6 | ESCALATORS

6.1 Lighting Design Concept*

The lighting scheme for the escalator tunnel has been developed as two discrete elements. Functional lighting for the escalator steps is provided by the uniformly illuminated escalator balustrade. This is coupled with indirect lighting of the vaulted tunnel, ceiling which is achieved by utilising deck-recessed uplights. The task lighting for the escalator is not detailed in the C100 specification since it is being supplied as part of the escalator procurement contract.

Space dimensions
The uplight luminaires will illuminate the two escalators tunnels of 5m diameter (type 1) and 6.5m diameter (type 2). In both cases the luminaires will be installed flush in the escalator deck cladding. All luminaires will be DALI-dimmable and this will allow adjustments to the dimming levels of both areas in order to achieve uniform light levels on the soffit.

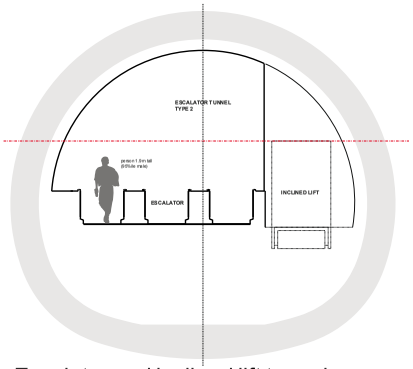
Materials
The internal surfaces of the escalators tunnels are clad in GFRC panels of light grey colour. Reflectance values for the acoustic panels have been estimated at 42%, while for the light grey soffit solid GFRC panels it has been estimated at around 52%. For the escalator treads a typical anodised aluminium finish should be assumed.

Luminance levels in tunnel soffit
General illuminance levels are taken from Standards, Lighting of London assets, 1-066. However, as the illuminance levels on the escalator tread's are mainly dependent on the balustrade-integrated backlight, the reference light levels for the additional architectural lighting of the tunnel are defined as luminance levels on the tunnel soffit GFRC panels' surface, expressed as cd/m2.

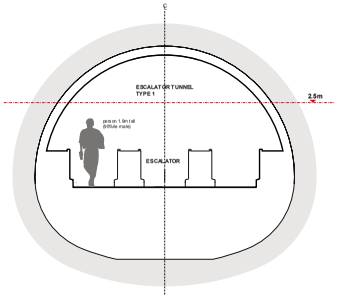
The uplights are primarily contributing to the illumination of the soffit, creating a feeling of comfortable space.

General illuminance (E) levels according to LU Standards:
Average illuminance: 150lux on escalator treads
Uniformity: 0.8
Glare rating: -
Colour rendering: 80>
Colour temperature: 4000 K

*Refer to note in section 1.1



Escalator and inclined lift tunnel cross-section.



Typical escalator tunnel cross-section.

Luminance (L) levels recommended:

Average luminance:	20 cd/m2
Uniformity:	0.8
Colour rendering:	80>
Colour temperature:	5,000 K

There are two possible types of escalator tunnel: standard, incorporating three escalators, and of larger radius, incorporating an additional inclined lift. The following section focuses specifically on the standard escalator tunnel. In station-specific conditions where inclined lifts are deployed, the lift shaft should be suitably lit in accordance with the relevant British Standards for lifts BS EN 81. Lighting should blend sympathetically with the light cast on the soffit by the escalator deck uplighting.

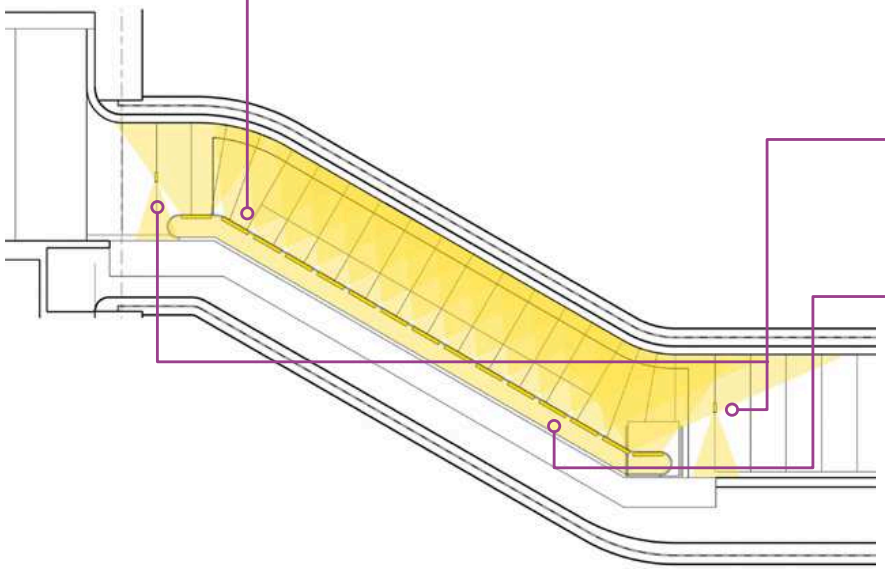
Escalators threshold area

The LUL 1-066 A2 standard defines the threshold area of the escalators as an area where high light levels and uniformity are needed. More specifically, the requirements are:

Average illuminance:	200lux
Uniformity:	0.8
Colour rendering:	80>
Colour temperature:	5,000 K

The minimum required distance from the last totem to the end of the escalators is 6m and, in order to compensate for the drop of illuminance values at the extended threshold area, an additional linear LED luminaire is introduced in the base of the suspended signage.

Station teams are to ensure that the light output from this luminaire and the backlit balustrate (which does not form part of the C100 scope of works) should provide the light levels stated above. Refer to calculations in Appendix I and section 6.2.2.



Escalator elevation

SPL-502 deck-recessed uplights mounted centrally and within escalator deck to uplight vaulted ceiling

Location of photocells to be determined by station teams where applicable

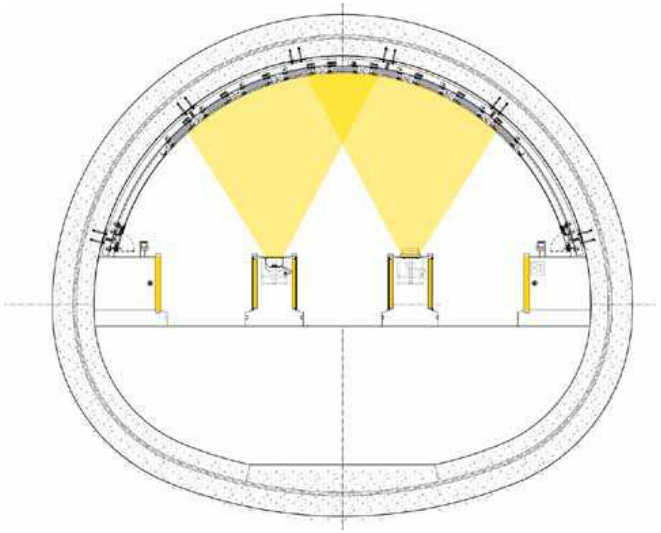
SPL-802 Linear LED downlight integrated within suspended sign at top and bottom escalator thresholds

SPL-502 uplight to be removable from the top and openable for maintenance

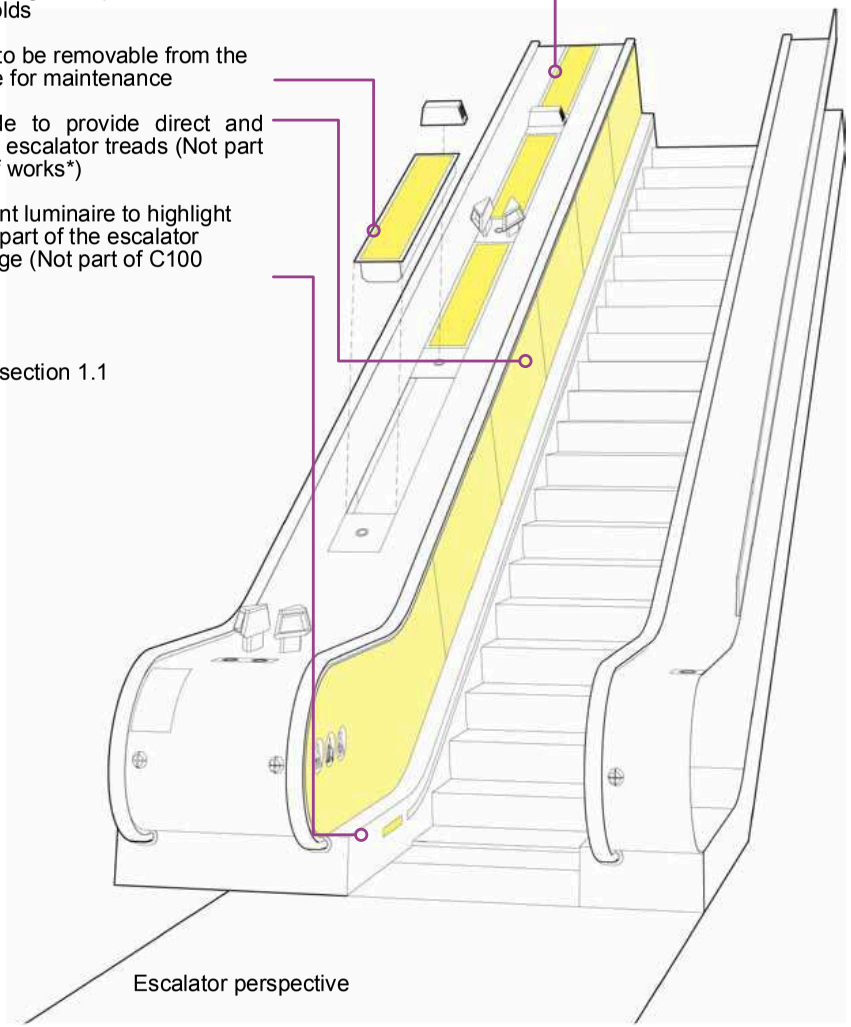
Backlit balustrade to provide direct and diffuse lighting to escalator treads (Not part of C100 scope of works*)

Comb plate accent luminaire to highlight landing steps as part of the escalator contractor-package (Not part of C100 scope of works*)

*Refer to note in section 1.1



Escalator cross-section



Escalator perspective

6.2 Luminaire Types

6.2.1 SPL-502 Escalator Deck Uplight

Recessed 1500mm x 305mm luminaire in escalator deck. 1870mm centres, separated by stand on right signs, emergency stop buttons and speakers.

The location of luminaires is within escalator deck. The luminaire is designed to focus light onto the vaulted tunnel overhead. Special care will need to be taken in the design of the luminaire to minimise potential glare to passengers travelling on the escalator and approaching the escalator from the Concourse.

To reduce the number of installed luminaire points, this luminaire is expressed over a greater surface area resulting in a large low luminance surface working in conjunction with the glowing escalator balustrades.

Glare protection

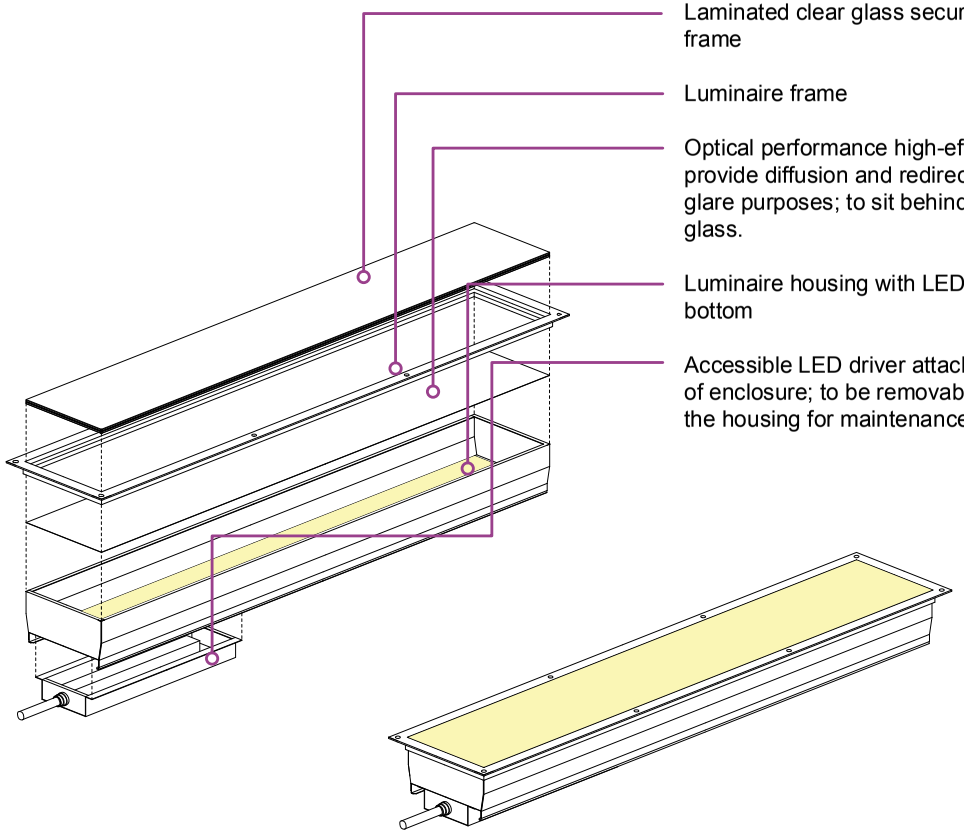
The diffuse light source will provide an improved illumination level to passengers faces. Care should be taken to control the surface brightness of the diffuser to avoid discomfort glare.

Maintenance

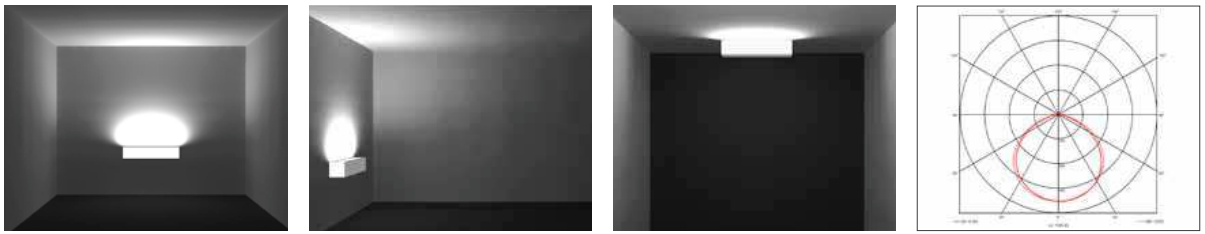
The luminaire is designed for access through the rear to allow for a fully sealed top plate with as few joints as possible. This reduces the locations for daily dirt build up on the top of the fixture and eliminates difficulties associated with resealing the top after maintenance.

Ingress Protection

Luminaire must include sealed top glass of IP65 rating, to prevent dust ingress and provide easy cleaning.



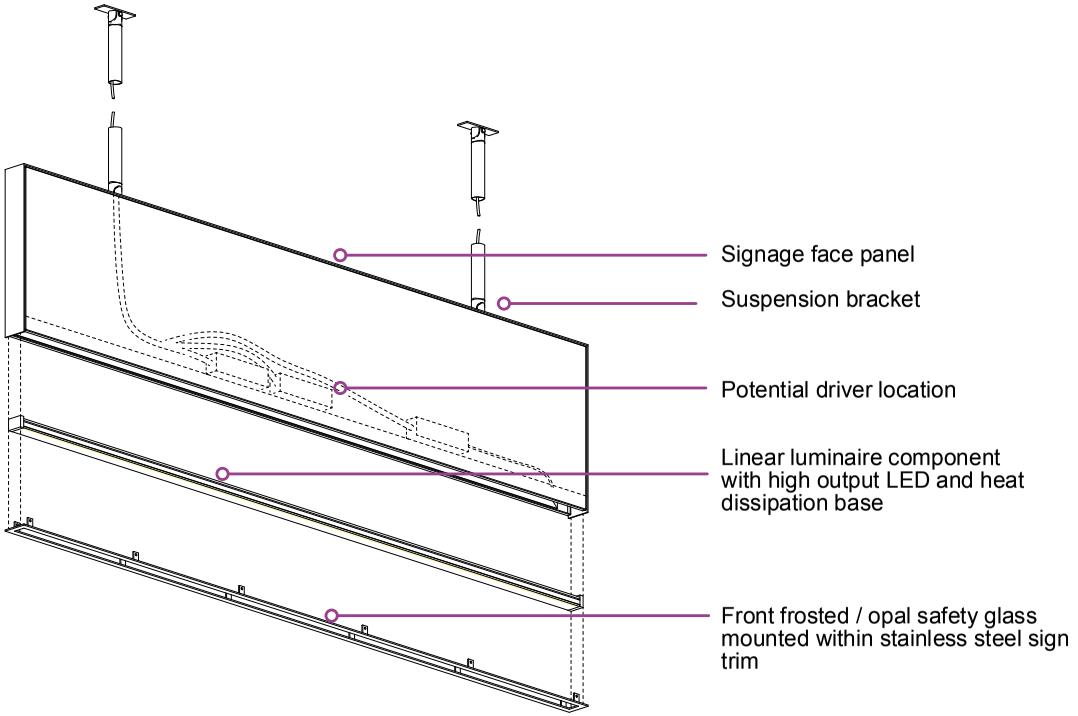
Design intent photo of backlit LED uplight in a mock-up position and in relation to the backlit balustrade



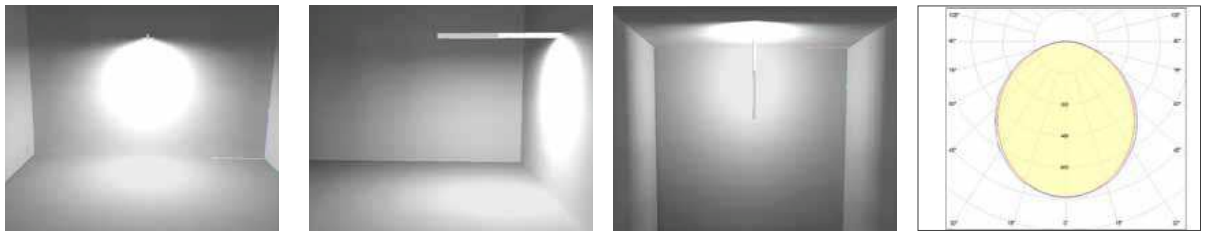
Luminaire distribution. Front, side, top and polar diagram

6.2.2 SPL-802 Sign Integrated Luminaire.
The suspended signage above escalator landings in the lower concourse accommodates a linear light source on the underside which provides enhanced levels of illuminance at the threshold. The luminaire should have wide-beam and diffuse light distribution with warm white colour temperature (3,000 K). It is proposed that the luminaire should be removed from the underside of the sign for maintenance. It is envisaged that access to LED drivers be through the hinged sign face.

Ingress protection
The luminaire should have an IP65 rating to prevent dust ingress and facilitate easy cleaning.



Design intent render images



Luminaire distribution. Front, side, top and polar diagram

6.3 Calculation Results: Normal & Emergency

The images right are a summary of the sample illuminance calculations undertaken for the escalator tunnel. For complete calculation results refer to Appendix I.

Note:The illuminance calculations also include the brightness or luminance values (L) on the soffit and exclude any illuminance calculations (E) on the escalator treads as this relies mainly on the direct illuminance by the backlit balustrade which is outside the C100 scope*.

Note: The CRL- nominated escalator manufacturer is responsible for ensuring that the task lighting provided as part of the escalator contract complies with LUL 1-066.

For the additional lighting at the threshold area (escalator landing) please refer to the complete list of calculations in Appendix I where the suspended signage element SPL-801 is included.

*Refer to note in section 1.1

Escalators: view from concourse render

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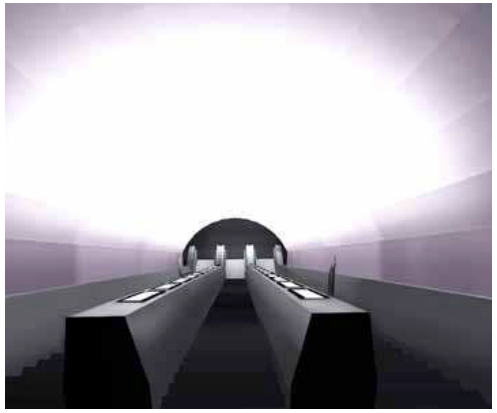
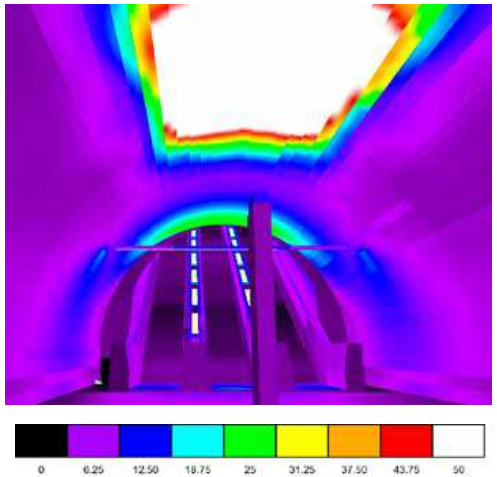
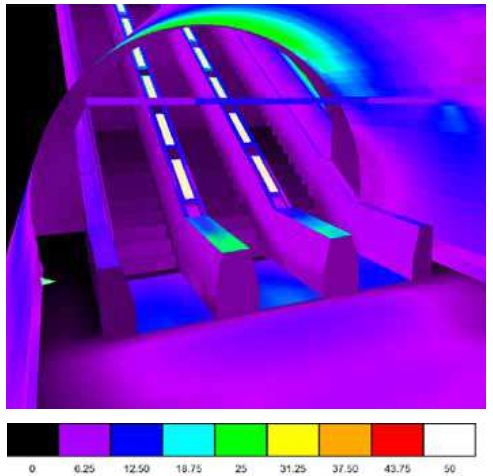


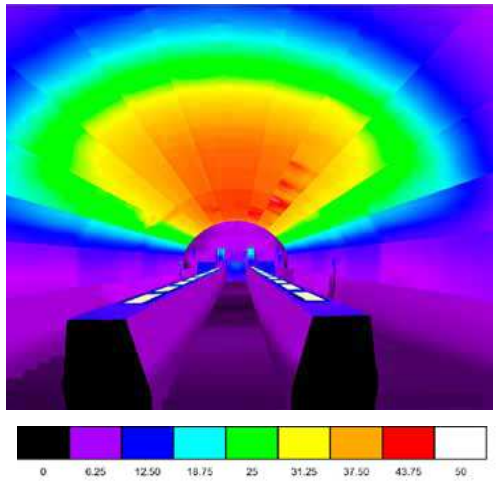
Escalators: view from top render



Escalators: view from concourse luminance (L) values



Escalators: view from concourse luminance (L) values



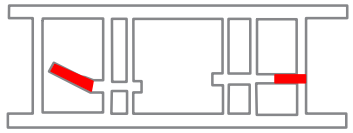
Escalators: view from topl uminance (L) values

I.VI Calculation Results: Escalators*
Normal Operation

The C100 scope and sample calculations include the deck-recessed uplights and suspended signage downlight, but exclude the backlit balustrade and comb plate accent light. Whilst the escalator task lighting concept is part of the generic station design, these lighting elements are included within the escalator contractor's scope of work. It is within their remit to provide a solution that complies with the LUL 1-066 A2 standard with regards to the illuminance levels on the escalator thread line (150lux) and top and bottom landing areas (200lux at the threshold). The escalator task lighting should also comply with C100 design intent.

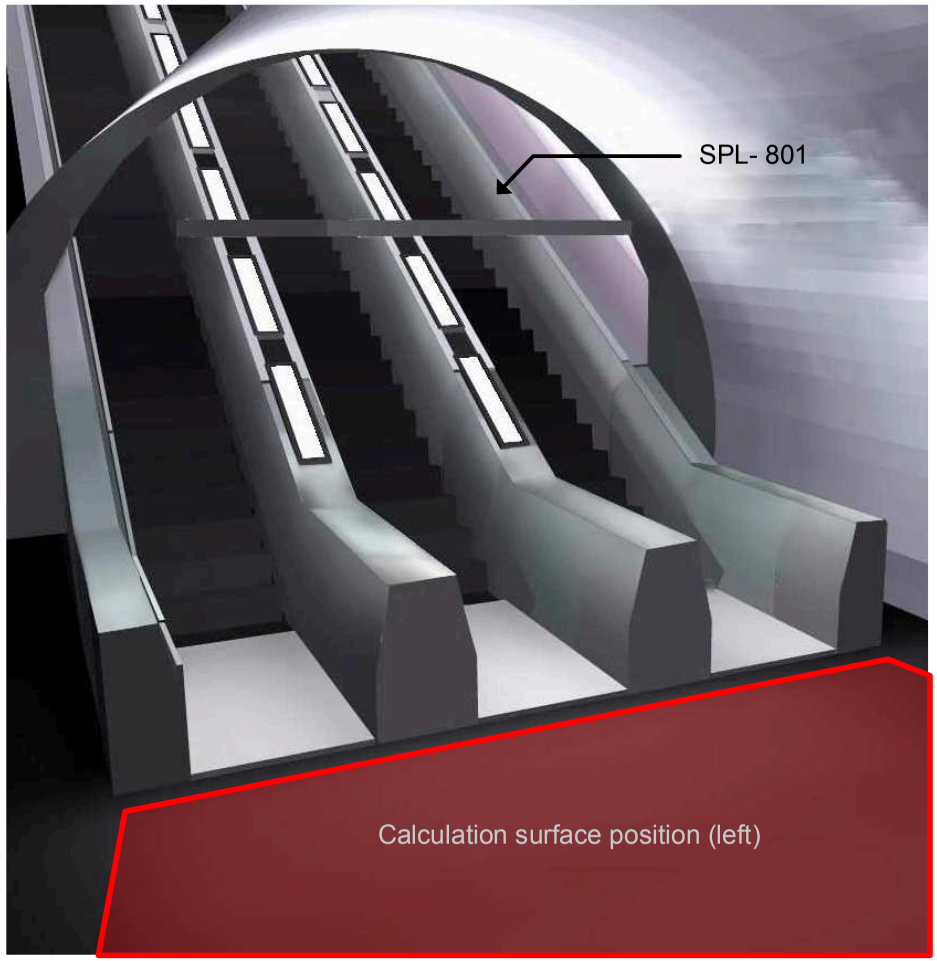
The calculations presented here confirm the required luminance values (L) for the vaulted ceiling only and confirm additional illuminance (E) provided at the escalator threshold area (upper and lower) by the signage integrated luminaire at these locations.

C100 Generic station key

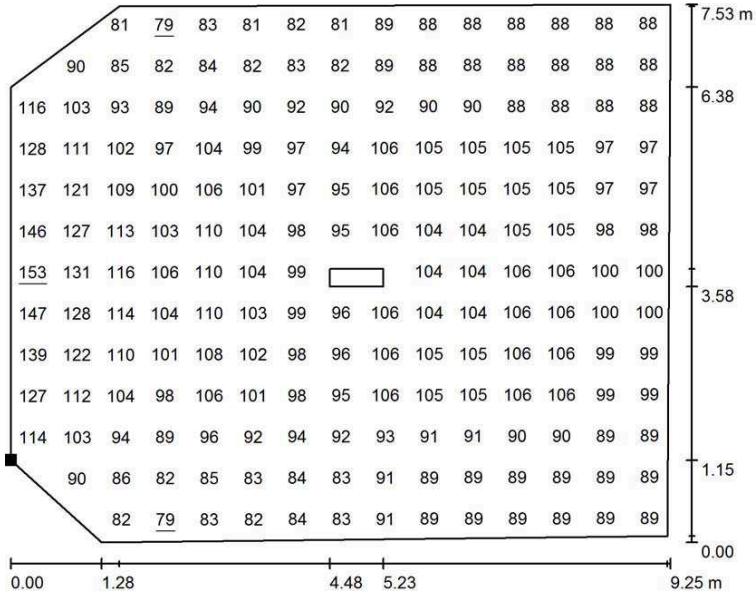


*Refer to note in section 1.1

Escalators : render



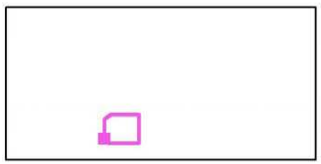
Escalators: threshold area illuminance (E) values (SPL-801 and SPL-501 reduced output contributions included in the calculation.



Values in Lux, Scale 1 : 75

Not all calculated values could be displayed.

Position of surface in external scene:
Marked point:
(3.454 m, 5.407 m, 0.050 m)



Grid: 15 x 13 Points

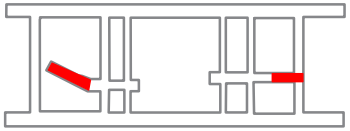
E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0	E_{min} / E_{max}
99	79	153	0.800	0.516

Lighting Summary

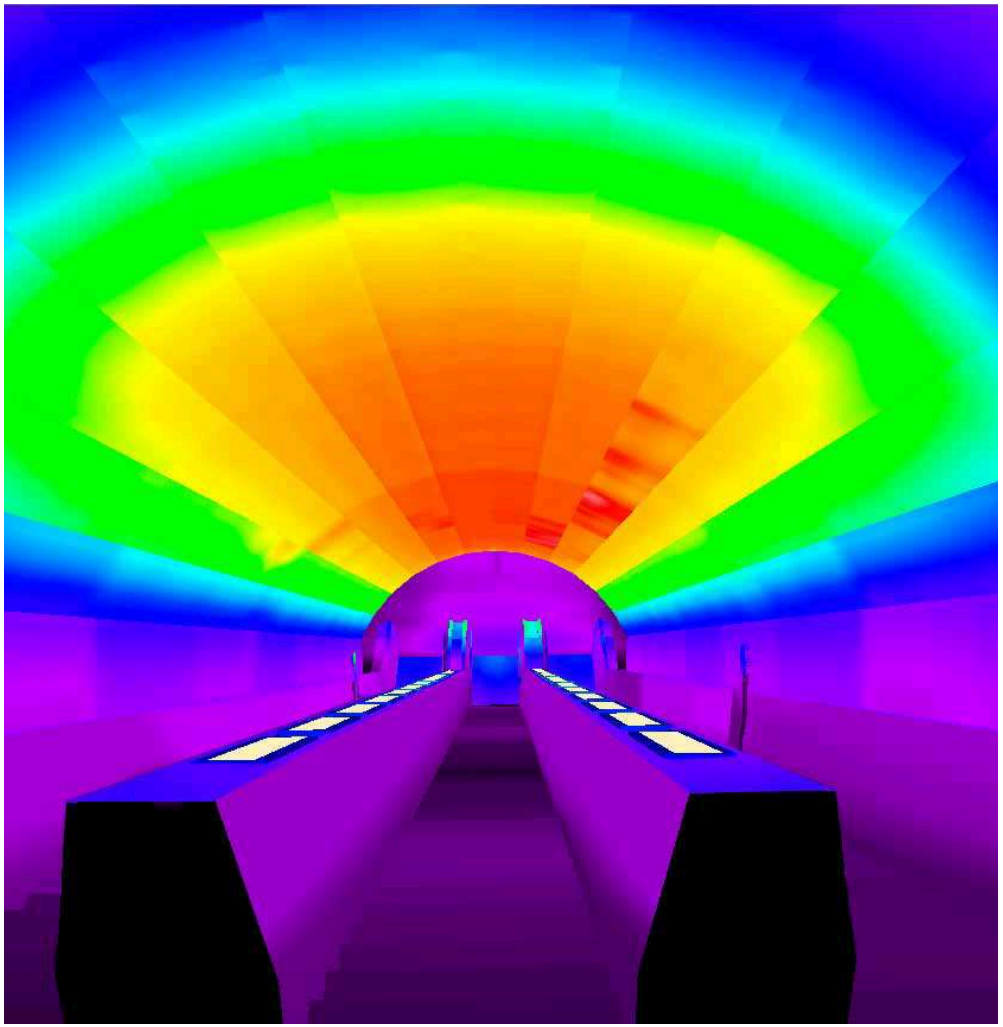
Station teams will need to verify that the complete lighting scheme for the escalator tunnel works in the defined measurement planes and that the perceived brightness of the ceiling ensures a smooth visual transition between the escalator tunnel and concourse environment.

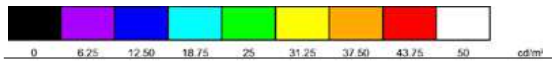
NOTE: Emergency calculations for the escalators area are not included as this is to be provided by the balustrade lighting (outside C100 scope).

C100 Generic station key

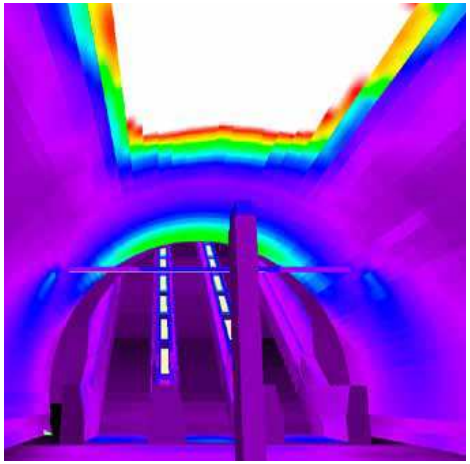


Escalators pseudo colours, view from top-luminance (L)





Escalators pseudo colours, view from bottom-luminance (L)



Escalators pseudo colours, threshold luminance (L)