S278 DETAILED DESIGN SUBMISSION

ASHON CANAL FOUR BRIDGE LIGHTING SCHEME

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Revision	Revision Description
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2.0. ABBREVIATIONS

Abbreviation	Meaning
A	Amperes
AC	Alternating Current
AFFL	Above Finished Floor Level
BS	British Standard
CMS	Cable Management System
DB	Distribution Board
DC	Direct Current
DNO	Distribution Network Operator
ELV	Extra Low Voltage
GA	General Arrangement
H&S	Health and Safety
kA	Kilo Amps
kVA	Kilovolt Amperes
kW	Kilowatt
LSZH	Low Smoke Zero Halogen
LV	Low Voltage
M	Mile
mm	Millimetre
MCB	Miniature Circuit Breaker
MET	Main Earth Terminal
M&E	Mechanical and Electrical
O&M	Operation and Maintenance
PVC	Polyvinyl Chloride
RCD	Residual Current Device

3.0. STANDARDS

Below is a list of the relevant design standards relating to this submission.

3.1. British Standards

Standard Reference	Issue; Date	Title
BS 6004	2012	Electric Cables. PVC insulated and PV sheathed cables for voltages up to and including 300/500V, for electric power and lighting.
BS 7430	2011+A1:2015	Code of Practice for Protective Earthing of Electrical Installations.
BS 7671	2018 + A2:2022	Requirements for Electrical Installations. IET Wiring Regulations.
BS 8300-2	2018	Design of an Accessible and Inclusive Built Environment
BS EN 61140	2016	Protection Against Electric Shock. Common Aspects for Installation and Equipment.
BS 5489-1	2020	Design of road lighting. Lighting of roads and public amenity areas - code of practice
BS EN 13201-2	2015	Road lighting. Performance requirements

4.0. INTRODUCTION & DOCUMENTATION

4.1. Project Background & Scope

4.1.1. Project Background

Planning Condition 42 of the Co-op Live planning permission requires that a scheme of improvements to the Ashton Canal be submitted for approval, prior to first use of the development, as indicated in the Planning Statement prepared by Deloitte Real Estate (dated 6 March 2020), along with a programme for the implementation of the works. The scheme of improvements includes "art/lighting improvements where the route passes beneath bridges."

There are four bridges that are proposed to be lit in accordance with this requirement, at:

- Viaduct Street
- Cambrian Street
- Beswick Street
- Carruthers Street

Bridges highlighted in orange are listed structures and bridges in blue are non-designated heritage assets. As part of the applications for consent for these works, a heritage statements covering all 4 bridges will be prepared. The location of the four bridges is below.

Image 1 – Map of Asthon Canal 4no. Bridges

Image 2 – Asthon Canal

The Ashton leaves the Rochdale Canal at Ducie St. Junction in central Manchester and climbs for 6 miles (9.7 km) through 18 locks, passing through Ancoats, Holt Town, Bradford, Clayton, Openshaw, Droylsden, Fairfield and Audenshaw to make a head-on junction with the Huddersfield Narrow Canal (formerly the Huddersfield Canal) at Whitelands Basin in the centre of Ashton-under-Lyne. At Bradford, the canal passes very close to the City of Manchester Stadium (currently known as the Etihad Stadium for sponsorship reasons), which was originally built to host the 2002 Commonwealth Games.

Apart from the Rochdale and Huddersfield Narrow canals, the Ashton Canal only currently connects with one other canal. Just short of Whitelands, at Dukinfield Junction/Portland Basin a short arm crosses the river Tame on the Tame Aqueduct and makes a head-on junction with the Peak Forest Canal.

There used to be four other important connections to branch canals: the Islington Branch Canal in Ancoats; the Stockport Branch Canal from Clayton to Stockport (Heaton Norris); the Hollinwood Branch Canal from Fairfield to Hollinwood; and the Fairbottom Branch Canal (itself a branch of the Hollinwood Branch Canal) from Waterhouses to Fairbottom. There was to have been a fifth branch, namely the Beat Bank Branch Canal (itself a branch of Stockport Branch Canal) from Reddish to Beat Bank in Denton, but this was abandoned before completion.

4.2. List of Documentation

Document Reference	Revision	Location within Document
Detailed Design Specification	B02	-
Designer Risk Assessment	-	Appendix 1
Lighting Calculations	-	Appendix 2
Manufacturers Literature	-	Appendix 3
Detailed Design Drawings	-	Appendix 4

4.3. List of Drawings

Drawing Reference	Rev.	Size	Colour/ Monochrome	Title
5125-VIT-DRG-EPT-000001	B02	A1	Colour	Proposed Cambrian Street Layout
5125-VIT-DRG-EPT-000002	B02	A1	Colour	Proposed Carruthers Street Layout
5125-VIT-DRG-EPT-000003	B02	A1	Colour	Proposed Beswick Street Layout
5125-VIT-DRG-EPT-000004	B01	A1	Colour	Proposed New Viaduct Street Layout
5125-VIT-DRG-EPT-000005	B01	A1	Colour	Proposed New Viaduct Street Elevations

5.0. PROPOSED ELECTRICAL SERVICES

This specification describes the MEP services required to facilitate the installation of the new lighting for the four existing bridges shown above.

The following sections of this specification, detail the electrical engineering systems forming the services strategy through the new lighting for the existing bridges.

The proposed electrical installation shall be in compliance with BS 7671:2018+A2:2022 – 18th Edition – Requirements for Electrical Installations.

Following the installation, the installation shall be tested and commissioned, in compliance with BS7671:2018+A2:2022. The following shall be provided upon completion of the works:

- Electrical Test Certificates (as per BS 7671:2018+A2:2022).
- Lux Level Plot.

The following standards for earthing and bonding standards shall be met:

- BS 7430:2011 + A1:2015 – Code of Practice for Protective Earthing of Electrical Installations.
- BS 7671:2018 + A2 2022– 18th Edition – Requirements for Electrical Installations.

5.1. New Viaduct Street

Image 3 – New viaduct Street Bridge

5.1.1 Electrical Distribution System

5.1.1.1 Existing lighting column supply.

The existing towpath near the New Viaduct Street bridge is currently illuminated via 6m post luminaire with integral photocell, raise and lower lighting columns.

Image 4 – New viaduct Street Lighting Columns (no.33)

The existing lighting column circuit comprises of 33no. lighting columns and 5no. underpass lighting which are feed from a local feeder pillar (FP1) located at Alan Turner way.

5.1.1.2 New Lighting Supply

The new lighting for the bridge will be supplied from the existing lighting column (shown above as image 4). The existing lighting column cutout will be replaced with a new loop in and loop out 6A cutout.

New cabling will be routed from the existing lighting column access window within uPVC duct to a new feeder pillar.

5.1.1.2 Proposed New Feeder Pillar

A new feeder pillar shall be installed adjacent to the existing bridge structure within the soft dig area. The feeder will be 1060 x 464 x 237mm (HxWxD) single-sided lift off door feeder pillar with. The cubicle shall be manufactured by Ritherdon Model R460. The new feeder pillar shall be complete with the following:

- Powder coated Light Grey to match existing lighting column
- 12mm ply backboard.
- Identification labels.
- Multiple lock options – Including Tri-Key Cam-Lock, Pin-Hex Cam-Lock and 1333 Key Operated Cam-Lock. Key type to be agreed with the client prior to works commencing.
- Integral Root.
- Earthing of Door.
- 2mm Stainless Steel.

Image 5– Example image of feeder Pillar

The new lighting will be supplied from via a new 6A loop in loop out cutout located within the new feeder pillar.

5.1.1.3 Additional lighting Demand

The additional demand for the new lighting is shown in the table below:

Item	Maximum Demand (Watts)
	L1
All New viaduct street bridge lighting – Full Load	257.4w
Total	257.4w

5.1.1.4 Proposed New Lighting

New lighting shall be installed to cover the existing towpath beneath the new viaduct street bridge.

Image 6– Example image proposed luminaire

The new lighting (type A) shall be 1250mm surface linear style LED luminaires. The luminaires shall be 23.4w, 2400 lumen, IK10, IP65 rated and 3000K. These luminaires will be installed on the existing stonework and brick work underneath this bridge. The new luminaires shall be black in colour (RAL 9005).

The new luminaire shall be manufactured by Vandalite lighting and model Strenna STR - SLIM 2.6 LED-3K /SM /EXT/B/FL-F/SS/IP65/PC (SIDE ENTRY). The new luminaire will be controlled via integral photocells. Luminaires to be factory set to 1300lumens output.

The footpath lighting levels shall be in accordance with the following standards:

BS EN 13201-2:2015 – Road Lighting Part 2 Performance Requirement.

Pedestrian footpath Lighting levels required shall be:

Area	Standard	Requirements
Pedestrian Footpath	BS EN 13201-2:2015 Table 2 – Class C2	Lighting Levels: 10 Lux Minimum 0.4Uniformity

Lighting calculations have been conducted on industry standard software with the following proposed levels to be achieved:

Location	Lux Level Achieved	Lux Level Required	Uniformity Achieved	Uniformity Required	Compliant Y / N
Pedestrian Footpath	18.7 Lux Minimum	BS EN 13201-2:2015 Table 2 – Class C2 – 10lux Minimum	0.44	0.4	**Yes**

There is no emergency lighting proposed for this scheme.

5.1.1.5 Lighting Controls

The following control methodology is proposed:

- Footpath– Luminaire Integral photocells.

5.1.1.6 Junction Boxes

It is proposed to install a new IP66 / IP67 polycarbonate junction box onto the underpass bridge wall where shown on the electrical drawings. The junction box shall be manufactured by Wiska model Combi 607, junction box shall be colour black.

5.1.2 Containment and Cabling

New containment shall be provided to enable new supply cabling to be installed. Where cables are to be buried below ground, these shall be run within suitably sized uPVC ducting. Where cables are to be run above ground, these shall be run within galvanised steel conduits (conduits, saddles etc to be powder coated to match the colour of the luminaires).

It is proposed to extend the existing lighting column circuits and install a new loop in loop out cutout with the new feeder. Note: due to insufficient information available, cable calculations have not been completed as we were advised by email dated 24.07.2024 to progress the design based on extending the 4.0mm^2 SWA cable. Contractor to verify and carry out relevant calculations before installation.

uPVC ducting shall be buried a minimum of 450mm below finished floor level.
New ducting shall be installed to the following:

- New Feeder Pillar

- Existing Lighting column
- Existing Bridge Wall

New containment will be installed on the walls beneath the bridge to provide a route for the lighting supply cables. The new containment shall rise up from uPVC ducting to a galvanised cable conduit via a new junction box.

All conduit glands shall be IP rated as per the new luminaires.

Where multicore cables are used for the lighting, these shall be multicore XLPE/SWA/LSZH type with integral CPC.

Where single core cables are used, these shall be LSZH type run within suitably sized galvanised steel conduits.

Supply cables shall be fully labelled at both source and destination of the cable. Intermediate labels shall also be installed at accessible chamber locations for ease of reference and maintenance.

All containment / conduit boxes to be installed with anti-tamper screws.

5.2. Cambrian Street

Image 7 – Cambrian Street Bridge

5.2.1 Electrical Distribution System

5.2.1.1 Existing lighting column supply.

The existing towpath near the Cambrian Street bridge is currently illuminated via 6m post luminaire with integral photocell, raise and lower lighting columns.

Image 8 – Cambrian Street Lighting Columns (no.34)

The existing lighting column circuit comprises of 12no. lighting columns which are feed from a local feeder pillar (FP1) located at Cambrian Street near lighting column 11.

5.2.1.2 New Lighting Supply

The new lighting for the bridge will be supplied from the existing lighting column (shown above as image 8). The existing lighting column cutout will be replaced with a new loop in and loop out 6A cutout.

New cabling will be routed from the existing lighting column access window within uPVC duct to a new feeder pillar.

5.2.1.2 Proposed New Feeder Pillar

A new feeder pillar shall be installed adjacent to the existing bridge structure within the soft dig area. The feeder will be 1060 x 464 x 237mm (HxWxD) single-sided lift off door feeder pillar with. The cubicle shall be manufactured by Ritherdon Model R460. The new feeder pillar shall be complete with the following:

- Powder coated colour Black to match the new lighting.
- 12mm ply backboard.
- Identification labels.
- Multiple lock options – Including Tri-Key Cam-Lock, Pin-Hex Cam-Lock and 1333 Key Operated Cam-Lock. Key type to be agreed with the client prior to works commencing.
- Integral Root.
- Integral Root.
- Earthing of Door.
- 2mm Stainless Steel.

Image 9– Example image of feeder Pillar

The new lighting will be supplied from via a new 6A loop in loop out cutout located within the new feeder pillar.

5.2.1.3 Additional lighting Demand

The additional demand for the new lighting is shown in the table below:

Item	Maximum Demand (Watts)
	L1
All Cambrian Street bridge lighting – Full Load	70.2w
Total	70.2w

5.2.1.4 Proposed New Lighting

New lighting shall be installed to cover the existing towpath beneath the Cambrian Street bridge.

Image 10– Example image proposed luminaire

The new lighting (type A) shall be 1250mm surface linear style LED luminaires. The luminaires shall be 23.4w, 2400 lumen, IK10, IP65 rated and 3000K. These luminaires will be installed on the existing stonework and brick work underneath this bridge. The new luminaires shall be black in colour (RAL 9005).

The new luminaire shall be manufactured by Vandalite lighting and model Strenna STR - SLIM 2.6 LED-3K /SM /EXT/B/FL-F/SS/IP65/PC (SIDE ENTRY). The new luminaires shall be installed with integral photocells. Luminaires to be factory set to **1300lumens** output.
The footpath lighting levels shall be in accordance with the following standards:

BS EN 13201-2:2015 – Road Lighting Part 2 Performance Requirement.

Pedestrian footpath Lighting levels required shall be:

Area	Standard	Requirements
Pedestrian Footpath	BS EN 13201-2:2015 Table 2 – Class C2	Lighting Levels: 10 Lux Minimum 0.4Uniformity

Lighting calculations have been conducted on industry standard software with the following proposed levels to be achieved:

Location	Lux Level Achieved	Lux Level Required	Uniformity Achieved	Uniformity Required	Compliant Y / N
Pedestrian Footpath	15.6 Lux Minimum	BS EN 13201-2:2015 Table 2 – Class C2 – 10lux Minimum	0.4	0.4	**Yes**

There is no emergency lighting proposed for this scheme.

5.2.1.5 Lighting Controls

The following control methodology is proposed:

- Footpath– Luminaire Integral photocells.

5.2.1.6 Junction Boxes

It is proposed to install a new IP66 / IP67 polycarbonate junction box onto the underpass bridge wall where shown on the electrical drawings. The junction box shall be manufactured by Wiska model Combi 607, junction box shall be colour black.

5.2.2 Containment and Cabling

New containment shall be provided to enable new supply cabling to be installed. Where cables are to be buried below ground, these shall be run within suitably sized uPVC ducting. Where cables are to be run above ground, these shall be run within galvanised steel conduits (conduits, saddles etc to be powder coated to match the colour of the luminaires).

It is proposed to extend the existing lighting column circuits and install a new loop in loop out cutout with the new feeder. Note: due to insufficient information available, cable calculations have not been completed as we were advised by email dated 24.07.2024 to progress the design based on extending the 4.0mm^2 SWA cable. Contractor to verify and carry out relevant calculations before installation.

uPVC ducting shall be buried a minimum of 450mm below finished floor level.
New ducting shall be installed to the following:

- New Feeder Pillar
- Existing Lighting column
- Existing Bridge Wall

New containment will be installed on the walls beneath the bridge to provide a route for the lighting supply cables. The new containment shall rise up from uPVC ducting to a galvanised cable conduit via a new junction box.

All conduit glands shall be IP rated as per the new luminaires.

Where multicore cables are used for the lighting, these shall be multicore XLPE/SWA/LSZH type with integral CPC.

Where single core cables are used, these shall be LSZH type run within suitably sized galvanised steel conduits.

Supply cables shall be fully labelled at both source and destination of the cable. Intermediate labels shall also be installed at accessible chamber locations for ease of reference and maintenance.

5.3. Beswick Street

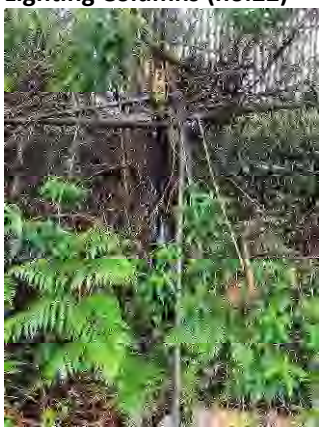
Image 11 – Beswick Street bridge

5.3.1 Electrical Distribution System

5.3.1.1 Existing lighting column supply.

The existing towpath near the Beswick Street bridge is currently illuminated via 6m post luminaire with integral photocell, raise and lower lighting columns.

Image 12 – Beswick Street Lighting Columns (no.22)



The existing lighting column circuit comprises of 12no. lighting columns which are feed from a local feeder pillar (FP1) located at Cambrian Street near lighting column 11 (same circuit as Cambrian Street).

5.3.1.2 New Lighting Supply

The new lighting for the bridge will be supplied from the existing lighting column (shown above as image 12). The existing lighting column cutout will be replaced with a new loop in and loop out 6A cutout.

New cabling will be routed from the existing lighting column access window within uPVC duct to a new feeder pillar.

5.3.1.2 Proposed New Feeder Pillar

A new feeder pillar shall be installed adjacent to the existing bridge structure within the soft dig area. The feeder will be 1060 x 464 x 237mm (HxWxD) single-sided lift off door feeder pillar with. The cubicle shall be manufactured by Ritherdon Model R460. The new feeder pillar shall be complete with the following:

- Powder coated colour Black to match the new lighting.
- 12mm ply backboard.
- Identification labels.
- Multiple lock options – Including Tri-Key Cam-Lock, Pin-Hex Cam-Lock and 1333 Key Operated Cam-Lock. Key type to be agreed with the client prior to works commencing.
- Integral Root.
- Integral Root.
- Earthing of Door.
- 2mm Stainless Steel.

Image 13– Example image of feeder Pillar

The new lighting will be supplied from via a new 6A loop in loop out cutout located within the new feeder pillar.

5.3.1.3 Additional lighting Demand

The additional demand for the new lighting is shown in the table below:

Item	Maximum Demand (Watts)
	L1
All Bewick Street bridge lighting – Full Load	163.8w
Total	163.8w

5.3.1.4 Proposed New Lighting

New lighting shall be installed to cover the existing towpath beneath the Beswick street bridge.

Image 14– Example image proposed luminaire

The new lighting (type A) shall be 1250mm surface linear style LED luminaires. The luminaires shall be 23.4w, 2400 lumen, IK10, IP65 rated and 3000K. These luminaires will be installed on the existing stonework and brick work underneath this bridge. The new luminaires shall be black in colour (RAL 9005).

The new luminaire shall be manufactured by Vandalite lighting and model Strenna STR - SLIM 2.6 LED-3K /SM /EXT/B/FL-F/SS/IP65/PC (SIDE ENTRY). The new luminaires to be installed with integral photocells. Luminaires to be factory set to **500lumens** output.

Due to the limited head height of this bridge the lighting will be installed and low level.
The footpath lighting levels should be in accordance with the following standards:

BS EN 13201-2:2015 – Road Lighting Part 2 Performance Requirement.

Pedestrian footpath Lighting levels required shall be:

Area	Standard	Requirements
Pedestrian Footpath	BS EN 13201-2:2015 Table 2 – Class C2	Lighting Levels: 10 Lux Minimum 0.4Uniformity

Lighting calculations have been conducted on industry standard software with the following proposed levels to be achieved:

Location	Lux Level Achieved	Lux Level Required	Uniformity Achieved	Uniformity Required	Compliant Y / N
Pedestrian Footpath	15 Lux Minimum	BS EN 13201-2:2015 Table 2 – Class C2 – 10lux Minimum	0.3	0.4	**No**

The height of the fittings is proposed for practicality given the very limited head clearance. Please note that this practical arrangement cannot achieve a 0.4 uniformity standard.

There is no emergency lighting proposed for this scheme.

5.3.1.5 Lighting Controls

The following control methodology is proposed:

- Footpath– Luminaire Integral Photocells.

5.3.1.6 Junction Boxes

It is proposed to install a new IP66 / IP67 polycarbonate junction box onto the underpass bridge wall where shown on the electrical drawings. The junction box shall be manufactured by Wiska model Combi 607, junction box shall be colour black.

5.3.2 Containment and Cabling

New containment shall be provided to enable new supply cabling to be installed. Where cables are to be buried below ground, these shall be run within suitably sized uPVC ducting. Where cables are to be run above ground, these shall be run within galvanised steel conduits (conduits, saddles etc to be powder coated to match the colour of the luminaires).

It is proposed to extend the existing lighting column circuits and install a new loop in loop out cutout with the new feeder. Note: due to insufficient information available, cable calculations have not been completed as we were advised by email dated 24.07.2024 to progress the design based on

extending the 4.0mm^2 SWA cable. Contractor to verify and carry out relevant calculations before installation.

uPVC ducting shall be buried a minimum of 450mm below finished floor level.
New ducting shall be installed to the following:

- New Feeder Pillar
- Existing Lighting column
- Existing Bridge Wall

New containment will be installed on the walls beneath the bridge to provide a route for the lighting supply cables. The new containment shall rise up from uPVC ducting to a galvanised cable conduit via a new junction box.

All conduit glands shall be IP rated as per the new luminaires.

Where multicore cables are used for the lighting, these shall be multicore XLPE/SWA/LSZH type with integral CPC.

Where single core cables are used, these shall be LSZH type run within suitably sized galvanised steel conduits.

Supply cables shall be fully labelled at both source and destination of the cable. Intermediate labels shall also be installed at accessible chamber locations for ease of reference and maintenance.

5.4. Carruthers Street

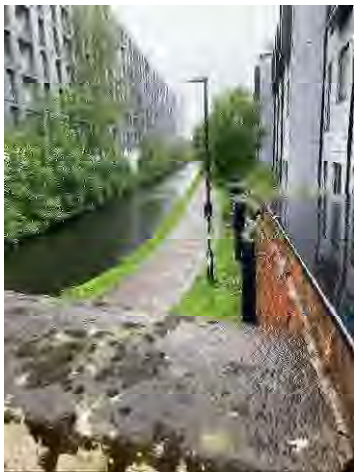
Image 15 – Carruthers Street bridge

5.4.1 Electrical Distribution System

5.4.1.1 Existing lighting column supply.

The existing towpath near the Carruthers Street bridge is currently illuminated via 6m post luminaire with integral photocell, raise and lower lighting columns.

Image 16 – Carruthers Street Lighting Columns (no.21)



The existing lighting column circuit comprises of 13no. lighting columns which are feed from a local feeder pillar (FP1) located at near lighting column 07.

5.4.1.2 New Lighting Supply

The new lighting for the bridge will be supplied from the existing lighting column (shown above as image 16). The existing lighting column cutout will be replaced with a new loop in and loop out 6A cutout.

New cabling will be routed from the existing lighting column access window within uPVC duct to a new feeder pillar.

5.4.1.2 Proposed New Feeder Pillar

A new feeder pillar shall be installed adjacent to the existing the bridge structure within the soft dig area. The feeder will be 1060 x 464 x 237mm (HxWxD) single-sided lift off door feeder pillar with. The cubicle shall be manufactured by Ritherdon Model R460. The new feeder pillar shall be complete with the following:

- Powder coated colour Black to match the new lighting.
- 12mm ply backboard.
- Identification labels.
- Multiple lock options – Including Tri-Key Cam-Lock, Pin-Hex Cam-Lock and 1333 Key Operated Cam-Lock. Key type to be agreed with the client prior to works commencing.
- Integral Root.
- Integral Root.
- Earthing of Door.
- 2mm Stainless Steel.

Image 17– Example image of feeder Pillar

The new lighting will be supplied from via a new 6A loop in loop out cutout located within the new feeder pillar.

5.4.1.3 Additional lighting Demand

The additional demand for the new lighting is shown in the table below:

Item	Maximum Demand (Watts)
	L1
All Carruthers Street bridge lighting – Full Load	93.6w
Total	93.6w

5.4.1.4 Proposed New Lighting

New lighting shall be installed to cover the existing towpath beneath the Carruthers Street bridge.

Image 18– Example image proposed luminaire

The new lighting (type A) shall be 1250mm surface linear style LED luminaires. The luminaires shall be 23.4w, 2400 lumen, IK10, IP65 rated and 3000K. These luminaires will be installed on the existing stonework and brick work underneath this bridge. The new luminaires shall be black in colour (RAL 9005).

The new luminaire shall be manufactured by Vandalite lighting and model Strenna STR - SLIM 2.6 LED-3K /SM/EXT/B/FL-F/SS/IP65/ PC (SIDE ENTRY). The new luminaires shall be installed with integral photocells. Luminaires to be factory set to **500lumens** output.

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The footpath lighting levels shall be in accordance with the following standards:

BS EN 13201-2:2015 – Road Lighting Part 2 Performance Requirement.

Pedestrian footpath Lighting levels required shall be:

Area	Standard	Requirements
Pedestrian Footpath	BS EN 13201-2:2015 Table 2 – Class C2	Lighting Levels: 10 Lux Minimum 0.4Uniformity

Lighting calculations have been conducted on industry standard software with the following proposed levels to be achieved:

Location	Lux Level Achieved	Lux Level Required	Uniformity Achieved	Uniformity Required	Compliant Y / N
Pedestrian Footpath	17.2 Lux Minimum	BS EN 13201-2:2015 Table 2 – Class C2 – 10lux Minimum	0.47	0.4	**Yes**

There is no emergency lighting proposed for this scheme.

5.4.1.5 Lighting Controls

The following control methodology is proposed:

- Footpath– Luminaire Integral photocells.

5.4.1.6 Junction Boxes

It is proposed to install a new IP66 / IP67 polycarbonate junction box onto the underpass bridge wall where shown on the electrical drawings. The junction box shall be manufactured by Wiska model Combi 607, junction box shall be colour black.

5.4.2 Containment and Cabling

New containment shall be provided to enable new supply cabling to be installed. Where cables are to be buried below ground, these shall be run within suitably sized uPVC ducting. Where cables are to be run above ground, these shall be run within galvanised steel conduits (conduits, saddles etc to be powder coated to match the colour of the luminaires).

It is proposed to extend the existing lighting column circuits and install a new loop in loop out cutout with the new feeder. Note: due to insufficient information available, cable calculations have not been completed as we were advised by email dated 24.07.2024 to progress the design based on extending the 4.0mm^2 SWA cable. Contractor to verify and carry out relevant calculations before installation.

uPVC ducting shall be buried a minimum of 450mm below finished floor level.
New ducting shall be installed to the following:

- New Feeder Pillar
- Existing Lighting column
- Existing Bridge Wall

New containment will be installed on the walls beneath the bridge to provide a route for the lighting supply cables. The new containment shall rise up from uPVC ducting to a galvanised cable conduit via a new junction box.

All conduit glands shall be IP rated as per the new luminaires.

Where multicore cables are used for the lighting, these shall be multicore XLPE/SWA/LSZH type with integral CPC.

Where single core cables are used, these shall be LSZH type run within suitably sized galvanised steel conduits.

Supply cables shall be fully labelled at both source and destination of the cable. Intermediate labels shall also be installed at accessible chamber locations for ease of reference and maintenance.

5.5 Methodology for lighting fixing to existing structure

Cables will run below ground wherever possible and rise vertically to each luminaire in line with perpend mortar joints.

Hand tools to be used to drill into existing structure to limit impact and mitigate damage.

Impact on original fabric will be limited by drilling and fixing into mortar joints wherever possible.

Impact for fixings should be minimised and limited to drilling required for the fixing itself.

If mortar is damaged during drilling, make good with equivalent materials to match existing (lime mortar etc)

If brickwork is damaged during drilling, repairs shall use equivalent materials to match existing and be undertaken by specialist contractor. If any bricks require replacement because of damage sustained during fixing, source suitable historic bricks and secure approval by the conservation officer before installation.

5.6. Earthing & Bonding

The new earthing and bonding system shall be in accordance with the following:

- BS 7671:2018+A2 2022 - Requirements for Electrical Installations. IET Wiring Regulations.

6.0. MATERIALS AND WORKMANSHIP

6.1. Sub-Main, Final Circuit Cables & Ancillary Containment

All cables for lighting and equipment run through ducts or on cable tray will be multicore XLPE/SWA/LSZH and HO7RNtype cables.

All cables will be fitted with an engraved label providing the following information at each end, and cable chambers (lettering to be minimum 3mm black on white):

1. CSA – Size of cable.
2. No. of cores.
3. Cable type.
4. Length.
5. Protection device size type.
6. Function
7. Destination.
8. Source.
9. Earth fault loop impedance measured

6.1.1. XLPE/SWA/LSZH Cables

The XLPE/SWA/LSZH cables will be to the appropriate BSS 600/1000-volt grade with copper conductors and shall be terminated with approved brass glands complying with BS 6724 and LSZH shrouds and earth tag installed to the maker's instructions. Great care must be taken in securing the wire armouring in order that the earth continuity is maintained.

In order to conform to the requirements of the IET Regulations, with regard to protective conductor impedance, the Contractor must ensure that the impedance of the wire armour is not greater than twice the live conductor impedance or that the cross-sectional area of the armour is not less than that required by the IET Regulations.

6.1.2. LSZH Singles Cables

All single cables will be LSZH 600/1000-volt grade single core and shall comply with BS 67211. Cable colours shall conform to BS 7671: 2018+A2:2022, Requirements for Electrical Installations Wiring Regulations Eighteenth Edition latest amendment.

All cables will be drawn in after the erection of the conduit and trunking systems complete with all outlet boxes etc. Cable runs between terminal points will be installed without intermediate joints.

6.1.3. Conduits

The conduit and fitting used throughout the whole of the installation will be in accordance with BS.4568 Parts 1:1970, AMD 1132:1973, AMD 5384:1987, BS EN 50086-1:1994, AMD 12052:2000, AMD 13548:2002 and BS EN 50086-2-1:1996, AMD 10513:2000, AMD 13547:2002 and will not be

less than 20mm in size. A screwed conduit system will be mechanically and electrically continuous across all joints, so that the electrical resistance of the earthing lead, measured from the earth electrode or any other position, satisfies BS 7671, Requirements for Electrical Installations Wiring Regulations Eighteenth Edition.

Class 4 protection conduit will be used throughout the installation.

No manufactured elbows, tees or purpose made bends will be installed. All conduits will be bent using purpose made bending formers.

Where conduits terminate in boxes which have no spout entry the connection of the conduit to the box will be made by means of a hexagon smooth bore long reach brass male bush screwed from the inside of the box into a machine faced coupling on the end of the conduit, the whole to be screwed up tightly in such a manner that there are no exposed threads. The smooth brass bushes shall be tightened with spanners and if any bushes become marked or mutilated, they shall be replaced. No type of ring bush shall be used in the installation.

Conduit will be mechanically and electrically continuous, tightly screwed between various lengths so that they butt together at the centre of the coupling joints, and against the shoulder provided in conduit boxes. There will be no exposed threads after erection of conduit, except at running joints. The whole of the conduit system will be swabbed clean before any cables are drawn in. The interior of conduit ends will be renamed, to ensure that the edge of the cut is smooth and free from defects. Where conduit ends must be left open, stop ends shall be fixed to prevent the entry of rubbish.

Earthing terminals shall be fixed inside each accessory box. The earthing terminal of each grid shall be connected by a separate protective conductor to the earthing terminal of the box.

Conduit fixed on the surface of walls and ceilings etc. are to be secured by means of distance saddles, and the following fixing centres are not to be exceeded.

Conduit size	Horizontal	Vertical
20 and 25mm	1500mm	1750mm
35mm	2000mm	2200mm

Additional saddles shall be provided at no more than 300mm from joints, bends, accessory boxes and at the point of emergence from floor or ceilings.

Drainage holes or 'Tee' boxes with short length spouts shall be installed at the discretion of Contract Administrator, at the lowest part of the installation to allow ventilation of wiring and drainage of moisture due to condensation.

In positions where the appearance of the conduit run is likely to be enhanced by the introduction of dummy lengths of conduits, and in all positions where a more secure fixing for the suspension of equipment, luminaires, etc. would be obtained, then the conduit will be extended beyond the normal terminations, by such dummy conduits and extensions.

Conduits throughout the installation shall be of sufficient diameter and so arranged with draw-in boxes to permit the easy draw-in or withdrawal of one or all cables. The number of cables contained in a conduit shall in no way exceed that as indicated in BS 7671.

All cut metalwork shall be treated with two coats of zinc rich paint neatly applied and colour matched if attached to footbridge.

6.2. EMC – Segregation of Services

Legal Requirements

All electrical and electronic equipment will comply with the EMC Directive 2004/108/EC (implemented by the UK Electromagnetic Compatibility Regulations 2006, SI 2006/3418).

The essential requirements state that equipment shall be designed and manufactured, having regard to the state of the art, so as to ensure that:

a. The electromagnetic disturbance it generates does not exceed a level above which radio and telecommunications equipment or other equipment cannot operate as intended; and
b. It has a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of its intended use.

Equipment will be approved for use and CE marked for the environment.

6.3. Lighting

Luminaires shall be of the type, size and wattage as specified on the design drawings.

New lighting shall be provided to serve the areas indicated on the design drawings.

Lighting General

Suitable fixings shall be included for, as part of the installation. All lighting to be housed within correctly rated housing for the environment that it is installed.

All LED lighting to have matching output rendering colour.

All new lighting to comply with British standards.

Lighting Controls

All lighting control photocell's to be set to the same sensitivity. To match arrangements of adjacent luminaires.

Voltage warning signs to be provided identifying separate supply sources where two supply sources are used.

6.4. Earthing & Bonding

All necessary earthing and bonding will be installed to satisfy the latest I.E.T. Regulations BS7671:2018+A2:2022 and this, plus the British Standard Code of Practice on Earthing.

All conductors shall be of the minimum size indicated on the drawings.

All earthing and bonding connections will be accessible for future inspection.

All cables shall comply with BS 5467.

6.5. Testing, Inspection and Commissioning

The electrical installation shall be inspected and tested in accordance with BS7671 (IET wiring regulations) to ensure compliance with the statutory regulations and design intent.

After inspection, testing and certification, the works will be commissioned in accordance with the commissioning plan and hand back documentation.

6.6. As Built and Operation and Maintenance Manuals

As-Builts

General

During the course of the work, on a spare set of drawings provided by the Engineer, the Contractor must keep an exact record of the location and routes of all containment and cables and all inspection and draw in boxes. A record must also be kept of any alteration to the positions or number of outlets and items of equipment. These must be kept to date and may be inspected by the engineer at any time during the contract period.

Immediately upon completion of the work, the Contractor must submit to the Engineers for approval, a draft copy of drawings showing the whole of the work as installed, incorporating these details.

In the same manner, the Contractor must record and prepare details of the distribution layout.

They also must provide a brochure or manual in duplicate, containing test results, schedules of all equipment, giving precise details of manufacture, reference, or catalogue numbers, together with manufacturers' leaflets and other descriptive literature the whole to comprise all relevant data for maintenance purposes.

The record drawings and manuals are to be handed over to the Engineer before handover at Practical Completion.

Record Documents

Provide record documents, being part of the works - prior, and as a pre-requisite to Practical Completion.

Correlate record documents so that the terminology and the references used are consistent with those used in the physical identification of the component's parts of the installation.

Demonstrate as required throughout the execution of the Works that adequate and accurate records are being maintained and that the record documents are being progressively compiled as the work on site proceeds.

Submit draft record documents to the Engineer for comment prior to commencement of commissioning.

Scope of Record Documents

The record documents shall comprise:

- As built drawings
- Distribution drawings, schedules, and schematics
- Operating and maintenance manuals
- Health and safety files

Record documents shall:

- Clearly record the arrangements of various sections of the works as actually installed and identify and locate all component parts
- Make it possible to comprehend the extent and purpose of the works and the method of operation thereof
- Set out the extent to which maintenance and servicing is required and how, in detail, it should be executed
- Provide sufficient, readily accessible, and proper information to enable spares and replacements to be ordered

As built and schedules

As built drawings and schedules shall be prepared, from the 'as installed' drawings maintained on site as the works progresses. Endorse all such documents 'as built'. Where agreed with the engineer, certain detailed information may be provided in schedule form.
As built drawings and schedules must include, but are not limited to:

- Location, including level of buried utility service connections, including those provided by the appropriate authority, indicating points, origin and termination, size, and material service and/or other information is position and depth of all underground systems

- Schematic drawings of each system indicating principal items of plant, equipment, zoning, means of isolation etc in sufficient detail to make it possible to comprehend the system operation and the inter-connections between various systems

- Diagrammatic dimensioned plans and sections of each system or service showing sizes and location of all ancillaries, plant, equipment control, test points and means of isolation etc

- All terminals/cables etc shall be identified by size/type and duty/rating as recorded from the approved commissioning results

- Detailed wiring drawings/diagrams/schedules for all systems, including controls, showing original route, cable/conduit size, type, number of conductors, length, termination size and identification and measured conductor and earth continuity resistance of each circuit. Routes shall indicate if cable/conduit is surface mounted, concealed in wall chase, in floor screed, cast insitu, above false ceiling etc

- Details of co-ordination of wiring and connections with cable core identification, notation of fire alarm, security, control and instrumentation and similar systems provided as part of the works

- Details to show inter-connections between the works and equipment or systems provided by others to which wiring, and connections are carried out as part of the works.

- Location and identity of each room or space housing switchgear or distribution equipment

Manufacturer's drawings of equipment indicating:

- General arrangement and assembly of component

- Parts which may require servicing

- Internal wiring diagrams together with sufficient physical arrangement details to locate and identify component parts

- Schedules as required to locate, reference, and provide details or ratings and duty of all items incorporated into the works together with all fixed and variable equipment settings established during commissioning

Operating and Maintenance Manuals

O&M manuals to be provided where required by the client.

Labelling

All cables will be fitted with an engraved label providing the following information at each end, and cable chambers (lettering to be minimum 3mm black on white):

1. CSA – Size of cable.
2. No. of cores.
3. Cable type.
4. Length.

5. Protection device size type.
6. Function
7. Destination.
8. Source.
9. Earth fault loop impedance measured

A suitable permanent notice durably marked in legible type and no smaller than the example in the Wiring Regulations.

> Safety Electrical Connection –
> Do Not Remove

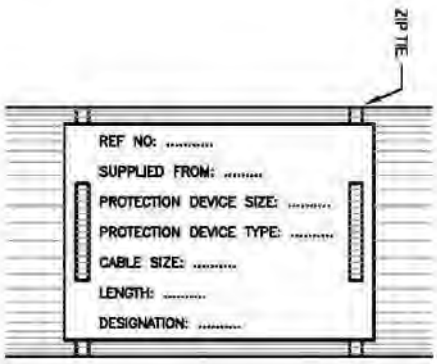
This shall be permanently fixed in a visible position at or near:

- the point of connection of every earthing conductor to an earth electrode

and

- the point of connection of every bonding conductor to an extraneous-conductive-part

Below are examples of proposed identification labels:

Identification	Label Description	Location
	Cable identifications note. The label shall have 3mm lettering, black on white traffolyte type labeller held in position by zip tie.	Ducted cable ends and chamber locations

Identification	Label Description	Location
	Self-adhesive Cover	Located on all electrical equipment such as distribution boards, switch disconnectors and control equipment.
	Self-adhesive label	Located on earthing conductor to earth electrode, point of connection of bonding conductors on separate earth terminal.

APPENDIX 1. DESIGNERS RISK ASSESSMENT

Project Hazard Record

Project Title	Ashton Canal Four Bridges
Location	Ashton Canal Manchester
Doc Ref	5125-VIT-DRA-EPT-000001
Revision Number	B01

DESIGN STAGE: **DETAILED DESIGN ISSUE**

Date: 02.08.2024

HAZARD IDENTIFICATION

RISK EVALUATION AND EVIDENCE

HAZARD ASSESSMENT										PHASE								EVALUATION (BEFORE MEASURES)				SAFETY MEASURES/REQUIREMENTS	EVALUATION (AFTER MEASURES)				EVIDENCE AND CLOSE OUT			
Hazard ID	Route Section / Section	Location	Deliverable (Optional)	Source	Item Last Edited (Name / Date)	Discipline	Hazard Cause	Hazard - The unsafe act or condition.	Hazard Description - Description of the Hazard Event (the RISK).	Design	Construction	Operational	Demolition	Primary Consequence - The top level consequence to the railway system (OPERATIONAL RISK ONLY).		Persons at Risk	CSM Risk Acceptance Principle (OPERATIONAL RISK ONLY)	F	C	Result	Hazard Owner	Risk Mitigation and Safety Measure Justification - Detail the hazard elimination or risk reduction actions. Reference any standards, procedures used to control risks. (Optional) Use ERIC sheets to document options considered or demonstrate that a tolerable risk is ALARP.	Evidence Required - evidence that will demonstrate that the risk mitigation has been carried out.	F	C	Result	Reference to supporting documentation - References to ACTUAL evidence provided that the safety measures have been implemented.	Notes - Provide any additional information that may help with understanding the risk assessment.	Status	Close Out - (Independent Review)
1		General		S728 Design	S.Davies August 2024	MEP	Working at Height.	Installing containment and lighting at high level.	Risk of falls due to working at height.		X			Slips, trips and fall hazard		Workers	Broadly Acceptable	3	3	6	Contractor	Ensure suitable approved equipment is used during the installation. Contractor to complete Suitable approved paperwork to confirm installation methods.	None	1	3	4	Identified on drawings.	None	Mitigation Identified	Open
2		General		S728 Design	S.Davies August 2024	MEP	Excavation works.	underground services strikes.	Risk of injury or death to workers due to cable/services strikes. In addition, risk of loss of service due to strikes.		X		X	Person struck/ impact with object hazards		Workers	Broadly Acceptable	3	3	6	Contractor	Risk identified on drawings. Contractor to carry out CAT Scans and GPR scans prior to works commencing in areas where civils works are to be carried out. Contractor to review existing buried services information provided by the client. Contractor to use suitable excavation method (hand dig, etc) to reduce the risk of damage to services.	None	1	3	4	Risk identified on drawings. Any buried services identified to be captured by photograph prior to the installation. These shall be issued to the client for record.	None	Mitigation Identified	Open
3		General		S728 Design	S.Davies August 2024	MEP	Working on the existing and new electrical installation.	Risk of electrical shock.	Risk of injury or death to workers due to electric shock.	X	X		X	Electrical Hazards		Workers	Broadly Acceptable	3	3	6	Contractor	Risk identified on drawings. Contractor to carry out inspection of distribution equipment prior to works commencing to identify and report any non-compliances. All works to be carried out by suitably qualified electrician.	None	1	3	4	Risk identified on design drawings. Contractor to carry out site survey and review the existing electrical installation prior to works commencing. Non-compliances to be reported back to the designer/client. CV's of electricians to be provided to the client prior to works commencing.	None	Mitigation Identified	Open
4		General		S728 Design	S.Davies August 2024	MEP	Pedestrians	Working in the vicinity of moving pedestrians.	Risk of injury to members of the public during the works.	X	X		X	Person struck/ impact with object hazards		Members of the Public	Broadly Acceptable	3	3	6	Contractor	Barriers and safe working and walking route to be in place prior to works commencing. Safe system of works to be developed prior to works commencing. Working out of hours in areas populated by the general public with high passenger movement. Contractor to detail within their Suitable approved paperwork. This shall be signed off by the client prior to any works commencing.	None	1	3	4	Risk identified on design drawings and will be developed further as part of the contractor Suitable approved paperwork. These shall detail method of segregation from the general public and any out of hours working periods.	None	Mitigation Identified	Open
5		General		S728 Design	S.Davies August 2024	MEP	Defective Mortar Beds	Mortar beds are deemed insufficient for fixing of equipment.	Risk of equipment falling or not being fixed correctly due to defective mortar beds.	X	X			Person struck/ impact with object hazards		Workers, Members of the Public	Broadly Acceptable	3	3	6	Contractor	All Mortars beds to be assessed prior to works commencing only where the equipment will be installed. If it's deemed the mortar beds are unsuitable then the contractor shall replace the existing mortar with new prior to installation of equipment.	None	1	3	4	Risk identified on design drawings and will be developed further as part of the contractors initial site survey and be programmed in to take into account of mortar bed seating times.	None	Mitigation Identified	Open
6		General		S728 Design	S.Davies August 2024	MEP	Working Near Water	Installation of new equipment / working in the vicinity of water.	Risk of equipment, workers and members of the public falling into the water due to the proposed works.	X	X		X	Persons Drowning		Workers, Members of the Public	Broadly Acceptable	3	4	7	Contractor	Barriers and safe working to be in place prior to works commencing. Safe system of works to be developed prior to works commencing. Working out of hours in areas populated by the general public with high passenger movement. Contractor to detail within their Suitable approved paperwork. This shall be signed off by the client prior to any works commencing.		2	2	4	Risk identified on design drawings and will be developed further as part of the contractors package.	None	Mitigation Identified	Open
7		General		S728 Design	S.Davies August 2024	MEP	Vegetation Clearance	Installation of new assets.	Vegetation will need to be cleared to facilitate the works. There is a risk of injury to contractors installing the assets and also risk to the programme if vegetation clearance is not arranged/carried out prior to works commencing. During clearance, there is a risk of tree's falling / falling debris causing danger to passengers.		X						Broadly Acceptable	3	1	4	Contractor	Contractor to carry out deveg of areas as required to ensure there is suitable clearance to allow for new assets to be installed. Suitably qualified operatives to be used for vegetation clearance/tree removal. Suitable exclusion zones to eliminate risk to general public from falling debris. Working at height regulations to be adhered to. The contractor shall employ an ecologist to assess the area where clearance is required prior to works commencing. A report shall be submitted to the client as to their findings.	None	1	1	2	Risk identified on design drawings and will be developed further as part of the contractor Suitable approved paperwork.	None	Mitigation Identified	Open
8		General		S728 Design	S.Davies August 2024	MEP	Open excavations.	Injury to public.	Risk of injury to members of the public due to excavations being left open and not secured / supervised.		X		X			Workers, Members of the Public	Broadly Acceptable	3	2	5	Contractor	Safe system of work to be employed by the contractor. Suitable approved paperwork to be submitted prior to works commencing. This shall be signed off by the client prior to any works commencing. No excavations to be left unattended during the works. All exactions to be suitably covered/protected and cover plates secured to remove risk.	None	1	2	3	Risk identified on design drawings.	None	Mitigation Identified	Open
9		General		S728 Design	S.Davies August 2024	MEP	Injury to workers.	Excavation works, breaking out, etc.	Risk of injury to workers due to use of power tools to excavate and break out existing foundations (HAV - Hand, Arm, Vibration).		X		X			Workers	Broadly Acceptable	4	2	6	Contractor	Contractor to employ suitable control measures to include; - Look for alternative work methods which eliminate or reduce exposure to vibration. - Mechanise or automate the work. - Make sure that equipment selected or allocated for takes is suitable and can do the work efficiently. - Select the lowest vibration tool that is suitable and can do the work efficiently. - Limit the use of high-vibration tools wherever possible. - Improve the design of workstations to minimise loads on employee's hands, wrists and arms caused by poor posture. - Use devices such as jigs and suspension systems to reduce the need to grip heave tools tightly. - Maintain equipment regularly. - Limit the time that your employees are exposed to vibration. - Wear PPE suitable to the task. Safe system of work to be employed by the contractor. Suitable approved paperwork to be submitted prior to works commencing. This shall be signed off by the client prior to any works commencing.	None	1	2	3	Risk identified on design drawings and will be developed further as part of the contractor Suitable approved paperwork.	None	Mitigation Identified	Open
10		General		S728 Design	S.Davies August 2024	MEP	Insufficient Existing distribution information.	Assumed Cable sizes.	Risk of existing cabling to be insufficient when extending the existing lighting circuit due to insufficient requested distribution information.	X	X	X				Workers	Broadly Acceptable	4	2	6	Contractor	Cable sizes have be sized inline with the existing supply cabling to the existing lighting columns due to not enough distribution information to produce cable calculations. The contractor shall confirm the supply information prior to works commencing and confirm cabling is sufficient via cable calculations. the client has confirmed to proceed on this basis to extend the existing lighting column supply.	None	1	2	3	Risk identified on design drawings and documentation. Client provided confirmation to proceed on this basis by email.	None	Mitigation Identified	Open
11		General		S728 Design	S.Davies August 2024	MEP	Injury to pedestrians	Non-complaint uniformity	Risk of injury to pedestrians due to non-complaint lighting uniformity at Beswick street towpath bridge.	X	X	X				Members of the Public	Broadly Acceptable	4	2	6	Contractor	Due to the height of the proposed fittings and restricted head space at Beswick street towpath bridge, we are not able to achieve the required 0.4 uniformity. The Client has confirmed and accepted the risk of not achieving the required uniformity.	None	1	2	3	Risk identified on design drawings and within the lighting calculations. the risk will be transferred to the client.	None		Open
12		General		S728 Design	S.Davies August 2024	MEP	Heights of Luminaires	Luminaires mounted at head height.	Risk of injury to pedestrians due to lighting being installed at head height.	X	X	X				Members of the Public	Broadly Acceptable	4	2	6	Contractor	Risk of predestains injuries due to the height of the proposed fittings and restricted head space within the bridges. Client has approved height of light fittings.	None	1	2	3	Risk identified on design drawings. The risk will be transferred to the client.	None		Open

APPENDIX 2. LIGHTING CALCULATIONS

Ashton Canal Bridges

Installation : Beswick Street Bridge

Project number	:	5125
Customer	:	Wilde
Processed by	:	Shaun Davies
Date	:	29.07.2024

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

1 Luminaire data

1.1 VANDALITE LIGHTING, STRENNA SURFACE LED, FROS... (!STR 2.6LED-3K)

1.1.1 Data sheet

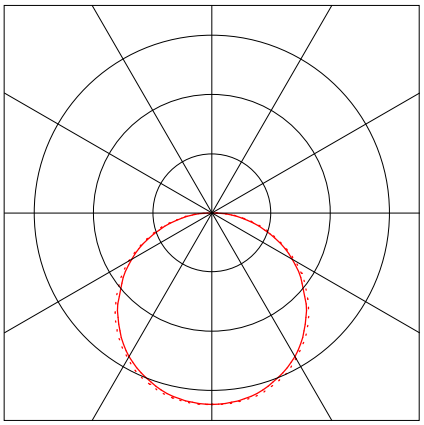
Manufacturer: VANDALITE LIGHTING

!STR 2.6LED-3K STRENNA SURFACE LED, FROST PANEL

Luminaire data		
Luminaire efficiency	:	100%
Luminaire efficacy	:	21.19 lm/W
Classification	:	A40 ↓100.0% ↑0.0%
CIE Flux Codes	:	44 76 94 100 100
UGR 4H 8H	:	18.2 / 18.3
Power	:	23.6 W
Luminous flux	:	500 lm

Equipped with		
Quantity	:	1
Designation	:	21W LED
Colour	:	3000K
Luminous flux	:	500 lm
Colour reproduction	:	1B

Dimensions : 1250 mm x 150 mm x 80 mm



2 Exterior 1

2.1 Summary, Exterior 1

2.1.1 Result overview, Footpath

-2 18 38 58 78 98 118 x [m]

0 0.10.150.2 0.3 0.50.75 1 1.5 2 3 5 7.5 10 15 20 30 50 75 100150200300500750100015002000300050007500

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux	3500 lm
Total power	165.2 W
Total power per area (10949.97 m²)	0.02 W/m²

Illuminance

Average illuminance	Em	50 lx
Minimum illuminance	Emin	15 lx
Maximum illuminance	Emax	128 lx
Uniformity Uo	Emin/Em	1:3.35 (0.3)
Diversity Ud	Emin/Emax	1:8.62 (0.12)

Type No.\Make

1	7 x	**VANDALITE LIGHTING**
		Order No. : !STR 2.6LED-3K
		Luminaire name : STRENNA SURFACE LED, FROST PANEL
		Equipment : 1 x 21W LED 23.6 W / 500 lm

Ashton Canal Bridges

Installation : Cambrian Street Bridge

Project number	:	5125
Customer	:	Wilde
Processed by	:	Shaun Davies
Date	:	29.07.2024

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

1 Luminaire data

1.1 VANDALITE LIGHTING, STRENNA SURFACE LED, FROS... (!STR 2.6LED-3K)

1.1.1 Data sheet

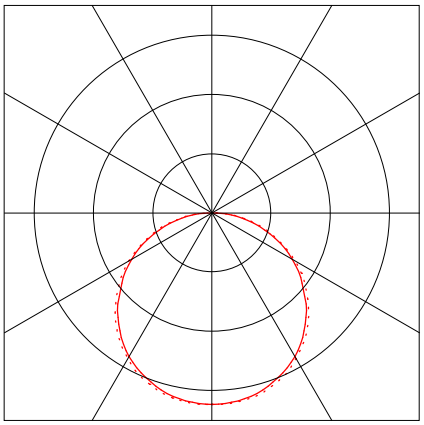
Manufacturer: VANDALITE LIGHTING

!STR 2.6LED-3K STRENNA SURFACE LED, FROST PANEL

Luminaire data		
Luminaire efficiency	:	100%
Luminaire efficacy	:	55.08 lm/W
Classification	:	A40 ↓100.0% ↑0.0%
CIE Flux Codes	:	44 76 94 100 100
UGR 4H 8H	:	21.5 / 21.7
Power	:	23.6 W
Luminous flux	:	1300 lm

Equipped with		
Quantity	:	1
Designation	:	21W LED
Colour	:	3000K
Luminous flux	:	1300 lm
Colour reproduction	:	1B

Dimensions : 1250 mm x 150 mm x 80 mm

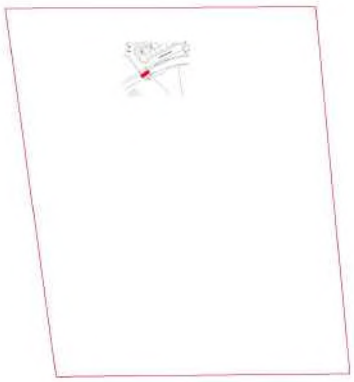


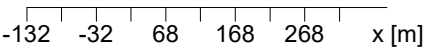
Object : Ashton Canal Bridges
Installation : Cambrian Street Bridge
Project number : 5125
Date : 29.07.2024

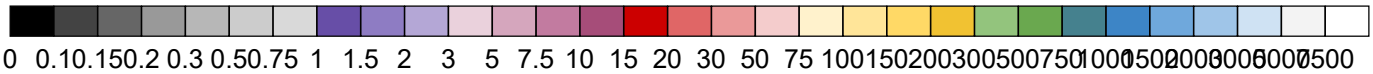
2 Exterior 1(Copy of)

2.2 Summary, Exterior 1(Copy of)

2.2.1 Result overview, Footpath







Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Height (phot.centre) [m]:	1.39 m
Maintenance factor	0.80
Total luminous flux	3900 lm
Total power	70.8 W
Total power per area (229653.00 m²)	0.00 W/m²

Illuminance

Average illuminance	Em	38.9 lx
Minimum illuminance	Emin	15.6 lx
Maximum illuminance	Emax	68.6 lx
Uniformity Uo	Emin/Em	1:2.5 (0.4)
Diversity Ud	Emin/Emax	1:4.41 (0.23)

Type No.\Make

		VANDALITE LIGHTING	
1	3 x	Order No.	: !STR 2.6LED-3K
		Luminaire name	: STRENNA SURFACE LED, FROST PANEL
		Equipment	: 1 x 21W LED 23.6 W / 1300 lm

Ashton Canal Bridges

Installation : Carruthers Street Bridge

Project number	:	5125
Customer	:	Wilde
Processed by	:	Shaun Davies
Date	:	29.07.2024

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

1 Luminaire data

1.1 VANDALITE LIGHTING, STRENNA SURFACE LED, FROS... (!STR 2.6LED-3K)

1.1.1 Data sheet

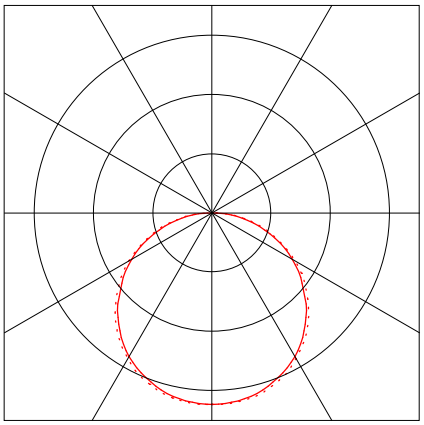
Manufacturer: VANDALITE LIGHTING

!STR 2.6LED-3K **STRENNA SURFACE LED, FROST PANEL**

Luminaire data		
Luminaire efficiency	:	100%
Luminaire efficacy	:	55.08 lm/W
Classification	:	A40 ↓100.0% ↑0.0%
CIE Flux Codes	:	44 76 94 100 100
UGR 4H 8H	:	21.5 / 21.7
Power	:	23.6 W
Luminous flux	:	1300 lm

Equipped with		
Quantity	:	1
Designation	:	21W LED
Colour	:	3000K
Luminous flux	:	1300 lm
Colour reproduction	:	1B

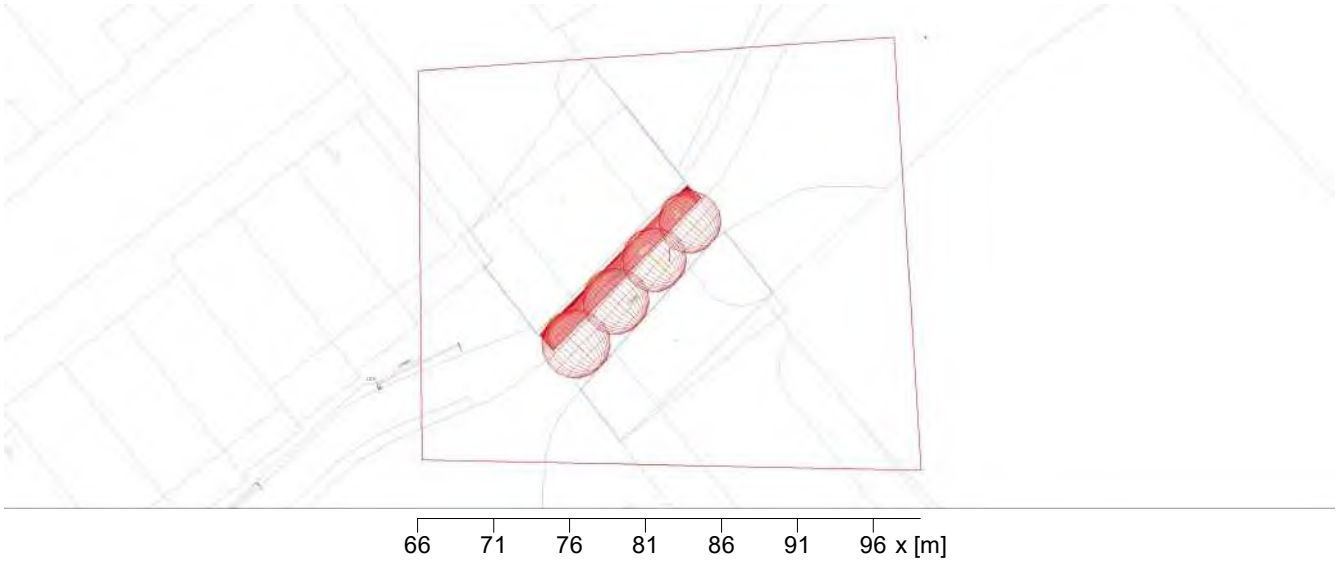
Dimensions : 1250 mm x 150 mm x 80 mm

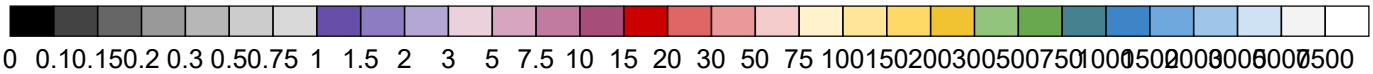


2 Exterior 1(Copy of)

2.1 Summary, Exterior 1(Copy of)

2.1.1 Result overview, Footpath





Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Height (phot.centre) [m]:	1.64 m
Maintenance factor	0.80
Total luminous flux	5200 lm
Total power	94.4 W
Total power per area (867.14 m²)	0.11 W/m²

Illuminance

Average illuminance	Em	36.2 lx
Minimum illuminance	Emin	17.4 lx
Maximum illuminance	Emax	52.4 lx
Uniformity Uo	Emin/Em	1:2.08 (0.48)
Diversity Ud	Emin/Emax	1:3.02 (0.33)

Type No.\Make

	VANDALITE LIGHTING	
1	4 x	Order No. : !STR 2.6LED-3K
		Luminaire name : STRENNA SURFACE LED, FROST PANEL
		Equipment : 1 x 21W LED 23.6 W / 1300 lm

Ashton Canal

Installation : New Viaduct Street Lighting

Project number	:	
Customer	:	Wilde
Processed by	:	Shaun Davies
Date	:	29.07.2024

The following values are based on precise calculations performed on calibrated lamps and luminaires, and their configurations, whereby gradual, unavoidable deviations can occur in practice. All guarantee claims are excluded for the specified data.

This exclusion of liability applies irrespective of the legal grounds for both damages and consequential damages suffered by users and third parties.

1 Luminaire data

1.1 VANDALITE LIGHTING, STRENNA SURFACE LED, FROS... (!STR 2.6LED-3K)

1.1.1 Data sheet

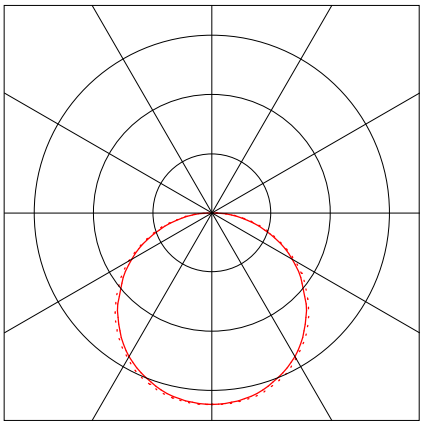
Manufacturer: VANDALITE LIGHTING

!STR 2.6LED-3K STRENNA SURFACE LED, FROST PANEL

Luminaire data		
Luminaire efficiency	:	100%
Luminaire efficacy	:	84.75 lm/W
Classification	:	A40 ↓100.0% ↑0.0%
CIE Flux Codes	:	44 76 94 100 100
UGR 4H 8H	:	23.0 / 23.2
Power	:	23.6 W
Luminous flux	:	2000 lm

Equipped with		
Quantity	:	1
Designation	:	21W LED
Colour	:	3000K
Luminous flux	:	2000 lm
Colour reproduction	:	1B

Dimensions : 1250 mm x 150 mm x 80 mm



2 Exterior 1

2.2 Summary, Exterior 1

2.2.1 Result overview, Footpath

448 468 488 508 528 548 x [m]

0 0.1 0.15 0.2 0.3 0.5 0.75 1 1.5 2 3 5 7.5 10 15 20 30 50 75 100 150 200 300 500 750 1000 1500 2000 3000 5000 7500

Illuminance [lx]

General

Calculation algorithm used	Average indirect fraction
Height of evaluation surface	0.00 m
Maintenance factor	0.80
Total luminous flux	22000 lm
Total power	259.6 W
Total power per area (9677.88 m²)	0.03 W/m²

Illuminance

Average illuminance	Em	42.1 lx
Minimum illuminance	Emin	17.3 lx
Maximum illuminance	Emax	64.1 lx
Uniformity Uo	Emin/Em	1:2.44 (0.41)
Diversity Ud	Emin/Emax	1:3.71 (0.27)

Type No.\Make

		VANDALITE LIGHTING	
1	11 x	Order No.	: !STR 2.6LED-3K
		Luminaire name	: STRENNA SURFACE LED, FROST PANEL
		Equipment	: 1 x 21W LED 23.6 W / 2000 lm

APPENDIX 3. MANUFACTURERS LITERATURE

CLEVELAND CABLE COMPANY
A WORLD POWER IN CABLE SUPPLY

T: 01642 241133
W: www.clevelandcable.com
E: sales@clevelandcable.com

BS 5467 PVC MAINS & CONTROL (1.5MM²-16MM²)

APPLICATION

Multi-core PVC cable with steel wire armour (SWA). Power and auxiliary control cables for use in power networks, underground, outdoor and indoor applications and for use in cable ducting.

CABLE STANDARDS

Flame propagation to BS EN/IEC 60332-1
BS 5467
BASEC Approved

CONSTRUCTION

Conductor: Class 2 stranded copper conductor acc BS EN 60228 (previously BS 6360)

Insulation: Cross Link Polyethylene (XLPE)

Bedding: Polyvinyl Chloride (PVC)

Armour: Steel Wire Armour (SWA)

Sheath: Polyvinyl Chloride PVC

CHARACTERISTICS

Voltage Rating: 600/1000 Volts

Temperature Limits: Fixed: -15°C to +90°C

Minimum Bending Radius:
As per cable manufacturer datasheet

CORE IDENTIFICATION

2 Core: Brown Blue
3 Core: Brown Black Grey
4 Core: Brown Black Grey Blue
5 Core: Brown Black Grey Blue G/Y

* Additionally these cables are stocked with:
3 Core: Brown Blue G/Y

5 core and above up to 6mm²: 8 White
2,3,4 or 5 core 1.5–2.5mm²: 8 White to ESI 09-6

Should not be installed at temperatures below 0°C or above +60°C

CLEVELAND CABLE COMPANY

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E: sales@clevelandcable.com

BS 5467 MAINS & CONTROL CABLE (1.5 MM²-16MM²) - DIMENSIONS

CCC CODE	CONDUCTOR SIZE (MM²)	STRANDING (MM)	NO OF CORES	WEIGHT (KG/KM)	OVERALL DIAMETER (MM)	GLAND SIZE (MM)	NYLON CLEAT SIZE
XLPE2X1/5**	1.5	7/0.53	2	234	11.06	20/16	0.5
XLPE3X1/5 **	1.5	7/0.53	3	271	11.54	20/16	0.5
XLPE4X1/5	1.5	7/0.53	4	306	12.26	20/16	0.5
XLPE5X1/5	1.5	7/0.53	5	356	13.23	20s	0.6
XLPE7X1/5	1.5	7/0.53	7	391	14.1	20s	0.6
XLPE8X1/5	1.5	7/0.53	8	501	16.7	20	0.7
XLPE10X1/5	1.5	7/0.53	10	650	18	20	0.8
XLPE12X1/5	1.5	7/0.53	12	657	18.3	20	0.8
XLPE19X1/5	1.5	7/0.53	19	863	20.78	25	0.9
XLPE27X1/5	1.5	7/0.53	27	1310	25.1	25	1.0
XLPE37X1/5	1.5	7/0.53	37	1590	27.5	32	1.1
XLPE48X1/5	1.5	7/0.53	48	1900	30	32	1.2
XLPE2X2/5	2.5	7/0.67	2	312	12.4	20s	0.5
XLPE3X2/5*	2.5	7/0.67	3	343	12.99	20s	0.6
XLPE4X2/5	2.5	7/0.67	4	392	13.86	20s	0.6
XLPE5X2/5	2.5	7/0.67	5	463	14.92	20s	0.6
XLPE7X2/5	2.5	7/0. 67	7	509	15.96	20	0.8
XLPE10X2/5	2.5	7/0.67	10	850	20	25	0.8
XLPE12X2/5	2.5	7/0.67	12	861	21.11	25	0.9
XLPE19X2/5	2.5	7/0.67	19	1324	25.16	25	1.0
XLPE27X2/5	2.5	7/0.67	27	1760	30	32	1.2
XLPE37X2/5	2.5	7/0.67	37	2185	33	40	1.4
XLPE48X2/5	2.5	7/0.67	48	2800	36	40	1.6
XLPE2X4	4.0	7/0.85	2	373	13.38	20s	0.6
XLPE3X4*	4.0	7/0.85	3	421	14.05	20s	0.6
XLPE4X4	4.0	7/0.85	4	496	15.04	20	0.6
XLPE5X4	4.0	7/0.85	5	573	16.35	20	0.7
XLPE7X4	4.0	7/0.85	7	741	18.21	20	0.8
XLPE12X4	4.0	7/0.85	12	1255	24.24	25	1.0
XLPE19X4	4.0	7/0.85	19	1690	27.61	32	1.1
XLPE27X4	4.0	7/0.85	27	2250	32	32	1.4
XLPE2X6	6.0	7/1.04	2	450	14.38	20s	0.6
XLPE3X6*	6.0	7/1.04	3	515	15.14	20	0.7
XLPE4X6	6.0	7/1.04	4	696	17.03	20	0.7
XLPE5X6	6.0	7/1.04	5	808	18. 39	20	0.8
XLPE7X6	6.0	7/1.04	7	1100	21.9	25	0.9
XLPE2X10	10.0	7/1.35	2	590	16.18	20	0.7
XLPE3X10*	10.0	7/1.35	3	781	17.76	20	0.8
XLPE4X10	10.0	7/1.35	4	927	19.09	25	0.8
XLPE5X10	10.0	7/1.35	5	1095	20.91	25	0.9
XLPE7X10	10.0	7/1.35	7	1500	25	25	1.0
XLPE2X16	16.0	7/1.70	2	893	19.06	25	0.8
XLPE3X16*	16.0	7/1.70	3	1059	20.35	25	0.9
XLPE4X16	16.0	7/1.70	4	1269	21.95	25	0.9
XLPE5X16	16.0	7/1.70	5	1679	25.19	25	1.1
XLPE7X16	16.0	7/1.70	7	2150	28.1	32	1.2

CLEVELAND CABLE COMPANY

T: 01642 241133
W: www.clevelandcable.com
E: sales@clevelandcable.com

BS 5467 MAINS & CONTROL CABLE - CURRENT CARRYING (AMPERES)

CONDUCTOR CROSS – SECTIONAL AREA	REFERENCE METHOD C (CLIPPED DIRECT)		REFERENCE METHOD E (IN FREE AIR OR ON A PERFORATED CABLE TRAY, HORIZONTAL OR VERTICAL)		REFERENCE METHOD D (DIRECT IN GROUND OR IN DUCTING IN GROUND, IN OR AROUND BUILDINGS)	
	1 TWO CORE CABLE SINGLE-PHASE AC OR DC	1 THREE OR 1 FOUR CORE CABLE THREE-PHASE AC	1 TWO CORE CABLE SINGLE-PHASE AC OR DC	1 THREE OR 1 FOUR CORE CABLE THREE-PHASE AC	1 TWO CORE CABLE SINGLE-PHASE AC OR DC	1 THREE OR 1 FOUR CORE CABLE THREE-PHASE AC
1	2	3	4	5	6	7
(MM²)	(A)	(A)	(A)	(A)	(A)	(A)
1.5	27	23	29	25	25	21
2.5	36	31	39	33	33	28
4	49	42	52	44	43	36
6	62	53	66	56	53	44
10	85	73	90	78	71	58
16	110	94	115	99	91	75

THE ABOVE IS IN ACCORDANCE WITH 18TH EDITION OF IET WIRING REGULATIONS

BS 5467 MAINS & CONTROL CABLE - VOLTAGE DROP

NOMINAL CROSS SECTIONAL AREA MM²	TWO CORE CABLE DC	TWO CORE CABLE SINGLE-PHASE AC MV/A/M	THREE OR FOUR CORE CABLE THREE-PHASE AC MV/A/M
(MM²)	(MV/A /M)	(MV/A/M)	(MV/A/M)
1.5	31	31	27
2.5	19	19	16
4	12	12	10
6	7.9	7.9	6.8
10	4.7	4.7	6.8
16	2.9	2.9	2.5

THE ABOVE IS IN ACCORDANCE WITH 18TH EDITION OF IET WIRING REGULATIONS

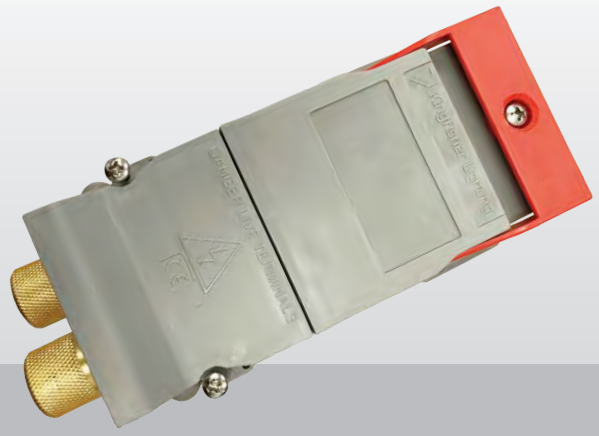
CONDUCTOR OPERATING TEMPERATURE: 90°C

CLEVELAND CABLE COMPANY

THE INFORMATION CONTAINED WITHIN THIS DATASHEET IS FOR GUIDANCE ONLY AND IS SUBJECT TO CHANGE WITHOUT NOTICE OR LIABILITY. WE BELIEVE THE INFORMATION IS CORRECT AT THE TIME OF PUBLICATION. PLEASE NOTE WHEN SELECTING CABLE ACCESSORIES THAT ACTUAL CABLE DIMENSIONS MAY VARY DUE TO MANUFACTURING TOLERANCES.

Kingfisher Lighting

Datasheet



Cut Outs

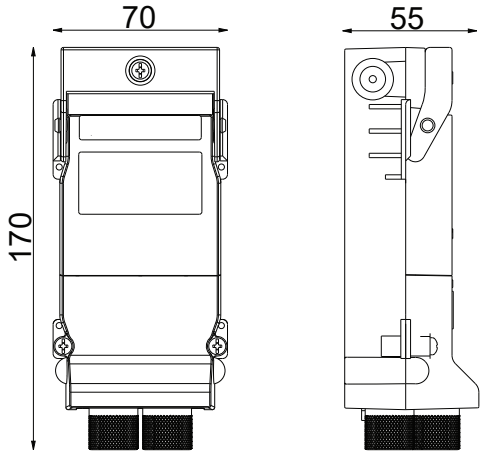
Our BS 7654 fused cut outs allow for the safe termination of incoming and outgoing PVC SWA cables and the fusing of the single phase supply feed to your luminaires.

Key Features

- Manufactured in high specification thermo-plastic material and suitable for column mounting
- Meet low voltage directive
- (LVD/2006/95/EC)
- Comes complete with earth block and gland plate
- Single or three phase incoming supply

Kingfisher Lighting

Dimensions



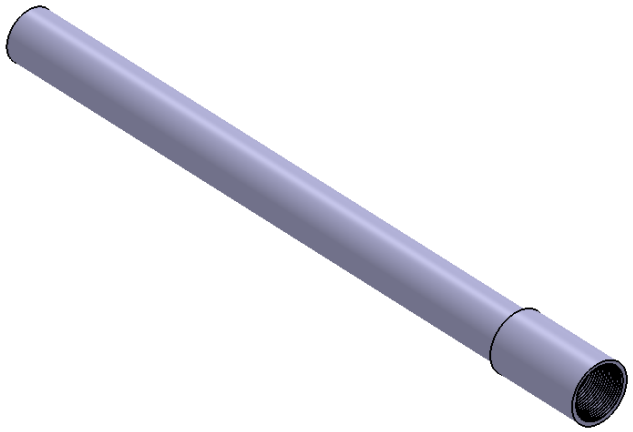
All measurements in mm

Code	Single / 3 Phase	Cable Size	Fuse Rating
FC06	Single	2 x 25mm²	6A
FC010	Single	2 x 25mm²	10A
FC016	Single	2 x 25mm²	16A
FC020	Single	2 x 25mm²	20A
FC063PH	3 Phase	4 x 6mm²	6A
FC0163PH	3 Phase	4 x 6mm²	16A

Newlec

Datasheet

ELECTRICAL CONDUIT TUBE



Part Number : NLCOND20MMGV

Description : 20mm Conduit 3.75 mtr Length

Key features :

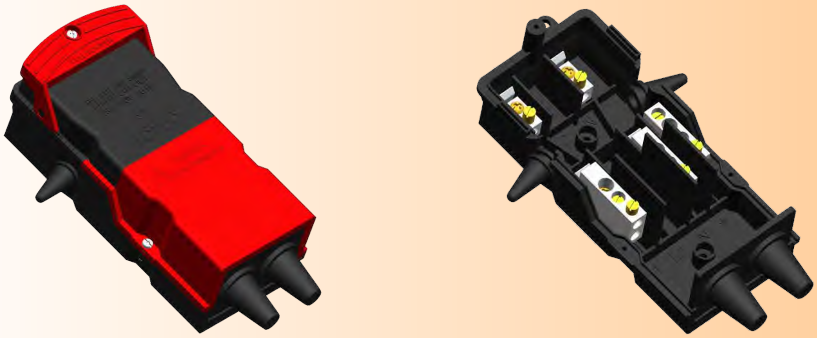
Finish	Hot Dipped Galvanised Class 4
Material	Steel
Inner Pack Qty	Inner bundle qty 8 lengths
Outer Pack Qty	Master bundle qty 400 lengths

Technical Details : Conforms to BS EN61386 - 1
Compliant to LU Standard 1-085 (for use on surface & sub-surface locations)
Threaded on both ends and supplied complete with one coupler

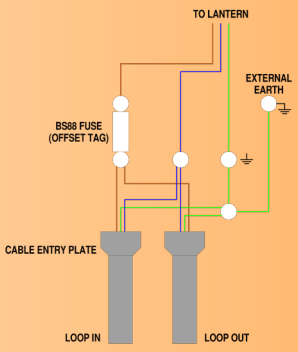
Date completed by manufacturer : 20/07/2017

F144 FUSE UNIT (BS7654)

MOULDED FROM FLAME RETARDANT SELF EXTINGUISHING ABS



F144 / F244 Fuse Unit



F144SP Wiring

F144 Fuse Unit	
F144SP	Single Pole, Single Fuse Protection, provides loop in / out facility
F244L	Single Pole, Twin Fuse Protection, provides loop in / out facility
F344SP	Three Phase, Single Pole, Single Fuse Protection, provides loop in / out facility
F144DP	Double Pole, Single Fuse Protection, provides loop in / out facility
F244DL	Double Pole, Twin Fuse Protection, provides loop in / out facility
F244DS	Double Pole, Twin Fuse One Lantern plus One Spur Protection, provides loop in / out facility, plus spur cable
F344DP	Three Phase, Double Pole, Single Fuse Protection, provides loop in / out facility

Designed to accept BS88 offset tag fuse links upto 32A (fixing centers 38.5 x 9.5mm). Height 160mm x Width 74mm x Depth 62mm, 45mm from terminal block to cable entry plate. Fitted with live, neutral and earth 2 way incoming supply terminal blocks as standard for up to 25mm^2 circular conductors, 3 way blocks also available. **Other configurations are also available, please contact us for details.**

Extension Boxes	
B1	**Two Way Short Extension Box for up to 25mm^2 cable**
	Height 50 x Width 90 x Depth 67mm, 100mm from fused unit terminal block to cable entry plate.
B21	**Two Way Long Extension Box, accepts up to 5 terminal blocks for up to 25mm^2 cable**
	Height 123 x Width 88 x Depth 58mm, 70mm from terminal block to entry plate.
B31	**Three Way Long Extension Box, accepts up to 5 terminal blocks for up to 35mm^2 cable**
	Height 123 x Width 88 x Depth 95mm, 70mm from terminal block to entry plate.

Other extension boxes are also available for up to 50mm^2 circular conductors, please call for details.

Cable Entry Plate Options	
IP4	Two Way Internal Brass Plate for use with F144 or F244 cut-out units, available with 2x20mm holes
IP7	Two Way Internal Brass Plate for use with B1 or B21 extension boxes, available with 2x20mm or 2x25mm holes
IP8	Three Way Internal Brass Plate for use with B31 extension box, available with 3x20mm, 3x25mm or 2x32mm holes

nqa ISO 9001 QUALITY MANAGEMENT

ILP INSTITUTION OF LIGHTING PROFESSIONALS

HEA Highway Electrical Association Award Winner 2018

CE

TOFCO CPP LIMITED

HEA / HEMSA Manufacturer of The Year 2018

TOFCO CPP LIMITED. MEADOWFIELD IND. EST. PONTELAND, NORTHUMBERLAND, NE20 9SD
Office Tel: **01661 860001** Email: **info@tofco.co.uk** Website: **www.tofco.co.uk**
REGISTERED IN ENGLAND 5893596

Pillars with integral root
INSTALLATION INSTRUCTIONS

Pillar Installation

1 Determine the size of hole required based on the overall size of the pillar, size plus a minimum of 200mm (8”) all round. The depth of the hole should be 300mm to the finished ground level – this is indicated on the front of the pillar.

R150	R300	R460
550mm x 550mm x 300mm	700mm x 550mm x 300mm	860mm x 630mm x 300mm

The finished ground level will include flagging, tarmac, block paving etc.

2 Place the pillar in the hole making sure that it is well supported and that the ground level indicator on the pillar is at the finished ground level.

3 Insert the conduit / ducting / armoured cable through the appropriate entry point(s) at the bottom of the pillar

4 If necessary, adjust the position of the pillar to make sure it is perfectly vertical in both planes.

5 Fill the hole, in and around the pillar, with concrete making sure that the pillar remains perfectly vertical in both planes during and after the pouring of the concrete. We recommend a concrete mix of ST4/C20.

6 Allow the concrete to cure.

7 Seal the base of the pillar with a minimum 6mm layer of epoxy resin (or other impermeable material) preferably over a bed of dry sand.

8 If appropriate, finish the ground around the pillar to the level indicated on the front.

Condensation in pillars and cabinets can be a real problem.
Please see our leaflet – “Sealing the bottom of a cabinet”

Sealing the bottom of a cabinet

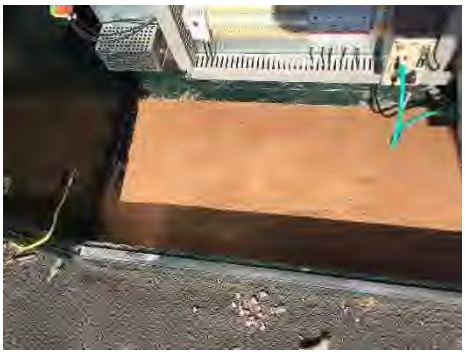
Preparation

Prepare the bottom of the cabinet by removing any debris and rubbish. Make sure that whatever is in the space at the bottom of the cabinet or plinth is not loose. If it is loose, compact it as well as you can.

Pour a layer of gravel so that it is level or just above the level of the bottom of the cabinet. Again, compact the gravel as well as you can.

Next, pour and spread the sand so that it is just a thin layer. The sand is intended to blind the top of the gravel to prevent the grout flowing through the gravel before it sets.

So it is very important to make sure that all areas of the gravel are covered by the sand.



Sealing the bottom of a cabinet

For best results, compact the sand using a tamp or a square trowel.

Brush any loose sand off the edges of the cabinet - any loose lumps of sand can seriously effect the sealing ability of the grout if not removed.

Finally, mix the grout and pour to a thickness of 20 – 25mm. The grout, when mixed correctly, will self-level, so there is no need to spread it. Please check that the grout covers the whole area and that there is nothing preventing it from flowing evenly across the bottom of the cabinet.

Materials Required – (gravel and sand can be obtained from any good builders merchant)

- 10mm gravel
- Building Sand
- Water

Grout – can be obtained from most builders merchants

- Febgrout Universal (See product data sheet **Febgrout Universal**)

(Mixing ratio – 25kg of grout to 2.3 – 3.9 litres of water. Mix with a slow speed drill and paddle.)

Equipment required:

- Shovel / spade
- Tamp or Square trowel
- Small brush (1" paint brush)
- 14 litre Flexible Mixing Tub
- Drill
- Paddle

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FEBGROUT UNIVERSAL

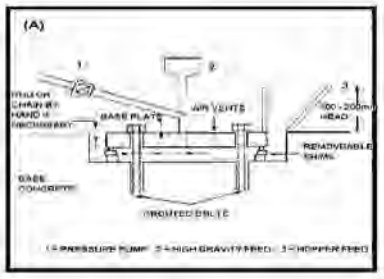
High Precision Flowable Grout

Description of Product
FEBGROUT UNIVERSAL is a ready to use, non-shrink construction grout. It can be used as fluid or plastic consistencies for grouting of equipment and machinery, bearing pads, rails and anchoring.

Typical Uses
FEBGROUT UNIVERSAL is recommended for:
- Grouting bearing pads and plinths.
- Grouting under machinery base plates, stanchion bases and crane rails.
- Anchoring bolts, reinforcing bars and rods.
- Underpinning.

Features and Benefits
- Non shrink for effective contact and support.
- High early strength for rapid installation and use of plant.
- Durable, uniform dense structure.
- Good workability into gap widths of down to 5mm for up to 1 hour at 20°C.

Instructions for Use
Surface Preparation
All surfaces must be clean and sound. Remove all surface laitence by acid etching or grinding, also dust and debris. All surfaces should be thoroughly wetted 6 – 24 hours before starting and be in a moist condition during placing. Any free surface water must be removed before application.
Mixing
For optimum results a high shear paddle or vane grout mixer should be used. Colloidal impeller mixers are not suitable for use with this product. Air entrainment should be avoided. For large or continuous placement ensure that adequate mixing capacity and sufficient labour is available. Add the correct amount of water for the required consistency to the mixer and then add the complete pack(s) slowly while mixing. Mix for a further 3 –4 minutes until smooth and cohesive. Allow to stand for 1 minute before use. Re-mix and use immediately.
Strength Development: The strength of the grout if often the determining factor in deciding when loads can be put on structural members or machinery. The strength of the grout is dependent on the amount of mixing water, temperature of the object grouted, curing and age of hardened grout.
Application
Under plates: Ensure sufficient material is available to complete the work and obtain a continuous fill. Pour from one side only to avoid air entrapment; keeping a head on the grout to promote flow. DO NOT vibrate but rods, straps and chains can be used to aid complete filling. A high gravity feed may also be used.
Grouting large volumes: FEBGROUT UNIVERSAL may be used up to 75mm thick sections. Above this the addition of clean, graded 10mm aggregates at up to one to one by weight is recommended. In this instance normal concrete mixers and pumps may be used.
Pumping: FEBGROUT UNIVERSAL may be placed using piston, ram or diaphragm type grout pumps fitted with ball valves. In all cases, ensure maximum restraint is maintained; otherwise compressive strength will be reduced.
Placing
Diagram (A) illustrates typical placements of FEBGROUT UNIVERSAL in the flowable state utilising straight pouring or pumping techniques to place a bedding mortar under bearing plates. Note that unrestrained areas around baseplates should always be kept to a minimum (<150mm).



Sealing the bottom of a cabinet

Issue 1 – 1/10/2010

Unrestrained areas: Even with good curing, unrestrained areas of grout, for example around baseplates, may exhibit drying shrinkage cracking some time after placement. This is not detrimental to the performance of the grout where it is restrained under the plate or bearing, but may affect the cosmetic appearance of the application.
Curing Good curing is essential on all exposed surfaces particularly in dry, sunny conditions. Failure to do so will reduce bond, strength and durability. Immediately after finishing apply 1 coat of FEBCLEAR SUPER to all exposed surfaces. Alternative methods are water ponding, mist spraying and the like, but in all cases these must be maintained for at least 7 days. Keep the grout above 5°C at all times during application and cure.

Coverage
25Kg of FEBGROUT UNIVERSAL mixed with 4.5 litres of water produces approximately 13.4 litres (0.0134 m³) of grout. (Approximately 75 x 25Kg bags per m³), using more or less water to meet consistency requirements, will increase or decrease the yield accordingly

Storage
Store in cool dry conditions away from direct sunlight and at ambient temperatures.

Shelf Life
9 months from date of manufacture when stored as directed.

Technical Data/Typical Properties

Colour	Grey	
Specification	Complies to specification for "Highway Works" Clause 2601 (DOT)	
Gap Width (minimum and max)	10mm- 100mm	
Joint Depth	5mm minimum, 75mm maximum	
Workability @ 20°C	approx 2 hours	
Setting time (initial) @ 20°C	approx 8 hours	
Final set @ 20°C (trafficable)	approx 12 hours	
Coverage	approx: 22kg/m² @ 25mm depth	
Minimum application temperature	+1°C (when mixed as directed above)	
Yield per 25kg (mixed as directed)	13.25 (fluid) -13.50 ltrs (flowable)	
Density (wet)	2160kg/m³	
Expansion characteristics (ASTM C87)	0.35%-1.1% (unrestrained)	
Static modulus of elasticity (ASTM 469-87A)	23KN/mm²	
Flow Characteristics (efflux time) ASTM C-939-87	25.25 seconds	
Chloride ion content (BS1881 Part 124)	<0.002% w/w	
Cement content (BS4551)	44.3% w/w	
Typical strengths (BS1881; Part 116) @ 20°C		
TIME AFTER PLACEMENT	**COMPRESSIVE STRENGTH (N/mm²)**	**FLEXURAL STRENGTH (N/mm²)**
1 day	29	-
7 days	60	9.25
28 days	70	9.55

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Cable Protection Guard

p217

Protection for cables on telegraph poles and brickwork

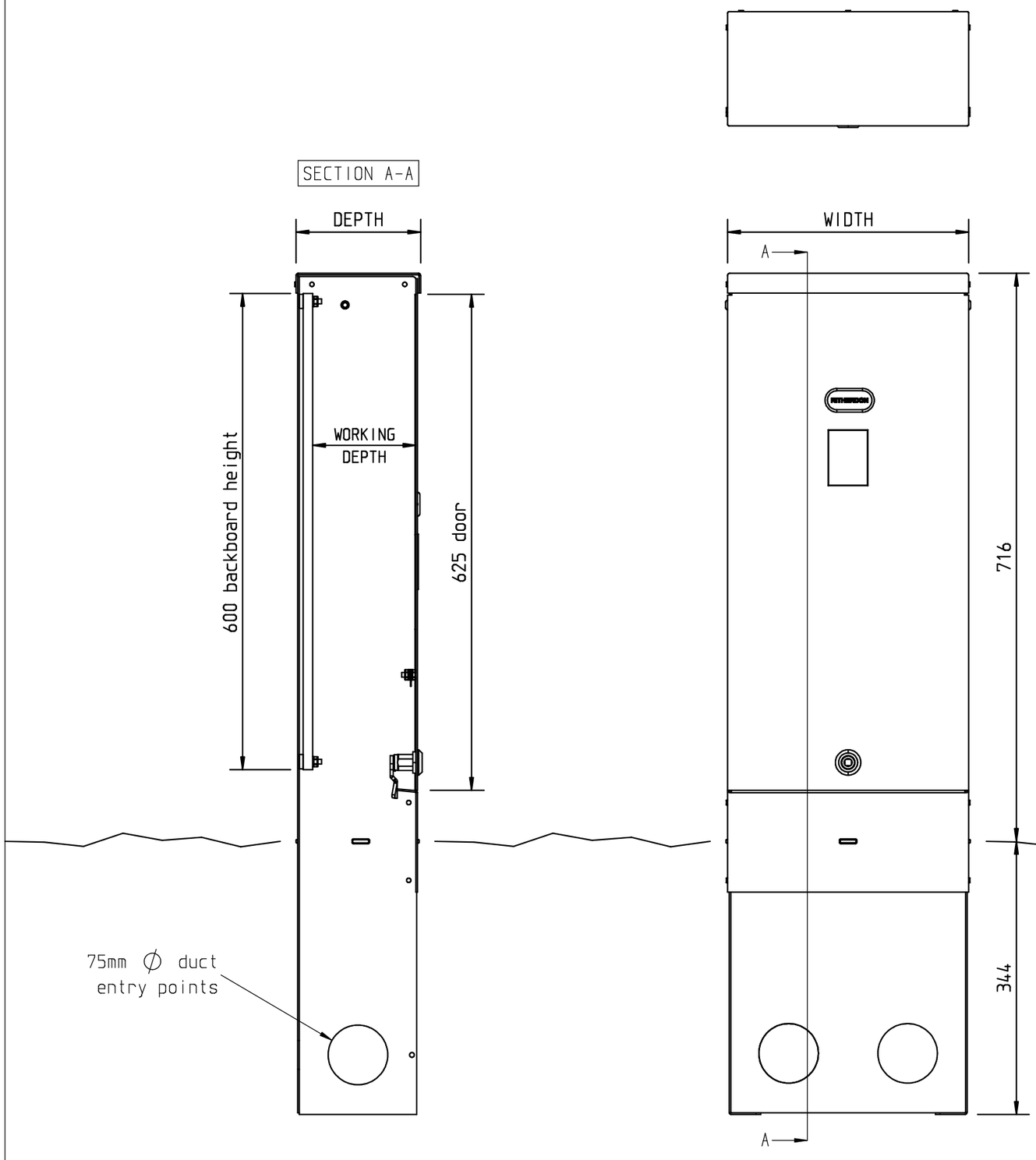
Cable protection guard is the perfect solution to protect cables from impact and damage on telegraph poles and exposed brickwork. Highly shock-resistant but light in weight, it is easy to transport and install thanks to pre-drilled screw holes.

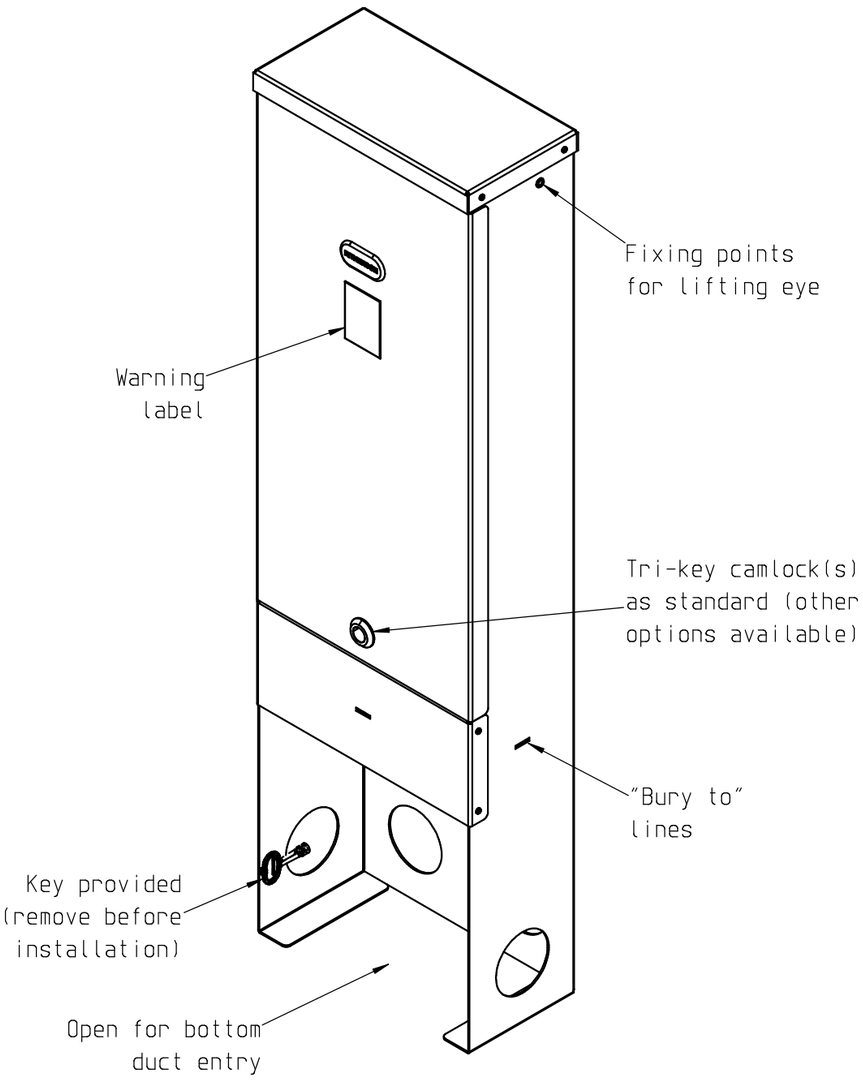
- Manufactured in high quality PVC-U for extra impact protection
- Supplied with pre-drilled screw holes for easy installation
- Lightweight and easily transported
- Available in 5 different diameter sizes

Cable protection guard (black only)

code	dimensions	pack
MTCG19BK	19 x 19mm	10x3m
MTCG25BK	25 x 25mm	10x3m
MTCG40BK	40 x 40mm	10x3m
MTCG55BK	55 x 55mm	10x3m
MTCG80BK	80 x 80mm	5x3m

	Width	Depth	Working depth	Backboard width	Number of locks
R150	154	144	117	130	1
R300	304	157	130	280	1
R460	464	237	210	440	2





D	11/02/20	1209	MAB
C	24/01/20	1209	MAB
B	16/10/18	1127	JE
A	17/05/18	1049	JE
ISSUE	DATE	MOD. NO.	DRN

DRAWN	Josh Eastham	DATE	02 . 02 . 2018
CHECKED	Mark Blease	DATE	02 . 02 . 2018
APPROVED	Mark Blease	DATE	02 . 02 . 2018

RITHERDON

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TOLERANCES
WHOLE NUMBERS +/- 0.5
1 DECIMAL PLACE +/- 0.2
HOLES +/- 0.15
UNLESS OTHERWISE STATED

ALL OUTSIDE SIZES

MATERIAL: Stainless Steel

FINISH: Powder Coated

TITLE: R Pillar range
General Arrangment

SCALE	DRAWING NO.	[SHEET]	ISSUE
NTS	S 9913	7	D

R Pillar Range
TECHNICAL DATA SHEET

The Ritherdon R Pillar is a feeder pillar cabinet typically used to house electrical supplies to external equipment in transport infrastructure such as traffic lights and electric car charging points. The R Pillar range features lift-off doors flush with the body of the cabinet. The R Pillar range is capable of resisting moderate forced entry and is supplied with a 12 mm plywood backboard for fitting electrical equipment. The height above ground for each model is 716 mm.

The R Pillar range is made from 2 mm Stainless Steel in 4003, 304 or 316 grade and is available following standard sizes:

Table 1 - Dimensions and weight of Product Range

Model	External Dimensions			Working Depth mm	Backboard		Weight kg
	Height mm	Width mm	Depth mm		Height mm	Width mm	
R150	930	154	144	117	600	130	13
R300	1060	304	157	130	600	280	18
R460	1060	464	237	210	600	440	27

Figure 1 – R150 Feeder Pillar with its door removed

Standard colours include Black, Dark Grey, Light Grey and Dark Green, and a natural finish is available for 304 and 316 Stainless Steel models at no extra cost. R Pillars can be made to any colour.

Features and Accessories

- **IP24 Rating** –Protected against +12.5 mm solid objects and water splashing according to BS EN 60529:1992 + A2:2013
- **IK10 Rating** – Can withstand impact energy 20J according to IEC 62262.
- Multiple lock options – Including Tri-Key Cam-Lock, Pin-Hex Cam-Lock and 1333 Key Operated Cam-Lock for added security
- Plywood Backboard – 12 mm backboard supplied with each unit for mounting electrical equipment
- Integral Root – Simple design allows for easy installation without need for a separate plinth
- Earthing of Door – A length of wire provides earth bonding of the door to the body to increase safety
- Prewiring Service – We are able to supply and assemble any internal electrical equipment that may be required

Figure 2 – An R460 Pillar in use for car charging in a GRIDSERVE solar farm

R Pillar Range
TECHNICAL DATA SHEET

Testing

The Ritherdon R Pillar Range has been tested according to the criteria specified in BS EN 62208: 2011 “Empty Enclosures for Low-Voltage Switchgear and Controlgear Assemblies – General Requirements”.

Figure 3 – An R150 after IPX4 test performed at Ritherdon

Ingress Protection (IP) Testing

- IP Testing was initially performed in accordance with BS EN 60529:1992+A2:2013 to obtain IP24 rating

Protection against external mechanical impacts (IK code)

- Done in conformity with IEC 62208 clause 9.7 and IEC 62262 achieving the highest rating IK10
- Three impacts applied on each exposed surface using a test hammer as described in IEC 60068-2-75 suitable for the dimensions of the enclosure

Resistance to Corrosion

- Done in conformity with IEC 62208 clause 9.13.2.1 & 2, severity tests A and B.
- Tests corrosion resistance using damp heat cycling and salt mist cycling (IEC 60068-2-30 & 11)
- No presence of rust, enclosure retained mechanical integrity, seals not damaged and doors, locks continued to function without abnormal effect

Figure 4 – An R460 Feeder Pillar

Static Load Testing

- Done in conformity with IEC 62208 clause 9.4
- Ensures enclosure can support maximum permissible load (50kg)

Axial Load Testing

- Done in conformity with IEC 62208 clause 9.6
- Ensures metal inserts can support the required load (500N on M6 inserts)

Thermal Power Dissipation Capability

- Done in conformity with IEC 62208 clause 9.14
- Determined using a calculation method according to IEC/TR 60890

Please contact our technical team if you require a more detailed report of the testing or if you have any other questions and would like to discuss any aspect of this data sheet.

Industrial | Custodial | Healthcare | Education | Public Space | Rail | Exterior

Vandalite. LIGHTING

STRENNA RANGE

Surface

Economical | LED | RGB LED | IP65 | IK10-150J

Vandal Resistant | ** Anti Ligature | Dimmable | Optional Motion Detection | Emergency Lighting

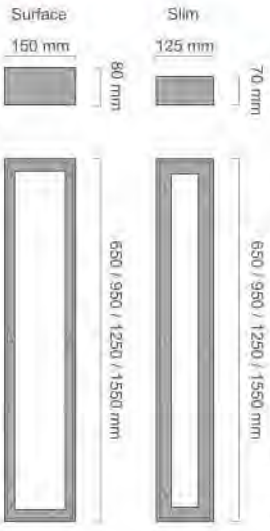
Recessed

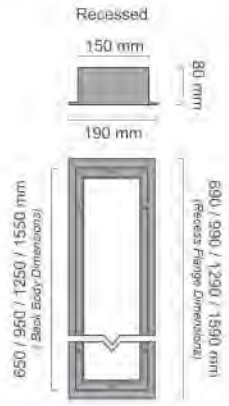
RAL 9016 White | CUSTOM RAL | RAL 9005 Black | VANDA COAT Option

Slim Metro

METRO

- Anti Ligature Must be correctly installed using 'Anti Pick' Mastic
- Fully Welded Fabricated Galvanised Steel Version
- Regressed Bezel & Captive Polycarbonate Diffuser
- Countersunk Stainless Steel Security Screw Fixing
- Removable LED Gear Tray





Recess Cut Out Dim's	Flange Dimensions
1ft 360mm x 160mm	390mm x 190mm
2ft 660mm x 160mm	690mm x 190mm
3ft 960mm x 160mm	990mm x 190mm
4ft 1260mm x 160mm	1290mm x 190mm
5ft 1560mm x 160mm	1590mm x 190mm

Standard Fixing Detail
4qty x 6mm Ø Back Body Corner Mounting Holes
1qty x 20mm Ø Back Body Centre Cable Entry Hole

Linear LED Technical Information

Please refer to website for current LED technical specification

Order Code		Length	Lumens		lm/W	W	Colour Temp	Ra	Weight
	HE HO	mm	HE	HO	Lumen efficacy	Circuit (HE) wattage (HO)	Kelvin (K)	CRI	Kg
STR	1.0 2.0	350	1000lm	2000lm	115	8.6 - 17.3	3000K/4000K	>80	6.0
STR	1.3 2.6	650	1300lm	2600lm	115	11.3 - 22.6	3000K/4000K	>80	8.0
STR	1.9 3.9	950	1950lm	3900lm	112	17.4 - 34.8	3000K/4000K	>80	10.0
STR	2.6 5.2	1250	2600lm	5200lm	110	23.6 - 47.2	3000K/4000K	>80	12.0
STR	3.2 6.5	1550	3250lm	6500lm	108	30.0 - 60.1	3000K/4000K	>80	14.0

LED Life-time 50,000Hr L80/B10 (@ 25°C - 40°C)

RGB Colour Change LED & **Tuneable White LED options

Ordering Options

Description	Suffix Ordering Code
Surface Mounted Body Version	/SM
Recess Mounted Body Version	/RM
Slim Body Version	/SLIM
Exterior Fully Weatherproof Version	/EXT
Metro Bus Shelter Version	/METRO
Dimmable Options *(DALi/1-10v/Sw-240v/Corridor)*	/DALi / 1-10v / SW-240v / CORR
Integral 3hr Emergency or 3hr Self Test	/EM3 or /EM3-SELF
Microwave Motion Detection	/M-Wave
Night Light	/NL
Frosted Diffuser	/F
Clear Stippled Diffuser	/P
Security Driver/Key	/SD
Stainless Steel Version *(316/304/430 Grades)*	On Request
LED Linear Tube Gear Tray *(240v Mains)*	/GT-LEDT5

CE

5 YEAR WARRANTY
(Full terms & conditions on request)