



# **FAIRFAX COUNTY PARK AUTHORITY**

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## **ATHLETIC FIELD LIGHTING SYSTEMS**

### **Performance Outline Specifications**

**Revision 3.3**

**July 28, 2010**

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# ATHLETIC FIELD LIGHTING SYSTEMS SYSTEMS PERFORMANCE OUTLINE SPECIFICATIONS

## 1.0 APPLICABILITY

These Specifications are applicable to and prescribe minimum performance requirements for the following types of athletic fields (*see Attachment Figures 1 to 6 for field layout drawings*):

<u>Field Type</u>	<u>Field Dimensions</u>
1. Small Rectangular Field ( <i>see Figure 1</i> ) .....	180 ft x 360 ft
2. Large Rectangular Field ( <i>see Figure 2</i> ) .....	210 ft x 360 ft
3. Little League - U13 / Fast Pitch Diamond Field ( <i>see Figure 3</i> ).....	200 ft x 200 ft x 200 ft
4. Slow Pitch / Softball Diamond Field ( <i>see Figure 4</i> ) .....	300 ft x 300 ft x 300 ft
5. Babe Ruth / Baseball Diamond Field ( <i>see Figure 5</i> ).....	310 ft x 380 ft x 310 ft
6. Overlay Field (Slow Pitch / Softball Diamond and Small Rectangular Fields) ( <i>see Figure 6</i> )	

## 2.0 GENERAL DESIGN CRITERIA

1. IBC International Building Code..... (IBC)
  2. Virginia Uniform Statewide Building Code..... (VUSBC)
  3. Fairfax County Zoning Ordinance (December 5, 2006)..... (FCZO)
  4. Illuminating Engineering Society of North America standards.....(IESNA)
  5. American Association of State Highway and Transportation Officials.....(AASHTO)
  6. Class of Play Category (IESNA RP-6-01) .....
  7. Lighting Environmental Zone Classification (IESNA RP-33-99)..... E2 and E3
  8. Luminaires (including spill and glare control devices)..... UL 1598-00
  9. Light Loss Factor (LLF) .....
  10. Aimable system
- Alternate Light Loss Factors (LLF) will be considered. A Tilt Factor is required when applicable.

## 3.0 ELECTRICAL REQUIREMENTS

1. Voltage .....480 Volt, 3 Phase
2. Voltage drop (max)..... 3% in any run, or 5% in the total electrical system
3. Lamps .....1,500 Watt metal halide
4. Electrical equipment enclosures..... NEMA 3R

#### **4.0 LIGHTING PERFORMANCE REQUIREMENTS**

( see Table 1 below )

#### **5.0 REMOTE CONTROL SYSTEM REQUIREMENTS**

- 5.1 A security code based, 24-hour, remote control system that enables Owner and/or authorized user to remotely turn the system on or off, control the field lighting schedule, and monitor the system, using telephone and web based or software driven computer.
- 5.2 The remote control system shall be protected against power outages and memory loss, shall reboot to real-time once power is restored, and execute any commands issued prior to the outage.
- 5.3 The remote control system shall monitor and provide reports of actual lighting system usage.
- 5.4 On-site equipment shall include manual on/off switches for maintenance and for manual operation.
- 5.5 System shall be capable of operating any given field from multiple computers via the Internet.

#### **6.0 POLE AND FOUNDATION REQUIREMENTS**

- 6.1 Pole Locations..... As shown on Figures 1 to 6  
Modification of pole locations only by approval of Owner.
- 6.2 Pole Height.....( *see Table 2 below* )
- 6.3 Pole Material ..... Hot-dip galvanized ASTM A595 Grade A or A572 Grade 65 steel, or precast concrete
- 6.4 Foundation Material ..... Reinforced concrete
- 6.5 Direct-Embedded Steel Poles..... Not acceptable
- 6.6 Design of poles and foundations shall be based on the 2003 edition of the International Building Code, wind speed of 90 mph, 3 second gust, exposure category C.
- 6.7 Design of luminaire, visor, and crossarm assembly shall be based on AASHTO: Wind speed of 125 mph with 1.3 gust factor, and maintaining luminaire aiming alignment.
- 6.8 Soil Conditions: Owner to provide geotechnical information (Boring Logs) at time of bid.
- 6.9 Design of poles, pole foundations, and crossarms shall be certified, signed and sealed by a Virginia State licensed Professional Engineer.

#### **7.0 WARRANTY AND MAINTENANCE REQUIREMENTS**

- 7.1 The lighting system manufacturer shall provide all materials and labor to ensure all lighting system components, excluding lamps, remain in good operating condition for a 10 year Warranty Period.
- 7.2 The lighting system manufacturer shall provide all materials and labor to ensure the lighting system performs as designed, throughout the Maintenance Period of 9,000 service hours or 15 years, whichever occurs first. During the Maintenance Period the manufacturer shall:
  1. Maintain horizontal lighting levels within  $\pm 10\%$  of the maintained average horizontal illuminance level for the entire field.
  2. Group-replace all lamps when they reach the end of their service life as specified by the lamp manufacturer.
  3. Spot-replace individual lamps when 10% of the lamps are extinguished on the entire athletic field or more than one lamp is extinguished on any one pole.
- 7.3 All repairs shall be made within 2 weeks of notification.

## **TABLES**

**Table 1 • Lighting Performance Requirements**

<b>LIGHTING PERFORMANCE REQUIREMENTS</b>	<b>RECTANGULAR FIELDS</b>			<b>DIAMOND FIELDS</b>		
	<b>On-Field</b>	<b>Off-Field Standard A<sup>2</sup></b>	<b>Off-Field Standard B</b>	<b>Infield</b>	<b>Outfield</b>	<b>Off-Field Standard B</b>

**ON-FIELD ILLUMINATION REQUIREMENTS**

Class of Play Category [IESNA RP-6-01]	III			III		
Lighting Environmental Zone Classification [IESNA RP-33-99]	E2 ~ E3			E3		
Light Loss Factor (LLF)	0.80			0.80		
Maximum on-field maintained average horizontal illuminance [FCZO Sect.14-904]	50 fc <sup>1</sup>			60 fc	40 fc	
Minimum on-field maintained average horizontal illuminance	33 fc			55 fc	33 fc	
Uniformity Ratio (max)	3 : 1			2 : 1	2.5 : 1	
On-field calculation grid spacing	30 ft <sup>1</sup> x 30 ft			30 ft x 30 ft		
On-field measurement grid spacing (max)	30 ft x 30 ft			30 ft x 30 ft		

**OFF-FIELD SPILL LIGHT LIMITATION REQUIREMENTS**

Maximum permitted initial vertical spill light		0.3 fc	0.8 fc			0.8 fc
Distance from the edge of the playing surface, foul line, or outfield fence line to the off-field Spill Light Measurement Line		150 ft				150 ft
Calculation and measurement point spacing along the off-field Spill Light Measurement Line		30 ft				30 ft

**OFF-FIELD GLARE (SOURCE INTENSITY) LIMITATION REQUIREMENTS**

Maximum permitted initial glare		7,000 cd <sup>1</sup>	12,000 cd			12,000 cd
Distance from the edge of the playing surface, foul line, or outfield fence line to the off-field Glare Measurement Line		200 ft				200 ft
Calculation and measurement point spacing along the off-field Glare Measurement Line		30 ft				30 ft

*Notes:*

1. Units: cd (candela); fc (footcandle); ft (foot)
2. Off-Field Standard 'A' is generally applicable to rectangular fields with an edge of the playing surface within 200 ft from an adjacent residential property line.

**Table 2 • Lighting Pole Height Requirements**  
*(relative to reference ground elevation of playing field)*

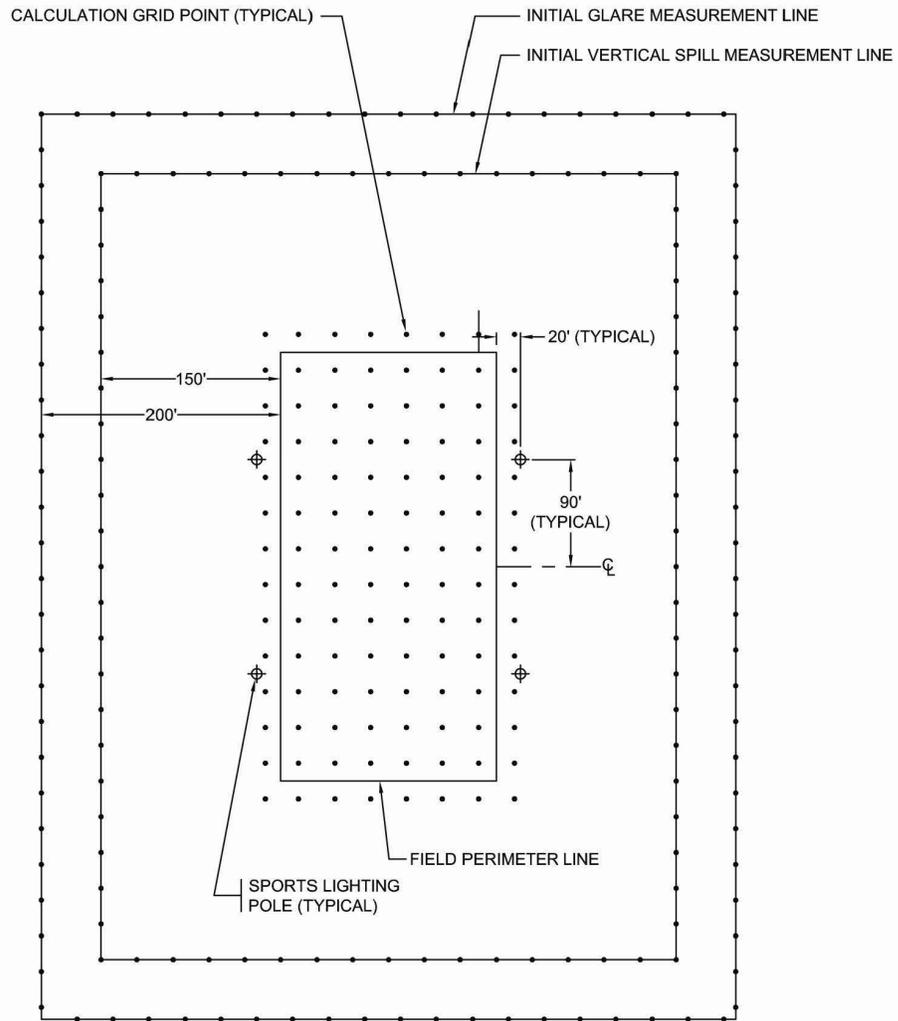
Attachment Figure	ATHLETIC FIELD		POLE HEIGHT (ft)	
	Type	Poles	Min.	Max.
1	<b>Small Rectangular Field</b> (180ft x 360 ft)	All	70	90
2	<b>Large Rectangular Field</b> (210 ft x 360 ft)	All		
3	<b>Little League - U13 / Fast Pitch Diamond Field</b> (a.k.a. 60 ft Diamond Field) (200 ft x 200 ft x 200 ft)	A	80	
		B		
4	<b>Slow Pitch Softball Diamond Field</b> (a.k.a. 65 ft Diamond Field) (300 ft x 300 ft x 300 ft)	A	70	
		B		
		C		
5	<b>Babe Ruth Baseball Diamond Field</b> (a.k.a. 90 ft Diamond Field) (310 ft x 380 ft x 310 ft)	A	70	
		B		
		C		
		D		
6	<b>Overlay Field</b> (Combined Slow Pitch Softball Diamond and Small Rectangular Fields) (see dimensions above)	A	80	
		B		
		C	70	
		D		

**TYPICAL ATHLETIC FIELD LAYOUTS**

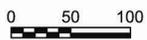
**FIGURES 1 - 6**

**GLARE ANALYSIS**

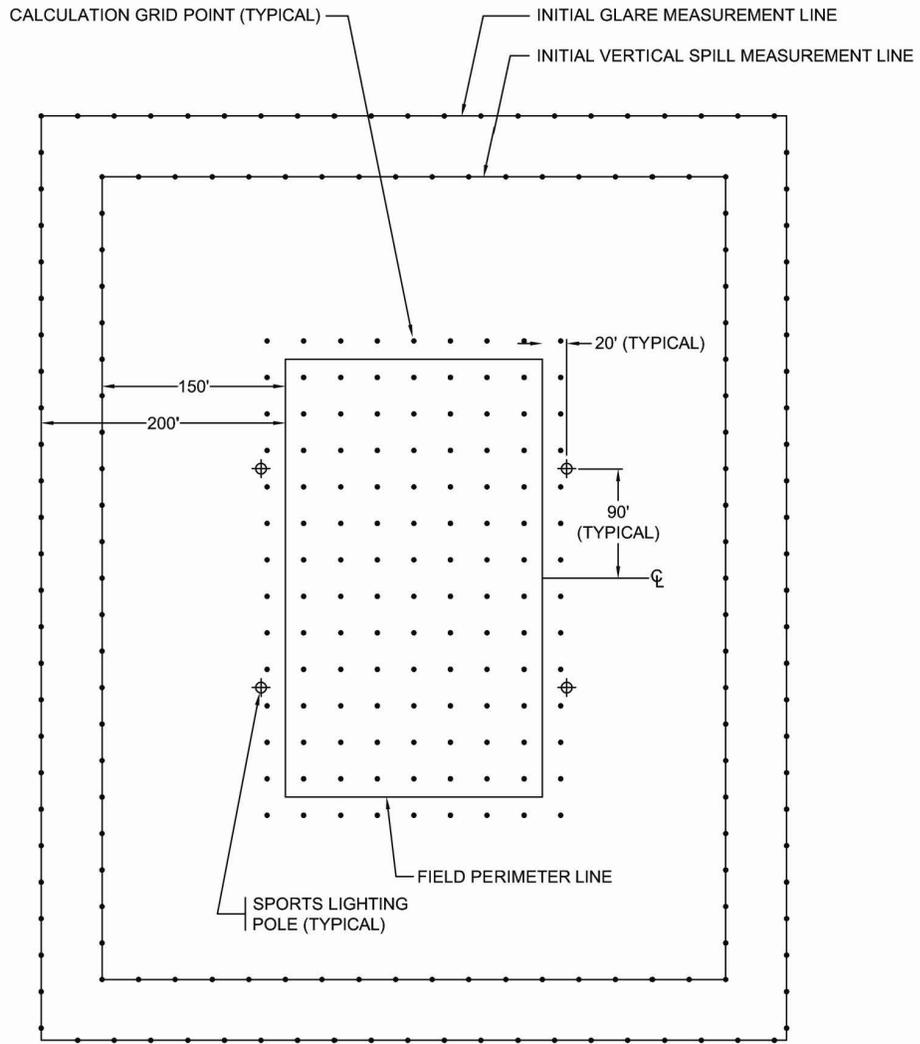
**FIGURE 7**



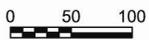
**SMALL RECTANGULAR FIELD LAYOUT**  
(180'W x 360'H)



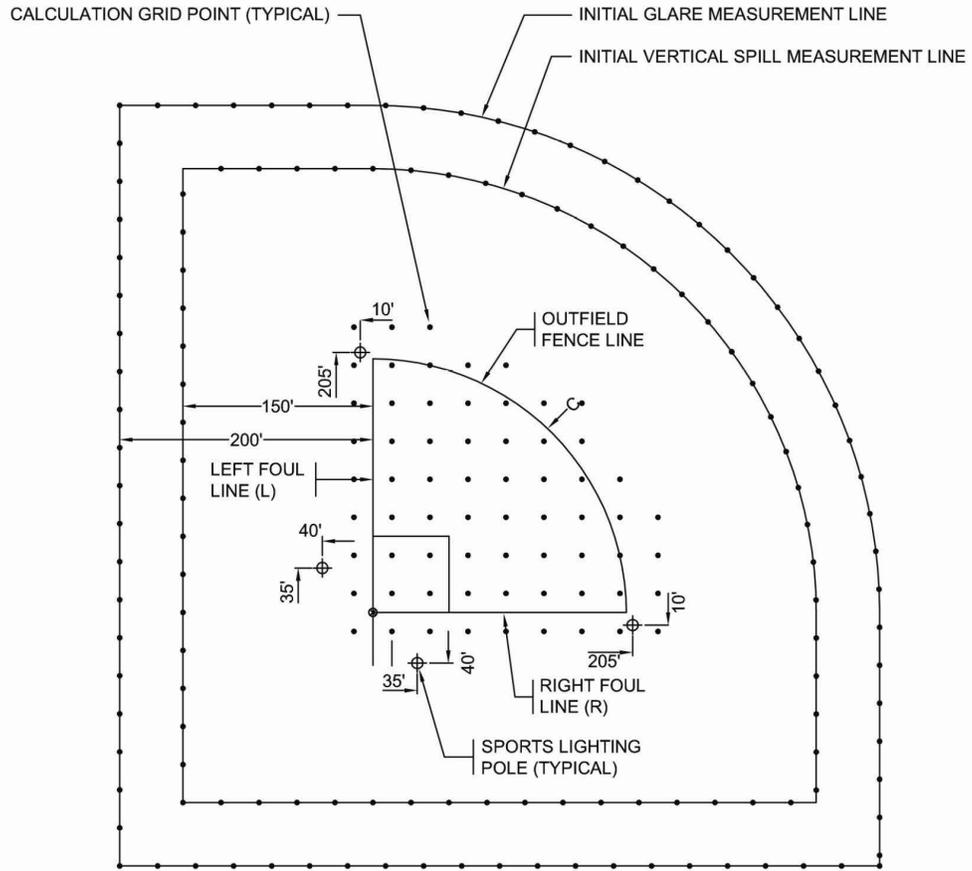
**FIGURE 1**



**LARGE RECTANGULAR FIELD LAYOUT**  
(210'W x 360'H)

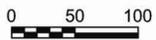


**FIGURE 2**

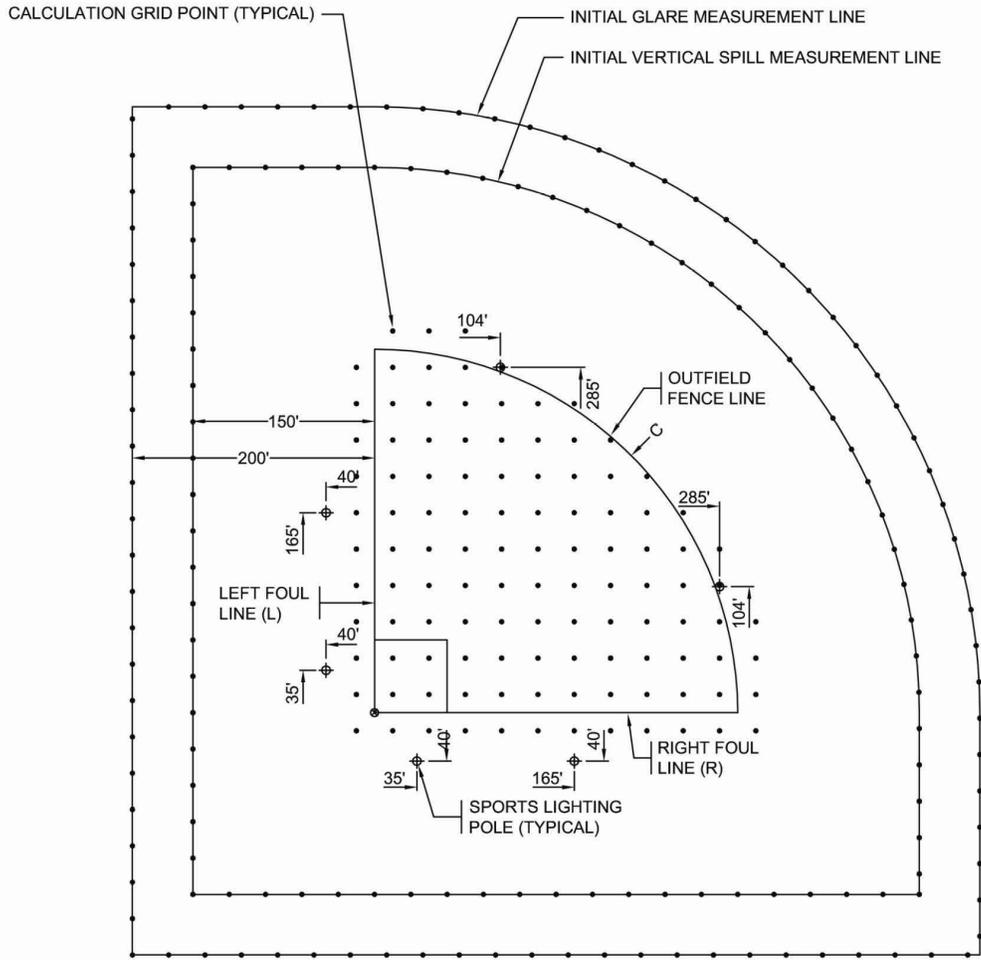


POLE LOCATION DIMENSIONS ARE RELATIVE TO HOME PLATE (0,0 REFERENCE POINT) ⊗

**LITTLE LEAGUE - U13 / FAST PITCH DIAMOND FIELD LAYOUT**  
(L=200', C=200', R=200')



**FIGURE 3**



POLE LOCATION DIMENSIONS ARE RELATIVE TO HOME PLATE (0,0 REFERENCE POINT) ⊗

**SLOW PITCH / SOFTBALL DIAMOND FIELD LAYOUT**  
 (L=300', C=300', R=300')

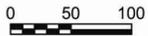
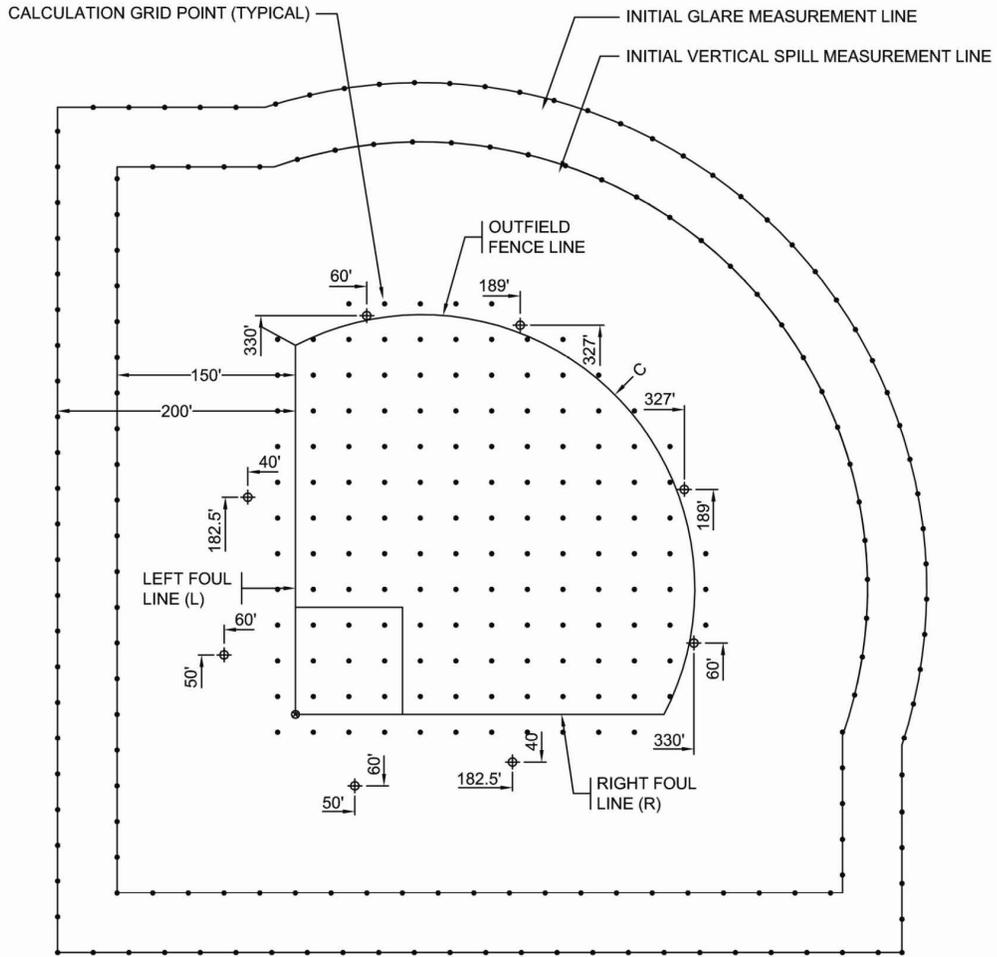


FIGURE 4



POLE LOCATION DIMENSIONS ARE RELATIVE TO HOME PLATE (0,0 REFERENCE POINT) ⊗

**BABE RUTH / BASEBALL DIAMOND FIELD LAYOUT**

(L=310', C=380', R=310')

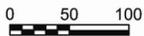
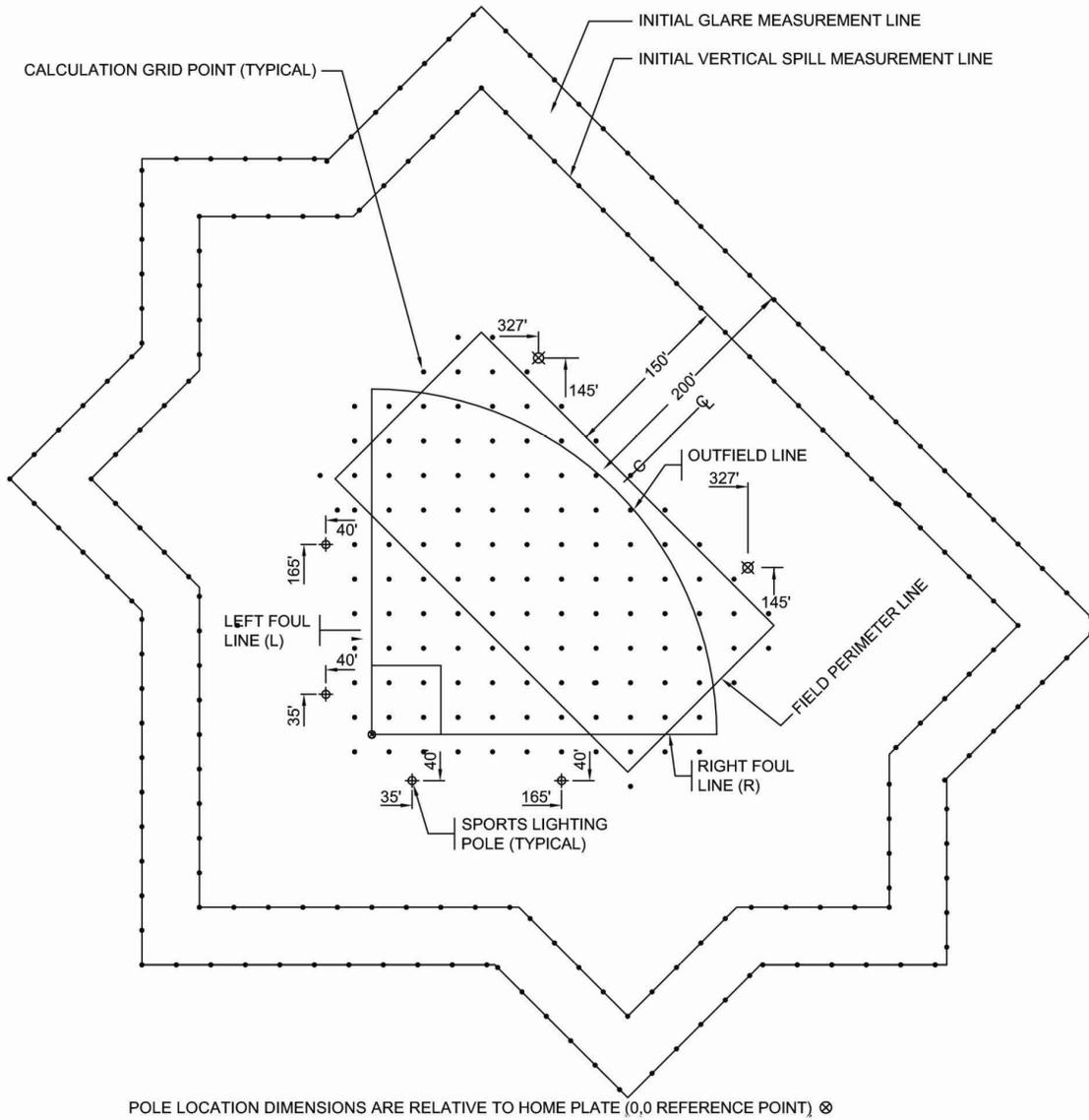


FIGURE 5



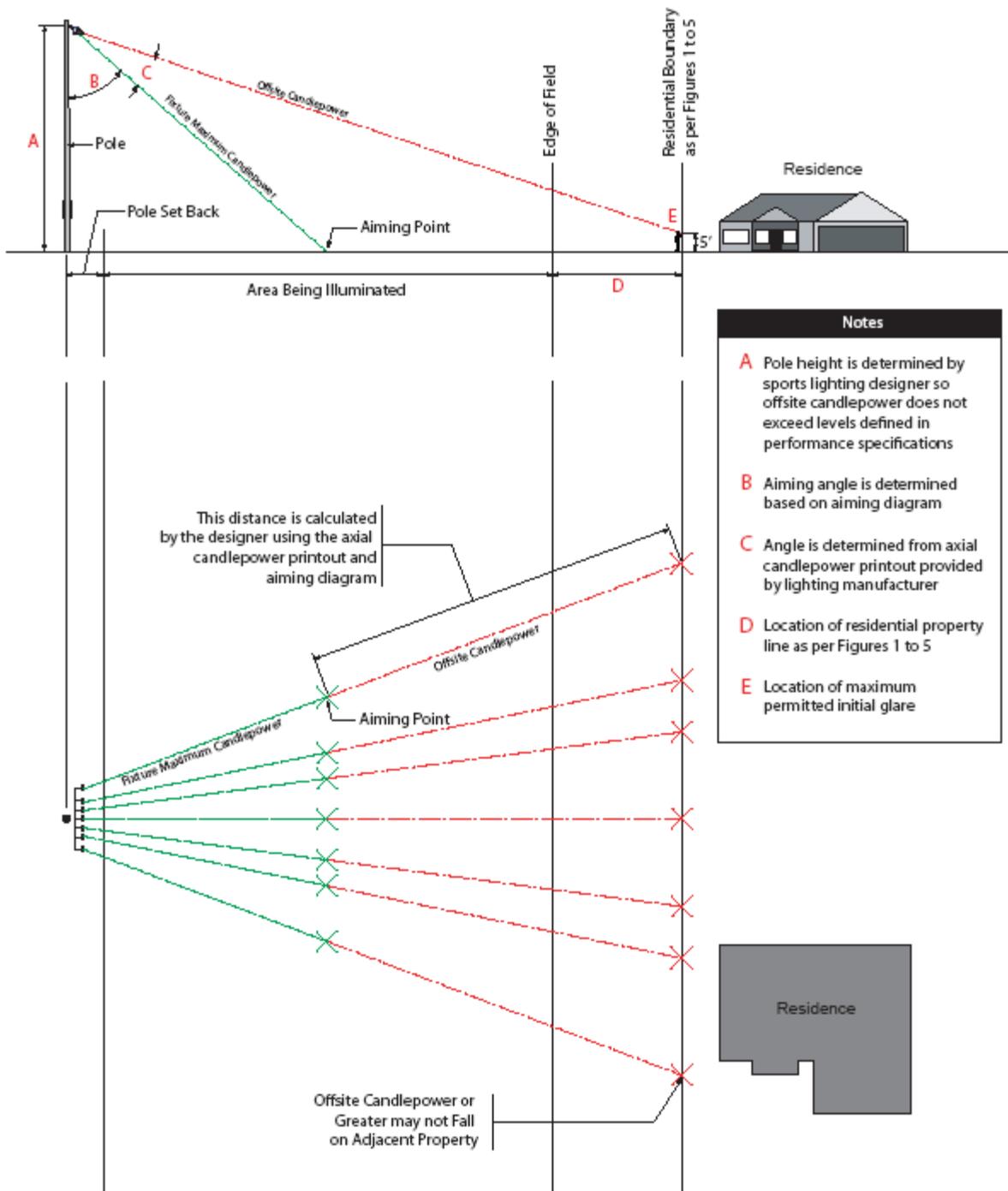
**SLOW PITCH / SOFTBALL DIAMOND - SMALL RECTANGULAR FIELD  
 OVERLAY FIELD**

(L=300', C=300', R=300') (180'W x 360'H)



**FIGURE 6**

**FIGURE 7**



Notes	
<b>A</b>	Pole height is determined by sports lighting designer so offsite candlepower does not exceed levels defined in performance specifications
<b>B</b>	Aiming angle is determined based on aiming diagram
<b>C</b>	Angle is determined from axial candlepower printout provided by lighting manufacturer
<b>D</b>	Location of residential property line as per Figures 1 to 5
<b>E</b>	Location of maximum permitted initial glare

Glare Analysis