

SHD

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Title	OFF ARLECDON PARKS ROAD
Project no.	SHD1349
Operation scenario	Private Lighting Design

Client	RG PARKINS
Date	27/01/2024

Company	SHD Lighting Consultancy Ltd
Designer	Stephen Higham

Project revisions

Revision	Revision by	Revision date	Comment
R0	Steve Higham	27/01/2024	

Content

1. Main supply	
1.1. Supply	1
2. Circuits schedule	
2.1. FP01	2
2.2. PR01	3
3. Lighting columns schedule	
3.1. FP01	4
4. Cables schedule	
4.1. Cables schedule	5
5. Analytical calculations	
5.1. FP01	6
5.2. PR01	8
6. Zs - Earth fault loop impedance	
6.1. FP01	16
6.2. PR01	17
7. Warnings	
7.1. Project warnings	18
8. Schematic diagrams	
8.1. Main	19

Main supply report : Supply

Company	SHD Lighting Consultancy Ltd	
Designer	Stephen Higham	

Supply details	
Description	Supply
Supply method	User defined source @100kVA
Phase/Voltage	Single-phase 230V 50Hz
Earthing system	TN-C-S
Voltage drop limit	Public supply: Lighting 3%, other uses 5%

Prospective symmetrical 3Ph fault	
Isc-3ph (kA)	-
Zp-p (Ω)	-
cos φ	-

Prospective Ph to N fault	
Isc-1ph (kA)	0.66
Zp-n (Ω)	0.35
cos φ	0.5

Prospective earth fault	
Ief (kA)	0.66
Ze (Ω)	0.3505

Earthing arrangements	
Earthing conductor (mm²)	-
Earthing electrode resistance (Ω)	0
Main bonding conductor (mm²)	10

Min/Max Fault levels							
Isc-max (kA)	16	Cmax	1	Isc-min (kA)	0.66	Cmin	1

Protection by supplier	Main protective device
-	Fuse 1P 25A/80kA Generic BS88 fuses

Load calculations				
Phase	L1	L2	L3	N
Connected load (A)	0.14	0	0	0.14
Diversified load (A)	0.14	0	0	0.14
Spare load (A)	0 (0%)	0	0	-
Design load (A) (Diversified + Spare)	0.14	0	0	0.14

Design load power calculations				
Phase	L1	L2	L3	Total
kVA	0.03	0	0	0.03
kW	0.03	0	0	0.03
kVAr	0	0	0	0
cos φ	1	1	1	1

Main conductor	2x1Cx6mm ² + 1x6mm ² E Pvc70/S/Cu Length: 1m
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Circuits schedule report : FP01



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Company	SHD Lighting Consultancy Ltd
Designer	Stephen Higham

Description	Voltage	Phase	Total circuit ways	Spare load	Spare ways	Empty ways			
FP01	230V AC	SP&N	4	0%	0	1Ph: 3 (75%)			
						L1	L2	L3	
Location:		Mounting:	Surface	Reference No.:		Connected load (A) Diversified load (A) Diversified+Spare load (A)	0.14 0.14 0.14		
Connected from:	Supply	IP Rating:	IP 4X	Isolator Rating:					
Zs (Ω):	0.3542	Board Rating (A):		Fault Rating (kA):					
Incomer device									

Way	Phase	Description	Conductor	Protective devices	Power factor Diversity factor 3rd Harmonics %			Connected load (A) Diversified load (A) Diversified+Spare load (A)		
					L1	L2	L3	L1	L2	L3
1	L1	PR01	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu Length: 7m	Fuse 1P 16A/80kA Generic BS88 fuses	1 1 0			0.14 0.14 0.14		
2	L1	empty								
3	L1	empty								
4	L1	empty								
L1		FP01	2x1Cx6mm ² + 1x6mm ² E Pvc70/S/Cu Length: 1m	Fuse 1P 25A/80kA Generic BS88 fuses	1 1 0			0.14 0.14 0.14		

Circuits schedule report : PR01



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Company	SHD Lighting Consultancy Ltd
Designer	Stephen Higham

Description	Voltage	Phase	Total circuit ways	Spare load	Spare ways			
PR01	230V AC	SP&N	2	0%	0			
						L1	L2	L3
Location:		Mounting:	Surface	Reference No.:		Connected load (A) Diversified load (A) Diversified+Spare load (A)	0.14 0.14 0.14	
Connected from:	FP01	IP Rating:	IP 4X	Isolator Rating:				
Zs (Ω):	0.3784	Board Rating (A):		Fault Rating (kA):				
Incomer device								

Way	Phase	Description	Conductor	Protective devices	Power factor Diversity factor 3rd Harmonics %			Connected load (A) Diversified load (A) Diversified+Spare load (A)		
					L1	L2	L3	L1	L2	L3
1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	1 1 0			0.04 0.04		
2	L1	PR02	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu Length: 28m		1 1 0			0.1 0.1 0.1		
2.1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	1 1 0			0.04 0.04		
2.2	L1	PR03	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu Length: 26m		1 1 0			0.07 0.07 0.07		
2.2.1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	1 1 0			0.04 0.04		
2.2.2	L1	PR04	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu Length: 25m		1 1 0			0.04 0.04 0.04		
2.2.2.1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	1 1 0			0.04 0.04		
L1		PR01	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu Length: 7m	Fuse 1P 16A/80kA Generic BS88 fuses	1 1 0			0.14 0.14 0.14		

Lighting columns schedule report : PR01



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Company	SHD Lighting Consultancy Ltd
Designer	Stephen Higham

Supplied from: FP01 **Voltage:** 230V AC **Max. volt drop/Limit:** 0.02% (LED luminaire)/Public supply: 3%
First column: PR01 **Location:** **Total load (A):** 0.14

Cables to Columns: Multicore 90°C XLPE armoured	Total length(m): 86	Cables to Lightings: Multicore 70°C PVC non-armoured	Total length(m): 28
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Column	Supplied from	Protective devices			Cable to column	Length(m)	Load(A)
[L1] PR01	FP01	Fuse 1P 16A/80kA			3Cx6mm ² + E(cable core and armour),SwaXlpe70/M/Cu	7	0.14
Lighting	Watts	cos(φ)	3rd Harmonics	Protective devices	Cable to lighting	Length(m)	Volt Drop
[L1] LED luminaire	1x8W	1	0%	Fuse 1P 6A/80kA	3Cx1.5mm ² (E cable core),Pvc70/M/Cu	7	0.01%
Column	Supplied from	Protective devices			Cable to column	Length(m)	Load(A)
[L1] PR02	PR01	Fuse 1P 16A/80kA			3Cx6mm ² + E(cable core and armour),SwaXlpe70/M/Cu	28	0.1
Lighting	Watts	cos(φ)	3rd Harmonics	Protective devices	Cable to lighting	Length(m)	Volt Drop
[L1] LED luminaire	1x8W	1	0%	Fuse 1P 6A/80kA	3Cx1.5mm ² (E cable core),Pvc70/M/Cu	7	0.02%
Column	Supplied from	Protective devices			Cable to column	Length(m)	Load(A)
[L1] PR03	PR02	Fuse 1P 16A/80kA			3Cx6mm ² + E(cable core and armour),SwaXlpe70/M/Cu	26	0.07
Lighting	Watts	cos(φ)	3rd Harmonics	Protective devices	Cable to lighting	Length(m)	Volt Drop
[L1] LED luminaire	1x8W	1	0%	Fuse 1P 6A/80kA	3Cx1.5mm ² (E cable core),Pvc70/M/Cu	7	0.02%
Column	Supplied from	Protective devices			Cable to column	Length(m)	Load(A)
[L1] PR04	PR03	Fuse 1P 16A/80kA			3Cx6mm ² + E(cable core and armour),SwaXlpe70/M/Cu	25	0.04
Lighting	Watts	cos(φ)	3rd Harmonics	Protective devices	Cable to lighting	Length(m)	Volt Drop
[L1] LED luminaire	1x8W	1	0%	Fuse 1P 6A/80kA	3Cx1.5mm ² (E cable core),Pvc70/M/Cu	7	0.02%

Cables schedule report



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Designer	Stephen Higham

Cable ID	Voltage	From	To	L (m)	Make-up	Type	Method	Classification
c-d-1	230V AC	Supply	FP01	1	2x1Cx6mm ² + 1x6mm ² E Pvc70/S/Cu	Single-core 70°C PVC non-armoured - Cu	Clipped direct flat touching	
c-d-2	230V AC	FP01	PR01	7	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu	Multicore 90°C XLPE armoured (Run to 70 °C) - Cu	In underground single way ducts	
c-f-1	230V AC	PR01	LED luminaire	7	3Cx1.5mm ² (E cable core) Pvc70/M/Cu	Multicore 70°C PVC non-armoured - Cu	Clipped direct	
c-d-2	230V AC	PR01	PR02	28	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu	Multicore 90°C XLPE armoured (Run to 70 °C) - Cu	In underground single way ducts	
c-f-1	230V AC	PR02	LED luminaire	7	3Cx1.5mm ² (E cable core) Pvc70/M/Cu	Multicore 70°C PVC non-armoured - Cu	Clipped direct	
c-d-2	230V AC	PR02	PR03	26	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu	Multicore 90°C XLPE armoured (Run to 70 °C) - Cu	In underground single way ducts	
c-f-1	230V AC	PR03	LED luminaire	7	3Cx1.5mm ² (E cable core) Pvc70/M/Cu	Multicore 70°C PVC non-armoured - Cu	Clipped direct	
c-d-2	230V AC	PR03	PR04	25	3Cx6mm ² + E(cable core and armour) SwaXlpe70/M/Cu	Multicore 90°C XLPE armoured (Run to 70 °C) - Cu	In underground single way ducts	
c-f-1	230V AC	PR04	LED luminaire	7	3Cx1.5mm ² (E cable core) Pvc70/M/Cu	Multicore 70°C PVC non-armoured - Cu	Clipped direct	

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	FP01	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	Supply	Circuit type	DB - DIN Rail
Remarks		Cable ID Classification	c-d-1

Circuit design data									
Conductor type	Single-core 70°C thermoplastic insulated non-armoured, 2x1Cx6mm ² + 1x6mm ² E, Pvc70/S/Cu							Length (m)	1
	Element	Copper (Cu)	Armour	No	Temp (°C)	Full loaded:70 / Actual:30	Reference	BS/4D1	
Installation method	Clipped direct flat touching - Reference method C				Correction factors		Ci:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	Ambient temperature (°C): 30.							
Protective conductor CPC	Installation settings		Separate conductor (separate cpc touching the phase conductor)						
	Separate conductor (mm²)	6	Other cpc (mm²)	0	Total equivalent to Cu (mm²)			6	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 25					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current I_b	Device rating I_n	Minimum effective conductor capacity - min I_z	Tabulated conductor capacity I_t		Phase conductor Z₁	CPC Z₂	Earth external	Phase external	
0.14	25	25	47		0.00365	0.00365	0.3505	0.0153	

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.14	-	-	0.14	Source (%)	0	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.03	-	-	0.03	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.03	-	-	0.03	Total (%)	0	-	-
Spare (%)	0			Reactive (kVAr)	0	-	-	0	Limit	Public supply other uses:5%		

Earth Fault Calculations	Earth fault current (kA)	Zs(Ω) at fault conditions	Max Zs(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.62	0.3542	2.1688	5	0.01	0.38

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	14.5252	10.8553	10.1995	1.86	476.1

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	PR01	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	FP01 (Way 1)	Circuit type	Lighting column
Remarks		Cable ID Classification	c-d-2

Circuit design data									
Conductor type	Multicore 90°C thermosetting insulated armoured, 3Cx6mm ² + E(cable core and armour), SwaXlpe70/M/Cu - Run to 70°C							Length (m)	7
	Element	Copper (Cu)	Armour	Steel	Temp (°C)	Full loaded:70 / Actual:20		Reference	BS/4D4
Installation method	In underground single way ducts - Reference method D				Correction factors		Cc:0.9 Cd:1 Cs:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	In Plastic Conduit Φ100 Light 1 Bends. Ground temperature (°C): 20. Underground settings: Depth 0.7m. Soil thermal resistivity 2.5k.m/W.							
Protective conductor CPC	Installation settings		Cable armour and integral conductor						
	Integral conductor (mm²)	6	Armour (mm²)	23		Total equivalent to Cu (mm²)		15.2	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 16					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current I_b	Device rating I_n	Minimum effective conductor capacity - min I_z	Tabulated conductor capacity I_t		Phase conductor Z₁	CPC Z₂	Earth external	Phase external	
0.14	16	17.78	46		0.02555	0.01765	0.3542	0.0226	

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.14	-	-	0.14	Source (%)	0	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.03	-	-	0.03	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.03	-	-	0.03	Total (%)	0	-	-
Spare (%)	0			Reactive (kVAr)	0	-	-	0	Limit	Public supply other uses:5%		

Earth Fault Calculations	Earth fault current (kA)	Z_s(Ω) at fault conditions	Max Z_s(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.58	0.3784	3.9441	5	0.01	0.2

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	10.8553	3.6067	3.1229	0.5	476.1

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	PR01	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	FP01 (Way 1)	Circuit type	Lighting column
Remarks		Cable ID Classification	c-d-2

Circuit design data									
Conductor type	Multicore 90°C thermosetting insulated armoured, 3Cx6mm ² + E(cable core and armour), SwaXlpe70/M/Cu - Run to 70°C							Length (m)	7
	Element	Copper (Cu)	Armour	Steel	Temp (°C)	Full loaded:70 / Actual:20	Reference	BS/4D4	
Installation method	In underground single way ducts - Reference method D				Correction factors		Cc:0.9 Cd:1 Cs:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	In Plastic Conduit Φ100 Light 1 Bends. Ground temperature (°C): 20. Underground settings: Depth 0.7m. Soil thermal resistivity 2.5k.m/W.							
Protective conductor CPC	Installation settings		Cable armour and integral conductor						
	Integral conductor (mm²)	6	Armour (mm²)	23	Total equivalent to Cu (mm²)			15.2	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 16					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current I_b	Device rating I_n	Minimum effective conductor capacity - min I_z	Tabulated conductor capacity I_t		Phase conductor Z₁	CPC Z₂	Earth external	Phase external	
0.14	16	17.78	46		0.02555	0.01765	0.3542	0.0226	

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.14	-	-	0.14	Source (%)	0	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.03	-	-	0.03	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.03	-	-	0.03	Total (%)	0	-	-
Spare (%)	0			Reactive (kVAr)	0	-	-	0	Limit	Public supply other uses:5%		

Earth Fault Calculations	Earth fault current (kA)	Z_s(Ω) at fault conditions	Max Z_s(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.58	0.3784	3.9441	5	0.01	0.2

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	10.8553	3.6067	3.1229	0.5	476.1

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	LED luminaire	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	PR01 (Way 1)	Circuit type	Lighting with gear losses (Ib x 1.8)
Remarks		Cable ID Classification	c-f-1

Circuit design data									
Conductor type	Multicore 70°C thermoplastic insulated non-armoured, 3Cx1.5mm ² (E cable core), Pvc70/M/Cu							Length (m)	7
	Element	Copper (Cu)	Armour	No	Temp (°C)	Full loaded:70 / Actual:30		Reference	BS/4D2
Installation method	Clipped direct - Reference method C				Correction factors		Ci:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	Ambient temperature (°C): 30.							
Protective conductor CPC	Installation settings		Integral conductor						
	Integral conductor (mm²)	1.5	Other cpc (mm²)	0			Total equivalent to Cu (mm²)		1.5
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 6					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current Ib x 1.8	Device rating In	Minimum effective conductor capacity - min Iz		Tabulated conductor capacity It	Phase conductor Z1	CPC Z2	Earth external		Phase external
0.06	6	6		19.5	0.1015	0.1015	0.3784		0.0736

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.04	-	-	0.04	Source (%)	0	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.01	-	-	0.01	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.01	-	-	0.01	Total (%)	0.01	-	-
Spare (%)	-			Reactive (kVAr)	0.01	-	-	0.01	Limit	Public supply lighting:3%		

Earth Fault Calculations	Earth fault current (kA)	Zs(Ω) at fault conditions	Max Zs(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.42	0.5256	8.0319	0.4	0.01	0.07

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	3.6067	0.9874	0.8314	0.06	29.76

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		

Circuit Description	PR02	Voltage / Phase	Single phase (230V E@230V) / L1	
Supply from	PR01 (Way 2)	Circuit type	Lighting column	
Remarks		Cable ID Classification	c-d-2	

Circuit design data											
Conductor type	Multicore 90°C thermosetting insulated armoured, 3Cx6mm ² + E(cable core and armour), SwaXlpe70/M/Cu - Run to 70°C							Length (m)	28		
	Element	Copper (Cu)	Armour	Steel	Temp (°C)	Full loaded:70 / Actual:20		Reference	BS/4D4		
Installation method	In underground single way ducts - Reference method D				Correction factors		Cc:0.9 Cd:1 Cs:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1				
	Settings	In Plastic Conduit Φ100 Light 1 Bends. Ground temperature (°C): 20. Underground settings: Depth 0.7m. Soil thermal resistivity 2.5k.m/W.									
Protective conductor CPC	Installation settings		Cable armour and integral conductor								
	Integral conductor (mm²)	6	Armour (mm²)	23		Total equivalent to Cu (mm²)			15.2		
Protective devices	Overcurrent		Generic, Fuses BS88 fuses (from supply) Rating(A): 16						Icu / Ics	80kA / 80kA	
	RCD/Earth fault device		No						mA	-	

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current I_b	Device rating I_n	Minimum effective conductor capacity - min I_z	Tabulated conductor capacity I_t		Phase conductor Z₁	CPC Z₂	Earth external		Phase external
0.1	16	17.78	46		0.1022	0.07061	0.3784		0.0736

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.1	-	-	0.1	Source (%)	0	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.02	-	-	0.02	Circuit (%)	0.01	-	-
Diversity factor	1	-	-	Resistive (kW)	0.02	-	-	0.02	Total (%)	0.01	-	-
Spare (%)	0			Reactive (kVAr)	0	-	-	0	Limit	Public supply other uses:5%		

Earth Fault Calculations	Earth fault current (kA)	Z_s(Ω) at fault conditions	Max Z_s(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.44	0.5013	3.9441	5	0.01	0.2

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	3.6067	0.9825	0.8272	0.5	476.1

Analytical calculations Report



info@shdlighting.co.uk 07834 490 192 www.shdlighting.co.uk

Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		

Circuit Description	LED luminaire	Voltage / Phase	Single phase (230V E@230V) / L1	
Supply from	PR02	Circuit type	Lighting with gear losses (Ib x 1.8)	
Remarks		Cable ID Classification	c-f-1	

Circuit design data										
Conductor type	Multicore 70°C thermoplastic insulated non-armoured, 3Cx1.5mm ² (E cable core), Pvc70/M/Cu							Length (m)	7	
	Element	Copper (Cu)	Armour	No	Temp (°C)	Full loaded:70 / Actual:30		Reference	BS/4D2	
Installation method	Clipped direct - Reference method C					Correction factors		Ci:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	Ambient temperature (°C): 30.								
Protective conductor CPC	Installation settings		Integral conductor							
	Integral conductor (mm²)	1.5	Other cpc (mm²)	0		Total equivalent to Cu (mm²)			1.5	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 6					Icu / Ics	80kA / 80kA	
	RCD/Earth fault device		No					mA	-	

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current Ib x 1.8	Device rating In	Minimum effective conductor capacity - min Iz		Tabulated conductor capacity It	Phase conductor Z1	CPC Z2	Earth external		Phase external
0.06	6	6		19.5	0.1015	0.1015	0.5013		0.2781

Load factors	L1	L2	L3	Design load				Voltage drop				
Power factor	1	-	-	Current (A)	0.04	-	-	0.04	Source (%)	0.01	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.01	-	-	0.01	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.01	-	-	0.01	Total (%)	0.02	-	-
Spare (%)	-			Reactive (kVAr)	0.01	-	-	0.01	Limit	Public supply lighting:3%		

Earth Fault Calculations	Earth fault current (kA)	Zs(Ω) at fault conditions	Max Zs(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.32	0.6742	8.0319	0.4	0.01	0.07

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	0.9825	0.5703	0.4781	0.06	29.76

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	PR03	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	PR02	Circuit type	Lighting column
Remarks		Cable ID Classification	c-d-2

Circuit design data									
Conductor type	Multicore 90°C thermosetting insulated armoured, 3Cx6mm ² + E(cable core and armour), SwaXlpe70/M/Cu - Run to 70°C							Length (m)	26
	Element	Copper (Cu)	Armour	Steel	Temp (°C)	Full loaded:70 / Actual:20		Reference	BS/4D4
Installation method	In underground single way ducts - Reference method D				Correction factors		Cc:0.9 Cd:1 Cs:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	In Plastic Conduit Φ100 Light 1 Bends. Ground temperature (°C): 20. Underground settings: Depth 0.7m. Soil thermal resistivity 2.5k.m/W.							
Protective conductor CPC	Installation settings		Cable armour and integral conductor						
	Integral conductor (mm²)	6	Armour (mm²)	23		Total equivalent to Cu (mm²)		15.2	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses (from supply) Rating(A): 16					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current I_b	Device rating I_n	Minimum effective conductor capacity - min I_z	Tabulated conductor capacity I_t		Phase conductor Z₁	CPC Z₂	Earth external	Phase external	
0.07	16	17.78	46		0.0949	0.06556	0.5013	0.2781	

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.07	-	-	0.07	Source (%)	0.01	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.02	-	-	0.02	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.02	-	-	0.02	Total (%)	0.02	-	-
Spare (%)	0			Reactive (kVAr)	0	-	-	0	Limit	Public supply other uses:5%		

Earth Fault Calculations	Earth fault current (kA)	Z_s(Ω) at fault conditions	Max Z_s(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.34	0.6365	3.9441	5	0.01	0.2

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	0.9825	0.5863	0.4916	0.5	476.1

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	LED luminaire	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	PR03	Circuit type	Lighting with gear losses (Ib x 1.8)
Remarks		Cable ID Classification	c-f-1

Circuit design data									
Conductor type	Multicore 70°C thermoplastic insulated non-armoured, 3Cx1.5mm ² (E cable core), Pvc70/M/Cu							Length (m)	7
	Element	Copper (Cu)	Armour	No	Temp (°C)	Full loaded:70 / Actual:30		Reference	BS/4D2
Installation method	Clipped direct - Reference method C				Correction factors		Ci:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	Ambient temperature (°C): 30.							
Protective conductor CPC	Installation settings		Integral conductor						
	Integral conductor (mm²)	1.5	Other cpc (mm²)	0			Total equivalent to Cu (mm²)		1.5
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 6					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current Ib x 1.8	Device rating In	Minimum effective conductor capacity - min Iz	Tabulated conductor capacity It		Phase conductor Z1	CPC Z2	Earth external	Phase external	
0.06	6	6	19.5		0.1015	0.1015	0.6365	0.4679	

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.04	-	-	0.04	Source (%)	0.02	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.01	-	-	0.01	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.01	-	-	0.01	Total (%)	0.02	-	-
Spare (%)	-			Reactive (kVAr)	0.01	-	-	0.01	Limit	Public supply lighting:3%		

Earth Fault Calculations	Earth fault current (kA)	Zs(Ω) at fault conditions	Max Zs(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.27	0.8207	8.0319	0.4	0.01	0.07

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	0.5863	0.4097	0.3429	0.06	29.76

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		
Circuit Description	PR04	Voltage / Phase	Single phase (230V E@230V) / L1
Supply from	PR03	Circuit type	Lighting column
Remarks		Cable ID Classification	c-d-2

Circuit design data									
Conductor type	Multicore 90°C thermosetting insulated armoured, 3Cx6mm ² + E(cable core and armour), SwaXlpe70/M/Cu - Run to 70°C							Length (m)	25
	Element	Copper (Cu)	Armour	Steel	Temp (°C)	Full loaded:70 / Actual:20		Reference	BS/4D4
Installation method	In underground single way ducts - Reference method D				Correction factors		Cc:0.9 Cd:1 Cs:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	In Plastic Conduit Φ100 Light 1 Bends. Ground temperature (°C): 20. Underground settings: Depth 0.7m. Soil thermal resistivity 2.5k.m/W.							
Protective conductor CPC	Installation settings		Cable armour and integral conductor						
	Integral conductor (mm²)	6	Armour (mm²)	23		Total equivalent to Cu (mm²)		15.2	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses (from supply) Rating(A): 16					Icu / Ics	80kA / 80kA
	RCD/Earth fault device		No					mA	-

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current I_b	Device rating I_n	Minimum effective conductor capacity - min I_z	Tabulated conductor capacity I_t		Phase conductor Z₁	CPC Z₂	Earth external	Phase external	
0.04	16	17.78	46		0.09125	0.06304	0.6365	0.4679	

Load factors	L1	L2	L3	Design load	L1	L2	L3	N/Totals	Voltage drop	L1	L2	L3
Power factor	1	-	-	Current (A)	0.04	-	-	0.04	Source (%)	0.02	-	-
3rd Harmonics (%)	0	-	-	Load (kVA)	0.01	-	-	0.01	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.01	-	-	0.01	Total (%)	0.02	-	-
Spare (%)	0			Reactive (kVAr)	0	-	-	0	Limit	Public supply other uses:5%		

Earth Fault Calculations	Earth fault current (kA)	Z_s(Ω) at fault conditions	Max Z_s(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.28	0.7757	3.9441	5	0.01	0.2

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	0.5863	0.4225	0.3537	0.5	476.1

Analytical calculations Report



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Company	SHD Lighting Consultancy Ltd		
Designer	Stephen Higham		

Circuit Description	LED luminaire	Voltage / Phase	Single phase (230V E@230V) / L1	
Supply from	PR04	Circuit type	Lighting with gear losses (Ib x 1.8)	
Remarks		Cable ID Classification	c-f-1	

Circuit design data										
Conductor type	Multicore 70°C thermoplastic insulated non-armoured, 3Cx1.5mm ² (E cable core), Pvc70/M/Cu							Length (m)	7	
	Element	Copper (Cu)	Armour	No	Temp (°C)	Full loaded:70 / Actual:30		Reference	BS/4D2	
Installation method	Clipped direct - Reference method C					Correction factors		Ci:1 Cg:1 Ca:1 Ct:0.87 Cf:1 Ch:1		
	Settings	Ambient temperature (°C): 30.								
Protective conductor CPC	Installation settings		Integral conductor							
	Integral conductor (mm²)	1.5	Other cpc (mm²)	0		Total equivalent to Cu (mm²)			1.5	
Protective devices	Overcurrent		Generic, Fuses BS88 fuses Rating(A): 6					Icu / Ics	80kA / 80kA	
	RCD/Earth fault device		No					mA	-	

Circuit calculations									
Currents (A)					Impedances at full loaded temperature (Ω)				
Design current Ib x 1.8	Device rating In	Minimum effective conductor capacity - min Iz		Tabulated conductor capacity It	Phase conductor Z1	CPC Z2	Earth external		Phase external
0.06	6	6		19.5	0.1015	0.1015	0.7757		0.6504

Load factors	L1	L2	L3	Design load				Voltage drop				
Power factor	1	-	-	Current (A)	L1	L2	L3	N/Totals	Source (%)	L1	L2	L3
3rd Harmonics (%)	0	-	-	Load (kVA)	0.04	-	-	0.04	Circuit (%)	0	-	-
Diversity factor	1	-	-	Resistive (kW)	0.01	-	-	0.01	Total (%)	0.02	-	-
Spare (%)	-			Reactive (kVAr)	0.01	-	-	0.01	Limit	Public supply lighting:3%		

Earth Fault Calculations	Earth fault current (kA)	Zs(Ω) at fault conditions	Max Zs(Ω)	Max Disconnection Time (s)	Device Disconnection Time (s)	Min CPC (mm²)
	0.23	0.9658	8.0319	0.4	0.01	0.07

Phase Fault Calculations	Max at starting point (kA)	Max at end point (kA)	Min at end point (kA)	Let-through Energy of Fuse I² t (A² s) x 10³	Conductors withstand k² S² x 10³
	0.4225	0.3224	0.2695	0.06	29.76

Zs - Earth fault loop impedance report : FP01



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Company SHD Lighting Consultancy Ltd

Designer Stephen Higham

Uo - Nominal Line Voltage to Earth: 230V

Way	Phase	Description	Conductor	Protective devices	Discon.	Max	Zs Calculated (Ω)		Max Zs Calculated (Ω)	
					time	Discon.	Zs	Z x 0.8	max Zs	max Zs x 0.8
					sec	sec				
	L1	FP01	2x1Cx6mm ² 1x6mm ² E Pvc70/S/Cu Length: 1m	Fuse 1P 25A/80kA Generic BS88 fuses	0.01	5	0.35	0.28	2.17	1.74
1	L1	PR01	3Cx6mm ² E(cable core and armour) SwaXlpe70/M/Cu Length: 7m	Fuse 1P 16A/80kA Generic BS88 fuses	0.01	5	0.38	0.3	3.94	3.16
2	L1	empty	-	-	-	-	-	-	-	-
3	L1	empty	-	-	-	-	-	-	-	-
4	L1	empty	-	-	-	-	-	-	-	-

Zs - Earth fault loop impedance report : PR01



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Company SHD Lighting Consultancy Ltd





Designer Stephen Higham

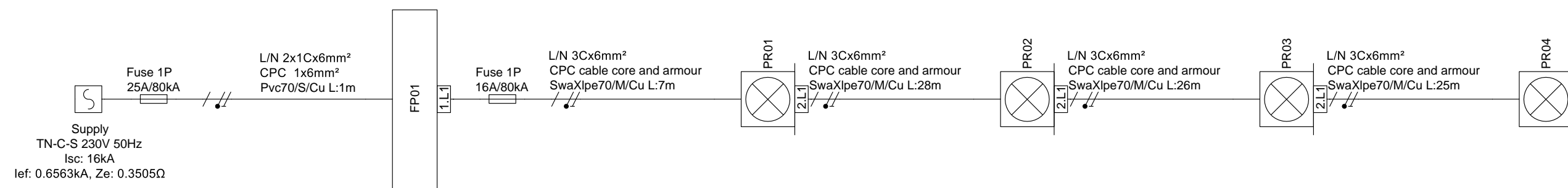
Uo - Nominal Line Voltage to Earth: 230V

Way	Phase	Description	Conductor	Protective devices	Discon. time sec	Max Discon. sec	Zs Calculated (Ω)		Max Zs Calculated (Ω)	
							Zs	Z x 0.8	max Zs	max Zs x 0.8
	L1	PR01	3Cx6mm ² E(cable core and armour) SwaXlpe70/M/Cu Length: 7m	Fuse 1P 16A/80kA Generic BS88 fuses	0.01	5	0.38	0.3	3.94	3.16
1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	0.01	0.4	0.53	0.42	8.03	6.43
2	L1	PR02	3Cx6mm ² E(cable core and armour) SwaXlpe70/M/Cu Length: 28m		0.01	5	0.5	0.4	3.94	3.16
2.1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	0.01	0.4	0.67	0.54	8.03	6.43
2.2	L1	PR03	3Cx6mm ² E(cable core and armour) SwaXlpe70/M/Cu Length: 26m		0.01	5	0.64	0.51	3.94	3.16
2.2.1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	0.01	0.4	0.82	0.66	8.03	6.43
2.2.2	L1	PR04	3Cx6mm ² E(cable core and armour) SwaXlpe70/M/Cu Length: 25m		0.01	5	0.78	0.62	3.94	3.16
2.2.2.1	L1	LED luminaire	3Cx1.5mm ² (E cable core) Pvc70/M/Cu Length: 7m	Fuse 1P 6A/80kA Generic BS88 fuses	0.01	0.4	0.97	0.77	8.03	6.43

Warnings

No Warnings were found in the calculated circuits

Symbols	
	Fuse
	General source
	Lighting Unit
	Lighting final circuit



All Distribution Circuits								
Working Voltage	From	To	Conductor Make-up	Conductor Type	Length (m)	Method	Protective Device	Voltage Drop
230V AC	Supply	FP01	2x1Cx6mm ² + 1x6mm ² E	Pvc70/S/Cu	1	Clipped direct flat touching	Fuse 1P 25A/80kA	0 %
230V AC	FP01	PR01	3Cx6mm ² + E(cable core and armour) (Run to 70 °C)	SwaXlpe70/M/Cu	7	In underground single way ducts	Fuse 1P 16A/80kA	0 %
230V AC	PR01	PR02	3Cx6mm ² + E(cable core and armour) (Run to 70 °C)	SwaXlpe70/M/Cu	28	In underground single way ducts	N/A	0.01 %
230V AC	PR02	PR03	3Cx6mm ² + E(cable core and armour) (Run to 70 °C)	SwaXlpe70/M/Cu	26	In underground single way ducts	N/A	0.02 %
230V AC	PR03	PR04	3Cx6mm ² + E(cable core and armour) (Run to 70 °C)	SwaXlpe70/M/Cu	25	In underground single way ducts	N/A	0.02 %

Project description OFF ARLECDON PARKS ROAD		Details Private Lighting Design - Main	
Design firm SHD Lighting Consultancy Ltd	Design by Stephen Higham	Design date 27/01/2024	Drawing No.
Client RG PARKINS	Revision by Steve Higham	Revision date 27/01/2024	Sheet No.

