



TECHNICAL DIRECTORATE

TECHNICAL PAPER

Platform Screen Lighting Requirements

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Abbreviations

LED	Light Emitting Diode
DALI	Digital Addressable Lighting Interface
PES	Platform Edge Screen
UPS	Uninterruptable Power Supply
FFL	Finished Floor Level
LOR	Light Output Ratio
LUL	London Underground Limited
BS	British Standard
BMS	Building Management System

Abstract

Background:

As part of the Crossrail station development, and corporate identity the platform will be illuminated by a continuous row of luminaires mounted above the platform edge. These luminaires are used for the general illumination of the platform environment and to provide a washed lighting effect on the rear arched wall, and also provide the platform emergency lighting.

1 Introduction

Light box

A factory sealed light box forming the upper fascia of the Platform Edge Screen. The light box shall be designed to achieve a minimum of 150 lux on the platform FFL luminous this fully sealed IP66 rated unit consists of the Following elements:

Front Diffuser

Manufactured to comply with LUL 1-085 and Crossrail Impact resistance / Explosion conformity tests, to withstand: Peak reflected pressure: 55.17kPa Peak reflected impulse: 188.3kPa-msec.

Mounting Brackets

For installation onto PES structure Brackets must be capable of taking out tolerances of structural steelwork typical Dimensions 1500mm +0mm,-2mm length, 1100mm high, 190mm wide at top decreasing to 55mm wide at base.

Light box enclosure

Fabricated in powder coated or enamelled mild steel, finished in white RAL 9010

LED Light Engine

Mid powered 100mA LED chips providing rear illumination, configured as replaceable modular board arrangement, each controlled separately by replaceable modular drivers with minimal current in rush characteristics. The Driver efficiency will be in excess of 0.9, and will incorporate

12VDC / 2 pole DALI control output for optional control equipment. Illumination levels will comply with LUL standard 1-066 issue number A2 titled "Lighting of London Underground Assets".

Maintenance

All components must be easily accessible. All "mission critical" devices will be "easily" exchanged without removing PES from its location, with dual plug and socket connections to supply both ordinary supply and UPS supply, utilizing a modular philosophy. Maintenance of the luminaire shall not affect the operation of adjacent luminaires, and will be properly maintained & cleaned from platform side.

Maintenance Factor

The applied luminaire maintenance factor is 0.66 this is based on luminaire cleaning frequency of once every two years, please refer to Crossrail document titled "Concourse Lighting Maintained Illuminance and Reflectance's" CRL1-XRL-E-RGN-CR001 6-50005.

2 Scope

Access to all components for maintenance will be achieved through the top of the luminaire; Photometric information will be supplied for all luminaires and will be in accordance with BS EN 13032-1. Final Fixing details to the PES will be further developed and coordinated in line with the Crossrail C100 RIBA stage F design.

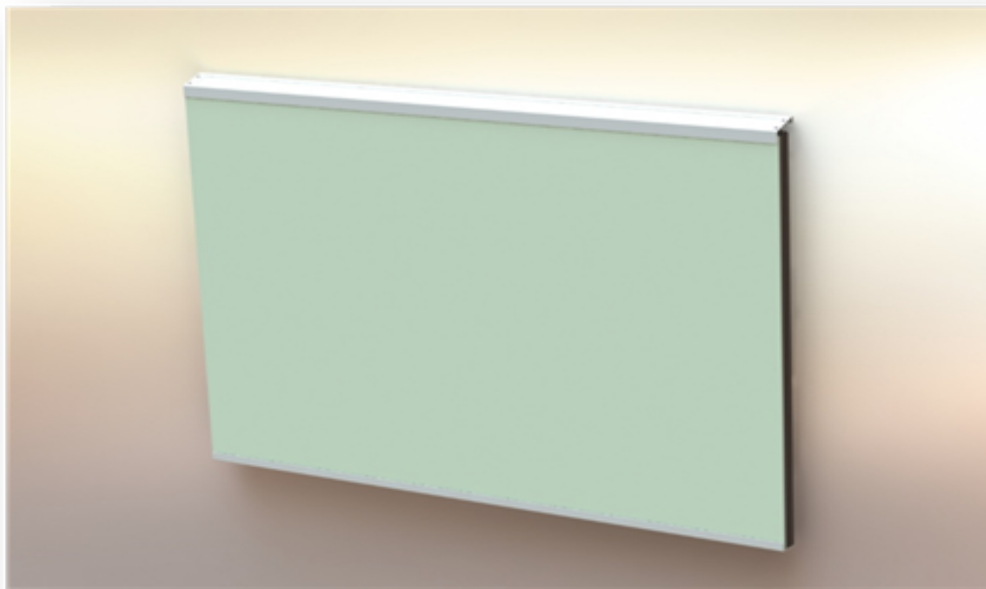


Figure 1 Typical Platform Edge Light Box

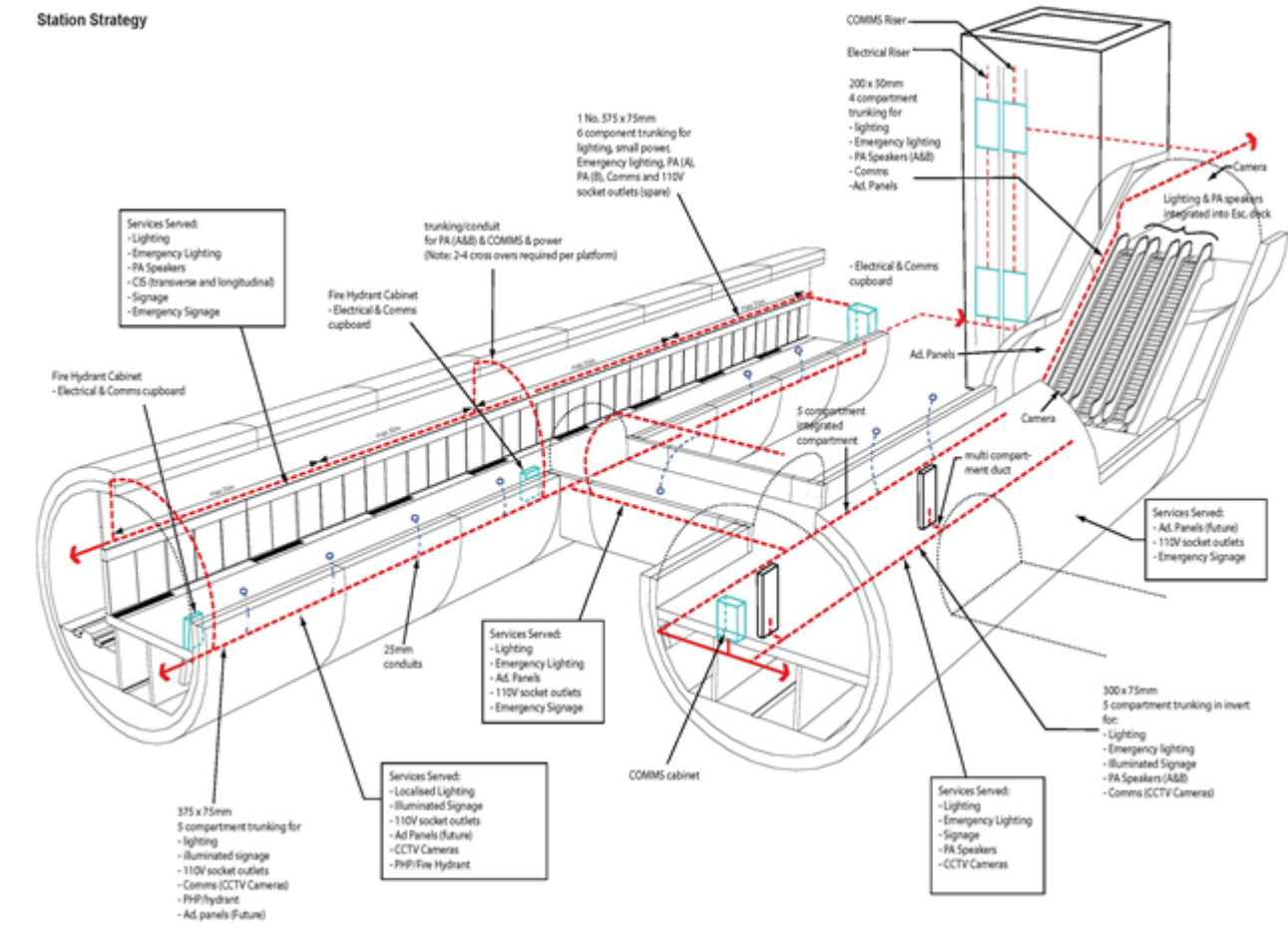


Figure 2. Lighting Distribution Boards and CMS Routing (Typical Positions)

LV Distribution Strategy

Typically there are 5 platform lighting distribution board positions, these are located in the C100 equipment cabinets as depicted in figure 2, the distribution boards will be 4 way three phase and neutral and will consist of general lighting A supply or general lighting B supply and in each instance will be accompanied by a UPS emergency lighting distribution board, Both distribution boards will be housed in separate cabinets.

Figure 3 Typical Wiring Configurations

The Platforms shall comprise of 160 Light boxes. The sketch in Figure 3 provides an example of how the designer could configure the lighting circuits on each platform.

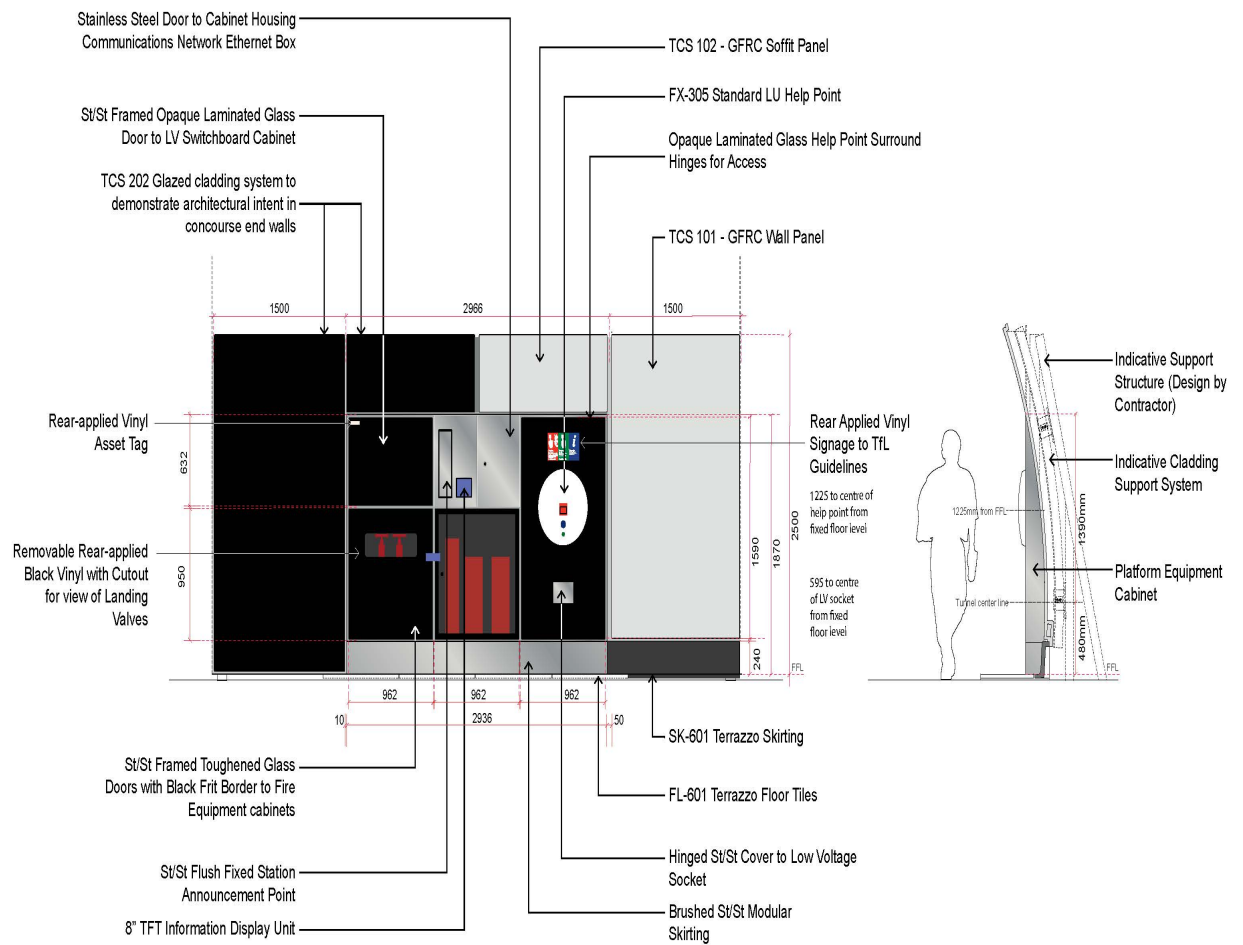


Figure 4. Typical Platform Equipment Cabinet Capable of Housing Single Phase Lighting Distribution Boards



Figure 5. Impression of the platform screen light box

2.1 Performance Requirements

- A. 1500 x 1200mm wide, Screen size 1500 x 1100mm sealed to IP66.
- B. A flush near to seamless join between light fittings
- C. 3500°K "White" CRI>80, total output to provide minimum of 150 Lux on platform FFL, With 200 Lux when boarding or alighting from trains.
- D. Screen must be Homogeneous with no bright/dark areas, no visible led spotting.
- E. Max of 100 Watts load and delivering 150 LUX on the platform FFL
- F. Minimum output of 120 lumens per LED
- G. Glare index <28
- H. LED's of each type to be supplied by the same manufacturer.
- I. Emergency lighting shall be supplied from the emergency lighting UPS system and provide continuous illumination to every Platform screen light fitting during either partial mains failure (failure of either the A or B supply) or total mains failure. The UPS battery autonomy will be 3hours for emergency lighting, to provide >15Lux @ platform FFL (15Lux = 25% portion of fitting (output CRI>80, CCT>3500°K).
- J. The manufactures sample, must be compliant with LUL 1-085 and be approved by the Crossrail Material Compliance Record Procedure (MCR).
- K. The design, supply, installation, testing and commissioning, and putting to work, shall be in accordance with the standards listed within the "Crossrail New Works Baseline - Document Reference: CR/ QMS/ DEV/ P/ 0155".

- L. ALL installation and maintenance “MUST” be carried out from Platform side.
- I. Will be installed and adjusted for accurate alignment from platform side.
- II. Maintenance of the luminaire shall not affect the operation of adjacent luminaires.
- III. Will be properly maintained & cleaned from Platform side.
- IV. All “mission critical” components will be “easily” exchanged without removing PES from its location
- IV. UPS Emergency backup to provide >15Lux @ platform FFL (15Lux = controlled by Dali of full output @ 150Lux) CRI>80, CCT>3500°K. This will be achieved By the UPS supplying panel 2 of the four removable LED panels during degrade mode.
- VI. The “PES” luminaire is to cover the entire Platform length @ approximately 240M / 1.5M = 160 luminaires
- VII. Allowance for Shorter “PES” illuminated luminaires circa: 1200 / 900 / 600mm wide versions.
- VIII. Allowance for Non-illuminated infill panels each platform end circa: 300/400/500mm.
- IX. Efficiency of entire circuit / luminaire “LOR” will including two way communication between luminaire and BMS via “DALI” protocol, the luminaire output will be increased over life to maintain lighting levels.

2.2 RAM Criteria

Design considerations in line with Crossrail “RAM”

- i. The “Expected” and Warranted LED Life will be a minimum of 60,000 hours
- ii. The “Expected” and Warranted LED driver life will match that of the LED
- iii. The design will allow for and include specific safety / maintenance features to ensure luminaire longevity / functionality including LED thermal monitoring with In-built “Back-up” components.
- iv. The construction and material specification will be suitable for the expected life of the “PES”.
- v. The “life” component count will include and account for all perishable items I.E. gaskets etc.
- vi. All “mission critical” components will be “easily” exchanged without removing the fitting from its location, including fascia panels in the event of breakage.
- vii. Maintenance must be able to be carried out safely without disrupting / isolating the LV supply.
- viii. Final electrical connection to all luminaires to be via a five core A or B supply and three core UPS supply complying with BS 6883 steel braid armoured 0.6 / 1kv LSOH insulated power cable. Cables to be connected directly to luminaire terminals at load end and via robust & compliant captive plugs and sockets at the supply end. The plugs and sockets to be five poles and three poles and to comply with BS 6972 and BS 7001.

2.3 Standards to be applied

- LUL 1-085
- LUL 1-066
- BS 5266 Pt. 1
- Draft Baseline Report of the ICNIRP European Environment and Health Strategy (COM 2003)338 final) Directive (Sept 2012).
- EN-60598
- Crossrail Material Compliance Record Procedure (MCR).
- BS 6972 and BS 7001
- Crossrail Impact resistance / Explosion conformity.
- BS EN 12464 – 1: 2002

3 Referenced Documentation

C100 RIBA Stage F1 Constructability, Access & Maintenance Report, document reference C100-ATK-K2-TSY-CRG02-00001, revision 2.0

Crossrail report titled “Safe Maintenance of Systems in Proximity to Overhead Line Equipment (OHLE)”, document reference CRL1-PDP-Z-RGN-CRG02-50001 revision 1.0

Crossrail report titled “Area above PSD HAZID Report”, document reference: CRL1-PDP-Z7-RGN-CRG03-50002, version 1.0

Crossrail report titled “Review of Underground Station Platform Fire Safety”, document reference: CRL1-PDP-Z-RGN-CRG02-50002, revision 2.0

Crossrail report titled “Platform Cross Section Design Development Report”, document reference: CRL1-PDP-Z-RAE-CRG02-00002, revision 1.

Crossrail report titled “Platform Edge Screen (PES) Systems Safety, Constructability, Functionality and Maintainability Report”, document reference: “CRL1-XRL-E-RGN—CR001_Z-6-50001, revision 1.0

Crossrail report titled “Concourse Lighting Maintained Illuminance and Reflectance’s” CRL1-XRL-E-RGN-CR001_6-50005, revision 1.0