SPORTS LIGHTING FOR
MESA SOCCER COMPLEX
SPECIFICATIONS

IFB# 10-09/03/15

BEI # 15350A

SECTION 010000 - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Summary of Work: Contract, Contractor use of premises, work sequence, owner occupancy.

B. Contract Considerations: Schedule of values, applications for payment, change procedures, alternates.

C. Coordination and Meetings: Coordination, field engineering, utility outages and shut down, alteration project procedures, cutting and patching, preconference, site mobilization conference, progress meetings, pre-installation conference.

D. Submittals: Quality Assurance, Submittal procedures, construction progress schedules, proposed products list, shop drawings, product data, samples, manufacturers' instructions, manufacturers' certificates.

E. Quality Control: Quality assurance - control of installation, References, Field Samples, Inspection and testing laboratory services, quality assurance.

F. Construction Facilities and Temporary Controls: telephone service, barriers, water removal of utilities, facilities, and controls.

G. Material and Equipment: Products, transportation and handling, storage and protection, products options, substitutions.

H. Starting of Systems: Starting systems, demonstration and instructions, testing adjusting and balancing.

I. Contract Closeout: Closeout procedures, final cleaning, adjusting, project record documents, operations and maintenance data, warranties, spare parts and maintenance materials.

1.2 CONTRACT

A. Contract Description: Stipulated Price.

1.3 CONTRACTOR USE OF SITE AND PREMISES

A. Access to Site: Site includes ball fields which will be in use in afternoons as is safe and possible while work is progressing. All work will be scheduled with Owner to the degree to allow maximum use while work is in process.

B. Construction Operations: Limited to areas noted on Drawings.

C. Utility Outages and Shutdown: Coordinate with local utilities if utility outage occurs or before intending to shutdown utility to site for construction purposes.

D. Hours of Operation: Normal working hours are considered to be from 8:00 a.m. to 5:00 p.m. Coordinate with Owner's security program for any additional hours of operation.

E. Protection of Existing Landscape: Provide protection of all existing trees and shrubs within the construction limits. Avoid use of any harmful materials or processes within the vicinity of existing trees and shrubs in or adjacent to the construction limits.

1.4 WORK SEQUENCE

A. Construct Work to accommodate Owner's occupancy requirements for the project during the construction period, coordinate construction schedule and operations with Owner.

1.5 OWNER OCCUPANCY

A. The Owner will occupy the site during the entire period of construction for the conduct of normal operations.

B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

1.6 CHANGE PROCEDURES

A. The Owner or Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time.

B. The Owner or Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications.

C. The Contractor may propose a change by submitting request for change to the Owner and Architect/Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Substitutions paragraph below.

D. Stipulated Sum Change Order: Based on proposal Request and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Owner and Architect/Engineer.

E. Change Order Forms: Contractor shall use Owner’s Change Order Form.

F. Execution of Change Orders: Owner will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.7 ALTERNATES

A. Definition: An alternate is an amount proposed by Bidders and stated on the Bid Form that will be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the scope of work or in products, materials, equipment, systems or installation methods described in Contract Documents.

B. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner - Contractor Agreement.

C. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

D. Refer to Bid Form for listing of Alternate(s).

1.8 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate and clean up the work of all sections in preparation for Substantial Completion. Areas of Work designated for Owners occupancy need timely coordination and cleanup to minimize delays in Owner's normal operations.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

G. Before excavating, contact local utility companies to verify location of their specific utility and coordinate power shutdowns during construction.

1.9 FIELD ENGINEERING

A. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.10 UTILITY OUTAGES AND SHUTDOWN

A. Utility Outages and Shutdown: Electrical services shall be maintained in the work areas throughout the construction. Any shutdown of utilities required during construction shall be arranged and shall be approved by the Owner. Request for outages must be submitted, in writing at least four weeks in advance of the planned utilities shutdown. All work under this division shall be coordinated with the general construction schedule and planning.

1.11 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in product Sections; match existing Products and work for patching and extending work.

B. Coordinate work of alternations and renovations to expedite completion and to accommodate Owner occupancy.

C. Remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.

E. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patched Work to match existing adjacent Work in texture and appearance.

F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendations to Owner.

G. Where a change of plane of 1/4 inch or more occurs, request instructions from Owner.

H. Finish surfaces as specified in individual Product Sections.

1.12 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.

B. Submit written request in advance of cutting or altering elements which affects:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight-exposed elements.
   5. Work of Owner or separate contractor.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
   1. Fit the several parts together, to integrate with other Work.
   2. Uncover Work to install or correct ill-timed Work.
   3. Remove and replace defective and non-conforming Work.
   4. Remove samples of installed Work for testing.
   5. Provide openings in elements of Work for penetrations of mechanical and

electrical Work.

D. Execute work by methods which will avoid damage to other Work and provide proper surfaces to receive patching and finishing.

E. Cut rigid materials using masonry saw or core drill.

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of wall, ceiling, or floor construction, completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

J. Identify any hazardous substance or condition exposed during the Work to the Owner for decision or remedy.

1.13 PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a conference after Notice of Award.

B. Attendance Required: Owner, Engineer, and Contractor, Contractor's Superintendent.

C. Agenda:
1. Distribution of Contract Documents.
2. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.
3. Designation of personnel representing the parties in Contract, and the Architect/Engineer.
4. Procedures and processing of field decision, submittals, substitutions, applications for payment, proposal request, Change Orders and Contract closeout procedures.
5. Scheduling.
6. Use of premises by Owner and Contractor.
7. Owner's requirements and occupancy.
8. Construction facilities and controls provided by Owner.
9. Temporary utilities provided by Owner.
10. Security and housekeeping procedures.
11. Schedules.
12. Procedures for testing.
13. Procedures for maintaining record documents.
14. Requirements for start-up of equipment.
15. Inspection and acceptance of equipment put into service during construction period.

1.14 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at weekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Architect/Engineer, Owner, participants, and those affected by decisions made.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

1.15 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date for receiving bids.

C. Obtain copies of standards when required by Contract Documents.

D. Maintain copy at job site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

F. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or interference otherwise in any reference document.

1.16 SUBMITTAL PROCEDURES

A. Transmit each submittal with transmittal.

B. Sequentially number the transmittal forms. Resubmittals to have original number with an alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Architect at business address. Coordinate submission of related items.

F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

G. Provide space for Contractor and Architect review stamps.

H. Revise and resubmit submittals as required, identify all changes made since previous submittal.

I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.17 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule (8 1/2" x 14" format) in duplicate within 10 days after date of Owner-Contractor Agreement for Architect/Engineer review.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a horizontal bar chart with separate line for each major section of Work or operation identifying first work day of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.18 PROPOSED PRODUCTS LIST

A. Within 10 days after date of Owner-Contractor Agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.19 SHOP DRAWINGS

A. Submit in the form of one reproducible transparency for drawings larger than 11" x 14".

B. After review, reproduce and distribute in accordance with Article on Procedures above and for Record Documents described in Section 01001 - Contract Closeout.

1.20 PRODUCT DATA

A. Submit the number of copies which the Contractor requires, plus submit one hard copy of drawings and product data 8 1/2" x 14" and smaller which will be retained by the Architect/Engineer.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01001 - Contract Closeout.

1.21 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.22 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturer's certificate to Architect/Engineer for review, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.23 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.24 REFERENCES

A. Conform to reference standard by date of issue current on date for receiving bids.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification for Architect/Engineer before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.25 TELEPHONE SERVICE

A. Provide, maintain and pay for telephone service to field personnel at time of project mobilization.

1.26 BARRIERS

A. Provide barricades around perimeter of work sites to discourage public access into work sites when required.

B. Provide protection for plant life designated to remain. Replace damaged plant life.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.27 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Prohibit traffic from landscaped areas.

1.28 SECURITY

A. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.29 ACCESS ROADS

A. Construct and maintain temporary vehicular access to the site.

B. Provide means of removing mud from vehicle wheels before entering streets.

1.30 PARKING

A. Owner will provide temporary off-street surface parking areas to accommodate construction personnel.

B. Do not allow vehicle parking along streets.

1.31 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Broom and vacuum clean interiors of panels prior to start of surface finishing, and continue cleaning to eliminate dust.

C. Remove waste materials, debris, and rubbish from site weekly and dispose off-site.

1.32 PROJECT IDENTIFICATION

A. Location established by Owner. Contractor shall be allowed to provide project sign in addition to Engineer. Size and content must be approved by Owner.

B. No other signs are allowed without Owner permission except those required by law.

1.33 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.

B. Restore grade and grassing to existing condition.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore permanent facilities used during construction equal to original condition.

1.34 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

C. Provide interchangeable components of the same manufacturer, for similar components.

1.35 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.36 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection. Coordinate on-storage areas with Owner at the Pre Bid Conference.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent

mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.37 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.38 SUBSTITUTIONS

A. Instructions to Bidders specify time restriction for submitting requests for Substitutions during the bidding period to requirements specified in this Section.

B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

C. A request constitutes a representation that the Bidder:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

D. Submit cut sheets and product data of specified product and proposed substitution.

E. Provide a written letter certifying compliance with specified product and outlining differences.

F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revisions to the Contract Documents.

1.39 STARTING SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Engineer seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper control sequence or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible Contractors' personnel in accordance with manufacturers' instructions.

G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

H. Submit light level test demonstrating compliance with project specifications.

1.40 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.41 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.42 FINAL CLEANING

A. Clean debris from roofs and drainage systems.

B. Clean site; sweep paved areas, rake clean landscaped surfaces.

C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.43 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.44 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
   1. Contract Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other Modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish grade datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to Permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract Drawings.

F. Submit above documents along with AIA Document G706 "Contractor's Affidavit of Payment of Debts and Claims," and G707 "Consent of Surety Company to Final Payment" to Architect/Engineer with claim for final Application for Payment.

1.45 OPERATION AND MAINTENANCE DATA

A. Submit two sets prior to final inspection, bound in 8 1/2 x 11 inch text pages, three D-side ring covers.

B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below, with tab titling clearly printed under reinforced laminated plastic tabs.

D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on white paper.

E. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.

F. Part 2: Operation and maintenance instruction, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   1. Significant design criteria.
   2. List of equipment.
   3. Parts list for each component.
   4. Operating instructions.
   5. Maintenance instructions for equipment and systems.
   6. Maintenance instructions for finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

G. Part 3: Project documents and certificates, including the following:
   1. Shop drawings and product data.
   2. Air and water balance reports.
   3. Certificates.
   4. Photocopies of warranties and bonds.

H. Submit one copy of completed volumes in final form 5 days prior to final inspection. This copy will be returned after final inspection, with Architect/Engineer comments. Revise content of documents as required prior to final submittal.

I. Submit final volumes revised, within ten days after final inspection.

1.46 WARRANTIES

A. Provide duplicate notarized copies.

B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three D-side ring binder with durable cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.47 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.48 CONTRACTOR LICENSES AND PERMITS

A. Contractor is required to obtain all required licenses and permits in the State of South Carolina and the county of Greenville, SC.

END OF SECTION 010000

SECTION 260500 — GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. The provisions of General Conditions and all other sections of Division 1 of these Specifications shall govern the work under this Division or Section the same as if incorporated herein.

1.2 SCOPE

A. The Contractor shall provide and install complete electrical systems including all conductors, raceways, fittings, protective devices, wiring devices, fixtures, supports, and all miscellaneous hardware necessary. All of the above equipment shall be completely installed and left in proper operating condition. All electrically powered equipment whether furnished by others or by the Contractor shall be wired by the Contractor.

B. Complete Power distribution and utilization system shall be installed, including service entrance, panelboards, utilization devices and equipment as indicated on drawings. The Contractor shall coordinate and comply with utility requirements for service and metering and pay all cost for difference in the standard service and service specified. Contractor shall include all lighting systems, poles, fixtures, controls, and foundations in his bids.

C. The Contractor shall furnish and install power, wiring and/or disconnects as shown on drawings for wiring systems for lighting systems to be furnished by Owner. The contractor shall coordinate with Laurens Electrical Cooperative for services indicated on plans.

1.3 REQUIREMENTS

A. Field verification of scale on electrical plans is directed since actual locations, distances and levels will be governed by actual field conditions.

B. In case of conflicts or discrepancies between plans, plans and specifications and/or actual field conditions, Contractor shall notify the Engineer before work is continued. Coordinate with other trades to avoid conflicts.

C. Permits, Inspections and Tests - The Contractor shall procure and pay for all permits, fees, inspections, and licenses required. Perform all tests to ensure all systems are in good operating condition.

D. Review of Material; Specific reference in the specification to any article, device, product, material, fixture, form or type of construction by name, make or catalog

number, with or without the words "or equal", shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition.

E. Bidders shall base bids on the material specified or on equals receiving approval 10 days prior to Bid Opening. Any increase in the cost of work resulting from substitution of any product specified is part of this contract and shall be accomplished in an approved manner at no extra cost to the Owner.

F. Substitutions. No substitution will be considered unless written request for approval has been received by the Engineer at least 10 calendar days prior to the date of receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, cuts, performance and test data and any other information necessary for an evaluation. Refer to section 265110 Sports Lighting for additional information required for substitution requests. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute would require shall be included; failure to do so does not alleviate the Contractor of his responsibility to make any and all necessary changes required for installation of the approved substitution. The burden of proof of the merit of the proposed substitute is upon the proposer. The Engineer's decision of approval or disapproval of a proposed substitution shall be final.

G. All materials shall be new and of current manufacturer. Where more than one of a type of device is used, all shall be by the same manufacturer. All materials shall conform to the grade, quality and standards of those specified.

H. Shop drawings shall be submitted in accordance with the General Conditions. Forward all shop drawings at one time. Each item shall bear project name and identifying symbol from plans. Shop Drawings required are as follows:

1. Lighting Fixtures
2. Lighting Poles
3. Lighting Controls
4. Panelboards
5. Wiring Devices
6. Contactors
7. Transformers

I. Interferences - The drawings are generally diagrammatic in nature, and accordingly the Contractor shall coordinate his work with that of all other trades to avoid interferences. The Contractor shall examine the complete set of drawings and specifications for the job before installation of electrical work, coordinating locations and routings with other trades to avoid interferences. Work installed by the Contractor which does interfere with another trade shall be removed and reinstalled at the Contractor's expense when directed by the Architect.

J. Workmanship shall be of the highest quality and all work shall be done by workmen skilled in the trades involved.

K. The Contractor shall guarantee all work under this contract for one year and shall be responsible for the maintenance of all electrical equipment furnished and installed

under this contract, excluding lamp replacement, for a period of one year from the date of substantial completion.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 APPLICABLE CODES AND STANDARDS

Note: The materials and installation shall conform to the minimum requirements and latest outstanding issues and revisions of the following codes, standards, and regulations wherein they apply:

NFPA No. 70, National Electrical Code, (2011 edition).

IBC (2012), IECC (2009), IFC (2012)

American National Standard, National Electrical Safety Code, (2012).

Applicable Publications of NEMA, ANSI, IEEE and IPCEA.

Underwriter's Laboratories, Inc. Standards

City, State and Local Codes and Regulations having jurisdiction.

OSHA requirements.

ADA requirements.

END OF SECTION 260500

SECTION 260501 — BASIC MATERIALS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 SCOPE

A. Contractor Furnished. Unless otherwise noted on the drawings, equipment list, or specifications, the Contractor shall furnish and install all materials, devices, and apparatus necessary for the complete electrical system. All materials and equipment shall be of types and manufacturer specified wherever practical. Should materials or equipment so specified be unobtainable, the Contractor shall submit the description and manufacturer's literature, reason for the substitution request and shall secure the approval of the Engineers before substitution of other material or equipment. This specification establishes performance requirements and the quality of equipment acceptable for use and shall in no way be construed to limit procurement from other manufacturers.

B. Equal or Equivalent. The term "or equal" and similar terms as used on the drawings or specifications shall be interpreted to mean "equal or equivalent" in the opinion of the Engineers.

C. Manufacturer's Prints. Where the Contractor furnishes equipment other than standard construction items, he shall furnish manufacturer's prints and reproducibles of all such equipment to the Engineers.

D. U.L. Listing. All equipment and materials shall be new and conform to the requirements of this specification. All equipment and materials shall be listed by the Underwriter's Laboratories, Inc., and shall bear their label whenever standards have been established and label service is regularly furnished. All equipment and materials shall be of the best grade of their respective kind for the purpose.

PART 2 - PRODUCTS AND EXECUTION

2.1 PANELBOARDS

A. Contractor Furnished. The contractor shall furnish all lighting, service, and power distribution panelboards required. All panelboards shall be of deadfront construction and shall incorporate all switching and protective devices of the type, quantity, number of poles, rating and type specified or shown on the drawings. The drawings and schedules indicate the ampere rating of mains, main breaker or disconnect, main lugs,

voltage rating, phases, neutral and type of devices and enclosures. Enclosures for panelboards may be flush or surface type as designated on the drawings.

B. Boxes. Boxes shall be constructed of code gauge galvanized sheet steel and provided with not less than 7" wiring gutters at the sides and 5" at top and bottom. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment (loop feeds), the box shall be sized to include this wiring space. This wiring space shall be in addition to the minimum gutter space specified above and the limiting width may be increased accordingly. Knockout type boxes may be used on flush mounted installations where conduits are routed concealed. Surface mounted boxes shall be furnished without factory stamped knockouts and the contractor shall punch the box for the conduit group desired. Conduit hubs shall be T&B Series 370 "Bullet" hubs or approved equal.

C. Doors. Hinged doors covering all switching device handles shall be included in all panel trims, except that panelboards having individual metal clad externally operable deadfront units may be supplied without such doors. Doors shall have flush or semi-flush type, corrosive resistant, cylinder lock and catch, except that doors over 48" in height shall have a vault handle and 3-point latch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Two keys shall be supplied for each lock. All locks shall be keyed alike for all panelboards supplied. Trims shall be fabricated of code gauge sheet steel. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screw-driver without the need for special tools. Trims shall be properly cleaned and finished with a gray paint over a rust inhibiting primer coating. The finish coat shall be the type that will permit adherence of field applied paint.

D. Directory. A directory holder with glass or heavy plastic plate and metal frame shall be mounted inside of each door with a neatly typed directory properly identifying each circuit as shown on panel schedule drawings.

E. Nameplate. The contractor shall furnish and install an engraved, laminated plastic nameplate on the trim. The nameplate shall identify the panel by power source designation, panel designation, voltage rating and phase. Nameplate shall be black engraved letters on white background.

F. Bus Bars. Bus bars and other conductive parts shall be copper and sized in accordance with Underwriter's Laboratories standards, full size insulated neutral bars shall be included. Bussing shall be braced equal to or greater than the highest rated practice governing short circuit stresses in panelboards. Phase bussing shall be full height without reduction. Cross connectors shall be copper.

G. Neutral Bus. Neutral bussing on 3-phase panels shall have a suitable lug for each outgoing feeder requiring a neutral connection.

H. Ground Bus. All panels shall be furnished with a bare equipment ground bus. The ground bus shall be of copper and 1/4" x 2" minimum size, properly bonded to the housing. Suitable lugs shall be provided for termination of each equipment ground conductor.

I. Phase Sequence. Bus bar connections to the branch circuit shall be the "distributed phase" or "phase sequence" type. Single-phase, three-wire panelboard bussing shall be such that any two adjacent single-pole units are connected to the opposite polarities in such a manner that two-pole units can be installed at any location. Three-phase, four wire bussing shall be such that any three adjacent single-pole units are individually connected to each of the three different phases in such a manner that two or three-pole units can be installed in any location.

J. Circuit Numbering. Panelboard circuit numbering shall be such that starting at the top, odd numbers shall be used in sequence down the left-hand side and even numbers shall be used in sequence down the right-hand side.

K. Terminals. Terminals for feeder conductors to the panelboard mains and neutral shall be U.L. listed as suitable for type of conductor specified and shall be T&B 54000 Series where possible. Terminals for branch circuit wiring, both breaker and neutral, shall be U.L. listed as suitable for the type of conductor specified.

L. 277/480V Panels. All lighting/service panels rated 277/480 volt, shall be equal to Square D Company, Type NF equipped with bolt-on branch breakers the type and rating specified on the drawings.

M. 120/208V Panels. All lighting/service panels rated 120/208 volt, shall be equal to Square D Company, Type NQOD equipped with bolt-on branch breakers of the type and rating specified on the drawings, unless noted on plans.

N. Panels and Panelboards are designed around Square D equipment. Acceptable alternate manufacturers are Eaton, Siemens, and General Electric Company. All alternate or substitution requests shall meet all performance requirements of specified equipment, as well as space and dimension requirements noted on drawings.

2.2 CIRCUIT BREAKERS

A. Contractor Furnished. The contractor will provide breakers unless specifically designated to be "Owner Furnished" on the drawings, equipment list, or within the specifications.

B. As Specified. Breakers shall be of the type, rating, number of poles, size, and interrupting capacity, specified or required for the environment, location, application, and load served.

C. Molded Case Circuit Breakers. Molded case circuit breakers shall be circuit interrupting devices which will operate both manually for normal switching functions and automatically under overload and short circuit conditions. Circuit breakers shall provide circuit protection when applied within rating.

D. Operating and Switching Mechanism. The operating mechanism shall be entirely trip-free so that the contacts cannot be held closed against an abnormal over-current or short circuit condition. The switching mechanism shall be quick-make, quick-break type.

E. Overload and Short Circuit Protection. The operating handle of the circuit breaker shall open and close all poles of a multi-pole breaker simultaneously. The breakers shall meet applicable NEMA and U.L. specifications. Each circuit breaker shall have a trip unit to provide overload and short circuit protection. The trip unit for each pole shall have elements providing inverse time delay under overload conditions and instantaneous magnetic tripping for short circuit protection. The trip element shall operate a common trip bar which shall operate all poles in case of an overload or short circuit through any one pole. Automatic tripping shall be clearly indicated by handle position.

F. Rating. The molded case circuit breakers shall be rated for fault duty as specified on the plans. Series ratings are not allowed. The Contractor shall verify available fault current with the Utility Company for the actual installation and forward to the Engineer.

2.3 SAFETY SWITCHES

A. Contractor Furnished. The contractor shall provide all safety disconnect switches required. The switches shall be of the type, voltage, ampere, and horsepower rating, number of poles, fusible or nonfusible, as specified or required for the environment, location, application, and load served.

B. Description. All safety switches shall be NEMA premium heavy duty, horsepower rated, industrial type, and shall be Underwriters' Laboratories listed. Fusible switches shall be complete with fuses of the type and rating specified (refer to paragraph "Fuses") and as indicated on the drawings or within these specifications. All switches shall have switch blades that are fully visible in the OFF position when the door is open and shall be of dead front construction with arc suppressors. The mechanism shall be quick-make, quick-break type. The door shall be interlocked (defeatable type) with the handle or mechanism to prevent unauthorized opening of the door in ON position. Pad-locking provisions shall be provided for padlocking in the OFF position with one or more locks or lockable hasps. Grounded switches in a common enclosure shall be mounted in enclosure types specified elsewhere. Individually mounted switches shall be mounted in enclosures suitable for the location and environment as specified on the drawings.

C. Nameplate. All switches shall be provided with an engraved laminated phenolic nameplate showing the power source (Unit No. or other), and title of equipment served. Nameplates to be black letters on white background.

D. Manufacturer and Enclosures. All switches furnished shall have enclosures as specified on the drawings. Acceptable manufacturers shall be Square D, General Electric, Siemens, and Cutler-Hammer.

2.4 FUSES

A. Contractor Furnished. The contractor shall furnish and install fuses in all fusible devices and equipment that are furnished by the contractor.

B. Manufacturer and Listing. Fuses shall be as manufactured. Bussman Manufacturing Division or equivalent products by Chase Shawmut Division.

2.5 MISCELLANEOUS CONTROL DEVICES

A. Enclosures. All devices furnished shall be suitable for the control requirements and shall have voltage rating and adequate capacity for the application. They shall be housed in enclosures suitable for the location and environment as indicated on the drawings.

2.6 RECEPTACLES – OUTLETS

A. Contractor Furnished. The contractor shall furnish and install all convenience (and power type) receptacles and outlets shown on the drawings. Suitable boxes, covers and matching plugs as specified shall be provided and the installation shall conform to typical details, drawings, and as described elsewhere in this specification. See electrical symbol drawings for additional descriptive data

B. Single Manufacturer. Receptacles of similar usage and rating shall be those of a single manufacturer.

C. Usage and Manufacturer. General use and convenience outlets shall be as specified by symbol on the drawings and as listed on the symbols drawing.

D. Ground Fault Protection. Note that all convenience receptacles to be installed as ground fault interrupting type are so noted on drawings.

2.7 BOXES

A. Contractor Furnished. The contractor shall furnish and install all electrical boxes required for the proper installation of the electrical systems. Boxes shall be of the NEMA type suitable for the location. Boxes shall be installed as specified on the drawings and as described under "Wiring Methods", and other applicable sections of this specification for wiring devices such as switches, receptacles, and similar devices. In order to maintain fire ratings, boxes installed "back-to-back" in fire walls shall not be located in the same space between studs, but shall have a stud located between them.

B. Concealed. Fixture, outlet, and switch boxes installed concealed in walls or ceiling areas shall be galvanized or cadmium plated sheet steel of not less than the minimum size as recommended in the National Electrical Code and shall be furnished with appropriate covers as specified in other applicable sections of these specifications or on the drawings. All boxes shall be accessible for maintenance purposes.

C. Exact locations of all floor boxes shall be coordinated in the field with the architect unless specific dimensions are shown on the drawings. Also, see Section 260501 of these specifications.

D. Surface Mounted. Fixture, outlet, and switch boxes installed surface mounted in plant, shop, operating, and unfinished areas shall be threaded, cast alloy iron or malleable iron. Iron type shall have a cadmium/zinc electroplate, or galvanized finish with appropriate lacquer. Boxes shall be of the approved type for the outlets, switches, and fixtures served and shall be made of the material and finish compatible with the conduit system and location. Surface mounted boxes shall be only as noted on the plans.

E. Splice and Tap Boxes. Splice and tap boxes for power circuits shall be used only where designated on the drawings and shall be of the type and size indicated. Otherwise all power wiring shall be continuous, splice and tap free, between equipment. On lighting and convenience receptacle circuitry, wiring may be spliced and boxes shall be provided for concealed or surface mounting as previously specified or may be JIC oil-tight of size and type indicated on the drawings or minimum size as specified in the National Electrical Code.

F. Pull Boxes. Pull boxes for interior, or outdoor exposed power wiring shall be provided where shown or required to facilitate the installation of the wiring. Pull boxes shall not be located in finished rooms and shall be accessible for maintenance use. For conduit sizes 3/4 and 1 inch, conduit fittings of the "C", "LB", "TB" and similar types may be used for "Pulling In." Unless designated otherwise, all pull boxes shall be the straight-through type and changes in direction shall not be made in the box. The boxes shall be of the minimum size and type as required by the National Electric Code or as sized on the drawings.

G. Exterior and Underground. For exterior exposed work, pull boxes shall be of NEMA 3R construction and shall be threaded hub type with gasketed cover.

2.8 COVERS AND DEVICE PLATES

A. Contractor Furnished. The contractor shall furnish and install the appropriate cover on all boxes, conduit fittings, panels, cabinets, switches, receptacles, and similar wiring devices and other equipment that is Contractor furnished. Conduit outlet fitting covers shall be the type specified under "Conduit Fittings."

2.9 ENCLOSURES

A. Enclosures and housings for all Contractor furnished electrical equipment and devices shall be suitable for the location and environmental conditions and shall be of NEMA type as shown on symbol sheet drawing.

END OF SECTION 260501

SECTION 260519 — CONDUCTORS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 SCOPE

A. This specification covers the requirements for all wire and cable to be used in the installation of the electrical systems for the project, including all power, lighting, control and instrumentation systems.

B. Wire and cable will normally be furnished by the Contractor for installation. Drawings will indicate where cable is not to be furnished.

C. All cable is to be "Contractor-furnished", the Contractor shall submit for approval by the Owner any deviations anticipated or proposed with respect to the cable manufacturer, cable type, or specification contained herein.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All wire and cable shall be Underwriters' Laboratories (UL) listed. In addition to other standard labeling, all wire and cable shall be marked UL on the outer surface indicating Underwriters' Laboratories, Inc. certification.

B. Grounding conductors, where insulated, shall be colored solid green. Conductors intended as a neutral shall be colored solid white.

C. For all circuits 600 volt and less, wires and cables shall have code grade, 600 volt type THWN-THHN, 75 degrees C., wet or dry locations, moisture and heat resistant thermoplastic insulation. Insulation thickness shall be per National Electrical Code, Table 310-13.

D. Conductor sizes are expressed in American Wire Gage (AWG) or in circular mils. Conductors shall be annealed copper wire, minimum size #12 AWG, except that #14 AWG may be used for control. All conductors shall be stranded except that solid conductors may be used for #12 AWG lighting and receptacle branch circuits.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Separation of Usage. Lighting and power wiring shall be routed in conduits, or other raceways as shown on the drawings. Lighting and power wiring shall not be routed in a common raceway except where shown on drawings. Push-button wiring shall be routed in separate raceways even though related to a particular motor circuit.

B. Pulling. Where mechanical assistance is used for pulling conductors, patented wire pulling compounds having inert qualities that do not harm the wire insulation or covering shall be applied to the conductors as they are pulled into raceways. Interior of all raceways shall be free from grease, filings or foreign matter before conductors are pulled in.

3.2 IDENTIFICATION

A. Wire, Cable, Raceways, and Conduits.

B. Circuit identification numbers shall be placed on each end of the conductor involved by using self-laminating marker tags, T&B Company E-Z Code Type WSL or equal. Circuit numbers shall be as shown on the plan and panel schedule drawings.

C. Phase Identification. Phase sequence throughout the installation shall be standardized wherever practical in all electrical power equipment as follows:

		Phase A	Phase B	Phase C
Position Occupied		Front	Center	Rear
		Top	Center	Bottom
		Left	Center	Right
Color Code:	208/120V, 3-phase	Black	Red	Blue
	480/277V, 3-phase	Brown	Orange	Yellow

3.3 SPLICES AND TERMINATIONS

A. Lighting Conductors. Splices in lighting conductors shall be made with splicing caps with metal inserts only, such as 3M Company's "Scotchlock" spring connectors. The splices shall be firmly and neatly taped to prevent entry of moisture.

B. Power Conductors shall be continuous from outlet to outlet. No power cable shall be spliced except on explicit instructions of the Owner’s Representative.

3.4 LUGS

A. All lugs shall be furnished and installed by the Contractor where required.

B. Lugs for copper power wiring, Sizes No. 12 and No. 10 AWG, shall be T&B "Sta-Kon" uninsulated ring type lugs. Lugs for copper power wiring from No. 10 AWG to size 1/0 AWG shall be T&B 1-hole Type 54100 Series. Size 2/0 AWG and larger lugs shall be 2-hole type 54200 series (except where 1-hole is required to match motor lead lugs). Sizes above 1/0 are to be applied using hydraulic pump tool.

C. Where motor leads are furnished without lugs, T&B 54500 Series 2-way connectors (splicing sleeves) shall be used. Splice sleeves may be desirable where limited space for termination exists.

D. The proper lugs will normally be furnished with equipment in all Owner-furnished equipment. All other lugs shall be furnished and installed by the Contractor. No mechanical type lugs shall be used except in panelboards. If any mechanical type lugs are furnished with Owner-furnished equipment, the Contractor shall replace them with proper compression type lugs where practical.

3.5 TAPING

A. All voids, sharp corners and bolt projections shall be made smooth by filling with Okonite or Scotch Fill before applying the laps of tape required for insulation. All loose strands of wire shall be removed before taping. Duxseal will not be permitted.

B. Joints and other sections of wiring requiring tape shall be half lap and at least two layers. Taping shall be neatly done and shall form a permanent insulation equal in mechanical and electrical strength to the insulation of the conductor. Taping shall be as follows:

1. 600 Volt insulation - A minimum of 1-1/2 lap layer varnished cambric and 2-1/2 lap layers of 3M No. 33 vinyl plastic electrical tape.

C. All taping, splicing and termination materials shall be furnished by the Contractor.

END OF SECTION 260519

SECTION 260526 — GROUNDING

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260500, GENERAL PROVISIONS.

1.2 WORK INCLUDES

A. As Required By the NEC. In general, fixtures, outlets, the enclosing cases, mounting frames, etc., of all switches, circuit breakers, control panels, and any other electrically operated or electrical equipment, conduit, and other raceways shall be effectively and permanently grounded with a separate copper grounding conductor of cross-section as required by the National Electrical Code and drawings. It shall be of capacity sufficient to insure continuity and continued effectiveness of the ground connections to carry fault currents. Ground conductors must be as short and straight as possible, protected from mechanical injury and if practicable without splice or joint. The grounding conductor shall be run from a ground established at the source of supply to the equipment to be grounded. Ground wires from below grade shall be protected by galvanized conduit and the conductor shall be brazed to conduit sleeve on each end. All grounding conductors shall be copper.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 INSTALLATION

A. Power Conductors Supplying Equipment. A copper grounding conductor must be run inside the conduit or raceway, enclosing the power conductors supplying the equipment, or in case of a multi-conductor power cable, must be located within the sheath.

B. Connect at Source. Ground conductors in power cable or ground wire in conduits shall always be connected directly to station ground at the source end, and to motor frame or equipment enclosure and/or equipment ground bar.

C. System Neutral. The equipment grounding conductor in all circuits shall be connected to the frame and ground lug in the panelboards and not the neutral bus. Equipment ground connections to a system neutral are not permitted.

D. Fuses. In all cases of grounded circuits, fuses must be omitted from the grounded neutral conductor throughout the entire installation.

E. Equipment Frames. Frames of all electrical apparatus will be connected to the grounding system. Neutrals of service transformers shall be connected to the grounding system.

F. Metallic Raceways. All metallic conduits and wiring channels must be connected at each end to the grounding conductor with a good electrical contact.

G. Identification. The grounding conductor shall be stranded and covered with a green jacket.

H. In all cases the white wire should be used for the current-carrying neutral only and never as a grounding conductor, or other purpose.

I. Ground Rods. Where specified on drawings, grounding connections to earth shall be made with 3/4" diameter (minimum) copper-clad steel exten-type ground rods a minimum of 10 feet long, or depth as indicated.

END OF SECTION 260526

SECTION 260539 — ELECTRICAL RACEWAYS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this Section shall comply with all applicable requirements of SECTION 260501, GENERAL PROVISIONS.

1.2 SCOPE

A. Contractor Furnished. The contractor shall provide all conduit, fittings, and supports required and not otherwise shown on plans as furnished by others.

B. The types of electrical raceways required for the project include the following:

1. Liquid-Tight Flexible Metal Conduit
2. Rigid Galvanized Conduit
3. PVC Rigid Conduit

C. The minimum raceway size shall be 3/4".

D. Product Delivery, Storage, and Handling. Contractor is to provide color-coded end-cap thread protectors and handle conduit and tubing carefully to prevent damage. Store pipe and tubing inside whenever possible. When necessary to store outdoors, elevate well above grade and enclose with durable, watertight wrapping.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Liquid-Tight Flexible Metal Conduit. Galvanized single steel strip, flexible, interlocked, double wrapped, with liquid-tight PVC jacket.

B. Rigid Galvanized Conduit. Rigid steel, hot-dipped galvanized conduit.

C. PVC Rigid Conduit: U.L. listed Schedule 40 heavy wall rigid conduit.

D. Conduit, tubing and duct accessories including straps, hangers, expansion and deflection fittings as recommended by conduit, tubing, and duct manufacturers.

PART 3 - EXECUTION

A. Liquid-tight Flexible Metal Conduit. Connection of motors and for other electrical equipment where subject to movement and vibration, and also subjected to one or

more of the following conditions: Exterior location; moist or humid atmosphere where condensate can be expected to accumulate; corrosive atmosphere; subjected to water spray; subjected to dripping oil, grease or water. Flexible conduit is not to exceed 60" in length for any one application.

B. Rigid Galvanized. Where specified on plans for certain underground or exposed runs, or where stubbed up at floor level.

C. Rigid PVC. Where specified on plans for certain underground runs, UL approved Schedule 40 heavy wall rigid PVC conduit shall be used. Not to be stubbed up at floor level. All PVC underground runs shall transition to rigid galvanized before stubbing up through floor slab or grade.

3.2 INSTALLATION

D. Install conduit and tubing in accordance with NEC and National Electrical Contractors Association's "Standard of Installation", and with recognized industry practices. Where NECA and NEC standards differ, use the more stringent requirement.

E. Complete the installation of raceways before starting installation of wires.

F. Wherever possible, install horizontal raceway runs above water and steam piping.

G. Care shall be taken to keep the interior of conduits clean, and each conduit run shall be thoroughly cleaned and dried before any cable is pulled through.

H. Unless indicated otherwise on drawings, all exposed conduits shall be run parallel with or perpendicular to building structural members.

I. Conduits entering sheet metal enclosures shall be made up with double locknut and insulating bushing. Locknut shall be of the type which will bite into the metal of the box.

J. Conduits entering threaded openings in equipment enclosures, boxes, etc., shall have at least five full threads engaged. In outdoor and underground locations, threaded joints shall be made up with a thin application of conducting joint compound. The inside of the fitting shall be thoroughly cleaned of any excess compound.

K. Power operated bending machines shall be used on conduits 1-1/4" and larger. Heating with torches will not be permitted.

L. All conduit runs shall be continuous from outlet to outlet with all joints and connections pulled tight to insure an electrically continuous and mechanically secure raceway system.

M. All raceways in "finished areas" such as offices, corridors, etc., shall be concealed.

END OF SECTION 260539

SECTION 260543 - UNDERGROUND ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract and other sections of Specifications apply to this Section.

B. Materials specified in this section shall comply with all applicable requirements of SECTION 260501, GENERAL PROVISIONS.

1.2 SCOPE

A. The Contractor shall install all underground electrical work required for this project including but not limited to:

1. Underground Ducts
2. In-grade Junction/Pull Boxes
3. Directionally Bored HDPE Pipe

PART 2 - PRODUCTS

2.1 MATERIALS

A. Direct Buried Duct shall be Schedule 40 PVC conduits. All duct shall be U.L. approved.

B. In-Grade Junction Boxes shall be traffic rated where required and sized for number of conduit entries. Provide Quazite or equal.

C. HDPE pipe utilized for directional boring shall be UL listed for purpose.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Junction boxes shall be set on a level bed of tamped gravel to allow drainage. Exact placement of junction box shall be determined in field.

B. All directional boring shall be coordinated in field with Owner and marked utilities. Repair all opening and re-grass.

END OF SECTION 260543

SECTION 262600 — SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Materials specified in this section shall comply with all applicable requirements of SECTION 260601, GENERAL PROVISIONS.

1.2 WORK INCLUDES

A. Contractor shall coordinate as required with the utility company, and general contractor(s) for site electrical services to provide electrical service to the building by way of padmount transformers.

B. Contractor shall include in his bid all costs, fees, or charges associated with installation of service to the building by the utility company.

C. Contractor shall confirm exact location of all service and distribution equipment with owner's representative prior to installation.

D. Service Utility is Laurens Electrical Cooperative for power.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Padmount transformers shall be provided by utility company. Existing transformer may be replaced with new transformer by utility.

PART 3 - EXECUTION

3.1 The required coordination and service installation work shall include, but not be limited to the following:

A. Contractor shall have existing underground utilities located in area of work and at existing transformers.

B. Contractor shall be responsible for installing concrete pad for transformer per the utility company's installation requirements and shall install all secondary conduits as shown on drawings, stubbing up in secondary section of transformer wiring area and running underground into the electrical room stubbing up into service equipment. Coordinate with utility at transformer for hand digging at transformer.

C. Contractor shall install required conduit for signal wires to meter. Meter base shall be provided and mounted on panel rack by contractor as shown on plans and as coordinated with the Utility.

D. Contractor shall install all secondary cables, pulling sufficient lengths for terminations at transformer and at service entrance gear. Service entry conduit shall be PVC, size as noted on plans, and buried a minimum of 30" below finished grade with yellow warning tape placed 6" above conduits in earth. Contractor shall coordinate all routings with that of other disciplines.

END OF SECTION 262600

SECTION 265110 - SPORTS LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including other sections of the specifications apply to this section.

1.2 SUMMARY

A. This Section includes lighting systems for the following Recreational outdoor soccer sports fields.

B. The drawings indicate two methods of sports lighting:

a) Depreciating Light Systems using a light loss factor of 0.70 to provide an initial level of light that will depreciate to the desired footcandle levels over the life of the lamp in accordance with IESNA RP-6-01. The basis of design is the Hubbell SVGA with Glare Control.
b) Constant lighting systems utilizing automatic power adjustment and compliant with IESNA Lighting Handbook Reference and Application, Ninth Edition, page 27-2 and 27-3.
c) Due to different power consumptions, the power distribution and infrastructure varies between the two types of systems. Should alternate lighting systems be approved, the submitted bid shall provide any adjustment required for alternate power distribution systems.
d) Demolition of existing poles and lighting is to be included in contractors' bids. Poles are to be removed completely. Cabling is to be removed to below 2'0" below surface with existing abandoned horizontal runs marked on demolition plan per locator service marking.

C. Lighting systems shall comply with IESNA RP-6-01. The Contractor shall include in his bid, all parts, labor and installation for a complete and operational system. System components shall include, but not be limited to:

1. Luminaires: 1500W metal halide lamps with internal glare control and external visors.
2. Remote mounted ballasts in housing with disconnect located on pole base at 10' above grade.
3. Wiring harness from ballast housing to fixtures at top of pole with abrasion protection and strain relief.
4. Poles shall be concrete, steel poles with anchor bolt foundations, direct buried steel poles with anti-corrosion coatings or hybrid steel poles, all with concrete bases. All poles shall have concrete foundation backfill poured around installed pole.
5. Contactors/controls system shall be supplied with contactor cabinets to control power to each pole or group of poles as indicated on the drawings. Contactor shall be enclosed in NEMA enclosures and shall have manual controls for each contactor. Contactors shall have timers to accumulate hours of usage for each field.

6. Warranty:
Each manufacturer shall supply a signed warranty covering the entire system. Parts shall be covered for the ten years with labor for the first two years. Warrantee shall include, but not be limited to, controls link, lamp replacements during the manufacturer's published lamp life, maintenance and control services, fixtures, ballasts, aiming and structural integrity.

Manufacturer shall warrant light levels for the years based on the manufacturer's published lamp data and the accumulated usage of the field. Should light levels fall below specified levels during the published life of the lamps, the Contractor shall correct light levels at his expense.

Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations.

C. Mounting heights as shown on plans are the nominal distance from the fixture to playing surface. Poles shall be sized to accommodate this height.

D. Calculations shall be based on IESNA RP-6-01, or systems utilizing automatic power adjustment for lumen control strategy. All designs shall utilize a 0.7 Recoverable Light Loss Factor or Constant Illumination, 3600 degrees Kelvin minimum and minimum CRI of 65.

1.3 DEFINITIONS

A. CV: Coefficient of variation; a statistical measure of the weighted average of all relevant illumination values for the playing area, expressed as the ratio of the standard deviation of all illuminance values to the mean luminance value.

B. Submittals: Documents, including drawings, calculations, and material and product specifications prepared by the manufacturer to confirm compliance with Engineer's design to obtain acceptance by Owner and authorities having jurisdiction.

C. Horizontal Illuminance: Measurement in foot-candles, on a horizontal surface 36 inches above ground, unless otherwise indicated.

D. LLD: Lamp lumen depreciation.

E. LLF: Light loss factor.

F. Luminaire: Complete lighting fixture, including ballast housing if provided.

G. Target Illuminance: Average maintained illuminance level, calculated by multiplying initial illuminance by LLF.

H. UG: Uniformity gradient; the rate of change of illuminance on the playing field, expressed as a ratio between the illuminances of adjacent measuring points on a uniform grid.

I. Vertical Illuminance: Measurement in foot-candles, in two directions on a vertical surface, at an elevation coinciding with plane height of horizontal measurements.

1.4 PERFORMANCE REQUIREMENTS

The Contract Documents include the requirements for two types of systems, constant illumination and depreciating systems based on IESNA RP-6 criteria. The following criteria shall be utilized on any request for substitution:

A. Illumination Calculations: Manufacturer shall design his luminaire system using computer-analyzed point method complying with IESNA RP-6 to optimize selection, location, and aiming of luminaries. Submit both initial foot candle calculations and maintained foot candle calculations.

1. Grid Pattern Dimensions: For playing areas of each sport and areas of concern for spill-light control, correlate and reference calculated parameters to the grid areas and intersection points of the indicated grid pattern.
2. Spill-Light Control: Minimize spill light for each playing area on adjacent and nearby areas.
3. Glare Control: Design illumination for each playing area to minimize direct glare in adjacent and nearby areas.
4. Use a field factor of 15 percent according to IESNA RP-6, in establishing initial illuminance.
5. LLF shall be 0.7.
6. Luminaire Mounting Height: Comply with recommendations of IESNA RP-6, with consideration to minimize spill light and glare.
7. Tilt factor shall be included in calculations.

B. Electric Power Distribution Requirements:

1. Electric Power: 480/277V, 3 phase, 4W is required as noted on the drawings.
2. If manufacturer's calculations result in a system requiring more electrical capacity, more feeder circuits, larger circuits, etc. than what is shown on the drawings, the Manufacturer shall include in his cost any engineering design and materials and labor required to up-size the electrical facilities to accommodate the manufacturer's requirements.
3. During installation, connect luminaries so as to balance load between phases at each pole. Maximum Total Voltage Drop from Secondary of Duke Power transformer to Load: 5 percent, including voltage drops in branch circuit, subfeeder, and feeder. Maximum Total Voltage Drop from panelboard to any given luminaire: 3 percent.

C. Performance Requirements: Playing surfaces shall be lit to an average light level and uniformity as specified in the chart in Paragraph D below. Light levels shall be designed to be above the minimum levels required for the ten years of the warranty. Lighting calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Measured average illumination level shall be equal to or greater than the predicted mean, and measured at the first 100 hours of operation.

D. Footcandle levels at each field shall be in accord with the following chart:

Area of Lighting	Average Constant Light Levels	Maximum to Minimum Uniformity Ratio	Grid Spacing
Soccer	30 footcandles	2.5 to 1.0	30' x 30'

SUBMITTALS

C. Product Data: For each type of lighting product; include the following:

a) Lamp life, output, and energy-efficiency data. Energy data shall comply with IESNA LM-47.
b) Photometric data based on laboratory tests of each luminaire type, complete with lamps, ballasts, and accessories.

a. Photometric data shall be certified by a qualified independent testing agency.
b. Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Submittals:

Submittals are to include the following:

1. Drawings and specifications for construction of lighting system. Include pole heights, fixture quantities and ballast wattage with lamp lumens, etc.
2. Manufacturer's determination of LLF used in design calculations.
3. Structural analysis data and calculations used for pole selection and foundation design.

a. Manufacturer Seismic Qualification Certification: Submit certification that sports lighting components and their mounting and anchorage provisions are designed to remain in place without separation of any parts when subjected to the seismic forces likely to occur at each site. Include the following:

1) Basis for Certification: Indicate whether withstand certifications are based on actual test of assembled components or on calculation.
2) Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

b. Manufacturer Wind-Load Strength Certification: Submit certification that selected total support system, including poles, complies with AASHTO LTS-4 for location of Project, including design for 90 MPH sustained winds. Luminaire, visor and crossarm shall withstand 150 MPH winds and maintain luminaire aiming alignment.

c. The structural foundation and backfill shall be per the plans and specifications. Manufacturer shall submit foundation detail sealed by structural engineer in the State of South Carolina.

4. Design calculations for the following:

a. Target illuminance & Point calculations of horizontal and vertical illuminance, CV, and UG at minimum grid size and area. Provide both initial and final printouts of calculations.
b. Point calculations of horizontal and vertical illuminance at boundary areas of concern for spill light, bounded by residential areas.
c. Calculations of source intensity of luminaries observed at eye level from indicated properties nearby the playing fields.
d. Capacity of service required to supply the lighting system.
e. Wiring requirements, including required conductors and cables and wiring methods if different from those shown on the drawings.

C. Manufacturer Certificates: Signed by manufacturer certifying that support structures, including brackets, arms, appurtenances, bases, anchorages, and foundations, comply with requirements.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For sports lighting system components to include in operation, and maintenance manuals.

F. Warranty: Ten year warranty as specified in this Section. Provide explanation of all terms of warranty.

G. Should submitted system be different than that specified, provide plans showing revised electrical drawings if required and include cost of addition in price for equipment.

H. Cut sheets of all fixtures and products to be provided with glare control components.

I. Provide explanation and material submittal for control system.

J. Provide a projected energy cost of light systems for twenty-five (25) years based on 400 hours per year and $0.10/KWHR.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs.

C. Luminaire Photometric Data Testing Laboratory: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

D. Luminaire Photometric Data Testing Laboratory: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 EXTRA MATERIALS

A. For the project, furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: Equal to 5 percent of amount installed for each size indicated, but no fewer than 4 units.
2. Ballasts: Equal to 1 percent of amount installed for each size indicated, but no fewer than 2 units.
3. Fuses: Equal to 5 percent of amount installed for each size indicated, but no fewer than 2 units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:

1. Hubbell Sports Lighting, SVGA Fixtures
2. Musco Lighting Incorporated, “Light Structure Green” fixtures

B. Substitutions Requests:

To be considered for substitution, the following submittal items bust be received 10 days prior to bidding.

1. Product material on fixtures including photometrics/construction/weight
2. Product material on ballast, housings, control cabinets, etc. to include ballast input wattage
3. Lamp information from manufacturer to include wattage, initial lumen outputs with copies of manufacturer’s test certifications
4. Initial and maintained light levels with footcandles On 30’x30’ grid, maximum to minimum. Horizontal uniformity ratios (below 2.5 to 1)
5. Control systems information on physical components, communications, Nema enclosures, operational information of how to schedule events and monitoring capabilities of lamping, including time of usage.

6. Any required changes to electrical distribution system shall be listed and shall be included in bids.
7. Warranty
8. Include cost of operation over 10 years.

AutoCAD plan of layout will be made available for use in calculations.

2.2 LUMINAIRES, LAMPS, AND BALLASTS

A. Luminaires: As per manufacturers.

B. Ballasts shall be mounted ballasts mounted remotely in NEMA 3R cabinet, approximately 10 feet above grade on the poles of associated luminaires. The enclosures shall include ballasts, capacitors and fusing for each luminaire. A safety disconnect switch, rated to match the feeder circuit supplying the pole, shall be included in the enclosure, and shall be factory installed. Provide a factory assembled wire harness to run from the ballast enclosure to the luminaires. It shall include an abrasion protection sleeve, strain relief and plug-in connectors

2.3 SUPPORT STRUCTURE:

A. Concrete Poles: Approved manufacturers may utilize spun concrete poles, directly buried with concrete collar foundation as follows:
   1. 8,000 PSI compressive strength concrete minimum.
   2. 3/4 Inch maximum aggregate.
   3. Deformed steel reinforcement shall conform to requirements of ASTM A615 for Grade 60 rebar.
   4. Pre-stressing steel reinforcement shall conform to unlocated 7-wire, stress relieved strand; AASTM-A416.
   5. Steel spiral reinforcement shall conform to the requirements of ASTM-A82.
   6. All structural steel shall conform to ASTM-A36 and zinc alloy AC41A shall conform to 7 ASTMB240. The finish shall be hot dipped galvanized in accordance with ASTM A153.
   7. All sports lighting poles will be supplied with a #2 stranded copper ground wire cast into the wall of the pole.
   8. All manufacturing tolerance, details of reinforcement and finishes shall be in accordance with the Guide Specification for Pre-stressed Concrete Poles as published in the May-May, 1982 issue of the Journal of the Pre-stressed Concrete Institute.
   9. The manufacturer shall have a minimum of 10 years of experience in the design and production of spun concrete poles for at least ten years.
   10. Poles shall have a smooth natural form finish, soft gray in color.
   11. Poles shall be designed and constructed so that all wiring and grounding facilities are concealed within the pole. All handholes, couplings, inserts for step bolts, thru-bolt holes and ground wire shall be cast into the pole during the manufacturing process.
   12. Poles shall be round in cross section and provide a continuous taper of 18" per foot of length and provide a minimum 4/5" of concrete coverage over the longitudinal steel.

13. Pre-stressed concrete poles shall be lifted and supported during manufacturing, stockpiling, transporting and erection operations only at the points shown on the shop drawings.
14. Transportation site handling and erection shall be performed with acceptable equipment and methods, and by qualified personnel.
15. Provide concrete base foundation.

B. Musco Lighting's "Light Structure" galvanized steel poles with pre-cast concrete bases.

1. Wind-Load Strength: Poles and foundations and other support structures, brackets, arms, appurtenances, bases, anchorages shall comply with AASHTO LTS-4 and shall be certified by manufacturers to withstand steady winds up to 90 MPH with a gust factor of 1.3 without permanent deflection or whipping.
2. Luminaires, visors, and cross arms shall withstand steady winds of 150 mph.

C. Steel poles with anchor bolts and concrete foundations are acceptable for bidding in compliance with plans and details.

Steel poles shall be designed in compliance with the latest edition of the AASHTO Poles Code and based on wind speed of 90 MPH. Poles shall be round and shall meet the material requirements of ASTM A572 or ASTM A595 Grade A. Base plates shall be welded and shall conform to ASTM A36 or ASTM 572.

Bolt holes shall allow $\pm$ 2.5 degrees rotation for field adjustment.

Anchor bolts shall meet the requirements of ASTM F1554, Grade 55 and ASTM A153. All shaft and base materials shall be galvanized in accordance with ASTM A123, completely coated inside and out.

D. Direct embedded steel poles for most sports lighting installations shall utilize a corrosion protection system to include:

1. The steel pole shall be supplied with a hot dipped galvanized finish per ASTM A123.

2. A nominal 20 mils of either an aliphatic or aromatic polyurethane barrier protection coating specifically formulated for the use on steel poles shall be applied to the full below grade length of the pole. This coating shall extend to at least 1' above finished grade.

3. The annular void between the poles and the wall of the augured hole in the ground shall be filled with concrete per foundation drawings prepared by a structural engineer registered in the State of South Carolina.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use web fabric slings (not chain or cable) to raise and set structural members.

B. Install poles and other structural units level, plumb, and square.

C. Except for embedded structural members, grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.

D. Install lamps in each luminaire and fasten luminaire to structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

E. Baffles and Louvers for Spill-Light Correction: Install on luminaires with fasteners provided by manufacturer. Install and adjust to correct out-of-limit spill-light and glare measurements.

3.2 FIELD QUALITY CONTROL

A. Perform the following field quality-control tests, inspections, and analysis according to IESNA RP-6 and IESNA LM-5, where applicable, and prepare test reports:

1. After installing sports lighting system and after electrical circuits have been energized, perform proof-of-performance field measurements and analysis for compliance with requirements.

b) Playing and Other Designated Areas: Make field measurements at intersections of grids, dimensioned and located as specified in Part 1 "Performance Requirements". Measure at least the number of points specified in the charts shown in paragraph 1.4.D of this section of the specifications. Make field measurements at areas of concern for spill light and glare.

c) Perform analysis to demonstrate correlation of field measurements with specified illumination quality and quantity values and corresponding computer-generated values that were submitted with engineered design documents, and submit a report of the analysis. For computer-generated values, use manufacturer's lamp lumens that are adjusted to lamp age at time of field testing.

d) Meet with Engineer and review all tested values for each field.

B. Correction of Illumination Deficiencies for Playing Areas: Make corrections to illumination quality or quantity measured in field quality-control tests that vary from specified illumination criteria by plus or minus 10 percent or more; add or replace luminaires, or change mounting height, revise aiming, or install louvers, shields, or baffles. If luminaires are added or mounting height is changed, revise aiming and recalculate and modify or replace support structures, if indicated. Retest as specified above after repairs, adjustments, or replacements are made. Report results in writing.

C. Correction of Excessive Illumination in Spill-Light-Critical Areas: If measurements indicate that specified limits for spill light are exceeded, make corrections to illumination quantity measured in field quality-control tests that reduce levels to within specified maximum values. Replace luminaires, or change mounting heights, revise aiming, or install louvers, shields, or baffles. If mounting height is changed, revise aiming and recalculate and modify or replace support structures, if indicated. Retest as specified above after repairs, adjustments, or replacements are made. Report results in writing.

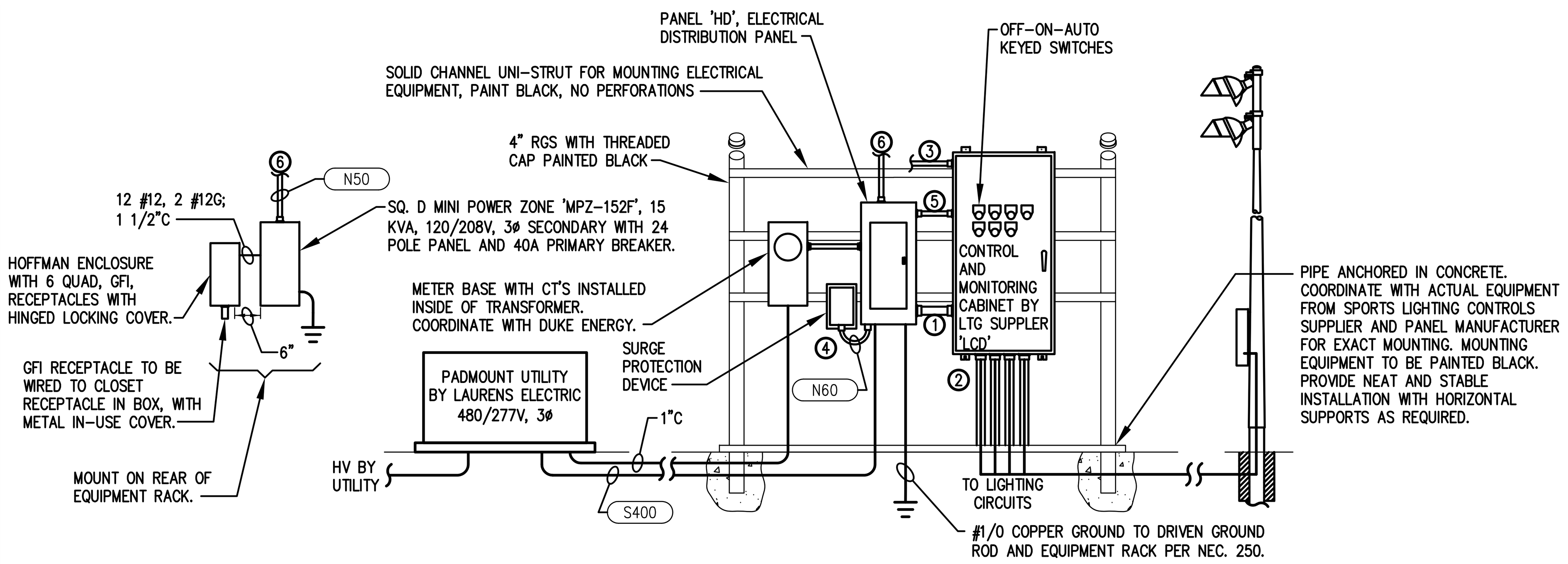
3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sports lighting.

3.4 WARRANTY EXECUTION

Provide an annual Certification of Light Levels and provide re-lamping and other corrective actions required to maintain light levels for the length of the warranty.

END OF SECTION 265110



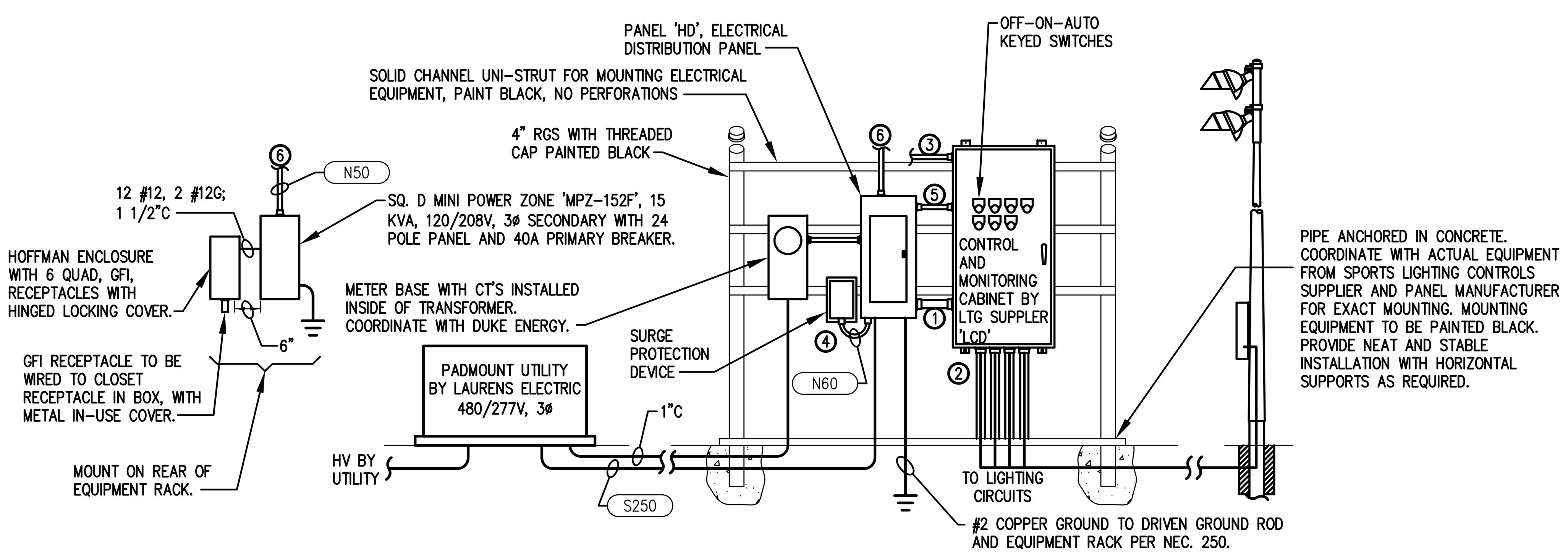
CABLE/CONDUIT SCHEDULE

TAG	WIRE AND CONDUIT
S400	2 [4 #3/0; 2 1/2"C]
N50	4 #8, 1 #10G; 3/4"C
N60	4 #6, 1 #10G; 1"C

1. LINE POWER TO CONTACTORS WITH GROUNDING CONDUCTOR.
2. LOAD POWER TO LIGHTING.
3. CONTROL POWER, DEDICATED 20A,120V.
4. SURGE PROTECTION DEVICE TO PANEL, 100KA PHASE TO PHASE, CURRENT TECHNOLOGIES OR EQUAL.
5. SURGE PROTECTION MONITORING.
6. TO LV PANEL ON REAR OF RACK.

COORDINATE ALL CABLING AND CONNECTIONS WITH SUPPLIER AND COMPLY WITH ALL REQUIREMENTS.

A / E0.1 POWER RISER DIAGRAM, DEPRECIATING LIGHT SYSTEM (REFERENCE DRAWING E2.1)
NOT TO SCALE



CABLE/CONDUIT SCHEDULE

TAG	WIRE AND CONDUIT
S250	4 #250 KCMIL; 3"C
N50	4 #8, 1 #10G; 3/4"C
N60	4 #6, 1 #10G; 1"C

1. LINE POWER TO CONTACTORS WITH GROUNDING CONDUCTOR.
2. LOAD POWER TO LIGHTING.
3. CONTROL POWER, DEDICATED 20A, 120V.
4. SURGE PROTECTION DEVICE TO PANEL, 100KA PHASE TO PHASE, CURRENT TECHNOLOGIES OR EQUAL.
5. SURGE PROTECTION MONITORING.
6. TO LV PANEL ON REAR OF RACK.

COORDINATE ALL CABLING AND CONNECTIONS WITH SUPPLIER AND COMPLY WITH ALL REQUIREMENTS.

B / E0.1 POWER RISER DIAGRAM, CONSTANT ILLUMINATION SYSTEM (REFERENCE DRAWING E2.2)
NOT TO SCALE

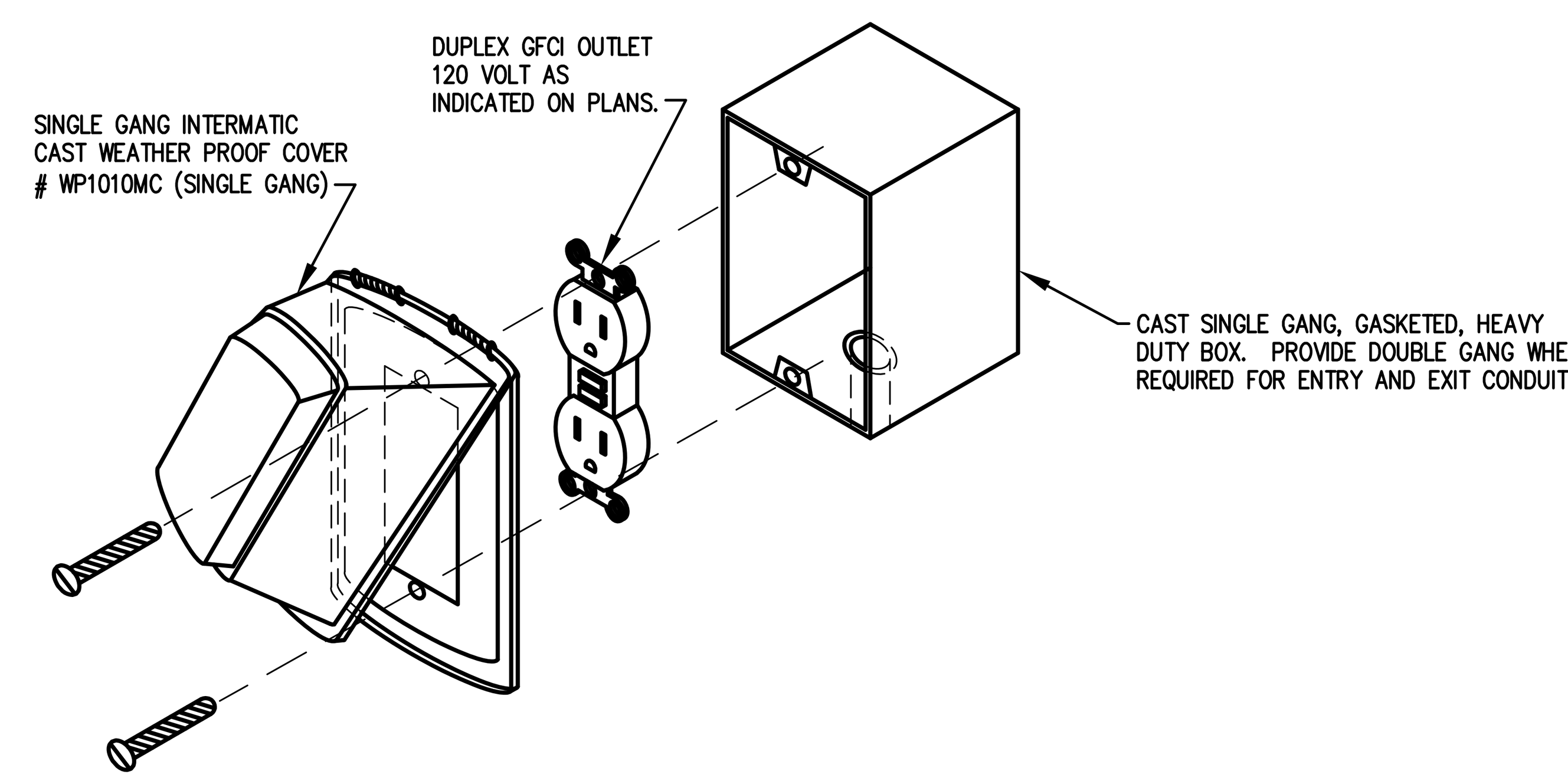
ABBREVIATIONS:

AFF	ABOVE FINISHED FLOOR	NTS	NOT TO SCALE
AFG	ABOVE FINISHED GRADE	PH	PHASE
ACH	ABOVE COUNTER HEIGHT	PNL	PANEL
BKR	BREAKER	PVC	POLYVINYL CHLORIDE CONDUIT
CU	COPPER	RECPT	RECEPTACLE (R.)
CKT	CIRCUIT	REQD	REQUIRED
DWG	DRAWING	RGS	RIGID GALVANIZED STEEL
EC	ELECTRICAL CONTRACTOR	SW	SWITCH
FU	FUSE	TYP	TYPICAL
FWE	FURNISHED WITH EQUIPMENT	UNO	UNLESS NOTED OTHERWISE
GFI	GROUND FAULT INTERRUPTER DEVICE	UGND	UNDERGROUND
HH	HAND HOLE	W/	WITH
LTG	LIGHTING (L.)	WP	WEATHER PROOF
MCB	MAIN CIRCUIT BREAKER	XFMR	TRANSFORMER
MFR	MANUFACTURER		

SYMBOL	DESCRIPTION
A-1,3	HOME RUN TO LIGHTING/SERVICE PANEL. HASH MARKS, WHEN SHOWN, INDICATE NUMBERS OF CONDUCTORS. " / " INDICATES HOT WIRE, " N " INDICATES NEUTRAL CONDUCTOR," P " INDICATES GROUND CONDUCTOR. HOME RUN NOTE INDICATES PANEL NAME AND CIRCUIT NAME OR FEEDER TAG. CONDUCTORS SHALL BE #12 AWG IN 3/4" CONDUIT UNLESS NOTED OTHERWISE. ANY HOME RUN OR CONDUIT WITHOUT HASH MARKS IS TO CONTAIN 3 CONDUCTORS; 1 HOT, 1 NEUTRAL, AND 1 EQUIPMENT GROUND, EACH HOT CIRCUIT SHALL BE PAIRED WITH A SEPARATE NEUTRAL CONDUCTOR. SHARING OF NEUTRAL CONDUCTORS BETWEEN CIRCUITS IS NOT ALLOWED.
	EXPOSED CONDUIT
	CONDUIT RUN IN SLAB OR UNDERGROUND.
	CONDUIT RUN CONCEALED ABOVE CEILING OR IN WALLS, UNLESS NOTED OTHERWISE.
	CONDUIT JUNCTION IN CONDULET OR JUNCTION BOX.
	CONDUIT TURNING UP
	CONDUIT TURNING DOWN
J	JUNCTION BOX STEM INDICATES WALL MOUNTED
J	JUNCTION BOX FLOOR MOUNTED
	LIGHTING OR SERVICE PANEL, SURFACE MOUNTED
30/20/3P/3R	SAFETY DISCONNECT SWITCH. "30" INDICATES AMP RATING, "20" INDICATES FUSE SIZES, "3P" INDICATES NUMBER OF POLES, ENCLOSURE TO BE NEMA 1 UNLESS NOTED OTHERWISE (3R, 4X, ETC.) SQUARE D H300 SERIES HEAVY DUTY SAFETY SWITCH
PE	PHOTOELECTRIC CELL, SPEC GRADE, TO BE MOUNTED ON ROOF, FACING NORTH, TORK MODEL 2101 OR EQUAL.
	CONNECTION TO A SPECIFIC PIECE OF EQUIPMENT. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH PROVIDER / INSTALLER OF THE EQUIPMENT.
	WIRING DEVICES
	NOTE: ALL WIRING DEVICES TO BE IVORY, WITH #302 STAINLESS STEEL COVERPLATE (FLUSH MOUNTED) UNLESS NOTED OTHERWISE ON THE DRAWING OR SPECIFICATIONS.
	SWITCH SYMBOLS
SM	MANUAL MOTOR STARTER
S	SINGLE POLE LIGHTING SWITCH 120-277 VOLT, 20 AMP, SPEC GRADE. LETTER ("a") DESIGNATES WHICH FIXTURES ARE CONTROLLED FROM WHICH SWITCHES WHEN MULTIPLE SWITCHES ARE USED ON ONE CIRCUIT
	STRAIGHT BLADE DEVICE SYMBOLS
	20A, 125V, 2P, 3W, NEMA 5-20R, DUPLEX RECEPTACLE. HUBBELL 5362-I OR EQUAL. STANDARD POWER. "WP" DENOTES WEATHERPROOF COVER PLATE. "GFI" DENOTES GFCI TYPE.
	LIGHTING SYMBOLS:
	LIGHTING POLE. REFER TO MANUFACTURER DRAWINGS FOR ADDITIONAL INFORMATION. LIGHTING SYSTEM TO BE INSTALLED UNDER THIS SET OF DOCUMENTS AND CONTRACT.

ELECTRICAL GENERAL NOTES:

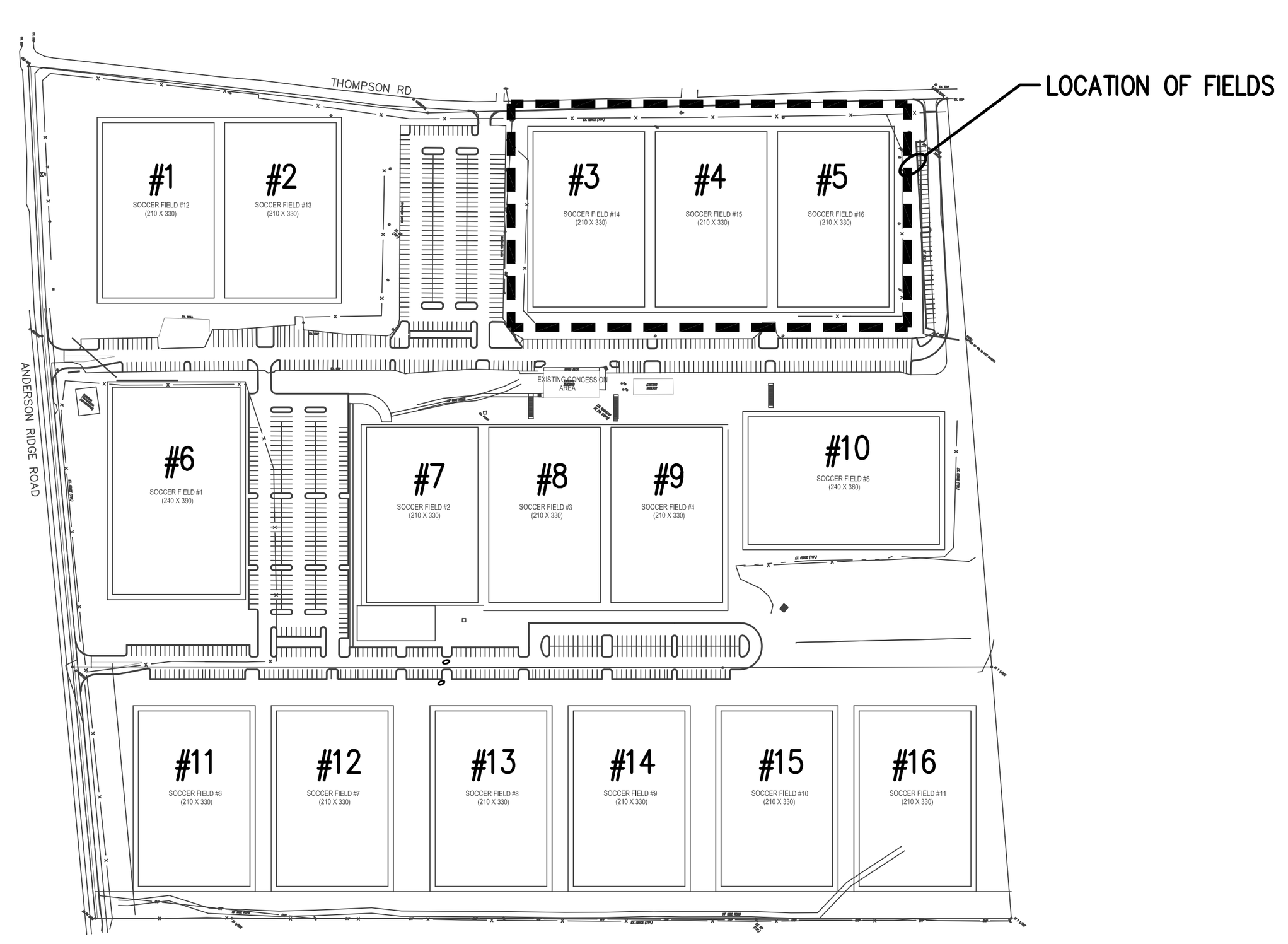
1. INSPECT SITE PRIOR TO SUBMITTING BID. DRAWINGS ARE INTENDED TO COVER THE REQUIRED ELECTRICAL SYSTEMS. DRAWINGS MAY NOT SHOW COMPLETE OR ACCURATE DETAILS OF THE BUILDING OR SYSTEM IN EVERY RESPECT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ANY ADDITIONAL INFORMATION AS REQUIRED.
2. CONFORM TO THE NATIONAL ELECTRICAL CODE (2011), IBC (2012), IECC (2009), APPLICABLE NEMA, ANSI AND IEEE PUBLICATIONS, U.L. AND ADA STANDARDS AND OSHA REQUIREMENTS. COMPLY WITH LOCAL, COUNTY, STATE AND NATIONAL CODES HAVING JURISDICTION.
3. FURNISH AND INSTALL ALL MATERIALS IN A NEAT AND WORKMANLIKE FASHION. ALL MATERIALS SHALL BE NEW, WITH FIRST QUALITY AND UL LABEL.
4. VERIFY ALL DIMENSIONS AND CLEARANCES PRIOR TO INSTALLATION OF EQUIPMENT AND RACEWAYS. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF WORK WITH THAT OF ALL OTHER TRADES AS REQUIRED.
5. CONDUIT SHALL BE EMT FOR BRANCH CIRCUIT WIRING AS ALLOWED BY NEC, EXCEPT THAT SET SCREW OR CRIMP FITTINGS ARE NOT ALLOWED. WHERE EXPOSED TO PHYSICAL DAMAGE CONDUITS SHALL BE RIGID GALVANIZED STEEL. MINIMUM CONDUIT SIZE SHALL BE 3/4". ALL CONDUCTORS SHALL BE TYPE THHN/THWN, STRANDED 600V COPPER BUILDING WIRE. MINIMUM SIZE SHALL BE #12 AWG COPPER UNLESS NOTED. UNDERGROUND CONDUITS SHALL BE PVC SCHEDULE 40 WITH TRANSITION TO RIGID GALVANIZED STEEL FOR EXPOSED CONDUITS.
6. PROVIDE GROUNDING FOR ALL EQUIPMENT IN ACCORDANCE WITH ARTICLE 250 OF THE NATIONAL ELECTRICAL CODE. GROUND SERVICE TO BUILDING STEEL, DRIVEN GROUND ROD AND COLD WATER PIPE.
7. ALL ENCLOSURES SHALL BE OF THE NEMA TYPE WHICH IS SUITABLE FOR THE APPLICATION.
8. SEAL ALL CONDUIT PENETRATIONS TO MATCH RATING OF WALL BEING PENETRATED.
9. ALL WORK SHALL HAVE PROPER LABELING AND NAMEPLATES. ALL CIRCUITS SHALL BE LABELED AT PANELS AND BOXES AS INDICATED. ALL PANELS AND DISCONNECTS ARE TO BE PERMANENTLY MARKED WITH NAME OR EQUIPMENT SERVED. ALL PANELS ARE TO BE PROVIDED WITH TYPEWRITTEN PANEL SCHEDULES.
10. COORDINATE WITH ELECTRICAL UTILITY AS REQUIRED FOR SERVICE ENTRY. INSTALL PAD, METER AND CONDUITS PER UTILITY REQUIREMENTS AND PAY ALL REQUIRED FEES OR CHARGES FOR SERVICES SHOWN.
11. THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS BEFORE PLACING IN OPERATION. RESTORE FINISHED SURFACES IF DAMAGED AND DELIVER THE ENTIRE INSTALLATION IN AN APPROVED CONDITION. INSTRUCT THE OWNERS' PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF THE SYSTEMS. FURNISH TO THE OWNER THREE SETS OF OPERATION AND MAINTENANCE MANUALS FOR EACH SYSTEM.
12. GUARANTEE THE WORK INSTALLED FOR A PERIOD OF ONE YEAR AFTER DATE OF FINAL ACCEPTANCE. DEFECTS WHICH APPEAR AS A RESULT OF NORMAL USAGE SHALL BE REMEDIED BY THE CONTRACTOR TO THE COMPLETE SATISFACTION OF THE OWNER WITHOUT COST TO THE OWNER.
13. CONTRACTOR SHALL KEEP CURRENT A SET OF PLANS FOR THE DURATION OF CONSTRUCTION WITH ALL CHANGES TO WORK NEATLY AND ACCURATELY MARKED IN RED AND SHALL TURN OVER TO OWNER AT COMPLETION OF PROJECT.
14. ALL ELECTRICAL EQUIPMENT SHALL BE INSTALLED TO MEET SEISMIC REQUIREMENTS OF 2012 IBC.
15. ALL PANELBOARDS SHALL BE FURNISHED WITH COPPER BUS BARS AND A COPPER GROUNDING BUS BAR.



E / E2.14 EXTERIOR MOUNTED POWER RECEPTACLE
NOT TO SCALE

PANEL PD — VOLTAGE 208Y/120V, 3ϕ, 4W — CABINET SURFACE MOUNTED — FEEDER BOTTOM — TYPE SQ. D NEMA 3R MINI-POWER ZONE — MAINS 60A MLO

AMPS TRIP	POLES	NOTES	DESIGNATION	No.	ϕA	ϕA	ϕB	ϕB	ϕC	ϕC	No.	DESIGNATION	NOTES	POLES	AMPS TRIP
20	1		R.-ENCLOSURE QUAD	1	360	360					2	R.-ENCLOSURE QUAD		1	20
20	1		R.-ENCLOSURE QUAD	3			360	360			4	R.-ENCLOSURE QUAD		1	20
20	1		R.-ENCLOSURE QUAD	5					360	360	6	R.-ENCLOSURE QUAD		1	20
20	1		SPARE	7							8	SPARE		1	20
20	1		SPARE	9							10	SPARE		1	20
20	1		SPARE	11						300	12	LIGHTING CONTROLS		1	20
			SPACE	13							14	SPACE			
			SPACE	15							16	SPACE			
			SPACE	17							18	SPACE			
			SPACE	19							20	SPACE			
			SPACE	21							22	SPACE			
			SPACE	23							24	SPACE			
INTEGRATED EQUIPMENT RATING: 10KAIC			KVA TOTAL		0.7		0.7		1.0			PANELBOARD KVA LOAD TOTAL: 2.5			



LOCATION MAP:

FIELD LIGHTING FOR MESA SOCCER COMPLEX FIELDS #3, #4 AND #5

GREENVILLE CountyRec PARKS • RECREATION • TOURISM

DRAWING LIST:

E0.1	LEGEND AND DETAILS
E1.1	ELECTRICAL LIGHTING PLAN – EXISTING CONDITIONS
E2.1	ELECTRICAL LIGHTING PLAN – DEPRECIATING LIGHTING SYSTEM LAYOUT
E2.2	ELECTRICAL LIGHTING PLAN – CONSTANT ILLUMINATION LIGHTING SYSTEM LAYOUT

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 9380 DONALD J. BURDETTE 8/7/15

SOUTH CAROLINA BURDETTE ENGINEERING INC. No. C00495 CERTIFICATE OF AUTHORIZATION

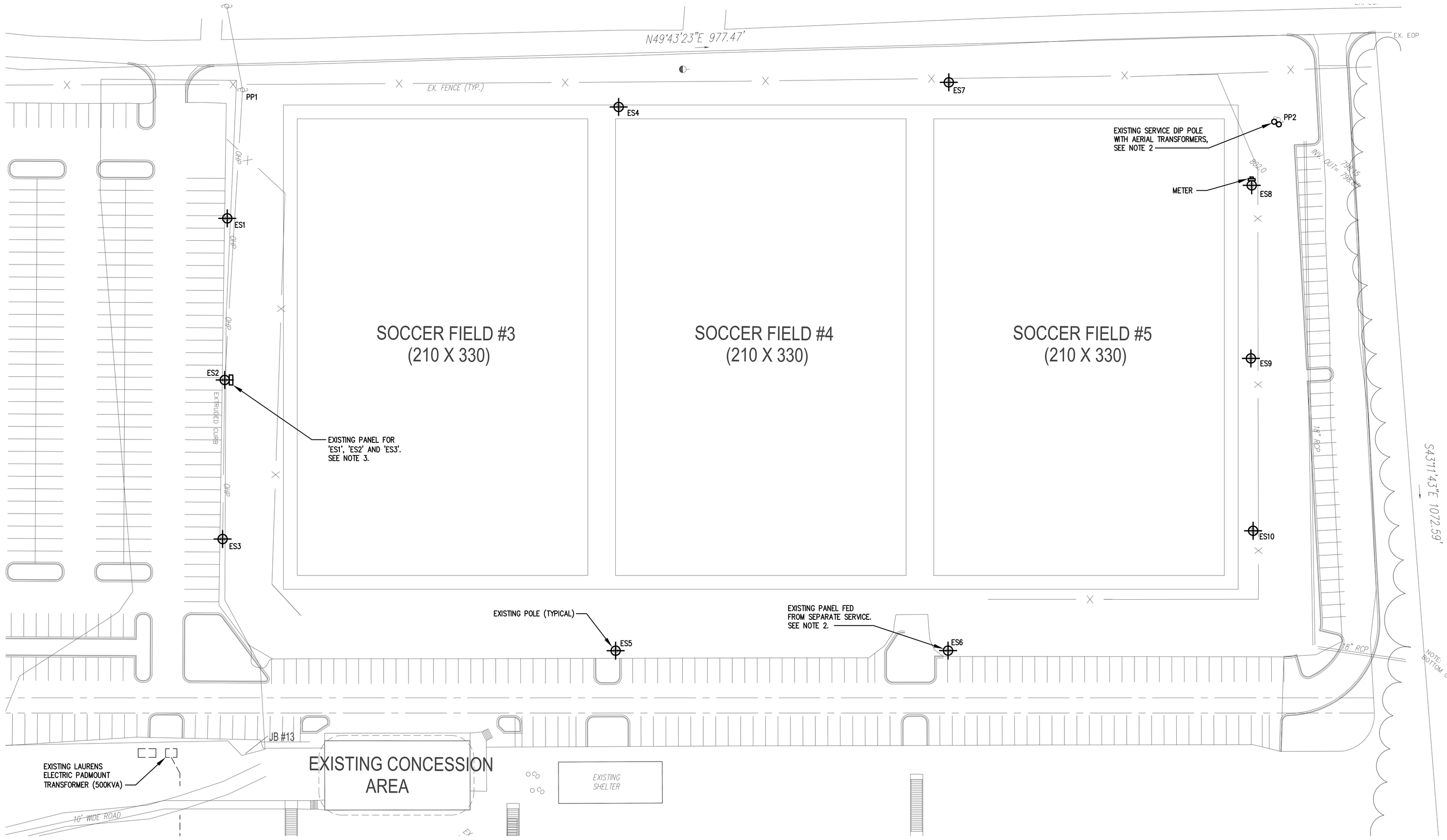
BURDETTE ENGINEERING
102 PILGRIM ROAD GREENVILLE, SC 29607
(864)297-8717 TEL (864)297-8719 FAX

REVISION	DATE	BY
ISSUED FOR CONSTRUCTION	8/7/15	DJB

PROJECT NO. 15350A
DATE 8/7/15
DRAWN BY TMP/LJK
CHECKED BY DJB

FIELD LIGHTING FOR MESA SOCCER COMPLEX
GREENVILLE, SOUTH CAROLINA

SHEET NUMBER E0.1



PROJECT NORTH

A E201 ELECTRICAL LIGHTING PLAN – EXISTING CONDITIONS

SCALE: 1" = 40'-0"

40 0 40 80 120

1" = 40'-0"

NOTES:

1. ALL POLES SHOWN ARE, WOODEN EXISTING AND ARE TO BE REMOVED COMPLETELY ALONG WITH EXISTING FIXTURES AND WIRING.
2. REMOVE EXISTING SERVICE AND METER FROM 'PP2'. COORDINATE REMOVAL WITH LAURENS ELECTRIC. REMOVE CABLE TO 2'-0" BELOW GRADE AND ABANDON IN PLACE.
3. EXISTING PANEL AT POLE 'ES2' IS FED FROM CONCESSION BUILDING. REMOVE EXISTING PANEL AND CABLING TO 2'-0" BELOW GRADE AND ABANDON IN PLACE. LOCATE SOURCE BREAKER AND RE-LABEL AS 'SPARE'.
4. LOCATE ABANDONED CABLES ON RECORD DRAWING SET TO BE TURNED OVER TO THE OWNER.

SOUTH CAROLINA PROFESSIONAL ENGINEER 8/7/15 No. 9352 DONALD J. BURDETTE

SOUTH CAROLINA BURDETTE ENGINEERING INC. No. C00495 CERTIFICATE OF AUTHORIZATION

BURDETTE ENGINEERING
102 PILGRIM ROAD
GREENVILLE, SC 29607
(864)297-8717 TEL
(864)297-8719 FAX

NO.	REVISION	DATE	BY
	ISSUED FOR CONSTRUCTION	8/7/15	DJB

PROJECT NO. 15350A
DATE 8/7/15
DRAWN BY TMF/JK
CHECKED BY DJB

FIELD LIGHTING FOR MESA SOCCER COMPLEX

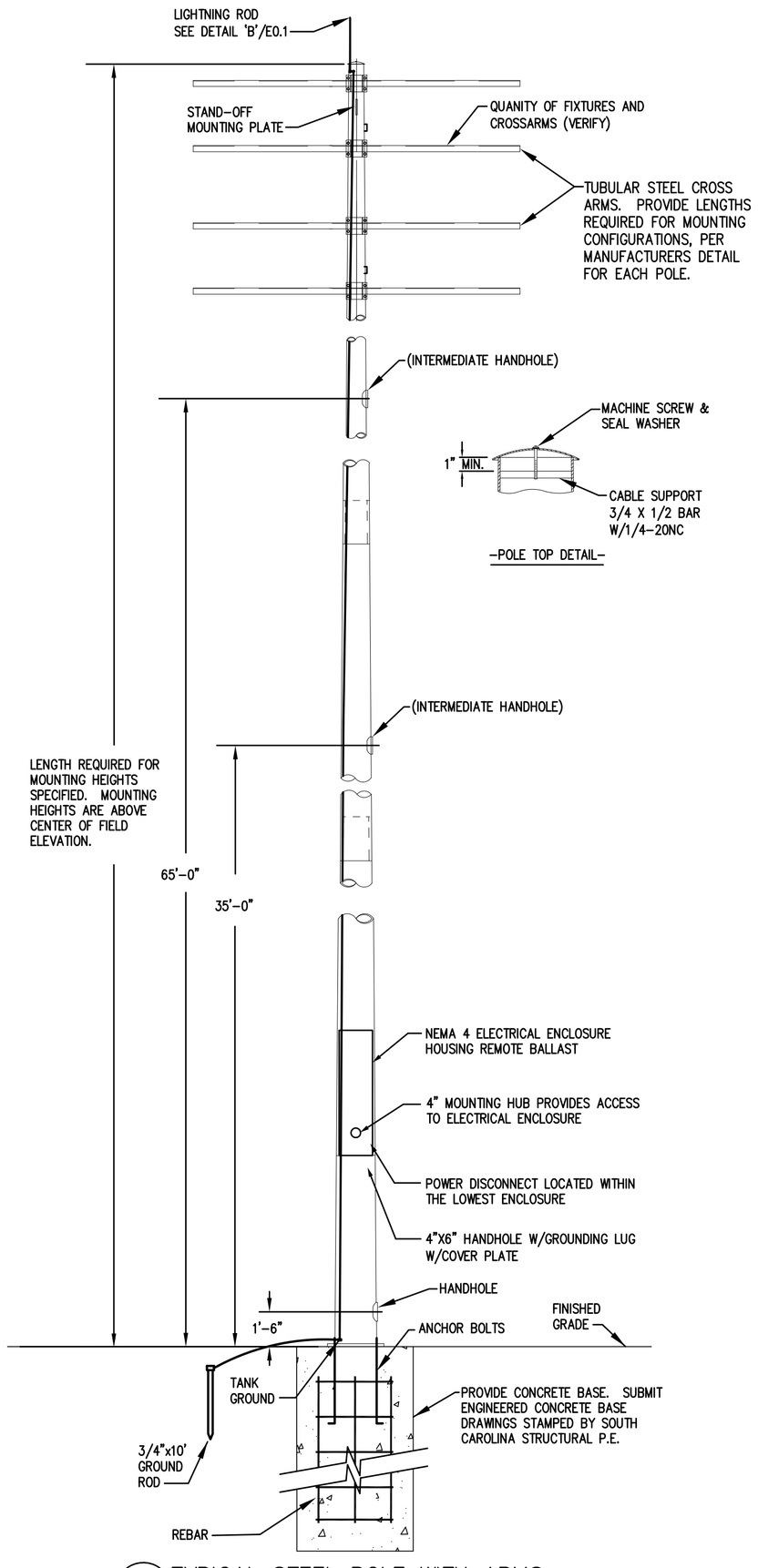
GREENVILLE, SOUTH CAROLINA

CountyRec PARKS • RECREATION • TOURISM

SHEET NUMBER

E1.1

2 OF 4 SHEETS

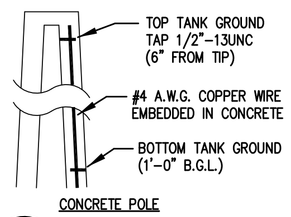


A E0.1 TYPICAL STEEL POLE WITH ARMS
NOT TO SCALE

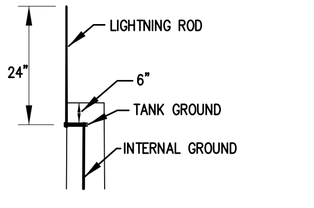
SUBJECT TO PLANS AND SPECIFICATIONS, DIRECT BURIED CONCRETE AND STEEL POLES MAY BE UTILIZED. REFERENCE SPECIFICATIONS FOR ADDITIONAL DETAILS.

GENERAL NOTES:

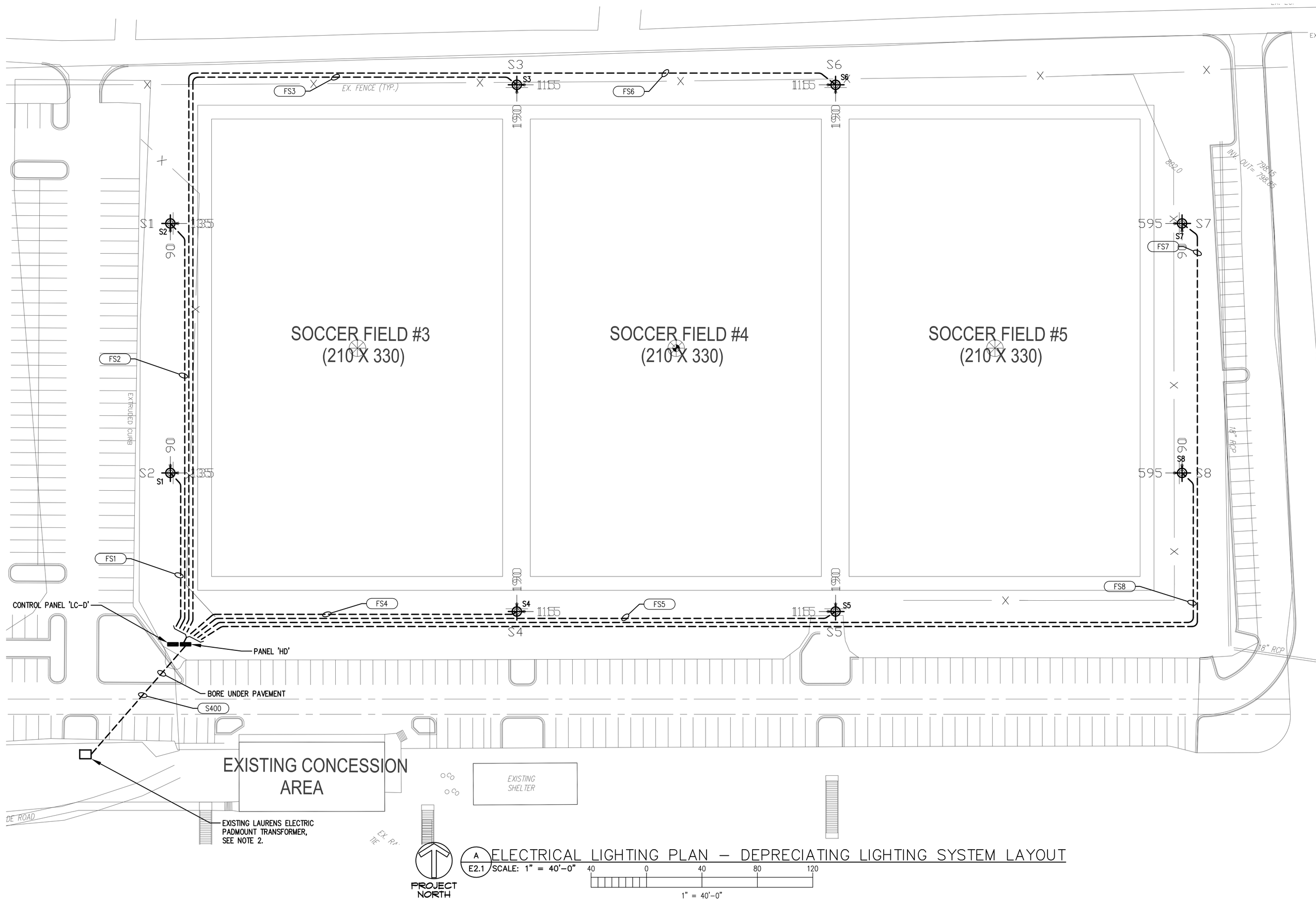
1. SPORTS LIGHTING SYSTEM COMPONENTS FURNISHED BY CONTRACTOR AND INSTALLED UNDER THIS CONTRACT. PANELBOARDS, BREAKERS, FEEDERS, BRANCH CIRCUITS, ETC. FURNISHED AND INSTALLED UNDER THIS CONTRACT. POLES SHALL BE GALVANIZED STEEL PER DETAILS.
2. REFER TO MANUFACTURERS' SPECIFICATIONS FOR DETAILS ON INSTALLATION AND ASSEMBLY OF POLES, FIXTURES, ETC.
3. AS PART OF SHOP DRAWING SUBMITTAL, PROVIDE CUSTOMIZED POLE CALCULATIONS, BY MANUFACTURER, PREPARED AND SEALED BY LICENSED PROFESSIONAL ENGINEER IN STATE OF S.C. INDICATING THE CONCRETE FOUNDATION REQUIRED FOR EACH POLE.
4. VERIFY ALL DIMENSIONS IN FIELD.
5. VERIFY ACTUAL ROUTING OF LIGHTING POLE LINES. MARK ON RECORD SET TO BE TURNED OVER TO OWNER UPON SUBSTANTIAL COMPLETION.
6. WHERE MORE THAN TWO CONDUITS ENTER LIGHTING POLES, PROVIDE APPROPRIATE IN-GRADE JUNCTION BOX ADJACENT TO POLE.



C E0.1 INTERNAL GROUND
NOT TO SCALE



B E0.1 TYPICAL ALL STEEL POLES
NOT TO SCALE



A E2.1 ELECTRICAL LIGHTING PLAN – DEPRECIATING LIGHTING SYSTEM LAYOUT
SCALE: 1" = 40'-0"

40 0 40 80 120
1" = 40'-0"

PLAN NOTES:

1. DEPRECIATING LIGHTING SYSTEM, PROVIDE INITIALLY LIGHTING HIGHER LIGHTING LEVELS AND DEPRECIATE NATURALLY TO THE REQUIRED 30fc LEVEL OVER THE LIFE OF THE LAMP. PROVIDE FOOT CANDLE VERIFICATION FOR INITIAL AND MAINTAINED LEVELS TO MAINTAIN 30FC AVERAGE. NUMBER OF FIXTURES IS BASED ON PRELIMINARY CALCULATIONS. PROVIDE ALL REQUIRED FIXTURES AND CABLING FOR A COMPLETE AND OPERATIONAL SYSTEM. FIXTURES SHOWN ARE BASED ON HUBBELL.
2. COORDINATE NEW LOAD WITH LAURENS ELECTRIC TO CONNECT TO PADMOUNT (480/277V, 3ø) IN EXISTING LOCATION. PROVIDE ALL REQUIREMENTS.
3. PROVIDE TESTING OF LIGHT LEVELS ON EACH FIELD AFTER COMPLETION IN NIGHT TIME CONDITIONS.
4. FIELD SURFACES ARE NOT TO BE DISTURBED. RESEED ALL GROUND DISTURBED PER OWNERS' REQUIREMENTS.
5. FIELD SHALL BE ABLE TO BE INDIVIDUALLY LIT.

DEPRECIATION CIRCUIT SUMMARY BY ZONE (480/277V, 3ø, 4W)

POLE TAG	MOUNTING HEIGHT	CIRCUIT DESCRIPTION	NUMBER OF FIXTURES	FULL LOAD V/A	CONTACTOR SIZE (AMPS)	FEEDER TAG	FEEDER
S1	70'	SOCCER FIELD #14	11	19800	60	FS1	3 #10, 1 #10G; 1"C
S2	70'	SOCCER FIELD #14	11	19800	60	FS2	3 #8, 1 #10G; 1"C
S3A	70'	SOCCER FIELD #14	9	16200	30	FS3A	3 #6, 1 #6G; 1 1/4"C
S3B	70'	SOCCER FIELD #15	11	19800	60	FS3B	3 #6, 1 #6G;
S4A	70'	SOCCER FIELD #14	9	16200	30	FS4A	3 #10, 1 #10G; 1 1/4"C
S4B	70'	SOCCER FIELD #15	11	19800	60	FS4B	3 #8, 1 #6G;
S5A	70'	SOCCER FIELD #15	11	19800	60	FS5A	3 #6, 1 #8G; 1 1/4"C
S5B	70'	SOCCER FIELD #16	9	16200	30	FS5B	3 #8, 1 #8G;
S6A	70'	SOCCER FIELD #15	11	19800	60	FS6A	3 #4, 1 #4G; 1 1/2"C
S6B	70'	SOCCER FIELD #16	9	16200	30	FS6B	3 #6, 1 #6G;
S7	70'	SOCCER FIELD #16	11	19800	60	FS7	3 #4, 1 #4G; 1 1/4"C
S8	70'	SOCCER FIELD #16	11	19800	60	FS8	3 #4, 1 #4G; 1 1/4"C
		TOTAL	124	223200			

PANEL HD — CABINET SURFACE MOUNTED — TYPE NEMA 3R, SERVICE ENTRANCE RATED
VOLTAGE 480Y/277V, 3ϕ, 4W — FEEDER BOTTOM — MAINS 400A MCB

DEVICE AMPS TRIP	DEVICE POLES	NOTES	BRANCH CIRCUIT DESIGNATION	No.	PHASE LOAD (VOLT-AMPS) ϕA	ϕB	ϕC	No.	BRANCH CIRCUIT DESIGNATION	NOTES	DEVICE POLES	DEVICE AMPS TRIP
				1	7200	5400		2				
40	3		POLE 'S1' (FIELD 14)	3		7200	7200	4	POLE 'S5A' (FIELD 15)		3	30
				5			5400	7200	6			
				7	7200	5400		8				
40	3		POLE 'S2' (FIELD 14)	9		5400	5400	10	POLE 'S5B' (FIELD 16)		3	30
				11			7200	5400	12			
				13	5400	7200		14				
30	3		POLE 'S3A' (FIELD 14)	15		7200	5400	16	POLE 'S6A' (FIELD 15)		3	30
				17			7200	7200	18			
				19	7200	5400		20				
30	3		POLE 'S3B' (FIELD 15)	21		7200	5400	22	POLE 'S6B' (FIELD 16)		3	30
				23			5400	5400	24			
				25	5400	7200		26				
30	3		POLE 'S4A' (FIELD 14)	27		5400	7200	28	POLE 'S7' (FIELD 16)		3	40
				29			5400	5400	30			
				31	7200	5400		32				
30	3		POLE 'S4B' (FIELD 15)	33		5400	7200	34	POLE 'S8' (FIELD 16)		3	40
				35			7200	7200	36			
				37		720		38				
60	3		SPD	39			720	40	RECEPTACLE PANEL 'PD' VIA TRANSFORMER		3	40
				41				1020	42			
				43				44				
30	3		SPARE	45				46	SPARE		3	30
				47				48				
INTEGRATED EQUIPMENT RATING: 22 KAIC			KVA TOTAL		76.3	76.3	76.6		PANELBOARD KVA LOAD TOTAL:			229.3

BURDETTE ENGINEERING
102 PILGRIM ROAD
GREENVILLE, SC 29607
(864)297-8717 TEL
(864)297-8719 FAX

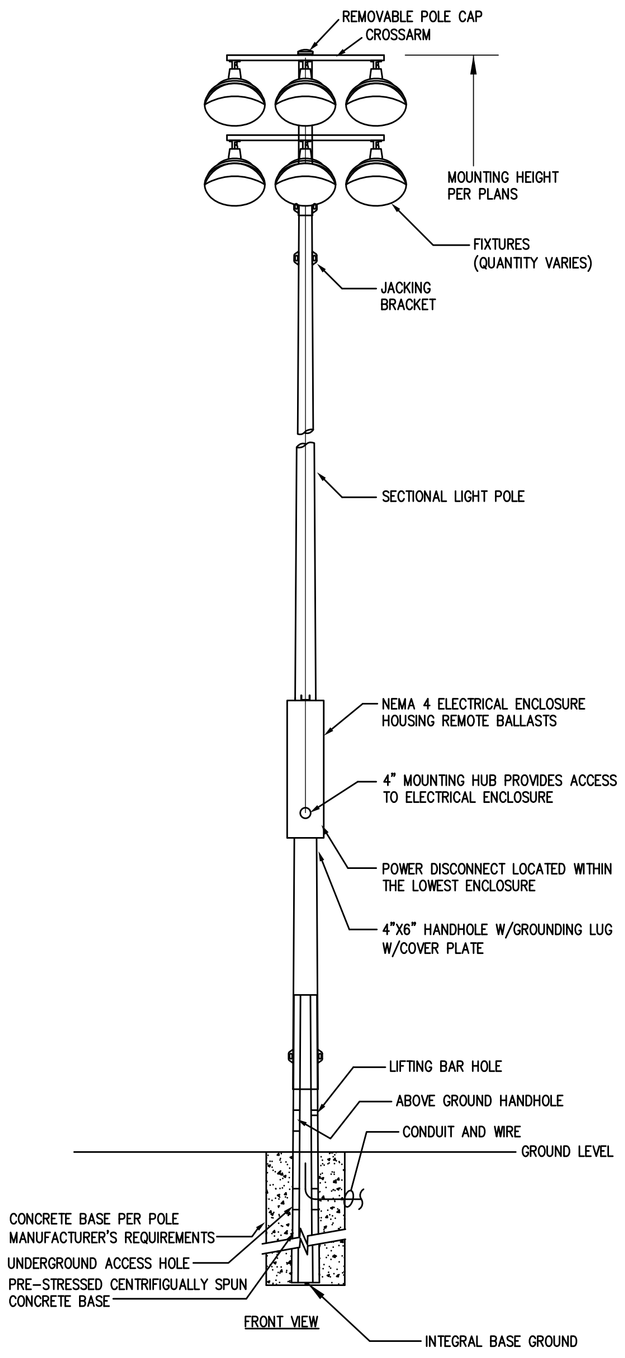
REVISION	DATE	BY
ISSUED FOR CONSTRUCTION	8/7/15	DJB

PROJECT NO. 15350A
DATE 8/7/15
DRAWN BY TMF/LJK
CHECKED BY DJB

FIELD LIGHTING FOR MESA SOCCER COMPLEX

GREENVILLE, SOUTH CAROLINA

SHEET NUMBER
E2.1
3 OF 4 SHEETS

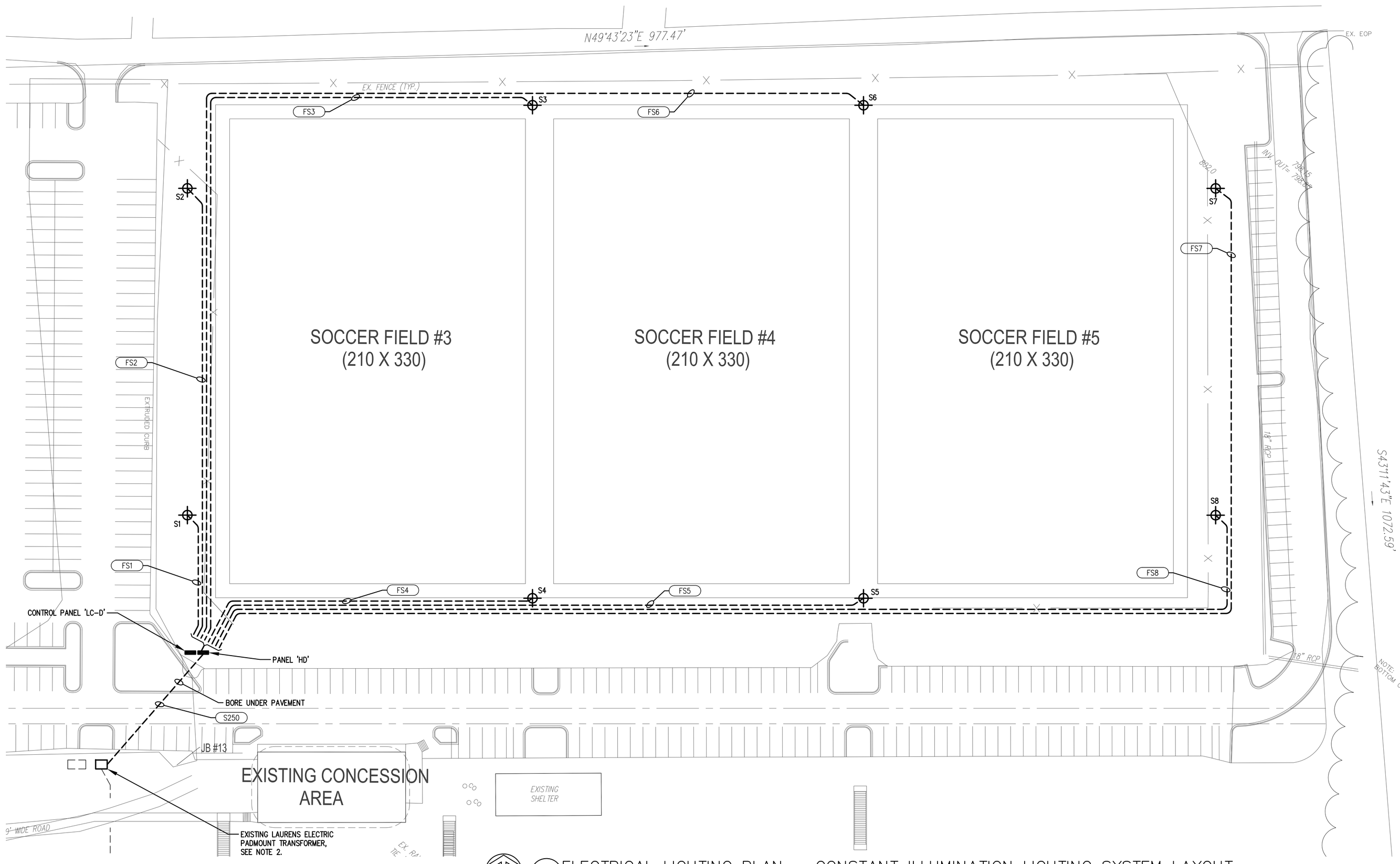


TYPICAL CONCRETE BASE AND STEEL POLE

B / E2.2 TYPICAL POLE DETAIL
NOT TO SCALE

NOTES:

1. SPORTS LIGHTING SYSTEM COMPONENTS FURNISHED AND, INSTALLED UNDER THIS CONTRACT. PANELBOARDS, BREAKERS, FEEDERS, BRANCH CIRCUITS, ETC. FURNISHED AND INSTALLED UNDER THIS CONTRACT.
2. REFER TO MANUFACTURERS' SPECIFICATIONS FOR DETAILS ON INSTALLATION AND ASSEMBLY OF POLES, FIXTURES, ETC.
3. PRIOR TO INSTALLING NEW POLES, PROVIDE CUSTOMIZED CALCULATIONS, BY MANUFACTURER, PREPARED AND SEALED BY LICENSED PROFESSIONAL ENGINEER IN STATE OF S.C. INDICATING THE BURIAL DEPTH AND CONCRETE FOUNDATION REQUIRED FOR EACH POLE.
4. VERIFY ALL DIMENSIONS IN FIELD.
5. VERIFY ACTUAL ROUTING OF LIGHTING POLE LINES. MARK ON RECORD SET TO BE TURNED OVER TO OWNER UPON SUBSTANTIAL COMPLETION.
6. ALL UNDERGROUND FEEDERS TO LIGHTING POLES MAY BE INSTALLED BY DIRECTIONAL BORING OR TRENCHING. NOTE THAT TRENCHING OR DRIVING WITHIN BALL FIELD FENCE LINES IS PROHIBITED.
7. WHERE MORE THAN TWO CONDUITS ENTER LIGHTING POLES, PROVIDE APPROPRIATE IN-GRADE JUNCTION BOX ADJACENT TO POLE.



A / E2.2 ELECTRICAL LIGHTING PLAN – CONSTANT ILLUMINATION LIGHTING SYSTEM LAYOUT
SCALE: 1" = 40'-0"

40 0 40 80 120
1" = 40'-0"

PROJECT NORTH

PLAN NOTES:

1. CONSTANT ILLUMINATION LIGHTING SYSTEMS REFER TO SYSTEMS THAT AUTOMATICALLY ADJUST POWER LEVELS IN COMPLIANCE WITH IES LUMEN MAINTENANCE CONTROL STRATEGY. PROVIDE FOOT CANDLE VERIFICATIONS FOR 30FC AVERAGE. NUMBER OF FIXTURES IS BASED ON PRELIMINARY CALCULATIONS. PROVIDE ALL REQUIRED FIXTURES AND CABLING FOR A COMPLETE AND OPERATIONAL SYSTEM. FIXTURES SHOWN ARE BASED ON MUSCO SYSTEMS.
2. COORDINATE NEW LOAD WITH LAURENS ELECTRIC TO CONNECT TO PADMOUNT (480/277V, 3ø) IN EXISTING LOCATION. PROVIDE ALL REQUIREMENTS.
3. PROVIDE TESTING OF LIGHT LEVELS ON EACH FIELD AFTER COMPLETION IN NIGHT TIME CONDITIONS.
4. FIELD SURFACES ARE NOT TO BE DISTURBED. RESEED ALL GROUND DISTURBED PER OWNERS' REQUIREMENTS.
5. FIELD SHALL BE ABLE TO BE INDIVIDUALLY LIT

CONSTANT CIRCUIT SUMMARY BY ZONE (480/277V, 3ø, 4W)

POLE TAG	MOUNTING HEIGHT	CIRCUIT DESCRIPTION	NUMBER OF FIXTURES	FULL LOAD AMPS	CONTACTOR SIZE (AMPS)	FEEDER TAG	FEEDER
S1	70'	SOCCER FIELD #14	6	10800	30	FS1	3 #10, 1 #10G; 1"C
S2	70'	SOCCER FIELD #14	6	10800	30	FS2	3 #10, 1 #10G; 1"C
S3A	70'	SOCCER FIELD #14	7	12600	30	FS3A	6 #6, 1 #6G; 1 1/4"C
S3B	70'	SOCCER FIELD #15	7	12600	30	FS3B	
S4A	70'	SOCCER FIELD #14	7	12600	30	FS4A	6 #10, 1 #10G; 1"C
S4B	70'	SOCCER FIELD #15	7	12600	30	FS4B	
S5A	70'	SOCCER FIELD #15	7	12600	30	FS5A	6 #8, 1 #8G; 1 1/4"C
S5B	70'	SOCCER FIELD #16	7	12600	30	FS5B	
S6A	70'	SOCCER FIELD #15	7	12600	30	FS6A	6 #6, 1 #6G; 1 1/4"C
S6B	70'	SOCCER FIELD #16	7	12600	30	FS6B	
S7	70'	SOCCER FIELD #16	6	10800	30	FS7	3 #6, 1 #6G; 1 1/4"C
S8	70'	SOCCER FIELD #16	6	10800	30	FS8	3 #8, 1 #8G; 1"C
		TOTAL	80	144000			

PANEL HD — CABINET SURFACE MOUNTED — TYPE NEMA 3R, SERVICE ENTRANCE RATED
VOLTAGE 480Y/277V, 3ø, 4W — FEEDER BOTTOM — MAINS 250A MCB

DEVICE AMPS TRIP	DEVICE POLES	BRANCH CIRCUIT NOTES	BRANCH CIRCUIT DESIGNATION	No.	PHASE LOAD (VOLT-AMPS) øA	øB	øC	No.	BRANCH CIRCUIT DESIGNATION	BRANCH CIRCUIT NOTES	DEVICE POLES	DEVICE AMPS TRIP
				1	3600	3600		2				
30	3		POLE 'S1' (FIELD 14)	3		3600	4500	4	POLE 'S5A' (FIELD 15)		3	30
				5			3600	4500	6			
30	3		POLE 'S2' (FIELD 14)	7	3600	4500		8				
				9		3600	3600	10	POLE 'S5B' (FIELD 16)		3	30
				11			3600	4500	12			
30	3		POLE 'S3A' (FIELD 14)	13	4500	4500		14				
				15		4500	4500	16	POLE 'S6A' (FIELD 15)		3	30
				17			3600	3600	18			
30	3		POLE 'S3B' (FIELD 15)	19	3600	3600		20				
				21		4500	4500	22	POLE 'S6B' (FIELD 16)		3	30
				23			4500	4500	24			
30	3		POLE 'S4A' (FIELD 14)	25	4500	3600		26				
				27		3600	3600	28	POLE 'S7' (FIELD 16)		3	30
				29			4500	3600	30			
30	3		POLE 'S4B' (FIELD 15)	31	4500	3600		32				
				33		4500	3600	34	POLE 'S8' (FIELD 16)		3	30
				35			3600	3600	36			
				37		720		38				
60	3		SPD	39			720	40	RECEPTACLE PANEL 'PD' VIA TRANSFORMER		3	40
				41				1020	42			
				43					44			
30	3		SPARE	45				46	SPARE		3	30
				47					48			
INTEGRATED EQUIPMENT RATING: 22 KAIC			KVA TOTAL		48.4	49.3	48.7		PANELBOARD KVA LOAD TOTAL:			146.5

BURDETTE ENGINEERING
102 PILGRIM ROAD
GREENVILLE, SC 29607
(864)297-8717 TEL
(864)297-8719 FAX

PROJECT NO.	REVISION	DATE	BY
15350A	ISSUED FOR CONSTRUCTION	8/7/15	DJB
DATE 8/7/15			
DRAWN BY TMP/LJK			
CHECKED BY DJB			

FIELD LIGHTING FOR MESA SOCCER COMPLEX

GREENVILLE, SOUTH CAROLINA

SHEET NUMBER

E2.2

4 OF 4 SHEETS