

2006 Little League® Lighting Standards & Safety Audit



Excerpted from the Little League® 2006 Operating Manual

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Artificial Lighting

Night games have been permitted in Little League starting in 1957 with the second Little League International Congress in Chicago. Standards set by the Illuminating Engineering Society (IES) of North America were adopted by Little League Baseball in 1957, and have been updated with recommendations from the National Electric Code, the Uniform Building Code, and others.

Over the years, these standards have been refined and have been adopted by Little League Baseball, the National Recreation Society and other organizations. **THE IMPORTANCE OF ADHERING TO THESE STANDARDS CANNOT BE UNDERSTATED, TO ASSURE THE UNIFORMITY OF LIGHTING LITTLE LEAGUE FIELDS MAKES THE GAME SAFER FOR CHILDREN AND VOLUNTEERS. ALL LIGHTING SYSTEMS MUST COMPLY WITH LITTLE LEAGUE STANDARDS, WITHOUT REGARD TO WHO INSTALLS OR FINANCES THE SYSTEM** (such as city, county, private individual, etc.).

Many leagues operate in conjunction with other organizations or municipalities. This does not need to be a roadblock in making sure that standards are met. Instead, it is a matter of educating people at all levels on this vital aspect of league operations.

The District Administrator (and each local Little League President) are directly responsible for ensuring that any fields on which night games are played within his/her league or district are up to these standards. The potential liability risks we all face makes compliance even more imperative.

As the Little League program grows and leagues charter more divisions, the demand for fields increases dramatically. For many leagues, a less costly alternative to constructing new fields is the installation of artificial lighting, providing optimum use of available fields within the curfew limitations for each division. In planning for artificial lights, it is most important that minimum lighting standards be attained. Every precaution should be taken to guard against mishaps that might result because of the installation of an inadequate lighting system. **The local district administrator must pre-approve plans for any new lighting system as being adequate and within minimum standards for safe play.** It is recommended that the District Administrator involve the lighting specialist in Williamsport in his/her review. The District Administrator and President of the league must check the system after installation to determine that the installed system complies with the plans and meets or exceeds the minimum standards for play. Annually, all lighting systems must be checked twice -- before the season begins and before tournament play. Copies of project plans be submitted to the District Administrator, for prior approval that the plans and installation comply with required standards.

The following standards have been adopted by Little League. They are divided into required minimum standards and desirable optional features. The minimum standards establish criteria which are important to the safe conduct of Little League activities. The desirable features are established to provide guidelines for adding important value to your lighting system.

Lighting systems installed prior to July 1, 1992 on fields with outfield fences 200 feet or less from home plate are temporarily "grandfathered" if they have a minimum of 24 -- 1500 watt metal halide fixtures mounted a minimum of 40 feet above the playing surface on four poles or more. These systems must provide a minimum average maintained illumination of 30 footcandles in the infield and 20 footcandles in the outfield. Since September, 1994, wood poles are not approved for use on Little League fields.

Notice: Any upgrade or addition of lighting equipment to existing systems after July 1, 1992, must be done so that the systems will be in complete compliance with current standards.

Standards for Lighting

I. Required Minimum Standards

These minimum standards must be complied with for all lighting installations after the date of adoption by Little League. The effective date is July 1, 1992. Systems in full compliance shall meet all of the required minimum standards.

A. Lighting

1. Quantity

There shall be 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 shall include a maintenance factor no greater than 0.7 and must include adjustments for actual tilt factor.

2. Quality

The quality of the lighting shall 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 shall not be greater than 2 times the lowest quantity. For the outfield measurement, the highest quantity of light shall 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 approved lamp for Little League play is a 1500 watt metal halide. Lamps must have an ANSI code -- M48PC-1500/BU. Philips, Sylvania and General Electric are the only manufacturers currently approved.

4. Footcandle Documents

The manufacturer of the lighting equipment shall provide drawings showing the horizontal footcandle quantity at each point of measurement on the field. The drawing shall 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 in the "LIGHTING PERFORMANCE" section of this chapter. 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. Aiming Angles

Aiming angles are a function of both pole height and the distance from fixture to aiming point. Little League has established minimum pole heights (see the graphs in this booklet) as well as minimum aiming angles. Both need to be met to be in compliance.

a. Light fixtures which are set back from the foul lines between home plate to third base and between home plate to first base shall 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 shall 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 shall 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 shall 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 shall 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 shall be individually fused with UL Listed fused equipment rated for use with the system.

2. Disconnects

There shall 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 shall be in addition to disconnects provided at the distribution panel for the entire field.

3. Grounding

All poles, fixtures and distribution panels shall 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 shall 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 shall 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 shall 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 shall show compliance with the standards and shall provide sufficient information for maintenance personnel.

9. Drawings of Electrical Distribution

The electrical designer shall provide drawings of the electrical system from the base of the pole to the transformer provided by the utility company. This drawing shall 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 shall 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 Standards

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

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 shall 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 shall 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 shall furnish structural calculations showing the pole to be of adequate strength to resist design loads.

- a. Galvanized Steel Poles are the recommended poles for Little League fields. Poles should be hot-dip galvanized to ASTM-123 standards. All accompanying hardware shall be galvanized steel or stainless steel.
- b. Wood Poles are not allowed after September 1, 1994.
- c. Based on current data, Little League does not recommend direct burial of steel poles because of the potential for deterioration at or below ground at critical stress points.
- d. Any other pole must meet all current Little League standards.

II. Desirable Features

The following standards, while not required for compliance to Little League charter requirements, are strongly recommended as being cost-effective for Little 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 Little 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 and glare light 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 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.

For documents to assist in planning and installing ball field lighting, contact Little League Headquarters (570) 326-1921.

Little League Lighting Standards Checklist

Lighting Design

Light Levels

The average maintained values should be 50 footcandles on the infield and 30 footcandles on the outfield.

Light Levels

- Maintained: 50 footcandles infield / 30 footcandles outfield

Uniformity or Smoothness

The standard sets maximum differences allowed in levels on both infield and outfield. It is measured as a ratio between highest and lowest light readings. This is important because uneven lighting can create visual illusions for the players. Objects appear to change speed when traveling through unevenly lighted areas. Uniformity ratios can be maintained through proper aiming logic in the design and by maintaining proper fixture alignment.

Uniformity/Smoothness

- 1. Infield 2.01:1
- 2. Outfield 2.5:1

Aiming Angles, Glare Control, Pole Location and Height

These items combine to provide a safe, playable field. Meeting the minimum pole heights and aiming angles assure that no fixture becomes a source of glare for players. Adequate attention to these standards provides for the safety of the participants and ease of viewing for spectators.

Aiming Angles (determined by mounting height)

- 1. Infield no less than 25 degrees
- 2. Outfield no less than 21 degrees
- 3. Poles located out of glare zones

Electrical Design

Little League Standards are derived from the National Electric Code and the National Fire Prevention Association. Strict adherence to these standards or adopted local codes is of utmost importance.

- UL Listing of equipment
- Drawings of electrical system
- Grounding to most NEC and NFPA standards (electrical and lighting)

Structural Design

Several elements are important in maintaining alignment.

- Adequate crossarm strength to withstand windloads and maintain fixture alignment.
- Proper structure to support and keep fixtures aligned. Wood poles are not allowed because of their tendency to twist and deteriorate from the interior. Today's lighting systems are aimed to within 1/2 of one degree accuracy, but wood poles easily twist 5 degrees or more in either direction.
- Foundation must be engineered to withstand the forces applied to it. Local building codes should be followed.
- Ballast and Capacitor should be located off the crossarm. These are the heavier components of a light fixture and their combined weights are a main cause of crossarm failure.
 - Weight of ballast off crossarm
 - Crossarms designed to maintain fixture alignment
 - Pole strength adequate for wind loads
 - Foundation engineered to national or local codes

Design Documents

- Layout — showing pole height and locations
- Lighting — drawings showing maintained light levels
- Electrical — drawings from service entrance all the way to fixtures
- Structural — pole and foundation drawings

Warranties

There should be a written guarantee to meet all Little League Lighting Standards, and manufacturer's warranties on lighting, electrical and structural elements.

Desirable Features

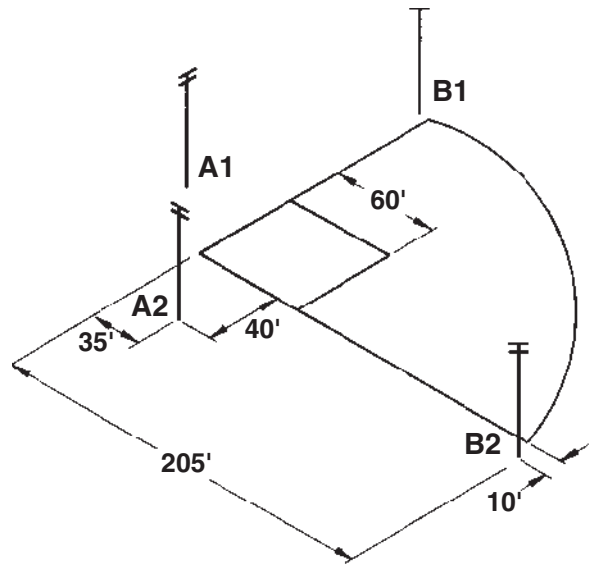
Several things can benefit a league in gaining the most value from their purchase.

- Review operating costs of systems being considered. They can vary greatly.
- Be a good neighbor. Spill and glare control may avoid disputes when lighting a field.
- Look to the future. Proper equipment can greatly reduce maintenance costs and extend usable life.
- Expect a good warranty. Know who to call if you need service and who is responsible for the various elements of the lighting system.

If you have any questions or need more information, please contact Little League Headquarters.

Lighting Diagrams

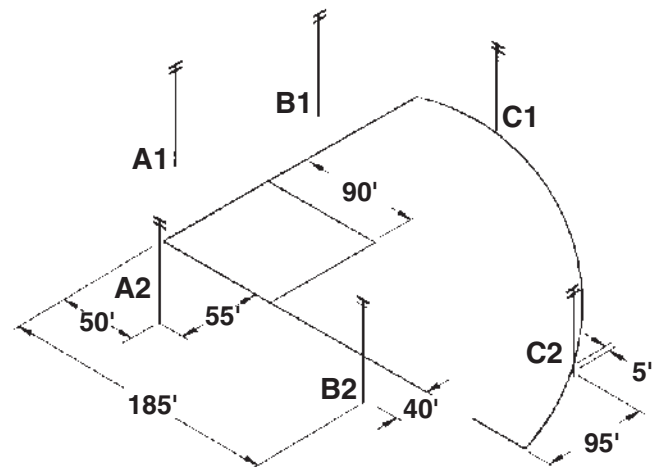
Layout for 200' radius field		
Poles		
Location	Minimum Quantity	Minimum Mtg. Ht. †
A	2	60'
B	2	60'
Total	4	



This layout is based on the following total playing area including a strip 20 feet wide outside each foul line. Infield area – 10,000 square feet. Outfield area – 31,200 square feet (approximately).

LITTLE LEAGUE – 60 foot base lines; outfield fence 200 feet from home plate.

Layout for 300' radius field		
Poles		
Location	Minimum Quantity	Minimum Mtg. Ht. †
A	2	70'
B	2	70'
C	2	60'
Total	6	



This layout based on: Infield area – 22,500 square feet. Outfield area – 67,100 square feet (approximate); including a strip 30 feet wide outside each foul line.

SENIOR LEAGUE AND BIG LEAGUE – 90 foot base lines; outfield fence 300 feet from home plate.

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 Little League standards will be attained.

† 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.

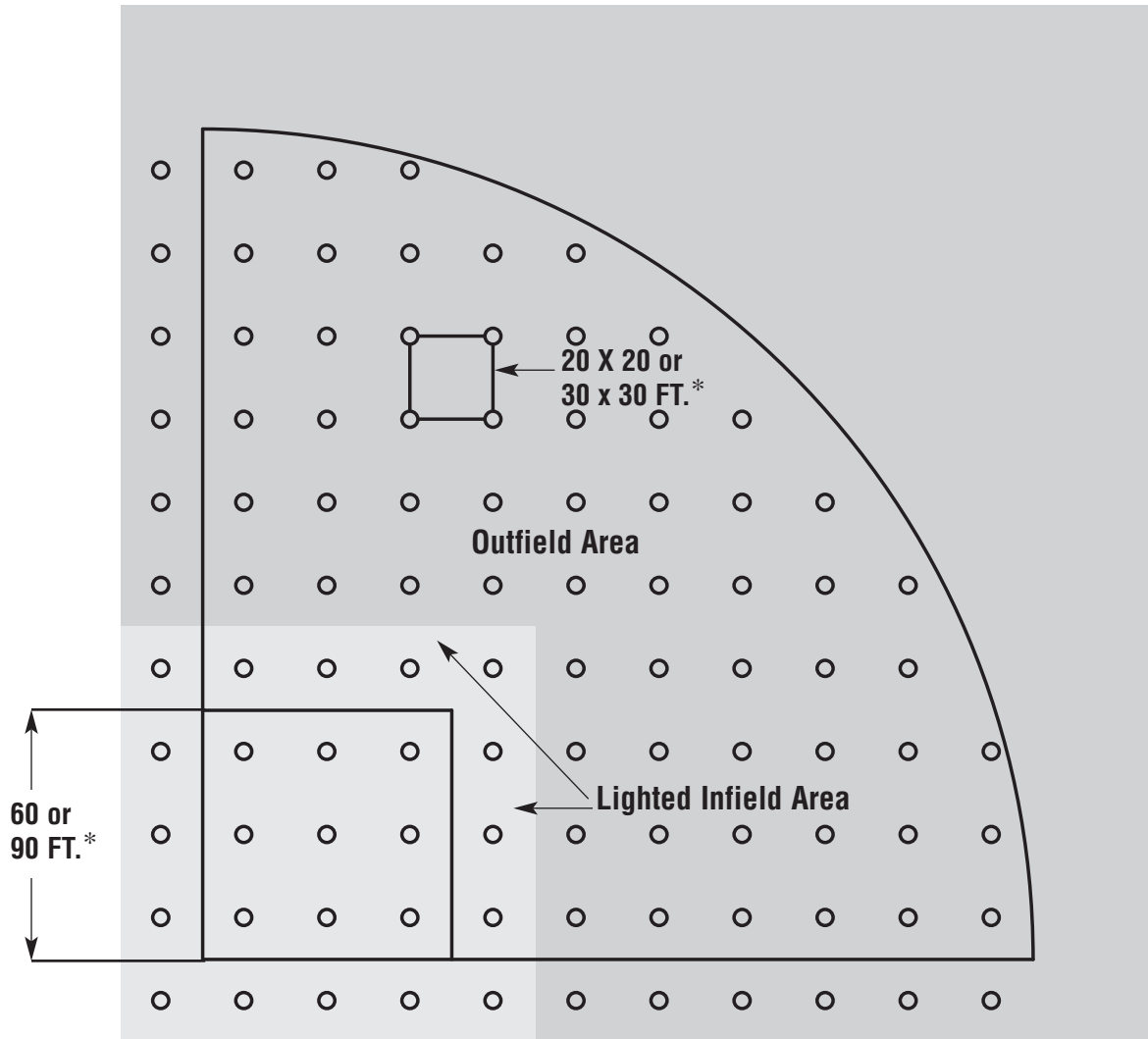


Fig. B4. Illuminance measuring points for baseball and softball. **Illuminating Engineering Society of North America Sports Lighting-RP-6-88**

* 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 a 30-foot x 30-foot grid.



Little League®

Lighting Safety Audit

Little League requirements call for regular inspections of your lighting system. The following safety audit will:

1. Identify components that may need repair or replacement.
2. Help you determine whether the performance of the system meets Little League minimum standards as outlined in the Standards of Artificial Lighting section of the Little League Operating Manual.

A copy of this completed form must be sent to your District Administrator and the original should be retained in league records.

Important - Inspection, testing and repair must be done by qualified technician:

1. Prior to season play each year.
2. Prior to tournament play each year.

Plans for new lighting must be approved by local District Administrator as being within minimum standards.

For additional information contact your District Administrator or Little League Headquarters.

League Name _____
Charter No. _____ - _____ - _____
Town _____ State _____
Number teams in league _____
Name of field _____
Number leagues using field _____
We share the field with _____ League
Total # of fields _____ # lighted _____
Date of Inspection _____
Inspected by _____
Testing & Repairs by _____

Lighting Performance

This field has the following light levels and uniformity:

Infield _____ Average footcandles
 _____:1 Uniformity

Outfield _____ Average footcandles
 _____:1 Uniformity

Date lighting equipment installed or last upgraded

 month / year

Readings are taken in the middle of each square represented on the chart below.

To obtain average footcandle value:

1. Record light readings within each numbered square.
2. Infield = Total of infield readings ÷ 25
3. Outfield = Total of outfield readings ÷ number of readings.

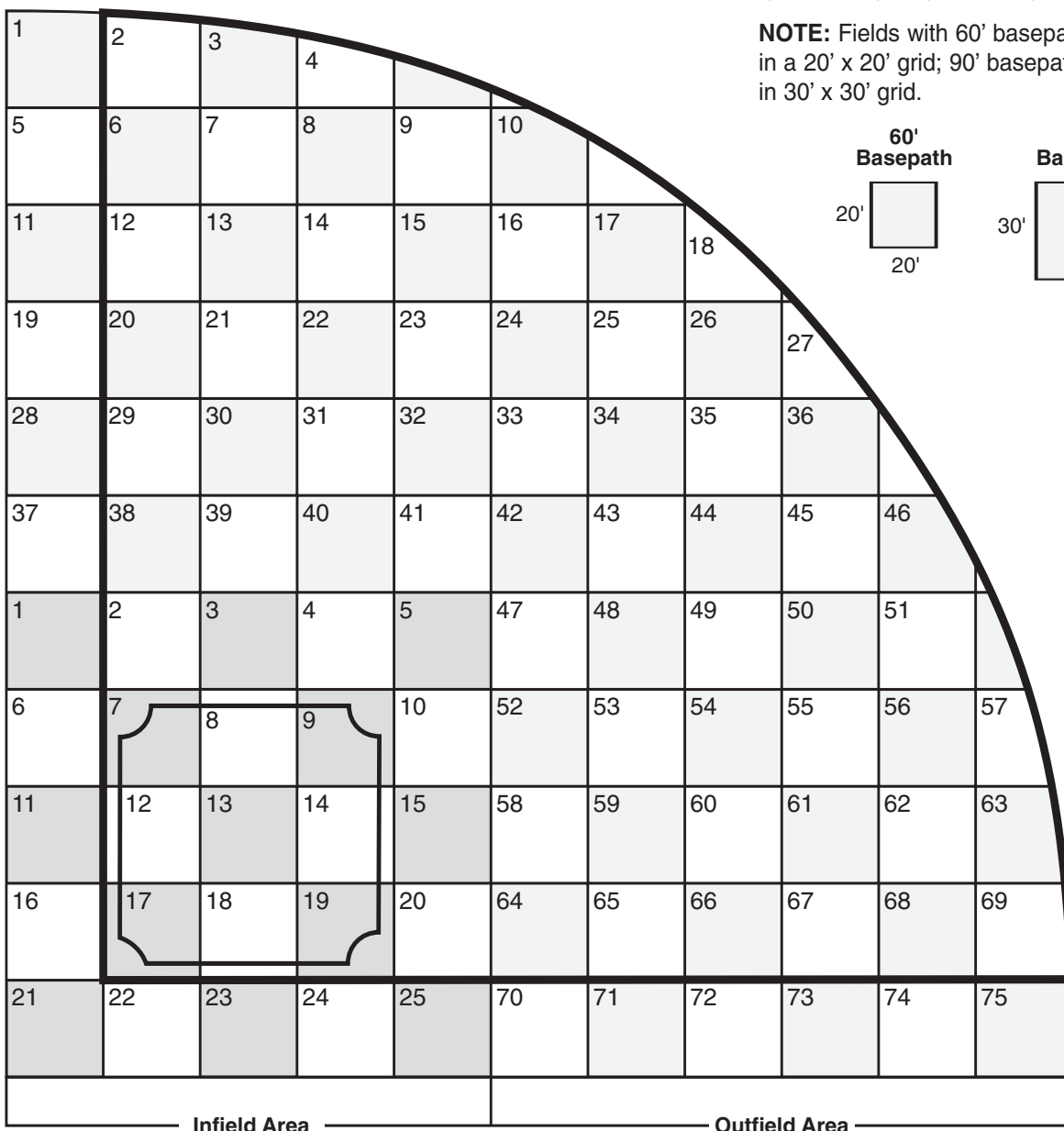
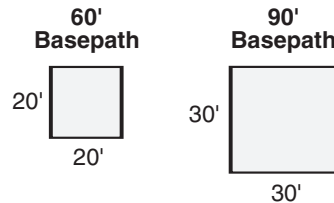
To obtain uniformity ratio for infield or outfield:

1. Divide highest (maximum) light level reading by the lowest (minimum) light level reading.

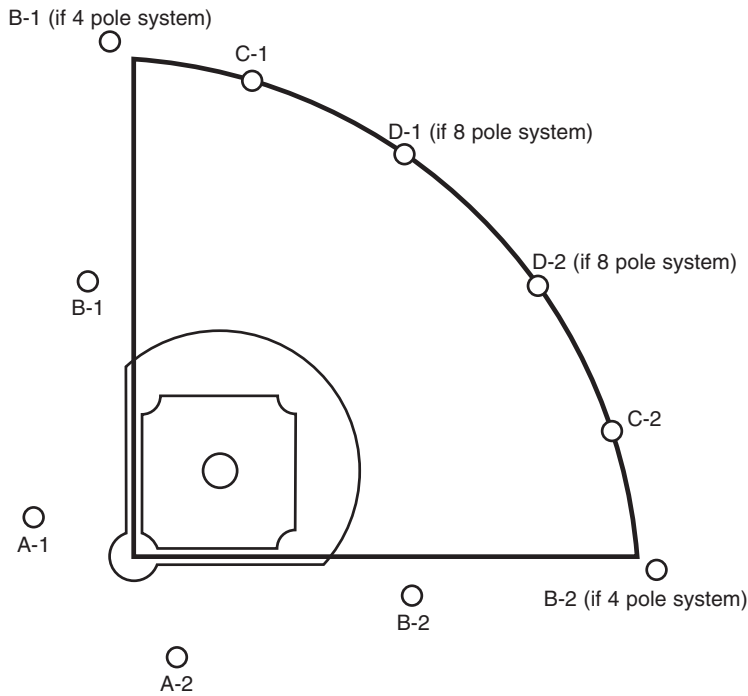
For example:

$$\frac{61 \text{ footcandles (infield maximum)}}{31 \text{ footcandles (infield minimum)}} = 2:1$$

NOTE: Fields with 60' basepaths are measured in a 20' x 20' grid; 90' basepaths are measured in 30' x 30' grid.



Equipment Listing



Fill in the number of fixtures on each pole and mounting heights:

	Pole	Number of Fixtures
<u>4 Pole System</u>	A-1	_____
	A-2	_____
	B-1	_____
	B-2	_____
<u>6 Pole System</u>	C-1	_____
	C-2	_____
<u>8 Pole System</u>	D-1	_____
	D-2	_____
	Total	_____

Type of poles: wood* steel concrete
 Fixture height above field: _____
 Basepath length: 60' 90'
 Distance from home plate to foul pole:
 175' 200' 300' other _____

*Note: Wood poles permissible only if installed prior to September 1, 1994

Lamp Type:



High Pressure Sodium



Quartz Incandescent



Incandescent



Metal Halide

Grounding System Test

THREE POINT GROUND ROD RESISTANCE TEST* - This test measures the resistance of the ground rod to earth. This method also measures the effect of a variety of conditions such as soil composition, drought conditions, etc. A direct-reading instrument called a Groundohmer or Groundometer is used for the following testing procedure:

- Two additional temporary grounds, consisting of short rods 2-3 feet. long, must be driven in the ground at least 20 feet away from the ground being tested
- The instrument is connected to all three grounds by means of insulated leads. A magneto or a battery in the instrument furnishes the necessary power for the test.
- The instrument reads the ground resistance directly in ohms.

NOTE: The National Electrical Safety Code (NEC) implies that the ground resistance should be measured at the time of installing the ground and that the ground resistance must not exceed 25 ohms for artificial (buried or driven) grounds.

* American Electricians Handbook procedure

It is recommended that testing procedures for grounding be in accordance with local, state, or national code.

System Operation

OK Needs Repair

Notes:

WARNING!! Turn off electricity at power source and at safety disconnect on the pole.

Service Entrance & Pole Distribution Boxes		
Check service panel for proper markings. • Emergency information should be visible.		
• Warning stickers, wiring diagrams, circuit labels and other servicing information signs should be posted and clearly legible.		
Test reset action on all service breakers. • Snap all breakers on and off several times to ensure firm contact. • If fuses are used at main service, check continuity.*		
Check the wiring. • Insulation around wiring should show no signs of deterioration. • Wiring should show no heat discoloration.		
Check all taped connections. • Signs of wear should be replaced.		
Make sure no live parts are exposed. • Bare wires and exposed connections should be wrapped with insulated covering.*		
Padlocks for service entrance & distribution boxes should be in place and operational.		
Poles - Annual Testing		
Check to see that poles aren't leaning.		
Check wood poles for decay or twisting. Twisted pole may require re-aiming of fixtures. • Effective Sept. 1, 1994 wood poles are no longer approved on new installations.		
Check base-plate of steel poles for signs of deterioration. • Check anchor bolt for signs of corrosion. • Check grouting under pole to make sure proper drainage exists.		
Check bolts and fittings for tightness. • Check all metal parts for signs of corrosion.		
Check to see that wiring covers are in place.		
Check all cables and conduits. • Pull on conduit to check for looseness. • Check for loose fittings and damaged conduit. • All cables should be straight and properly strapped.* • If cables are exposed to the elements, make sure the insulation has the proper rating.*		
Check overhead wiring. • Wiring should be properly secured • Check that new growth on tree branches and limbs won't obstruct or interfere with overhead wiring.		
Luminaires		
Check fixture housings. • Housings should show no sign of cracking and/or water leakage.		
Check lenses. • Clean lenses. • Replace broken lenses.		
Replace burned-out lamps.		
Check luminaire fuses. • Replace burned-out fuses. • Fuses should be the correct size. • All fuses should be operational.		
Insulation covering on wiring should show no signs of wear or cracking.		
Ground wire connections must be secure.		
Check around ballasts for signs of blackening.		
Check that capacitors aren't bulging.		
Check aiming alignment of all fixtures. • On wooden poles, see if crossarms are still aligned with the field and horizontal.		
Ground - Annual Testing		
Check grounding connections.*		
Check nearby metal objects. • Make sure metal bleachers and other metal objects are located at least 6' from the electrical components. • Metal objects, such as bleachers, must have their own individual grounding system.		

* These tests and/or repairs require the services of a qualified electrician.

For additional informatin contact:
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