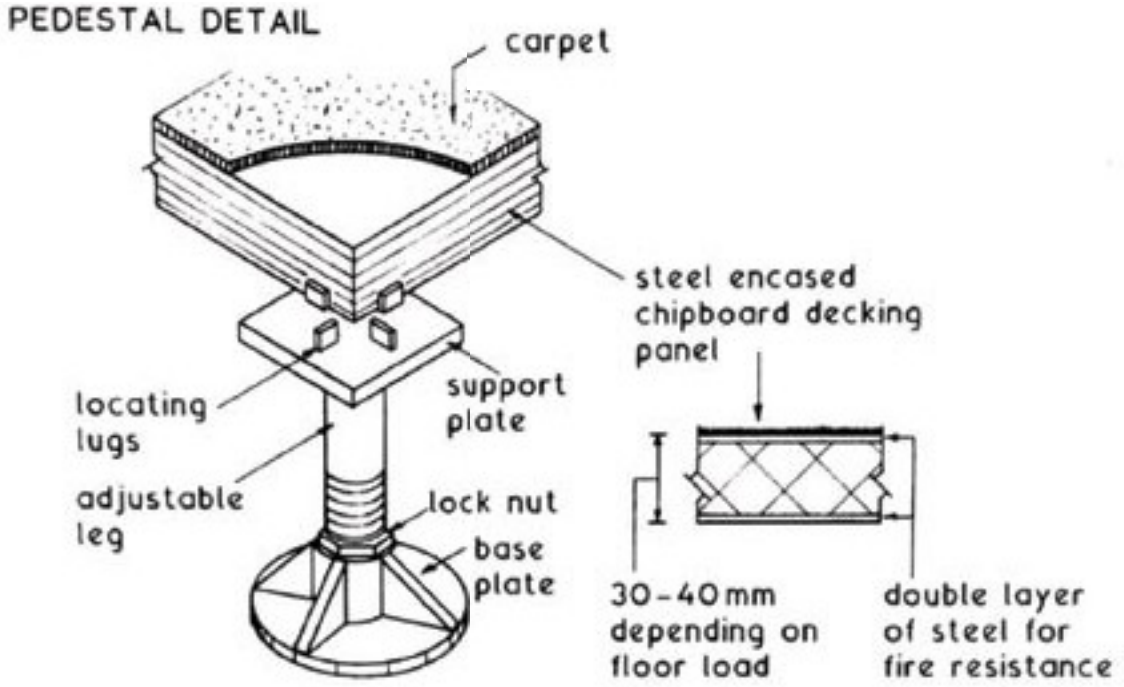
Raised Access Floor: Non-Domestic Uses



Raised Access Floor Site Photo

Floor as Service Zone: Raised Access Floor





Excerpt from Building Construction Handbook

Design Considerations - MEP

What do we mean by MEP?
1. Mechanical
2. Electrical
3. Public Health

1. Mechanical systems include:
- heating
- cooling
- ventilation

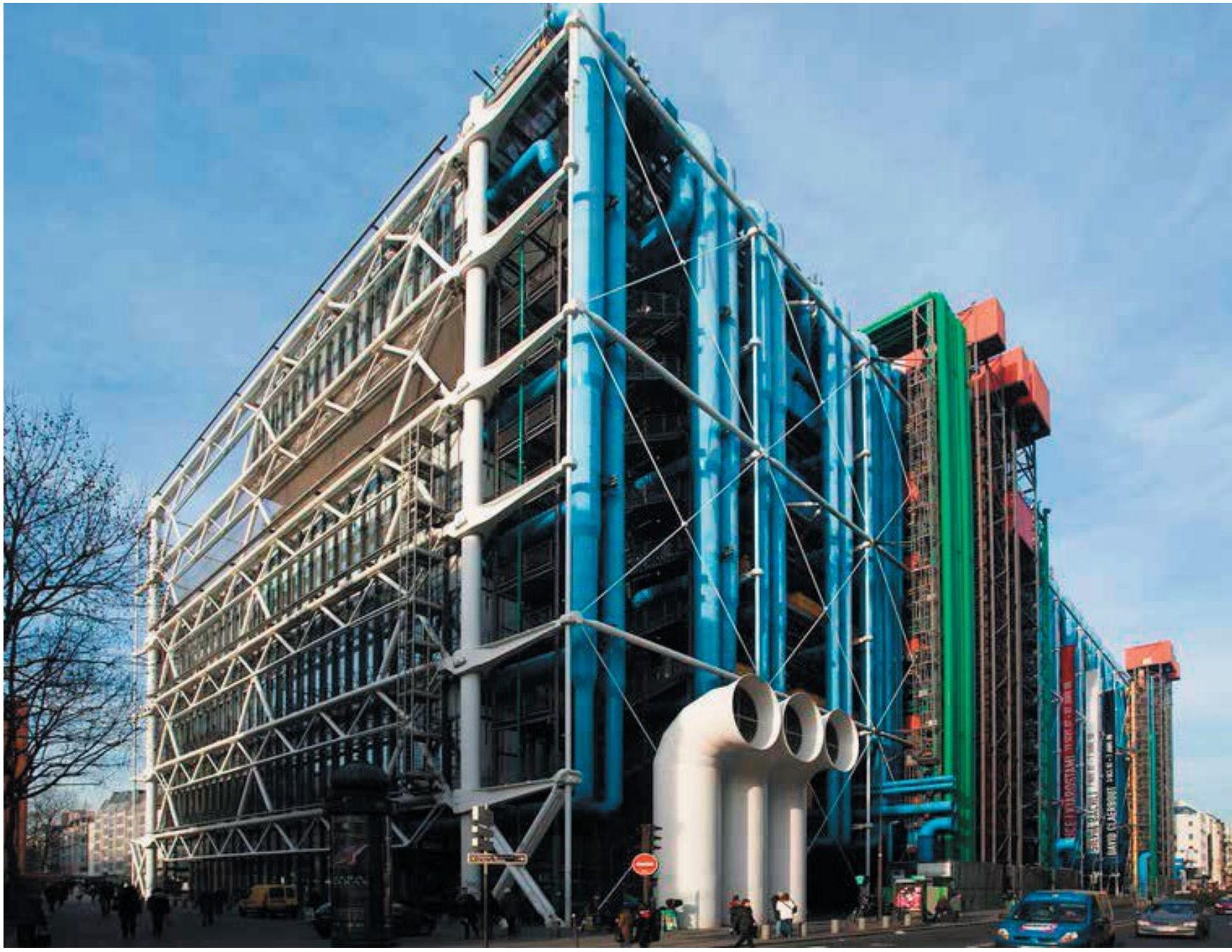
2. Electrical systems include:
- power to all outlets services and appliances
- lighting

3. Public Health systems include:
- delivery of drinking and flushing water
- draining of waste water

Note:
As architects and interior architects, we are not normally qualified to design building services. Therefore, a Services Engineer is required and we co-ordinate their design into our work

Banham Group Headquarters, Thornsett Road, London - Allies and Morrison

MEP v Architecture v Structure
(External Services & Structure provide clear floor plates)



Le Centre Pompidou,
Paris, France
Richard Rogers,
Renzo Piano &
Gianfranco Franchini

MEP Strategy v Interior Architecture

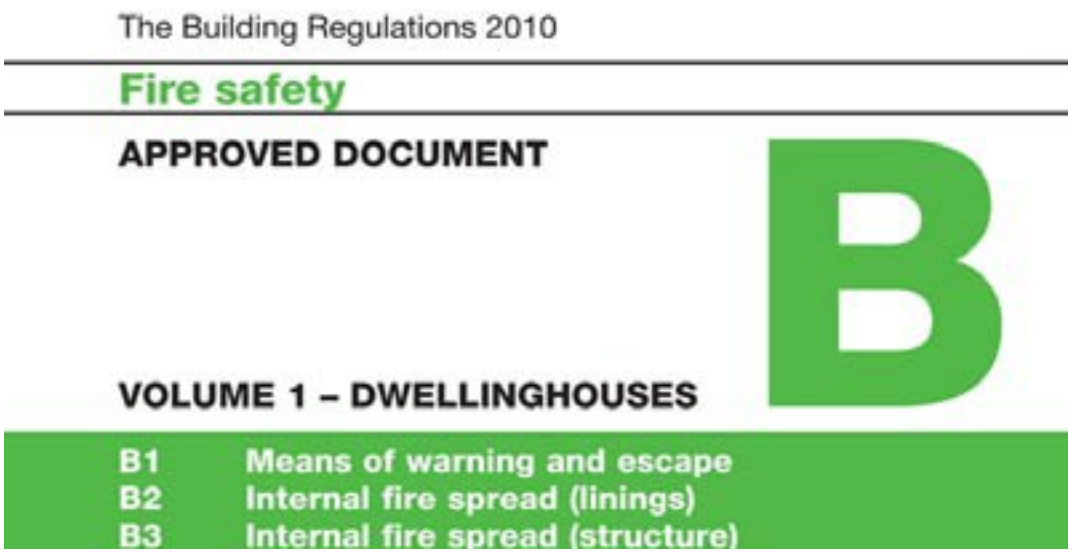
Banham
Headquarters, London
Allies and Morrison

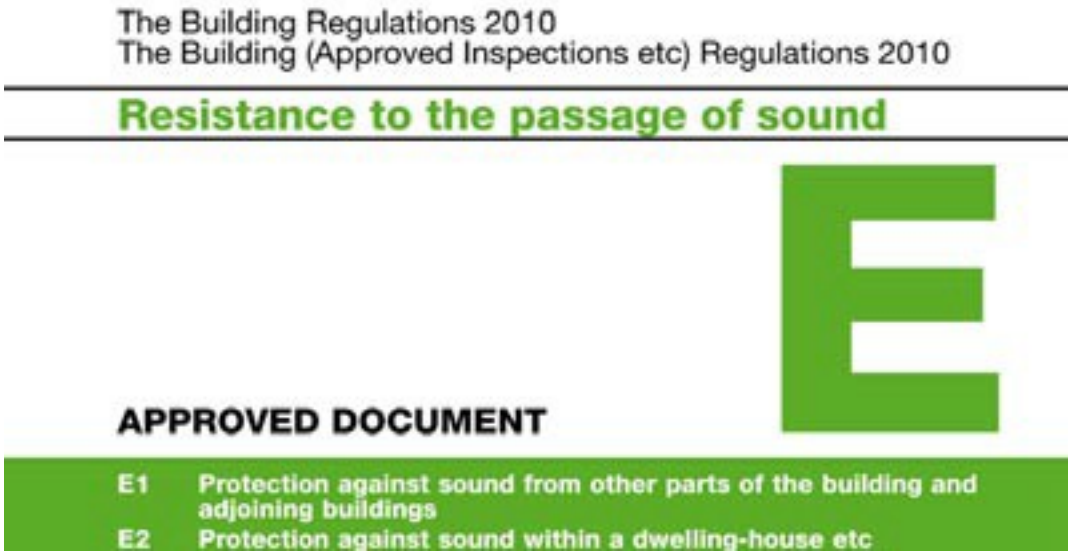
Performance Requirements of Ceilings

As the underside of a floor or a roof, ceilings can contribute to:

- The look and feel of a space
- Fire performance of the space
- Acoustics performance, depending on materials, format and finishes
- Thermal Comfort of the 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

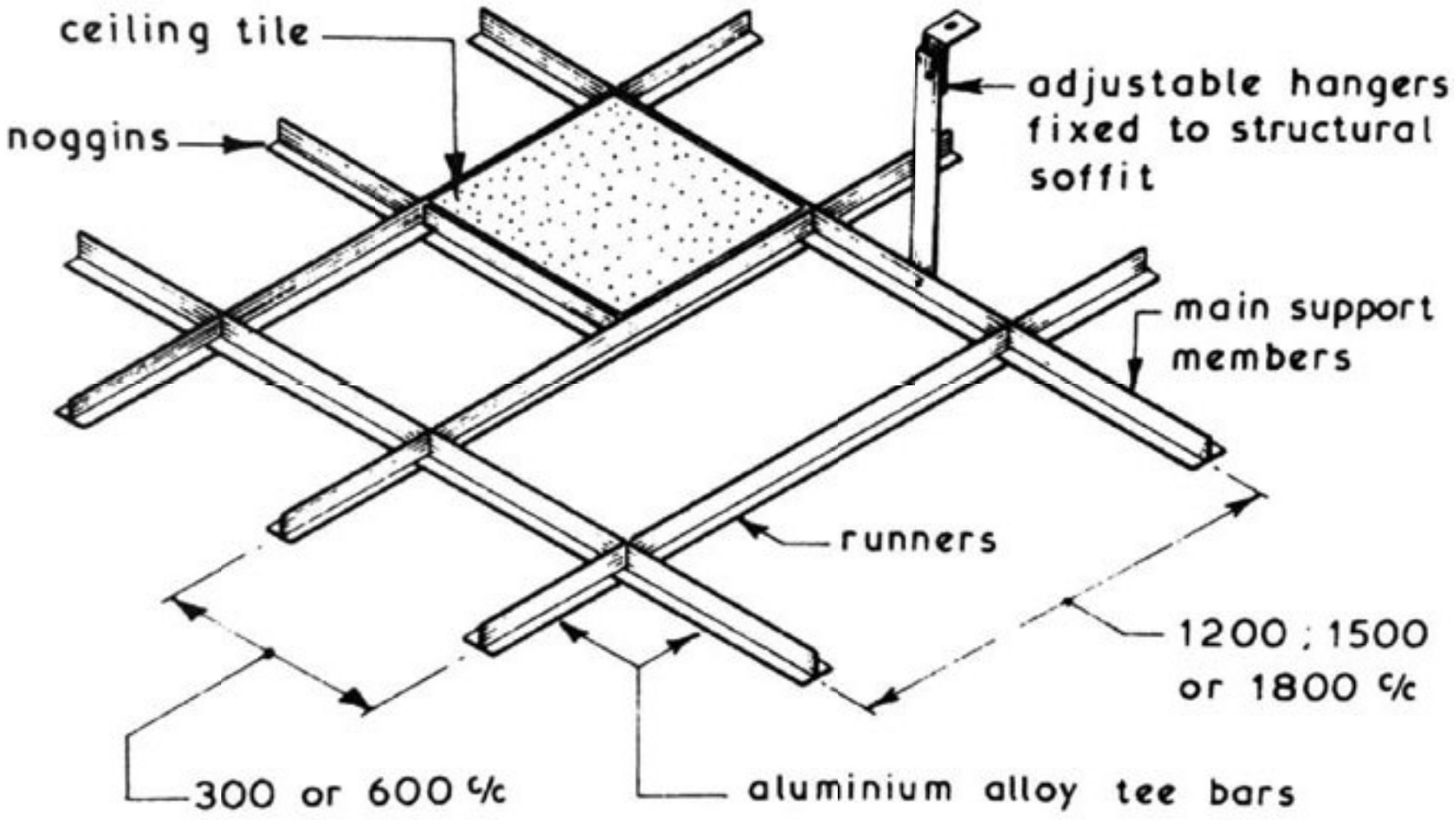
Key Building Regulations





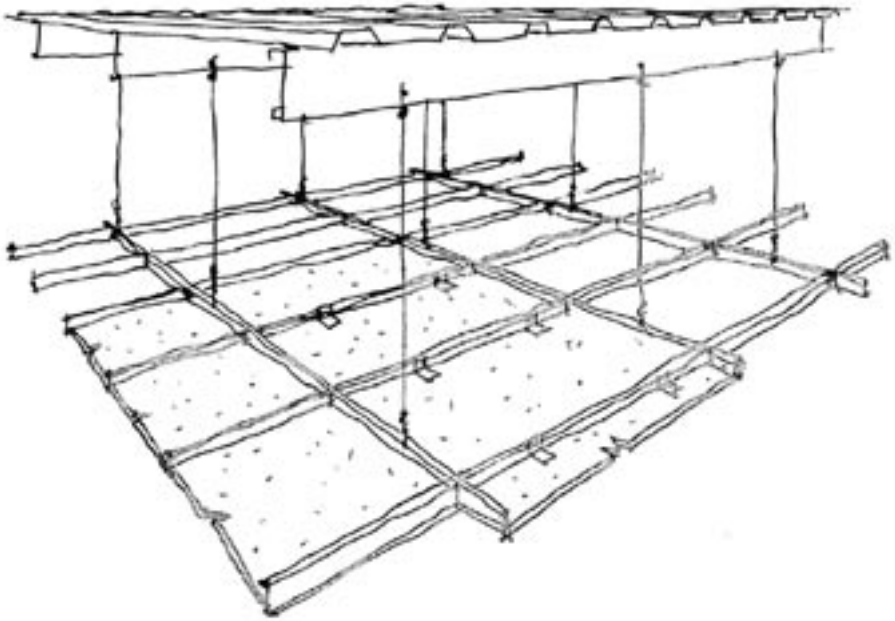
Suspended Ceiling: Components

Typical Suspended Ceiling Grid Framework Layout ~



Excerpt from Building Construction Handbook

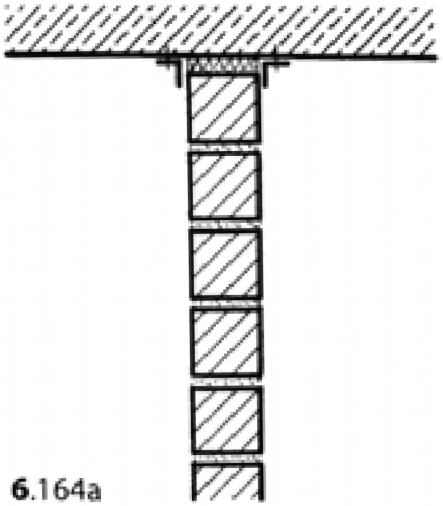
Suspended Ceiling: Suspensions grid

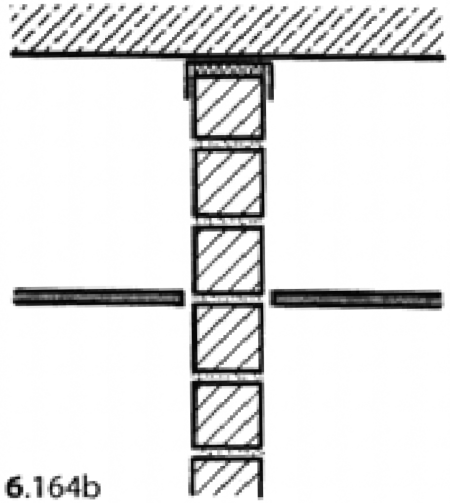


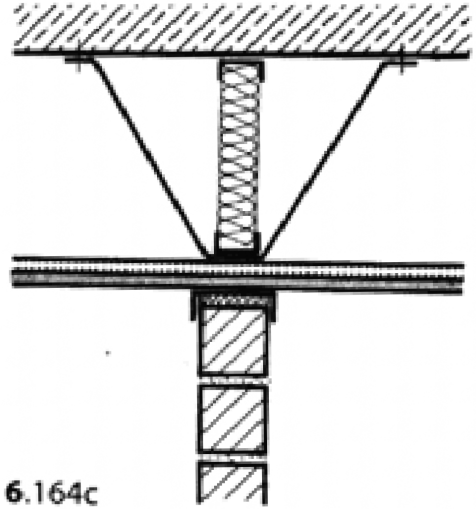
Example Sketch

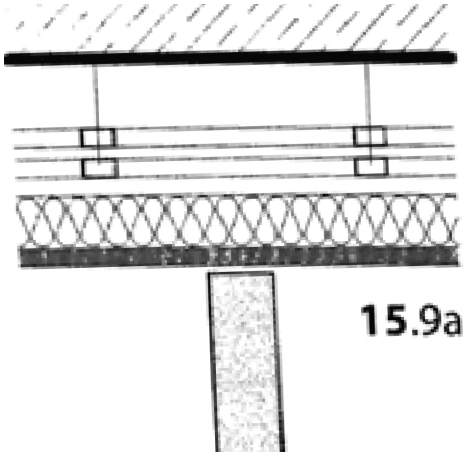
Site Image

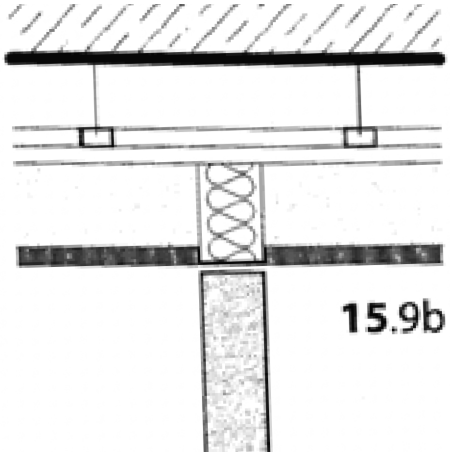
Suspended Ceiling & Wall or partition Junctions: Structural Acoustic & Fire Arrangements and Details

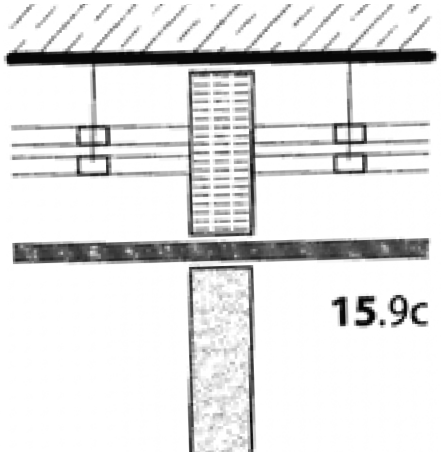


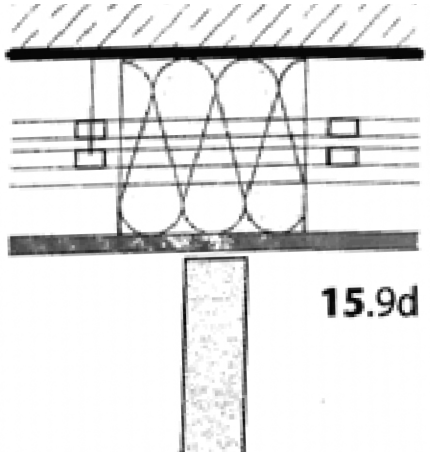










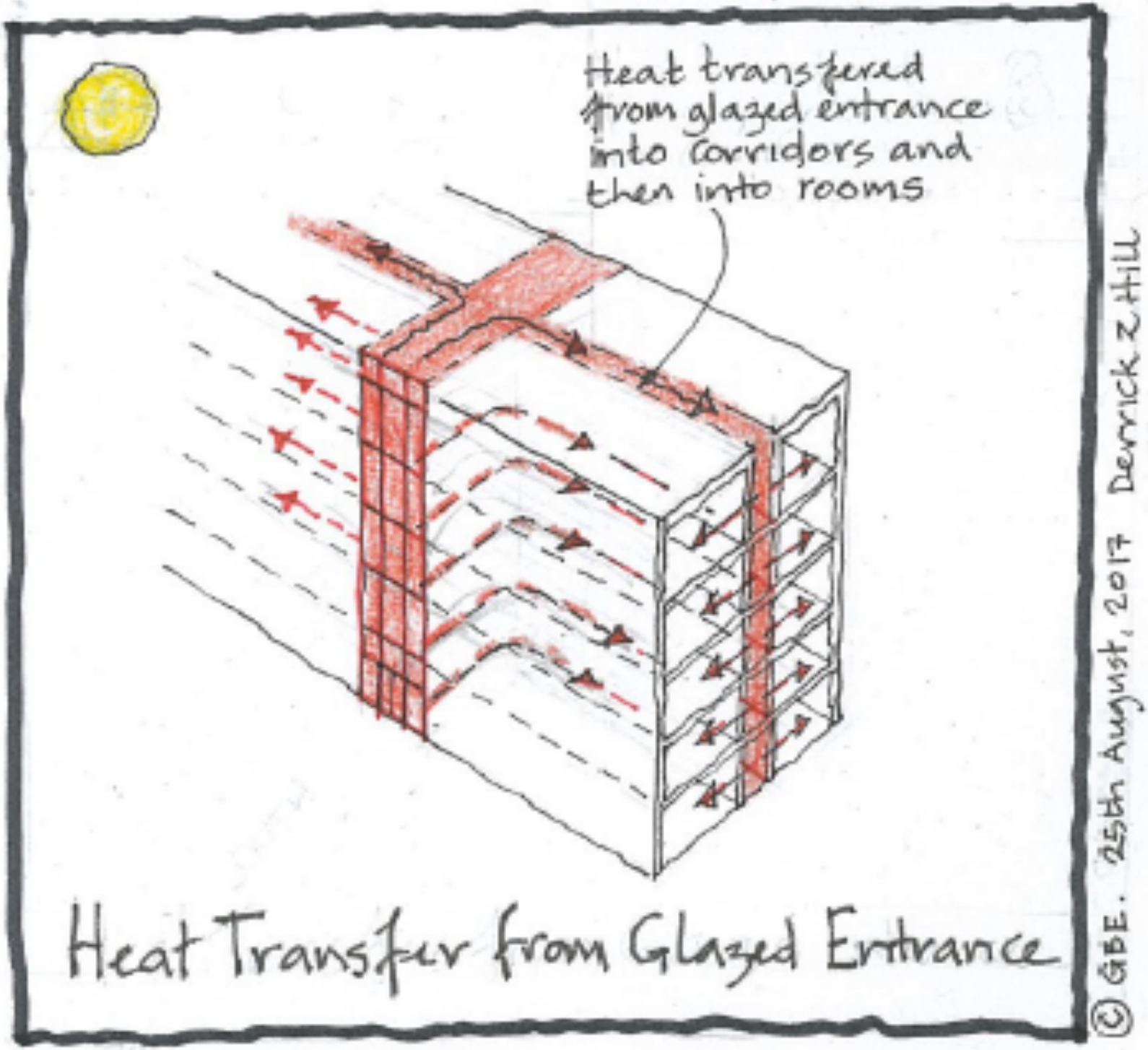


Excerpt from Baukonstruktions-Lehre

Environmental Design

Glazed Stairwells Overheat

- Overheating affects 20% of housing
- Walk up flats with glazed stair enclosures
  - Without opening vents at top and replacement air vents at bottom
- Warm up in summer
- Heat corridors
- Overheat apartments or rooms


Heat transfered from glazed entrance into corridors and then into rooms
Heat Transfer from Glazed Entrance
© GBE. 25th August, 2017 Derrick Z Hill

Stairwells As Acoustic Barriers

External stairs

External conditions

Enclosed without roof:

light and stair well

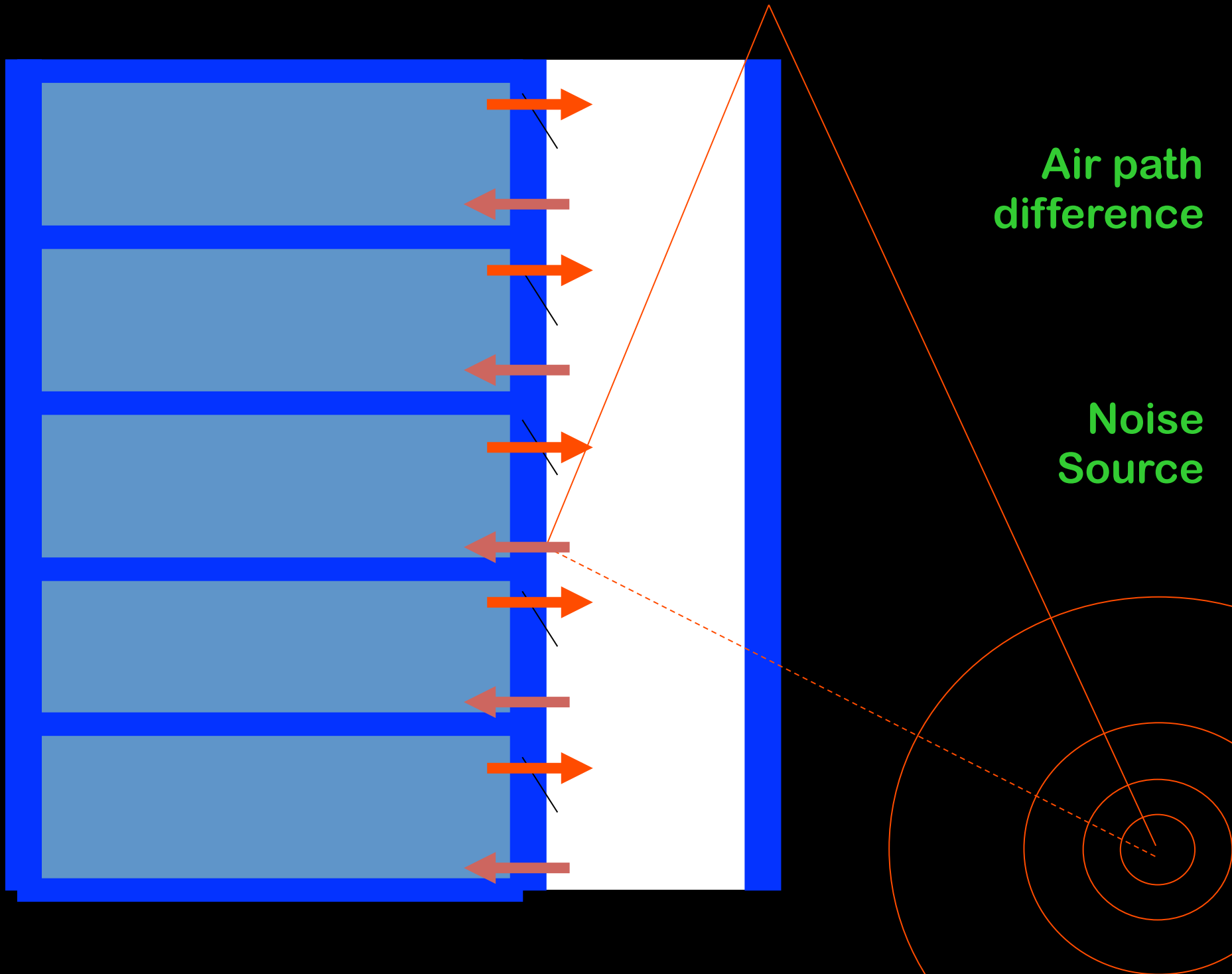
Windows/vents/doors open into well

Walls forms long pathway for urban street noise barrier

Natural Vent/Acoustic Wells

Urban areas with high traffic noise create problems for natural ventilation of buildings
Wells within the building offer long air path difference acoustic performance and an opportunity for natural ventilation from rooms to the well
The well may well include staircases
Discourage them as smoking places

Light/Acoustic/Vent Well




60 Great Suffolk St London, England
Google, Inc.
Google GB


INTERIOR
DESIGN

External Envelope Preformance Checklist:

1. Structure - frame, stability, movement
2. Water - envelope
3. Thermal - envelope
4. Airtightness - envelope
5. Acoustic - sound control, penetration, tansmission
6. Fire - insulation and integrity
7. Security - robustness, privacy, locking
8. Maintenance - access, de-constructing, re-assembling
9. Comfort - temperature, ventilation, daylight

Definitions: Sub-Structure & Super Structure

Sub-structure: foundations or basement.
Superstructure main frame of a building.
That which if removed would lead to a collapse of the whole composition.

Types:
- Concrete frame: Precast or Insitu
- Heavy Steel frame:
- Heavy Timber frame: Post and beam
- Loadbearing Masonry Walls:
- Timber Panels: CLT Glued or loose
- And combinations of any of the above.

Note:
As architects and interior architects, we are not normally qualified to design structural frames. Therefore, a Structural Engineer is required and we coordinate their design into our work

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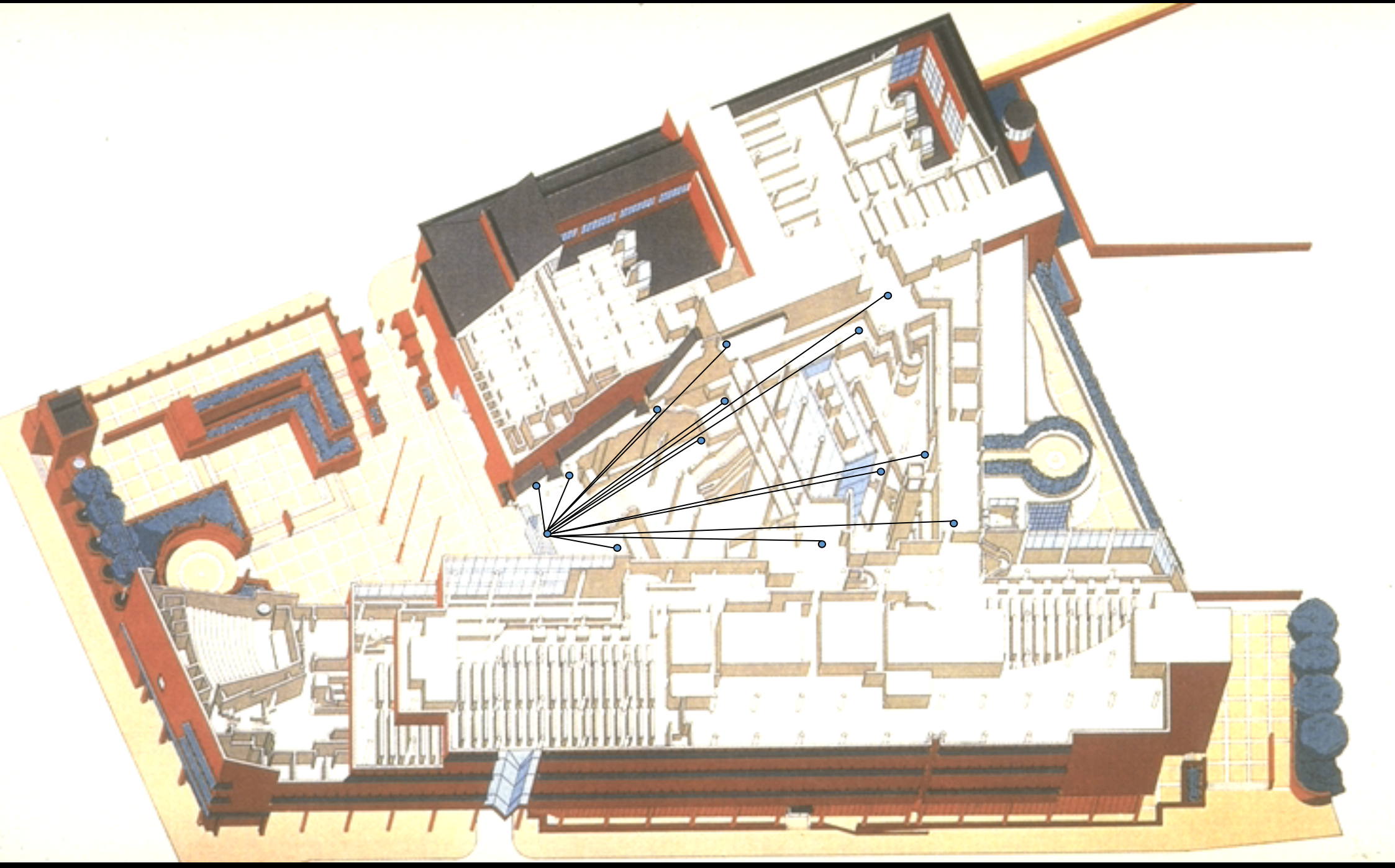
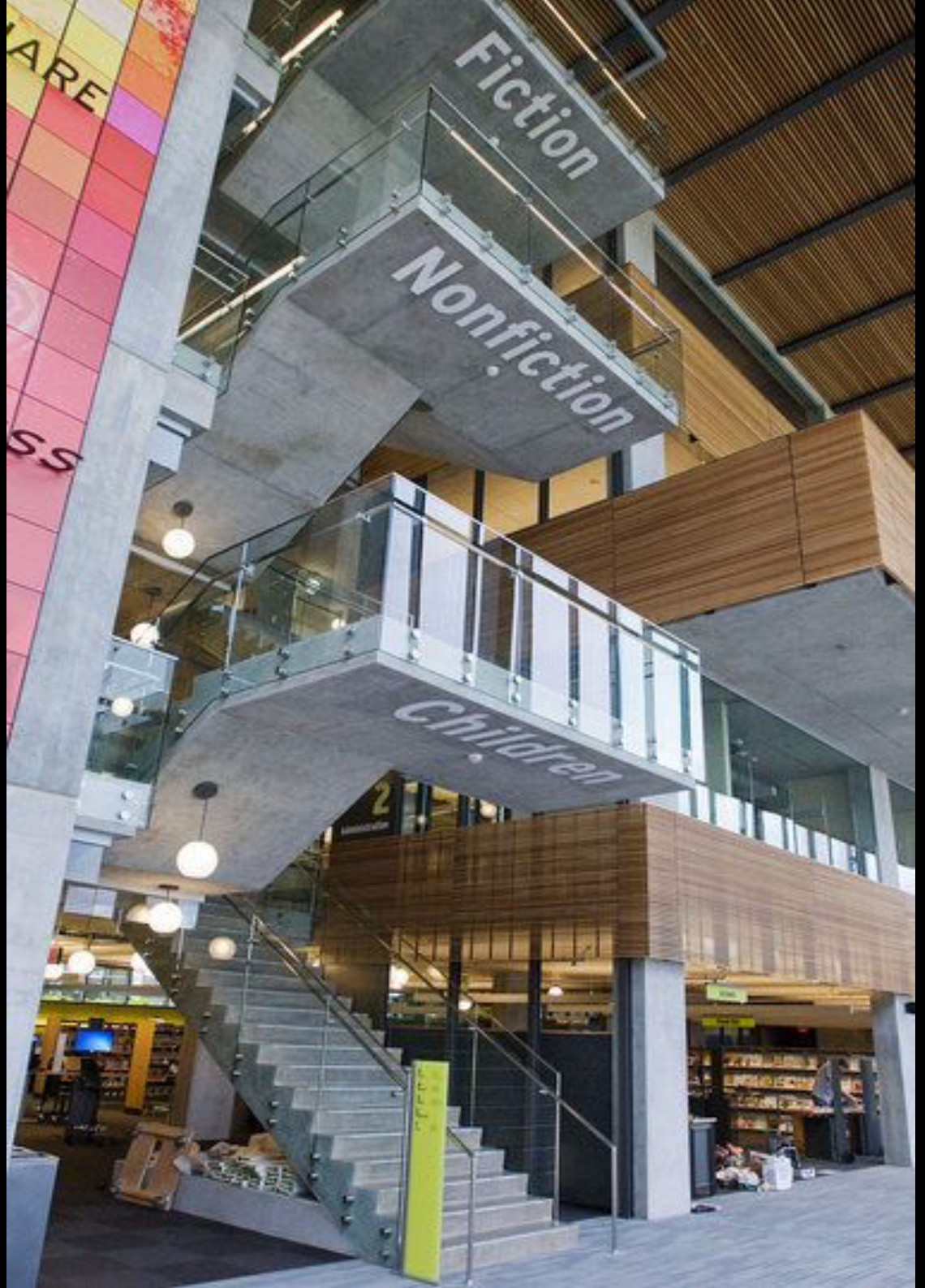
High Rise Economic Design

Building Navigation

Entrance Area: hub of the building
Routes to building functions/rooms
Route to rooms: readability legibility
Room and stairs visibility
    Plan your route with your eyes
Stairs Ramps Routes Passarells v Signage
    British Library Entrance Hall
Stairs as Signage
    Stair Soffits signs indicate Library departments




Fiction
Nonfiction
Children

L30 Communication Accommodation Stairs

Not as regulated as Means of Escape stairs

They can be front of house,

- Encourage stair use over lifts,

Can be at the heart of business activity

- Enable some of the most important impromptu interactions that happen by chance
- Link different departments of the business
- Linking social/kitchenette/café/meet spaces

Inter-visibility between floors advantageous

- if not essential to the wellbeing of the business

MCM's Havas HQ LKX

- same stair arranged differently at each floor of the well


MIND
YOUR
HEAD

Cores at perimeter not at core

Escape stairs inside building volume have to be in a fire compartment (FR, thickness, NIA/GIA)

Push the cores to the perimeter of floor plates and isolate them from office compartments, services risers and lifts

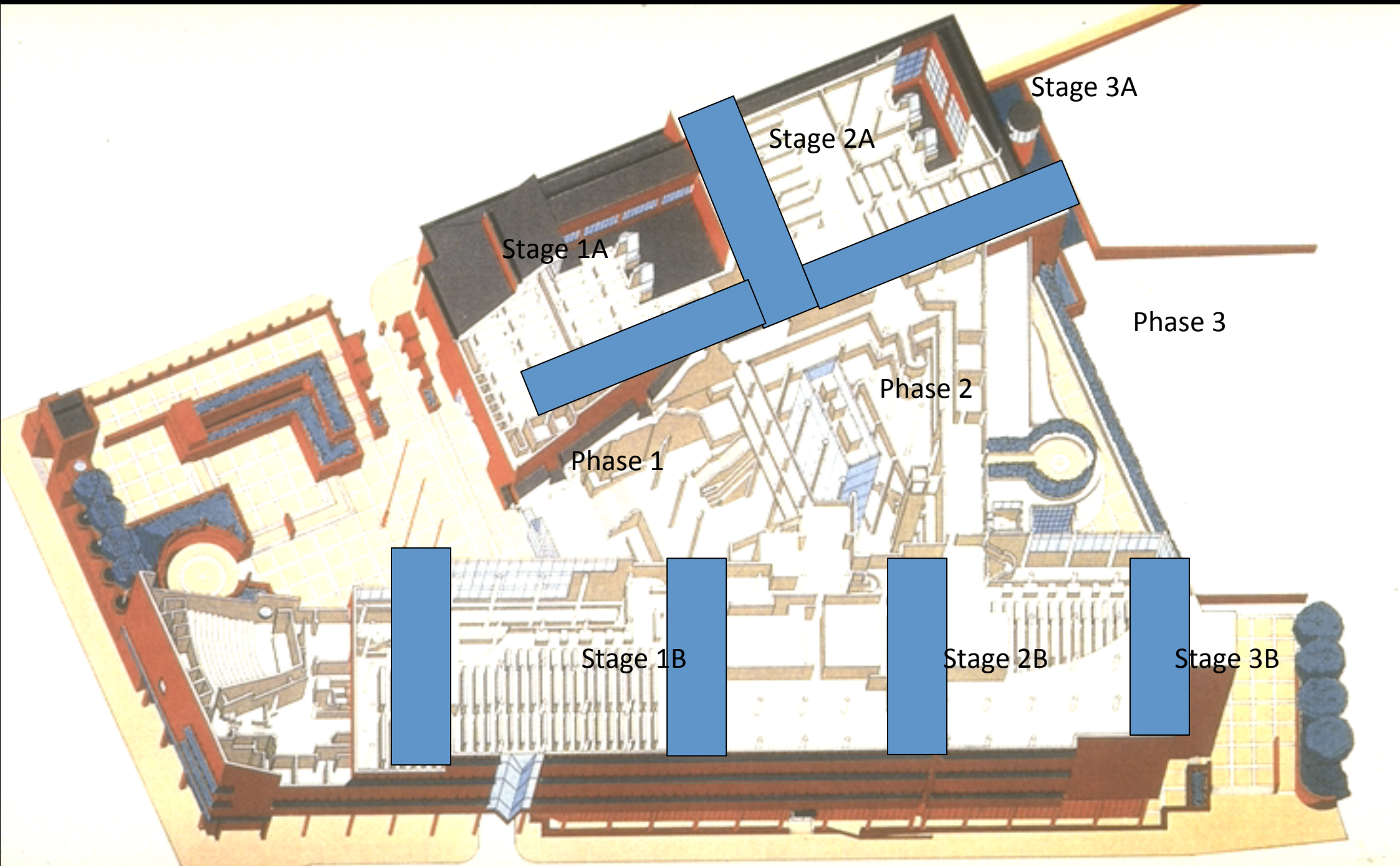
Reduces compartment enclosure performance requirements:

- Fire, acoustic
- Unoccupied spaces: lower thermal requirement? potentially reduces their costs

Richard Rodgers and Rab Bennetts

Servicing of buildings requires space

- Stairs, Lifts/Elevators, Services Risers, smoke vent shafts,
- Plant rooms, stores, WCs
  - MEP Engineers:
    - “Architects never provide enough room”
- Rationalise the floor plans into zones
  - Serving and Served spaces
  - Service Cores and Rooms
  - Stack similar functions on top of each other
- British Library cores to Phases/Zones
  - 1 bay of core to 3-6 bays of space
  - Acknowledges phased development


Stage 3A
Stage 2A
Stage 1A
Phase 3
Phase 2
Phase 1
Stage 1B
Stage 2B
Stage 3B

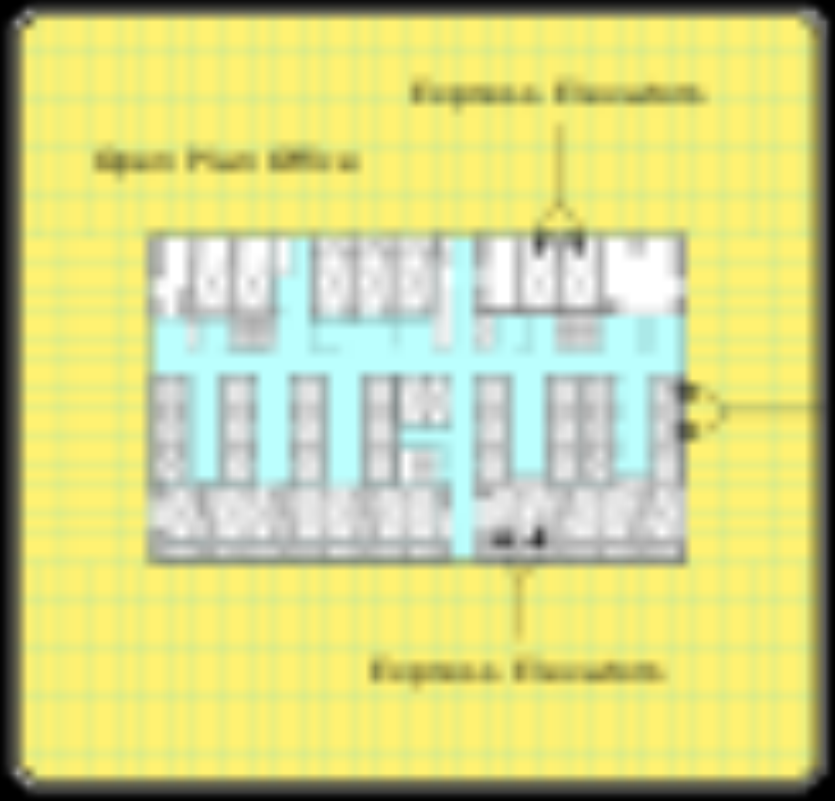
(66) Transport Systems

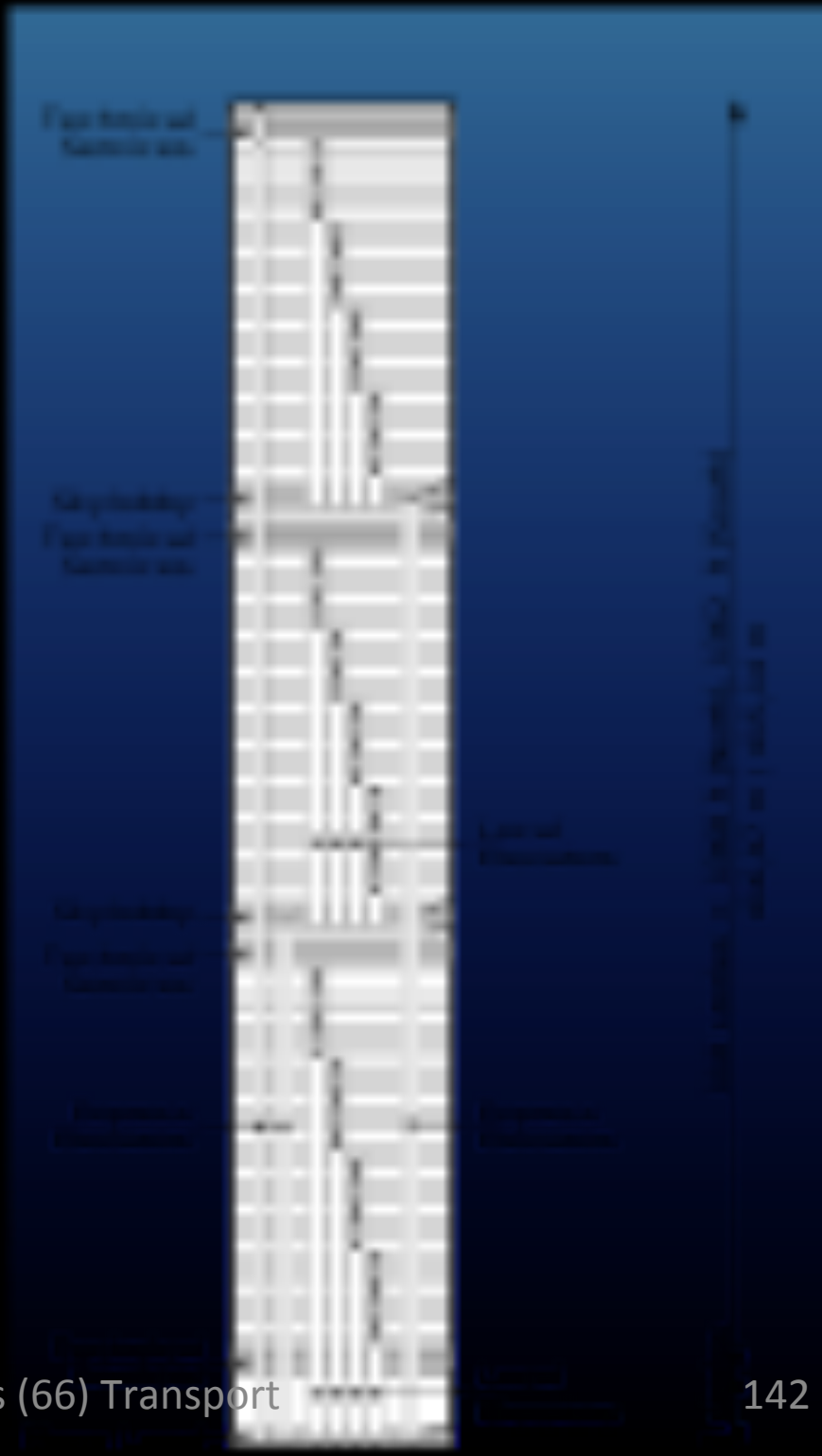
Mechanical vertical and diagonal movement

Tall buildings and Lift Cores
Time and Space saving

- The taller the building the more lifts are needed to handle people at peak times
  - Canary Wharf Towers (CWT) 10,000 staff and many visitors
  - World Trade Centre (WTC) 25,000 staff and 5,000 visitors each
- If all lifts can stop at many floors
  - many lifts are needed
  - more time is needed to make a lift journey
- If lifts have dedicated destinations (CWT)
  - ranges for floors
  - not stopping at others on route
  - Less lifts are needed
- If sky concourses are created (WTC)
  - where transfers to other lifts can occur
  - Then many more lifts can ride in the same lift shaft
    - in low, mid or upper zones
  - At each concourse lifts have dedicated destinations (CWT style)
- Concourses can include coffee lounges and meeting rooms

System Design Concept





X10 X11 Energy Cost Saving

Unless put to sleep manually: on 24/7 Hrs/days/week

London Kings Cross station platform escalators

Lifts/Elevators/Escalators/Moving pavement

can be set to auto shut-down when not in use/low traffic

Lifts stop closest to highest potential demand

Lifts lights off, lift car controls off

Landing lift call buttons remain on to reactivate

Escalators slow/stop, lights-down/off

Still asks ‘has he turned me on yet’

‘ready for action when he does’

Stand-by red light function

Never completely inactive, never zero demand

Classification

CI/SfB: Information Library, Manufacturer's Literature, CAD layering, Drawing numbering

- (66.1) Lifts,
- (66.4) Escalators,
- (66.5) Moving pavements

CAWS: Specification Work Sections

- **X10 Lifts,**
- **X11 Escalators,**
- **X12 Vertical Platform Lifts,**
- **X13 Powered Stair lifts,**
- **X14 Fire Escape Chutes/slings,**
- **X15 Moving Pavements**

X10 Lifts are disablers

Just like flying, lifts are no-go areas for some susceptible people

They only need to stuck in a faulty lift for a short while for panic to set in

Some choose to walk up but there is a limit to the number of floors

Glass lifts in tall atrium or facing the outside world are just as disabling if not more so

First Principles

Function of a lift:

- Provision of vertical transportation between building floors, levels or decks for both people, people and goods or goods alone

- Provision of vertical circulation for wheelchair and other non-ambulant building users

- Provision of ingress/egress for fire fighting and evacuation purposes

Key Building Regulations

The Building Regulations 2010

Access to and use of buildings

APPROVED DOCUMENT

M

The Building Regulations 2010

Protection from falling, collision and impact

APPROVED DOCUMENT

K

The Building Regulations 2010

Fire safety

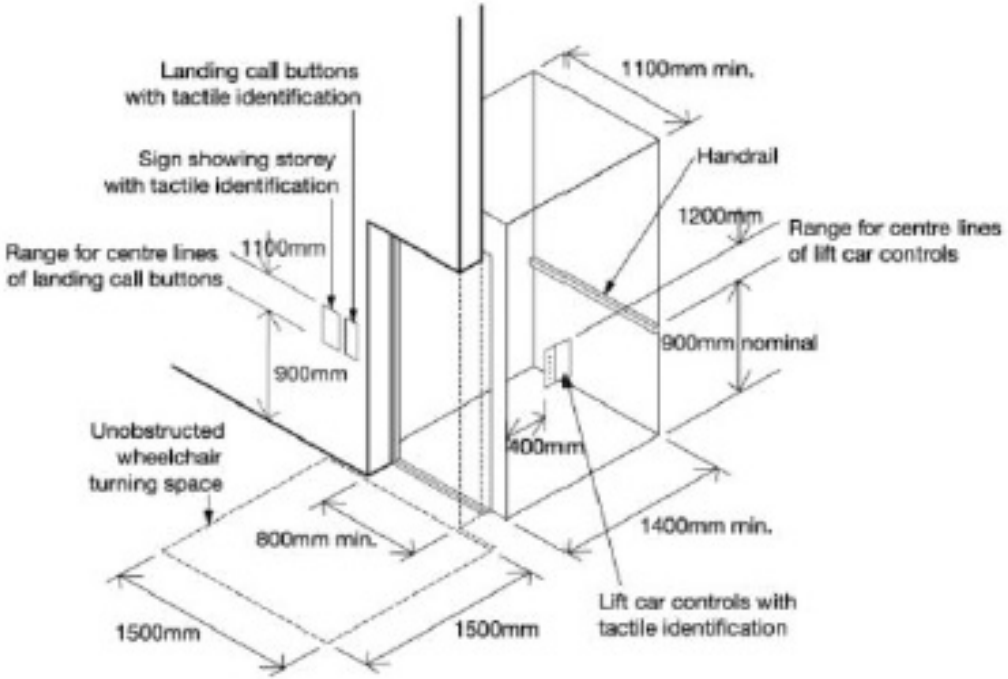
APPROVED DOCUMENT

B

VOLUME 1 – DWELLINGHOUSES

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

Approved Document M



reached and where in a bank of lifts it is located.

3.32 The use of visually and acoustically reflective wall surfaces can cause discomfort for people with visual and hearing impairment.

3.33 Where planning allows, lift cars (used for access between two levels only) may be provided with opposing doors to allow a wheelchair user to leave without reversing out.

Provisions

3.34 Passenger lifts will satisfy Requirement M1 or M2 if:

a. they conform to the requirements of the Lift Regulations 1997, SI 1997/831 (**Note:** These regulations may be met by compliance with, among other things, the relevant British Standards, EN 81 series of standards, in particular BS EN 81-70:2003 Safety rules for the construction and installation of lifts. Particular applications for passenger and good passenger lifts, or where necessary, by product certification issued by a Notified Body);

b. they are accessible from the remainder of the storey;

c. the minimum dimensions of the lift cars are 1100mm wide and 1400mm deep (see Diagram 11);

d. for lifts of a size that does not allow a wheelchair user to turn around within the lift car, a mirror is provided in the lift car to enable a wheelchair user to see the space behind the wheelchair;

e. power-operated horizontal sliding doors provide an effective clear width of at least 800mm (nominal);

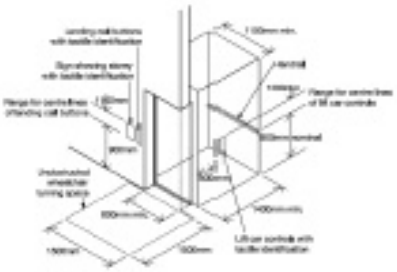
f. doors are fitted with timing devices and re-opening activators to allow adequate time for people and any assistance dogs to enter or leave;

g. car controls are located between 900mm and 1200mm (preferably 1100mm) from the car floor and at least 400mm from any return wall;

h. landing call buttons are located between 900mm and 1100mm from the floor of the landing and at least 500mm from any return wall;

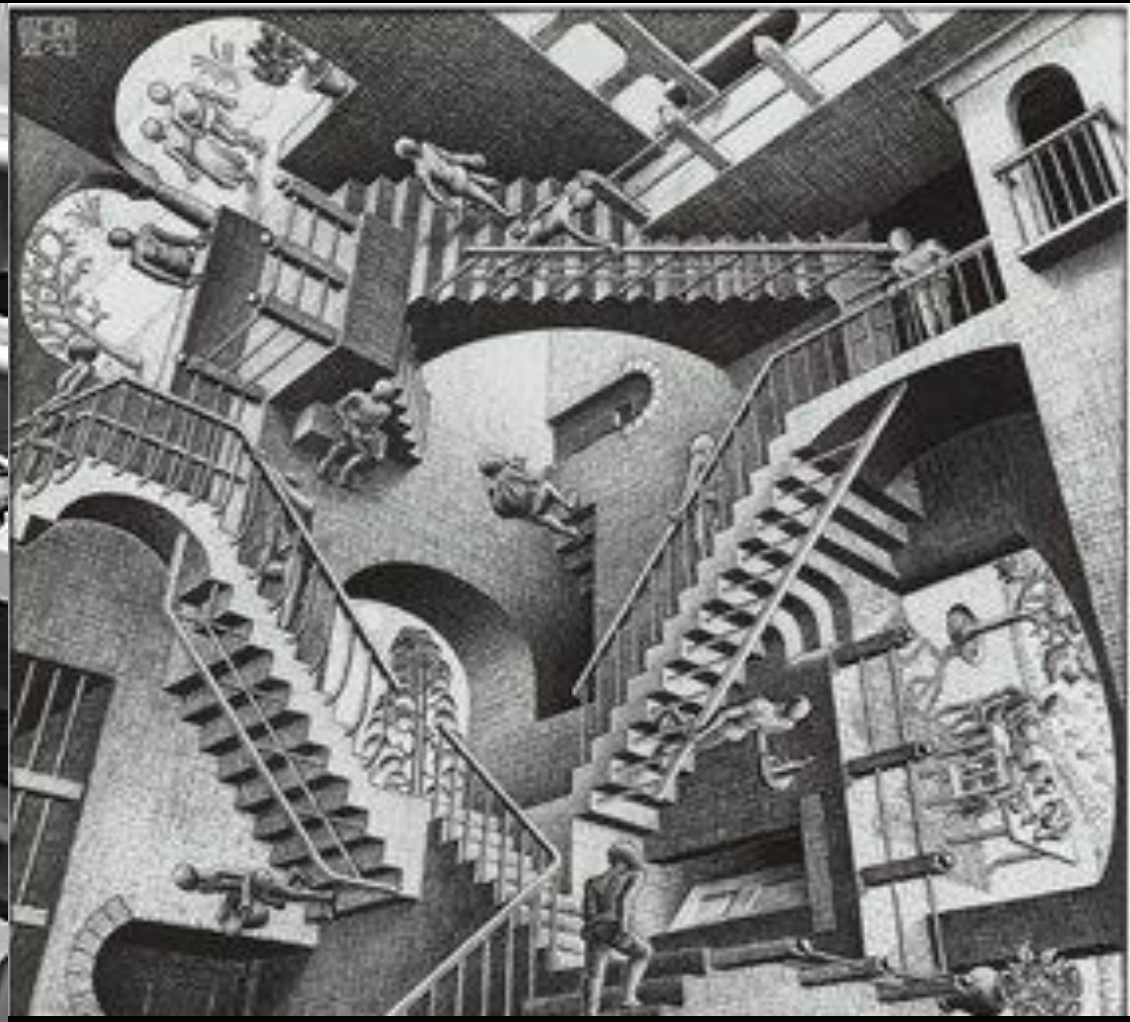
i. lift landing and car doors are distinguishable visually from the adjoining walls;

Diagram 11 **Key dimensions associated with passenger lifts**



Stairs/Escalators as Fantasy

MC Escher invented the multi-dimensional gravity defying stairs
JKR imagineered the articulated stairs
HP and colleagues had the advantage of many optional routes across the stair well
Stairs can be replaced by fantasy escalators (on all the time?)
    RR Lloyd Building London
    NF Willis Faber Dumas Ipswich



L30 Stairs as Playground

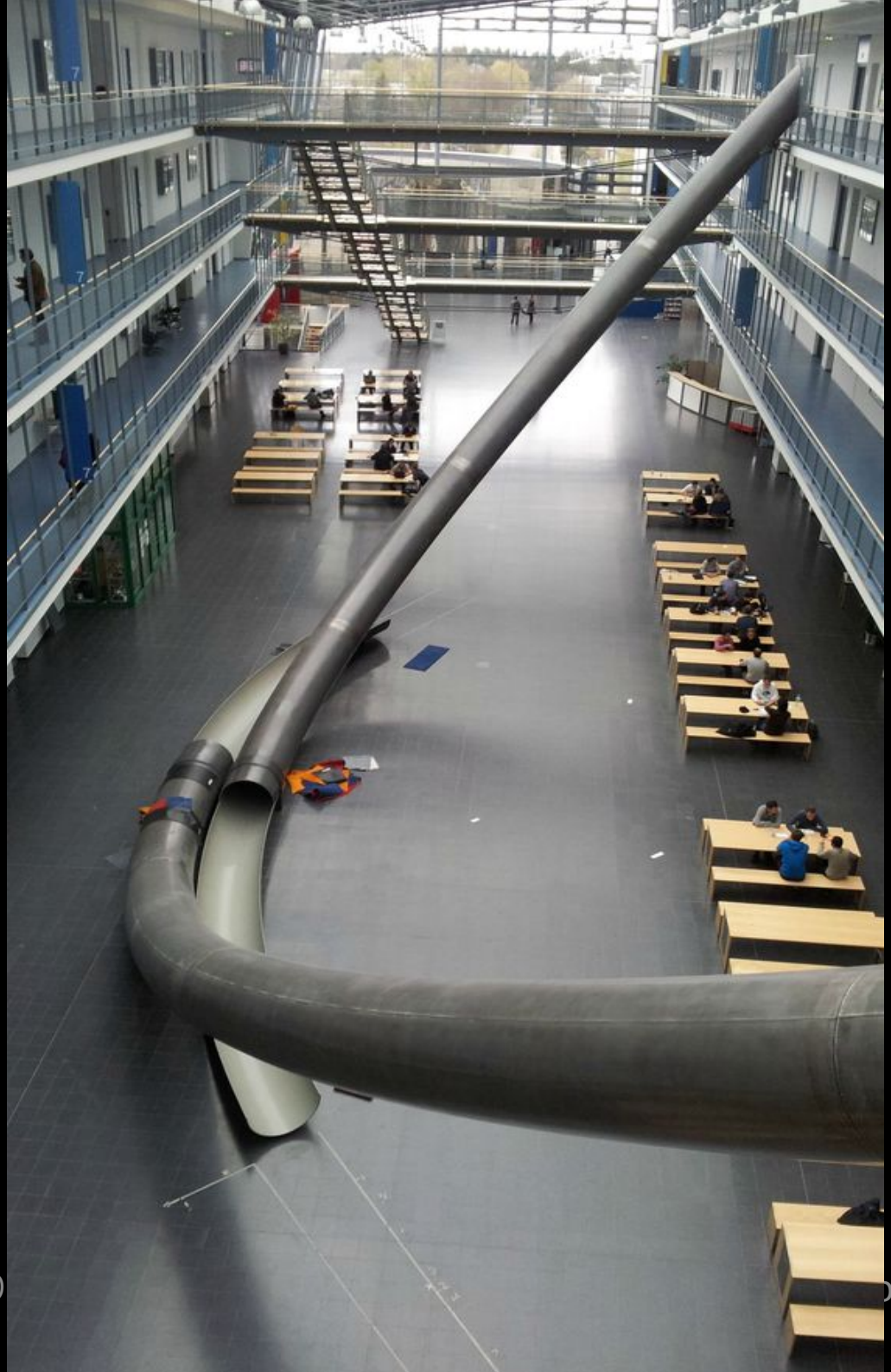
- Stairs and Slides integrated
  - For kids and adult ‘inner kids’
  - Progressive companies
- Stairs with concentric slides
- Snakes and Ladders
  - Climb stairs
  - Slide down

X10 Lifts out of bounds in a fire

If lifts are turned off or fail-safe in a fire
you could be trapped in the line of fire or smoke
- ‘fail-safe’ does not seem to apply
- Never use lifts in a fire

Fire fighting lifts are dedicated lifts
- isolated from normal ‘fire-off’ functions
- They need to be more robust internal finishes

Most people die of smoke rather than fire,
- with a few exceptions:
- Summerland burning plastics droplets
- Grenfell combustible plastic insulation then combustible interiors and home contents



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