

FLOODLIGHTING IMPACT ASSESSMENT



LIVERPOOL FOOTBALL CLUB TRAINING GROUND



REPORT STATUS 'FINAL'

Client: Liverpool FC

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CLIENT & ASSESSMENT DETAILS

CLIENT DETAILS

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Liverpool Football Club

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SITE GPS CO-ORDINATES

53.483132, -2.867858

SITE ADDRESS

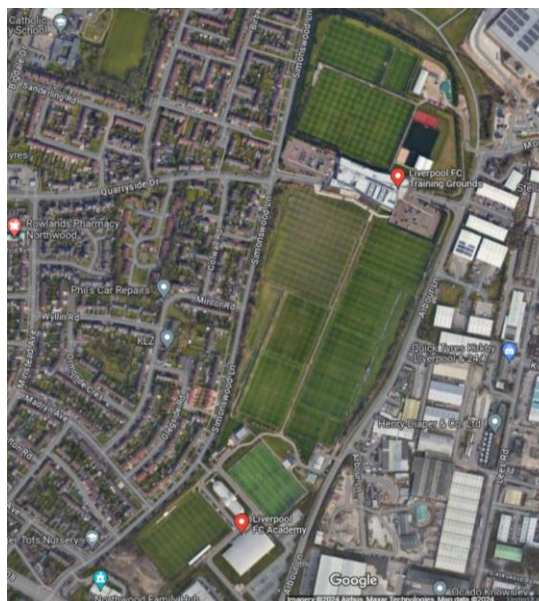
Liverpool FC Training Grounds
Arbour Ln, Liverpool L33 7ET

LIGHTING TO BE INSTALLED

17 x 18m lighting columns
TLC-LED-1500 luminaires only

4 x 15.2m lighting columns
3 x 8.0m lighting columns
A combination of TLC-LED-1500 &
TLC-LED-1200 luminaires

SITE PLAN VIEW



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FOREWORD & LABORATORY DETAILS

ABOUT SPORTS LABS

Operating since 1998 our headquarters are based in Scotland, with satellite offices and laboratories around the world. We are an independent sports technology test house providing laboratory product testing and field testing in the sports sector operating under the auspices of approved and recognised national and international standards. Sports Labs are a FIFA approved test institute for Floodlight assessments.

We do this adhering to testing protocols for safety and performance. In addition, we actively contribute to the development of testing standards, ensuring testing protocols are up-to-date with the most current product innovations.

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FOREWORD

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EXECUTIVE SUMMARY

Consisting of upgrades to four football pitches, 1 training pitch, 1 volleyball court and 1 tennis court the proposed lighting system for Liverpool FC Academy North Pitches has been designed to meet the specific lighting requirements for:

- **Class I Football**
 - BS EN 12193:2018 (500 lux)
- **Beach Volleyball**
 - Table A.21 BS EN 12193:2007
 - Class II 200 lux / 0.6 Uniformity
- **LTA Tennis recommended for outdoor floodlit courts**
 - 500 Lux (Min 400) in the principle playing area with uniformity of 0.7
 - 400 Lux (Min 300) in the total playing area with uniformity of 0.6.

The site is represented in Appendix A.1 for the four football pitches, and Appendix B.1 for the training pitch, volleyball court and tennis court.

The existing site is already extensively floodlit, and this scheme is an extension to illuminate the remaining pitches.

The design calculations included evidence that vertical spill levels would be less than 10 Lux at any property and source intensity values would be below 10,000cd.

This has been designed in accordance with the national and local environmental lighting standards while considering the location of the site, within a suburban geography.

The obtrusive light calculations produced by Musco Lighting show the cumulative effect of lighting is compliant with the obtrusive light requirements for a site within an **environmental zone E3, suburban location**.

In addition, the training campus is an open playing fields, and the design of the floodlights are screened in order to minimise glare.

INTRODUCTION

This **Planning Design Statement** has been undertaken by Sports Labs Ltd on behalf of Liverpool FC, to assess the impact of the proposed floodlighting system that has been put forward for planning permission. The proposed floodlighting system is to be installed at Liverpool FC Academy Training Grounds, Kirkby.

This is a desktop and theoretical review of the lighting system and obtrusive lighting. The design and supporting documents have been supplied by Musco Lighting and can be viewed in the appendices.

The site plan consists of lighting:

- **4 football pitches**, by means of 17 lighting columns, of approximately 18 meters high, galvanized steel masts, with a total of 106 TLC-LED-1500 luminaire fixtures, of 149.46 kW total load.
- **1 training pitch** by means of 4 lighting columns, , 2 of approximately 15.24 meters high, and 2 of approximately 8.0m with galvanized steel masts. A total of 14 luminaire fixtures, 8 being TLC-LED-1200 and 6 being TLC-LED-1500 with a total load of 13.14 kW.
- **1 volleyball court** by means of 2 lighting columns, , 1 of approximately 15.24 meters high, and 1 of approximately 8.0m with galvanized steel masts. A total of 6 TLC-LED-1200 luminaire fixtures, with a total load of 4.68 kW.
- **1 tennis court** by means of 4 lighting columns, , 2 of approximately 15.24 meters high, and 2 of approximately 8.0m with galvanized steel masts. A total of 9 luminaire fixtures, 6 being TLC-LED-1200 and 3 being TLC-LED-1500 with a total load of 4.68 kW.

In order to assist in the approval of planning permission and the development of the proposed project, this document shall outline the design and considerations within the local environs and to facility users and residents.

The lighting of pitches should not exceed the recommended requirements for an **environmental zone E3** within the local Suburban location.

SITE SPECIFICS

Site History

The Academy is situated at the south end of the overall complex and was opened in 1998 as a dedicated training base for the club's youth teams. The facility consists of a main building with an adjoining indoor pitch. There are four full-size grass pitches and one with an artificial surface. There are also a further seven smaller pitches and an indoor arena. The grounds cover an area of 56 acres. Pitches are allocated according to age group; younger teams play on pitches closer to the Academy building, older teams play on pitches closer to the first-team complex. This provides both a physical and metaphorical progression for young players toward the first team.

Facility Purpose

There is currently no floodlighting provisions on the main pitches identified, South of the main complex within the grounds. As the pitches will be used by elite players at National Standard and higher the main pitch lighting has been designed to meet the requirements for a Class I installation requiring an average of 500 Lux and a uniformity(min/ave) of 0.70 or higher.

In addition, the smaller football training pitch adjacent to the tennis and volleyball courts has been designed to Class 1 football. The Tennis and Volleyball courts have been designed to meet the LTA and Sport England guidelines as respectively.

Ecological disruption

With the installation of the proposed lighting, the facility owners and floodlighting consultants declare there is no evidence of ecological disturbance.

Perimeter Fencing

The site at Arbour Lane, North West Liverpool, is within an urban location with a medium background illuminance. The training campus has residential properties to one boundary, and commercial properties on 3 boundaries. albeit separated by roads and pavements.

FURTHER DETAIL

Benefits of the Development

The site development will allow increased playing hours on the training facility. This includes all ages of users. There will be a social and economical benefit from this development due to increased physical activity and wellbeing of users.

Environmental benefits – LED

The proposed system utilises the most recent lighting technology. Light Emitting Diodes are the most energy efficient and environmentally friendly lighting technologies. Source efficacy and luminaire efficacy allows LEDs to create this offering. In addition LED's have longer life span, and are non toxic.

DESIGN STANDARDS

The floodlighting proposals have been assessed using industry standard guidance:

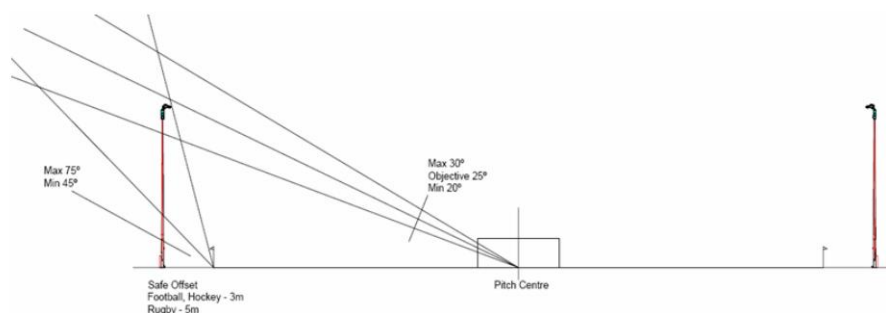
- BS EN 12193 Light and Lighting – Sports Lighting (2018)
- BS EN 12193 sets the minimum lighting levels for sports within Europe, it classifies sports into three standards.
 - Class III – Training and recreational use
 - Class II – High quality coaching and low-level competition
 - Class I – National standard coaching and high-level competition

ILP Guidance notes for the reduction of obtrusive light

Industry guidelines for maximum values of light spill and glare dependent on the environmental zone category of the site.

CIBSE Lighting Guide LG4 – Sports Lighting

CIBSE Guide LG4 provides information on how to use floodlight beams, the control of glare and spill light containment, along with knowledge on how to calculate the optimum mounting height for floodlights using maximum and minimum angles projected from the centre of the sports area. This creates the most optimal floodlighting offering and reduces spill and waste light.



Calculation method for floodlight mounting height for CIBSE LG4

Calculation Method for Mounting Height

OBTRUSIVE LIGHTS LIMITATIONS

The Institute of Lighting Professionals has made public a guidance document to be used by lighting professionals, planning authorities bringing attention to the opportunity of reducing the environmental impact of lighting installations. The ILP 'Guidance notes 01/21 The Reduction of Obtrusive Light' categorises the environment into five zones, extracts below.

The categorisation considers the urban location, the existing background illumination and the degree of protection required to maintain the current environmental zone.

Table 2: Environmental zones

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on premises

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

OBTRUSIVE LIGHTS LIMITATIONS

Table 4 (CIE 150 table 3): Limits for the luminous intensity of bright luminaires⁴

Light technical parameter	Application conditions	Luminaire group (projected area A_p in m ²)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0 Pre-curfew Post-curfew	0 0	0 0	0 0	0 0	0 0	0 0
	E1 Pre-curfew Post-curfew	0.29 d 0	0.63 d 0	1.3 d 0	2.5 d 0	5.1 d 0	2,500 0
	E2 Pre-curfew Post-curfew	0.57 d 0.29 d	1.3 d 0.63 d	2.5 d 1.3 d	5.0 d 2.5 d	10 d 5.1 d	7,500 500
	E3 Pre-curfew Post-curfew	0.86 d 0.29 d	1.9 d 0.63 d	3.8 d 1.3 d	7.5 d 2.5 d	15 d 5.1 d	10,000 1,000
	E4 Pre-curfew Post-curfew	1.4 d 0.29 d	3.1 d 0.63 d	6.3 d 1.3 d	13 d 2.5 d	26 d 5.1 d	25,000 2,500

Note 1 d is the distance between the observer and the glare source in metres;

Note 2 A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions;

Note 3 A_p is the apparent surface of the light source seen from the observer position

Note 4 For further information refer to Annex C of CIE 150

Note 5 Upper limits for each zone shall be taken as those with column $A_p > 0.5$

The guidance notes details beam elevations for the floodlighting, with consideration to spill and glare reduction.

DESIGN OVERVIEW

Floodlighting System | Musco

The design consists of lighting 4 football pitches, 1 training area, a tennis court and a volleyball court. by means of 17 x 18m lighting columns, 4 x 15.2m lighting columns, and 3 x 8.0m lighting columns utilising a combination of TLC-LED-1500 & TLC-LED-1200 luminaires. The drawings in the appendices supplied by Musco detail and segment this information.

It is important spill and lux is considered as there are neighbouring residential and commercial properties to the West, with road infrastructure in between. These are considered in the design, irrespective of any vegetal barriers in the area such as a high tree line.

It is proposed for the new floodlighting system to be powered by the existing power supply on site at the training complex already.

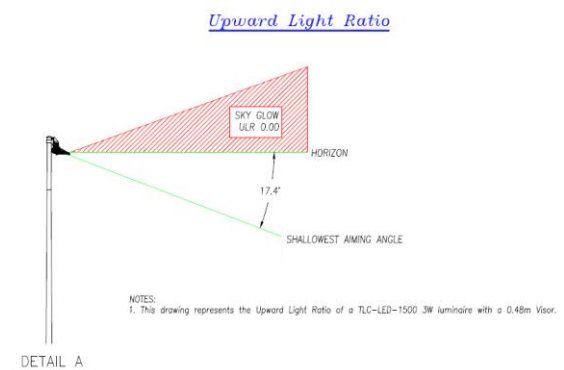
Light spill levels from the new floodlighting system were required to be less than 10 Lux at the site boundary. As shown in the floodlighting layout drawings this has been kept below the set limit at 5 Lux to insure minimal disruption nearby properties.

Column Sharing

In this multipitch design where possible column sharing has been utilised. This limits the visual impact of the installation on the surrounding area. There is shared columns between all the pitches optimising the layout and deterring from unnecessary columns.

Upward Light Ratio

In the documentation provided the designer has included visor technology in the units to remove Upward Light Ratio, declared at 0% and demonstrated in the example diagram.



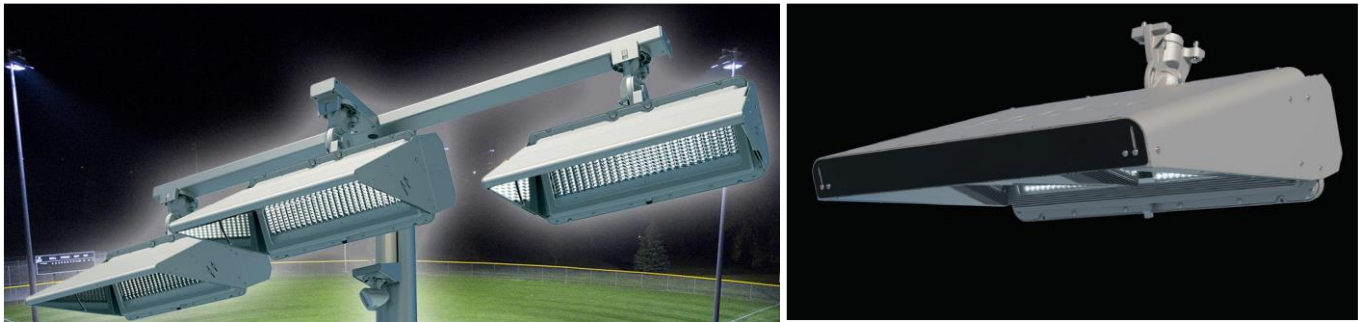
Foundation Design

The design of the bases shall be in line with the encountered ground conditions, and this will be structurally designed to comply.

Crosshead, Fittings and Luminaires

The floodlights used LED technology with individual LED lights sources mounted in clusters on boards on the front of the floodlight. The floodlights were fitted with external hoods/visors designed to reduce upward spill light and shield residential properties from excessive glare and spill light.. The product image 'TLC-1500 LED' floodlights. See overleaf.

DESIGN OVERVIEW CONTINUED....



The proposed floodlighting system has been designed by Musco Lighting using their TLC-1500 LED and TLC-1200 LED luminaires.

Pitch 1(Football) – Appendix A.1 – A.9

Six columns (S1-S6) at a 18.28m height, with a total load of 39.48 KW.

A scan Average of 515 Lux. There is 28 fixtures on the cross head of the TLC-1500 LED technology.

Pitch 2(Football) – Appendix A.1 – A.9

Three columns (S4, S5, & S6) at a 18.28m height and three columns (S7, S8, & S9) at 18.2m, with a total load of 36.66 KW.

A scan Average of 522 Lux. There is 26 fixtures on the cross head of the TLC-1500 LED technology.

Pitch 3 (Football) – Appendix A.1 – A.9

Six columns (S8-S11, S17) at a 18.2m height, with a total load of 36.66 KW.

A scan Average of 538 Lux. There is 26 fixtures on the cross head of the TLC-1500 LED technology.

Pitch 4 (Football) – Appendix A.1 – A.9

Six columns (S11-S16) at a 18.2m height, with a total load of 36.66 KW.

A scan Average of 529 Lux. There is 26 fixtures on the cross head of the TLC-1500 LED technology.

Training Pitch (Football) – Appendix B.1 – B.7

Two columns (P01 & P02) at 8.0m height, and two columns (P05 & P06) at 15.24m.

A total of 10 luminaire fixtures, 8 being TLC-LED-1200 and 6 being TLC-LED-1500 with a total load of 13.14 kW and a scan Average of 519 Lux.

Volleyball Court – Appendix B.1 – B.7

Two lighting columns (P01 & P07) , P07 of approximately 15.24 meters high, and P01 of approximately 8.0m with galvanized steel masts. A total of 6 TLC-LED-1200 luminaire fixtures, with a total load of 4.68 kW and a scan Average of 453 Lux.

DESIGN OVERVIEW CONTINUED....

Tennis Court – Appendix B.1 – B.7

Four lighting columns (P02, P03, P04 & P05) , two of approximately 15.24 meters high, and two of approximately 8.0m with galvanized steel masts. A total of 9 luminaire fixtures, 6 being TLC-LED-1200 and 3 being TLC-LED-1500 with a total load of 4.68 kW and a scan Average of 666 Lux.

General

Musco Lighting has produced comprehensive design calculations at points surrounding the Training Facility and out with the boundary. This can be seen in their design reference File #225315B · 23-Feb-23 and File #225315E· 13-Aug-24.

The calculations show mast locations, floodlight orientation, pitch illuminance levels and vertical spill values on the facades of residential properties along with contours showing the effective cut off light.

APPENDIX A.1

Document Name: Musco Design 225351B_Site Layout
Supplied by: Musco Lighting
Supplied Date: 01.05.2024



APPENDIX A.2

Document Name: Musco Design 225351B_Equipment List
Supplied by: Musco Lighting
Supplied Date: 01.05.2024

Liverpool Football Club Training Ground North Pitches

Liverpool, North West

Lighting System

Pole / Fixture Summary						
Pole ID	Pole Height	Mig Height	Fixture Qty	Luminaire Type	Load	Circuit
S1-S2	18.3	18.3	5	TLC-LED-1500	7.05 kW	A
S3	18.3	18.3	4	TLC-LED-1500	5.64 kW	A
S4	18.3	18.3	4	TLC-LED-1500	5.64 kW	A
		18.3	4	TLC-LED-1500	5.64 kW	B
S5	18.3	18.3	5	TLC-LED-1500	7.05 kW	A
		18.3	4	TLC-LED-1500	5.64 kW	B
S6	18.3	18.3	5	TLC-LED-1500	7.05 kW	A
		18.3	5	TLC-LED-1500	7.05 kW	B
S7	18.2	18.2	4	TLC-LED-1500	5.64 kW	B
S8	18.2	18.2	4	TLC-LED-1500	5.64 kW	C
		18.2	4	TLC-LED-1500	5.64 kW	B
S9	18.2	18.2	5	TLC-LED-1500	7.05 kW	B
		18.2	4	TLC-LED-1500	5.64 kW	C
S10, S17	18.2	18.2	5	TLC-LED-1500	7.05 kW	C
S11, S16	18.2	18.2	4	TLC-LED-1500	5.64 kW	C
		18.2	4	TLC-LED-1500	5.64 kW	D
S12, S15	18.2	18.2	5	TLC-LED-1500	7.05 kW	D
S13-S14	18.2	18.2	4	TLC-LED-1500	5.64 kW	D
17			106		149.48 kW	

Circuit Summary			
Circuit	Description	Load	Fixture Qty
A	Soccer 1	39.48 kW	28
B	Soccer 2	36.66 kW	26
C	Soccer 3	36.66 kW	26
D	Soccer 4	36.66 kW	26

Fixture Type Summary							
Type	Source	Wattage	Lumens	L80	L80	L70	Quantity
TLC-LED-1500	LED 5700K - 75 CRI	1410W	181,000	>120,000	>120,000	>120,000	106

Single Luminaire Amperage Draw Chart						
Driver (.80 min power factor)	Line Amperage Per Luminaire					
Single Phase Voltage	220 (50)	230 (50)	240 (50)	380 (50)	400 (50)	415 (50)
TLC-LED-1500	7.9	7.6	7.3	4.6	4.4	4.2

Light Level Summary

Calculation Grid Summary								
Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Min/Max	Min/Ave		
Blanket	Horizontal	137	0	789	0.00	0.00	A,B,C,D	106
Blanket	Max Vert Illuminance (by Light Bank)	198	0	1283	0.00	0.00	A,B,C,D	106
Soccer 1 Extension	Horizontal	299	101	463	0.22	0.34	A	28
Soccer 1	Horizontal Illuminance	515	385	691	0.56	0.75	A	28
Soccer 2	Horizontal Illuminance	522	368	707	0.52	0.70	B	26
Soccer 3	Horizontal Illuminance	538	409	675	0.61	0.76	C	26
Soccer 4	Horizontal Illuminance	529	410	684	0.60	0.78	D	26

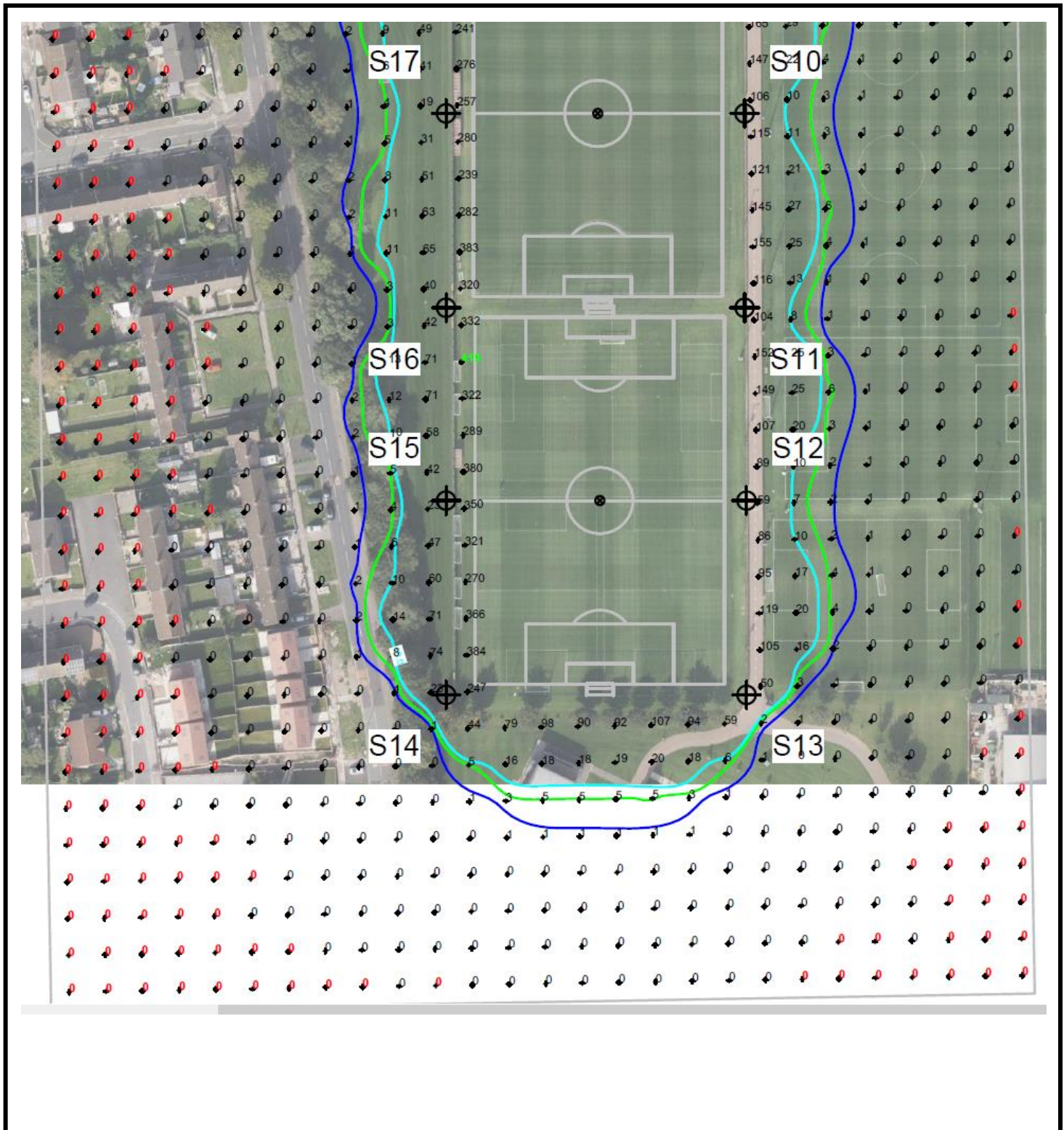
APPENDIX A.3

Document Name: Musco Design 225351B_Spill 1
Supplied by: Musco Lighting
Supplied Date: 01.05.2024



APPENDIX A.4

Document Name: Musco Design 225351B_Spill 2
Supplied by: Musco Lighting
Supplied Date: 01.05.2024



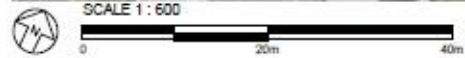
APPENDIX A.5

Document Name: Musco Design 225351B_Soccer Extension

Supplied by: Musco Lighting

Supplied Date: 01.05.2024

EQUIPMENT LIST FOR AREAS SHOWN									
Pole				Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	TIME PERIOD	OTHER	REMARKS
2	S1-S2	18.28m	-	18.28m	TLC-LED-1500	5	5	0	
2	S3	18.28m	-	18.28m	TLC-LED-1500	4	4	0	
2	S4	18.28m	-	18.28m	TLC-LED-1500	4/4*	4	4	
2	S5	18.28m	-	18.28m	TLC-LED-1500	5/4*	5	4	
2	S6	18.28m	-	18.28m	TLC-LED-1500	5/5*	5	5	
6	TOTALS					41	28	13	



APPENDIX A.6

Document Name:

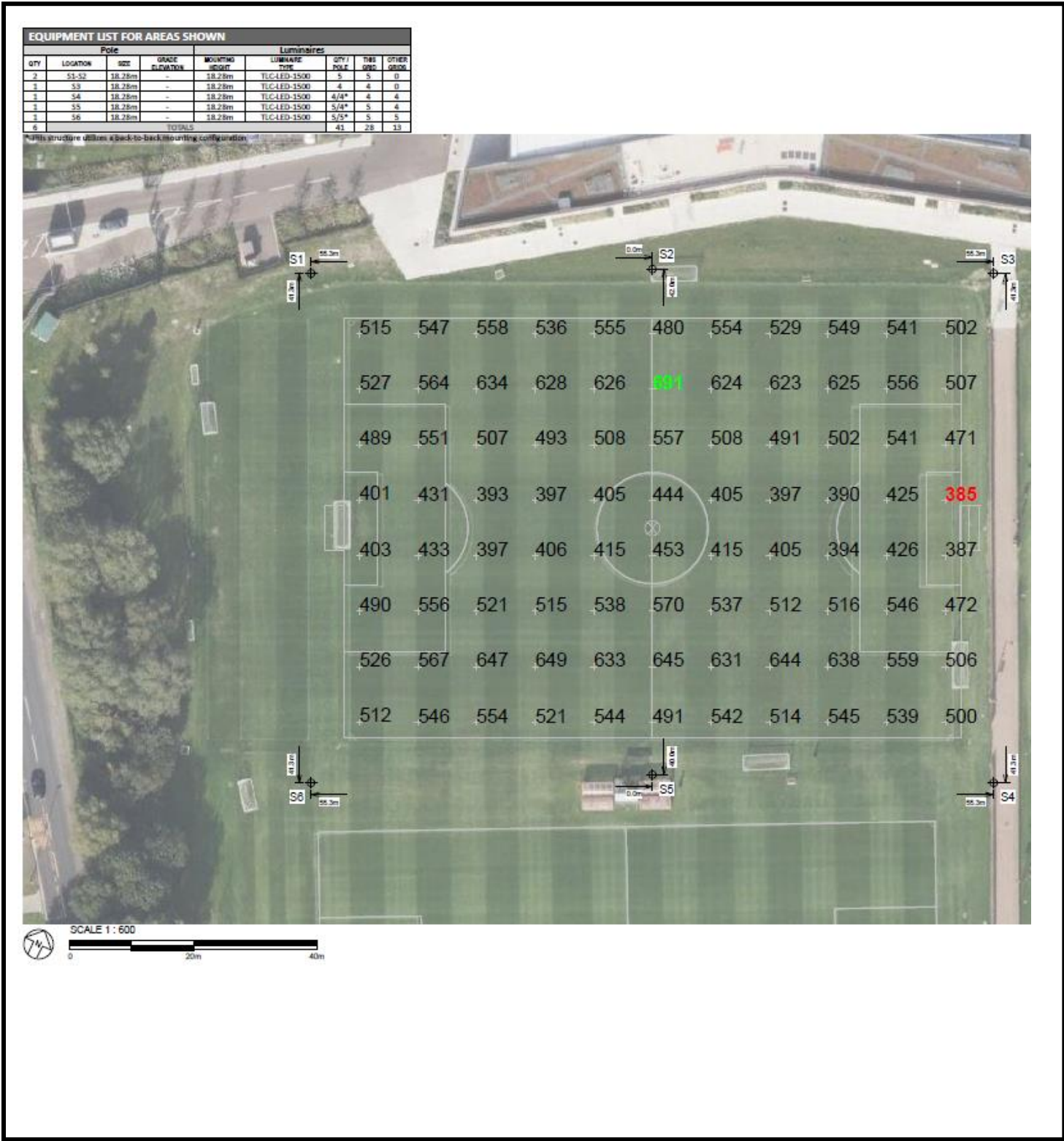
Musco Design 225351B_Soccer 1

Supplied by:

Musco Lighting

Supplied Date:

01.05.2024

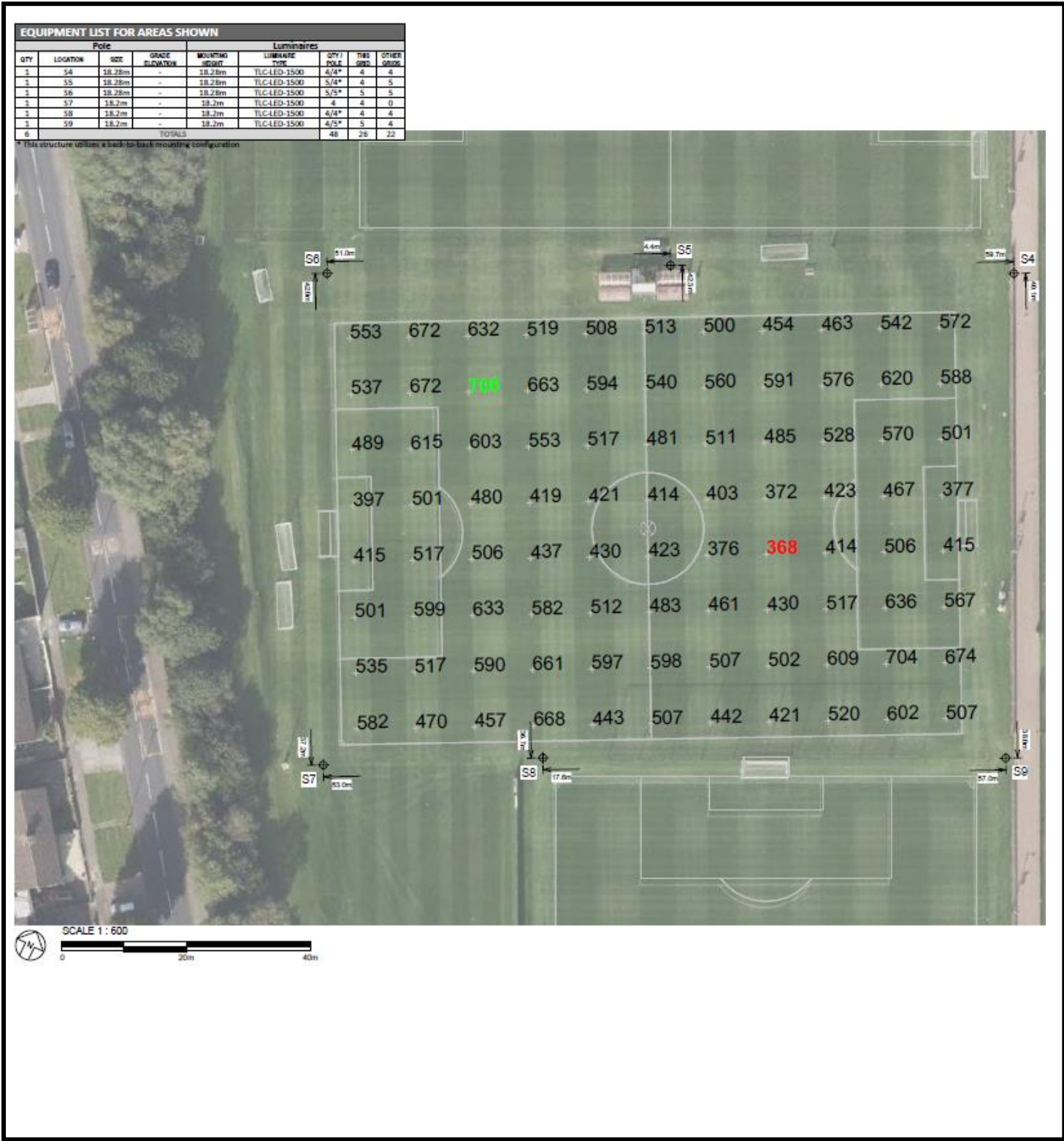


APPENDIX A.7

Document Name: Musco Design 225351B_Soccer 2

Supplied by: Musco Lighting

Supplied Date: 01.05.2024

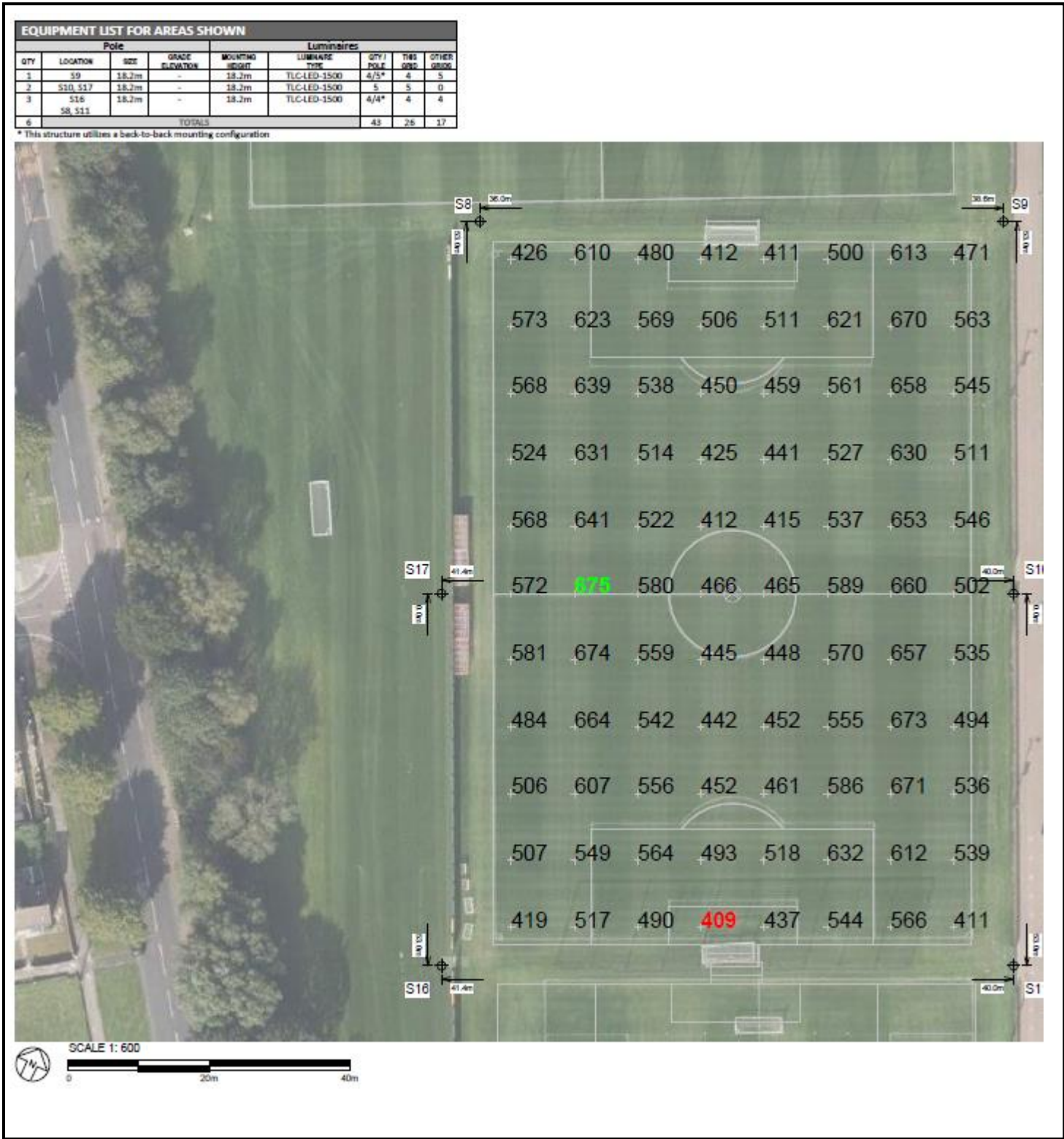


APPENDIX A.8

Document Name: Musco Design 225351B_Soccer 3

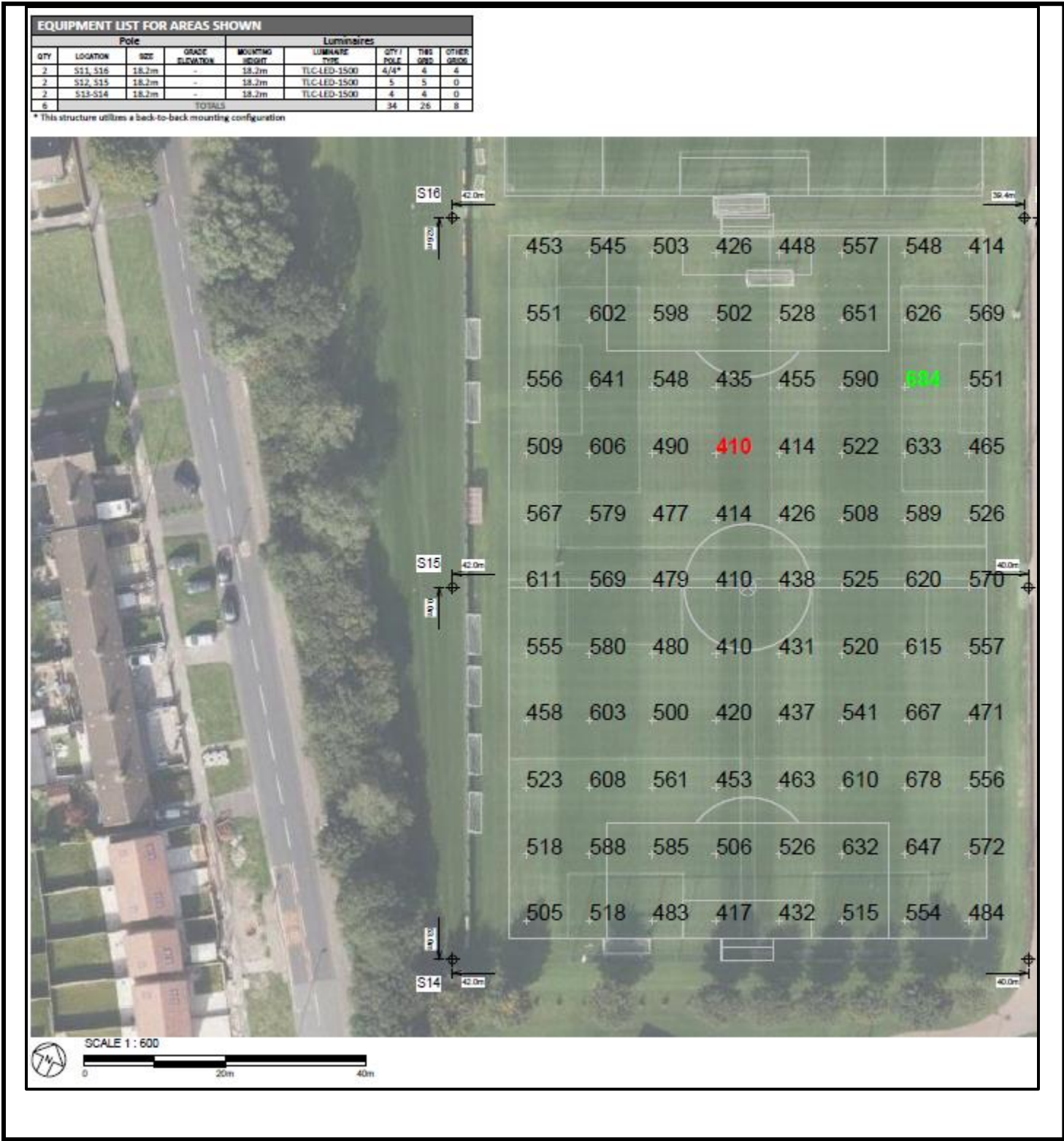
Supplied by: Musco Lighting

Supplied Date: 01.05.2024



APPENDIX A.9

Document Name: Musco Design 225351B_Soccer 4
Supplied by: Musco Lighting
Supplied Date: 01.05.2024



APPENDIX B.1

Document Name: Musco Design 22535E_Site Layout
Supplied by: Musco Lighting
Supplied Date: 20.08.2024



APPENDIX B.2

Document Name: Musco Design 22535E_Equipment list
Supplied by: Musco Lighting
Supplied Date: 20.08.2024

Liverpool Football Club Training Ground North Pitches

Liverpool, North West

Lighting System

Pole/Fixture Summary						
Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
P01	8.0 m	8.0 m	2	TLC-LED-1200	2.34 kW	B
		8.0 m	2	TLC-LED-1200	2.34 kW	C
P02	8.0 m	8.0 m	1	TLC-LED-1200	1.17 kW	A
		8.0 m	2	TLC-LED-1200	2.34 kW	B
P03	8.0 m	8.0 m	1	TLC-LED-1200	1.17 kW	A
P04	15.2 m	15.2 m	1	TLC-LED-1200	1.17 kW	A
P05	15.2 m	15.2 m	1	TLC-LED-1200	1.17 kW	A
		15.2 m	3	TLC-LED-1500	4.23 kW	B
P06	15.2 m	15.2 m	3	TLC-LED-1500	4.23 kW	B
P07	15.2 m	15.2 m	2	TLC-LED-1200	2.34 kW	C
7			18		22.50 kW	

Circuit Summary			
Circuit	Description	Load	Fixture Qty
A	Tennis	4.68 kW	4
B	Training Pitch	13.14 kW	10
C	Volleyball	4.68 kW	4

Fixture Type Summary							
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1200	LED 5700K - 75 CRI	1170W	150,000	>120,000	>120,000	>120,000	12
TLC-LED-1500	LED 5700K - 75 CRI	1410W	181,000	>120,000	>120,000	>120,000	6

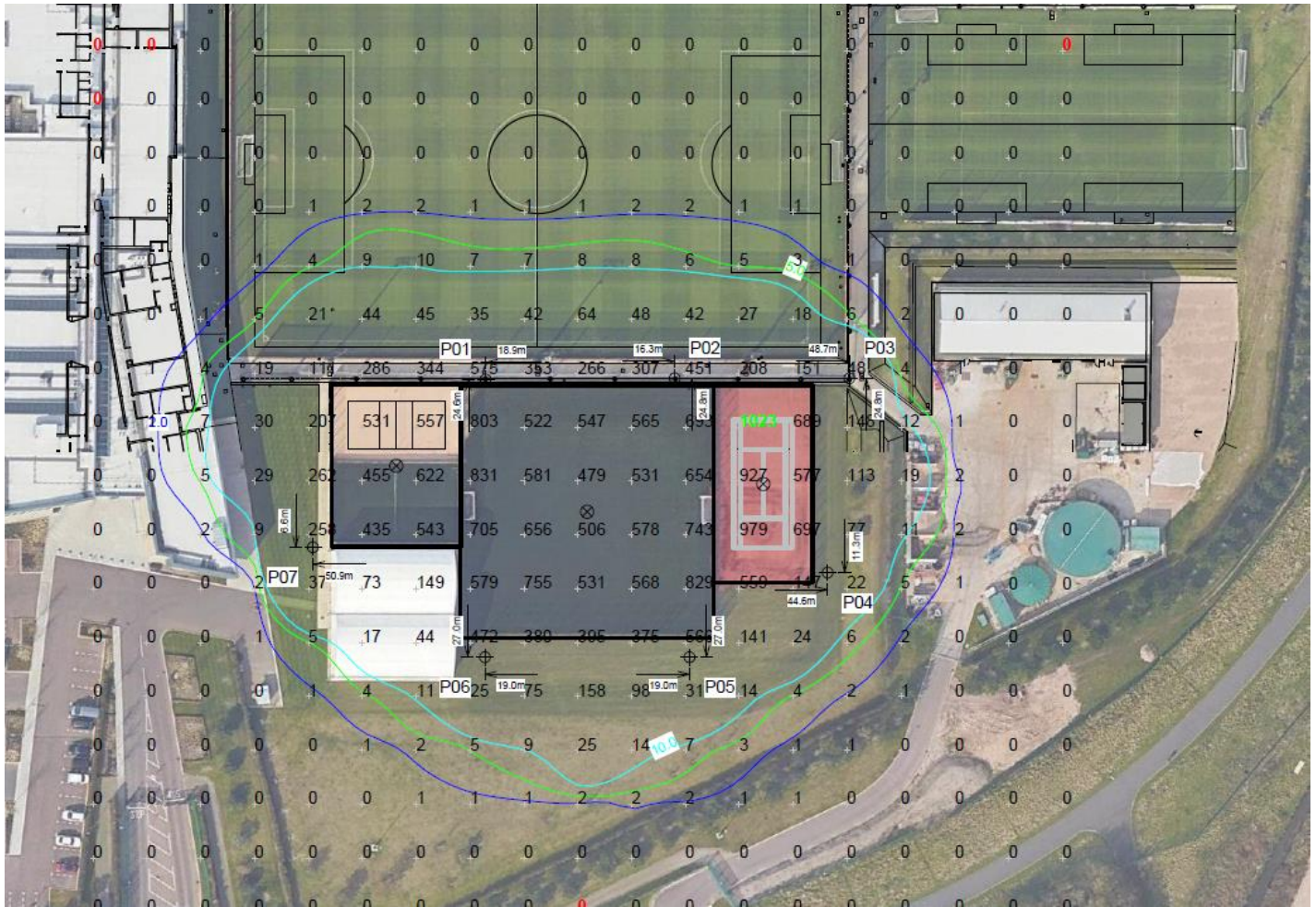
Single Luminaire Amperage Draw Chart						
Driver Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)					
	220 (50)	230 (50)	240 (50)	380 (50)	400 (50)	415 (50)
TLC-LED-1200	6.5	6.3	6.0	3.8	3.6	3.5
TLC-LED-1500	7.9	7.6	7.3	4.6	4.4	4.2

Light Level Summary

Calculation Grid Summary								
Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Min/Max	Min/Ave		
Spill Blanket	Horizontal	91.14	0	1023	0.00	0.00	A,B,C	18
Spill Blanket	Max Vert Illuminance (by Light Bank)	108.24	0	1229	0.00	0.00	A,B,C	18
Tennis	Horizontal Illuminance	665.56	495	863	0.57	0.74	A	4
Training Pitch	Horizontal Illuminance	518.99	395	753	0.53	0.76	B	10
Volleyball	Horizontal Illuminance	452.77	353	547	0.64	0.78	C	4

APPENDIX B.3

Document Name: Musco Design 22535E_Spill Blanket 1
Supplied by: Musco Lighting
Supplied Date: 20.08.2024



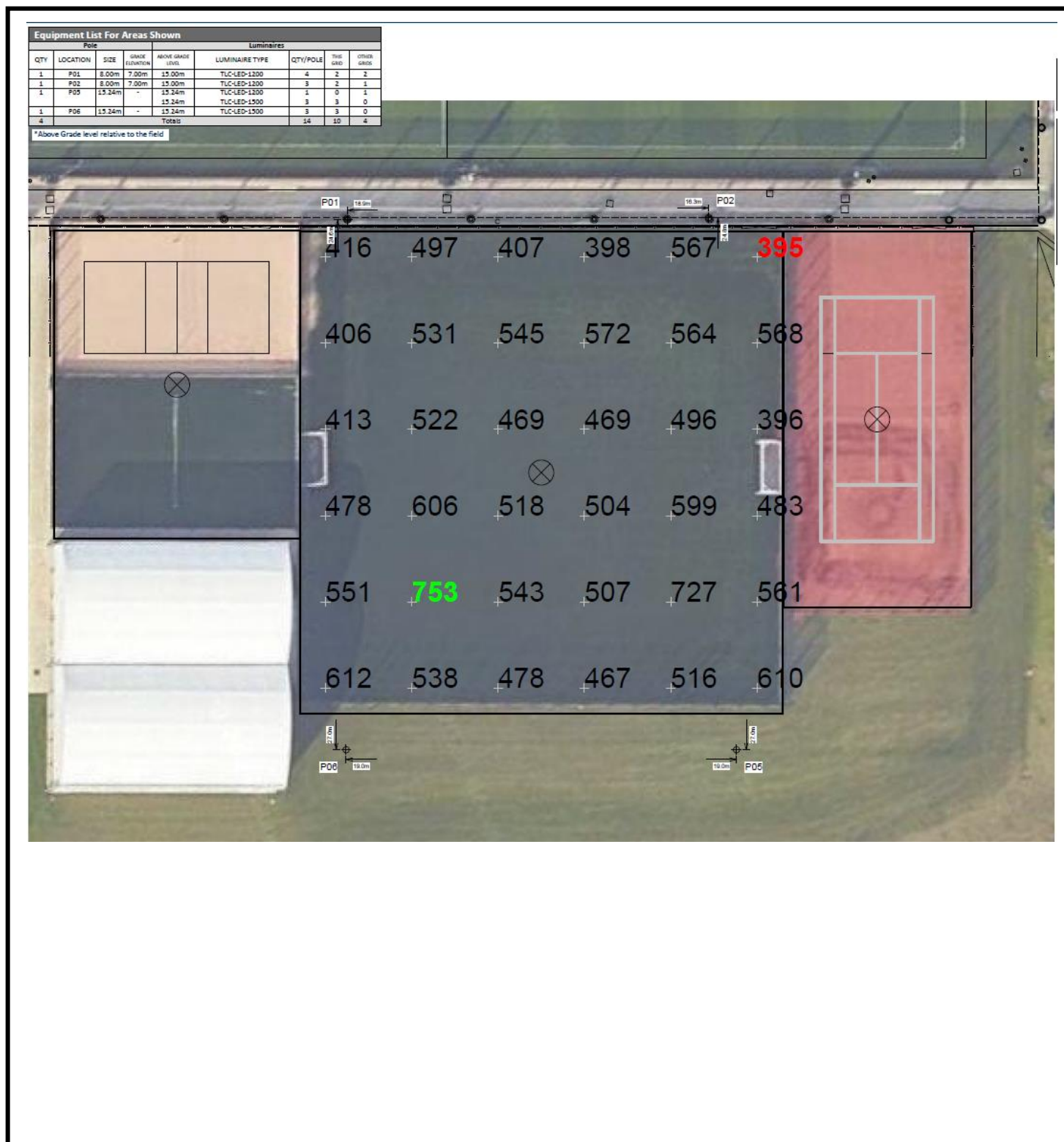
APPENDIX B.4

Document Name: Musco Design 22535E_Spill Blanket 2
Supplied by: Musco Lighting
Supplied Date: 20.08.2024



APPENDIX B.5

Document Name: Musco Design 22535E_Training pitch
Supplied by: Musco Lighting
Supplied Date: 20.08.2024

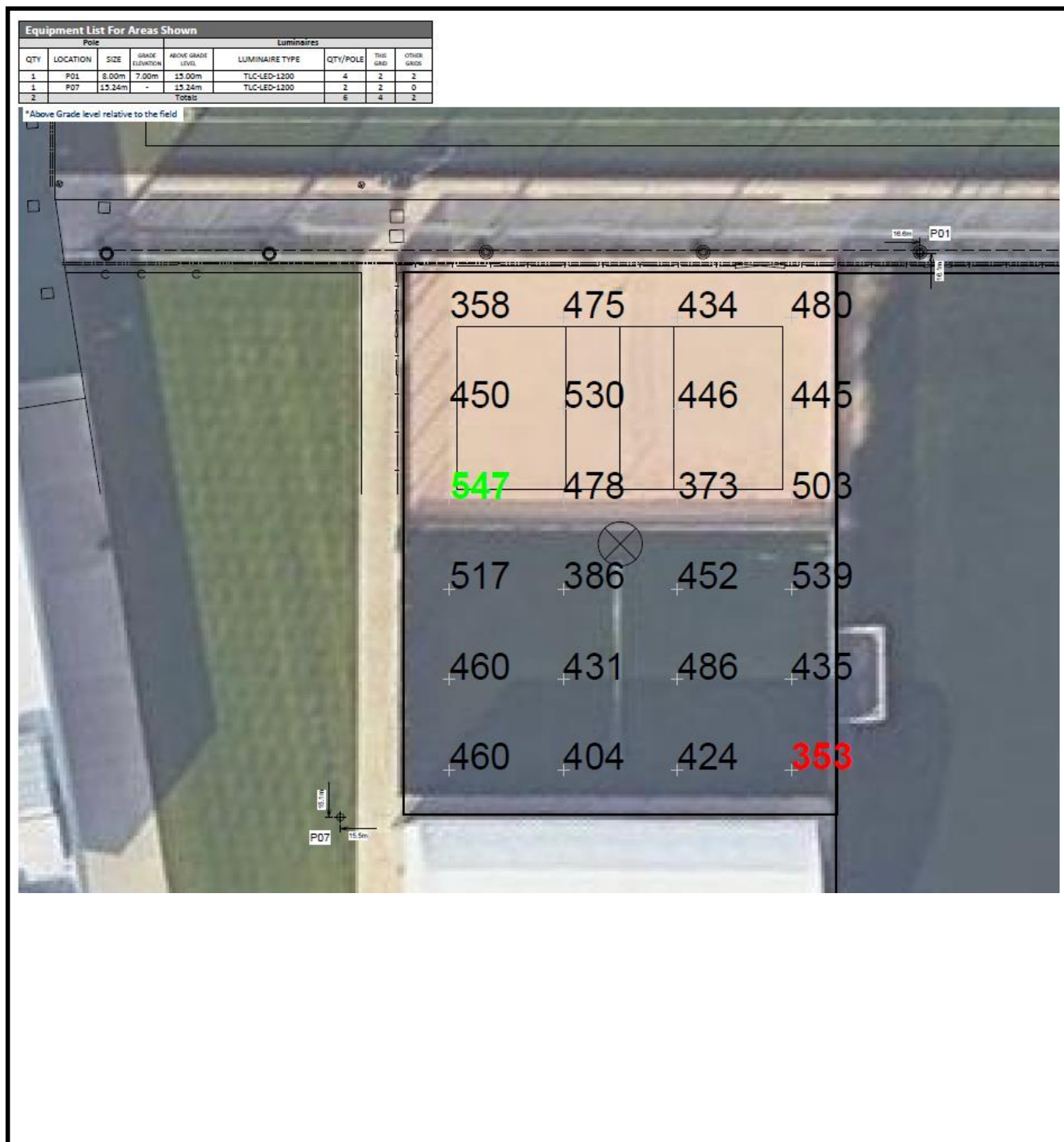


APPENDIX B.6

Document Name: Musco Design 22535E_Volleyball

Supplied by: Musco Lighting

Supplied Date: 20.08.2024

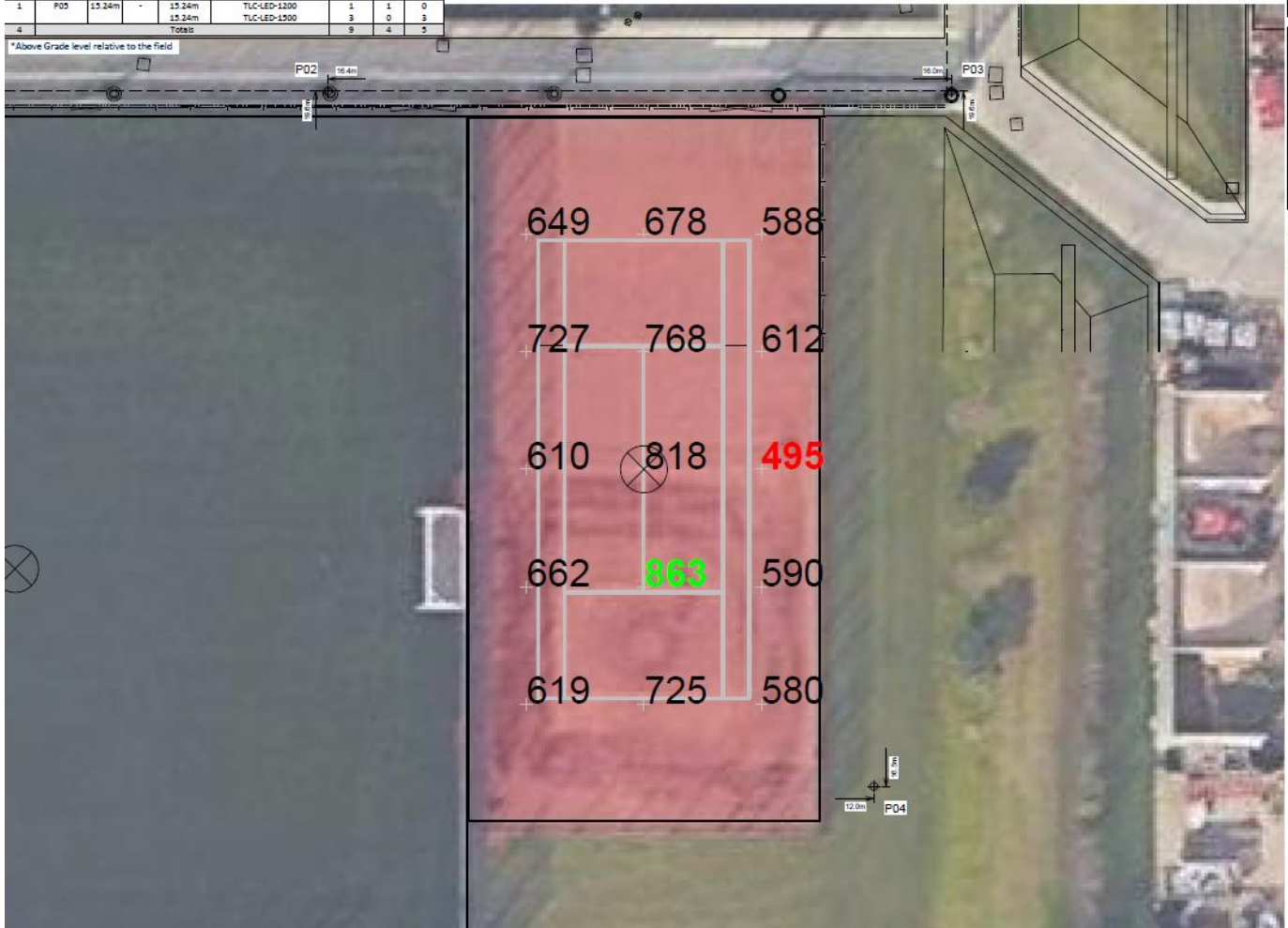


APPENDIX B.7

Document Name: Musco Design 22535E_Tennis
Supplied by: Musco Lighting
Supplied Date: 20.08.2024

Equipment List For Areas Shown							
Pole			Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	ABOVE GRADE LEVEL	LUMINAIRE TYPE	QTY/POLE	THIS GRADE
1	P02	8.00m	7.00m	15.00m	TLC-LED-1200	3	1
1	P03	8.00m	7.00m	15.00m	TLC-LED-1200	1	1
1	P04	15.24m	-	15.34m	TLC-LED-1200	1	1
1	P05	15.24m	-	15.34m	TLC-LED-1200	1	1
4	Totals					9	4

* Above Grade level relative to the field



GLOSSARY

Lumen The standard unit of light (luminous flux) used in describing light emitted by a source or received by a surface.

Illuminance and Maintained Illuminance(lumens/m2 or lux) Illuminance is the term used to describe the level of light on a surface in lumens/square metre or lux. Maintained illuminance is the term used to describe the average illuminance on a reference surface e.g. desktop, at the time maintenance has to be carried out.

Horizontal Illuminance The level of light falling on to a horizontal plane(ie The Ground).

Vertical Illuminance The level of light falling on to a vertical plane(ie The walls of a house).

Light Output Ratio (LOR) This is the ratio of the total light output of a luminaire, relative to the total light output of the lamp/s under reference conditions. Total LOR can be divided into downward(DLOR) and upward(ULOR) light output ratios if appropriate.

Light Intrusion (Light trespass, Overspill, Light into windows). The flow of light spilling outside the location boundary. With inadequate control Intrusive light may be sufficiently great as to provide a serious nuisance and disturbance to adjacent areas.

Glare. the uncomfortable brightness of a light source when viewed against a dark background Glare may be divided into 2 types known as disability and discomfort glare. In a Sports Lighting context it relates primarily to direct viewing of the floodlights. Only in severe situations would disability glare be experienced. In most instances it is discomfort glare that may result, causing annoyance to the viewer if inadequate screening of floodlights is not provided.

E1: Intrinsically dark landscapes National Parks, Areas of Outstanding Natural Beauty, etc

E2: Low district brightness areas Rural, small village, or relatively dark urban locations

E3: Medium district brightness areas Small town centres or urban locations

E4: High district brightness areas Town/city centres with high levels of nighttime activity

Obtrusive Light, whether it keeps you awake through a bedroom window or impedes your view of the night sky, is a form of pollution and can be substantially reduced without detriment to the lighting task.

Light Trespass, the spilling of light beyond the boundary of the property or area being lit, are all forms of obtrusive light which may cause nuisance

Sky Glow the brightening of the night sky above our towns, cities and countryside. Direct waste light from floodlights or indirect redirected light from the sports surface.

ILP The Institution of Lighting Professionals.

ILP 'Guidance notes for the reduction of light pollution' A booklet produced by the ILP providing advice on reducing the impact of exterior lighting installations on the environment. The degree of permissible overspill & ULOR varies depending on the environmental zone as categorized in the guidance notes. Due to the higher ambient lighting levels in built up areas the restrictions are not as stringent in city centres, where as dark landscapes & rural areas require tighter control

END OF REPORT



CLIENT FEEDBACK



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