Facilities Lighting Guide

I. Lighting Guidelines — Minimum Recommendations

The guidelines are divided into Minimum Recommendations and Other Considerations. The Minimum Recommendations establish criteria important to safe conduct of Babe Ruth League activities. The Other Considerations provide guidelines for lighting systems that give added values of durability, energy-efficiency, environmental sensitivity as to spill light and glare and that are more cost-effective to own and operate.

A. Lighting

1. Quantity

There should be an initial minimum average quantity of 62.5 horizontal footcandles on the infield and a minimum average quantity of 37.5 horizontal footcandles on the outfield. These initial light levels will provide a maintained minimum average quantity of 50 horizontal footcandles on the infield and a maintained minimum average quantity of 30 footcandles on the outfield. Design calculations to arrive at maintained light levels should include a maintenance factor no greater than .8 and adjustments for actual tilt factor.

2. Quality

The quality of the lighting should be determined on a basis of uniformity and smoothness.

a. Uniformity of the lighting shall be such that on the infield, the highest measure of quantity of light should not be greater than 2 times the lowest quantity. For the outfield measurement, the highest quantity of light should not be greater than 2.5 times the measurement of the lowest quantity of light.

b. Over the entire area of the infield and outfield, the change in the quantity of horizontal footcandles should not occur at a greater rate than 10 percent per 10 feet, except for the outside perimeter readings which may change at a greater rate.

3. Lamps

The recommended lamp for Babe Ruth League play is a 1500 watt metal halide with initial design lumens of 155,000. Lamps must have an ANSI code — M48PC-1500. Philips, Sylvania and General Electric are the only manufacturers currently recommended. High output lamps are not approved from any manufacturer.

4. Footcandle Documents

The manufacturer of the lighting equipment should provide two drawings showing the horizontal footcandle quantity at each point of measurement on the field. One drawing is to show the initial quantity of light to be provided when the fixtures and lamps are new. The second drawing should be in compliance with the minimum standards established above.

a. Area of Measurement

The areas for measurements are to be taken and the points of measurement within that area are shown in the graphic on page 17. It is important that measurements be taken at all the points to establish that the quantity and quality standards are being met.

b. Method of Measuring Light Quantities

The light meter is to be held 36 inches above the playing surface with the sensing surface horizontal to the ground so that it detects light coming downward to the sensing surface from all directions.

5. Vertical Aiming Angles

Aiming angles are a function of both pole height and the distance from fixture to aiming point. Babe Ruth League has recommended minimum pole heights (see the graphs in this booklet) as well as minimum aiming angles. Both should be met to be effective.

a. Light fixtures which are set back from the foul lines between home plate to third base and between home plate to first base should be mounted at a height above the playing surface such that a line from the lighting fixture to the point on the field where its maximum intensity is aimed is a line that is at least 25 degrees below horizontal.

b. Light fixtures positioned beyond the outfield fence or along the foul line beyond third base and first base should be mounted at a height with a minimum aiming angle of 25 degrees below horizontal for fixtures aimed toward the infield and 21 degrees for fixtures aimed across the outfield.

6. **Aiming Recapture**
   The lighting equipment should include a mechanical device for recapturing the original aiming when it is necessary to move the reflector for re-lamping.
7. **Aiming Diagram**
   The manufacturer should supply a drawing showing the aiming alignment of each fixture with measurements referencing the field and pole locations.
8. **Glare Considerations**
   Pole heights and locations should be established by the layouts in the graphs in this book to enhance playability.
9. **Ballast and Capacitor Weight**
   The ballast and capacitor for each fixture should be mounted away from the fixture and crossarm and onto the pole to avoid problems of misalignment caused by the weight of these components.

B. Electrical

1. **Fusing**
   Each lighting fixture should be individually fused with UL Listed fused equipment rated for use with the system.
2. **Disconnects**
   There should be provided at each pole a disconnect means located at stepladder height (minimum 8 feet above ground) to allow disconnecting of the electrical power to the pole. This disconnect means should be in addition to disconnects provided at the distribution panel for the entire field.
3. **Grounding**
   All poles, fixtures and distribution panels should be grounded according to National Electric Code recommendations. It is important to verify the ground and grounding connections.
4. **Lightning Protection**
   Each pole or structure supporting lighting equipment should be equipped with lightning protection as established by NFPA 780 (National Fire Protection Association). **NOTE**: In many instances the supplemental ground may not provide adequate lightning ground, creating the potential for a faulty electrical system in the case of a lightning strike.
5. **Enclosed Rigid Cover**
   All wiring conductors above ground should be enclosed in rigid cover.
6. **Hinged Lockable Enclosures**
   All enclosures of electrical conductors which are hinged and designed to be opened must be lockable and should be kept locked except during times of access for operation or service.
7. **Electrical Conductor Wires**
   All electrical conductor wires for distribution of power around the playing field should be buried underground at depths provided by local code.
8. **Drawings of Entire Electrical System**
   The manufacturer of the lighting equipment should provide a drawing of the entire electrical system from the light fixtures at the top of the pole to the base of the pole. This drawing should show compliance with the standards and should provide sufficient information for maintenance personnel.
9. **Drawings of Electrical Distribution**
   The electrical designer should provide drawings of the electrical system from the base of the pole to the transformer provided by the utility company. This drawing should show that the local authority regulating electrical systems has approved them.
10. **Underwriter Laboratory Listing**
    The lighting and electrical equipment on each ball field lighting structure should have a UL Listing to confirm that the equipment has passed the safety tests of Underwriters Laboratory not only as to the individual components but also as to the use of the components in the configuration of the lighting system on the field.

11. Non-compliance with the electrical guidelines

Deviation from these guidelines of electrical systems may occur only after approval of written documentation signed by an electrical engineer licensed in the state. The documentation should state the reason why it is necessary to deviate from the guidelines and state how a safe electrical system will be achieved using the alternate guidelines.

C. Structural

1. Foundation

a. Reinforced concrete is the recommended pole foundation. Foundations should provide for pole attachment a minimum of 18 inches above ground to avoid corrosive deterioration. Concrete should cure a minimum of 28 days to develop adequate strength before stress loads are applied.

b. Supplier should furnish structural calculations showing the foundation design adequate to resist maximum EPA loads based on 50 year mean recurrent isotach wind map for each locale to satisfy applicable building codes.

c. Suppliers utilizing direct burial of poles with concrete backfill should provide structural calculations showing the installation provides adequate strength to resist maximum EPA loads based on 50 year mean recurrent isotach wind map for each locale to satisfy applicable building codes.

2. Poles

Pole suppliers should furnish structural calculations showing the pole to be of adequate strength to resist design loads.

a. For durability and safety reasons, galvanized steel poles are recommended poles for Babe Ruth League fields. Poles should be hot-dip galvanized to ASTM-123 standards. All accompanying hardware should be galvanized steel or stainless steel.

b. If direct burial steel poles are used, the operator should require stamped foundation designs from a structural engineer licensed in the state where the field is located. A soil analysis should be conducted by a geotechnical engineering firm and appropriately analyzed to assess the interaction between the galvanizing and the surrounding soil, to assess compatibility. The embedded portion of steel should be sealed inside and out with a moisture impervious coating to help resist corrosion. If the coating is damaged in transit or during installation, it should be repaired using the manufacturer's recommended procedures and permitted to cure an appropriate length of time before final installation.

4. Lightning Protection

All structures should meet the National Fire Protection Association (NFPA) 780 lightning protection code.

D. Quality Assurance

1. Visual Testing

Visual testing should be performed annually on lamps, lenses, conduit, poles, fuses, ballasts, grounding connections and breaker boxes to ensure integrity and performance of system.

2. Performance Audits

Performance audits should be performed every other year.

3. Relamping

Group relamping should be done at the end of the rated useful lamp life.

4. Annual Inspection

For safety and performance reasons, facilities which still have wood poles should conduct an annual inspection of the condition of the wood. See maintenance checklist on page 24.

II. Other Considerations

The following standards, while not required for compliance to Babe Ruth League, Inc. charter requirements, are strongly recommended as being cost-effective for Babe Ruth League facilities.

A. Lighting

1. **Energy and Maintenance Efficiency**
   There can be a 25 percent difference in the number of fixtures required to light a Babe Ruth League field among manufacturers. This can have a significant impact to leagues in terms of operating and maintenance costs. It is recommended that these differences be evaluated thoroughly before making purchase decisions.

2. **Environmental Spill and Glare Control**
   Many ball fields are, or soon will be, surrounded by residential properties. Technology is currently available to effectively control spill light and glare from trespassing onto adjoining properties. Consideration should be given these issues in the initial design stage to minimize or avoid complaints. It is recommended that the league check with local authorities for ordinances requiring public notification of intent to install lighting. If this is an issue, ask your lighting manufacturer to provide drawings showing maximum footcandles which will occur at any points of concern on properties surrounding your ball field. You should also determine the manufacturer's experience and ability to work with local authorities and neighbors in meeting glare and spill criteria for adjoining properties.

B. Electrical Enclosure

Other than the lamp, it is not necessary that any electrical components be located at the top of the pole. It is recommended that the electrical components of ballast, capacitor, fusing and disconnect be located in an enclosure mounted on the pole at a point 8 feet above the ground. This allows for maintenance work from a stepladder yet keeps the electrical components out of the reach of people standing on the ground. The equipment and methods for locating these components near the base of the pole must be a part of the Underwriters Laboratory Listing.

C. Warranty

There are considerable differences in the warranties offered by lighting manufacturers. Evaluation of warranties should include the extent of equipment covered, the time period covered, and whether parts and/or labor are included. The warranty is important from two perspectives. First and most importantly, the extent of the warranty indicates the manufacturer's confidence in the product. Secondly, in the event of failure, the warranty offers the opportunity to reduce costs of repair.

Illuminance Measuring Points

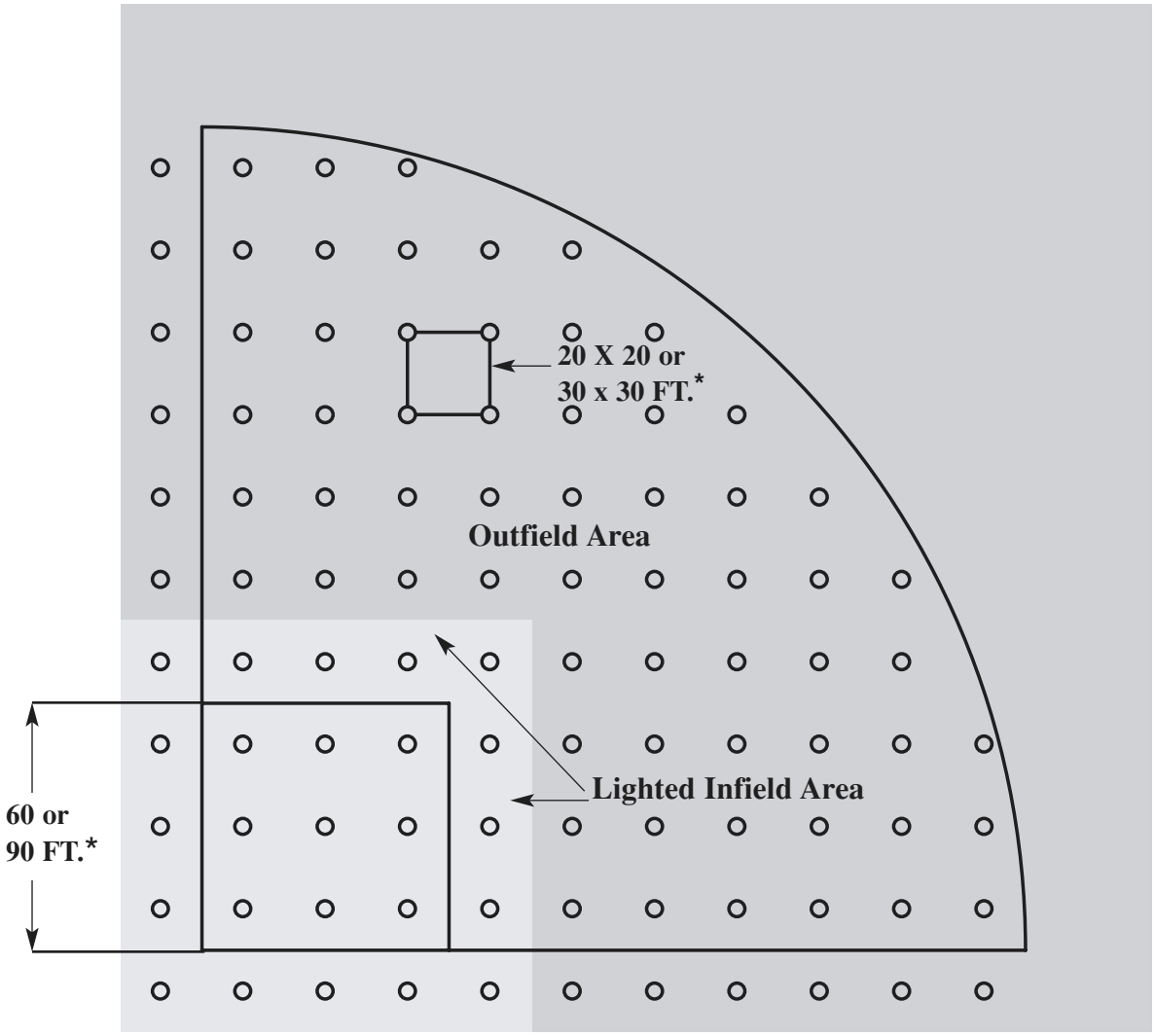


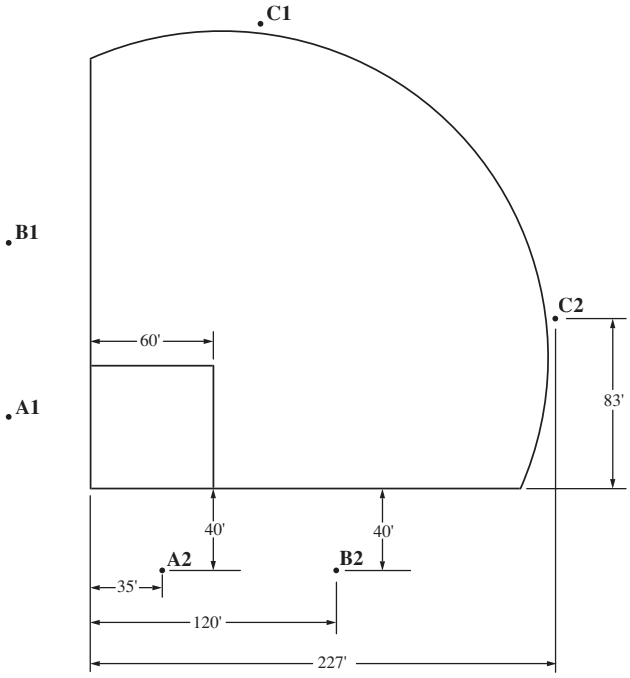
Fig. B4. Illuminance measuring points for baseball and softball. **Illuminating Engineering Society of North America Sports Lighting-RP-6-01**

* Fields with 60-foot basepaths (for 175-foot and 200-foot fields) are measured in a 20-foot x 20-foot grid; fields with 90-foot basepaths (for 300-foot fields) are measured in 30-foot x 30-foot grid.

Lighting Diagrams

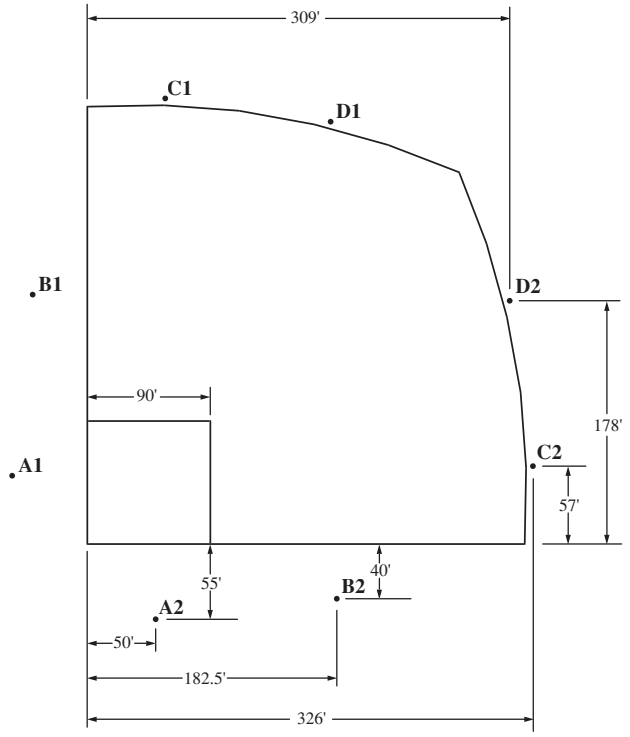
CAL RIPKEN DIVISION (ages 5-12)

EQUIPMENT LISTING for 210'/250'/210' radius field					
Pole count	Pole location	Mounting height*	Pole size	Fixt.† /unit	Kilow /unit
2	A1-A2	60'	60'	4	6.4
2	B1-B2	60'	60'	6	9.6
2	C1-C2	60'	60'	5	8



BABE RUTH BASEBALL (ages 13-18)

EQUIPMENT LISTING for 320'/340'/385'/340'/320' radius field					
Pole Count	Pole Location	Mounting Height*	Pole Size	Fixt.† /unit	Kilow /unit
2	A1-A2	70'	70'	6	9.6
2	B1-B2	80'	80'	12	19.2
2	C1-C2	70'	70'	4	6.4
2	D1-D2	70'	70'	5	8



NOTE:

† The number of fixtures necessary to meet minimum lighting requirements varies between manufacturers. Please be sure you are provided adequate documentation from the manufacturer showing Babe Ruth League, Inc. guidelines.

* For glare control, taller fixture mounting heights may be required. Also, if obstructions or common poles for multiple fields require poles to be set back farther from the field, then taller poles may be required.

Lighting Diagrams

BABE RUTH SOFTBALL (ages 5-18)

EQUIPMENT LISTING for 200' radius field					
Pole count	Pole location	Mounting height*	Pole size	Fixt.† /unit	Kilow /unit
2	A1-A2	60'	60'	4	6.4
2	B1-B2	60'	60'	8	12.8