

2	STATIONS	3
2.1.	SPATIAL DESIGN	3
2.1.1.	General Guidance	3
2.1.2.	Station forecourts	3
2.1.3.	Entrances, exits and doors	4
2.1.4.	Station lighting	4
2.1.5.	Ventilation	4
2.1.6.	Information displays	5
2.1.7.	Booking offices and other retail outlets	5
2.1.8.	Stairways, steps and ramps	5
2.1.9.	Escalators, passenger conveyors and lifts	6
2.1.10.	Layout, alighting areas and passenger flows	6
2.1.11.	Escalators and passenger conveyors	6
2.1.12.	Escalator and passenger conveyor emergency facilities	7
2.1.13.	Escalator and passenger conveyor fire precautions	7
2.1.14.	Escalator and passenger conveyor cleaning and maintenance	7
2.1.15.	Lifts	7
2.1.16.	Lift emergency facilities	7
2.1.17.	Non-public areas and facilities	8
2.1.18.	Machine and plant rooms	8
2.2.	PLATFORMS	9
2.2.1.	General Guidance	9
2.2.2.	Platform layout	9
2.2.3.	Platform construction	9
2.2.4.	Platform lighting	10
2.2.5.	Monitoring of train boarding and alighting	10
2.2.6.	Protective fencing	11
2.3.	TERMINUS FEATURES	12
2.3.1.	Buffer stops and platform arrangements	12
2.4.	EVACUATION	13
2.4.1.	Fire at the station	13
2.4.2.	Fire on a train at a platform	13
2.4.3.	Escalator and passenger conveyor emergency facilities	13
2.4.4.	Lift emergency facilities	13
2.4.5.	Information displays and public address systems	13
2.5.	FIRE PRECAUTIONS	15

2.5.1.	General precautions	15
2.5.2.	Rendezvous points	15
2.5.3.	Additional fire prevention and environmental control facilities for underground stations	15
2.5.4.	Additional fire-fighting provisions for underground stations	16
2.6.	CONTROL	17
2.6.1.	Station control room	17
2.7.	SUB-SURFACE STATIONS	18
2.7.1.	Additional general guidance	18
2.7.2.	Additional guidance for platforms	18
2.7.3.	Lighting	19
2.7.4.	Ventilation	19

2 STATIONS

2.1. SPATIAL DESIGN

Principle 2.1 Spatial design

Stations should provide for the free and safe movement of all the people who may occupy them.

2.1.1. General Guidance

- 2.1.1.1. This section provides general guidance for the spatial design of all stations. Additional guidance for sub-surface (including underground) stations is set out in section 2.7. The guidance given in section 2.7 may also apply to new surface stations and to existing surface stations where they are altered by building over or otherwise covering over a significant part of the station.
- 2.1.1.2. The public areas of stations should allow the free movement of passengers. These areas, which include passageways and stairways etc, should be designed, subject to the minimum dimensions given in this guidance, for the foreseeable peak passenger usage, with due allowance for operational difficulties in emergency conditions.
- 2.1.1.3. Allowance should be made for the surge of passengers arriving by trains, for the presence and movement of passengers carrying luggage, those accompanied by children and those with other mobility impairments.
- 2.1.1.4. Changes in the width or direction of passageways which could cause constriction of passenger flow routes or congestion should be avoided.
- 2.1.1.5. Vehicles and mechanical plant should be segregated from the passenger areas so far as is reasonably practicable.
- 2.1.1.6. Stations should be durable and easy to inspect, maintain and clean. Where it is intended to clean any part of a station while the station is in use, then adequate provision should be made to ensure that this does not disrupt the functioning of the station.
- 2.1.1.7. All floors, steps, treads etc should be designed taking into account environmental conditions, contamination and cleaning to minimise the risks of slipping and tripping.
- 2.1.1.8. All areas open to the outside environment should have adequate means for draining water and prevention of ponding.
- 2.1.1.9. The headroom in all passenger areas of stations should be not less than 2500mm. Equipment or signs should not reduce headroom below 2300mm.
- 2.1.1.10. Any obstructions in public areas such as columns, posts, seats etc should be clearly visible and minimise the risks to the visually impaired.
- 2.1.1.11. Train servicing equipment should not cause an obstruction to the normal or emergency movement of people about the station or present a hazard when being used.
- 2.1.1.12. Provision shall be made for passengers with disabilities to have access to stations. This provision shall be in accordance with the relevant legislation and other standards as required by the RSC.
- 2.1.1.13. The way passengers will be dispersed (in both normal and emergency situations) outside the station should be considered, as well as assembly points for evacuated staff.
- 2.1.1.14. Fencing or balustrades protecting the edges of areas where passengers pass beneath should not be less than 1800mm high and should be continuous without significant gaps.

2.1.2. Station forecourts

2.1.2.1. Station forecourts and approaches should provide:

- (a) safe access to the station for people;
- (b) safe access to the station for intended road vehicles including the emergency services;

- (c) safe boarding and alighting from road vehicles; and
- (d) segregation of road traffic, pedestrians and trains.

2.1.3. Entrances, exits and doors

- 2.1.3.1. All entry and exit routes should be clearly signed. Normal entrances may be suitably signed and designated as emergency exits. The exits should be designed to ensure the integrity of the means of escape to allow the station to be evacuated safely.
- 2.1.3.2. Escape routes should discharge to a place of safety which, where reasonably practicable, should be outside the station premises. Where appropriate, exit routes should be protected from the effects of fire and smoke.
- 2.1.3.3. Doors should be avoided in all main circulation areas and passenger flow routes. Doors may be used to control passenger flow and environmental conditions in other areas such as passenger waiting rooms, catering and shopping areas. Doors should not be provided adjacent to escalators, passenger conveyors and exits from lifts.
- 2.1.3.4. Where doors are provided, due consideration should be given to:
 - (a) the free flow of passengers normally and in an emergency;
 - (b) bi-directional flow;
 - (c) the failure modes of power-operated doors and equipment;
 - (d) facilities for people with disabilities and mobility impairment.
- 2.1.3.5. Glass screens and doors should be suitably marked to ensure visibility to all users including the visually impaired. Where trolleys or mechanical plant are to be used, suitable barriers should be provided to protect glass screens.
- 2.1.3.6. Where automatic ticket gates or barriers are provided consideration should be given to:
 - (a) the number of gates for each flow of passengers taking into account all normal and abnormal passenger flows;
 - (b) the means of overriding the gates when they fail as large numbers of people wishing to pass through them can build up very quickly;
 - (c) there should be a means of controlling the gates in an emergency to either prevent movement through them or allow free access through them dependent upon the situation;
 - (d) there should be a staffed manual access/egress gate for passengers with prams, bulky luggage, wheelchairs etc close to every set of automatic ticket gates.

2.1.4. Station lighting

- 2.1.4.1. All station premises to which people have access during the hours of darkness should be adequately lit. Areas to which passengers have access, including footbridges, subways, passages, stairways, steps, ramps and escalators, should be permanently lit when there is no daylight while the station is open.
- 2.1.4.2. Lighting levels should be graduated as required for comfort, safety and monitoring. Abrupt changes in illumination level should be avoided. The level of illumination should enable the train crew to have a uniform view of platforms both on approach, and through monitors and mirrors where provided.
- 2.1.4.3. Emergency lighting should be provided in accordance with IS 3217:1989 Code of Practice for Emergency Lighting and other current European Standards subject to the approval of the RSC.
- 2.1.4.4. The station name should be conspicuously shown at intervals along all platforms and the name boards should be lit when the station is open during the hours of darkness. The name boards should be visible to people on a train and their sighting not impaired by waiting passengers.

2.1.5. Ventilation

- 2.1.5.1. The means of ventilation should be capable of maintaining a supply of fresh air and an air temperature in the enclosed public areas of the station of no greater than 25°C or no more than

5°C above outside ambient temperature when this exceeds 20°C whichever is the greater.

2.1.5.2. Station ventilation should, as appropriate:

- (a) have means of maintaining a safe environment and escape routes for a sufficient period of time to enable evacuation of the station;
- (b) have means of purging smoke from public and non-public areas once evacuation has been completed;
- (c) have means of purging emissions from trains to minimise exposure of people to substances hazardous to health;
- (d) and be simple to operate from a central service control room and locally at the station;

2.1.5.3. Where complex ventilation systems are installed, computer-aided decision-making as to the most appropriate mode of operation may be required.

2.1.6. Information displays

2.1.6.1. Passenger information displays should be located so that passengers seeking information do not obstruct the free flow of other passengers. They should be designed such that they do not confuse or distract the drivers of trains approaching or leaving the platform.

2.1.7. Booking offices and other retail outlets

2.1.7.1. People using booking offices and other retail outlets should not obstruct the free flow of other people using the station. This is of particular importance where queues or crowds may develop at the sales counter.

2.1.7.2. People using the retail outlet should not encroach on the effective platform area needed for passengers waiting at or walking along the platform where the outlet is situated on or close to a platform.

2.1.7.3. The nature of the activity carried on in the retail outlets should be such that it does not introduce significant risks to the station area in which it is situated or any other part of the station. Particular hazards may be those associated with hot food outlets where substantial heat and fumes are generated as part of the normal business activity.

2.1.7.4. The means of servicing the retail outlet both goods and supplies inwards and refuse outwards should be such that it does not conflict with passengers or people on business.

2.1.7.5. Booking offices and other retail outlets should have additional public information and emergency information systems for those using them where the general station systems are inadequate.

2.1.8. Stairways, steps and ramps

2.1.8.1. Stairways, steps and ramps should be of uniform and adequate width to avoid overcrowding, and should not be obstructed by any transverse barrier. The available width should not be reduced in any way by any erection or obstruction. Stairways, steps and ramps should have anti-slip surfaces.

2.1.8.2. Where a stairway or a ramp leads directly towards a platform edge, a barrier should be provided beyond the run-off landing if the distance to the platform edge is less than 5000mm.

2.1.8.3. The steps of all stairways should be of uniform design and in the first instance complying with Building Regulations Technical Guidance Document K 'Stairways, Ladders, Ramps and Guards'. Where the route is expected to be used by people with disabilities then the requirements of Building Regulations Technical Guidance Document M 'Access for People with Disabilities' should be complied with. The edge of treads should be conspicuously marked.

2.1.8.4. Intermediate landings should be provided between flights of steps in stairways. The maximum number of steps in each flight should normally not exceed 16, but in cases of physical constraint a single flight of steps with an overall rise of 3000mm is acceptable. The length of the top, intermediate and bottom landings should be at least equal to the width of the widest section of the staircase between handrails. Where the flights of steps are expected to be used by people with disabilities the requirements of Building Regulations Technical Guidance Document M 'Access for People with Disabilities' should be complied with.

- 2.1.8.5. Stairways and ramps should be provided with continuous handrails on both sides, in accordance with the dimensional requirements of Building Regulations Technical Guidance Document M 'Access for People with Disabilities'. Handrails should present a round surface for easy use by the disabled. They should extend beyond the last step or the end of a ramp and be suitably terminated, provide clear passage of the hand from end to end. Any handrails provided should not afford stepping purchase or unauthorised access at places where this might give rise to danger.
- 2.1.8.6. Stairways and ramps should be at least 1200mm wide between handrails to accommodate passengers with luggage. Where ramps are likely to be used by people with wheelchairs at busy stations they should be at least 2m wide between handrails. Wider stairways and ramps should have intermediate handrails so that the distance between handrails is not less than 1200mm or more than 2400mm.
- 2.1.8.7. Ramps for passenger access should normally be provided in accordance with the requirements of Building Regulations Technical Guidance Document M 'Access for People with Disabilities' except where this document stipulated a standard of construction. Ramps should be constructed at a gradient not steeper than 1 in 20. In case of difficulty however, and where ramps are not to be regularly used by people with disabilities, they may be at a slope of 1 in 12.
- 2.1.8.8. A change in direction or an offset should be provided at every second landing for ramps with a gradient not steeper than 1 in 20 and at every landing for steeper ramps.
- 2.1.9. Escalators, passenger conveyors and lifts**
- 2.1.9.1. Lifts, escalators, and passenger conveyors should be installed so that the ambient environmental conditions of their machinery and controls are maintained within the working limits specified by the manufacturer. If not within a building they should be protected against the effects of the weather. Measures may also be necessary to protect them from materials, such as salt and sand, used in icy conditions.
- 2.1.10. Layout, alighting areas and passenger flows**
- 2.1.10.1. The positioning of escalators, passenger conveyors and lifts should be integrated with passenger flows throughout the station.
- 2.1.10.2. The layout of escalators and passenger conveyors should be designed to avoid passengers being transported into an area already blocked by other passengers. Particular care may be required where failure of ticket barriers may cause congestion, or where failure of an onward escalator may cause congestion of an intermediate landing. Sufficient waiting areas should be provided at lifts to avoid obstruction of other passenger flows. There should be no change of direction of any passageway within 2000mm of lift doors.
- 2.1.10.3. Escalator landings with multiple exits should be big enough to accommodate hesitant passengers seeking direction signs before proceeding.
- 2.1.10.4. Normally, escalator and conveyor landings and lift doors should not face a platform edge. Where escalators, conveyors or lifts discharge directly towards a platform edge closer than 5000mm, barriers should be provided.
- 2.1.10.5. No escalator, conveyor or lift should provide the sole means of access to or egress from any part of a station.
- 2.1.11. Escalators and passenger conveyors**
- 2.1.11.1. Status information for lifts, escalators and passenger conveyors should be displayed in the appropriate station control room/control point. For escalators and passenger conveyors this should comprise indications of the direction of running, whether it is stopped and if an emergency stop device has been operated. For lifts, an indication should be given of the operation of the passenger alarm button.
- 2.1.11.2. All escalators and passenger conveyors should comply with EN 115 Safety rules for the construction and installation of escalators and passenger conveyors. The special requirements specified for Public Service application apply to all escalators and passenger conveyors which form part of the passenger flow routes. In addition, the following specific options and

interpretation of EN 115 apply:

- (a) the angle of inclination should not exceed 30° for escalators, and not normally exceed 5° for conveyors;
- (b) the minimum width of treadway for escalators and passenger conveyors should be not less than 1000mm. The minimum width should be at least 1400mm for passenger conveyors where passenger trolleys are permitted;
- (c) where an escalator is installed in a shaft with a curved roof, the overhead clearance at the centre of the nose of the steps should be at least 2300mm, but where necessary, a clearance over the ends of the steps of 2200mm may be permitted. On reconstructed escalators some reduction of these clearances may be permitted with the agreement of the RSC;
- (d) the horizontal distance between the outer edges of the handrail and the adjacent wall should be not less than 150mm. This clearance should be maintained up to a height of at least 1700mm above step level. The emergency stop buttons may be situated within this width, but not within 80mm of the handrail; and
- (e) all escalators, regardless of the rise, should be equipped with an auxiliary brake.

2.1.12. Escalator and passenger conveyor emergency facilities

- 2.1.12.1. The emergency stop devices, provided in accordance with EN 115, should stop only the escalator or conveyor to which they refer unless a second escalator or conveyor is directly cascading passengers toward the stopped escalator or conveyor. In this case the second escalator or conveyor should also stop. It should be clear to which escalator or conveyor each stop device refers.
- 2.1.12.2. All equipment necessary to release trapped people or animals should be provided near to each escalator or passenger conveyor, or group of escalators or passenger conveyors, and should be easily accessible to station staff.
- 2.1.12.3. Effective barriers should be provided to deter public access to escalators or conveyors when necessary. Where any escalator or conveyor is used as a means of escape in an emergency, the barrier should be provided with an emergency push through facility. Whenever an escalator is made unfit for use as a stairway, barriers to deny access should be provided.
- 2.1.12.4. Any unplanned stoppage of an escalator or passenger conveyor should give an audible alarm.

2.1.13. Escalator and passenger conveyor fire precautions

- 2.1.13.1. Escalators and passenger conveyors should be fitted with effective fire detection and suppression equipment. The equipment should be in accordance with the relevant European Standards.

2.1.14. Escalator and passenger conveyor cleaning and maintenance

- 2.1.14.1. Access should be provided to the underside of escalators to facilitate maintenance inspection and cleaning while allowing the stationary escalator to be used as fixed stairs. Access to inspection chambers or equipment rooms should not block the end of the escalator or obstruct parallel escalators or stairs which remain in use.
- 2.1.14.2. Where alternative routes exist and provide sufficient capacity for passenger flows or there is time for maintenance to be undertaken when the station is closed, different arrangements may be acceptable.

2.1.15. Lifts

- 2.1.15.1. All passenger lifts should comply with the relevant parts of EN 81 Safety rules for the construction and installation of lifts and service lifts. Where lifts are required for evacuation in case of fire or to provide access for emergency services they should comply with the specific parts of EN 81 and BS 5588 Fire precautions in the design, construction and use of buildings or alternative standards subject to the approval of the RSC.

2.1.16. Lift emergency facilities

- 2.1.16.1. All passenger lifts should comply with BS 7255 Code of practice for safe working on lifts, or

alternative standard subject to the approval of the RSC, and allow for the emergency release of lift passengers. The following specific interpretation of the emergency release requirements of BS 7255 should be adopted:

- (a) each lift car should be provided with an alarm button at low level and a means of two-way speech communication, both connected to a location which is continuously staffed when passengers may be using the lift. These devices should be powered from a supply that is independent of the main lift supply. Where the lift is provided with dual supplies, this may provide an acceptable alternative;
- (b) emergency lighting with a duration of at least 3 hours should be provided in all lift cars and connecting corridors, subways, and bridges. This should be illuminated automatically on failure of the main supply; and
- (c) two-way speech communication should be provided between the lift car and the location from which the emergency release is controlled.

2.1.16.2. Any unplanned stoppage of a lift should give an audible alarm.

2.1.17. Non-public areas and facilities

2.1.17.1. Non-public areas should be segregated from public areas and appropriate arrangements made to prevent unauthorised access.

2.1.18. Machine and plant rooms

2.1.18.1. Machine rooms, including escalator inclines, should be adequately lit and include emergency lighting.

2.1.18.2. A means of communication with the control room/control point should be provided.

2.1.18.3. Appropriate fire detection and suppression systems should be provided in machine rooms and on escalator inclines. All fire detection systems should be linked to the main station fire alarm system.

2.1.18.4. An effective means of alerting staff inside a machine room to activation of any fire alarm on the station may be necessary.

2.1.18.5. The appropriate safeguards should be provided to prevent people coming into contact with the dangerous moving parts of machinery in machine rooms.

2.2. PLATFORMS

Principle 2.2 Platforms

Platforms should be designed for safety of access and safe waiting, boarding and alighting conditions for all passengers, including those of impaired mobility.

2.2.1. General Guidance

2.2.1.1. This section describes measures that are applicable to all station platforms. Additional guidance applicable to sub-surface (including underground) platforms is given in Section 2.7. The guidance given in Section 2.7 may also apply to new surface stations and to existing surface stations where they are altered by building over or otherwise covering over a significant part of the platform(s).

2.2.2. Platform layout

2.2.2.1. No platforms should be built adjacent to lines where the line speed exceeds 200 km/h except where special measures are provided see section 2.2.3.11.

2.2.2.2. Where reasonably practicable, stations should be constructed with straight platforms and on the level or on a gradient not steeper than 1 in 500. Minor stations, at which trains do not terminate or reverse, may be built on steeper gradients where suitable arrangements can be made to ensure safety, subject to the agreement of the RSC. Where a platform cannot be located on a straight alignment, a risk assessment subject to RSC approval should be carried out to ensure proposed mitigation measures are adequate.

2.2.2.3. The location of station buildings and platform canopies should take account of the need for the sighting of signals and other signs required for the safe operation of trains.

2.2.3. Platform construction

2.2.3.1. Platforms should be long enough to accommodate the longest train booked to call at the station plus an allowance for inaccurate stopping, normally 2 m (5 m at main-line stations and termini). Exceptionally, at existing stations, a shorter platform may be accepted provided that it is long enough to accommodate the majority of trains and special arrangements are agreed with the RSC for other trains. Where special situations exist, such as Automatic Train Operation or platform screen doors, the necessary stopping allowance and platform length should be agreed with the RSC.

2.2.3.2. The width of any platform should be adequate for the greatest number of passengers likely to use it at any time including emergencies, special events and occasions of train service disruption. Platform buildings or other obstructions such as vending machines should not cause undue restrictions to the movement of passengers. It may be necessary to allow extra width if the platform is to be used by passengers as a route between one part of the station and another (but see restriction in section 2.7.1.4). At busy stations, barriers may be required to prevent platforms becoming overcrowded.

2.2.3.3. Where it is not reasonably practicable to maintain a constant width of platform throughout its length, it may be reduced in width at its ends. The full width should be provided over the centre third of the platform length, or longer as necessary to include any main access.

2.2.3.4. Single-face platforms should not be less than 2500mm wide. Where trains pass a platform at speeds greater than 165 km/h, this minimum width should be increased to 3000mm.

2.2.3.5. Island platforms should not be not less than 4000mm wide. Where trains pass an island platform at speeds greater than 165 km/h, this minimum width should be increased to 6000mm.

2.2.3.6. All columns or other obstructions should be at least 2000mm clear of the platform edge. Where trains pass at speeds greater than 165km/h the distance for columns and other obstructions to the platform edge should be increased to 3000mm.

2.2.3.7. Platforms should have a clear headroom of at least 2500mm to structures and platform signs for a width of at least 2000mm from the platform edge over their whole length. This dimension may need to be increased where the floor level of any train is high relative to the platform. At distances greater than 2000mm from the platform edge, the clear headroom to suspended

equipment and signs may be reduced to 2300mm.

- 2.2.3.8. CCTV monitors or mirrors provided at the end of the platform to assist the train crew should be at least 750mm from the platform edge, conform with the standard structure gauge, and be at a sufficient height, or otherwise positioned so as not to restrict the movement of people. CCTV monitors or mirrors provided at intermediate locations along the platform should conform with the height and width given above.
- 2.2.3.9. Platforms should have a clearance to the swept envelope as detailed in section 1.5.5.8. This will normally be 50mm. The platform level should be determined taking into account all rolling stock using the platform.
- 2.2.3.10. The floor or step boards of passenger rolling stock should be as close as practicable to the platform. The distances between the platform edge and the floor or footboards of the passenger rolling stock should not exceed any of the following dimensions:
250mm vertically; or
275mm horizontally; or
350mm on the diagonal.
- These dimensions may only be exceeded when dispensation has been obtained from the RSC. Warning notices reading 'MIND THE GAP' with hatching along the platform edge, station announcements, staffing or other agreed measures, may be required.
- 2.2.3.11. Before platforms which are designated as part of a high speed line, i.e. the linespeed is 200km/h or more, are to be constructed, a method of meeting the needs of disabled persons to allow them to access the train and platform *without assistance* where it is reasonably practicable must be approved by the RSC. This can be achieved by a number of possible ways:
- (a) Rolling Stock solutions
 - (b) Infrastructure solutions
 - (c) Operational solutions

This particular guidance is derived from the High Speed Interoperability TSI. See section 2.1.1.12 for general requirements.

- 2.2.3.12. A 300mm wide recess should be formed beneath the platform coping and should be kept clear of cables and other obstructions to provide an emergency refuge. A wider recess may be necessary where there is a platform or other obstruction on both sides of a track.
- 2.2.3.13. All platforms should slope away from the adjacent track, have an anti-slip surface and be terminated with ramps at a gradient not steeper than 1 in 8. Where platform ramps lead to a barrow path used by passengers and people on business a shallower ramp should be provided. Platform ramps should be not less than 2000mm wide. Island platforms should slope towards the centre and away from both adjacent tracks with a means of drainage in the centre area.
- 2.2.3.14. Platform edges should be clearly defined with a strip of a lighter colour. An additional line at least 900mm from the platform edge should be provided together with 'KEEP BEHIND THIS LINE' marking, explanatory signs should be displayed. A tactile surface should indicate the approach to the edge to visually impaired people.
- 2.2.3.15. Platforms should be easily cleaned and avoid traps for debris to collect in.

2.2.4. Platform lighting

- 2.2.4.1. Platform lighting should be provided in accordance with Section 2.1.4.

2.2.5. Monitoring of train boarding and alighting

- 2.2.5.1. Facilities to monitor passengers boarding and alighting should be provided where workers responsible for ensuring that doors are clear or closed, before either closing doors or initiating the train departure process, cannot see the whole train due to the length of the train or curvature of the platform. These facilities should normally be either CCTV monitors or mirrors.

These facilities should provide complete coverage of the length of the train which cannot be seen directly by the workers.

- 2.2.5.2. Consideration should be given to ensure that low sunlight or glare from surfaces does not reduce the visibility of these facilities.

2.2.6. Protective fencing

- 2.2.6.1. The back edge of platforms not otherwise protected should be fenced to a height of at least 1500mm. Where seats or other items of platform furniture are placed close to the fence, the height of the fencing should be increased to give an effective height of at least 1500mm when standing on the raised surface of the seat or furniture where a fall over the fence of more than 2m would result.

- 2.2.6.2. Fencing or other protection should be provided at the end of a platform where there is no ramp.

- 2.2.6.3. Appropriate sign posting and anti-trespass measures should be provided at the boundaries of platforms and other areas to which the public have access. This sign posting and the anti-trespass measures should deter passengers and people on business from leaving the station other than by designated routes.

2.3. TERMINUS FEATURES

Principle 2.3 Terminus features

Station arrangements should prevent danger to people from a train over-running any dead-end track.

2.3.1. Buffer stops and platform arrangements

- 2.3.1.1. Normally, energy absorbing buffer stops should be provided at terminal stations or bay platforms. The buffer stop should be designed to stop the heaviest train from its determined impact speed without the risk of serious injury to people on the train or platform while avoiding excessive deceleration of other lighter trains.
- 2.3.1.2. Buffer stops should be compatible with the train design and should normally be designed to bring a train carrying passengers to a halt in a controlled manner with an average retardation rate not exceeding 15% g (1.47 m/sec²). A greater average rate of retardation up to 25% g (2.45 m/sec²) may be permissible provided a risk assessment considers the consequences of a collision for the passengers and other people who may be at risk. Of particular significance when considering a greater rate of retardation will be the internal arrangements of any particular train foreseeably using the platform, as these will determine the risks to passengers from luggage and seating etc in the event of a collision. The impact speed should be determined based on a consideration of track layout, approach speed, any automatic train protection, visibility and foreseeable misjudgement.
- 2.3.1.3. The positioning of the buffer stop should take into account the effects of adverse weather conditions or other external factors on the railhead condition and the distance needed to brake under varying conditions.
- 2.3.1.4. Premises, including kiosks and ticket collectors' booths which are normally occupied by staff or the public, or locations where people are likely to congregate should not be positioned within 20m from the face of buffer stops nor within a line 2000mm back from the platform edge. Similarly columns and other structural members supporting buildings or canopies overhead should not normally be positioned within 20m from the face of the buffer stops nor within a line 2000mm back from the platform edge. This provision may be relaxed if the train control and signalling system is designed to guard against buffer impact or there are physical containment measures taken beyond the buffer stop or a higher rate of retardation is specified for the trains at the station.
- 2.3.1.5. Where buffer stops are upgraded at existing stations a compromise may be required between the rate of retardation and the distance a buffer stop should be set back from the end of the platform if platform lengths are physically constrained beyond reasonably practicable measures to extend them.
- 2.3.1.6. Where a sub-surface railway terminates at a station, an adequate length of overrun tunnel should be provided.
- 2.3.1.7. A red light or reflective marker should be provided at fixed buffer stops to suit the requirements of signalling at terminal or bay platforms.

2.4. EVACUATION

Station design should allow safe evacuation of its foreseeable occupants in an emergency.

2.4.1. Fire at the station

2.4.1.1. The following conditions should be used for the design of escape capacity from a fire at the station:

- (a) Occupancy at the time of evacuation should be based on peak usage with 5 minutes delay to the scheduled train service in the busiest direction only;
- (b) The exit route with the greatest capacity should be discounted, as it could be blocked by fire;
- (c) Passengers waiting to board, plus those normally alighting from the next train in each direction should be evacuated;
- (d) Passengers should be able to clear each platform through the remaining exits and reach a protected route to safety within a specified time, acceptable to the RSC and the Fire Authority, after receiving the instruction to evacuate;
- (e) There should never be less than two escape routes from any part of the station to a place of safety.

2.4.2. Fire on a train at a platform

2.4.2.1. The following conditions should be used for the design of escape capacity from the station platform in the event of an emergency:

- (a) Occupancy at the time of evacuation should be based on peak usage with 5 minutes delay to the scheduled train service in the busiest direction only;
- (b) Passengers to be evacuated are all the occupants as defined in (a), plus all the occupants of a crush-loaded train (assumed on fire), plus those normally expected to alight from the next train in the other direction or on any other lines;
- (c) All exit routes may be counted as available for use but any escalators should be regarded as continuing to run in the same direction as before the emergency;
- (d) The passenger escape arrangements should assume passengers cannot pass along the platform or through the train past the source of the fire;
- (e) The passengers identified in (a) should be able to reach a protected route to safety within a specified time, acceptable to the RSC and the Fire Authority, from receiving the instruction to evacuate;
- (f) The size of escape routes to meet the objectives should be based on appropriate data on flow rates, the source of which should be documented;
- (g) A train is the most likely source of fire requiring evacuation of the greatest number of people through the station. If the fire is elsewhere, it is assumed the train will evacuate those on board;
- (h) Normally, for example, for a sub-surface station, the passengers should be able to clear each platform within 4 minutes, and reach a protected route to safety within 6 minutes.

2.4.3. Escalator and passenger conveyor emergency facilities

2.4.3.1. The guidance relating to escalators and passenger conveyors as emergency evacuation facilities is included in the part of the document relating to that equipment generally, see section 2.1.12

2.4.4. Lift emergency facilities

2.4.4.1. The guidance relating to lifts as emergency evacuation facilities is included in the part of the document relating to that equipment generally, see section 2.1.16

2.4.5. Information displays and public address systems

2.4.5.1. Where provided, passenger information systems which can display a variable message should be capable of showing evacuation instructions or other important information in an emergency.

They should be linked automatically to the operation of the alarm system or via the station information control system.

- 2.4.5.2. Similar arrangements should apply to any public address system which should be audible to all passengers and people on business.

2.5. FIRE PRECAUTIONS

Principle 2.4 Fire precautions

Stations should have fire prevention, detection and control measures that are appropriate to the risk.

2.5.1. General precautions

- 2.5.1.1. Where stations are relatively simple arrangements which have low passenger numbers, few enclosed spaces and are not underground, the principal fire precautions to be taken should be based on the passive design of the station. Factors such as choice of materials, exit routes etc should obviate the need for more sophisticated active systems such as surveillance equipment. The local Fire Authority and Building Control Authority should be consulted to obtain advice and ultimately a Fire Safety certificate where required.
- 2.5.1.2. The arrangements for means of escape from fire at all surface stations should be in accordance with Fire Safety in Places of Assembly (Ease of Escape), Regulations 1985 and Building Regulations Technical Guidance B 'Fire Safety'.
- 2.5.1.3. The public areas of the station and the choice of materials in public areas should be such as to keep the fire load and the smoke and toxic gas generation in the event of a fire to a reasonably practicable minimum. Public areas should be segregated from non-public areas.
- 2.5.1.4. The sub-division of the public area within larger stations by such devices as 'smoke-doors', whether normally open or closed, is not considered an appropriate method for the control of smoke during the period of passenger evacuation but may be appropriate to help in protection of escape routes. Smoke doors should not reduce exit widths or otherwise impede means of escape during evacuation. Means may be required to delay the closing of such doors while evacuation is in progress.
- 2.5.1.5. An electrical fire alarm should be provided which is capable of manual operation by the public or staff, and installed in accordance with the relevant IS 3218 Code of Practice for Fire Detection and Alarm Systems or alternative standard subject to the approval of the RSC. The public areas of the station should be provided with an effective system of surveillance and public address. Public address systems should be protected in the manner outlined in IS 3218 Code of Practice for Fire Detection and Alarm Systems or alternative standard subject to the approval of the RSC. Minor surface stations may be exempt from the requirements of this section subject to the approval of the Fire Authority.
- 2.5.1.6. The non-public areas of stations may require a warning or address system. An effective means may be necessary to alert staff inside plant and machine rooms to the activation of any station fire alarm.
- 2.5.1.7. At larger stations, radio/telephone networks should be provided allowing communication between any station control point and other staff on the station. The network should be compatible with emergency services communications equipment.
- 2.5.1.8. Retail outlets, if provided, should be in accordance with section 2.7.1.6.
- 2.5.1.9. Where ventilation systems are provided, they should be designed such that they can be controlled during an emergency to ensure that smoke does not hinder the evacuation of the station nor that fresh air feeds the fire, see section 2.1.5.
- 2.5.1.10. Facilities and systems for fire fighters should be provided in accordance with Building Regulations Technical Guidance Document B 'Fire Safety' and subject to approval by the Fire Authority.

2.5.2. Rendezvous points

- 2.5.2.1. At larger or complex stations, a rendezvous point for the emergency services should be identified in a place of safety which should be readily accessible to their vehicles. It should be conspicuously marked, have means of communication with the station control room, and plans of the station should be provided for the emergency services.

2.5.3. Additional fire prevention and environmental control facilities for underground stations

- 2.5.3.1. There are currently no stations in the Republic of Ireland which would be regarded as underground, although a few that are covered by large roofs may mean parts being treated as such. Consequently there is little national legislation or guidance applicable to the particular requirements and considerations which underground stations need for safe design and operation. In the absence of this and the developed UK regime (in part resulting from deficiencies in the regime prior to the Kings Cross fire disaster) the RSC will evaluate all proposals for development of underground stations with reference to UK practice.
- 2.5.3.2. Station compartmentation, fire detection and fire suppression should be in accordance with the principles of the UK Fire Precautions (Sub-Surface Railway Stations) Regulations 1989. Smoke from any such fire should be contained or controlled, by ventilation or other suitable means, at least for the duration of any evacuation.
- 2.5.3.3. The arrangements for means of escape from fire at all sub-surface stations should be in accordance with principles of the UK Home Office guidance in respect of the Fire Precautions Act 1971 for certifiable and non-certifiable premises in so far as it is applicable to stations.
- 2.5.4. Additional fire-fighting provisions for underground stations**
- 2.5.4.1. Fire precautions and fire-fighting provisions should be not less than the principles of those required in the UK Fire Precautions (Sub-Surface Railway Stations) Regulations 1989, with the following additions:
- (a) a fire-fighting shaft and, where disabled passengers have access to the station, means of escape for the disabled should be provided to all levels of the station in accordance with BS 5588. Such a shaft may also be counted as part of the means of escape for passengers;
 - (b) a falling fire main in accordance with BS 5306 Fire extinguishing installations and equipment on premises;
 - (c) where a train fire could create a high fire loading, a suitable system to minimise the intensity and rate of propagation of a train fire, such as a water drenching system installed above the location of a train at each platform, should be installed based on analysis of risk;
 - (d) Where a water drenching system is installed above the location of trains in platforms, the discharge heads should be operable only on command from the station control room or at platform level. Discharge may be zoned so only the appropriate heads are opened.

2.6. CONTROL

Principle 2.5 Control

Appropriate facilities should be provided to manage safety at any station in normal and emergency situations.

2.6.1. Station control room

- 2.6.1.1. All major surface and all sub-surface (including underground) stations should be provided with a control room or point from which the activities of the operation of the station can be co-ordinated.
- 2.6.1.2. The following facilities should be provided:
- (a) an emergency procedure information system;
 - (b) a means of monitoring fire detection systems including audible and visual alarms and means of co-ordinating and controlling all other fire safety features provided for the station;
 - (c) a means of summoning the emergency services;
 - (d) communication between station staff, other parts of the railway system and external agencies, including the emergency services rendezvous point (see section 2.5);
 - (e) appropriately zoned public address equipment;
 - (f) a means of monitoring the operation of, and controlling, any escalators, passenger conveyors, lifts, ticket barriers and other equipment which could influence the free flow of passengers;
 - (g) a means of selecting and controlling the various ventilation modes; and
 - (h) closed-circuit television (CCTV) monitoring of all public places in the station, including emergency exit staircases not normally used.
- 2.6.1.3. The station control room or point should be easily accessible to the emergency services via a protected route from the open air and be located, designed and constructed so that it can continue to function during an emergency. If this cannot be achieved, some duplication of facilities will be required at another point which is easily accessible and is in a safe location.
- 2.6.1.4. Where operating conditions permit, more than one station may be supervised from one station control room, but sufficient facilities should be provided at all stations to enable an emergency to be effectively managed.

2.7. SUB-SURFACE STATIONS

Principle 2.6 Sub-surface stations.

Sub-surface (including underground) railway stations should be designed and have facilities to address the particular dangers that they present to people.

2.7.1. Additional general guidance

- 2.7.1.1. This section provides additional guidance for sub-surface (including underground) railway stations. This guidance may also apply to new surface stations and to existing surface stations where they are altered by building over or otherwise covering over a significant part of the station or platform(s).
- 2.7.1.2. The public areas of the station should be designed for the free movement of passengers. The widths of platforms, passageways, stairways, escalators and passenger conveyors should be designed, subject to the minimum widths given in previous sections for the foreseeable peak passenger usage, with due allowance to prevent congestion being caused by extended intervals between trains.
- 2.7.1.3. Additional factors for consideration about sub-surface station design
- (a) Any congestion control measures which will apply in the event of a severe disruption of service;
 - (b) If the railway undertaking intends to carry passengers with disabilities, including those in wheelchairs, appropriate provisions such as lifts to all public levels should be incorporated;
 - (c) The arrangements for evacuation in an emergency;
 - (d) Access to platforms should be in accordance with guidance for platforms.
- 2.7.1.4. The flows of arriving and departing passengers should be separated so far as is reasonably practicable. Passengers moving from one part of the station to another should not be routed along any platforms. Means to warn passengers and deter them from entering either in an emergency or to prevent congestion should be provided at all entrances and exits to the station.
- 2.7.1.5. All rooms, platforms, escalators, lifts, staircases etc should have conspicuous and unique identification signs. All passenger routes to and from platforms should be clearly signed.
- 2.7.1.6. Retail outlets should not be located lower than the first ticket hall/concourse level accessible to the public, and should not be sited so as to cause congestion or obstruction of the passenger flows. They should have a fire detection system and fire-fighting equipment automatically operated by outbreak of fire in that part of the premises.

2.7.2. Additional guidance for platforms

- 2.7.2.1. Subject to the minimum dimensions below, platforms should accommodate the passengers waiting to board a train after a minimum of 5 minutes delay to the planned train service in the peak period.
- 2.7.2.2. Any single-face platform should be not less than 3000mm wide and any island platform not less than 6000mm wide. Exceptionally a minimum width from any obstruction of 2000mm may be permitted near to the extreme ends of the platforms.
- 2.7.2.3. The main structure of the station should provide a headroom of at least 3000mm over the whole length and width of platforms.
- 2.7.2.4. Separate entrances and exits should be provided and arranged to facilitate even loading of the platforms and rapid egress with minimum congestion or conflict. Normal entrances may be signed as emergency exits where appropriate, and counted as such in evacuation calculations. Additional widths of platforms may be required adjacent to entrances to and exits from the platform to avoid congestion at these places.
- 2.7.2.5. At least two alternative escape routes should be provided from each platform, with a travel distance of not more than 90 m between any two exits.
- 2.7.2.6. The length of any platform should be adequate for the longest train used on the line and include an allowance for the accuracy with which trains can be stopped at the platform. An additional

length beyond the stopping tolerance should be provided at both ends of platform to allow access to and from the track while a train is stopped at the platform.

- 2.7.2.7. A track adjacent to a platform accessible from the platform side only should have an emergency pit accessible from either end when a train is in the platform unless platform edge screen doors are provided, or where there is a clearance of at least 450mm between the track bed and all under-train equipment over a width of 600mm.
- 2.7.2.8. Platforms should be straight or, if unavoidable, curved at a radius not less than 1000 m.
- 2.7.2.9. Platform edge screens and doors should only be installed at stations on lines with automatic train operation and should be fully compatible with the rolling stock.
- 2.7.2.10. Platform screen doors should be designed to withstand crowd crush loading and should be of sufficient height to deter climbing. All platform edge screens should include means of access and egress from the track and adjacent tunnels.

2.7.3. Lighting

- 2.7.3.1. The station should be permanently illuminated in accordance with Section 2.1.4 when occupied and be provided with an adequate illumination system for evacuation with two independent power supplies.
- 2.7.3.2. For sub-surface stations emergency lighting should be in accordance with the principles of the UK Fire Precautions (Sub-Surface Railway Stations) Regulations 1989 , or other documentation subject to the approval of the RSC.

2.7.4. Ventilation

- 2.7.4.1. Station ventilation systems should include the following as appropriate:
- (a) a means to control smoke from retail premises;
 - (b) a means to accommodate the aerodynamic effects generated by trains passing through restricted spaces; and
 - (c) a smoke extraction system along the length of the platform railway tracks, designed to prevent smoke from a train fire spreading to the other parts of the station.