EXTERIOR ATHLETIC LIGHTING

1. PART - LIGHTING PERFORMANCE

The lighting systems manufacturer shall supply equipment to meet or exceed the following performance criteria:

1.1 Requirements

A. The following establish the design and performance requirements for the lighting system.

B. Initial Light Levels, established after 100 hours of system operation, are computed only to verify that the computer-generated design is in accordance with Illuminating Engineering Society (IES) recommendations (RP6-88), and are not computed in order to establish actual measurements. The following criteria must be utilized and substantiated by required documentation:

1. **100-Hour Lamp Lumen Output** (as shown on the lamp manufacturer’s specification sheet)

2. **Ballast Factor** (wattage output of ballast when operating hot in the fixture, as shown on the ballast manufacturer’s specification sheet: if ballast is rated cold, output must be derated by 0.95)

3. **Lamp Tilt Factor** (.90 for axially mounted lamps; 1.0 for horizontally mounted lamps)

4. **Initial Light Level = Lamp Manufacturers 100 Hr Lamp Lumens Output x Ballast Factor x Lamp Tilt Factor**

C. Targeted Light Levels (Maintained Footcandles) shall be determined utilizing the following formula and considering the following criteria:

1. **Initial Light Levels X 0.80 LLF (Light Loss Factor)**

2. The lumen output for each luminaire, as denoted by a numeric value, must be clearly shown on the computer-generated design. Failure to do so shall be grounds for rejections of bid.
3. Actual field measurements shall be taken after 100 hours of system operation. To attain 100 hours of operation, lamps shall be cycled eleven hours on and one hour off (per IES LM-54-91).

4. Specified light levels shall be an average of all the measurement readings in the given area of play.

D. Average initial horizontal light level measured 36" above the playing surface will meet or exceed ______________ FC ______________ LUX.

E. Average maintained horizontal light level measured 36" above the playing surface will meet or exceed ______________ FC ______________ LUX.

F. The uniformity of the playing field shall be determined by comparing the maximum reading to the minimum reading. The maximum to minimum ratio shall not exceed: ______________.

G. The areas to be included as Primary Playing Area, (PPA) requiring equal illumination, are in distances of ______________' beyond the field boundary (per IES Lm-5-96).

H. Initial spill light readings shall not exceed the following values at a distance of ______________' from the boundary of playing area in any direction:
   1. Average Initial horizontal light level measured 36" above grade ______________ FC ______________ LUX.

   2. *Average Initial vertical light level measured 36" above grade ______________ FC ______________ LUX.

I. To compare actual performance of the lighting installation with the computer-generated design, measurements shall be taken in the field on a grid with points spaced ______________', X ______________', totaling ______________ (per IES RP6-88).

J. The entire lighting system shall not exceed ______________kW.

K. The lighting system shall have an ETL, UL, or CSA listing. This listing shall be based upon ETL or UL testing and evaluation of the compatibility of components for use in combination in this application, as well as the individual components being ETL or UL listed or recognized.

*NOTE: Maximum Spill - The maximum illuminance calculated at a point when the light meter at that point is aimed successively at each light source or group of light sources.
1.2 WARRANTY

A. The sports lighting system materials and workmanship are warranted to be free from manufactured defects for five years from time of shipment from the manufacturer’s facility to the site. Excluded from this five-year warranty are lamp, fuses, and any labor charges.

1.3 SHOP DRAWINGS

A. Submit shop drawings for all equipment specified, including luminaire assemblies, electrical components and computer-generated designs verifying initial and targeted light levels.

PART II - PRODUCTS

2.1 SPECIFIED MANUFACTURER

A. The sports lighting system and specifications shall be from Cooper Lighting, Universal Sports Lighting.

2.2 LUMINAIRE

A. The luminaire shall consist of an integral, pre-wired and pre-assembled ballast housing and general purposed optical assembly. The luminaire shall feature horizontal lamp optics utilizing standard BT-56 Mogul base lamps with optional internal glare/spill light control louvers. The luminaire shall comply with all appropriated NEMA and ANSI specifications.

B. In order to ensure proper heat dissipation and properly balance the luminaire load on the crossarm, the luminaire shall feature an isolated ballast compartment design with transverse crossarm mounting. The integral ballast housing shall be of die-cast aluminum and isolate the core and coil on one side and capacitors on the other for coolest operation. The optical assembly shall also be completely separate from the ballast housing for maximum thermal management. The die-cast aluminum housing shall be uniformly painted inside and out with a polyester powder coat finish. The ballast housing shall be accessible by the removal of a formed aluminum ballast cover. Cover fastener hardware shall be captive to prevent loss during installation and maintenance. All external hardware shall be stainless steel or polymer coated for corrosion resistance.

C. The luminaire shall have a cast-in horizontal aiming protractor and feature single bolt mounting to the crossarm or service platform without the use of an additional crossarm adapter or special mounting plate for ease of installation.
D. The luminaire shall be rated for 55 degree C maximum ambient temperature operations for up to 1650 watts, and shall reliable start and operate the lamp in ambient temperatures down to -20 degrees C for the life of the rated lamp. Capacitor temperatures shall not exceed 68 degrees C in a 55 degree C ambient environment operating a maximum 1650 watt lamp.

E. The ballast shall be capable of starting and operating one 1000/1500/1650 watt metal halide lamp from a nominal 120/208/240/277/347/480 volt, 60 Hz power source, or a 220,230,240 volt 50Hz power source.

F. The ballast shall be in full compliance with lamp/ballast specifications available from the lamp manufacturer. The ballast must protect itself against normal lamp failure modes and be capable of operation with the lamp in an open circuit condition for six months without accelerate loss of ballast life.

G. The ballast output shall not vary more than +/- 5% from rated wattage when operated hot in the fixture (with nominal line and lamp voltage). Rated wattage for the ballast, supplied by the ballast manufacturer, shall be determined when the ballast is operating hot in the supplied luminaire, not cold on the bench.

H. For ease of installation and maintenance, the luminaires shall be supplied with a pre-installed STOOW-A cord with molded integral UL/CSA certified water-tight connector plug for connection to the pre-wired, galvanized steel mounting structure. Mating parts shall be mechanically keyed to prevent miss mating. Pins extended from the male device shall be recessed for protection. A molded rubber collar shall circle the base of each male pin to form a cork-like seal with each female socket. Pins and sockets shall be machined from solid bar stock to provide maximum moisture resistance. The grounding pins shall be extended for maximum safety. SO cable shall be rated at 600 volts and 105 degree C. All electrical components shall be UL recognized (UL #53429).

I. The general-purpose optical assembly shall consist of a one piece spun aluminum reflector that is symmetrically parabolic in shape. It shall be uniformly finished inside and out with a corrosion resistant anodized finish for maximum optical performance and lumen maintenance. The reflector shall be held in place by two stainless steel mounting arms and die-cast aluminum socket castings. The socket casting and reflector shall be sealed with post baked, high temperature, silicone gaskets.

J. The stainless steel mounting arms shall feature separate vertical aiming pivot bolts for permanent fixed aiming, and separate re-lamping hinge bolts so that the vertical aiming pivot point is never adjusted during re-lamping to prevent miss-aiming. The separate re-lamping hinge bolts shall allow easy rear re-lamping from service platforms or catwalks. An aluminum extrusion shall be used to provide positive stop repositioning without the use of friction or pin based re-positioning stops.
Vertical aiming degree markers shall be mounted on both sides of the optical for ease of aiming in any direction. A fixed mounted external aiming site shall also be supplied on the luminaire.

K. The optical shall use an impact and thermal-resistant tempered glass lens. The lens shall be mounted in a stainless steel hinged doorframe with a permanent hinge and stainless steel latches. The lens door shall be sealed with a post baked, high temperature silicone gasket to protect the internal reflective surfaces from the photometric degradation caused by the entry of dirt and contaminants.

L. The optical shall utilize internal glare control louvers for cutoff to lamp and lamp image without the increase in Effective Projected Area wind loading caused by external visors or louvers. The optical shall also include a thermal resistant vibrations lamp support with a fiberglass protective sleeve.

M. The luminaire shall be vibration tested to a 3G force for 100,000 cycles in three planes, and shall be wind tunnel tested to 125 mph with a 1.3 Gust Factor.

2.3 LAMP

A. The lamp shall be metal halide, manufactured to current industry standards, and commercially available at common sources of supply. Lamp construction shall be such that it is capable of operation in the luminaire without special retaining devices.

2.4 DISCONNECT SWITCH/FUSE ENCLOSURE

A. Power disconnect enclosure shall be NEMA 3 rated and ETL or UL/CSA listed. It shall be hot-dipped galvanized per ASTM A123. It shall be equipped with a manual UL/CSA certified power disconnect switch and fuse holder. Enclosure door shall have stainless steel hinges and a waterproof gasketed seal. Enclosure shall be pre-wired complete, ready for installation.

B. Enclosure shall be mounted on the pole at approximately 10’ above grade.

2.5 SEOPRENE DROP CABLE

A. The electrical supply cable shall be of the multiple conductor type and designed for suspension applications in high abrasion and extreme environment applications with a 600 volt, 105 degree C UL/CSA classification. Cable to be furnished with appropriate suspension device.
2.6 POWER DISTRIBUTION BOX

A. Power distribution box shall be NEMA 3R rated and hot-dipped galvanized. It shall contain power distribution blocks and grounding lugs rated for 600 volts. Box shall be mounted on mounting structure assemblies.

PLEASE CHOOSE ON “2.7" BELOW

2.7 STEEL POLES - ANCHOR BOLT FOUNDATION

A. The sports lighting system shall include a steel pole with an anchor bolt foundation.

B. The fabricator shall have been involved in the production of high mast steel structures for a period of no less than three years in order to ensure adequate experience, knowledge, equipment, and capability.

C. Pole shaft and foundation shall be designed to withstand an Isotach wind velocity of ___________ mph times a 1.3 gust factor, including the total effective projected area (EPA) and weight of the luminaires and assembly, as based upon the 50-Year Mean Recurrence Interval Isotach Chart.

D. Upon award of contract, lighting system manufacturer shall provide complete calculations verifying that the lighting pole meets the wind load requirements specified herein.

E. Each section of the pole shaft shall be of a single ply of steel with no welded splices, and having only one longitudinal seam weld. Each slip joint shall be assembled in the field by slipping the upper section over the lower section by a minimum lap of 1.5 times the largest inside diameter of the upper section. The pole cross section shall be rounded or sixteen-sided with a four inch corner radius. The pole shaft sections shall be high strength steel meeting the requirements of ASTM A595 Grade A or B or ASTM A572 Grade 65.

F. The base plate shall be of steel meeting the requirements of ASTM A36 or ASTM A572 Grade 42. It shall be integrally welded to the pole shaft with either 100% penetration, free of cracking and under cutting, and shall be ultrasonically tested, or a telescopic welded joint and magnetic particle tested.

G. Poles shall be hot-dipped galvanized in accordance with the requirements of ASTM A123. Each component must be completely coated in a single dip. No double dipping will be allowed. All miscellaneous hardware shall be galvanized per ASTM A153.

H. The anchor bolt material shall meet the requirements of ASTM A615 Grade 75 with a minimum yield strength of 75,000 psi, elongation of 10% minimum in 8", 
and charpy impact values of 15 ft/lb at -20 degrees F, or the anchor bolt material shall be AASHTO M314 Grade 55 with supplemental requirement S1.

I. Anchor bolts shall be hot-dipped galvanized to ASTM A153 for a minimum of 12" on the threaded end. Each anchor bolt shall be supplied with the two hex nuts and two flat washers. The strength of the nuts shall equal or exceed the proof load of the anchor bolts.

J. Steps shall be 3/4" - 10 UNC x 6-1/2" long. They shall be secured to the step lug (welded to the pole shaft) with a 3/4" - 10 UNC square nut and a 3/4" - UNC hex nut. Step spacing shall be on 15" staggered centered, beginning at approximately 12' - 15' above grade.

K. Safety climbing device shall consist of 1/4" stainless steel safety cable, attached with a cable terminator even with the first step up from pole base and to the service basest with an impact attenuator, and having an intermediate cable guide. The safety climbing device should be used with an OSHA approved body harness with D-rings, 6' lanyard, and detachable sleeve with quick stop locking device.

2.7 STEEL POLES - FLANGE FOUNDATION

A. The sports lighting system shall include a steel pole with a flange foundation.

B. The fabricator shall have been involved in the production of high mast steel structures for a period of no less than three years in order to ensure adequate experience, knowledge, equipment, and capability.

C. Pole shaft and foundation shall be designed to withstand an Isotach wind velocity of ____________ mph times a 1.3 gust factor, including the total effective projected area (EPA) and weight of the luminaires and assembly, as based upon the 50-Year Mean Recurrence Interval Isotach Chart.

D. Upon award of contract, lighting system manufacturer shall provide complete calculations verifying that the lighting pole meets the wind load requirements specified herein.

E. Each section of the pole shaft shall be of a single ply of steel with no welded splices, and having only one longitudinal seam weld. Each slip joint shall be assembled in the field by slipping the upper section over the lower section by a minimum lap of 1.5 times the largest inside diameter of the upper section. The pole cross section shall be rounded or sixteen-sided with a four inch corner radius. The pole shaft sections shall be high strength steel meeting the requirements of ASTM A595 Grade A or B or KASTM A572 Grade 65.
F. The base plate shall be of steel meeting the requirements of ASTM A36 or ASTM A572 Grade 47. It shall be integrally welded to the pole shaft with either 100% penetrations, free of cracking and under cutting, and shall be ultrasonically tested, or a telescopic welded joint and magnetic particle tested.

G. Poles shall be hot-dipped galvanized in accordance with the requirements of ASTM A123. Each component must be completely coated in a single dip; no double dipping will be allowed. All miscellaneous hardware shall be galvanized per ASTM A153.

H. The flange foundation shall project approximately one foot out of the ground, have a top plate to match the pole’s base plate, and be hot-dipped galvanized to guard against corrosion. It shall be made of high strength steel meeting the requirements of ASTM A572, Grade 65. The tip plate shall meet or exceed the requirements of ASTM A36. It shall be integrally welded to the steel tube with either a telescopic welded joint or a full penetration butt weld with a backup bar.

I. Steps shall be 3/4" - 10 UNC x 6-1/2" long. The shall be secured to the step lug (welded to the pole shaft) with a 3/4" - 10 UNC square nut and a 3/4" - UNC hex nut. Step spacing shall be on 15" staggered centers, beginning at approximately 12' - 15' above grade.

J. Safety climbing device shall consist of 1/4" stainless steel safety cable, attached with a cable terminator even with the first step up from pole base and to the service basket with an impact attenuator, and having an intermediate cable guide. The safety climbing device should be used with an OSHA approved body harness with D-rings, 6' lanyard, and detachable sleeve with quick stop locking device.

2.7 STEEL POLES - DIRECT EMBEDDED

A. The sports lighting system shall include a steel pole that is direct embedded.

B. The fabricator shall have been involved in the production of high mast steel structures for a period of no less than three years in order to ensure adequate experience, knowledge, equipment and capability.

C. Pole shaft and foundation shall be designed to withstand an Isotach wind velocity of _____________ mph times a 1.3 gust factor, including the total effective projected area (EPA) and weight of the luminaires and assembly, as based upon the 50-Year Mean Recurrence Interval Isotach Chart.

D. Upon award of contract, lighting system manufacturer shall provide complete calculations verifying that the lighting pole meets the wind load requirements specified herein.
E. Each section of the pole shaft shall be of a single ply of steel with no welded splices, and having only one longitudinal seam weld. Each slip joint shall be assembled in the field by inside diameter of the upper section. The pole cross section shall be rounded or sixteen-sided with a four inch corner radius. The pole shaft sections shall be high strength steel meeting the requirements of the ASTM A595 Grade A or B or KASTM A572 Grade 65.

F. Poles shall be hot-dipped galvanized in accordance with the requirements of ASTM A123. Each component must be completely coated in a single dip. No double dipping will be allowed. All miscellaneous hardware shall be galvanized per ASTM A153.

G. Steps shall be 3/4" - 10 UNC x 6-1/2" long. They shall be secured to the step lug (welded to the pole shaft) with a 3/4" - 10 UNC square nut and a 3/4" - UNC hex nut. Step spacing shall be on 15" staggered centers, beginning at approximately 12' - 15' above grade.

H. Safety climbing device shall consist of 1/4" stainless steel safety cable, attached with a cable terminator even with the first step up from poles base and to the service basket with an impact attenuator, and having an intermediate cable guide. The safety climbing device should be used with an OSHA approved body harness with D-rings, 6' lanyard, and detachable sleeve with quick stop locking device.

2.7 STEEL TOWERS - ANCHOR BOLT FOUNDATION

A. The sports lighting system shall include a three-sided steel tower with an anchor bolt foundation.

B. The fabricator shall have been involved in the production of high mast steel structures for a period of no less than three years in order to ensure adequate experience, knowledge, equipment, and capability.

C. Tower and foundation shall be designed to withstand an Isotach wind velocity of ______________ mph times a 1.3 gust factor, including the total effective projected area (EPA) and weight of the luminaries and assembly, as based upon the 50-Year Mean Recurrence Interval Isotach Chart.

D. Tower and foundation design shall account for ice load per the latest revision of ANSI/EIA-222.

E. Tower shall be constructed of the following materials:

1. Steel pipe legs (ASTM A618, Grade III) and solid rod legs (ASTM A572, Grade 50) having a minimum yield strength of 50 ksi.
2. Solid rod braces (C-1008) having a minimum yield strength of 33 ksi.

3. Angle braces up to 3" x 3" x 1/4" through 4" x 4" x 3/8" (ASTM A36 Modified) having a minimum yield strength of 50 ksi.

4. Angle braces up to 3" x 3" x 1/4" through 4" x 4" x 3/8" (ASTM A36 Modified) having a minimum yield strength of 50 ksi.

5. Angle braces of 5" x 5" x 5/16" or more (ASTM A572, Grade 50).

6. Tower bolts shall be ASTM A325.

F. Each structural member shall be identified by a part number, and any parts with the same part number must be interchangeable. This shall allow tower sections to be installed at any 120 degree rotation without changing the tower structurally. Match marking requirements of tower sections by the tower manufacturer, for proper assembly, shall not be acceptable.

G. Tubular leg members shall maintain an open interior diameter through the flange plate at least as large as the inside diameter of the pipe and shall be electrically welded internally and externally.

H. Flanged leg connections shall utilize a minimum of four bolts per leg.

I. The tower base plates shall be of steel, meeting the requirements of ASTM A36.

J. Anchor bolts shall meet or exceed ASTM A193 Grade B7 and ASTM A320 Grade 1.7.

K. Anchor bolts shall be hot-dipped galvanized to ASTM A153 for a minimum of 12" on the threaded end. Each anchor bolt shall be supplied with two hex nuts and two flat washers. The strength of the nuts shall equal or exceed the proof load of the anchor bolts.

L. Poles/Tower shall be hot-dipped galvanized in accordance with the requirements of ASTM A123. Each component must be completely coated in a single dip; no double dipping will be allowed. All miscellaneous hardware shall be galvanized per AST A153.

M. All welds shall be in accordance with the American Welding Society (AWS) D1.1-84 Gas Metal Arc process and performed by AWS-certified welders.

N. Ladder shall be a minimum of 1' - 1-1/2" in width, with rungs 5/8" in diameter and spaced 15” o.c. Side rails shall be 1-1/2" x 1/4" bar. Where ladder sections are joined, splice plates and ½" x 1-1/2" bolts shall be used.
O. Safety climbing device shall consist of 3/8” diameter 1 x 7 galvanized or stainless steel safety cable, attached at the bottom ladder rung with a bracket and compression spring and at the service basket with an impact attenuator, and having an intermediate cable guide. The safety climbing device should be used with an OSHA approved body harness with D-rings, 6' lanyard, and detachable sleeve with quick stop locking device.

P. Tower design, fabrication and galvanizing quality shall be maintained through in-house control. Subcontracting of any of these responsibilities to companies other than the primary tower vendor shall be cause for rejection of the tower.

2.7 POLES - CONCRETE

A. The following covers design, fabrication, and installation of pre-stressed concrete poles for sports lighting.

B. Poles shall be designed to conform to the design criteria of the American Association of State Highway and Transportation Officials (AASHTO).

C. Pole shall be a single continuous structure. Sectional poles to be field-assembled shall not be allowed.

D. Poles shall be designed and constructed so that all wiring and grounding facilities are concealed within the pole. Any handholds, wire inlets and outlets inserts for pole steps, thru-bolt holes, and ground wire shall be cast into the pole during manufacturing. It is intended that no field drilling of the poles be required.

E. Poles shall be designed considering the application of both dead load and wind load. The moment at any point along the length is to be the sum of moments resulting from dead loads and wind loads. The wind force is to be computed by multiplying the specified wind pressure by the effective projected area (EPA) of the individual components involved.

F. Poles shall be designed to withstand a constant wind speed of ______________ mpg times a gust factor of 1/3, as base upon the 50-Year Mean Recurrence Interval Isotach Chart.

G. No deviations in pole design will be permitted without prior written approval of the engineer. Requests for any deviation must be submitted in writing at least seven (7) days prior to the bid date so that adequate time is available for evaluation and proper addendum. All such requests must be submitted with conclusive engineering and descriptive data to prove that the resulting structures and all components will meet or exceed the requirements herein.
H. Upon award of contract, lighting system manufacturer shall provide complete calculations verifying that the lighting pole meets the wind load requirements specified herein.

I. Pole fabrication shall adhere to the following:

1. The concrete mix shall be designed to achieve a minimum twenty-eight day compressive strength of 7,000 psi. Cement shall conform with ASTM C150. Maximum aggregate size shall be 3/4". Any water reducers, retarders or accelerating admixtures shall conform to ASTM C494. Water shall be free from foreign material in amounts harmful to concrete and embedded steel.

2. **Reinforcing Steel** - Steel reinforcements shall conform to the requirements of ASTM A615 for Grade 60 rebar.

3. **Pre-stressing Steel** - Pre-stressing steel reinforcement shall conform to un-coated 7- wire, stress relieved strand (including low relaxation) ASTM A416.

4. **Spiral Reinforcement** - Steel spiral reinforcement shall conform to the requirements of ASTM A82 and shall be not less than 0.2031" in diameter (5 gauge). The pitch of the spiral steel shall not be greater than 6".

5. **Hardware** - All structural steel shall conform to ASTM A123. Zinc alloy AC41A for inserts, handhole frames, and covers shall conform to ASTM B240. All nuts, bolts, washers, and other fasteners must either be hot-dipped galvanized or stainless steel to resist corrosion.

J. All manufacturing tolerances, details of reinforcement, and finishes shall be in accordance with “Guide Specification for Pre-stressed Concrete Poles” as published in the JOURNAL OF THE PRE-STRESSED CONCRETE INSTITUTE.

K. All poles must be pre-stressed to ensure a minimum 28-day compression strength of 7,000 psi.

L. Forms shall be designed to provide a maximum continuous taper of 1/4” inches per foot of length, and provide a minimum of 3/4” concrete cover over all reinforcing steel.

M. Pole shall have a smooth natural form finish, soft gray in color.

N. The manufacturer shall have a minimum of three years experience in the design and production of concrete.

O. Each concrete sports lighting pole shall include the following:
1. No. 6 stranded copper ground wire cast in the pole and attached to pre-stressing steel by appropriate connectors. Wire to be terminated at the top of the pole and at the bottom of the pole at approximately 18” below grade in a copper tank ground which provides a ½” tapped insert at the pole face for attachment to the lightning rod at the top of the pole and ground rod below grade. Provision for grounding of the safety climbing cable shall be provided by bonding one or more of the inserts used to install the safety cable eye bolts.

2. Lightning rod (½” x 24”) to be attached to the pole.

3. As imprint or name plate cast into the wall of the pole approximately 4’ - 5’ above the ground to identify the manufacturer, year of manufacture, customer or job, and overall length.

4. A minimum 2” conduit raceway centered 18” below grade.

5. 3” x 8” minimum reinforced handhole frame and flush metal cover 24” above grade.

6. A 1-1/2” coupling for wire inlet/outlet opposite handhole at fixture level.

7. 5/16” diameter galvanized stranded safety climbing cable for servicing luminaires, nylon body harness with D-rings, detachable quick-strip latch, and 6’ lanyard.

8. 5/8” x 7” long step bolts complete with locking nuts on 15” staggered centers beginning at approximately 12’ - 15’ above grade.

9. Each pole shall be capped at top and plugged at bottom.

2.8 SERVICE PLATFORMS

A. Service platforms design shall comply with all OSHA safety and structural requirements. Service platforms shall be one piece units, factory assembled, shipped ready for installation. No field assembly of service baskets shall be allowed.

B. The service platforms shall be made of rectangular tubular members. The vertical center support shall measure 4” x 6”. Horizontal members shall be made from 2” x 4” steel tubing and be mounted through the vertical support. No support member will be dependent upon a weld for its structural integrity. All tubing components shall conform to ASTM designation A36. The assembly shall be manufactured as a one-piece modular unit for ease of installation and shall bolt directly to the pole with high strength ASTM A325 connection bolts. The floor shall be 3# expanded
metal grating with a hinged and framed door allowing access. The door shall be capable of closing prior to uncoupling safety climbing device.

C. Service basket members shall be internally hard wired with 16 AWG stranded copper wire encased by a synthetic rubber molding and rated for 90 degree C and 600 volts. Wiring shall be UL/CSA certified for enclosed applications. The wire shall terminate at each luminaire location on the service basket with a ½" NPT receptacle threaded into the underside of the horizontal tubular member. Receptacles shall be epoxied for durability and moisture resistance. Wiring shall originate in UL/CSA certified compression-type terminal blocks. Block is to be mounted in a NEMA rated UL/CSA certified, gasketed enclosure. Each set of wires shall be marked and identified by luminaire location. The pole top mounting bracket shall have internal drip shielding for wire entrance.

D. Welding shall be in accordance with the American Welding Society (AWS) structural Welding Code D1.1 Section 1 - 8, and shall be performed by welders certified in accordance with the AWS Code.

E. The service basket shall be hot-dipped galvanized. Galvanizing to be in accordance with the requirements of ASTM A123. Each component must be completely coated in a single dip; no double dipping will be allowed. All miscellaneous hardware shall be galvanized per ASTM A153.

F. All service basket materials shall be produced in the United States of America. They shall be of the ASTM type.

2.9 CROSSARMS

A. The crossarm shall be made of rectangular tubular members to allow for internal wiring of fixtures. The vertical center support shall measure 4" x 6". Horizontal members shall be made from 2" x 4" steel tubing and be mounted through vertical supports. No support member shall be dependent upon a weld for its structural integrity.

B. All tubing components shall conform to ASTM designation A36 and shall be pre-drilled for mounting luminaires. The assembly shall be manufactured as a one-piece modular unit for ease of installation and shall bolt directly to the pole with high strength ASTM A325 connecting bolts.

C. Welding shall be accordance with American Welding Society (AWS) structural Welding Code D1.1 Sections 1 - 8, and shall be performed by welders certified in accordance with AWS Code.

D. Crossarms shall be hot-dipped galvanized. Galvanizing to be in accordance with the requirements of ASTM A123. Each component must be completely galvanized.
in a single dip. No double dipping will be allowed. All miscellaneous hardware shall be galvanized per ASTM A153.

E. All crossarm materials shall be produced in the United States of America. They shall be of the ASTM type.

2.10 SUBSTITUTE PRODUCTS

A. Luminaires, poles lighting assemblies, and electrical components not in compliance with specification criteria must be submitted to the owner seven (7) days prior to bid opening for evaluation and approval. Substitute equipment must be equal to or exceed the requirements specified herein.

B. Lighting manufacturers submitting products other than those in compliance with specifications shall submit photo metric data showing equal or better footcandles levels, uniformity levels, and electrical consumption, while using the same design criteria and formulations.

C. Information shall be included on the following: ballast and ballast housing, all materials and electrical components of the luminaire, pre-wiring, pre-aiming, and luminaire construction. Omission of information or failure to provide proper and concise data shall be ground for rejection of bid.

D. Photometric reports must be submitted as outlined in Section 1.5. Failure to provide this information shall be cause for rejection of bid.

E. Lighting system manufacturer shall provide statement of warranty for all substitute equipment provided.

F. Lighting system manufacturer shall submit a written itemized statement of exceptions and discrepancies to specification.

PART III

3.1 MEASUREMENT PROCEDURES AND EVALUATION (per IES RPG-88, pp 88-89)

A. All luminaries shall be operating and properly aimed.

B. HID lamps shall have been in operation for 50 to 100 hours prior to testing. If the lamps and/or luminaires have been in operation for more than 100 hours, the approximate operating hours should be recorded.

C. For HID lamps, the system shall be operating for at least 30 minutes prior to testing.
D. Testing shall be done when the air and sky are clear and extraneous light is at a minimum.

E. Care shall be taken that test personnel do not cast shadows or reflected light from clothing or measurement instruments.

F. The photometer shall be of good quality and accuracy, recently calibrated or its accuracy otherwise verified.

G. The measurement record shall include the following information:
   1. Name of the installation.
   2. Date and time of the measurements.
   3. Description of the lighting system, including luminaire and lamp type and quantities, mounting heights, and other pertinent details.
   4. Age of the lighting system and number of operating hours since the last lamp change.
   5. Type, make and serial number of the photometer.

H. A variation between computer-predicted performance and the site-measured results is to be expected. However, the actual results shall be within 10% of the predicted results.

3.2 ON-SITE ASSISTANCE

A. At the request of the owner or contractor, the manufacturer shall provide a representative during the installation of the lighting system to instruct the installing contractor and to ensure that poles and luminaire assemblies are properly oriented according to manufacturer requirements.

PART IV - DELIVERY

4.1 REQUIREMENTS

A. All material shall be delivered to the site undamaged and stored in an area safe from damage of all nature.

B. Damaged material shall be rejected.
C. The contractor shall be responsible for receiving the sports lighting system and poles at the site, and shall provide all equipment and labor required to unload the materials. Poles shall be stored as recommended by the manufacturer.

END OF SECTION 26 51 50