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November 16, 2018

I. PURPOSE OF REPORT:

The purpose of this report is to discuss illumination guidelines included in the proposed "Soccer Club" text change to the City of Stamford Zoning Regulations. The proposed Soccer Club use contemplates the use of interior building lighting and exterior site lighting including building lighting, walkway and parking lot lighting, and field lighting. Due to the typical adjoining residential uses in the RA-2 and RA-3 zones, special considerations must be made to mitigate the quality of life impacts generated by site lighting of the proposed Soccer Club facility.

In this report we will evaluate the impact of site lighting at a typical athletic or other outdoor field facility, zoning regulations in Connecticut common to mitigate the impact this lighting, site specific considerations for approving boards and commissions, and the regulations proposed under the Soccer Club text change.

II. TYPICAL LIGHT GENERATION FOR ATHLETIC CLUBS AND ACCESSORY USES

Exterior lighting is typically designed using Illumination Engineering Society (IES) guidelines and specifications. The IES recommends the following levels of exterior lighting for various uses that could be found at the proposed Soccer Club:

- Parking Lot and associated roadways- 1.0 Foot Candles average/ 0.2 Foot Candles minimum
- Tennis Courts – 50.0 Foot Candles average/ 40.0 Foot Candles minimum (within the field of play)
- Soccer Fields – 30.0 Foot Candles average/ 20.0 Foot Candles minimum (within the field of play)
- Building Perimeter/walkways – 1.0 Foot Candles average/ 0.3 Foot Candles minimum
- Playgrounds- 30 Foot Candles average/20 Foot Candles minimum
- Concession Areas-40 Foot Candles average

A typical athletic facility layout is shown in Appendix I. A typical lighting layout with both vertical and horizontal light spill is shown in Appendix II. It can be seen that this typical lighting layout without lighting controls would create light spill beyond the 100' set back shown.

III. TYPICAL ZONING REGULATION LIGHTING CONTROLS:

In order to evaluate the lighting controls being proposed under this text change, we researched surrounding municipalities to ascertain typical requirements and limitations on athletic facilities within a Residential Zone. Municipalities researched included Stamford, Darien, Greenwich, New Canaan, Weston, Westport and Wilton. These communities were chosen because each contains very low density residential zones with minimum lot sizes of at least two acres and permit special exception uses, including athletic facilities, in these zones.

Nearly universally, all towns cited “Dark Sky” initiatives as suggested by The International Dark Sky Association, including requirements of glare free lamps and fixtures, but rarely mentioned exact illumination levels. Terminology used in the various zoning regulations is often subjective and therefore difficult to enforce. The International Dark Sky Association defines certain terminology and is repeated here for reference purposes.

- Light pollution is defined as "Any adverse effect of artificial light." The result of outdoor lighting that is not properly shielded and can produce light trespass defined as "light falling where it is not wanted or needed. Spill light. Obtrusive light."
- Light trespass would allow light to be directed into the eyes, neighbors windows, yards, or the night sky.
- Light shining into the night sky can produce sky glow which is defined as "diffused, scattered skylight attributable to the scattered light from sources on the ground."
- Light that shines into the eyes could be called glare and is defined as "intense and blinding light that reduces visibility. A light within the field of vision that is brighter than the brightness to which the eyes are adapted". .

IV. PROPOSED ZONING REGULATION LIGHTING CONTROLS:

We reviewed the proposed Soccer Club text change and identified the following sections that act as lighting controls. These sections act to mitigate the impact of Soccer Club lighting on adjoining properties. Beneath each section, we indicate how site lighting is mitigated.

19.3.2(f) 1 No parcel of land to be used for the above described purposes shall be less than fourteen (14) acres in area.

i. Large sites allow for appropriate location of facilities, away from adjoining properties to allow for screening and natural mitigation/diminution of light

19.3.2(f) 6 Any building whether principal or accessory and any lounging area or other area designed for active use shall be not less than one hundred feet (100') from the nearest property line of abutting residential property, and no part of any parking area shall be less than fifty feet (50') from any such property line.

i. Generous required yards create significant buffer areas that reduce light trespass and allow for appropriate screening. Illumination is inversely proportional to the square root of the distance from lamp to illuminated surface. Therefore a larger setback would reduce the amount of stray light

significantly i.e. a setback distance of 100 ft vs. 50 ft would reduce the amount of light on the illuminated surface by 75%. Also parking lot illumination levels are significantly lower than those prescribed for an athletic field, thereby allowing lesser setbacks to be appropriate for parking lots.

19.3.2(f) 7 There shall be a landscape buffer of not less than fifty feet (50') in depth, prepared in consultation with a Connecticut licensed arborist, to visually screen areas designed for active use from abutting residential properties.

19.3.2(f) 8 The minimum front yard distance shall be governed by the Regulations applicable to the district or districts wherein such use is to be located.

i. 60' from street line/85' from center line of street

19.3.2(f) 9 The maximum building height shall be governed by the Regulations applicable to the district or districts wherein such use is to be located.

i. 3 stories/35'

19.3.2(f) 10 All exterior lighting fixtures shall be fully shielded, and lights shall be so designed and located such that their beams are not directed into residential areas or into the public highway in a manner resulting in an intensity of lighting as measured by a light meter with a cosine corrector exceeding one-tenth (0.1) of a foot candle at all property lines. No exterior flashing, strobe, or search lights are permitted.

19.3.2(f) 11 There shall be no restaurant, café, or other permanent or temporary concession stand, food-truck, or snack bar permitted on the premises.

i. As stated in Section II. concession areas are normally illuminated at 40 Foot candles average. This regulation would totally eliminate this source of lighting trespass or spill.

19.3.2(f) 12 The Zoning Board of Appeals may impose any other reasonable conditions with regard to the operation of a Soccer Club in keeping with section 19.3.2(b) of these Regulations.

i. Permits site specific discretion

19.3.2(f) 13 All records necessary to permit checking for compliance with these Regulations shall be made available to the Zoning Enforcement Officer on request.

i. Permits review of lighting maintenance settings logs if such exist

V. SITE SPECIFIC CONSIDERATIONS:

A detailed lighting design, utilizing IES standards and other good practices would need to be performed and approved by a municipality for a project on a Soccer Club site. Plans should include but not necessarily be limited to the following:

- Site plan showing all new exterior lighting fixtures, poles, circuitry, etc.
- Details and specifications of all proposed fixture types indicating lamp wattage, type, lumens, color rendition, etc.
- Proposals for shading of all fixtures per Dark Sky initiatives.
- A photometric plan, prepared at proper scale, showing calculated footcandle levels throughout the property. Generally speaking, a photometric plan using a 10' x 10' matrix is sufficient for approval. Special care should be taken at all property lines and roadway abutments.
- Details and narrative of site lighting control including photocell controls, time clock controllers and override systems need to be included.

VI. FURTHER LIGHT CONTROL:

In addition to the section cited above, to meet and exceed IES and standard good practices, O'Donnell Law LLC is proposing a 50' minimum landscape buffer to visually screen any active club areas from abutting residential properties. This screening along with proper lighting fixture selection, controls and placement should mitigate any objectionable stray light and glare.

Further, all exterior lighting would need to be on photocell controls as well as time clock controllers per the International Energy Conservation Code, 2017 Edition and any other controls that the City would deem appropriate.

As an additional enhancement of the proposed screening, the location of fixtures will also take advantage of topographical features to enhance shielding of the lighting fixtures.

Enforcement of the proposed ordinance would entail a detailed plan review prior to construction which would include the aforementioned photometric plan of the site, setbacks and all other details to show compliance with the ordinance.

After construction, the Zoning Official can verify the field conditions meet all photometric requirements with a photometer.

Most Zoning Enforcement Officers that we spoke with did not have light meters, but nearly all Fire Marshals and Building Officials have them to verify emergency lighting levels.

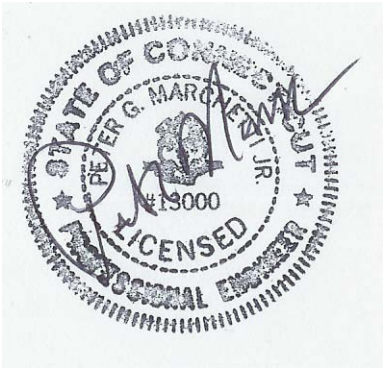
VII. CONCLUSION:

We feel confident that if all new lighting is designed and installed in accordance with approved IES Standards and the Zoning Regulation text change as written, it will ensure a well lighted facility that will have no adverse effects on their adjoining neighbors and roadways.

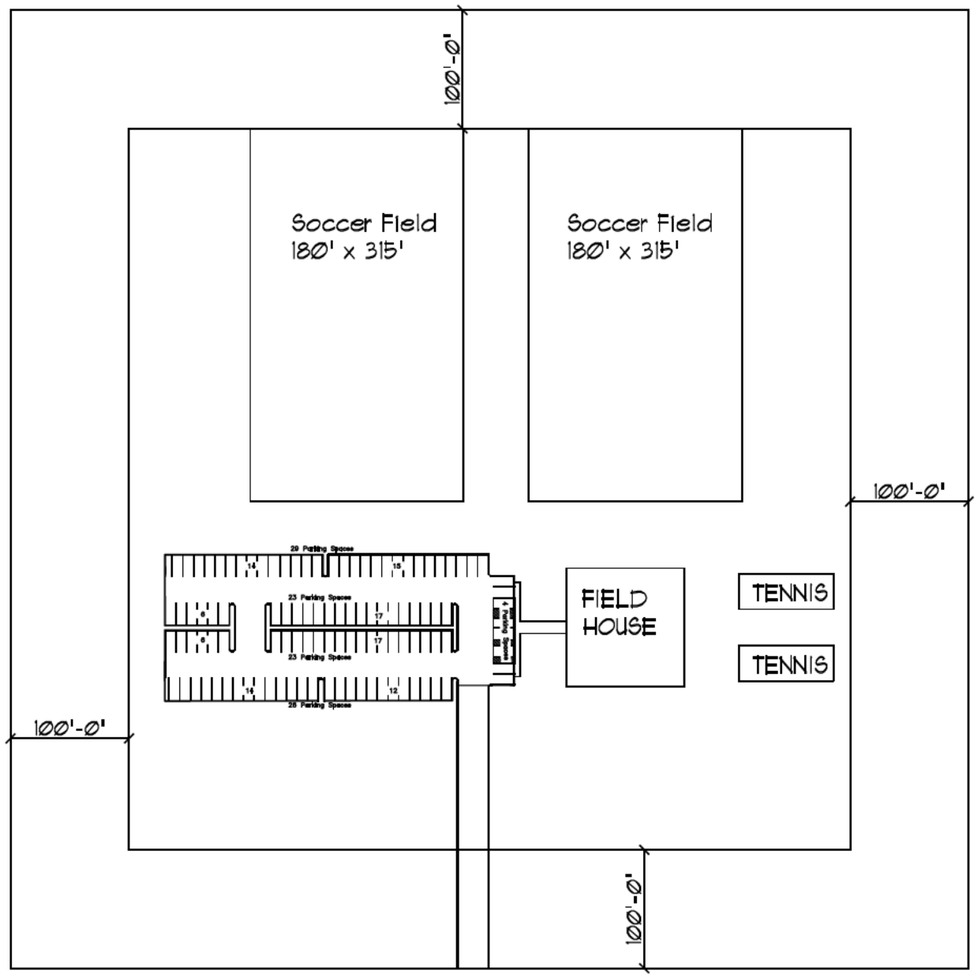
The fact that O'Donnell Law LLC included a concrete number of 0.1 Foot Candles of intensity at all property lines provides a measurable value on which to evaluate the final installation.

We believe that the lighting criteria that O'Donnell Law LLC has proposed for the text change to the City of Stamford Zoning Regulations are thorough, prudent and equitable both for any Athletic Club activity and its residential neighbors.

Peter G. Marchetti
Marchetti Consulting Engineers



APPENDIX I



14 acres = 609,840 sf

5% Building coverage allowed = 30,492 sf

Building coverage proposed = 10,000 sf

(1) Field House @ 10,000 sf

25% Site coverage allowed = 152,460 sf

Site coverage proposed = 59,852 sf

(2) Tennis Couts @ 4,800 sf.

(1) Field House @ 10,000 sf.

(1) Parking coverage for 105 spaces @ 35,052sf

(1) Parking driveway and circulation @ 10,000 sf

2018-05-08

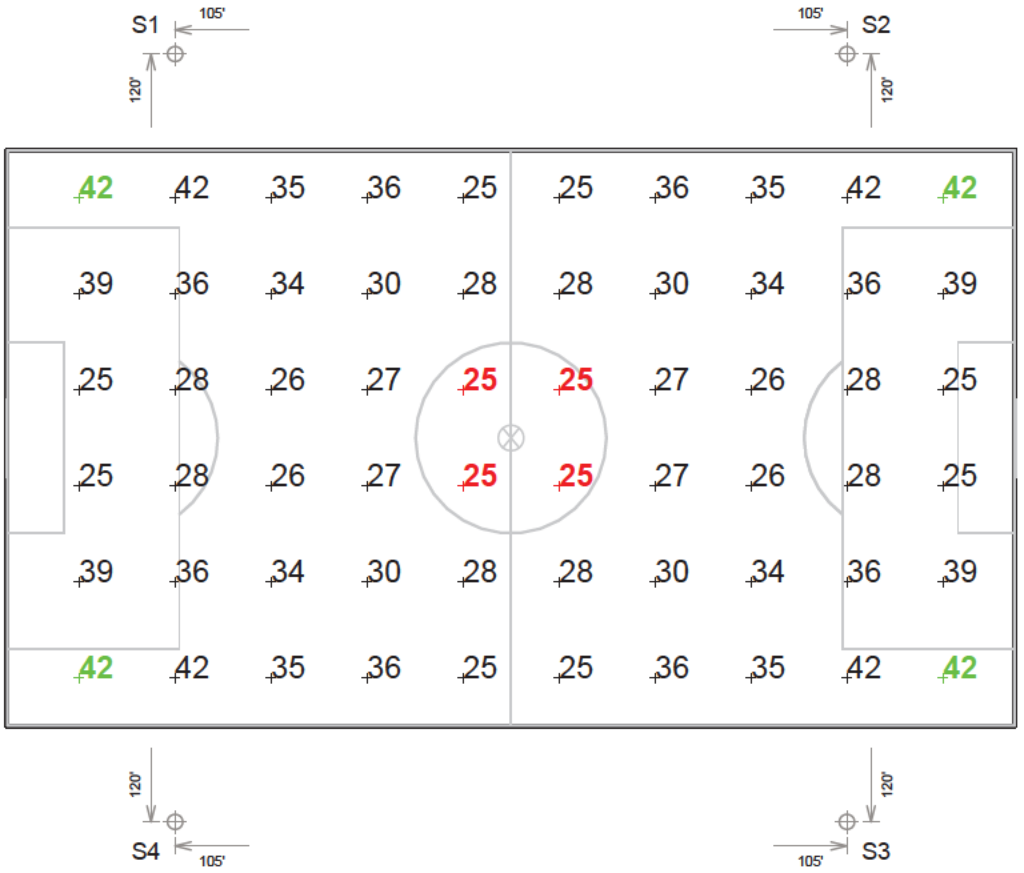
SOCCER CLUB CONCEPT PLAN

RIDBERG + Associates
Ridberg & Associates, Architects, PC
20 Church Street, Suite A4
Greenwich, CT 06830
203 625 0491
203 625 0621 (FAX)
www.ridarch.com

APPENDIX II

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-1150	5	5	0
4	TOTALS					20	20	0



SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

ENGINEERED DESIGN By: • File #so5040_4p-1150_b • 06-Jun-17

PROJECT NAME

PROJECT LOCATION

GRID SUMMARY

Name:	**Soccer**
Size:	315' x 180'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Guaranteed Average:	**30**
Scan Average:	32.05
Maximum:	42
Minimum:	25
Avg / Min:	1.27
Guaranteed Max / Min:	**2.5**
Max / Min:	1.67
UG (adjacent pts):	1.55
CU:	0.74
No. of Points:	60

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	**20**
Total Load:	23.0 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>51,000	>51,000	>51,000

Reported per TM-21-11. See luminaire datasheet for details.

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0 95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

We Make It Happen.

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-1150	5	5	0
4	TOTALS					20	20	0

PROJECT NAME

PROJECT LOCATION

GRID SUMMARY

Name:	**150' Spill**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0009**
Maximum:	0.01
Minimum:	0.00
No. of Points:	65

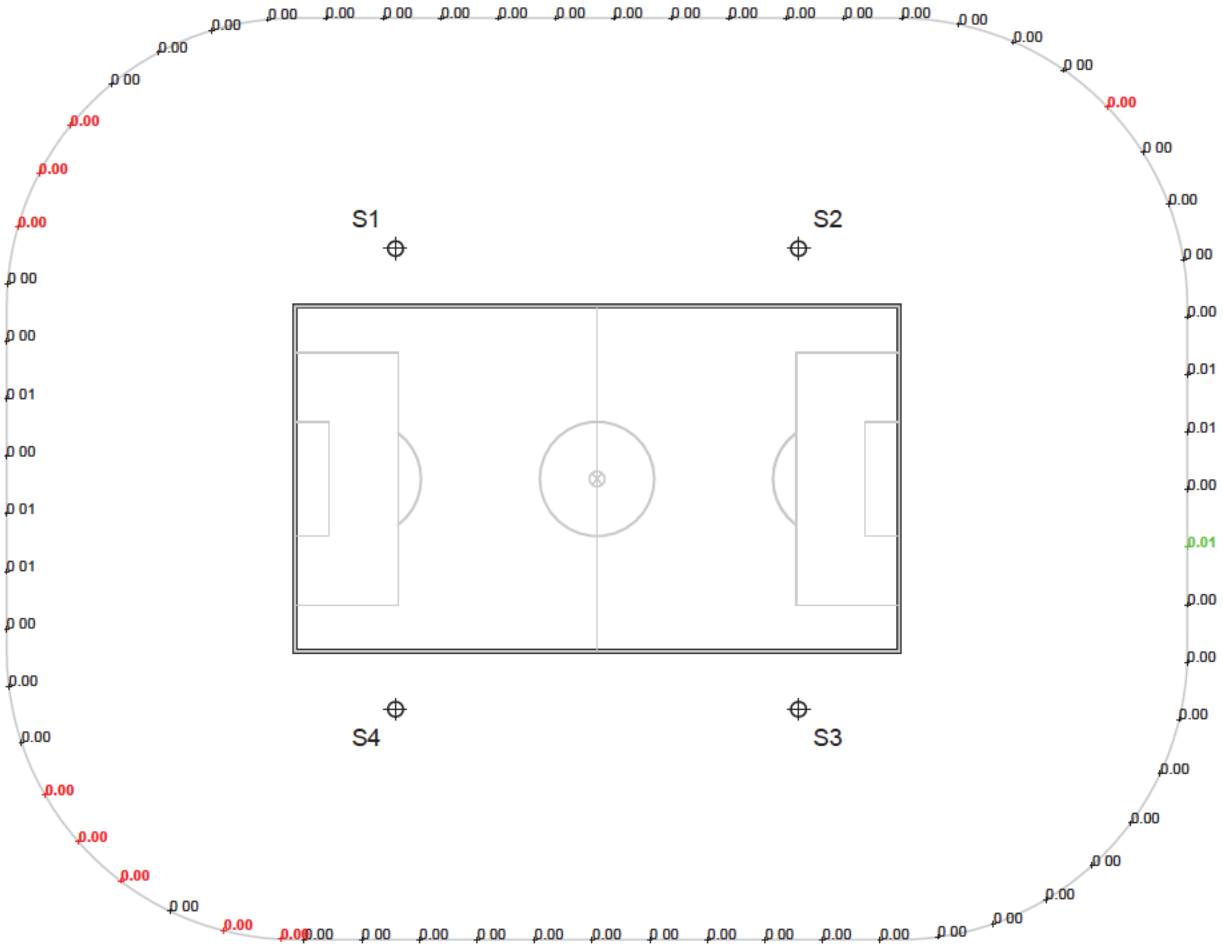
LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	**20**
Total Load:	23.0 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>51,000	>51,000	>51,000

Reported per TM-21-11. See luminaire datasheet for details.



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0 95 dirt depreciation factor.

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Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

musco Lighting

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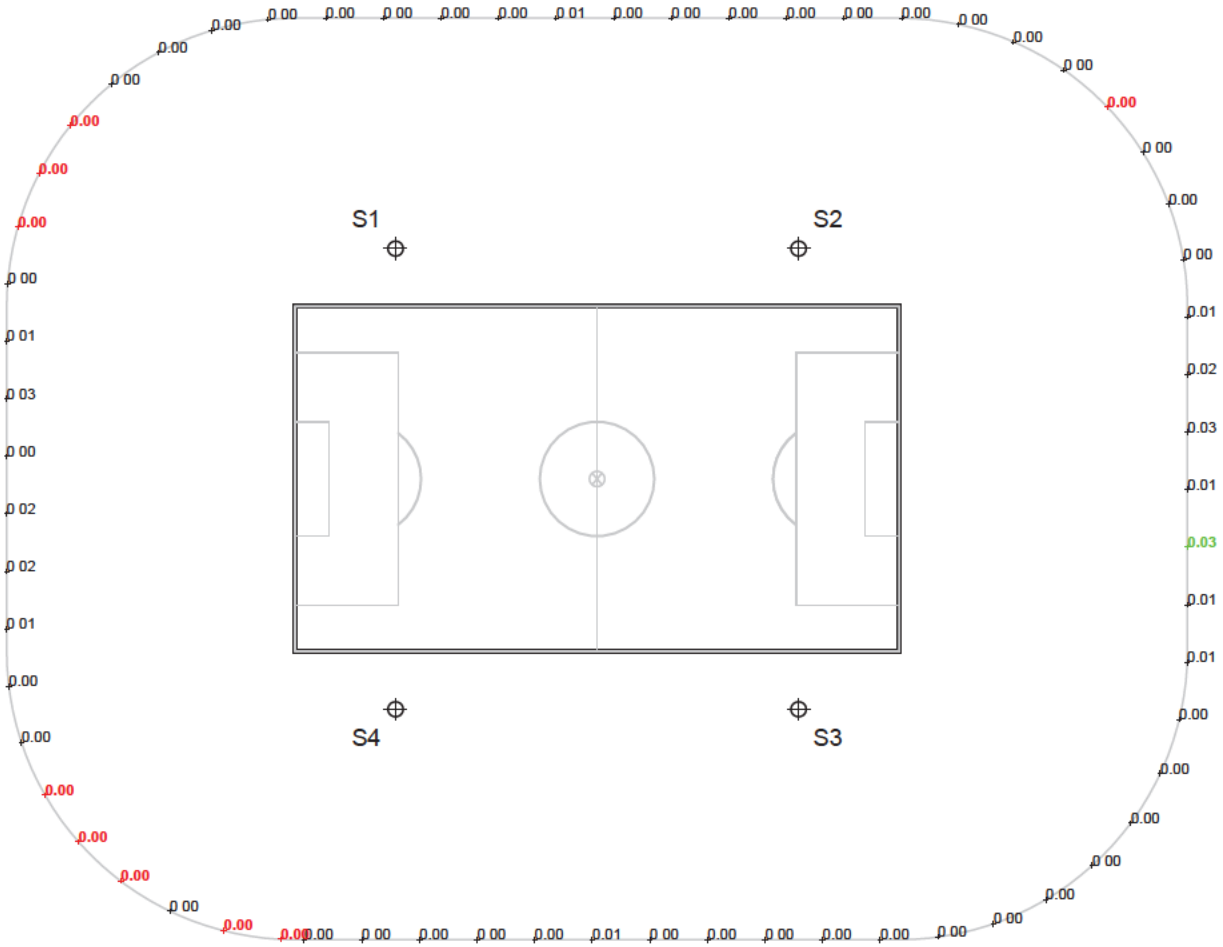
ENGINEERED DESIGN By: • File #so5040_4p-1150_b • 06-Jun-17

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	S1-S4	60'	-	60'	TLC-LED-1150	5	5	0
4	TOTALS					20	20	0



SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

PROJECT NAME

PROJECT LOCATION

GRID SUMMARY

Name:	**150' Spill**
Spacing:	30.0'
Height:	3.0' above grade

ILLUMINATION SUMMARY

MAINTAINED MAX VERTICAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0036**
Maximum:	0.03
Minimum:	0.00
No. of Points:	65

LUMINAIRE INFORMATION

Color / CRI:	5700K - 75 CRI
Luminaire Output:	121,000 lumens
No. of Luminaires:	**20**
Total Load:	23.0 kW

Lumen Maintenance

Luminaire Type	L90 hrs	L80 hrs	L70 hrs
TLC-LED-1150	>51,000	>51,000	>51,000

Reported per TM-21-11. See luminaire datasheet for details.

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ENGINEERED DESIGN By: • File #so5040_4p-1150_b • 06-Jun-17