Transport for London
London Underground

Category 1 Standard

S1371 Station planning

Issue: A6

Issue date: September 2016
Review date: September 2021

Contents

1 Purpose

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

1.2 This Standard applies to:

a) New stations;
b) New assets within existing stations;
c) Altered assets within existing stations.

1.2.1 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 headroom, platform width and room size requirements of this Standard without major re-building/alteration to the existing structure of the station, then the following conditions apply:

i) Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer;
ii) Proposals shall be demonstrably optimal in relation to the compliant state for new stations;
iii) Proposals shall always comply with the minimum dimensions set out in sections 3.5.2, 3.9.5.3, 3.10.2.4, 3.10.7.2, and 3.12.9.1 of this Standard, each of which should be read in full to achieve an acceptable condition.

1.2.2 The reason for these sections is to recognise that the structure of an existing station may not be able to accommodate some of the constraints of this Standard in terms of linear dimensions, available floor area or volume. If this is the case the onus is on the Supplier (as proposer) or other proposer to identify all risks associated with their proposal and to prove and evidence that these are ALARP in accordance with other relevant category 1 Standards.

1.2.3 The Supplier (as proposer) or other proposer must also be able to demonstrate that their proposal is the best that can be achieved under the circumstances, offering optimal compliance to the Standard whilst meeting the requirements of LU category 1 Standard S1538 ‘Assurance’. This will typically mean an analysis of available options. If these conditions are satisfied and if the minimum dimensions listed in the relevant sections of this Standard can also be met then a concession application is not required.

1.2.4 All dimensional requirements for passageways, stairways, and run-offs are not affected by the clauses in this section, which shall always be fully compliant. Proposers shall seek additional support from the technical content manager of this Standard (see Responsibilities section clause 4.3) if compliance cannot be achieved and a concession is likely to be required.

1.3 For temporary works in place for not more than six months and where it is impossible to comply with the spatial requirements in this Standard as a consequence of installing the Temporary Works e.g. Headroom, platform width, room size, run-offs, then the following conditions apply:

a) Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer to LU, and;
b) Proposals shall be demonstrably optimal in relation to the compliant state

Note:	To achieve the conditions required within section 1 that produce the best possible results, proposers will have to account for customer service impacts in their assessment of what is 'optimal' e.g. congestion and journey times. This may entail seeking additional support from the technical content manager of this Standard (see Responsibilities section clause 4.3) on more complex or congested station routing, congestion and passenger flow issues.

2 Scope

2.1 This Standard addresses and supports spatial planning issues of:

a) Normal operations;
b) Degraded operations during temporary works and special events;
c) Controlled evacuation;
d) Evacuation in the event of a fire.

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

a) Passenger flow;
b) Ticket hall;
c) Access and Interchange facilities;
d) Secondary income facilities;
e) Operational staff accommodation;
f) Station Operations Rooms and Control Facilities;
g) Ticket issuing facilities;
h) Platforms;
i) Lifts and Escalators;
j) Evacuation;
k) Public facilities.

insofar as they relate to Station planning.

3 Requirements

3.1 Introduction

3.1.1 Stations and Structures shall comply with category 1 Standards, the Building Regulations and relevant British Standards. Where any conflicts arise between Building Regulations and this Standard, compliance with this Standard shall take precedence except where a breach in the Law would arise. Details of relevant references can be found in the Premises Standards listed in section 6.1.2.

3.1.2 Space for normal operations in stations shall be planned to:

a) minimise congestion;
b) be resilient to surges in demand and train service disruption;
c) provide sufficient non-passenger space to enable staff to function efficiently;
d) provide a suitable level of security to reassure passengers and staff.

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

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

3.1.5 New and substantially altered existing stations shall be designed to ensure that persons of reduced mobility can move between street and train via step-free routes between levels, which comprise of lifts, ramps and level access from platform to trains, and between platforms on different lines.

3.1.6 At stations where encumbered passengers are prevalent, lifts shall be located close to escalators wherever possible, and the use of lifts (rather than escalators) is encouraged for safety reasons.

3.2 Passenger survey data

3.2.1 The calculations for station areas shall use the average flow per minute which shall be derived from the peak 15 minutes flow.

$$\text{The average per minute} = \left(\frac{\text{Peak 15 minutes}}{15}\right)$$

3.2.2 The following elements are the exception to the peak 15 minute flow:

a) Run-offs;
b) Ticket issuing facilities;
c) UTS gates;
d) Smartcard readers;
e) Lift Waiting Areas.

3.2.2.1 Run-offs and ticket issuing facilities shall be designed for peak 1 hour, UTS gates and smartcard readers shall be designed to cater for the average flow per minute derived from the peak 5 minute flow (see section 3.3.3) while lift waiting areas shall be designed to cater for the peak one minute passenger demand.

3.2.3 Should peak fifteen minute passenger flow data be unavailable (e.g. for a new station), the factors from the following table shall be applied to the flow for the shortest peak period available (either peak 3-hours or peak 1-hour) to give the peak flows in the shorter periods. Hence:

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

3.2.4 Passenger areas derived from methodologies contained in this document shall be the net areas available after allowing for the requirements of all customer related activities, as specified in other relevant category 1 Standards.

3.2.5 Stations are allocated a category for the purposes of spatial capacity planning and dynamic modelling, as follows:-

a) City;
b) Inner Suburb;
c) Outer Suburb
d) Shopping;
e) Terminus
f) Tourist.

3.2.6 Passenger flow data is derived and extracted from the LU RODS database and is available, along with the station categories, from S&SD Transport Strategy or by e-mail to [redacted]

Note: The Station Planning types for differing stations do not align with the categories defined for stations under the Fit-for the-Future (Stations) project, and should not be confused. The Fit-for-the-Future (Stations) categories are based on staffing requirements, whereas the categories for Station Planning are based on the spatial needs of customers within stations.

3.3 Ticket hall

3.3.1 General

3.3.1.1. When planning the layout of a ticket hall, all customer related activities (as specified in other relevant category 1 Standards) that are expected to take place within the ticket hall shall be identified and incorporated. Conflicts of differing passenger flows shall be avoided. These activities include ticket selling, gatelines, queuing, customer circulation & assistance and secondary revenue activities

3.3.2 Station Entrances/Exits

3.3.2.1 Station entrance/exit minimum width shall be calculated as follows:-

$$\text{Entrance/Exit width per ticket hall} = \left(\frac{\text{No. of UTS Gates} \times 50}{80} + \left(\text{No. Of Entrances/Exits} \times 2 \times 0.3 \right) \right) \text{m}$$

3.3.2.2 The entrance/exit width may be split across multiple entrances and exits; however each of these shall have a minimum width of 2.5m.

3.3.2.3 Station entrance/exits shall not be so large that they cannot safely contain on the unpaid side the number of customers that may enter concurrently, nor significantly exceed the capacity of the gatelines, stairways or escalators.

3.3.2.4 Station entrance/exits shall be protected by a sliding gate installation (typically of the Bostwick type), lockable at three points.

3.3.2.5 There shall be a level landing outside and immediately in front of any station entrance/exit of at least 1.5m deep and at least 300mm wider than the entrance/exit.

3.3.2.6 Station entrance/exits shall be protected by hostile vehicle mitigations where they are exposed to the public carriageway.

3.3.3 Concourse (Unpaid side)

3.3.3.1 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.

$$\text{Concourse Area} = \left(\frac{\text{Peak 15 minute flow}}{15}\right) \text{ X } 1.0m^2$$

3.3.3.2 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.

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

3.4 Ticket issuing arrangements

3.4.1 Tickets within LU stations are sold from Passenger Operated Machines (POMs). POMs include Ticket Vending Machines (TVMs), Multi- Fare Machines (MFMs), Advanced Fare Machines (AFMs), Queue Buster Machines (QBMs) and any future automatic ticket issuing machines.

3.4.2 Space for ticket issuing

3.4.2.1 To ensure that adequate customer space is provided, the number of POMs shall be sufficient to ensure that at least 95% of passengers requiring tickets during the peak 1 hour of ticket sales shall not wait for more than 3 minutes.

3.4.2.2 To specify the space required for the minimum number of POMs:

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

3.4.2.3 It shall be assumed for this calculation that the average POM transaction time for all stations is 45 seconds (this figure is constantly under review and is refined further when provision of ticketing is specified). Thus, on this basis:

$$\text{Number of POMs} = \frac{\text{Peak 1 hour POM sales x 95\% x 45}}{4 \text{ x } 180}$$

3.4.2.4 If only 3 hour ticket sale figures are available, then the peak 1 hour ticket sale figures shall be determined using the factors in the section on Passenger Flow Data.

3.4.2.5 The resultant number shall then be rounded up to the nearest integer, and space shall be provided for this number of POMs.

3.4.2.6 Provision and type of Ticket-Issuing Facilities will then be specified by LU Customer Strategy, Strategy and Service Development Directorate. These details can be obtained by e-mail to [redacted]

3.4.2.7 Irrespective of the calculated space for POMs, there shall always be space for a minimum of either 2 cash-enabled TVMs, or a minimum of 1 MFM and 1 AFM in each ticket hall, dependant on the type of POMs in use.

3.4.2.8 Where a larger number of POMs have been specified, there shall always be space for at least 1 MFM to every 4 AFMs (or QBMs, in any combination), or any number of TVMs and QBMs in any combination.

3.4.3 Special events

3.4.3.1 Event stations, near which special events take place (e.g. sports events, exhibitions) shall have additional POMs, the number of shall be specified by LU Customer Strategy, Strategy and Service Development Directorate.

3.4.4 Spacing of POMs

3.4.3.1 AFMs and QBMs shall not be in groups of more than two without being separated by either an MFM or a 600mm boarded gap. This is to prevent overcrowding at machines, thus maximising usage.

3.4.3.2 TVMs shall be installed in groups of three or fewer to allow sufficient space for staff to assist customers.

3.4.3.3 There shall be space adjacent to the POMs to display a fares list as specified in LU category 1 Standard S1311 ‘Customer Information - Stations’.

3.4.4 Queuing distance in front of POMs

3.4.4.1 The queuing distance in front of each POM shall be 4m. This space shall not overlap with gateline or other run-offs. Where a queuing system is in place, the queuing distance shall be calculated as being within the confines of the queuing system.

3.4.5 Queuing Systems

3.4.5.1 Where there are more than four POMs, a queuing system, commonly known as a ‘Uni-Queue’, shall be considered.

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

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

3.4.5.4 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 face of the POMs. At the turning circle, there should be a minimum width of 1.5 metres across the angle of the corner.

3.4.5.5 Where the Uni-queue has an overall length in excess of 6 metres, then intermediate gates shall be fitted to enable the queue to be shortened by half at times where demand is low.

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

3.4.5.7 Uni-Queues shall be of a semi-permanent nature and not of the retractable belt ‘Tensa’ barrier style.

3.4.7 Customer Information zone

3.4.7.1 Adequate space shall be provided for a consolidated area of wall-mounted customer information (as specified in LU category 1 Standard S1311 'Customer Information – Stations) with a surrounding exclusion zone of at least 1m.

3.4.7.2 Content within the customer information zone shall be in accordance with the current S&SD Customer Information Hierarchy document, which can be found in LU category 1 Standard S1311 'Customer Information – Stations.

3.4.7.3 The customer information zone shall be inclusive of the area for the unpaid side of the concourse calculated in clause 3.6, and not in addition to.

3.4.8 Staff facilities adjoining the Ticket Hall

3.4.8.1 A Station Office shall be provided, which shall also act as a place of safety, with requirements specified in clause 3.12.4 (Station staff office suites). This shall have the functions required to control the station from a single point where that station is not large enough to merit its own Station Operations Room.

3.4.8.2 If no staff toilets are available in the vicinity of the ticket hall, one unisex facility shall be provided solely for staff use.

3.5 UTS gateline and Other UTS Equipment

3.5.1 All stations shall have a UTS gateline. The formula for calculating the required number of UTS gates at a station is split into three parts.

a) The first part of the formula calculates the number of gates needed to accommodate the ENTRY flow through the gateline;
b) The second part of the formula calculates the number of gates needed to accommodate the EXIT flow through the gateline;
c) 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 (This is the 'X' shown in 3.3.3.3).

3.5.2 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.

Note: If a station has a high level of usage (i.e. 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.

3.5.3 The highest figure from all of these calculations shall then be used as the required number of UTS gates.

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

$$\text{roundup}\left(\frac{\text{5min Entry Flow}}{25 \times 5}\right) + \text{roundup}\left(\frac{\text{Total Number of Exiting Passengers}}{25 \times 2}\right) + X$$

3.5.5 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 (i.e. before X is added).

3.5.6 The inputs for the UTS gateline formula are:

a) The peak *5 min entry flow* into the station (converting from 15 minute entry flow if appropriate, see section 3.2.2).
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 2 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.

3.5.7 The Number of Exiting Passengers shall, where possible, be **extracted** from individual train alighting load survey data for each train service or, if this is not available, calculated using the following formula applied to each train service.

$$\text{Number of exiting passengers} = \left(\frac{\text{Peak 15 min alighters} - \text{Peak 15 min interchangers}}{15} \right) \times \text{Train service headway}$$

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, (e.g. Circle and District 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%).

3.5.8 The minimum number of UTS gates shall be three in each ticket hall.

3.5.9 A number of wide aisle gates shall be provided 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

[1] Uni-directional gatelines only

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

3.5.9.2 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.

3.5.9.3 Where a single wide aisle gate is installed and used in bi-directional or First Come First Served mode the throughput of the gate is 7 passengers per minute and hence cannot be used to make up the number of gates in any UTS gateline calculations.

3.5.9.4 UTS gatelines shall be sited so that all gates are readily accessible to passengers moving in an expected manner through the ticket hall. The width of a UTS gateline shall be determined as follows:

$$\text{Gateline width} = (\text{Number of automatic gates} \times \text{walkway width} + (\text{no. of gates} + 1) \times \text{stanchion width} + \text{gateline equipment (as required from table below)})$$

3.5.9.5 Entry or exit gate shall be grouped to one side of the gateline (i.e. they shall not alternate between entry and exit)

3.5.10 UTS Gate Dimensions are as follows:

Automatic gate type	Walkway width, mm	Stanchion width, mm
Pneumatic	620	267
Electric (Mk. 1 and Mk. 2)	620	155
Wide aisle	1080	155

3.5.10.1 Additional gateline equipment

Gateline equipment	Position	Pneumatic gate – Dimensions	Electric gate – Dimensions
Combined manual/ equipment gate with luggage port	As part of gateline	Height: 1300mm Width: 1750mm Opening: 1400mm (towards exit)	Height: 1300mm Width: 1700mm Opening: 1300mm (towards exit)
Manual gate – single leaf/ with luggage port	As part of gateline	Height: 1300mm Width: 1394mm Opening:900mm (towards exit)	Height: 1300mm Width: 1350mm Opening: 900mm (towards exit)

3.5.10.2 Where wide aisle gates are installed, there shall be no requirement for manual gates to be installed.

3.5.10.3 Where no wide aisle gate is fitted and where large pieces of equipment (such as parts for escalators or lifts etc.) will be required to pass through the gateline, the combined manual/equipment gate shall be required at stations. At other stations where no wide aisle gate is installed, the single leaf manual gate shall be used.

3.5.10.4 Luggage chutes shall no longer be installed and shall be removed whenever wide aisle gates are installed.

3.5.10.5 The following items shall be positioned in the ticket hall.

Equipment	Position	Dimensions
Free-Standing Place of Safety (typically an existing GLAP), but only where no other place of safety is available (see 3.8).	In the vicinity of the gateline, but not necessarily part of the gateline. Usually on unpaid side close to the THSCU.	Height: 2300mm Width: 990mm Depth: 1240mm
Ticket Hall Station Control Unit (THSCU) (see 3.13.4 for definition).	Installed within a secure enclosure and with a clear view of the gates.	Height: 1802mm Width: 432mm Depth: 430mm
Smartcard readers.	Where required, as specified in section 3.3.3 below.	Height: 1038mm Width: 325mm Depth: 157mm

3.5.11 Smartcard readers

3.5.11.1 General

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

3.5.11.3 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 route validation is required for calculating fares (using pink-coloured smartcard readers);
d) at entrances and exits used during special events which do not have UTS gatelines;

e) where applicable when there is an interchange between LU, other TfL modes or 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 stairways or both.

3.5.11.4 Smartcard readers shall be located so that they are readily accessible to passengers moving in an expected manner. The position shall not encroach into run-off areas, POM queuing areas or passageways. Their exact location shall be site specific.

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

3.5.12 Ungated stations

3.5.12.1 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:

$$\text{Number of Smartcard Readers} = \left(\frac{\text{Peak 5 min (entry + exit)} \times 38}{25 \times 5 \times 100}\right) \text{Rounded up} + 1$$

3.5.12.2 It shall be assumed that the number of passengers requiring smartcard validation during the peak 5 minutes is 38% of the sum of the peak 5 minute total entry and exit passenger flows. This figure is subject to ongoing review.

3.5.12.3 Forecast data shall be used to carry out this calculation. If however only current passenger flow data is available, the peak 5 minute flow shall be increased by 20% before rounding up and adding one to arrive at the total number of readers required.

3.5.12.4 If peak 5 minute passenger flow data is not available then this shall be derived from peak 1 hour or peak 3 hour data using the factors given in the section on passenger flow data.

3.5.12.5 There shall be a minimum of two smartcard readers at each entrance/exit, located at the transition between paid and unpaid side and appropriately sited to aid passenger flows and throughput.

3.5.13 Manual gates

3.5.13.1 Manual gates are now obsolete for customer use, however where they have been retained for use in lieu of a wide-aisle gate, each manual gate shall have one smartcard reader, appropriately located for optimal use.

3.5.13.2 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.

3.5.14 Route validation Smartcard Readers (Pink-Coloured)

3.5.14.1 The number of pink smartcard route validators shall be sufficient for the number of people requiring smartcard route validation during the peak 1 minute so that no queuing occurs; assuming the throughput of a smartcard route validator is 25 passengers per minute.

3.5.14.2 Route validation smartcard readers should be located either near to platform entrances and exits, or at a convenient interchange point, as appropriate to aid passengers' flows and throughput and avoid congestion.

3.5.15 Smartcard readers at interchange stations between LU and other TfL modes or LU and National Rail train operating companies' services

3.5.15.1 The requirements for smartcard readers are as follows:

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:

Length of interchange part of platform	Less than 60m	60 to 90m	Over 90m
Number of Smartcard readers	2	3	4

b) Same platform interchange:
   i. Smartcard readers shall be evenly spaced a maximum of 30m apart.

c) Between platforms via a passageway or stairways or both:
   i. There shall be a minimum of two smartcard readers located near the passageway or stairways in each alternative route, appropriately sited to aid passenger flows and throughput.

3.5.16 Entrances/exits (for special events) which do not have UTS gatelines

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

$$\text{Number of Smartcard Readers} = \left(\frac{\text{Peak 5 min passenger flow} \times 38}{25 \times 5 \times 100}\right) \text{Rounded up} + 1$$

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 5 minute passenger flow is 38% of this peak. This figure is subject to ongoing review;
d) there shall be a minimum of 2 smartcard readers at each additional entrance or exit, appropriately sited to aid passenger flows and throughput.

3.6 Run-offs

3.6.1 The following minimum lengths shall apply across the maximum width of the run-off types for one-way flows:

Run-off type	Minimum run-off length (For variable lengths see 3.4.7)
One way *(Note: for one-way flow the direction is from the first to the second item)*	
Escalator-Gateline (2)	8m – 12m
Gateline-Escalator (when the ratio of the number of gates to each escalator is less than or equal to 4) (1)	6m
Gateline-Escalator (when the ratio of the number of gates to each escalator is more than 4) (1)	8m – 12m
Gateline-Moving walkway (when the ratio of the number of gates to each Moving walkway is less than or equal to 4) (1)	6m
Gateline-Moving walkway (when the ratio of the number of gates to each Moving walkway is more than 4) (1)	8m – 12m
Moving walkway-Gateline	8m – 12m

Footnote 1: Note that the capacity in normal circulation of both an escalator and a moving walk is 100 passengers per minute and the capacity of a UTS gate is 25 passengers per minute.

Footnote 2: Pan-TfL escalators shall have an additional 2m added to their minimum run-off.

3.6.2 The following minimum lengths shall apply across the maximum width of the run-off types for two-way flows:

Run-off type for Two-Way flows	Minimum run-off length (For variable lengths see 3.4.7)
Escalator-Escalator (2)	8m – 12m
Escalator-Passageway (2)	6m
Escalator-Concourse or Circulating area (2)	6m
Escalator-Stairway (2)	6m – 10m
Escalator-Platform (2) (3)	6m
Escalator-Street (2)	6m
Gateline-Passageway	4m
Gateline-Platform (3)	4m
Gateline-Entrance Matwell	4m
Gateline-Street	6m
Moving walkway-Escalator (2)	8m – 12m
Moving walkway-Passageway	6m
Moving walkway-Concourse or Circulating area	6m
Moving walkway-Moving walkway	8m – 12m
Moving walkway-Stairway	6m – 10m
Moving walkway-Entrance Matwell	4m
Moving walkway-Street	6m
Stairway-Gateline	6m – 10m
Stairway-Passageway	4m
Stairway-Concourse or Circulating area	4m
Stairway-Platform (3)	4m
Stairway-Entrance Matwell	2m
Stairway-Street	4m

Footnote 2: Pan-TfL escalators shall have an additional 2m added to their minimum run-off.

Footnote 3: The run-offs from escalators, stairways and gatelines onto a platform shall be in addition to the platform width

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

3.6.4 Gatelines shall never be on platforms.

3.6.5 Run-off dimensions for escalators and moving walkways are measured from the equipment 'combs'.

3.6.6 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:

$$\text{Run-Off Length} = \left(\text{Minimum Run-Off} + \left(\frac{\text{Peak hour flow} - 1000}{500} \right) \right) \text{m}$$

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:

Light flow	= the maximum peak hour entry or exit flow, for the relevant station area, across the whole traffic day is less than 1000 passengers
Medium flow	= the maximum peak hour entry or exit flow, for the relevant station area, across the whole traffic day is between 1000 and 3000 passengers
Heavy flow	= the maximum peak hour entry or exit flow, for the relevant station area, across the whole traffic day is greater than 3000 passengers

3.6.7 The width of a run-off shall be consistent along its entire length.

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

3.7.1 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.

3.7.2 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 headroom requirements of this Standard without major re-building/alteration to the existing structure of the station

then the following conditions apply:

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

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

3.7.5 Proposals shall always comply with the following minimum dimensions:

3.7.5.1 Headroom – not less than 2.3m for areas of ceiling, beam soffits, CMS installations.

3.7.5.2 Headroom – not less than 2.1m for fixtures such as signage, CCTV cameras, or information displays.

3.8 Place of safety for staff working in the ticket hall

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

3.8.2 A place of safety shall have clear visibility of as much of the ticket hall as possible.

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

a) Existing offices or other rooms with lockable doors such as the Station Office or the lobby leading to it (but not POM rooms or secure suites).
b) Specially constructed areas to meet unique requirements.
c) If neither of the above are available, free-standing secure structures such as an existing Gateline Attendants Point's (GLAP) would be acceptable.

3.8.4 When identifying the type and position of the place of safety, local staff, managers and Health & Safety representatives must be consulted.

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

3.8.6 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.

3.9 Access and interchange in public areas

3.9.1 General

3.9.1.1 Routeways shall be arranged to minimise walking distances and to make the wayfinding through the station as obvious as possible.

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

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

3.9.1.4 Where routeways exceed 50m in length, recessed rest areas with seating shall be provided at appropriate locations.

3.9.1.5 Rest areas shall not protrude into routeways, but shall avoid providing a recess or hiding place by a gradual widening to provide sufficient space for seating to be installed without disturbing customer flows.

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

Height of change in level	Means
Less than 2m	Ramp
0.5m to 3m	Stairway (Minimum of three risers)
3m to 5m	Stairway or Escalator if benefits are justifiable
Over 5m	Escalator

3.9.1.7 Lifts may be considered as a primary means of vertical transportation where severe local constraints justify their use, as defined in section 1 of this Standard.

3.9.1.8 The 5m rise limit is not cumulative and stairways shall not be separated for the sole purpose of avoiding installing escalators.

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

3.9.1.10 No single escalator, moving walkway or lift shall provide the sole means of access or egress from any part of the station.

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

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

3.9.1.13 When calculating capacity in routeways with square walls, 0.3m ‘edge effects’ shall be added to each wall, except where noted in 3.9.3.

3.9.1.14 Equipment installed on squareworks walls in routeways and platforms shall not protrude into busy public areas by more than 100mm between a height of 300mm and 2.1m above floor level.

3.9.1.15 Equipment installed on circular cross-section walls in routeways and platforms shall not protrude into the area above the flat floor level of the routeway or platform.

3.9.1.16 Large equipment or plant (such as air-conditioning condensers etc) shall not be installed in public areas of sub-surface stations.

3.9.1.17 Convex mirrors shall only be installed where blind corners, recesses, wide pillars and other obstructions exist, and where a safety risk assessment has identified the probability of injury due to collision.

3.9.2 Passageways

3.9.2.1 Two-way passageway width shall be determined as follows:

$$\text{Two-way passageway width} \left(\frac{\text{Average flow per minute}}{40} + (2 \times 0.3) \right) \text{m}$$

where the average flow per minute is specified in section 3.2.1

3.9.2.2 One-way passageway width shall be determined as follows:

$$\text{One-way passageway width} \left(\frac{\text{Average flow per minute}}{50} + (2 \times 0.3) \right) \text{m}$$

where the average flow per minute is specified in section 3.2.1

3.9.2.3 Central barriers shall be installed to separate opposing pedestrian flows where significant bi-directional movement occurs in passageways.

3.9.2.4 Central barriers, where installed, shall have regular breaks.

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

3.9.2.6 The minimum width either side of the passageways central barrier shall be 1.7m between barrier and wall finishes. Therefore the minimum passageway width shall be 3.7m, i.e. (2 x 1.7m) + 0.3m.

3.9.2.7 The minimum width for any passageway including evacuation and emergency exit routes shall be 2m between finishes.

3.9.2.8 The width of a passageway between junctions shall be constant for its entire length and to minimum headroom height (with the exception of circular cross-section passageways, as detailed below).

3.9.3 Circular cross-section passageways

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

3.9.4 Moving walkways

3.9.4.1 Passageways exceeding 75m in length shall have a moving walkway installed.

3.9.4.2 The minimum length of a moving walkway shall be 50m and the maximum shall be 100m. Longer passageways shall have a series of two or more moving walkways.

3.9.4.3 The following shall be taken into account when designing moving walkways:

a) Moving walkway 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 all moving walkways (see 3.4).

3.9.4.4 A conventional passageway beside the moving walkway shall be provided. For passageways with one moving walkway only, the width of the conventional passageway shall be as defined for two-way flows in 3.9.2.1 above.

3.9.4.5 For passageways with two or more parallel moving walkways, the conventional passageway shall be as defined for a one-way flow in 3.9.2.2 above.

3.9.5 Headroom over moving walkways and escalators

3.9.5.1 For escalators and moving walkways installed in atriums, the headroom shall not be less than 3m above both landings and over the whole length of the escalator or moving walkway (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.

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

3.9.5.3 When work is proposed that affects headroom over moving walkways and escalators and:

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 headroom requirements of this Standard without major re-building/alteration to the existing structure of the station –

then the following conditions apply:

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

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

3.9.5.3.3 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 moving walkway.
b) Headroom – not less than 2.1m for fixtures such as signage, CCTV cameras, and information displays.

3.9.6 Stairways

3.9.6.1 All stairways shall comply with LU category 1 Standard S1133 'Premises – Stairways and Ramps', where particular notice shall be taken of the emphasis on safety with regard to handrails.

3.9.6.2 One-way stairway width shall be determined as follows:

$$\text{One-way stairway width} = \left(\frac{\text{Average flow per minute}}{35} \right) \text{m}$$

where the average flow per minute is specified in section 3.2.1

3.9.6.3 Two-way stairway width shall be determined as follows:

$$\text{Two-way stairway width} = \left(\frac{\text{Average flow per minute}}{28} \right) \text{m}$$

where the average flow per minute is specified in section 3.2.1

3.9.6.4 All dimensions are measured between handrails.

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

3.9.6.6.1 For planning purposes the minimum widths for stairways shall be as follows:-

c) A two-way stairway shall be 2.4m, not including handrails.
d) A one-way stairway shall be 2.0m, not including handrails.
e) Between all handrails shall be minimum 1.5m, and a maximum 2.0m.

3.9.6.6.2 As an exception to these requirements; Where a single stairway is required to be installed in between a bank of only two escalators, they shall be of 1m minimum width (between the handrails) for the full rise of those escalators.

Note: Where stairways of between 2m and 3m width will be required, the 2m maximum between handrails shall always take precedence. Guidance should be sought to ensure that the most appropriate solution does not unnecessarily compromise customer flows.

3.9.7 Escalators

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

$$\text{Number of escalators} = \left(\frac{\text{Average one-way flow per minute}}{100} \right) \text{m}$$

where average flow per minute is specified in 3.2.1 and based on escalator capacity of 100 passengers per minute.

3.9.7.2 The calculated number of escalators shall be rounded up to the next whole number if the first number after the decimal point is equal to or more than 0.2, and rounded down otherwise; e.g. 2.2 escalators would be rounded up to 3 and 2.1 escalators would be rounded down to 2.

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

3.9.7.4 Where one bank of escalators is provided as the sole primary means of vertical transportation and only two escalators are planned to be installed, a stairway shall be installed centrally between the two escalators, as defined in section 3.9.6.9.

3.9.7.5 Where four or more escalators are planned for the same route, they may be installed in two separate adjacent banks without the need for a central staircase.

3.9.7.6 Escalator machine chambers shall be accessed by non-public stairs from within the station and in the vicinity of the escalators themselves. Doors to the machine chambers shall open inwards and not be located within the escalator run-offs or where they may create a hazard to customers when used for access. These doors shall be sealed from the elements if liable to be exposed to inclement weather.

3.9.7.7 Space shall be provided for engineer's barriers in the form of a cupboard for their storage, in the vicinity of each escalator or group of escalators, at the same level and sited so that they do not create a hazard to customers when used for access.

3.9.8 Lifts

3.9.8.1 Lifts shall be conspicuously sited, and clearly signed to encourage their use by all encumbered customers, for reasons of safety.

3.9.8.2 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.

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

3.9.8.4 All lifts (except those withdrawn from use for scheduled maintenance) shall be available for customer use throughout applicable station opening hours.

3.9.8.5 Where a lift is to be withdrawn from service for scheduled maintenance, the availability of alternative lift facilities shall be indicated.

3.9.8.6 Where no alternative lift is available (due to unforeseen loss of service), arrangements shall be made to communicate this to customers travelling to or from the affected station.

3.9.8.7 For lifts that provide the Primary Means of Vertical Transportation, the effective capacity of the lift shall be assumed to be 4 passengers / m^2, based on the internal dimensions to the handrail.

3.9.8.8 For lifts that provide the Secondary Means of Vertical Transportation, the effective capacity of the lift shall be assumed to be 1 passenger / m^2, based on the internal dimensions to the handrail

3.9.8.9 Lift capacity shall be calculated as follows:

$$\left(\frac{\text{Peak minute passengers using lifts x lift cycle times (minutes)}}{\text{Capacity of lift(s)}} \right) = \text{Number of lifts}$$

where 'Peak minute passengers using lifts' is derived from the peak minute flow in the peak direction along the link served by the lift, multiplied by the proportion of people expected to use the lift – the number of lifts shall always be rounded up.

3.9.8.10 Lift waiting areas shall be provided in front of lift doors, calculated for each passenger according to the type of lift, as defined below:

PMVT through lifts	0.45m^2
PMVT non-through lifts	0.69m^2
SMVT through lifts	0.69m^2
SMVT non-through lifts	0.93m^2

Note: The proportion of PRMs likely to use the lifts varies significantly by type of station and throughput. Full guidance can be found in the Legion Modelling Best Practice Guide, section 13.4.

3.9.8.11 Where, due to the existing infrastructure of a station, the lift capacity does not match the demand for the lifts, then the lift waiting areas shall be correspondingly enlarged to ensure that sufficient waiting capacity is available.

Note: Where lifts serve more than two levels, it will not be possible for it to be a fully through lift at every level. Capacity should be calculated according to the predominant flows and demand at each level, and an appropriate decision made as to which measure of waiting area is used.

3.9.8.12 In addition to the calculated lift waiting area, non-through SMVT lifts shall have a 1,500mm turning circle immediately in front of the lift doors.

3.9.8.13 Lift waiting areas located in concourses or circulating areas shall be bordered by barriers to protect vulnerable passengers, and to ensure adjacent customer flows are not hindered.

3.9.8.14 Lift waiting areas shall be provided with seating either within or in the vicinity of the lift waiting area.

3.9.8.15 Where lifts are located on surface station platforms, they shall have a sheltered waiting area no smaller than the calculated lift waiting area immediately in front of the lift door.

3.9.8.16 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 3m from the platform edge.

3.9.8.17 Where they cannot be accommodated within the associated lift engineering room, space shall be provided for engineer's barriers in the form of a cupboard for their storage, in the vicinity of each lift or group of lifts. These shall be located at one of the levels served by the lift or lifts, and sited so that they do not create a hazard to customers when used for access.

3.9.9 Ramps

3.9.9.1 All ramps shall comply with LU category 1 Standard S1133 'Premises – Stairways and Ramps'.

3.9.9.2 The maximum vertical rise between landings shall be 0.5m.

3.9.9.3 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.

3.9.10 Intermediate concourses

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

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

a) Run-off areas (see section 3.4) (note: run-offs from adjacent means of access shall not overlap);
b) An area of $2m^2$ in front of any line diagram.

3.9.10.3 Intermediate concourses shall be of a consistent width along their entire length.

3.10 Platforms

3.10.1 Platform length

3.10.1.1 Platforms lengths at stations that are exclusively used by LU trains shall be at least 3m longer than the longest current or proposed train stock type booked to stop at that platform.

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

3.10.1.3 Stations with terminus (dead-end) platforms shall be at least 7m longer than the longest train booked to stop at that platform.

3.10.2 Platform width – General principles

3.10.2.1 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.

3.10.2.2 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;

3.10.2.3 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 between platform nosings).

3.10.2.4 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 re-building/alteration to the existing structure of the station -

then the following conditions shall apply:-

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

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

3.10.2.4.3 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 – see 3.10.3.2 – whichever is greater) for permanent installations. This does not apply to deep level tube platforms, which must comply with 3.10.2.3.

b) Platform width – for temporary works/installations in place for not more than 6 months – not less than 2.0m (or 1.0m less than the calculated platform width- see 3.10.3.2 – whichever is greater). temporary works/installations shall not be located within 5m of platform entrances or exits. This does not apply to stations which have been designated as Step Free.

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

3.10.3 Uniform platform width

3.10.3.1 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.

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

$$\text{Platform Width} = \left(\frac{\text{Platform per headway} \times P \times 0.93\text{m}^2}{\text{Platform length} \times 0.25} \right) + 1\text{m}$$

where P = the proportion of the platform load; in this case 0.35, and;
Where the platform load per headway shall be determined from the following steps:

a) Peak 3 hour platform load = Peak 3 hour entry flow to platform + Peak 3 hour exit flow to platform
b) Peak 15 min platform load can be derived from (a) using table in 3.2.2
c) Average platform load per minute can be derived from (b) using formula in 3.2.1
d) Train service headway = 60 / No. of trains per hour
e) Platform load per headway = (c) x (d)

3.10.3.3 Equipment lockers (e.g. for fire equipment), 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.

3.10.3.4 Passenger help points and litter bins on platforms shall not be installed within 3m of platform entrances or exits.

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

3.10.3.6 Increased platform width shall be provided if installed equipment is over 0.5m deep.

3.10.4 Variable platform width

3.10.4.1 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.

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

3.10.4.3 The calculation for platform width for each quarter of the platform 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.

3.10.4.4 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.

3.10.5 Island platforms

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

3.10.6 Alignment of escalators and stairways with platform edges

3.10.6.1 Stairways and escalators feeding directly onto a platform shall be aligned along the length of the platform, i.e. parallel with the tracks.

3.10.7 Headroom on platforms

3.10.7.1 The headroom above a platform shall not be less than 2.5m when measured to the lowest point of suspended signage or equipment.

3.10.7.2 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 headroom requirements of this Standard without major re-building/alteration to the existing structure of the station

then the following conditions apply:-

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

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

3.10.7.2.3 Proposals shall always comply with the following minimum dimensions:

a) Headroom – not less than 2.3m for the full width of the platform.
b) Headroom – not less than 2.1m for fixtures such as CCTV cameras, information displays and signage at distances greater than 2m from the platform edge.

3.10.8 Entry or Exits from platforms

3.10.8.1 Two-way platform entry or exit widths shall be determined as follows:

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

3.10.8.2 One-Way platform entry widths shall be determined as follows:

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

3.10.8.3 One-Way platform exit widths shall be determined as follows:

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

3.10.8.4 The average platform load per minute shall be as calculated in step (c) of 3.10.3.2.

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

3.10.8.6 Similarly, for the average alighting load per minute, only the flow from the platform shall be used.

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

3.10.8.8 The greater of the capacities required for normal operations or for emergency evacuation (see 3.14) shall be provided.

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

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

3.10.8.11 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.

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

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

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

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

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

3.11 Planning criteria and Levels of Service

3.11.1 The previous sections of this Standard specify how to calculate the size or capacity of station elements for what is considered to be normal Levels of Service (LoS). Stations shall also be planned to give the levels of service in the table shown in 3.11.6 during any special events such as concerts, exhibitions and sporting occasions.

3.11.2 When construction work is carried out in parts of existing stations, the levels of service in the table shown in 3.11.6 shall apply.

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

Note: At some stations, the busiest periods may not necessarily be the traditional morning or evening peaks, such as stations with heavy night-life usage or major rail termini. At these locations, it may also be necessary to assess crowding for these extraordinary peaks.

3.11.4 Using the table in 3.11.6 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.

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

3.11.6 The table below shows the levels of service and associated quantitative measures to apply to four categories of station operation in the locations listed. A fuller description of Levels of Service and their definitions can be found in the accompanying guidance document 'Station Planning Standards and Guidelines'.

Station area	Category of station operation							
	Normal operation		Guidance for Special events up to 3 days		Guidance for Special events over 3 days		Guidance for Temporary work	
	LoS	Quantitative measure	LoS	Quantitative measure	LoS	Quantitative measure	LoS	Quantitative measure
Open concourses	B	1.0m^2 per person	D	0.45 m^2 per person	C	0.8 m^2 per person	C	0.8 m^2 per person
Queuing for ticket hall facilities	C	0.8 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
Passageways								
- one-way	D	50 pax/m/mw	E	80 pax/m/mw	D	65 pax/m/mw	D	65 pax/m/mw
- two-way	C	40 pax/m/mw	E	65 pax/m/mw	D	50 pax/m/mw	D	pax/m/mw
Stairways								
- one-way	D	35 pax/m/mw	E	43 pax/m/mw	E	43 pax/m/mw	E	43 pax/m/mw
- two-way	C	28 pax/m/mw	E	43 pax/m/mw	D	35 pax/m/mw	D	35 pax/m/mw
Escalators		100 Pax per minute		120 Pax per minute		110 Pax per minute		110 Pax per minute
Platforms	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
Note: pax/m/mw = passengers per minute per metre width								

3.11.7 **Temporary works in stations**

3.11.7.1 When existing stations are being upgraded, modernised or refurbished, the associated construction works will generally require hoardings that will compromise the dimensions of routeways. The section above defines acceptable levels of service under these circumstances, while the following section defines applicable criteria and the minimum dimensions for routeways during temporary works.

3.11.7.2 For temporary works not in place for more than six months and where it is impossible to comply with the spatial requirements of this Standard as a consequence of installing the temporary works, then the following conditions shall apply instead:

(a) Risks that are introduced by the proposal shall be identified, assessed and evidenced ALARP by the proposer to LU, and;
(b) Proposals shall be demonstrably optimal in relation to the compliant state
(c) The following minimum dimensions for all routeways shall apply:

3.11.7.3 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.

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

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

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

3.11.7.7 Where buildings works are of a size and type which may make it difficult for people to use the station or facility concerned, information about the nature of the obstacle, how long it will remain and alternative means of travel shall be clearly displayed at the station entrance.

3.12 Staff accommodation – general principles

3.12.1 To determine the requirements for stations of all sizes and complexity, tables are used below to reflect station size and rostered 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. Rostered staff numbers can be obtained from operational staff or from the station staffing model, available from LU. All staff accommodation rooms shall comply with the Workplace (Health, Safety and Welfare) Regulations.

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

- Area Manager accommodation;
- Station staff ticket hall accommodation;
- Station staff welfare facilities;
- Secure suites with enclosures to service rear-loading POMs
- Secure suites to service front-loading Ticket Vending Machines (TVMs)
- Ancillary accommodation.
- Temporary works in staff accommodation

3.12.3 Area Manager Office suites

3.12.3.1 Accommodation for the Area Manager shall be defined by the Line General Manager, according to the policy within that particular line.

3.12.3.2 The Area Manager, when located on a station, shall be expected to share the use of the station office. This office shall not be accessed via the secure suite lobby.

3.12.4 Station staff ticket hall offices

3.12.4.1 There are 3 sizes of office suite for station staff dependent upon the number of staff (not including Area Manager and their Staff) allocated to the station. The rooms required for each size of suite are given in the following table:

Room	Location	Requirements	4-10 staff (small suite)	11-25 staff (medium suite)	26+staff (large suite)
Station Office at Stations with no SOR	See Section 3.13		20m^2 min.	20m^2 min	N/A
Station Operations room (SOR)			N/A	25m^2 min	30m^2 min.
Station Office at Stations with an SOR			N/A	12m^2 min	15m^2 min
Staff Toilets (see 3.3.5)	Ticket Hall level	Only if no other staff toilets at this level	One Single Unisex Cubicle 3.3m^2		
Operations Store	Ticket Hall level	Level Access Required	6m^2 min	6m^2 min	6m^2 min

3.12.5 Station staff welfare facilities

3.12.5.1 There are 3 sizes of welfare facilities for station staff dependent upon the number of staff (not including Area Manager and their staff) allocated to the station. The rooms required for each size of suite are given in the following table:

Room	Location	Requirements	4-10 staff (small suite)	11-25 staff (medium suite)	26+staff (large suite)
Mess/Kitchen	Preferably away from the ticket hall. May be on the level above or below.	Access to mess/kitchen to be from a corridor and not another office.	11.5m^2 min	21.5m^2 min.	32.7m^2 min.
Male Locker Room	Adjacent to Toilets and Shower room	All Locker facilities based on an area of 0.7m2 per person plus a bench	Single Unisex facility with changing cubicle	Separate Facility for each gender, no changing cubicle required	
Female Locker Room				Separate Facility for each gender, no changing cubicle required	
Male Shower Room	Adjacent to Toilets and Locker room	All Shower facilities based on an area of 3.3m^2 per cubicle	Discretionary Single Unisex facility with changing cubicle	Single Unisex facility with changing cubicle	Separate Facility per gender, no changing cubicle required
Female Shower Room					
Drying Facilities	Adjacent to Lockers and Shower room	A drying cupboard may be installed at small and medium facilities, located in the locker room, or near to the lockers and showers			7.5m^2 min Room
Multi-Purpose Room	For use by BTP, Trade Unions, for Interviews or Training, or as a Faith Room or Quiet Room		N/A	8m^2 min	15m^2 min.
Male Toilets	One cubicle for every ten staff members, each Cubicle 3.3m^2		One Cubicle	2 or 3 Cubicles	3 or more cubicles
Female Toilets	One cubicle for every ten staff members, each Cubicle 3.3m^2		One Cubicle	2 or 3 Cubicles	3 or more cubicles

3.12.6 Secure Suites to service front-loading Ticket Vending Machines (TVMs)

3.12.6.1 TVMs require no rear access for floating or maintenance, therefore no enclosure is required behind the machines. Allowance shall be made for their physical space requirements within the ticket hall itself, including front loading access clearance.

3.12.6.2 TVMs require a Consolidation Room within the vicinity of the machines, and accessed via a secure lobby on the unpaid side of the gateline.

Room	Requirements	Dimensions
Secure Lobby	Entrance to self-contained secure suite	2.5m min. Depth x 1.2m min. Width
Consolidation Room	A clear, level space around the consolidation equipment shall allow it to be accessed for use and maintenance.	10m^2 min
TVM	Ticket-Vending Machine	830mm W x 625mm D x 1780mm H
Note: 25mm space required between each adjacent TVM and 10mm to facia for TVMs at end of line		
Concrete Plinth	Each TVM (adjacent overlap permitted)	884mm W x 646mm L x 144mm (min) D
TVM	TVM with Cap (Free-Standing Units Only)	830mm W x 625mm D x 1973mm H
TVM	TVM Front Access Clearance Dimensions	819mm clear for door opening swing
TVM	TVM with Upper Door Extension	830mm W x 625mm D x 1907mm H
Note: The Upper Door Extension may sit proud of an alcove, but the alcove is limited to 1805mm maximum		

3.12.7 Secure suites with enclosures to service rear-loading POMs

3.12.7.1 POM room sizes shall vary according to the amount of POM provision, with details defined in the table below.

3.12.7.2 The suite shall be secure and self-contained, with the entrance to the secure lobby on the unpaid side of the gateline.

3.12.7.3 The Secure Suite contents and other requirements are defined in LU category 1 Standard S1375 'Planning for Ticket Issuing Facilities'.

Room	Requirements	Dimensions
Secure Lobby	Entrance to self-contained secure suite, with space to ramp up 150mm to POM room fixed floor level.	2.5m min. Depth x 1.2m min. Width
POM Room	A clear, level space around each POM shall allow it to be accessed for floating and maintenance. The floor shall be solid, and at a level 150mm above the ticket hall	a) The size of a POM enclosure with 1 AFM and 1 MFM is 4.1m min. Wide x 2.5m min. Depth. b) For each additional 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.
Paper Store	Requirement may be merged into single enlarged POM room	6m^2 min
MFM	Multi-Fare Machine	1130mm W x 720mm D x 1800mm H
AFM	Advanced Fare Machine	530mm W x 720mm D x 1800mm H
QBM	Queue-Buster Machine	514mm W x 515mm D x 1858mm H
QBM (DDA)	Queue-Buster Machine (DDA)	514mm W x 515mm D x 1558mm H
	Note that adjacent QBMs will require a 407mm gap for maintenance access purposes	

3.12.8 UTS Ancillary Accommodation

3.12.4.1 Station Computer Rooms and UTS Switch Rooms should preferably be located adjacent to each other, but shall never be located in the same room.

Room	Location	Requirement	Size
Station Computer Room	Not more than 40m from ticket issuing facilities and gateline, but must not be located within the secure suite – may be located on the level above or below.	One SCR may serve two ticket halls if both are less than 40m from the SCR and there are fewer than 30 devices in total.	2m x 2m minimum (internal dimension between finishes) 3m x 2m if more than 30 UTS devices
UTS Switch Room	Not more than 34m from ticket issuing facilities and gateline, but must not be located within the secure suite – may be located on the level above or below.	Switchgear and distribution boards solely for the UTS equipment power supply. This includes POMs, SCUs, gatelines and all consolidation equipment.	2.4m x 2.4m minimum (internal dimension between finishes) 3.6m x 2.4m if more than 30 UTS devices

3.12.9 Cleaners Accommodation

Room	Location	Requirement	Size
Bin Store	At street level with direct street access, so not necessarily at Ticket hall level, but with internal access to station. Not adjacent to a public exit route if that is the only exit route. Opening doors shall not interfere with customer flows.	One metre space in front of each bin shall be allowed for access. Space for refuse compactor where required at larger stations (electrical services required).	5.1m^2 min. (3m x 1.7m) for small stations. 10m^2 (4m x 2.5m) for central area stations. 15m^2 (6m x 2.5m) for terminus stations. Floor to Ceiling Height shall be 2.8m minimum.
Cleaning Machine Store	At appropriate levels for cleaning machine use.	Water point, drainage and charging facilities, suitably segregated.	1.5m x 2.5m clear area plus 4m^2 extra, with separated areas for charging and water.
Cleaners Water Point Store	One store at each major level, usually platforms and ticket hall.	Water point at each level to avoid water carried between levels	4m^2 min.
Cleaners Dry Services Store	Appropriately located close to other Cleaners rooms. May be located at basement level or merged with staff facilities.	Shelving to store chemical materials	3m^2 min.
Cleaners Tea Point		Suitable space for welfare facilities.	5m^2 min.

3.12.9 Staff Accommodation requirements during temporary works

3.12.9.1 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 room size requirements of this Standard without major re-building/alteration to the existing structure of the station -

then the following conditions apply:

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

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

3.12.9.4 Room areas (except SORs and Station Offices) shall not be less than 20% below the compliant areas defined in section 3.12.

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

3.13 Station Operations Rooms / Station Office / Station Control Unit

3.13.1 General requirements

3.13.1.1 A Station Operations Room (SOR) is defined as a multi-desk control facility; these are located at those stations nominated by LU.

3.13.1.2 At those stations without an SOR, a Station Office shall be available which shall have the capability and functions required to control the station from a single point.

3.13.2 Station Operations Room

3.13.2.1 SORs shall be located in a conspicuous position at ticket hall level and provide 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.

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

3.13.2.3 The SOR shall be glazed to the ticket hall to permit observation from both sides. The proportion of glazing to solid wall shall be determined on a site by site basis in consultation with S&SD and the BTP Architectural Liaison Office (Contacted through LU Network Security). The glazing shall be as specified in LU category 1 Standard S1134 ‘Premises – Doorsets and Glazing’.

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

3.13.3 Station Office

3.13.3.1 At stations that have an SOR, a Station Office shall be located in the vicinity of the SOR at ticket hall level, for use by the Customer Service Manager when necessary.

3.13.3.2 At stations without an SOR, a Station Office shall be located on the unpaid side of the ticket hall, for use by the Customer Service Manager when necessary.

3.13.3.3 A signing-in point for visitors shall be available within the Station Office, suitably segregated from any operational area, and with no view of any CCTV monitors.

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

3.13.3.5 Where space permits, the station office shall have a separate desk for the sole use of the Area Manager.

Note: Some stations without an SOR will have a Station Control Point, almost always located in what previously was the ticket office and carrying out identical functions to the Station Office. This terminology is now obsolete, and all new installations will be termed as the 'Station Office'.

3.13.4 Station Control Unit (SCU) and emergency opening of gatelines

3.13.4.1 Station control units control UTS gatelines and monitor passenger operated ticket machines. There shall be at least one located near to this equipment, adjacent to each gateline.

3.13.4.2 Station control units shall also contain an emergency plunger for opening the gatelines, located in a conspicuous position within sight of the associated gateline

3.13.4.3 Stations with more than one ticket hall (or with gatelines not within a reasonable distance of one another) shall have a separate SCU (with emergency plunger) to serve these additional facilities.

3.13.4.4 Stations with an SOR shall have an additional SCU (with emergency plunger) located within them, to control and monitor the UTS facilities in the ticket halls.

3.14 Evacuation

3.14.1 General

3.14.1.1 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 relative place of safety within six minutes.
b) Fire within the station structure. In this the affected passenger load shall reach a relative place of safety within six minutes.

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

3.14.1.3 Sub-surface 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.

3.14.1.4 Escape and emergency access routes shall comply with the requirements for passageway and stairway widths set out in section 3.9.

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

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

3.14.1.7 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 stairway.

3.14.1.8 Lifts shall not be used for evacuation unless the lift has been designated as a managed evacuation lift.

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

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

3.14.1.11 The evacuation capacities of station elements are:-

Means of escape	Capacity
Horizontal circulation elements – passageways and stopped moving walkways.	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 moving walkways.	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.

Note: Other types of staff-managed evacuation may occur, during such incidents as security closures, major service disruption, power failures etc. For these types of incidents, all routes are deemed as available (with all escalators in use as fixed stairs during power failures). Otherwise, due to their nature, their requirements need no further consideration in this section.

3.14.2 Fire-protected routes

3.14.2.1 A fire-protected route shall be any one of the following:

a) through which the evacuation load or affected passenger load can proceed;
b) which can be segregated from the area of incident (e.g. by fire doors);
c) where there is an escape exit to the street.

3.14.2.2 Fire doors that have been installed to help in the protection of fire –protected routes shall not protrude into the route when open.

3.14.2.3 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.

3.14.3 Method for determining the size of evacuation routes

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

3.14.3.2 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.

3.14.3.3 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.

3.14.4 Train on fire in station scenario

3.14.4.1 **Assumptions**

3.14.4.1.1 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).

3.14.4.1.2 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.

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

3.14.4.2.1 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.

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

Train Load = Average Link Load per minute x Train Service Headway x 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.

3.14.4.2.3 For platforms served by a multiple train service (e.g. stations on the Circle line), the above formula shall be used, but with the train service headway of all lines combined, as per the following formula:-

Train Load = Average Link Load per minute x Combined Train Service Headway x 2

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

Platform Load = Average Platform Load per minute x Combined Train Service Headway x 2

where average flow per minute flow is specified in section 3.2.

3.14.4.2.5 The evacuation load for the busiest platform shall be determined as follows:-:

Evacuation Load = Train Load + Platform Load

3.14.4.2.6 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 evacuation 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)

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

3.14.4.3.1 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 4; to give the number of passengers required to be evacuated in each minute of the 4 minute target evacuation time from the platform.

b) Divide the 1 minute evacuation load by the capacity flow rates in section 3.14.1.11 to determine the required width of platform exits, passageways, ramps, stairways, escalators, moving walkways 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:

$$\text{Width of Station Element} = \frac{\left(\frac{\text{Total Evacuation Load}}{4}\right)}{\text{Flow Rate for that Element}}$$

c) Apply the following walk speeds to the last passenger off the platform, to check that the 4 minute and 6 minute target times can be met. The last passenger shall take a maximum of four minutes to clear the platform, and shall reach a place of safety within six minutes.

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

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

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

3.14.4.4 **Configuration of means of escape from platforms**

3.14.4.4.1 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.

3.14.5 Fire within the station structure scenario

3.14.5.1 Assumptions

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

3.14.5.1.2 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.

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

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

3.14.5.2.1 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 3.10.3.2 (i.e. the average number of passengers waiting for a train plus the number of passengers alighting from the train, at the height of the peak).

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

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

3.14.5.3.2 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 section 3.14.1.11 to determine the required width of passageways and stairways and the required number of escalators and UTS gates – no allowance for 'edge effects' in routeways 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 separated route can be met), and assume the last passenger will have to walk the whole length of the platform.

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

3.14.5.3.3 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.

3.14.5.4 Configuration of means of escape through the station structure

3.14.5.4.1 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:

a) 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).

b) 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.

3.15 Secondary income and other free-standing items

3.15.1 Space for secondary income facilities

3.15.1.1 Space-proofing for secondary income facilities shall be considered where feasible, and in consultation with TfL Commercial Development directorate.

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

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

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

3.15.1.5 For secondary income facilities that have a counter, it shall be assumed that one person is being served.

3.15.1.6 For movable retail trolleys, space shall be provided for one person using the secondary revenue unit and the space of the unit itself

3.15.1.7 One person shall be assumed to take up $0.8m^2$ in concourse areas, in passageways and on platforms.

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

3.15.2 Advertising and sponsorship

3.15.2.1 There shall be no intrusions into the space required for passenger movement up to a height of 2m, with the exception of poster frames of less than 50mm depth.

3.15.2.2 Advertising and sponsorship equipment shall comply with the requirements for circular cross-section passageways (see section 3.9.3).

3.15.2.3 Advertising frames shall not be positioned on external station facades.

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

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

3.15.3 Automated Telling Machines (ATMs)

3.15.3.1 Adequate space shall be provided facing out into all ticket halls for one or more ATMs, appropriate to the demand levels at that station. Access shall be provided to a dedicated room to the rear of the ATM.

3.15.3.2 ATM Rooms may be accessed through a common lobby with the secure suite (due to both having the same security requirements), but the ATM shall not be located within the LU POM room without the agreement of COO Ticketing & Revenue, and a Crime and Disorder assessment by LU Operational Security.

3.15.3.3 The space to be provided for the ATM queue shall be 4m, which shall not conflict with customer flows, ticket purchasing or staff going about their duties.

3.16 Other public facilities

3.16.1 Public toilets

3.16.1.1 Public toilet facilities shall be provided at all new build stations, and when major building or modernisation works are carried out at existing stations.

3.16.1.2 Toilets being installed at stations which are step-free between the street and the platform should include at least one toilet suitable for wheelchair users. This should be unisex, with an entrance separate to the male and female toilets.

3.16.1.3 Toilets should be located on the paid side of the gateline, in the ticket hall area if possible. Where this is not possible, toilets should be in busy areas which have good natural surveillance. This will allow toilets to be monitored more easily by staff and reduce the need for toilets to be kept locked, or opened only on request.

3.16.2 Litter receptacles

3.16.2.1 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.

3.16.3 Exclusion Zone for Sensitive Items

3.16.3.1 A total exclusion zone of 1200mm (from the outer edge) shall be applied to all memorials, plaques and heritage features (including Labyrinth artworks).

4 Responsibilities

4.1 This Standard will be owned by the Director of Strategy and Service Development.

4.2 The technical content manager for this Standard is the Station Planning Standards Manager who is responsible for the content of the Standard and ensuring that the content is fully assured technically.

4.3 The technical content manager for this Standard is responsible for matters concerning customer service impacts arising from clause 1.3 of this Standard.

5 Supporting information

5.1 General considerations

5.1.1 There are requirements laid down by the Office of Rail and Road, and this Standard is LU's response to these requirements.

5.1.2 Good station planning is necessary to provide safe, comfortable and efficient conditions for passengers making their journeys and for staff operating stations.

5.1.3 Careful attention to the spatial design of stations will minimise the risks of accidents and congestion and will speed evacuation in the event of an emergency.

5.1.4 All works shall follow the principles of the LU Station Design Idiom which contains additional information about the requirements of design insofar as they relate to this Standard.

5.1.5 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.).

5.1.6 The methods within this Standard will produce sufficient space to allow free flow of customers through public areas and to give reasonable comfort in waiting areas.

5.2 Safety considerations

5.2.1 The design of a station (as well as the facilities contained therein) and all the materials and construction methods used in building it must comply with all statutory and LU Standards, regulations and processes relating to safety. This will particularly include those relating to Fire safety.

5.2.2 LU will need assurance, via specified processes, that this is the case.

5.2.3 Where the refurbishment or modernisation is part of a larger project to construct and deliver a new or rebuilt station, the processes of ensuring and assuring that the station is fully safety compliant shall be integrated with and equal to those in place to ensure the entire project is safety compliant.

5.3 Environmental considerations

5.3.1 The construction of a station (and all facilities contained therein) and all the materials and methods used in building it must comply with all statutory and LU Standards, regulations and processes relating to the environment and environmental protection.

5.3.2 This will include compliance with all requirements relating to any listed building, conservation or heritage status that apply to the station or the area around it.

5.3.3 LU shall require assurance, via specified processes, that this is the case.

5.4 Customer considerations

5.4.1 Stations shall be designed and built to maximise the benefits to LU's customers by providing adequate and compliant facilities to enhance the customer experience.

5.4.2 Stations shall be designed in accordance with the requirements of equality legislation, whilst not compromising the needs of staff for which these facilities are part of their workplace.

5.5 Security considerations

5.5.1 Stations shall be designed and built with consideration to the requirements of the Department for Transport document Security in Design of Stations (SIDOS) Guide.

5.6 Other information

5.6.1 Failure to apply the criteria set down in this Standard is likely to result in poorly planned and congested stations. This is likely to cause passenger distress and the need for temporary station closures and other control measures.

6 References

6.1 References

6.1.1 Legislation

Document no.	Title
EU Directive 89/654/EEC	Workplace (Health, Safety and Welfare) Regulations
DfT / CPNI / BTP publication	Security in Design of Stations (SIDOS) Guide
BS8300:2009+A1:2010	Design of buildings and their approaches to meet the needs of disabled people – Code of Practice

6.1.2 LU company documents

Document no.	Title
S1133	Premises – Stairways and Ramps
S1134	Premises – Doorsets and Glazing
S1311	Customer Information – Stations
S1375	Planning for Ticket Issuing Facilities
S1538	Assurance

6.2 Definitions

The following topic specific definitions are created:

a) within London Underground's Glossary of Terms (S1622) (a category 1 Standard);
b) from published sources that are clearly identified.

Term	Definition	Source
Consolidation Room	Secure Room close to the ticket vending machines containing equipment associated with the consolidation function, and for the purpose of storing float monies.	a
Edge Effect	Space that passengers leave at the edge of routeways and platforms	a
Event Station	Any station that has local events that meet any one or more of the following three requirements:- • The event attracts significant numbers from outside the locale, therefore increases demand for LU services. • The event has a large enough attendance and a single (hard) finish to impact the operation of stations that serve the venue. • The event requires road closures that would impede a rail replacement bus service.	a
Hostile vehicle mitigations	A substantial installation consisting of a number of solid barriers designed to prevent hostile vehicle incursion into the public (or other sensitive) areas of LU stations. These may take the form of gates, barriers, bollards, benches, planters, or any other design that may blend harmoniously with the streetscape.	a
Lift cycle time	The following sequence of operations from bottom landing entrance to top landing entrance: Loading, closing doors, travelling up, opening doors, unloading, loading, closing doors, travelling down, opening doors and unloading. For lifts serving more than two levels, the sequence of 'opening doors, unloading, loading and closing doors' is repeated for every extra level in both directions,	a
Moving walkway	A passenger conveyor between fixed sides, and having moving handrails	a
Place of Safety	An area or place where staff working in the ticket hall can temporarily retreat to if they are being assaulted or are physically threatened, providing a physical barrier from potential assailants.	a
Primary means of vertical transportation lift	A lift that is crucial to the operational management of a station. Failure of a PMVT lift will put the operational management of the station at risk.	a
Routeways	All passageways, intermediate concourses, overbridges, escalators, moving walkways, lifts, stairways and ramps in public areas.	a
Run-off	The area in front of or beyond an escalator, gateline, moving walkway, passageway or stairway, in which there shall be no obstruction	a
Secondary means of vertical transportation lift	A lift that is crucial to the step-free access status of a station. Failure of an SMVT lift will not put the operational management of the station at risk but will remove the step-free access status if no other SMVT lifts are available at that station.	a
Step-free access	Stations with lifts or ramps (or a combination of both) to enable customers who cannot use escalators or stairs to move between the street and the platform. Note that separate provision may still be required for step-free access from the platform to the train.	a
Temporary Works	Works within the staff accommodation or the public area of the station that are in place for not more than six months	a
Ticket Vending Machine	A Passenger Operated Machine (POM) for the purposes of self-service ticket issuing. Accessed and serviced from the front, and with no requirement for a rear enclosure.	a
Train Service Headway	For the purpose of this Standard the definition is the time between trains in the peak hour expressed in minutes	a
Uni-Queue	A common queuing system for Ticket Issuing Facilities	a

6.3 Abbreviations

The following abbreviations are created:

a) within London Underground's Glossary of Terms (S1622) (a category 1 Standard);
b) from published sources that are clearly identified.

Abbreviation	Definition	Source
AFM	Advanced Fare Machine	a
ALARP	As Low As Reasonably Practicable	a
ATM	Automated Teller Machine	a
BTP	British Transport Police	a
CMS	Cable Management System	a
CCTV	Closed Circuit Television	a
COO	Chief Operating Officer	a
CPNI	Centre for the Protection of National Infrastructure	a
DfT	Department for Transport	a
GLAP	Gateline Attendant's Point	a
LoS	Level of Service	a
LU	London Underground	a
MFM	Multi-Fare Machine	a
ORR	Office of Rail and Road	a
POM	Passenger Operated ticket Machine	a
QBM	Queue-Buster Machine	a
SCR	Station Computer Room	a
SCU	Station Control Unit	a
SIDOS	Security in Design of Stations	a
SOR	Station Operations Room	a
THSCU	Ticket Hall Station Control Unit	a
TOC	Train Operating Company	a
TVM	Ticket Vending Machine	a
UTS	Underground Ticketing System	a
WAG	Wide Aisle Gate	a

6.4 Technical content manager

Paragraph number	Technical content manager
3.4 (all) 3.5 (all) 3.8 (all) 3.9.1 - 3.9.9 inclusive 3.10.1 - 3.10.7 inclusive 3.10.8.9 3.10.8.10 3.10.8.14 3.10.8.15 3.11.7 (all) 3.12.7 (all) 3.13.2 (all) 3.14 (all) 3.15.2.1 3.15.2.2	Joint technical content managers: [redacted] Station Planning Standards Manager; [redacted] Principal Premises Engineer
All other requirements not listed above	Nick McDermott, Station Planning Standards Manager

6.5 Document history

Issue no	Date	Changes	Author
2-03001-024 A1	April 2005	Issued	LU S&SD
1-371 A2	December 2006	Section 1 changed and sections 3.5.2, 3.10.5.3, 3.11.2.4 and 3.11.7.3 added via PSC S1-01060. Standard renumbered.	LU SQE
1-371 A3	August 2009	Proposed changes to 1.2, 3.3.2, 3.7, 3.10, 3.11.3.3, 3.13, 3.14, 6.1.1, 6.2 and 6.5. Additional changes made to reflect comments on PSC M1-01239	LU S&SD
1-371 A4	November 2010	Put into new Standards template and changes made in accordance with DRACCT Log No 00049 and 00050: New clause 1.3 added; Sentence added to clause 3.13.1; Sentence removed from Note following clause 3.13.3.3; Sentence added to clause 3.14.1.1; Clause 3.14.2.4 removed; New clause 4.3 added; Brought into line with new organisation.	[redacted]
S1371 A5	June 2011	Renumbered and as per DRACCT 00398 this Standard was updated in line with recent changes to legislation, changes in customer behaviour and changes in best practice. Also, other minor changes made are intended to improve the clarity of the Standard and remove ambiguity	[redacted]
S1371 A6	September 2016	As per DRACCT 03242, this Standard was updated in line with recent changes to legislation, customer behaviour and best practice, and company policy following the Fit-for-the-Future (Stations) project, and its effects on the LU staffing model. Finally, other numerous minor changes have been made to improve the clarity of the Standard and remove any ambiguity.	[redacted]