London Underground

Station planning standards and guidelines

2012 edition

MAYOR OF LONDON

Transport for London

UNDERGROUND

Contents

Foreword

Welcome to the 2012 edition of the Station Planning Standards and Guidelines (SPSG). This publication supersedes the previous edition dated November 2005 and contains changes to the structure, space planning parameters, scope, text and presentation.

SPSG forms a guide to the interpretation of London Underground's (LU's) Station Planning Standard number S1371 (formerly 1-371). This edition includes updates to the standard up to issue number A5.

The Station Planning Standard is LU's source document for space planning in stations. It establishes the requirements for all station works that affect passenger movement or that have an impact on overall station size. It also sets out the requirements for secondary revenue and public and staff facilities.

This new edition is intended to be more customer-focused, by offering clearer and more specific guidance and covering a wider range of station planning issues.

Research into station planning and policy issues is ongoing, and these may result in further updates whenever a need for change arises. It is a living document, and we would welcome any suggestions for improving it.

Gareth Powell
Strategy & Service Development, Director
May 2012

Application

1.1 Introduction

The purpose of this document is to define the space requirements for public areas and staff accommodation in stations.

This document establishes the requirements for all works to stations that affect passenger movement or that impact on overall station size. It also sets out the requirements for secondary revenue and public and staff facilities.

Its business objective is to provide customers and staff with access to train services at both new and existing stations in an attractive, safe and efficient environment and in a consistent and cost effective manner.

This 2012 edition builds on the previous SPSG, but contains changes to the space planning parameters, scope, text, layout and presentation.

Updates include the results of ongoing research into station issues, further additions to the scope, and any alterations that result from new legislation or the changing operational environment.

General planning advice is given, and the status of each clause (whether it is a standard or guideline) is clearly stated. The standards contained within SPSG are incorporated in Strategy & Service Development Standard S1371 – Station Planning – and the approvals and concessions process follows that of all Strategy & Service Development standards.

1.2 Scope and applicability

Scope

This document applies to the spatial aspects of station planning in the following areas:

- Public areas within stations
- Operational staff accommodation
- Evacuation

The aims of the document are to:

- Provide all the information required by an architect or other designer to produce an outline station design of sufficient detail to provide a plus 35 per cent cost estimate and to feed into a passenger modelling process
- Provide information that shall be used to identify the station 'footprint'

Compliance with this document will produce a station that has minimum congestion.

This document is not intended as a complete set of detailed design standards. Other standards are cross-referenced where necessary.

The standards within this document are contained within Strategy & Service Development Standard S1371, Station Planning. The document as a whole forms a Good Practice Guide, G-371A, within the suite of Strategy & Service Development standards, and complements all other LU standards, British Standards, and HMRI Railway Safety Principles and Guidance.

Applicability

This document applies to all stations, existing and planned, whether they are surface stations, enclosed stations (formerly known as 'Section 12'), heavily used central area stations, or lightly used outer suburban stations.

Space planning

Space for normal operations in stations shall be planned to:

- Minimise congestion
- Be resilient to surges in demand and train service disruption
- Provide sufficient non-passenger space to enable staff to function efficiently

Space planning, as defined in this standard, is based upon passenger density and the concept of 'levels of service' (see research by John J. Fruin Ph.D.). The methods that follow produce sufficient space to allow free flow of passengers through public areas and to give reasonable comfort in waiting areas. This level of space provision is considered to be economically optimal.

Station size shall be determined by the space requirements of all activities, eg ticket purchase, retailing, passage through the gateline, wayfinding, access to and from platforms, waiting for trains, boarding and alighting from trains and staff accommodation.

Station planning shall ensure that obvious routes with minimum travel distances, which are free from obstructions, have good lines of sight and avoid dead ends and hiding places.

The Equality Act (2010) includes provisions for all future stations to incorporate step-free access and other features to assist the mobility impaired. These provisions are required for new-build stations and significant works at existing stations, and most features will benefit all customers, not just disabled passengers. New stations or ticket halls should therefore be planned with the concept of full accessibility for all, rather than as an add-on facility. This means the entire route from street level to platform should become step-free, which is likely to involve the provision of lifts, ramps and level access between platform and trains at most stations. Where stations have more than one entrance, it is not necessary to provide step-free access at each of these.

Station entrances should be planned to promote easy interchange between modes, and have enough space available to incorporate information about other travel facilities (such as real-time 'Countdown' displays for buses). Where possible, they also incorporate sufficient space for leaving passengers to orientate themselves and plan their onward journey without obstructing those entering the station.

Staff accommodation is an important and often neglected area of station planning. Adequate staff accommodation enables a station to function efficiently and has a positive impact on staff morale and behaviour. It should be planned at the outset of any major station project.

Planning for hazards

There are two main elements to consider when planning for hazards:

- Command and control
- Emergency evacuation

Enclosed stations (formerly known as 'Section 12 stations') shall be equipped with a station operations room (SOR), which is either specific to that station or with a facility in the Station Supervisors Office that is linked to an SOR controlling a group of stations.

SORs shall be located in a clearly visible position at ticket hall level on the paid side of the Underground Ticketing System (UTS) gateline. The site shall give the best view of the ticket hall and any critical areas that are liable to become overcrowded, such as gatelines and the heads of escalators. Direct access to the SOR from the street via a fire-protected route, for use by emergency services, shall be provided.

For surface stations that would previously have been non-Section 12, there should be a Station Control Facility (SCF) within each station. Groups of stations may also be linked to a single control facility, and each individual station should have Passenger Help Point (PHP) facilities linked to that group SCF.

The aim in emergency evacuations is to clear the passengers to a place of safety within six minutes. Where possible emergency evacuation routes should be the same as those used in normal station operations. This is likely to be more cost effective than providing separate infrastructure and, more importantly, passengers will evacuate a station more quickly if they are familiar with the route.

Planning station facilities

Station facilities should be planned to maximise secondary income, but must do so without impeding passengers' journeys through the station.

More specifically:

- Retailing: opportunities should be maximised, but for fire safety reasons retailing in enclosed stations is restricted to ticket hall level
- Advertising/Sponsorship: this shall not interfere visually with directional signing, or reduce the impact of LU's corporate identity
- Secondary revenue items: these shall be located where they do not impede passenger flows
- Public toilets: stations shall be assessed for need on an individual basis, but toilets shall always be provided where step-free access from street to platform is available
- Platform furniture: platforms shall have adequate seating facilities, but these must not impede movement along platforms
- Cycle parking facilities: these shall be provided at stations where space permits

1.4 Approvals and concessions

Approvals

The standards contained within this document are contained within Strategy & Service Development Standard S1371 Station Planning, and are therefore mandatory.

The standards apply to both new stations and works at existing stations. They do not apply retrospectively.

The guidelines contained within this document are not mandatory and there is no approvals process for them. However, the guidelines represent best practice and the planning of all new station infrastructures should endeavour to meet them in full.

Advice on applying either the standards or the guidelines can be sought from the Station Planning Standards Manager.

Concessions

There may be circumstances in which it is not possible to meet the standards, in which case a concession must be sought, via the Safety, Quality and Environment (SQE) concession request process.

As the technical content manager of S1371 Station Planning, the Station Planning Standards Manager is responsible for granting concessions.

As the guidelines are not mandatory, there is no concessions process for them.

Passenger space planning

Space planning, as defined in this document, is based upon passenger density and the concept of 'levels of service'.

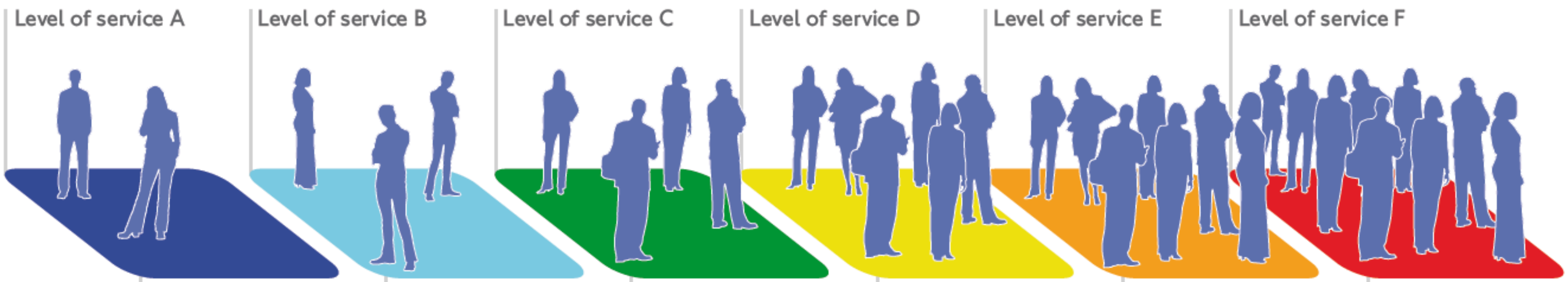
The table below shows the correlation between 'levels of service' and the quality of the passenger's space.

Level of service	Description (for queuing areas, walkways and stairways)
A	Free circulation.
B	Uni-directional flows and free circulation. Reverse and cross-flows with only minor conflicts.
C	Slightly restricted circulation due to difficulty in passing others. Reverse and cross-flows with difficulty.
D	Restricted circulation for most pedestrians. Significant difficulty for reverse and cross-flows.
E	Restricted circulation for all pedestrians. Intermittent stoppages and serious difficulties for reverse and cross-flows.
F	Complete breakdown in traffic flow with many stoppages.

2.1 Planning criteria (continued)

The methods that follow produce sufficient space to allow free flow of passengers through public areas and to give reasonable comfort in waiting areas.

The levels of service specified in the standard provide adequate levels of comfort without making stations uneconomically large.



Description (for queuing areas, walkways and stairways)	Level of service A	Level of service B	Level of service C	Level of service D	Level of service E	Level of service F
	Free circulation	Uni directional flows and free circulation. Reverse and cross flows with only minor conflicts	Slightly restricted circulation due to difficulty in passing others. Reverse and cross flows with difficulty	Restricted circulation for most pedestrians. Significant difficulty for reverse and cross flows	Restricted circulation for all pedestrians. Intermittent stoppages and serious difficulties for reverse and cross flows	Complete breakdown in traffic flow with many stoppages

Requirements

3.1 Introduction

Standard – General

Space for normal operations in stations shall be planned to:

a) Minimise congestion

b) Be resilient to train service disruption and surges in demand

c) Provide sufficient non-passenger space to enable staff to function efficiently

Station size shall be determined by the space requirements of all activities, eg ticket purchase, retailing, passage through the gateline, wayfinding, access to and from platforms, waiting for trains, boarding and alighting from trains and staff accommodation.

Station planning shall ensure that obvious routes with minimum travel distances, which are free from obstructions, have good lines of sight and avoid dead ends and hiding places.

New stations shall be designed to ensure that passengers with reduced mobility can move between street and train via step-free routes between levels, which comprise of lifts, ramps and level access between platform and trains.

3.2 Passenger flow data

Standard – Passenger flow data
The calculations for station areas shall use the average flow per minute that shall be derived from the peak 15 minutes flow. UTS gates are the exception, which shall be designed to cater for the average flow per minute derived from the peak five minute flow (see relevant section below). LU Passenger demand queries can be sent to **rods&countsqueries@tfl.gov.uk**

In the absence of observed data should peak 15 minute passenger flow data be unavailable (eg for a new station), the factors from the following table shall be applied to the flow for the shortest peak period available (either peak three hours or peak hour) to give the peak flows in the shorter periods. Hence:

Peak	Station fare zone	Factor applied to peak three-hour flow to give peak hour flow	Factor applied to peak hour flow to give peak 15 minute flow	Factor applied to peak 15-minute flow to give peak five-minute flow (see UTS gateline below)
AM peak	Zones 1, 2 & 3	0.45	0.27	0.4
	Zones 4, 5 & 6	0.48	0.27	0.4
	Other zones	0.53	0.27	0.4
PM peak	Zones 1, 2 & 3	0.41	0.26	0.4
	Zones 4, 5 & 6	0.39	0.26	0.4
	Other zones	0.39	0.31	0.4

$$\text{The average flow per minute over the peak 15 minutes} = \frac{\text{the peak 15 minute flow}}{15}$$

Passenger areas derived from methodologies contained in this document shall be the net areas available after allowing for the requirements of amenities and facilities as specified in other relevant Category 1 Standards.

This section covers the following areas:

- UTS gatelines
- Smartcard readers
- Run-offs
- Headroom
- Concourse (unpaid side)
- Ticket issuing arrangements
- Place of safety for gateline staff
- Space for secondary income facilities

Standard – General

When planning the layout of a ticket hall, all activities related to amenities and facilities, as specified in other relevant Category 1 Standards, that are expected to take place within the ticket hall shall be identified and incorporated. Conflicts with passenger flows shall be designed out. These activities include ticket selling, gatelines, queuing and secondary revenue activities.

UTS gatelines

Standard – UTS gateline formula

The formula for calculating the required number of UTS gates at a station is split into three parts:

1) The first part of the formula calculates the number of gates needed to accommodate the entry flow through the gateline
2) The second part of the formula calculates the number of gates needed to accommodate the exit flow through the gateline
3) The third part of the formula adds either one or two additional gates to the combined number of entry and exit gates calculated in parts one and two

The formula shall initially be used twice, once to calculate the number of gates needed in the AM peak and then again to calculate the number of gates required in the PM peak. If a station has a high level of usage (ie tourist, shopping, etc) then the busiest period of gateline activity may be found to be outside the AM and PM weekday peak times, in which case a third calculation for the number of gates will be required. The highest figure from all of these calculations shall then be used as the required number of UTS gates.

The formula for the total number of gates is as follows:

$$\text{round up} \left\{ \frac{\text{5 min entry flow}}{25 \times 5} \right\} + \text{round up} \left\{ \frac{\text{total alighting load}}{25 \times 2} \right\} + X$$

The calculations for the entry and exit flows shall be from the same period of gateline demand (all station users except interchangers) using forecasted flows. If forecasted flows are not available, then the result based on current demand levels may be used. When using current demand, the rounding exercise takes place after an increase of 20% has been applied to the results from the first two parts of the calculation (ie before X is added).

The inputs for the UTS gateline formula are:

a) The peak five min entry flow into the station (converting from 15 minute entry flow if appropriate, see section 3.2)

b) Total Number of Exiting Passengers; this is the sum of all passengers exiting the station from each train service. The formula assumes all trains arrive concurrently and all exiting passengers must now pass through the gateline in two minutes

   Note: It is important that before combining the Number of Exiting Passengers from each of the train services, the train service that contributes the highest number of exiting passengers has its contribution increased by 25% (This is to allow for a gap in service.)

c) X = 1 if total (without X) is less than or equal to 10 gates, or X = 2 if total (without X) is more than 10 gates

The number of exiting passengers shall, where possible, be extracted from individual train alighting load survey data for each train in service or, if this is not available, using the following formula applied to each train service:

$$\text{alighting load} = \left\{\frac{\text{peak 15 min alighting load}}{15}\right\} \times \text{train service headway}$$

Where:

a) Train service headway is the time in minutes between trains in the peak hour in the period being considered

b) For different train services that share one or more platforms (eg Circle and District lines at St. James's Park), a combined train service headway shall be used

c) The maximum number of exiting passengers exiting the station from a single train shall be the practical crush capacity for the train stock type on the line

d) The total number of exiting passengers shall be the sum of all the number of exiting passengers for each train service (including the rule that the highest number of exiting Passengers from all of the individual train services shall be increased by 25%).

The minimum total number of automatic gates shall be three in each ticket hall.

Worked example – UTS gateline formula (Zone 1 station with four different train services on four unique platforms)
It is assumed that individual survey data is not available but that appropriate future year demand forecasts for the AM and PM three-hour peaks have been obtained.

Initially a calculation is carried out for the AM peak:

Entry gates		
1	AM Peak three-hour entry flow (future year demand)	1,680
2	AM Peak one-hour entry flow	1,680 x 0.45 = 756
3	AM Peak 15-minute entry flow	756 x 0.27 = 204
4	AM Peak five-minute entry flow	204 x 0.4 = 82
5	Number of entry gates	82 / (25x5) = 0.66
6	Round-up number of entry gates	1
Exit gates		
	Line one northbound train service	
7	AM Peak three-hour alighting load (future year demand)	6,820
8	AM Peak three-hour interchangers from line one northbound	640
9	Peak hour alighters	6,820 x 0.45 = 3069
10	Peak hour interchangers from line one northbound	640 x 0.45 = 288
11	Peak 15-minute alighters	3,069 x 0.27 = 829
12	Peak 15-minute interchangers from line one northbound	288 x 0.27 = 78
13	Train service headway (28 trains per hour)	60/28 = 2.14 mins
14	Number of exiting passengers	(829 – 78)/15 x 2.14 = 107 passengers

	Line one southbound train service	
15	AM Peak three-hour alighting load (future year demand)	5,670
16	AM Peak three-hour interchangers from line one southbound	750
17	Peak hour alighters	5,670 x 0.45 = 2553
18	Peak hour Interchangers from line one southbound	750 x 0.45 = 339
19	Peak 15-minute alighters	2,553 x 0.27 = 690
20	Peak 15-minute interchangers from line one southbound	339 x 0.27 = 92
21	Train service headway (28 trains per hour)	60/28 = 2.14 mins
22	Number of exiting passengers	(690 – 92)/15) x 2.14 = 85 passengers
	Line two northbound train service	
23	AM peak three-hour alighting load (future year demand)	3,170
24	AM Peak three-hour interchangers from line two northbound	230
25	Peak hour alighters	3,170 x 0.45 = 1427
26	Peak hour interchangers from line two northbound	230 x 0.45 = 104
27	Peak 15-minute alighters	1,427 x 0.27 = 386
28	Peak 15-minute interchangers from line two northbound	104 x 0.27 = 29
29	Train service headway (20 trains per hour)	60/20 = 3 mins

30	Number of exiting passengers	(386-29)/15 x 3 = 71 passengers
	Line two southbound train service	
31	AM Peak three-hour alighting load (future year demand)	2,170
32	AM Peak three-hour interchangers from line two southbound	610
33	Peak one hour alighters	2,170 x 0.45 = 977
34	Peak one hour interchangers from Line two SB	610 x 0.45 = 275
35	Peak 15-minute alighters	977 x 0.27 = 264
36	Peak 15-minute interchangers from line two southbound	275 x 0.27 = 74
37	Train service headway (20 trains per hour)	60/20 = 3 mins
38	Number of exiting passengers	(264 – 74)/15 x 3 = 38 passengers
	Establish train service to be increased by 25% before determining number of exit gates	
39	Maximum number of exiting passengers comes from which train service?	Line one NB
40	Total number of exiting passengers in peak 15 minutes	(107 x 1.25) + 85 + 71 + 38 = 328 passengers
41	Number of exit gates	328 / (25 x 2) = 6.56
42	Round-up number of exit gates	7

Total number of gates required in AM Peak		
43	Determine number of gates (without X)	1 + 7 = 8
44	X (less than 10, therefore X=1)	1
45	Determine final number of gates	8 + 1 = 9

This calculation should be repeated for the PM peak and, at stations where interpeak demand may be high, for interpeak and weekend peak demand. The highest of the resulting gate requirements should be applied.

Standard – Wide-aisle gates

A number of the gates provided shall be wide aisle gates according to the size of the gateline.

Size of gateline	Minimum wide aisle gates required
Up to 6 gates[1]	1
Up to 12 gates	2
Up to 18 gates	3
More than 18 gates	4

A bi-directional gateline shall always have at least two wide aisle gates.

The UTS gateline formula assumes that both the entry and exit capacity of a UTS gate is 25 passengers per minute. A wide aisle gate in uni-directional mode also has a capacity of 25 passengers per minute, so can be included in any UTS gateline calculations.

Where a single wide aisle gate is installed and used in bi-directional or first come, first served (FCFS) mode the throughput of the gate is seven passengers per minute and hence cannot be used to make up the number of gates in any UTS gateline calculations.

[1] Uni-directional gates only

Standard – Gateline arrangement

UTS gatelines shall be sited so that all gates are readily accessible to passengers moving in an expected manner through the ticket hall.

Entry or exit gates shall be grouped to one side of the gateline (ie they shall not alternate between entry and exit).

The width of a UTS gateline shall be determined as follows:

gateline width = number of automatic gates x walkway width + (number of gates + 1) x stanchion width + at least one item of additional gateline equipment from the table below

Where:

Automatic gate type	Walkway width mm	Stanchion width mm
Pneumatic	620	267
Electric (slimline) (Mk.1 and Mk. 2)	620	155
Wide aisle	1,080	155

Additional gateline equipment

The choice of additional gateline equipment is station dependent and will be specified by the LUL Project Sponsor.

Gateline equipment	Position	Pneumatic gate – Dimensions	Electric gate – Dimensions
Combined manual/ equipment gate with luggage port	Adjacent to ticket office	Height: 1,300mm Width: 1,750mm Opening: 1,400mm (towards exit)	Height: 1,300mm Width: 1,700mm Opening: 1,300mm (towards exit)
Manual gate – single leaf/ with luggage port	Adjacent to ticket office	Height: 1,300mm Width: 1,394mm Opening: 900mm (towards exit)	Height: 1,300mm Width: 1,350mm Opening: 900mm (towards exit)
Luggage chute	In line with gateline	Height: 1,300mm Width: 500mm Opening: 960mm tall x 400mm wide	Height: 1,300mm Width: 500mm Opening: 960mm tall x 400mm wide

Where wide aisle gates are installed, there shall be no requirement for additional gateline equipment as listed in the table on page 23, except where stipulated below.

The combined manual/equipment gate shall be required at stations where large pieces of equipment, such as parts for escalators or lifts etc. will be required to pass through the gateline. At other stations the single leaf manual gate shall be used.

The decision as to whether the gateline needs luggage chutes and the quantity will depend on the passenger profile for that station, eg stations with high tourist traffic, such as airports, shall require luggage chutes.

The following items shall be positioned in the ticket hall.

Equipment	Position	Dimensions
Gateline attendant's point (GLAP), where no other place of safety is available	Adjacent to the gateline, but not necessarily part of the gateline. Usually close to the Ticket Hall Station Control Unit (THSCU)	Height: 2,300mm Width: 990mm Depth: 1,240mm
Ticket Hall Station Control Unit (THSCU)	Adjacent to the gateline	Height: 1,802mm Width: 429mm Depth: 473mm

The following items are also required.

Equipment	Position	Dimensions
Station Control Unit (SCU)	Installed within a secure enclosure (eg ticket office) and with a clear view of the gates	Width: 432mm Depth: 430mm
Smartcard readers	As specified in section related to smartcard readers below	Height: 1,038mm Width: 325mm Depth: 157mm

Guideline – Gateline arrangement

Overhead signing beams (as specified in the Signs Manual) should only be considered where there is sufficient head room above the gatelines and where there are good sightlines on approaching them. Signing for the gate should be clearly visible to take account of visually impaired people and should clearly indicate the operational status of the gate.

A combination of one-way and reversible gates should be included in the gateline to minimise the overall length. (Eg if in the AM peak a station needs two entry gates and one exit gate, and in the pm peak one entry gate and two exit gates, this can be achieved using two one-way gates and one reversible gate, ie three in total rather than four).

Typical Ticket Hall Station Control Unit

Typical gateline layout

Standard – Smartcard readers

Smartcard readers are to be used to validate Oyster and other future smartcards.

In addition to being fitted to each UTS gate, smartcard readers shall be installed in the following circumstances:

a) At ungated stations

b) By each manual gate

c) Where there is an interchange between LU and National Rail train operating companies' services involving either:

   i) Cross-platform interchange on island platforms

   ii) The same platform

   iii) Between platforms via a passageway or stairs or both

d) At entrances and exits used during special events which do not have UTS gatelines

The number of smartcard readers required for each of these circumstances, and any other requirements, are detailed in the sub-sections below.

The position of smartcard readers shall be located at each site so that they are readily accessible to passengers moving in an expected manner. The position shall not encroach into run-off areas, ticket issuing window queuing areas or passageways. Their exact location shall be site specific.

The formula assumes that each smartcard reader will have a throughput of 25 passengers per minute.

Standard – Ungated stations

The number of smartcard readers shall be sufficient for the number of people requiring smartcard validation during the peak daily passenger flow. The number of smartcard readers shall be determined as follows:

number of smartcard readers =

$$\left\{\frac{\text{peak 5 min (entry + exit) x 38}}{25 \times 5 \times 100}\right\}\ \begin{matrix}\text{rounded-up}\\ +1\end{matrix}$$

It shall be assumed that the number of passengers requiring smartcard validation during the peak five minutes is 38% of the sum of the peak five minute total entry and exit passenger flows. This figure is subject to ongoing review.

Forecast data shall be used to carry out this calculation. If however only current passenger flow data is available, the peak five minute flow shall be multiplied by 120% before rounding up and adding one to give the total number of smartcard readers required.

If peak five minute passenger flow data is not available then this may be derived from peak hour or peak three hour data using the factors given in section on passenger flow data.

There shall be a minimum of two smartcard readers at each ticket barrier line.

Typical smartcard reader

Worked example – smartcard readers at ungated stations (Mill Hill East station)

1	AM peak three-hour current entry flow	700
2	Peak hour entry flow	700 x 0.48 = 336
3	Peak 15-minute entry flow	336 x 0.27 = 91
4	Peak five-minute entry flow	91 x 0.4 = 36.4
5	AM peak three-hour current exit flow	244
6	Peak one-hour exit flow	244 x 0.48 = 117.2
7	Peak 15-minute exit flow	117.2 x 0.27 = 31.6
8	Peak five-minute exit flow	31.6 x 0.4 = 12.65
9	Total five-minute flow	36.4 + 12.65 = 49.05
10	Factoring up current flow	49.05 x 120% = 58.86
11	Using first part of formula	(58.86 x 38)/25 x 5 x 100 = 0.18
12	Completing formula to obtain number of smartcard readers	0.18 rounds up to 1 +1 = 2

This calculation should be repeated for the PM peak and at stations where interpeak demand may be high, for interpeak and weekend peak demand. The highest of the resulting gate requirements should be applied.

Standard – Manual gates

Each manual gate shall have one smartcard reader.

The smartcard reader shall be located on the paid side of the gateline close to the manual gate in a location that is available to passengers entering and exiting the station.

Typical smartcard reader at manual gate

Standard – Interchange stations between LU and National Rail train operating companies' services

The requirements for each of the three situations are:

a) Cross platform interchange on island platforms

   i) Smartcard readers shall be evenly spaced a maximum of 30 metres apart, however;

   ii) If only part of the length of the platform is used for cross platform interchange, the number of smartcard readers shall be as follows:

b) Same platform interchange

   i) Smartcard readers shall be evenly spaced a maximum of 30 metres apart

c) Between platforms via a passageway or stairs or both

   i) There shall be a minimum of two smartcard readers located near the passageway or stairs in each independent route, appropriately sited to aid passenger flows and throughput

Length of interchange part of platform	Number of smartcard readers required
Less than 60 metres	2
60 to 90 metres	3
Over 90 metres	4

Standard – Entrances and exits used during special events which do not have UTS gatelines

When additional entrances or exits which are used during special events do not have UTS gatelines, the number of smartcard readers shall be determined as follows:

number of smartcard readers =

$$\left\{\frac{\text{peak 5 min (entry + exit) x 38}}{25 \times 5 \times 100}\right\} \text{rounded-up} + 1$$

Where:

a) It is assumed that the passenger flow is one way

b) The maximum passenger flow either entering or leaving the station through this route is used

c) It is assumed that the number of passengers requiring smartcard validation during the peak five minute passenger flow is 38% of this peak. This figure is subject to ongoing review

d) There shall be a minimum of two smartcard readers at each additional entrance and/or exit

Worked example – special events entrance/exit

There are 5,000 passengers entering a station through a special entrance over a period of one hour.

Surveys have shown that 35% of these passengers arrive in the peak 15-minute period so 5,000 x 0.35 = 1,750 passengers arrive in the peak 15-minute period.

Peak five-minute flow = 1,750 x 0.4 = 700

Number of smartcard readers =

$$\left\{\frac{700 \times 38}{25 \times 5 \times 100}\right\} = 2.128$$

which rounds up to 3 + 1

Therefore a total of four smartcard readers are required.

Run-offs

The purpose of run-off spaces is to 'pull' passengers away from escalators, UTS gates and stairways, to provide a clear landing area for following passengers.

Run-offs are required for:

- Orientation time – passengers can move clear of an escalator, gateline or stair while deciding where to go next (a six metre run-off allows an orientation time of four to five seconds)
- Decision/action time – passengers then need space to decide which gate or escalator to use, to form lanes, to get tickets out/put them away etc
- Queuing time – in the event of a system failure the space provides a reservoir in which passengers can accumulate safely

Consequently, decision points should not occur close to such vulnerable locations, where a stationary passenger would severely impede flow, and a hazardous situation could develop.

The lengths of run-offs from gatelines to stairs or escalators are dependant on demand: the run-off comprises of a 'protected zone' of two metre from an escalator, passenger conveyor or gateline (not required for a stair), and a 'variable element' of four metres to eight metres, depending on demand. The formula for the variable element is based on the peak hour entry or exit flow only, across the whole traffic day.

3.4 Run-offs (continued)

Standard – Run-offs

The following minimum run-offs shall apply:

Run-off type	Minimum run-off length (for variable lengths see below)
One way (Note: for one-way flow the direction is from the first item to the second item)	
Escalator-gateline	8m – 12m
Gateline-escalator (when the ratio of the number of gates to each escalator is less than or equal to)[1]	6m
Gateline-escalator (when the ratio of the number of gates to each escalator is more than four)[1]	8m – 12m
Gateline-passenger conveyor (when the ratio of the number of gates to each passenger conveyor is less than or equal to four)[1]	6m
Gateline-passenger conveyor (when the ratio of the number of gates to each passenger conveyor is more than four)[1]	8m – 12m
Passenger conveyor-gateline	8m – 12m

[1] The run-offs from escalators, stairways and gatelines onto a platform shall be in addition to the platform width

Run-off type	Minimum run-off length (for variable lengths see below)
Two-way	
Escalator-escalator	8m – 12m
Escalator-passageway[2]	6m
Escalator-stairway	6m – 10m
Escalator-street	6m
Gateline-passageway[2]	4m
Gateline-platform[2]	4m
Gateline-street	6m
Passenger conveyor-escalator	8m-12m
Passenger conveyor-passageway[2]	6m
Passenger conveyor-passenger conveyor	8m-12m
Passenger conveyor-stairway	6m – 10m
Passenger conveyor-street	6m
Stairway-gateline	6m – 10m
Stairway-passageway[2]	4m
Stairway-platform[2]	4m
Stairway-street	4m

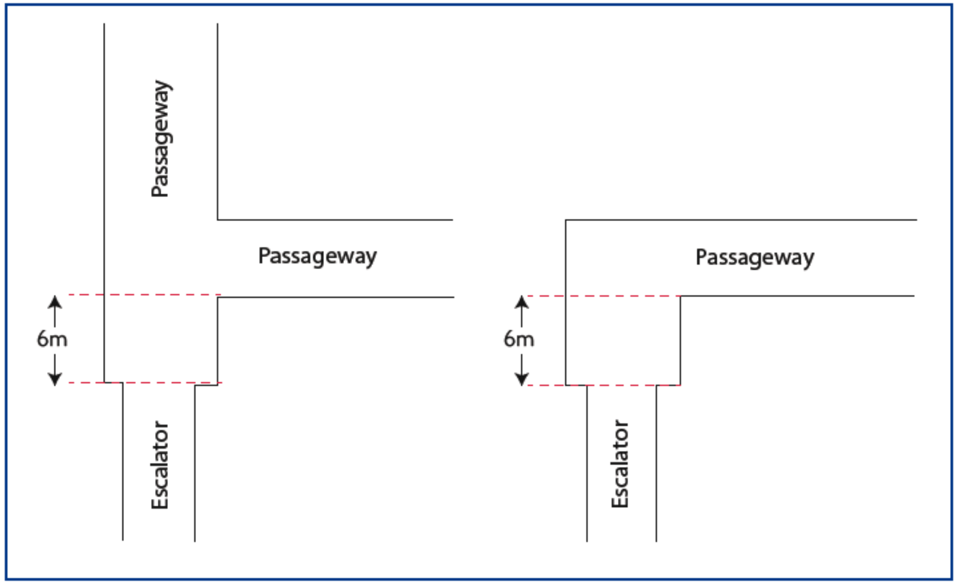
[2] Note that the capacity of both an escalator and a passenger conveyor is 100 passengers per minute and the capacity of a UTS gate is 25 passengers per minute. The run-offs from escalators, stairways and gatelines onto a platform shall be in addition to the platform width

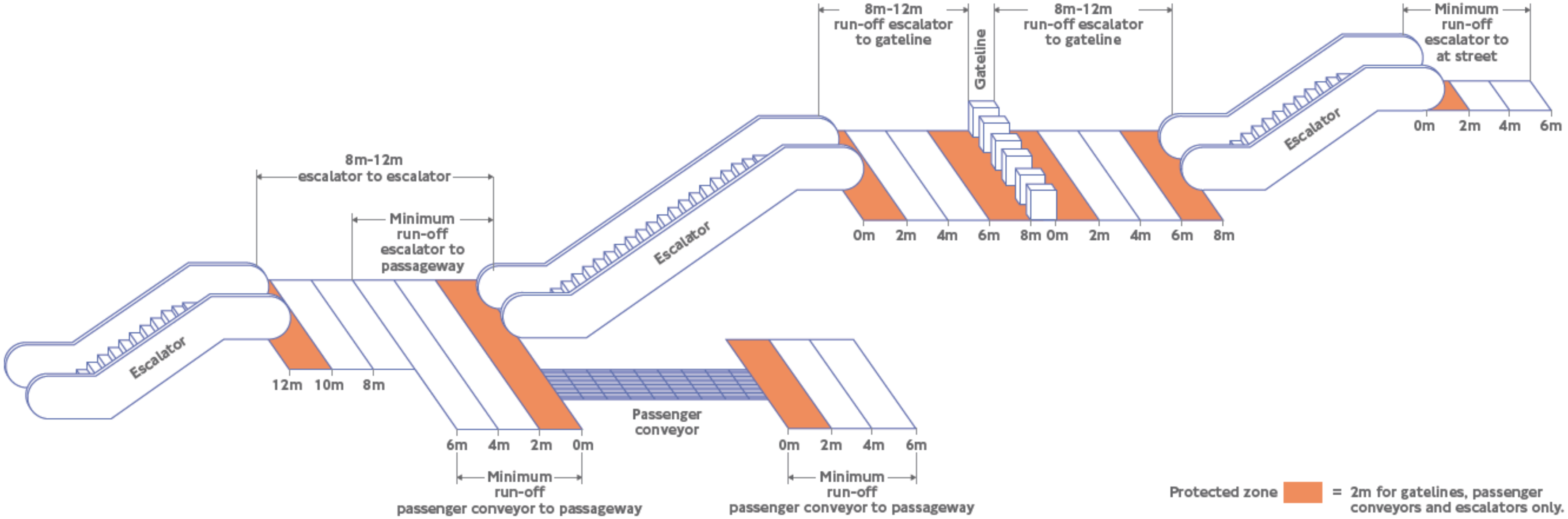
3.4 Run offs (continued)

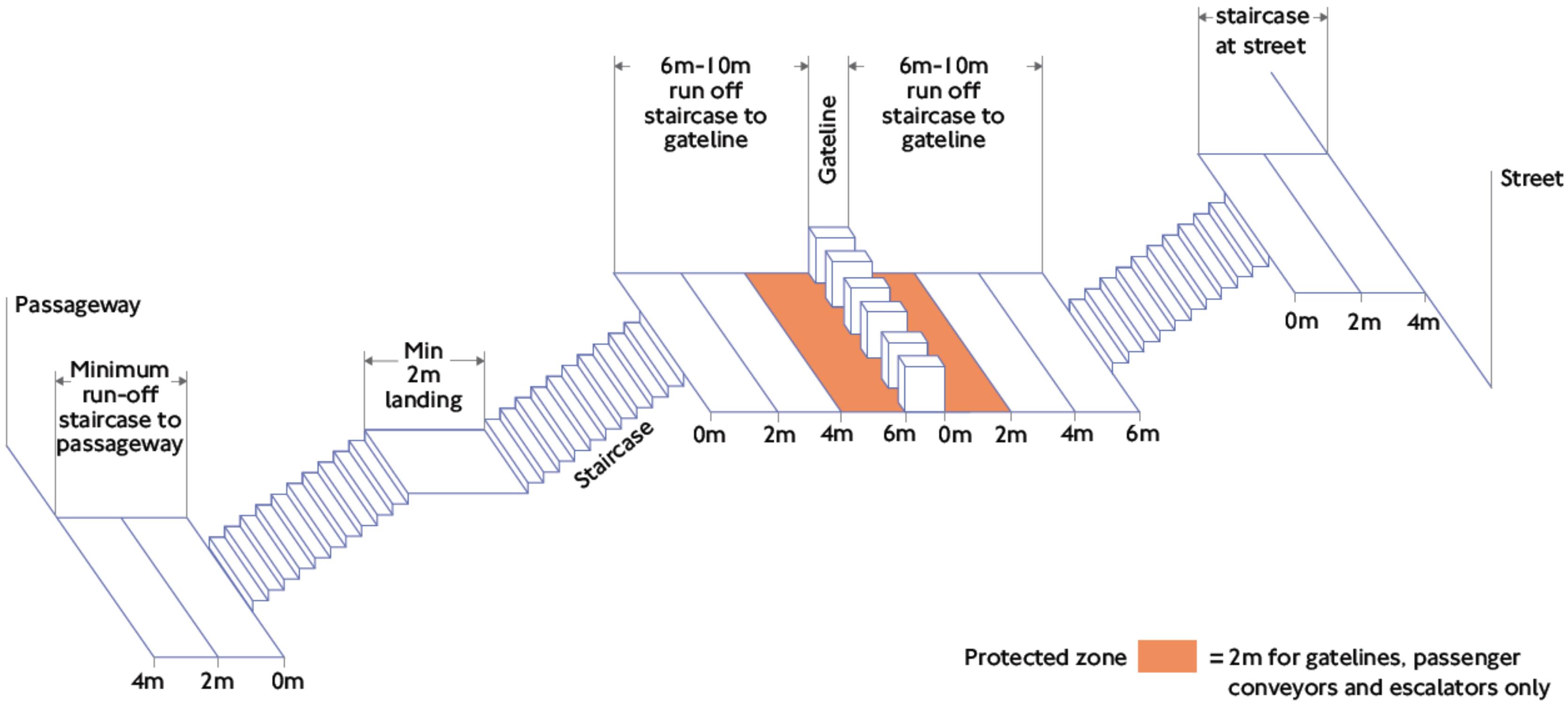
Run-offs shall be before any change in direction, decision point or reduction in width.

Gatelines shall never be on platforms.

Run-off dimensions for escalators and Passenger Conveyors are measured from the equipment 'combs'.






Passageway
Minimum run-off staircase to passageway
4m
2m
0m
Min 2m landing
Staircase
6m-10m run off staircase to gateline
Gateline
6m-10m run off staircase to gateline
0m
2m
4m
6m
0m
2m
4m
6m
staircase at street
0m
2m
4m
Street
Protected zone
= 2m for gatelines, passenger conveyors and escalators only

Light flow	= the maximum peak hour entry or exit flow, for the relevant station area, across the whole traffic day is less than 1,000 passengers
Medium flow	= the maximum peak hour entry or exit flow, for the relevant station area, across the whole traffic day is between 1,000 and 3,000 passengers
Heavy flow	= the maximum peak hour entry or exit flow, for the relevant station area, across the whole traffic day is greater than 3,000 passengers

Standard – Run-offs (continued)

The variable lengths of run-off shall depend upon the level of passenger flows as follows:

a) For 'light flow' the minimum run-off length shown above shall apply

b) For 'medium flow' the run-off length shall be:

$$\text{run-off length} = \text{Minimum run-off} + \left\{\frac{\text{peak hour flow} - 1000}{500}\right\}$$

where the minimum run-off is the lower of the lengths given in the table above

c) For 'heavy flow' the maximum run-off length shown above shall apply:

Where the width of a run-off shall be consistent along its entire length.

Headroom in ticket halls, for horizontal circulation and stairways in public areas

Adequate headroom is a major factor in the feeling of openness that a station offers, and can impact on signing and hence wayfinding.

Standard – Headroom in ticket halls, for horizontal circulation and stairways

The headroom in ticket halls, concourses, passageways and over stairways shall not be less than 3m (measured to the lowest point of suspended ceiling, equipment or permanent signage). However, where there are local obstacles protruding downwards which make it impossible or impracticable to provide a 3m headroom; headroom shall be no lower than 2.4m (as measured above):

a) Over an area of no more than 2m x 2m in ticket halls and concourses, or

b) Over a length of no more than 2m in a passageway or over a stairway

When work is proposed that:

a) Does not involve alterations to the primary structure of the station, and

b) Is defined as new or altered assets within existing stations and

c) Where it is impossible to comply with the headroom requirements of this standard without major re-building/alteration to the existing structure of the station

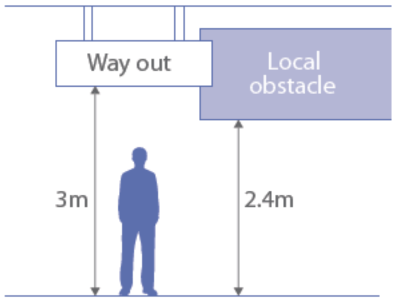
Then the following conditions apply:

- Risks that are introduced by the proposal shall be identified, assessed and evidenced as low as reasonably possible (ALARP) by the proposer
- Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer
- Proposals shall be demonstrably optimal in relation to the compliant state for new stations

Proposals shall always comply with the following minimum dimensions:

a) Headroom – not less than 2.3m for areas of ceiling, beam soffits, cable management system (CMS) installations

b) Headroom – not less than 2.1m for fixtures such as signage, CCTV cameras, information displays



3.6 Concourse - unpaid side

Concourse (unpaid side)

On the unpaid side of the ticket hall concourse, passengers make complex crossing movements, which can become seriously impeded at relatively low passenger densities. The concourse sizing is therefore based on Fruin level of service B, which equates to 1.0m^2 per passenger.

Standard – Concourse (unpaid side)

The area of the unpaid side of the ticket hall concourse shall be designed to offer a minimum of 1.0m^2 per passenger, for the forecast average flow per minute over the peak 15 minutes.

$$\text{concourse area} = \left\{ \frac{\text{peak 15 minute flow x1.0}}{15} \right\} \text{m}^2$$

This area is inclusive of and not additional to gateline run-offs, ticket queuing space and amenities and facilities as specified in relevant Category 1 Standards.

If forecast flows are not available, then the result based on current demand levels, shall be multiplied by 120%.

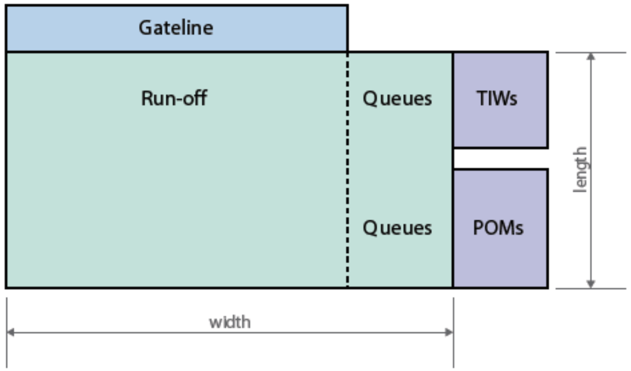
Guideline – Concourse (unpaid side)
The required areas for two typical ticket hall (unpaid side) concourse layouts (illustrated below) are determined by the following methods. These methods shall be varied to suit other layouts as required. The unpaid side concourse area comprises the gateline run-off, queuing space for the ticket issuing windows and passenger operated ticket machines and any other area necessary.

For ticket hall concourse layout one, the minimum width of the unpaid side of the ticket hall concourse shall be the UTS gateline width plus the queuing space of four metres at the ticket issuing windows.

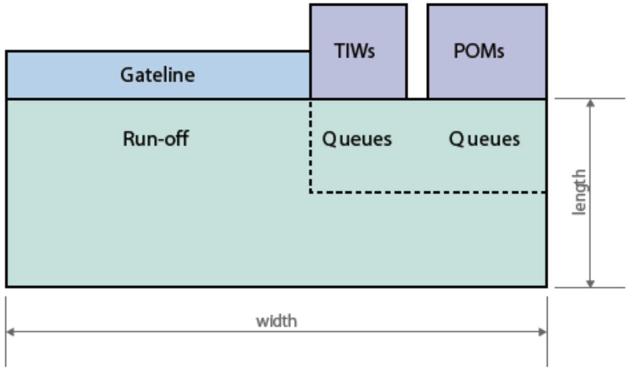
The length of the unpaid side of the ticket hall concourse in layout one shall be the greater of: the run-off length (see run-offs standard above), the combined length of the ticket office suite and the length determined by dividing the calculated concourse area (from concourse [unpaid-side] standard above) by the minimum width determined in section above.

For ticket hall concourse layout two, the minimum width of the unpaid side of the ticket hall concourse shall be the UTS gateline length (from gateline width standard above) plus the combined length of the ticket office suite.

The length of the unpaid side of the ticket hall concourse in layout two shall be the greater of the run-off length (see run-offs standard above) and the length determined by dividing the calculated concourse area (from concourse (unpaid-side) standard above) by the minimum width determined in section above.



Typical ticket hall concourse – layout one



Typical ticket hall concourse – layout two

3.7 Ticket issuing arrangements

Ticket issuing arrangements

The space planning considerations of ticket selling facilities include queuing at windows, the number of windows, the space between them, and similar requirements for passenger operated machines.

Tickets are sold from either Ticket Issuing Windows (TIWs) or Passenger Operated Machines (POMs). POMs include Few Fare Machines (FFMs), Multi-Fare Machines (MFMs), Advanced Fare Machines (AFMs), Queue Buster Machines (QBMs) and any future automatic ticket issuing machines.

Standard – Number of TIWs and POMs

The number of TIWs and POMs shall be sufficient to ensure that at least 95% of passengers requiring tickets during the peak hour of ticket sales shall not wait for more than three minutes.

The number of TIWs and POMs shall be determined for:

a) Existing stations (where ticket sales are known)

b) New stations (where ticket sales are not known)

There shall be an assistance window on the paid side of the gateline integral to the ticket office suite.

3.7 Ticket issuing arrangements (continued)

Standard – Existing stations

The required numbers of TIWs =

$$\frac{\text{peak 1 hour TIW sales x 95\% x average TIW transaction time (secs)}}{\text{20 (no. of 3 minute periods in 1 hour) x 180 (no. of seconds in 3 minutes)}}$$

It shall be assumed that the average TIW transaction time for all stations is 60 seconds (this figure is constantly under review). Thus, on this basis:

$$\text{Number of TIWs} = \frac{\text{peak 1 hour TIW sales x 95\% x 60}}{\text{20 x 180}}$$

The required numbers of POMs =

$$\frac{\text{peak 1 hour POM sales x 95\% x average POM transaction time (secs)}}{\text{20 (no. of 3 minute periods in 1 hour) x 180 (no. of seconds in 3 minutes)}}$$

It shall be assumed that the average POM transaction time for all stations is 45 seconds (this figure is constantly under review). Thus, on this basis:

$$\text{Number of POMs} = \frac{\text{peak 1 hour POM sales x 95\% x 45}}{\text{20 x 180}}$$

If only three hour ticket sale figures are available, then the peak hour ticket sale figures shall be determined using the factors in section on passenger flow data.

The calculated number of TIWs and POMs shall be rounded up to the nearest integer.

There shall be at least two TIWs and one assistance window per ticket hall.

There shall be at least one MFM and one AFM or one FFM per ticket hall.

There shall be at least one MFM for every four FFMs or AFMs in any combination.

There shall be space for at least one extra FFM or AFM for future ticket machines within the POM suite.

Where additional POM facilities are required and space is a constraint, consideration shall be given to installing QBMs.

Standard – New stations

New stations shall be allocated to one of the following categories:-

a) City

b) Inner suburb

c) Outer suburb

d) Shopping

e) Terminus

f) Tourist

Ticket buying patterns at stations in each of the categories vary as follows:

The figures in this table are subject to review due to the impact of the Future Ticketing Programme. For up-to-date figures, please contact the Technical Content Manager (see contact details in further information).

Category of station	Peak hour ticket sales as % of forecast peak hour entry flow A	Peak hour TIW sales as % of peak hour ticket sales B	Peak hour POM sales as % of peak hour ticket sales C
City	5	31	69
Inner suburb	10	38	62
Outer suburb	11	42	58
Shopping	5	33	67
Terminus	6	35	65
Tourist	5	34	66

The number of TIWs and POMs at new stations in each category shall be calculated from the formulae used for existing stations given above, and the relevant pair of percentages in the table above applied to the forecast peak hour entry flows, ie columns A and B for TIWs and columns A and C for POMs.

3.7 Ticket issuing arrangements (continued)

Worked example – new inner suburb station

1	Peak hour entry flow	2,100
2	Peak hour ticket sales	2,100 x 0.10 = 210
3	Peak hour TIW sales	210 x 0.38 = 79.8
4	Peak hour POM sales	798 x 0.62 = 130.2
Number of TIWs		
5	From formula number of TIWs	(79.8 x 0.95 x 60)/(20x180) = 1.26
6	Round up	2 TIWs
Number of POMs		
7	From formula number of POMs	(130.2 x 0.95 x 45)/(20 x 180) = 1.54
8	Round up	2 POMs

From the table above the formulae indicate a requirement of 1.26 TIWs and 1.54 POMs. So in this instance this new station would require two TIWs and an assistance window, together with one MFM and one FFM or AFM, with space in the POM suite for further POMs.

3.7 Ticket issuing arrangements (continued)

Standard – Special events
Stations near which special events take place (eg sports events, exhibitions) shall have additional POMs, the number of which shall be determined by the LU Project Sponsor.

Standard – Spacing of TIWs and POMs
TIWs shall be 1.8 metres apart between centres.

The assistance window shall be 900mm wide minimum. (This assumes that no ticket issuing equipment is required at this window. If ticket issuing equipment is required at this window then the minimum width required is 1.8 metres.)

FFMs/AFMs/QBMs shall not be in groups of more than two without being separated by an MFM, or a 600mm boarded gap. This is to prevent overcrowding at machines, thus helping to achieve maximum use.

There shall be space adjacent to the POMs to display a fares list as specified in LU standard 1-313

Typical ticket hall

3.7 Ticket issuing arrangement (continued)

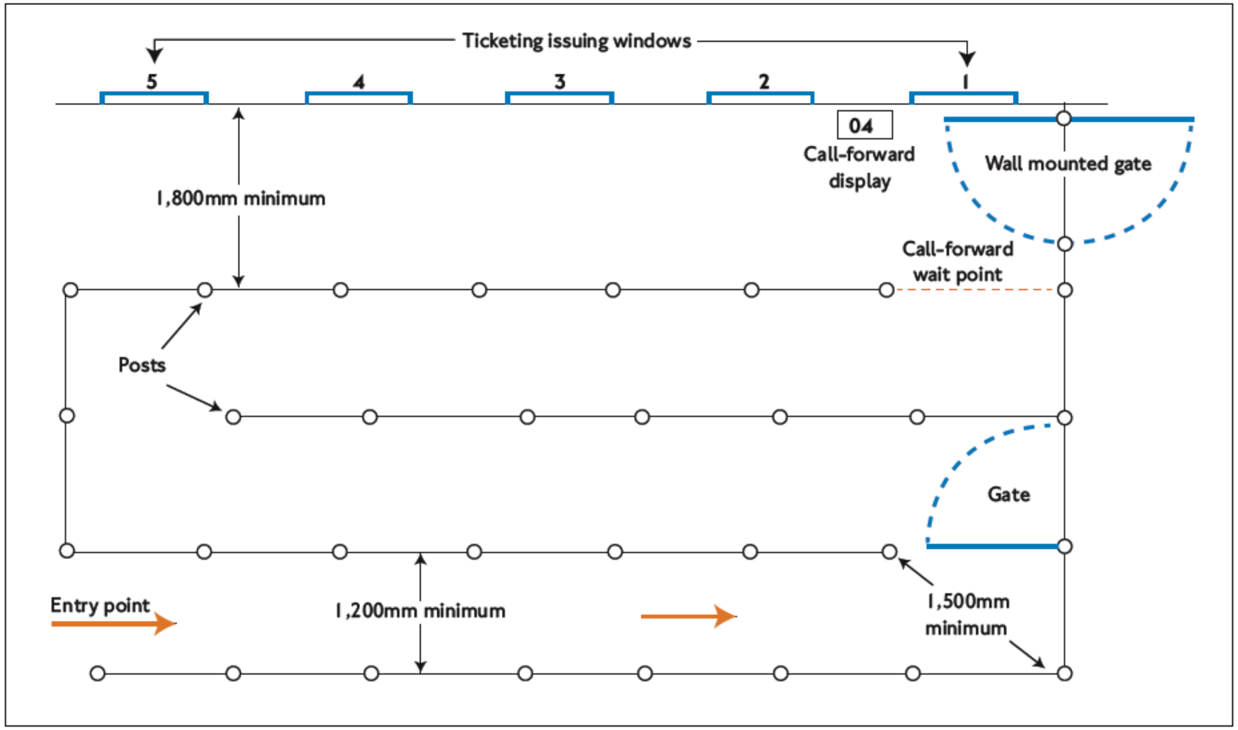
Standard – Queuing distance in front of TIWs and POMs
The queuing distance in front of each TIW and POM shall be 4m. This space shall not overlap gateline or other run-offs.

Where there are more than two TIWs a queuing system shall be considered.

Standard – Queuing systems
Where there are more than two TIWs or three POMs, a queuing system, commonly known as a 'uni-queue', shall be considered.

The uni-queue shall be of sufficient capacity to contain the queue length expected at the station at peak times.

The Uni-Queue shall be designed in such a manner that it will not impede the flow of passengers around the ticket hall.



Where installed, a uni-queue shall be no less than 1.2 metres wide along the walkways, and no less than 1.8 metres wide along the ticket issuing windows. At the turning circle, there should be a minimum width of 1.5 metres across the angle of the corner.

Where the uni-queue has an overall length in excess of six metres, then intermediate gates shall be fitted to enable the queue to be shortened by half at times when demand is low.

At the point where the front of the queue reaches the TIWs or POMs, a gate shall be fitted where necessary to aid the customer flows.

Uni-queues shall be of a semi-permanent nature and not of the heavy cloth 'Tensa' barrier style.

3.8 Place of safety for gateline staff

Standard – Place of safety for gateline staff
A place of safety is an area where staff working on or around the ticket gateline can temporarily retreat to if they are being assaulted or are physically threatened, providing a physical barrier from potential assailants.

Where space permits the place of safety shall be located on the paid side of the gateline and shall be quickly and easily accessible.

The place of safety shall be equipped with communications equipment and an alarm so that assistance can be summoned if required. Should the equipment be defective, staff must carry a radio and/or personal alarm depending on what is not available within the place of safety.

A place of safety shall have a clear view of the gateline, and will generally be situated adjacent to it.

A place of safety shall depend on the physical layout of the ticket hall and prevailing operational conditions. Examples include:

a) Gateline attendants point (GLAP)

b) Existing offices or other rooms with lockable doors (but not ticket offices) adjacent to and with a clear view of the gateline

c) Specially constructed areas to meet unique requirements

When identifying the type and position of the place of safety, local staff, managers and health and safety representatives must be consulted.

Provision of the place of safety shall not exclude the use of other controls, if appropriate, to reduce the risk of potential assault.

Where proposals do not meet the above requirements, the alternative solution shall be referred to the Stations and Revenue Control Health and Safety Council for consideration.

Standard GLAP


Specially constructed GLAP

3.9 Secondary income facilities

Standard – Space for secondary income facilities
Space for secondary income facilities shall be in addition to the passenger space determined above.

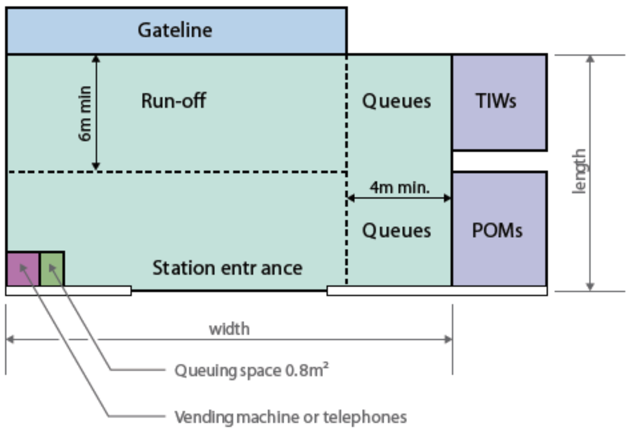
Secondary income facilities, including queuing space for them, shall not be located within the run-off of gatelines, escalators and stairways.

The ticket hall shall be arranged so that such facilities do not hinder passenger flows through the ticket hall.

Location of secondary income facilities on platforms shall not interfere with passenger flows.

Guideline – Space for secondary income facilities

The layouts below show some typical layouts involving secondary income facilities.



Typical ticket hall layout showing that minimum run-offs, station entrance and secondary income facilities do not interfere with each other.

Typical platform layout showing that no platform furniture shall be located within five metres of the platform entrance or exit. Also minimum platform width should be three metres with the minimum dimension of 2.5 metres from the platform edge to any piece of platform furniture, secondary revenue equipment etc.

3.10 Access and interchange

This section covers the following areas:

- Changes in level
- Passageways
- Circular cross-section passageways
- Passenger conveyors
- Headroom over passenger conveyors and escalators
- Stairways
- Escalator sizing
- Lifts
- Ramps
- Intermediate concourses

Standard – General

Passageways, intermediate concourses, escalators, passenger conveyors, lifts, stairs and ramps shall be arranged to minimise walking distances and to make the wayfinding through the station as obvious as possible.

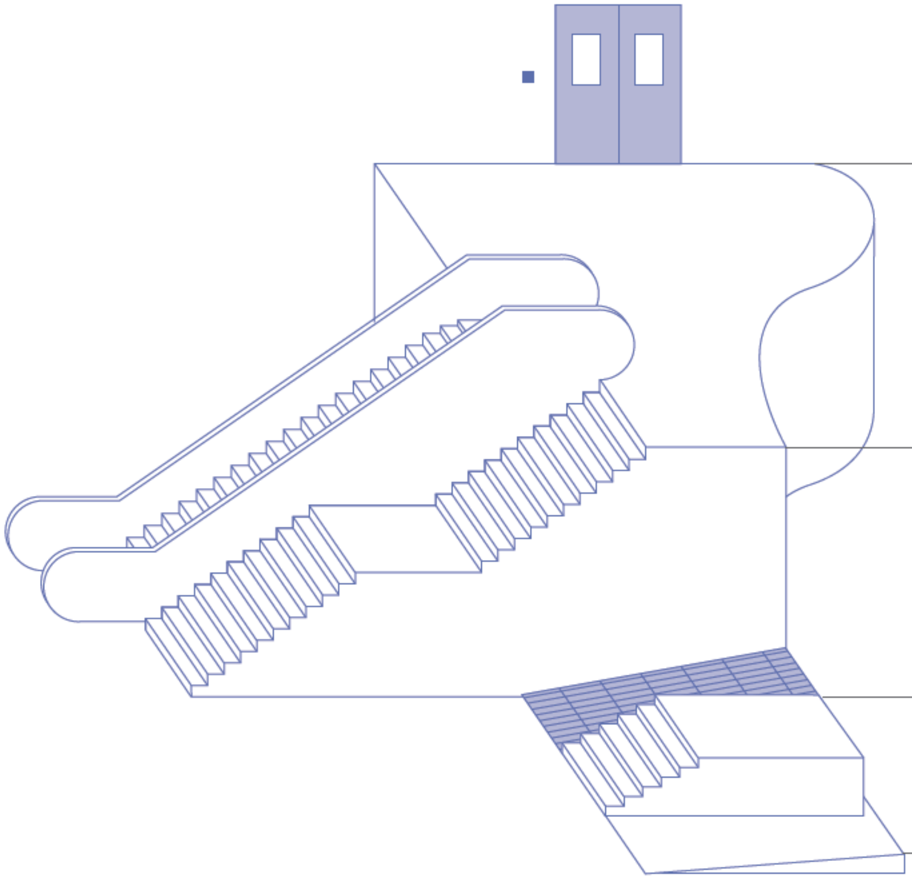
Where stairways are located in passageways the passageway shall be the same width as the stairways.

All routes shall be free from obstructions and shall avoid recesses that could harbour litter and provide possible hiding places.

The means for providing changes in level shall be as follows:

Height of change in level	Means
Less than 0.5m	Ramp
0.5m to 3m	Stairway (minimum of three risers)
3m to 5m	Stairway. Escalator if benefits are justifiable
Over 5m	Escalator or lift

3.10 Access and interchange (continued)



New stations shall include at least one step-free access route between the street and the unpaid side of the concourse and at least one step-free route between the paid side of the concourse and the platforms.

No single escalator, passenger conveyor or lift shall provide the sole means of access or egress from any part of the station.

Where fire doors or flood doors are installed in stations they shall not interfere with passenger flows in the normal running of the station.

The flows of passengers travelling in opposite directions shall, in all parts of the station, be separated so far as is reasonably practical.

Convex mirrors shall be installed at all stations (subject to architectural and heritage considerations) where blind corners, recesses, wide pillars and other obstructions exist to break a reasonable sightline of the passenger moving through the station.

Passageways

Two-way passageway sizing is based on Fruin level of service C, as defined in Section 2.1, which equates to 40 passengers per minute per metre width.

One-way passageway sizing is based on Fruin level of service D, also as defined in Section 2.1, which equates to 50 passengers per minute per metre width. This is a higher passenger density than for two-way passageways as there is no opposing flow.

Standard – Passageway width

Passageway width shall be determined as follows:

$$\text{two-way passageway width} = \left\{\frac{\text{average peak minute flow}}{40} + (2 \times 0.3)\right\} \text{m}$$

$$\text{one-way passageway width} = \left\{\frac{\text{average peak minute flow}}{50} + (2 \times 0.3)\right\} \text{m}$$

Where central barriers are provided in passageways to divide passenger flows, 0.3 metres shall be added to the passageway width.

The minimum width either side of the central barrier shall be 1.7 m between barrier and wall finishes (ie the minimum passageway width shall be 3.7m [(2 x 1.7) + 0.3].

The minimum width for any passageway including escape and emergency access routes shall be 2m between finishes.

The width of a passageway between junctions shall be uniform along its entire length, which shall be maintained to the headroom height (with the exceptions of circular cross-section passageways detailed below).

Guideline – Passageways

Note: an 'edge effect' of 0.3 metres at each sidewall has been incorporated into the above formulae to take account of the space passengers leave to avoid touching the walls.

There is no 'edge effect' at a central handrail.

Separate passageways should be provided for each-way traffic where flows are heavy.

Worked example – two-way passageway width calculation:

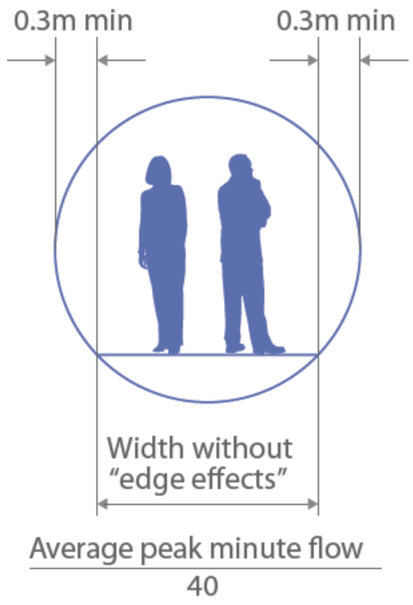
1. Peak 15-minute flow	975 passengers
2. Peak minute flow	975/15 = 65 passengers
3. Passageway width @ 40 people per minute per metre, without 'edge effects'	65/40 = 1.6 metres
4. Width + 'edge effects'	1.6 + (2 x 0.3) = 1.6 + 0.6 = 2.2 metres

Standard – Circular cross-section passageways

Circular cross-section passageways shall satisfy the following requirements:

a) The width of the floor shall be no less than the calculated passageway width, but without adding the sidewall 'edge effects'

b) The internal diameter of the passageway (ie with finishes applied) shall be no less than the calculated passageway width with the sidewall 'edge effects' included. This requirement and the requirement above do not allow any local reductions to width, for example caused by advertising panels that 'square off' a circular cross-section passageway



Standard – Passenger conveyors

The minimum length of a passenger conveyor shall be 50 m and the maximum shall be 100m. Longer passageways shall have two or more passenger conveyors.

The following shall be taken into account when designing passenger conveyors:

a) Conveyor capacity = 100 passengers per minute per metre width of treadway (based on a linear speed of 0.75m per second)

b) The width of treadway shall not be less than 1.2m, or 1.4m where luggage trolleys are permitted

c) Run-offs shall be provided at both ends of any one passenger conveyor (see Section 2.2)

A conventional passageway beside the passenger conveyor shall be provided. For passageways with one passenger conveyor only, the width of the conventional passageway shall be as defined for two-way flow in section on passageway width above.

Typical passenger conveyor

For passageways with two or more parallel passenger conveyors, the conventional passageway shall be as defined for two-way flow in section on passageway width above.

Standard – Headroom over passenger conveyors and escalators

For escalators and passenger conveyors installed in atriums, the headroom shall not be less than 3m above both landings and over the whole length of the escalator or passenger conveyor (measured to the lowest point of suspended ceiling, equipment or permanent signage). However, where there are local obstacles protruding downwards, which make it impossible or impracticable to provide a 3m headroom, the headroom shall be no lower than 2.4m (as measured above) over a length of no more than 2m.

For escalators and passenger conveyors installed in shafts, the headroom shall not be less than 2.3m above both landings and over the whole length of the escalator or passenger conveyor when measured at the nosing line.

When work is proposed that affects headroom over passenger conveyors and escalators and:

a) Does not involve alterations to the primary structure of the station, and

b) Is defined as a new or altered assets within existing stations, and

c) Where it is impossible to comply with the headroom requirements of this Standard without major re-building/alteration to the existing structure of the station –

then the following conditions apply:

Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer.

Proposals shall be demonstrably optimal in relation to the compliant state for new stations.

Proposals shall always comply with the following minimum dimensions:

a) Headroom – not less than 2.3m above both landings and over the whole length of the escalator or passenger conveyor

b) Headroom – not less than 2.1 metres for fixtures such as signage, CCTV cameras and information displays

Stairways

Two-way stairway sizing is based on Fruin level of service C, as defined in Section 2.1, which equates to 28 passengers per minute per metre width.

One-way stairway sizing is based on Fruin level of service D, also as defined in Section 2.1, which equates to 35 passengers per minute per metre width. This is a higher passenger density than for two-way stairways as there is no opposing flow.

There are no ‘edge effects’ on stairways as all dimensions are measured between handrails (passengers walk very close to handrails as the arm and shoulder overhangs the handrail).

Standard – Stairways

All stairways shall comply with LU Category one Standard 1-133.

Stairway width shall be determined as follows:

$$\text{two-way staircase width} = \left\{\frac{\text{average peak minute flow}}{28}\right\} \text{ m}$$

$$\text{one-way staircase width} = \left\{\frac{\text{average peak minute flow}}{35}\right\} \text{ m}$$

All dimensions are measured between handrails.

If the stairway has one or more central handrails, 0.3m shall be added to the overall width for each central handrail.

The minimum width for a two-way stairway shall be 2.4m between handrails. The minimum width for a one-way stairway shall be 2m between handrails.

A single stairway, of 1m minimum width, shall be provided alongside a bank of two or more escalators for the full rise of those escalators.

Escalators

The number of escalators required is based on an assumed capacity of 100 passengers per minute.

The minimum three-way escalator shaft requirement below is to cater for potential demand growth and for an escalator being out of service, eg every escalator requires a mid-life (20 year) overhaul lasting approximately nine months.

There are no ‘edge effects’ on escalators as passengers stand very close to the handrails.

As stated in the stairways section above. A 1m wide staircase must be provided alongside a bank of two or more escalators for the full rise of those escalators. This ensures there is exactly enough space to install an additional escalator should the need arise.

Standard – Escalator sizing

The number of escalators required for any one direction is as follows:

$$\text{number of escalators} = \left\{\frac{\text{peak minute one-way flow}}{100}\right\}$$

Where peak minute flow is as in earlier section on passenger flows and based on escalator capacity of 100 passengers per minute.

The calculated number of escalators shall be rounded up to the next whole number if the first number after the decimal point is more than 0.2, and rounded down otherwise, eg 2.2 escalators would be rounded up to three, 2.1 escalators would be rounded down to 2.

Escalator shafts shall be constructed to be capable of accommodating a minimum of three escalators even if fewer than that number are installed initially.

Lifts

The provision of a lift or lifts should be considered as the primary means of vertical circulation, or as a secondary means to achieve step-free access between street and ticket hall, and ticket hall and platforms.

If lifts are provided as a secondary means of vertical circulation, passageways leading to them should be incorporated into the general passenger flow. If this is not possible, they should be planned to create a feeling of openness and security.

Large areas of glass are ideal in lifts because they enable lift users to be seen clearly from outside and vice-versa, but must be marked with low reflective, brightly coloured banding (not black or grey) to prevent passenger accidents.

Standard – Lifts

Lifts shall be conspicuously sited.

Whether planned as the main method of vertical circulation, or as a step-free access route, they shall be installed for the benefit of all passengers.

In new and modernised stations the use of transverse or inclined lifts as a means of vertical transit shall be considered.

The effective capacity figures, which shall be assumed to be 70% of the plated capacity figures, shall be used for lift capacity calculations.

A waiting area of $0.45m^2$ per passenger waiting shall be provided in front of lift doors used for entry only. If the same doors are used for entry and exit, the waiting area shall be $0.8m^2$ per passenger waiting. This area shall prevent passenger flows in adjoining areas from being disrupted.

Where lifts are located on surface station platforms they shall have a sheltered waiting area equivalent to $0.8m^2$ per passenger waiting.

The number of passengers waiting for the lifts shall be:

$$\text{Number of passengers waiting for the lifts} = \frac{\text{peak minute passengers using lift} \times \text{lift cycle times (mins)}}{\text{number of lifts}}$$

Where lifts discharge directly towards a platform edge and the doors are closer than 5m from the platform edge, a barrier shall be provided between the lift and the platform edge which is not less than 2m from the platform edge.

Ramps

Ramps are a useful way of providing step-free access for small changes in level, but should not be steep or long, and should not be used to change levels greater than 0.5m, unless as a secondary means of access.

Standard – Ramps

All ramps shall comply with LU Category one Standard 1-133.

The maximum vertical rise between landings shall be 0.5m, unless the ramp is a secondary means of access.

The width shall be calculated in the same way as that for a passageway unless the gradient is steeper than 1 in 20. In this case a 10% reduction in the flow rate shall be assumed.

Intermediate concourses

Additional space should be provided in intermediate concourses for passengers who wish to pause and consider their next action.

Standard – Intermediate concourses

Intermediate concourses within a station shall be constructed at the intersection of more than two means of access.

The required area for an intermediate concourse shall comprise the following:

a) Run-off areas (see standard on run-offs above). (Note: Run-offs from adjacent means of access shall not overlap.)

b) An area of $2m^2$ in front of any line diagram

3.11 Platforms

Platforms should be designed to promote easy access, exit and circulation and have good sightlines by avoiding recesses and indentations which could offer hiding places and litter traps.

Platform sizing is one of the most important aspects of station design. Platform crowding is the most common reason for the implementation of station control, and it can have a major impact on the regularity of the train service by determining the length of dwell times. Platform sizing should also take into account the impact of train service disruption.

The shortest time period data available should be used in all formulas below. The factors from the table in Section 3.2 should then be applied, if necessary, to obtain the correct flow for the relevant formula. All station planning should allow for long- term future demand changes, according to the scenarios in the LU Corporate Planning Guidelines.

This section covers the following areas:

- Platform sizing
- Headroom
- Platform exits

Platform sizing

Platforms are sized to offer a minimum of 0.93m^2 per passenger at the busiest part of the platform, which equates to the Fruin level of service B/C boundary, as defined in Section 2.1.

The platform sizing methodology recognises that passengers are not evenly distributed along platforms, and at the busiest part of the platform it is assumed that 35% of the platform load occupies 25% of the platform.

The formula requires the average platform load per headway (ie the average number of passengers waiting for a train at the height of the peak plus the number of passengers alighting from the train).

0.5m is added for each of the front and rear 'edge effects'. The front 'edge effect' is because passengers do not like to walk or stand too near the edge of the platform; the rear 'edge effect' takes into account the presence of platform furniture, such as seating.

Standard – Platform length

Platform lengths at stations that are exclusively used by LU trains shall be at least 3m longer than the longest train booked to stop at that platform.

Platform lengths at stations where train operating company trains share the same platforms as LU trains shall be at least 5m longer than the longest train booked to stop at that platform.

Platform lengths at terminus stations shall be at least 5m longer than the longest train booked to stop at that platform.

Guideline – Overall length of trains

Line	Stock type	Overall length over couplers in metres
Tube stock		
Victoria	2009	134 (8 cars)
Bakerloo	1972 Mk1 and Mk2	114 (7 cars)
Piccadilly	1973	107 (6 cars)
Central	1992	133 (8 cars)
Waterloo and City	1992	66 (4 cars)
Northern	1995	109 (6 cars)
Jubilee	1996	127 (7 cars)
Sub-surface stock		
Metropolitan	A	132 (8 cars)
Circle, Hammersmith & City, District (Edgware Road to Wimbledon)	C	94 (6 cars)
District (all other routes)	D	111 (6 cars)
District, Circle and Hammersmith & City	S7	118 (7 cars)
Metropolitan	S8	134 (8 cars)

Note: Information taken from rolling stock information sheets. Stock type on a line is subject to change.

Standard – Platform width

General principles

The width of a platform shall be the same along its entire length except in the following circumstances:

a) When space is restricted elsewhere within the station and there is a justifiable need to encroach into the platform area to accommodate equipment rooms and staff accommodation only

b) For essential structural reasons

c) To accommodate track geometry

Any variation in platform width shall be subject to the following conditions:

a) Width reductions shall be at the less busy parts of the platform as defined below for variable platform width

b) All parts of the platform shall be visible from all of the entrance and exit points onto the platform

The following minimum widths shall apply:

a) Side platforms: 3m (where measurement is taken from platform nosing to wall finish at platform level)

b) Island platforms: 6m (where measurement is taken from platform nosing to wall finish at platform level)

When work is proposed that:

a) Does not involve alterations to the primary structure of the station, and;

b) Is defined as clause 1.2 b. or c. (new or altered assets within existing stations) and

c) Where it is impossible to comply with the platform width requirements of this standard without major rebuilding/alteration to the existing structure of the station

then the following conditions apply:

- Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer
- Proposals shall be demonstrably optimal in relation to the compliant state for new stations
- Proposals shall always comply with the following minimum dimensions:

  a) Platform width – not less than 2.5m (or 0.5m less than the calculated platform width – whichever is greater) for permanent installations. This does not apply to deep level tube platforms

  b) Platform width – for temporary works/installations not in place for more than six months – not less than 2.0m (or 1.0 metres less than the calculated platform width – see 3.11.3.2 – whichever is greater)

  c) Temporary works/installations shall not be located within 5m of platform entrances or exits. This does not apply to stations which have been designated step-free access

Note: This may require additional operating staff to supervise the platform, especially at peak times. Evidence of agreement with the GSM is also required. Platform width is defined as the measurement taken from platform nosing to wall finish for side

Standard – Uniform platform width

It is assumed that passengers are distributed along a platform such that 35% of a platform load occupies 25% of the platform at the busiest section. The platform is sized to give these passengers $0.93m^2$ per passenger with 2 x 0.5m (1m) added for edge effects.

The formula for the width of a platform along its entire length is as follows:

platform width =

$$\left\{ \frac{\text{platform load per headway} \times P \times 0.93}{\text{platform length} \times 0.25} + 1 \right\} \text{m}$$

Where:

P = the proportion of the platform load – in this case 0.35

And where the platform load per headway is determined from the following steps:

1) Peak three-hour platform load = peak three-hour entry flow to platform + peak three-hour exit flow from platform

2) Peak hour platform load = peak three-hour platform load x relevant factor from the table in section 3.2 above, unless observed peak hour data is available

3) Peak 15-minute platform load = peak hour platform load x relevant factor from the table in section 3.2 above, unless observed peak 15-minute data is available

4) Peak minute platform load = peak 15-minute platform load / 15

5) Train service headway = 60 / number of trains per hour

6) Platform load per headway = peak minute platform load (step four) x train service headway (step five)

Equipment lockers (eg for fire equipment), Help points, seats and secondary revenue equipment shall only be installed along the platform wall within the 0.5m allowed for edge effects and not within 5m of platform entrance or exits.

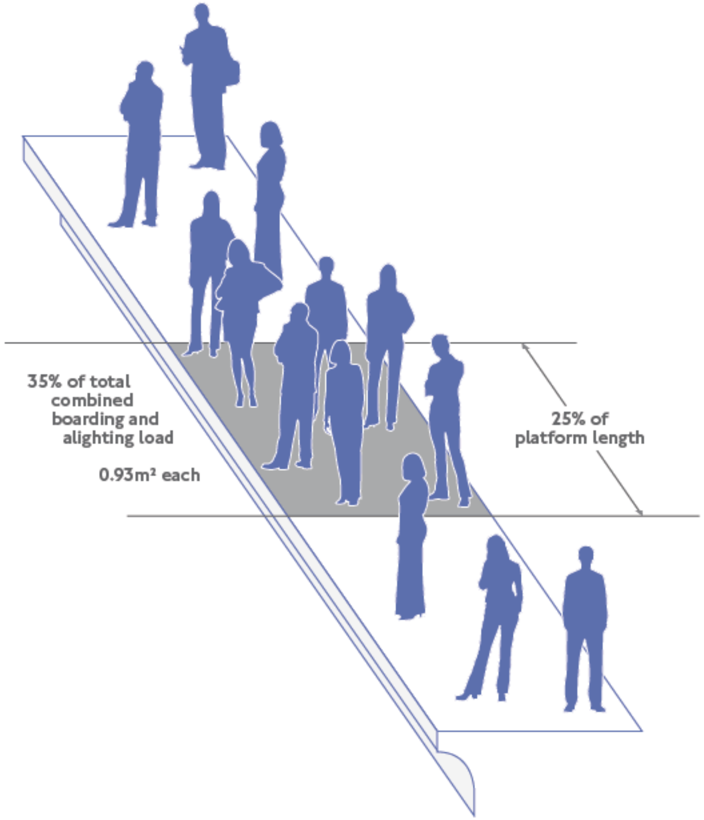
Passenger Help points on platforms shall not be installed within 3m of platform entrances or exits.

Posts and columns shall only be installed along the platform wall within the 0.5m allowed for edge effects.

Increased platform width shall be provided if installed equipment is more than 0.5 metres deep.

Worked example – Uniform platform width
(Warren Street station)

Victoria line northbound platform (assuming observed data unavailable)		
1	Peak three-hour platform load	362 (to Vic Nb) + 4,040 (from Vic Nb) = 4,402
2	Peak hour platform load	4,402 x 0.45 = 1981
3	Peak 15-minute platform load	1,981 x 0.27 = 535
4	Peak minute platform load	535 / 15 = 35.7
5	Train service headway	60 / 26 = 2.31 minutes
6	Peak headway platform load	35.7 x 2.31 = 83.4
7	Busiest section of platform load	83.4 x 35% = 28.8
8	Space requirement (area)	28.8 x 0.93m² = 26.8m²
9	Busiest section of platform length	120m x 25% = 30m
10	Width (without 'edge effects')	26.8m² / 30m = 0.89m
11	Edge effects	1m
12	Total platform width	0.89m + 1m = 1.89m



This is less than the specified minimum width, therefore the platform width defaults to three metres.

Standard – Variable platform width

It is assumed that passengers are distributed along a platform such that 35% of a platform load occupies 25% of the platform at the busiest section. It is also assumed that 30% of a platform load occupies the second busiest 25% of the platform, 22.5% of a platform load occupies the third busiest 25% of the platform and 12.5% of a platform load occupies the final 25% of the platform.

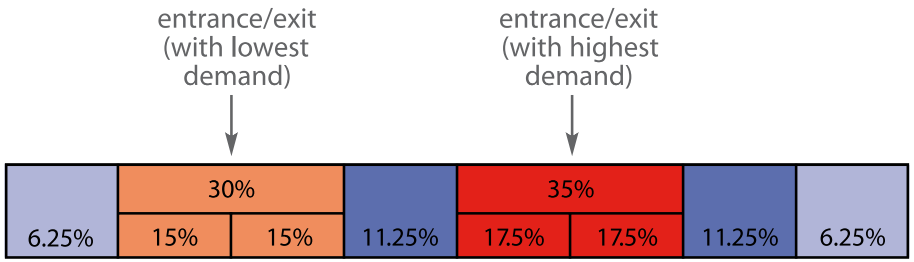
The busiest quarters of the platform will be located either side of the busiest entrances/exits whilst the least busy quarters will be distributed progressively away from the entrances/exits. Each quarter may be split into eighths, by dividing by two, as appropriate.

The calculation for platform width for each quarter shall be determined from the formula given for uniform platform width above, where P = 0.35; 0.30; 0.225 and 0.125 for each of the quarters respectively.

The location of rooms at platform level shall start at the ends of platforms except that, if an entrance or exit is at one end of the platform, the width shall not be reduced at that end.

Guideline – Variable platform width

An example of the distribution of the quarters and eighths along the platform is illustrated below:



Although the illustration shows that there is less demand in the central part of the platform between the two entrance/exit points (ie the 11.25% sector fourth from the left). The width of this sector must be at least as wide as that of the adjacent 15% sector in order to comply with the visibility requirement above).

Standard – Island platforms

Island platform widths shall be calculated by treating them as two separate platforms and adding the two widths together.

Standard – Alignment of escalators and staircases with platform edges

Staircases and escalators feeding directly onto a platform shall be aligned along the length of the platform, ie parallel with the tracks.

Guideline – Platform edge doors

If considering the use of platform edge doors, care should be taken to ensure that adequate platform width is provided for passenger movement. Even utilising the space normally provided for the 'edge effect', extra width platforms may be required as the presence of doors may cause an uneven distribution of passengers along the platform.

Sufficient width should be provided to allow passengers to circulate along the platform clear of any groups of passengers clustered around the doors.

While the usual 0.5 metres for 'edge effect' at the front of the platform need not be provided, it is unlikely that passengers will make full use of the areas between the doors, since there would not seem to be much advantage in standing by the platform edge a long way from a door.

Sufficient space should be allocated for the depth of the platform edge doors, clear of the requirement for passenger circulation.

3.11 Platforms (continued)

Headroom

Headroom is a key factor in ensuring that all platform signage and passenger information is easily visible.

Standard – Headroom on platforms

The headroom above a platform shall not be less than 2.5m when measured to the lowest point of suspended signage or equipment for a width of at least 2.9m when measured from the platform edge.

At distances greater than 2.9m from the platform edge, the minimum headroom to suspended signage or equipment shall be 2.3m.

Platform exits

Platform exits (and entrances) should be arranged to encourage an even platform distribution and to enable the alighting train load to clear the platform before the next train's doors have opened.

The capacity of the entrances/exits serving the platforms is derived in the same way as for passageways. The formula for two-way entrances/exits uses the peak minute platform load as derived in step four of the platform sizing methodology: the formula for one-way entrances/exits uses the peak minute boarding or alighting load, as relevant.

Standard – Entry or exits from platforms
Platform entry or exit widths shall be determined as follows:

$$\text{two-way platform entry or exit width} = \left\{\frac{\text{Peak 1 minute platform load}}{40} + (2 \times 0.3)\right\} \text{ m}$$

$$\text{one-way platform exit width} = \left\{\frac{\text{Peak 1 minute alighting load}}{50} + (2 \times 0.3)\right\} \text{ m}$$

$$\text{one-way platform entry width} = \left\{\frac{\text{Peak 1 minute boarding load}}{50} + (2 \times 0.3)\right\} \text{ m}$$

The peak one minute platform load shall be as given in step four of platform width calculation.

The peak minute boarding load shall be derived in the same way as the peak minute platform load, except that only the flow to the platform shall be used (as above).

Similarly, for the peak 1minute train alighting load, only the flow from the platform shall be used.

If the total capacity required is to be provided by more than one platform entry or exit then the 'edge effect' of 0.3m per sidewall shall be included for each platform entry or exit (eg one exit of 4.6m is equivalent to two exits of 2.6m each).

The greater of the capacities required for normal operations or for emergency evacuation (see section on Planning for Hazards) shall be provided.

3.11 Platforms (continued)

The minimum width of a platform entry, exit or cross-passageway shall be 2.0m.

The maximum distance from any point on the platform to a means of escape or normal entry or exit routes shall be 45m (ie the maximum distance between entry or exits shall be 90m).

To encourage balanced loading within trains, the location of each entrance and exit relative to the train shall be varied from one station to the next and not favour one particular end of a train.

For platforms with more than one entrance and exit, these shall be distributed along the platforms as evenly as possible.

Separate entrances and exits shall be provided and arranged to facilitate even loading of the platforms and rapid egress with minimum congestion and to minimise conflicts between passenger flows.

Platforms and circulation routes shall be configured to avoid dead end conditions.

The distance from a dead end on a platform or in a corridor to a means of escape shall not exceed 20m.

Passengers moving from one part of the station to another shall not be routed along any platforms as part of the interchange route.

Standard – Planning criteria and levels of service

The previous sections of this standard specify how to calculate the size or capacity of station elements for what is considered to be a normal level of service (LoS). Stations shall also be plan for levels of service to fall within the intervals as shown in the table below during any special events such as concerts, exhibitions and sporting occasions.

When construction work or temporary works not exceeding six months are carried out in parts of existing stations, the levels of service listed in the last column of the table below shall apply.

The levels of service shall apply to peak forecast traffic demand.

Using this table and the relevant formulae for sizing station elements, capacities of existing and new stations can be determined for these special events or during work. These capacities need to be known for existing stations to determine if and when special station control measures need to be implemented.

If special events are a regular occurrence, such as football matches every other week, then station capacity and design shall reflect this situation.

The table below shows the levels of service (LoS) and associated quantitative measures to apply to four categories of station operation in the station areas listed.

The minimum width for a one-way passageway shall be 1.4m in stations without step-free access and 1.9m in stations with step-free access.

Standard – Construction work in existing stations:

The minimum width for a two-way passageway shall be 1.9m.

The minimum width for a two-way staircase shall be 2.0m.

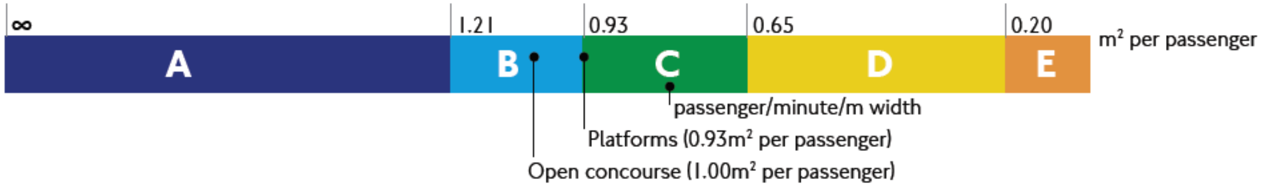
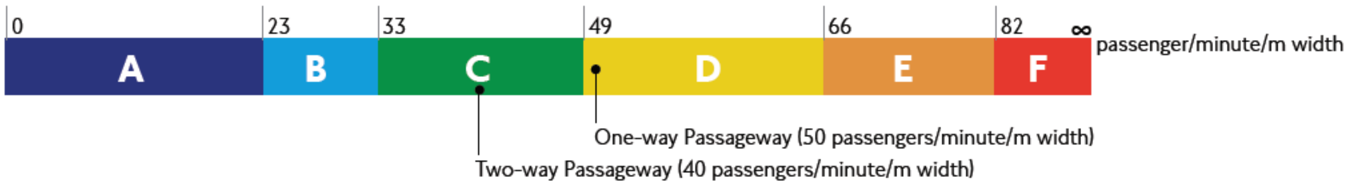
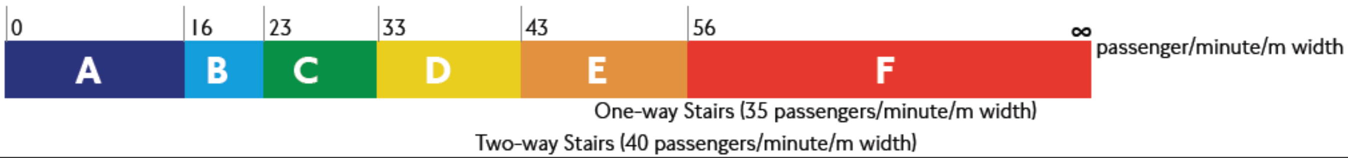
The minimum width for a one-way staircase shall be 1.2m.

Contents

Station area	Category of station operation							
	Normal operation		Guidance for special events up to three days		Guidance for special events over three days		Guidance for construction work	
	LoS	Quantitative measure	LoS	Quantitative measure	LoS	Quantitative measure	LoS	Quantitative measure
Open concourses	B	1.0m^2 per person	D	0.45m^2 per person	C	0.8m^2 per person	C	0.8m^2 per person
Queuing for ticket hall facilities	C	0.8m^2 per person	E	0.28m^2 per person	D	0.45m^2 per person	D	0.45m^2 per person
Passageways- one-way	D	50 passengers /minute/m width	E	80 passengers /minute/m width	D	65 passengers /minute/m width	D	65 passengers /minute/m width
Passageways- two-way	C	40 passengers /minute/m width	E	65 passengers /minute/m width	D	50 passengers /minute/m width	D	50 passengers /minute/m width
Stairs- one-way	D	35 passengers /minute/m width	E	43 passengers /minute/m width	E	43 passengers /minute/m width	E	43 passengers /minute/m width
Stairs- two-way	C	28 passengers /minute/m width	E	43 passengers /minute/m width	D	35 passengers /minute/m width	D	35 passengers /minute/m width
Escalators		100 passengers /minute		120 passengers /minute		110 passengers /minute		110 passengers /minute
Platforms	B/C	0.93 m^2 per person	E	0.28 m^2 per person	D	0.45 m^2 per person	D	0.45 m^2 per person

Guideline – Level of service

The diagram below highlights the LoS concept for the normal operations category of station operations in more detail:

<table>
<tr><th rowspan="2">Station area</th><th>Category of station operation</th></tr>
<tr><th>Normal operation</th></tr>
<tr><td>Open concourses, platforms, queing for ticket hall facilities</td><td>
</td></tr>
<tr><td>Passageways</td><td>
</td></tr>
<tr><td>Staircases</td><td>
</td></tr>
<tr><td>Escalators</td><td>100 passenger/minute</td></tr>
</table>

Station staff accommodation

4.1 Planning station staff accommodation

Requirements for the following groups of accommodation are given in the sub-sections that follow:

- Line management office suites
- Station staff office suites
- Ticket office suites
- Ancillary accommodation

Guideline – General principles

The following factors should be considered when planning staff accommodation:

Experience

- Lessons learnt from recently completed station staff accommodation projects

Location of station and accommodation

- Location of the accommodation within the building
- Interaction between rooms and other aspects of the station
- Impact of location on localised congestion
- Specific features of the station location, eg football grounds and hospitals
- Operational experiences/local issues highlighted by staff
- Operational lines of sight to passengers and staff

Staff/tasks

- Existing and proposed operational tasks
- Disabled staff
- Differing modes of station operation (include secondary users – cleaners, emergency services, visitors, etc
- Flexibility for new, additional and upgraded equipment, changes in roles/responsibilities, staffing levels, function of space – 25% extra space is good practice, if there is a reasonable likelihood of expansion
- Maintenance considerations

Regulations

- Safety and security (include UK and LU Health and Safety regulations, LU Code of Practice for Materials – for fixtures and fittings)
- Company and line operating policy
- Other company standards
- Legislative constraints

Standard – General principles

In order to determine the requirements for stations of all sizes and complexity, tables are used below to reflect station size and staff numbers. It shall be noted that some station rooms have fixed measurements, whilst the sizes of others depend upon the number of staff expected to use the rooms. Staff numbers can be obtained from operational managers or from the station staffing model, available from LU. All staff accommodation rooms shall comply with the Workplace (Health, Safety and Welfare) Regulations.

Standard – Line management office suites

Room	Location	Requirement	Size
Group Station Manager's (GSM's) Office	Not necessarily sited on a station but when this is the case, the office shall be at ticket hall level (one office per group of stations)	Access to office shall be via the administration/reception area	$20m^2$ minimum
Duty Station Manager's (DSM's) office	With the GSM office. Not necessarily sited on a station but when this is the case, the office shall be at ticket hall level (one office per group of stations)	Access to office to be via the administration office/reception area	$49m^2$ minimum for four DSMs plus $10m^2$ minimum for each extra DSM (see staffing model for station group)
Administration office/ reception area/ waiting room	Ticket hall level in suite adjacent to GSM's and DSM's offices	Reception area/waiting room to be a separate area	Typically $25m^2$ minimum for office (to suit two administration staff and associated filing and storage space) plus $12m^2$ minimum for reception area/waiting room
Tea point	In GSM/DSM suite		$7m^2$ minimum
Store room	In GSM/DSM suite		$6m^2$ minimum
Toilet (male)	In GSM/DSM suite	One cubicle	$3.3m^2$ minimum
Toilet (female)	In GSM/DSM suite	One cubicle	$3.3m^2$ minimum

Standard – Station staff office suites

There are three sizes of office suite for station staff dependent upon the number of staff (not including GSM, DSMs and GSM's administrative staff) allocated to the station. The rooms required for each size of suite are given in the following matrix:

Room	Location	Requirements	4-10 staff (small suite)	11-25 staff (medium suite)	26+staff (large suite)
Station Supervisors office	Ticket hall level	Adjacent to mess/kitchen. Window to public area	15m^2 minimum	15m^2 minimum	N/A
Station Operations room (SOR)	See section four	See section four	N/A	N/A	30m^2 minimum
SOR administration office	Adjacent to SOR		N/A	N/A	15m^2 minimum
Interview/ training room	In the suite of offices		N/A	15m^2 minimum	15m^2 minimum
Revenue Protection Inspector/ examiners office	In the suite of offices		N/A	15m^2 minimum	15m^2 minimum
Mess/kitchen	In the suite of offices	Access to mess/kitchen to be from a corridor and not another office	11.5m^2 minimum	21.5m^2 minimum	32.7m^2 minimum

Room	Location	Requirements	4-10 staff (small suite)	11-25 staff (medium suite)	26+staff (large suite)
Locker room	In the suite of offices		$0.7m^2$ minimum per person		
Station store	Adjacent to the suite of offices but accessible from ticket hall	Area may be split between more than one location but areas shall be kept close to offices	$20m^2$ minimum		
Drying room	In the suite of offices close to the locker room		N/A	$7.5m^2$ minimum	$12m^2$ minimum
Toilet (unisex)	In the suite of offices		$3.3m^2$	N/A	N/A
Toilet (male)	In the suite of offices		N/A	$3.3m^2$ minimum	2 x $3.3m^2$ minimum = $6.6m^2$
Toilet (female)	In the suite of offices		N/A	$3.3m^2$ minimum	2 x $3.3m^2$ minimum = $6.6m^2$
Indicative overall size of suite			$65m^2$ minimum	$135m^2$ minimum	$215m^2$ minimum

Standard – Ticket office suites

Three sizes of ticket office suite shall apply depending upon the size of the station. The rooms required for each size of suite are given in the following matrix. The ticket office and POM enclosure vary in size depending upon the number of ticket issuing facilities required (ie ticket issuing windows (TIWs) and POMs). The suite is to be secure and self contained. The entrance to the secure lobby shall be on the unpaid side of the barrier.

Typical ticket office

Typical inside of ticket office

Room	Location	Requirements	2-3 TIWs plus one assistance window (small suite)	4-5 TIWs plus one assistance window (medium suite)	6+ TIWs plus one assistance window (large suite)
Ticket Office	Ticket hall with access from the secure lobby	a) Two or more TIWs plus an assistance window shall be provided b) Assistance windows are required to serve the paid side of the gateline close to the main TIW All of the windows will have a glazed area 1,800mm nominal width x 950mm height x 42mm thick anti-ballistic classification G2/S86 glass with cash/ticket bowl and speech transfer facilities	a) Ticket office with two TIWs plus one assistance window shall be 6.6m minimum wide x 2.45m minimum depth b) For each additional TIW add 1.8m width x 2.45m depth		
POMs	Within the ticket office secure suite (access from secure lobby)	a) A clear, level space around each POM shall allow it to be used from a wheelchair b) FFM/AFM is 530mm width x 720mm depth (approx) c) MFM is 1,130mm width x 720mm depth (approx)	a) The size of a POM enclosure with one FFM/AFM and one MFM is 4.1m minimum wide x 2.5m minimum depth b) For each additional FFM/AFM add 0.6m to the width x 2.45m depth and each additional MFM add 1.2m to the width x 2.5m depth		
Locker room	Within secure suite		$0.7m^2$ minimum per person		

Room	Location	Requirements	2-3 TIWs plus one assistance window (small suite)	4-5 TIWs plus one assistance window (medium suite)	6+ TIWs plus one assistance window (large suite)
Secure lobby	Entrance to self contained secure suite		2.45m. minimum depth x 1.2m minimum width		
Mess/ kitchen	Accessible only from within secure suite	Access to mess/kitchen to be from a corridor and not another office	11.5m^2 minimum	11.5m^2 minimum	21.5m^2 minimum
Ticket clerk's office	Accessible from within secure suite		8m^2 minimum	13m^2 minimum	15m^2 minimum
Paper store	Within secure suite		5m^2 minimum	10m^2 minimum	10m^2 minimum
Toilet (unisex)	Within secure suite		3.3m^2	N/A	N/A
Toilet (male)	Within secure suite		N/A	3.3m^2 minimum	3.3m^2 minimum
Toilet (female)	Within secure suite		N/A	3.3m^2 minimum	3.3m^2 minimum

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Room	Location	Requirement	Size
Station computer room (SCR)	Close to secure ticket office suite, but not accessed from it. Where space at ticket hall level is at a premium, location of the SCR may be considered at basement or upper machine chamber level, or first floor level	At stations with several ticket halls additional SCRs may be required. However, where the total number of devices (eg UTS gates, TOMs, POMs etc) remains below 30 the secondary ticket office suite(s) may be served from the one computer	2m x 2m minimum (internal dimension between finishes) 3m x 2m if more than 30 devices
Dustbin/rubbish store	At or near street level with direct access to street where possible. Opening doors shall not interfere with passenger flows. Not adjacent to a public exit route if that is the only exit route	One metre space in front of each bin shall be allowed for access	5.1 m^2 minimum (3m wide x 1.7m deep) for stations with small staff and ticket office suites and 10 m^2 (4m wide x 2.5m deep) for all other stations. Space for refuse compactor where required (electrical services required). Floor to ceiling height shall be 2.8m minimum
Remote ticket office	Ticket hall level (secondary ticket halls only)	Two TIWs (one of which will be an excess fares window) plus associated fittings	4.9m minimum width x 2.45m minimum depth
Cleaners store/ water point	Centrally situated within station complex, usually at platform level		6 m^2 minimum
Cleaning services store	Adjacent to cleaners store	Shelving to store materials	5 m^2 minimum
Cleaners tea point	Adjacent to cleaners store		7 m^2 minimum

When work is proposed that:

a) Does not involve alterations to the primary structure of the station, and

b) Is defined as clause a new or altered assets within existing stations, and

c) Where it is impossible to comply with the room size requirements of this standard without major re-building/alteration to the existing structure of the station

Then the following conditions apply:

Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer. Proposals shall be demonstrably optimal in relation to the compliant state for new stations.

Proposals shall be demonstrably optimal in relation to the compliant state for new stations.

Room areas (except SORs and rooms containing Station Control Facilities) shall not be less than 20% below the compliant areas defined in the previous tables in this section.

Note: A Human Factors study must demonstrate that the room is fit for purpose.

4.2 Station control

Every enclosed Underground station (formerly known as Section 12) should have a control room capable of receiving the information from all the monitoring and communications equipment relevant to the station, and must have CCTV and public address covering the whole station. The room should be highly visible to passengers, with large glass windows or walls. It is important to both actual and perceived security that passengers can see that they are being monitored. The room should be located at ticket hall level to obtain the best view of the station, and for easy access by emergency personnel. It should also have separate access to street level.

For surface stations there may be an SOR to control a group of stations, although each individual station should still have a control facility linked to the group SOR. Passenger Help Point (PHP) facilities at each individual station should also be linked to the group SOR.

Stations should offer locations at ticket hall and platform levels in which passengers can obtain information, summon assistance or raise an alarm immediately, and be monitored while waiting.

These facilities should be located in the same relative position within each station so that passengers can find them readily.

This section covers the following areas:

- Station control rooms
- Station control unit
- Station evacuation

Standard – Station Operations Rooms/ Station Control Facilities – General

A Station Operations Room (SOR) is defined as a multi-desk control facility and a Station Control Facility (SCF) is defined as a single-desk control facility. A Station Control Facility may be combined with either a Station Supervisor's Office or a ticket office. In the design of new SORs and SCFs, refer to BS EN ISO-11064-3.

All stations nominated by LU shall be equipped with either a Station Operations Room or a Station Control Facility.

Note: The single-desk facility should be referred to as a Station Control Facility (SCF) to avoid confusion with the Station Computer Room (SCR).

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

Standard – station operations room (SOR)

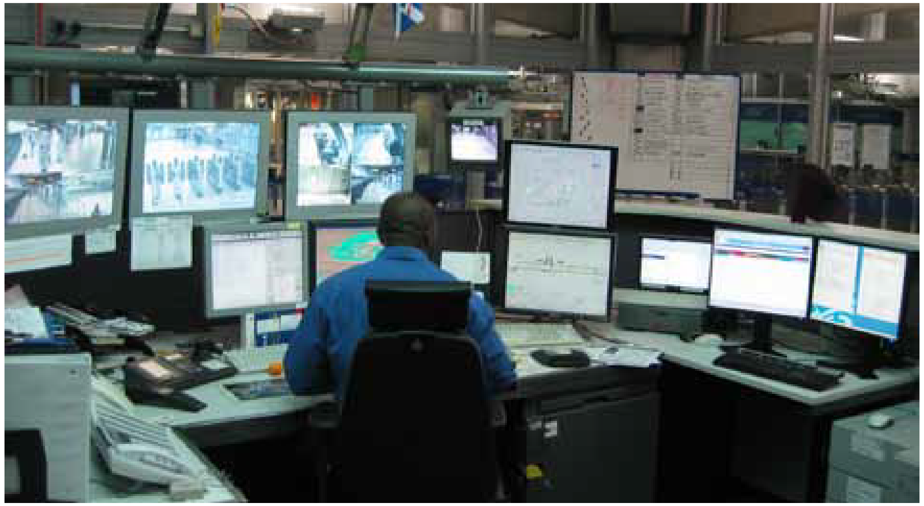
SORs shall be located in a conspicuous position at ticket hall level on the paid side of the UTS gateline.

The location shall give the best view of the ticket hall and any critical areas that are liable to become overcrowded such as gatelines and the heads of escalators.

Direct access to the SOR from the street via a fire protected route, for use by emergency services, shall be provided.

The SOR shall be clear glass fronted permitting observation from both inside and outside.

There shall be a lobby entrance to the SOR on the paid side of the gateline



Typical station operations room

Standard – SOR administration room
At stations that have an SOR, an SOR administration room shall be located adjacent to the SOR at ticket hall level. This shall be in lieu of a station supervisor's office (refer to room matrix on station staff office suites).

Standard – Station control unit (SCU) and emergency opening of gatelines
Station control units control UTS gatelines and monitor passenger operated ticket machines. There shall be at least two located near to this equipment, one in the ticket office, and one adjacent to each gateline.

At stations with more than one ticket hall or gateline, there shall also be separate emergency plungers for opening the gatelines. These shall be located in a conspicuous position within sight of the related gateline. These are typically contained within the THSCU.

Planning for hazards

5.1 Planning for hazards – evacuation

The aim in emergency evacuations is to clear the passengers to a place of safety within six minutes. Where possible emergency evacuation routes should be the same as those used in normal station operations. This is likely to be more cost effective than providing separate infrastructure and, more importantly, passengers will evacuate a station more quickly if they are familiar with the route.

The shortest time period data available should be used in all formulas below. The factors from the table in Section 3.2 should then be applied, if necessary, to obtain the correct flow for the relevant formula. Current passenger flow data can be obtained from Transport Planning, Strategy & Service Development, LU.
Email to rods&counts@tfl.gov.uk

This section covers the following areas:

- General definitions
- Train on fire in station scenario
- Fire within the station structure scenario

Standard – Evacuation: General

In order to plan escape capacity, station design shall take account of two emergency scenarios reflecting 'worst case' situations. These scenarios are:

a) Train on fire in station. In this case the evacuation load (platform and train loads) shall be cleared from the immediate area (the platform) within four minutes, and shall reach a fire-protected route within six minutes

b) Fire within the station structure. In this case the affected passenger load shall reach a fire-protected route within six minutes

In practice there may be scope for passengers to be evacuated by train, but the planned station capacity shall not rely on this.

Enclosed (formerly known as Section 12) stations shall have at least two alternative means of escape from each platform and two fire-protected routes passing through the station and leading to street level.

Escape and emergency access routes shall comply with the requirements for passageway and staircase widths set out in section 3.10 above.

Surface stations shall have more than one evacuation route from each platform, each route positioned to serve one half of the platform.

It shall be assumed that escalators continue to run in the same direction as before the emergency.

It shall be assumed that one escalator, in the least capacious section of the busiest escalator route within the station, shall be unavailable even as a fixed staircase.

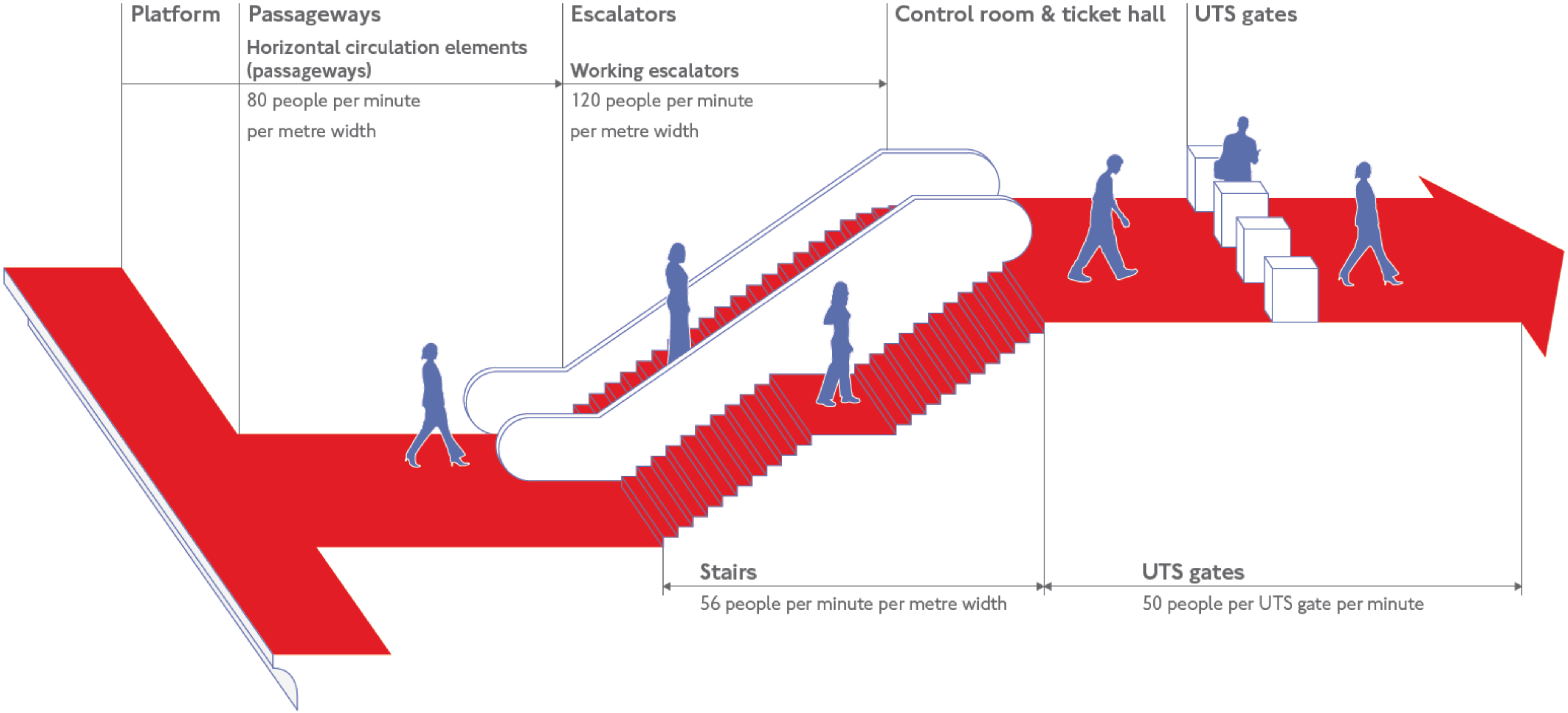
Lifts shall not be used in emergency evacuations unless the lift has been designated as an emergency evacuation lift.

Evacuation capacities shall be calculated for the busiest period in the traffic week and during special events at stations where these occur (eg sports, exhibition venues).

All passengers within the station shall be assumed to be on platforms at the start of the evacuation.

The evacuation capacities of station elements are:-

Means of escape	Capacity
Horizontal circulation elements – passageways and stopped passenger conveyors	80 people per minute per metre width
Vertical circulation elements – stairways	56 people per minute per metre width. (The width is measured between the innermost part of the handrails.)
Working escalators and passenger conveyors	120 people per minute per metre width
UTS gates	50 people per (UTS) gate per minute. Evacuation capacity required in excess of that achievable through the UTS gates shall be provided by emergency gates in the gateline.


Platform
Passageways
Horizontal circulation elements (passageways)
80 people per minute
per metre width
Escalators
Working escalators
120 people per minute
per metre width
Control room & ticket hall
UTS gates
Stairs
56 people per minute per metre width
UTS gates
50 people per UTS gate per minute

Fire-protected routes

A fire-protected route shall be a route:

- Through which the evacuation load or affected passenger load can proceed
- Which can be segregated from the area of incident (eg by fire doors)
- Where there is an escape exit to the street

Firstly, the evcuation fire doors that have been installed to help in the protection of fire-protected routes shall not protrude into the route when open.

Dedicated fire-protected routes shall be provided where routes used during normal operations have insufficient capacity to accommodate the flows arising in the emergency scenarios.

Method for determining the size of evacuation routes

The evacuation capacity of the means of escape (eg numbers of escalators and UTS gates and widths of passageways and staircases) through the station from each platform shall be calculated for the train-on-fire in station scenario.

The evacuation capacity of the means of escape for each of the fire-protected routes shall then be calculated for the fire-in-station structure scenario.

The width of passageways and stairs and the number of escalators or UTS gates for either of the fire-protected routes shall be the greater of the results arising from the calculations.

Guideline – train on fire in station

The train on fire in station scenario represents a worst case in terms of the maximum number of passengers likely to be evacuated from a station.

The passenger flow rates reflect both the high density of passengers and their desire to get out of the station. There are no 'edge effects' in emergency evacuations as passengers will use all the available space.

Firstly, the evacuation load should be calculated for every platform in the station. The platform for which this load is highest should be the one at which the train is assumed to be on fire.

The second step is to calculate the time it takes to evacuate all the passengers from this platform. If this time is greater than four minutes, the station does not comply with the standard.

The third step is to calculate the time it takes to evacuate all the passengers on all the platforms to a fire protected route. Be aware that the method of calculation for the train on fire evacuation load is different from the other platforms. The formula shall be as described for the platform load per headway in section 3.11

This evacuation time calculation comprises of two more stages. Firstly, determine the least capacious element on the escape route (i.e a pinchpoint) so that a clearance time can be calculated. This may be a passageway, stairway, gateline or escalator bank. Secondly, determine the free-flow walk journey time to the fire protected route.

The total time for the last passenger to reach a place of safety or fire protected route is the determined as follows:

evacuation time = platform clearance time + pinchpoint clearance time + free-flow walk time

All the platform exits leading to a place of (relative) safety should be used. The proportion of the evacuation load through each of them is proportional to the platform exit width.

Standard – Train on fire in station scenario

Assumptions

The scenario shall assume that a train is on fire in the station at the busiest platform or at a platform served by the busiest common route from adjoining platforms. The busiest platform or busiest common route serving adjoining platforms is the one with the greatest total of passengers on the train (or trains) plus passengers on the platform (or platforms).

Evacuation capacities shall be calculated for the escape routes from each platform in turn, until the point in the station at which the escape routes from different platforms merge. From that point the capacity of the escape route shall be based upon an evacuation from the busiest platform or busiest common route from adjoining platforms combined with normal passenger flows both from other platforms and other common routes from adjoining platforms.

Number of people to be evacuated from train on fire (evacuation load)

The number of passengers to be evacuated shall be the number of passengers on the train on fire, after a gap in the service of one cancelled train, plus the number of passengers waiting for that train. The number of passengers on the train shall be limited to the 'practical crush capacity' for the train stock type on the line.

If individual train load data is not available, the following formula shall be used:

$$\text{train load} = \left\{\frac{\text{Peak 15 min link load}}{15}\right\}$$

$$\times \text{ train service headway} \times 2$$

Where train service headway is the time in minutes between trains and the link load is the number of passengers on trains entering the platform in question.

For platforms served by a multiple train service (eg stations on the Circle line), the combined train service headway shall be used in the above formula.

If individual platform load data is not available, the following formula shall be used

The normal train service (with no cancellations) shall be assumed on all of the other platforms that are served by the evacuation route being considered. Thus the loads to be evacuated from these other platforms shall be the number of passengers waiting for a train plus the number of passengers alighting from the train. (It is assumed that the first train to arrive at any platform after notification of the incident cannot be informed in time, to prevent its doors from being opened).

$$\text{platform load} = \left\{\frac{\text{Peak 15 min platform load}}{15}\right\} \times \text{train service headway} \times 2$$

thus: evacuation load = train load + platform load

Determination of widths of means of escape from platforms (train on fire)

Once the maximum evacuation load has been obtained, the width of the required means of escape shall be calculated as follows:

a) Divide the evacuation load by four to give the number of passengers required to be evacuated in each minute of the four minute target evacuation time from the platform

b) Divide the one minute evacuation load by the capacity flow rates in 'evacuation general' to determine the required width of platform exits, passageways, ramps, stairs, escalators, passenger conveyors and UTS gates. No allowance for 'edge effects' shall be made in passageways and on stairways

Steps a) and b) above can be summarised in the following formula:

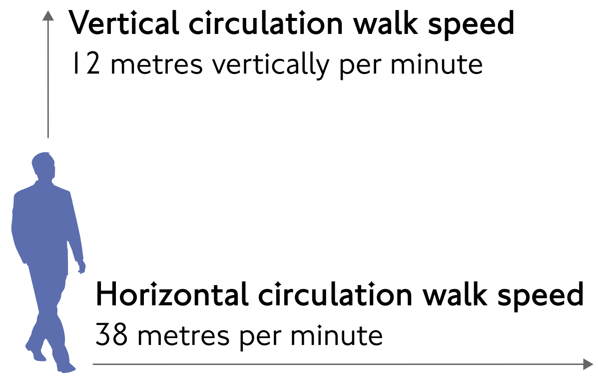
$$\text{width of station element} = \frac{\text{total evacuation load / 4}}{\text{flow rate for that element}}$$

The minimum width of any means of escape (passageway or stairway) shall be 2m.

c) Where two or more escape routes converge, the flows shall be added together

d) Apply the following walk speeds to the last passenger off the platform, to check that the four minute and six minute target times can be met. The last passenger shall take a maximum of four minutes to clear the platform

Circulation	Passenger walk speed
Horizontal circulation	38m per minute
Vertical circulation	12m vertically per minute



Configuration of means of escape from platforms

Once the required capacity of means of escape from platforms has been determined, it can be distributed into any reasonable number of egress elements, though the greater the number, the less certainty can be attached to the estimated use of each.

The following conditions shall apply:

a) No fewer than two alternative means of escape from any platform shall be provided. These escape routes shall remain independent up to and including the station exterior (final exit).

b) On stairways used for evacuation, additional resting areas clear of stair flights and landings shall be provided at alternate landings. A resting area shall be at least 50% of the area of the adjacent landing space.

Guideline – Practical crush capacity of existing stock types

The number of passengers on the train in the train on fire scenario shall be limited to the 'practical crush capacity' for the stock type on the line. If the train load exceeds the practical crush capacity, the practical crush capacity should be used.

The table below shows the practical crush capacity of existing LU stock, which is based on five passengers standing per square metre. These figures are subject to change as new stock types are introduced.

Stock	Practical crush capacity
Bakerloo 1972 stock	847
Central 1992 stock (8 car)	1,047
Sub-surface C-Stock	876
Sub-surface D-Stock	971
Sub-surface S7-Stock	1,050
Sub-surface S8-Stock	1,176
Jubilee (7 car)	972
Northern	787
Piccadilly	801
Waterloo & City	506
Victoria 09 Stock	999

Worked example – Train on fire scenario

Consider a simple enclosed station served by one line. It is assumed that the peak train service is 15 trains per hour (tph) running in each direction, and that the stock type is Victoria line 09 stock. First we calculate the total evacuation load from the platforms:

Calculate evacuation load for busiest platform		
1	AM peak 15 minute line load on NB trains	484
2	NB train service headway	(15 tph) = 60/15 = 4 minutes
3	NB train load	484/15 x 4 x 2= 258
4	Is train load less than practical crush capacity of the stock (999)	Yes, so use train load not crush capacity
5	AM peak 15 minute flow from ticket hall to NB platform	276
6	NB platform load	276/15 x 4 x 2 = 147
7	NB platform total evacuation load	258 + 147 = 405
8	AM peak 15 minute line load on SB trains	460
9	SB train service headway	(15 tph) = 60/15 = 4 minutes
10	SB train load	460/15 x 4 x 2= 245
11	Is train load less than practical crush capacity of the stock (999)	Yes, so use train load not crush capacity
12	AM peak 15 minute station flow from ticket hall to SB platform	167
13	SB platform load	167/15 x 4 x 2 = 89

Calculate evacuation load for busiest platform		
14	SB platform total evacuation load	245 + 89 = 334
15	Identify busiest platform	NB platform
Note: Because the NB platform has the highest evacuation load, it is the busier platform so we assume the train on fire is on the NB platform.		
Calculate evacuation load for other platform		
16	Peak 15 minute boarders at SB platform	167
17	Peak 15 minute alighters at SB platform	102
18	SB platform train headway	15tph = 60/15 = 4 minutes
19	Calculate evacuation load from SB platform	[(167 + 102)/15] x 4 = 72
Note: for the SB platform we are no longer doubling the train and platform load to account for a cancelled train – this is only done for the busiest platform		
Calculate total evacuation load from both platforms		
20	Total evacuation load from both platforms	405 + 72 = 477

The standard requires that customers are able to clear the immediate area of the fire (in this case the NB platform) within four minutes. So the next step is to calculate the clearance time from the NB platform. We assume that there are three passages leading off from the platform (as shown in the diagram above), each 3m wide:

Calculate platform clearance time		
21	Total evacuation load from NB platform	405
22	Capacity of each passageway	3 x 80 = 240 passengers per minute
Note that no edge effects are assumed		
23	Total capacity of routes off platform	3 x 240 = 720 passengers per minute
24	Calculate platform clearance time	405/720 = 0.56 minutes
25	Check clearance time less than four minutes	Yes

In this case, the platform clearance time is well within the requirements of the standard.

The standard also requires that customers are able to reach a fire protected route within six minutes. For this example, we will assume no fire doors are present so customers need to leave the station within six minutes. We will assume that the platform is linked to the ticket hall via three escalators, and that the normal configuration of these escalators is two up escalators and one down escalator.

It is necessary to identify the least capacious pinch point on the escape route from the station. This could be a gateline, a passageway, a staircase or an escalator bank. In this case we assume that the up escalators present the least capacious pinch point.

Calculate time to board up escalator		
26	Total number of customers to be evacuated from platform	477
27	Number of up escalators available	1
Note that it is assumed that the down escalator continues to run in the down direction, and that one of the two up escalators is unavailable, as dictated by the standard		
28	Total capacity of up escalators	1 x 120 = 120 passengers per minute
29	Calculate escalator clearance time	477/120 = 3.98 minutes

So far we have calculated that it would take four minutes from the start of the evacuation for the last customer to board the single up escalator. We now need to calculate the free flow walk time from the platform entry/exit to the station exit. We will assume that is a distance of 70 horizontal metre and 20 vertical meters.

Calculate free flow journey time from bottom of escalator to station exit		
30	Calculate time to travel up 20m	20/12 = 1.67 minutes
31	Calculate time to travel along 70m	70/38 = 1.84 minutes
32	Total free flow walk time	3.51 minutes
Calculate total time for the last passenger to exit station		
33	Total time to exit station	0.56 + 3.98 + 3.51 = 8.05 minutes

In this case, the time required to exit the station is greater than the six minutes dictated by the standard. This means that this station does not comply with the standard. A further escape route should be provided to supplement the exit capacity. In fact, this would be required in any case because the standard also requires that two alternative means of escape from any platform shall be provided.

Also in this case, passengers on the other platform used the same evacuation route however there may be other platforms in stations which do not. Passengers on other platforms must also be able to reach a (relative) place of safety within 6 minutes. If more than one place of (relative) safety exists, calculate the journey time to each one of them. The evacuation time is the most onerous time to reach a place of (relative) safety.

Note that these calculations have been carried out in the AM peak. The calculations should be repeated for the PM peak when the demand may be greater and the escalator configuration may be different. For some stations, it may also be necessary to repeat the calculations for the demand expected at weekends or during special events.

Standard – Fire within the station structure scenario

Assumptions

For this scenario it shall be assumed that there is a fire in the most capacious of the two fire-protected routes through the station and that the entire evacuation load from all platforms shall be via the other route.

The normal train service shall be assumed at each platform apart from the busiest platform where it is assumed that there has been a delay of one headway.

All passengers within the station shall be assumed to be on platforms at the start of the evacuation (as this is the worst case).

Number of people to be evacuated from station on fire (affected passenger load)

The affected passenger load to be evacuated shall be the sum of the boarding and alighting loads on each platform apart from the busiest platform where this number is doubled due to delay of one headway. The boarding and alighting loads shall be as used in section on 'platform width' (ie the average number of passengers waiting for a train, plus the number of passengers alighting from the train, at the height of the peak).

Determination of widths of means of escape (station on fire)

Given the requirement for two alternative means of escape and the assumption that one of the routes will be unavailable, the size of each of the two means of escape shall be designed to accommodate the entire evacuation load.

The capacity of each of the two required means of escape shall be calculated as follows.

a) For each platform, determine the maximum evacuation flow per minute through the platform exits, using the platform exit widths calculated for the train on fire in station scenario:

maximum evacuation flow per minute = width of exits x 80 passengers per minute per metre width

b) If the affected passenger load from the platform is less than the capacity of the platform exits then:

affected passenger load = evacuation flow per minute

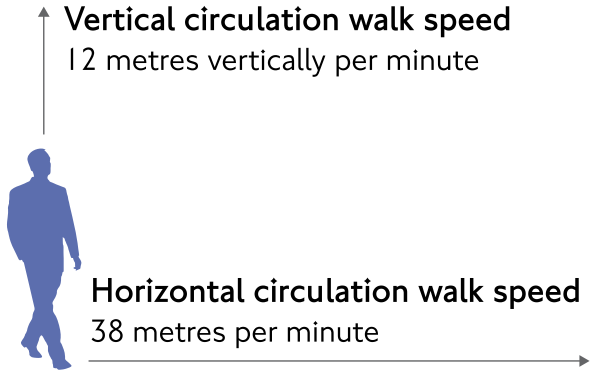
c) Divide the evacuation flow per minute from step a) above by the capacity flow rates in 'evacuation general' to determine the required width of passageways and stairs and the required number of escalators and UTS gates (no allowance for 'edge effects' in passageways and on stairs shall be made):

d) Where two or more escape routes converge, the flows shall be added together.

e) Apply the following walk speeds to the last passenger off the platform, to check that the six minute target time to reach a fire-protected route can be met. Assume the last passenger will have to walk the whole length of the platform.

The width of passageways and stairways and the number of escalators or UTS gates for either of the fire-protected routes shall be the greater of the results arising from the calculations for each of the scenarios above.

Circulation	Passenger walk speed
Horizontal circulation	38m per minute.
Vertical circulation	12m vertically per minute



Configuration of means of escape through the station structure

Once the required capacity of means of escape through the station structure has been determined, it can be distributed into any reasonable number of egress elements, though the greater the number, the less certainty can be attached to the estimated use of each. The following conditions shall apply:

If more than one place of (relative) safety exists, the evacuation time for each one must be calculated. Time to reach a place of (relative) safety is the most onerous of the evacuation timings for each possible route.

No fewer than two alternative means of escape through the station structure shall be provided. These escape routes shall remain independent up to and including the station exterior (final exit).

On stairways used for evacuation, resting areas clear of stair flights and landings shall be provided at alternate landings. A resting area shall be at least 50% of the area of the adjacent landing space.

Facilities

6.1 Secondary income and other free-standing items

The policy of London Underground is to 'maximise net social benefit within available funds subject to a defined gross margin target', and within this remit there is considerable scope for generating secondary revenue within stations, through retailing and advertising. Secondary revenue activities can also generate social benefits in themselves, through the provision of useful facilities such as telephones.

Secondary revenue should be maximised, but shall not impact on the core business of generating primary revenue or conflict with normal passenger flows through the station.

Retail units and other secondary income units, including associated queuing space, shall not be located within the run-off area of UTS gatelines, stairs or escalators.

Secondary revenue units shall be positioned so that the machine and the person using it do not impede passenger flows.

Specifically, any impact secondary revenue generation has on the following areas must be assessed before any decision is taken:

- Safety
- Emergency evacuation
- Passenger movement under normal station operations
- Congestion

Planning for new and refurbished stations should always include secondary revenue from the outset, and Strategy & Service Development, Customer Service Strategy, should be consulted at the beginning of any project or study.

The following standards and guidelines specify the planning of space for secondary revenue schemes.

This section covers the following areas:

- General comments
- Retail
- Advertising and sponsorship
- Automated telling machines

Standard – General
Space shall be provided for one person using the secondary revenue units and the space of the unit itself.

One person shall be assumed to take up 0.8m^2 in concourse areas and 0.8m^2 in passageways.

Guideline – Telephones
It is not generally advisable to position telephones on columns as they can easily cause an obstruction when in use. If this is considered, detailed analysis of passenger flows should be carried out.

Telephones usually protrude from walls, and it is recommended that they be marked by contrasting colour. A floor mounted structure such as end panels or seats on both sides of the units would also warn cane-users and guide dogs of the extent of the overhang. Telephones should be fitted with induction loops to improve quality of sound for hearing aid users. Appropriate public information symbols should be used.

Standard – Retail
Retail units shall not be located below ticket hall level in enclosed (formerly known as Section 12) stations.

For retail units that have a counter, it shall be assumed that one person is being served.

Guideline – Retail
Retail outlets with extended opening hours should encourage regular use of the ticket hall from the street, maintaining a human presence and improving security.

Walk-in retail units should be positioned such that they do not create cross-flow movements. Generally units are between a minimum of 5m^2 and a maximum of 30 m^2 in size.

Once a tenant is in place, station staff should make sure that the appearance of the retail unit is maintained and that retail facilities do not impinge into operational space. Signing and advertising should also be controlled.

6.1 Secondary income and other free-standing items (continued)

Standard – Advertising and sponsorship
There shall be no intrusions into the space required for passenger movement up to a height of 2m, with the exception of non-illuminated poster frames.

Advertising and sponsorship equipment shall comply with the requirements for circular cross-section passageways (see section 2.3).

Advertising frames shall not be positioned on external station facades.

Advertising and sponsorship shall not be positioned on platform surfaces, UTS gate paddles, UTS gate stanchion sides and their approaches.

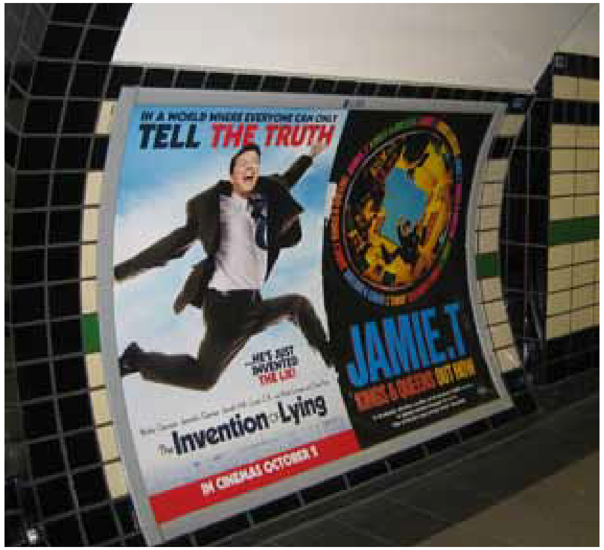
Only static advertising shall be used on escalator and staircase approaches and headwalls.

Guideline – Advertising and sponsorship
Advertising and sponsorship should comply with the guideline for wall and air space hierarchy.

Advertising and sponsorship should consider the guidelines contained in ‘Sponsorship, co-branding and innovative advertising’ from LT Design Management.

Only the rise of the ‘exit’ stairs or escalators may be decorated with a sponsor or advertiser’s brand or message. It should never reduce definition of the stair riser or tread. The requirements of disabled or visually impaired passengers should always be considered.

Typical phone installation



Typical commercial advertising site

Standard – Automated telling machines (ATMs)

The queuing space to be provided for the ATM shall be 4m deep.

Typical ATM site

6.2 Other public facilities

A station should provide all the facilities required by passengers (subject to a business case). The items in this section generate social benefits and therefore primary income through fares revenue, rather than secondary income through commercial activities.

This section covers:

- Public toilets
- Waiting areas/platform furniture
- Cycle parking facilities
- Litter bins

Standard – Public toilets
If toilets are installed, there shall be separate male and female facilities, each occupying a minimum area of 10m^2.

Accessible toilet facilities shall be provided at stations which have step free access between street and platforms. These shall be designed for the specific requirements of persons with restricted mobility. The facilities may either be provided within both the male and female toilets, or as a single unisex cubicle with its own separate entrance.

Guideline – Public toilets
Feedback from customers shows that they value having toilet facilities available when travelling. It is good practice to provide toilets where possible, to help older people, disabled people and those travelling with young children to use LU services more easily. In situations where this is not possible, an 'access statement' should record the reasons for this.

A recent report by the London Assembly made a range of recommendations to improve public toilet availability across London. While not specifically targeted at LU, this makes it clear that public bodies should give consideration to toilet provision. There has been public criticism of the failure to incorporate toilet facilities in some Crossrail stations, so LU should look to demonstrate that this has been considered when building new stations or making significant changes to the layout of stations.

Poorly designed toilets can cause difficulties for operational staff, which may lead to toilets being kept locked or closed permanently. When planning new toilet facilities, or improving existing ones, consideration should be given to site and design to minimise vandalism and misuse. This may include locating toilets on the paid side of the station, or individual cubicles opening directly into the ticket hall area for easier observation.

Where there is insufficient space for separate male and female facilities, unisex facilities should be provided, which meet the requirements for an accessible toilet facility, in order to assist mobility impaired people. The cubicle should have an entrance separate from either the male or female toilets to accommodate a carer of the opposite gender. These facilities should meet the guidance set out in British Standards as well as the provisions of section 17 of the Crime and Disorder Act.

Guideline – Waiting areas/platform furniture
The provision of enclosed waiting rooms should be considered for open air platforms. Waiting rooms should be well-ventilated, but draught-free and warm with easy access doors. Waiting rooms should include a public address system for the relay of emergency, train and other information.

Waiting areas and seating should be provided, particularly in outlying stations, within sight of staff accommodation for security. Sufficient glazing should be provided for visibility into and out of the waiting area. Turning space for wheelchairs and pushchairs should also be taken into account.

Standard – Cycle parking facilities
Cycle parking facilities shall be provided at stations where space permits.

Size and location shall be decided specific to that station.

Guideline – Cycle parking facilities
The existence of cycle facilities at stations can change public perception and encourage a more general use of the cycle/rail combination as a mode of transport. Cycle storage facilities should be provided at stations whenever possible. If space is available, there should be secure storage accommodation within the station area. Where this is not achievable, liaison with local authorities may help with the provision of alternative facilities nearby.

Cycle racks should follow the approved TfL Design appropriate to that location.

Standard – Litter bins
Litter receptacles, to the design approved by LU, shall be sited in stations subject to the gaining of appropriate safety and security approvals and provided that they do not interfere with passenger flows, run-offs etc. as specified throughout this standard.

Appendices

BCV stations

Bakerloo line (11)	Central line (18)	Victoria line (10)
Elephant & Castle	Shepherd's Bush	Brixton
Lambeth North	Holland Park	Vauxhall
Waterloo	Notting Hill Gate	Pimlico
Charing Cross	Queensway	Victoria
Piccadilly Circus	Lancaster Gate	Warren Street
Regent's Park	Marble Arch	Highbury & Islington
Marylebone	Bond Street	Seven Sisters
Edgware Road (B)	Oxford Circus	Tottenham Hale
Warwick Avenue	Holborn	Blackhorse Road
Maida Vale	Chancery Lane	Walthamstow Central
Kilburn Park	St Paul's	
	Bank	
	Monument	
	Bethnal Green	
	Mile End	
	Wanstead	
	Redbridge	
	Gants Hill	

JNP stations

Jubilee line (7)	Northern line (26)	Piccadilly line (19)
North Greenwich	South Wimbledon	Heathrow T5
Canary Wharf	Colliers Wood	Heathrow T4
Canada Water	Tooting Broadway	Heathrow T123
Bermondsey	Tooting Bec	Hatton Cross
London Bridge	Balham	Hounslow West
Southwark	Clapham South	Knightsbridge
Westminster	Clapham Common	Hyde Park Corner
	Clapham North	Green Park
	Stockwell	Leicester Square
	Oval	Covent Garden
	Kennington	Russell Square
	Borough	Caledonian Road
	Old Street	Holloway Road
	Angel	Arsenal
	Tottenham Court Road	Finsbury Park
	Goodge Street	Manor House
	Euston	Turnpike Lane
	Mornington Crescent	Wood Green
	Camden Town	Bounds Green
	Chalk Farm	Southgate
	Belsize Park	
	Hampstead	
	Highgate	
	Archway	
	Tufnell Park	
	Kentish Town	

SSL stations

District line (13)	Metropolitan & Circle lines (9)
Fulham Broadway Earl's Court Gloucester Road South Kensington St James's Park Embankment Temple Blackfriars Mansion House Cannon Street Tower Hill Aldgate East Stepney Green Bow Road	Bayswater Paddington Baker Street Great Portland Street Euston Square King's Cross St Pancras Moorgate Liverpool Street Aldgate

Appendix 2: Enclosed stations definition

Definition of enclosed stations (formerly known as 'Section 12'), taken from the Fire Precautions (sub-surface railway stations) Regulations 2009:

These regulations apply to any premises where:

a) The premises are used as a railway station,

b) Members of the public have access to the premises (whether on payment or otherwise); and

c) There is a railway platform in the premises which is an enclosed underground platform

A railway platform is an enclosed platform if the platform and the permanent way to which it is adjacent are situated wholly or mainly in a tunnel or wholly or mainly within or under any building.

A railway platform is an underground platform if the level of the roof or ceiling immediately above the platform and the permanent way to which it is adjacent is below the level of the surface of the ground adjacent to any exit from the railway station providing a means of escape from the station in case of fire.

A railway platform is situated mainly in a tunnel or mainly within or under a building if the platform and the permanent way to which it is adjacent are covered by any part of a tunnel or building for more than half the length of the platform.

These regulations apply to premises owned or occupied by the Crown.

For further information

This document has been produced by the Station Planning Standards Manager within the Transport Planning section of the Strategy & Service Development Directorate.

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