

SECTION 26 0000

GENERAL PROVISIONS

PART 1 - GENERAL

- A. The general contract provisions apply to this section and take precedent over this section in case of conflict.

1.01 GENERAL PROVISIONS

- A. This division supplements the applicable requirements of other divisions.

1.02 DEFINITIONS

- A. For the purposes of Division 260000, the following definitions apply:
 - 1. Provide: Furnish and install.
 - 2. Indicated: As shown on the drawings or specified herein.
 - 3. Circuit Designation: Panel designation and circuit number, i.e., LA-13.
 - 4. Approved equal: Approved by the engineer of record as equal in his sole determination.

1.03 SCOPE OF WORK

- A. The Specifications for Work of Division 260000 include, but are not limited to the following sections:

26 0000–General Provisions

26 0030–Tests and Identification

26 0050–Basic Electrical Materials and Methods

26 0060–Minor Electrical Demolition for Remodeling

26 0111–Conduits

26 0120–Conductors

26 0130–Electrical Boxes

26 0142–Nameplates and Warning Signs

26 0164–Branch Circuit Panelboards

26 0190–Support Devices

26 2450–Grounding

- B. Work Included: All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this division, complete, as shown on the drawings and/or specified herein. Work includes, but is not necessarily limited to the following:
1. Examine all divisions for related work required to be included as work under this division.
 2. General provisions for electrical work.
 3. Site observation including existing conditions.
- C. Related Work Specified Elsewhere but included in the scope of work:
1. Motors and their installation.
 2. Control wiring and conduit for heating, ventilating and air conditioning.
- D. Work Not In Contract (N.I.C.):
1. Telephone instruments.
- E. Coordination
1. The following supplements are additional General Requirements pertaining to work of this Division. Provisions of Division 1 - General Requirements shall remain in effect.
 - a. Coordinate work of various sections of Division 26 and 27.
 - b. Coordinate work of this Division 26 with work of Divisions 2 through 25.

1.04 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI).
- B. Association of Edison Illuminating Companies (AEIC).
- C. Electrical Testing Laboratories (ETL).
- D. Illuminating Engineering Society (IES).

- E. Institute of Electrical and Electronic Engineers (IEEE).
- F. Insulated Cable Engineers Association (ICEA).
- G. National Electrical Manufacturers Association (NEMA).
- H. National Fire Protection Association (NFPA).
- I. Underwriters Laboratories, Inc. (UL).
- J. California State Fire Marshal (CSFM).
- K. California Energy Commission (CEC) Title 24.

1.05 QUALITY ASSURANCE

- A. Regulations: All the electrical equipment and materials, including their installations, shall conform to the following applicable latest codes and standards:
 1. California Electric Code, Latest Adopted Edition (NEC), 2017 unless a more current version has been adopted.
 2. Local and State Fire Marshal.
 3. Occupational Safety and Health Act (OSHA).
 4. Requirements of the Serving Utility Company.
 5. Local Codes and Ordinances.
 6. Requirements of the Office of the California State Architect (OSA).
 7. California Administrative Code, Title 8, Chapter 4, Industrial Safety Orders.
 8. California Administrative Code, Title 24.
 9. County of Ventura Codes and Regulations.
- B. Variances: In instances where two or more codes are at variance, the most restrictive requirement shall apply. In instances where plans and specifications are at variance or conflict the most restrictive requirement shall apply. Contractor shall be responsible for all his associated work and materials and also the work and materials of related or affected trades.
- C. Contractor's Expense: Obtain and pay for all required bonds, insurance, licenses, and pay for all taxes, fees and utility charges required for the electrical work.
- D. Testing and Adjustment:

1. Perform all necessary tests required to ascertain that the electrical system has been properly installed, that the power supply to each item of equipment is correct, and that the system is free of grounds, ground faults, and open circuits, that all motors are rotating in the proper directions, and such other tests and adjustments as may be required for the proper completion and operation of the electrical system. Contractor shall provide a copy of all test reports to prove these tests have been performed.
2. If, during the course of testing, it is found that system imbalance is in excess of 20%, rearrange single-pole branch circuit in lighting and receptacle panels to bring system balance to within 20% on all phases. Record all such changes on the typewritten panelboard schedule and submit a summary of changes to the Engineer on the record drawings.

1.06 SUBMITTALS

- A. Procedure: In accord with the Submittal Section.
- B. Shop drawings: Detailed shop drawings for the following equipment:
 1. Branch circuit panelboards.
 2. Lighting Fixtures
- C. Product data: Detailed manufacturer's data for:
 1. Capacitors.
 2. Lighting fixtures and associated equipment including control.
- D. Test results for the following:
 1. Grounding systems.
- E. Include sufficient information to indicate complete compliance with Contract Documents. Include illustrations, catalog cuts, installation instructions, drawings, and certifications. On each sheet show manufacturer's name or trademark.
- F. Operating, maintenance, and instruction data for:
 1. Lighting equipment
- G. Instruction materials:
 1. Provide at the time of personnel instruction period three bound copies of instruction manuals for the systems as listed in Subparagraph 1.04.A.4.f.
 2. Include the following (minimum) information in each copy of instruction manual:

- a. Manufacturers' names and addresses including phone numbers.
- b. Serial numbers of items furnished.
- c. Catalog cuts, exploded views and brochures, complete with technical and performance data for all equipment, marked to indicate actual items furnished and intended use.
- d. Recommended spare parts.

1.07 OWNER'S PERSONNEL INSTRUCTIONS

- A. Prior to completion of the contract, and at the Owner's convenience, instruct verbally and demonstrate to the Owner's personnel, the operation of the systems as listed under operating, maintenance, and instructional data and/or emergency generator, automatic transfer switch and fire alarm annunciator panel.

1.08 CLEANING

- A. Clean exterior surfaces and interiors of equipment and remove all dirt, cement, plaster and other debris. Protect interior of equipment from dirt during construction and clean thoroughly before energizing.
- B. Clean out cracks, corners and surfaces on equipment to be painted. Remove grease and oil spots so that paint may be applied without further preparation.

1.09 PROJECT RECORD DOCUMENTS - Prepare the following and submit to the engineer before final acceptance:

- A. Mark Project Record Documents daily to indicate all changes made in the field.
 - 1. In addition to general requirements of Project Record Drawings, indicate on drawings, changes of equipment locations and ratings, trip sizes, and settings on circuit breakers, alterations in raceway runs and sizes, changes in wire sizes, circuit designations, installation details, one-line diagrams, control diagrams and schedules.
- B. Use green to indicate deletions and red to indicate additions.
 - 1. Use the same symbols and follow the same drafting procedures used on the Contract Drawings.
- C. Locate dimensionally off of contract drawings all underground conduit stubbed-out for future use, underground feeder conduits, and feeder pull box locations using building lines by indicating on the Project Record Drawings.
- D. At the completion of underground conduit installation provide underground conduit record documents to owner's representative.

- E. Two copies, in binder form, of all test results as required by these specifications - 260030.
 - F. Two copies of local and/or state code enforcing authorities final inspection certificates.
 - G. Two copies, in binder form, of electrical equipment cut sheets, manufacturer's installation instructions, warranty certificates, and product literature for all products utilized on project.
- 1.10 SERVICE INTERRUPTIONS AND UTILITY
- A. Coordinate with the Owner the interruption of services necessary to accomplish the work.
 - B. Coordinate with the utility company all work associated with power and communications distribution systems and service entrance equipment.
 - C. Electrical contractor shall supply temporary power for all trades.
- 1.11 MINIMUM SPECIFICATION REQUIREMENTS (ALL WORK OF DIVISION 260000)
- A. As a minimum Specification requirement, all materials and methods shall comply with applicable governing codes.
- 1.12 PENETRATION SEALING
- A. Seal penetration through exterior walls and fire rated walls, floors, ceilings, and roofs with 3M Firestopping materials of fire rating capacity rated per architectural plans and UBC or prevailing building code requirements.
- 1.13 PLACING EQUIPMENT IN SERVICE
- A. Do not energize or place electrical equipment in service until all interested parties have been duly notified and are present or have waived their rights to be present. Where equipment to be placed in service involves service or connection from another contractor of the owner, notify the owner in writing when the equipment will be ready for final testing/connection and schedule to the owner's satisfaction of this service connection. Notify the owner two weeks in advance of the date the various items of equipment will be complete.
- 1.14 OWNER-FURNISHED ITEMS
- A. Pick up Owner-furnished items and handle, deliver, install, and make all final connections.

1. Assume responsibility for the items when consigned at the storage facility or in the field in accord with requirements of the Contract Documents.

1.15 ELECTRIC ITEM LOCATION

- A. Electrical drawings are generally diagrammatic. Verify equipment sizes with shop drawings and manufacturers' data and coordinate location layout with other trades. Notify owner and engineer of any changes of location requirements prior to installation and obtain engineer's written acceptance for all changes/revisions.

1.16 DEMOLITION

- A. Scope: Provide and perform demolition, preparatory and miscellaneous work as indicated and specified, complete.
- B. Principle Items of Work:
 1. Demolition and removal of existing electrical conduit, wiring and equipment required to complete the project.
 2. Preparation of the existing building to receive or connect the new work.
 3. Miscellaneous demolition, cutting, alteration, and repair work in and around the existing building necessary for the completion of the entire project.
 4. Disconnecting and reconnection of electrical equipment as required by the construction modifications.
- C. Existing Conditions: Make a detailed survey of the existing conditions pertaining to the work. Check the locations of all existing structures, equipment and wiring (branch circuiting and controls). Provide at bid time any exclusions for existing conditions work.
- D. Salvage and Disposal: All removed material other than items to be reused shall be returned to the owner or disposed of in accordance with instructions from the owner's representative. Disposal shall be done in accordance with EPA and governing body requirements and regulations. Contractor shall pay all fees and charges for disposal.

1.17 ELECTRICAL WORKMANSHIP REQUIREMENTS

- A. It is required that all electrical construction of this Contract be performed by journeyman electricians. All journeyman electricians shall have a minimum of 4 years of apprenticeship training and hold a valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards. This is intended to mean that a person who does not hold a valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards will not be permitted to do

electrical work of any kind that involves new construction, nor make repairs, alterations, additions, or changes of any kind to any existing system of electrical wiring, apparatus, equipment, light, heat, or power.

- B. Contractor may employ electrical helpers or apprentices on any job of electrical construction, new or existing, when the work of such helpers or apprentices is performed under direct and constant personal supervision of a journeyman electrician holding a valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards.
1. Each journeyman electrician will be permitted to be responsible for quality of workmanship for a maximum of eight helpers or apprentices during any same time period, provided the nature of work is such that good supervision can be maintained and quality of workmanship achieved is the best, as expected by Owner and as implied by the latest edition of the California Electrical Code (National Electrical Code with State of California amendments).
 2. Before each journeyman electrician commences work, deliver to Owner at project site a photocopy of journeyman's valid Certificate of Completion from an apprenticeship training course approved by the State of California Department of Industrial Relations, Division of Apprenticeship Standards.
- C. All electrical systems shall be installed in a neat and workmanlike manner per National Electrical Code requirements and ANSI approved NEIS National Electrical Installation Standards.

1.18 DESIGN CHANGES AFTER AWARD OF BID

- A. When a change in the quantity or size of conductors is made, the conduit size will remain in accordance with that indicated in the original contract drawings rather than the drawing symbol conduit table. When code permits, provide conductor insulation 'THWN' where required to maintain conduit fill conformance with the National Electrical Code.

1.20 MATERIAL AND EQUIPMENT SUBSTITUTION

- A. Where two or more trade names or manufacturers are mentioned, selection shall be made from the group listed for use in the base bid. The order in which names are listed is not intended to be any indication of preference.
- B. Where a single manufacturer, product or trade name is stated, that manufacturer, product or trade name shall be used in the base bid. The use of other manufacturers, products or trade names will be considered by the engineer of record (unless that product is indicated for no substitution) only if submitted as alternate items at the time of bidding, with evidence of equality and a statement of net price difference as compared to the specified item. After approval by the engineer of record, the architect

and owner reserve the right to review such submittals and to determine the acceptability for use.

- C. Equipment other than that specified will be accepted only when written approval is given by the engineer of record and architect, in accordance with Division 1.
- D. The contractor shall be held responsible for all physical changes in piping, equipment, etc. resulting from equipment substitution and likewise bear any increased cost of other trades in making said substitution. Approval by the architect of equipment other than that specified does not relieve this contractor of this responsibility.

1.21 REQUESTS FOR INFORMATION

- A. The contractor shall submit all requests for information (RFI's) typewritten on the attached form.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 26 00 30
TESTS AND IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Tests and identification.

1.02 SUBMITTALS

- A. In accord with Section 260000.
- B. All test values.

1.03 DEFINITION

- A. Circuit designation: This term is construed to mean panel designation and circuit number; i.e., LA-13.

1.04 TESTS AND ADJUSTMENTS

- A. Prior to energizing, test all systems. Test to ensure systems are:
 - 1. Free from short circuits and grounds.
 - 2. Free from mechanical and electrical defects.
- B. Ground systems:
 - 1. Visual and mechanical inspection: Verify ground system is in compliance with Drawings and Specifications.
 - 2. Electrical tests:
 - a. Perform fall-of-potential test or alternative in accord with IEEE 81 on the main ground electrode or system.
 - b. Perform point-to-point tests to determine resistance between main ground system and all major electrical equipment frames, system neutral, and/or derived neutral points.
 - 3. Test values:

- a. Resistance between main ground electrode and ground shall be no greater than 10 ohms. Additional rods shall be installed and bonded to grounding system and driven to a depth of 50 ft. or refusal, whichever comes first.
- b. Investigate point-to-point resistance values which exceed 0.5 ohm.
- c. Record all test values and provide certified copies to Owner.

1.05 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates on all electrical distribution equipment shown on single-line diagram, and on control panels, dimmer panels, terminal cabinets, and separately mounted circuit breakers, disconnects, and starters.
- B. Provide equipment and circuit designation on nameplates with minimum letter and plate sizes as indicated.
- C. Provide engraved plastic nameplates with 1/4 in. minimum height letters indicating:
 - 1. Circuit designation at branch overcurrent devices in distribution panelboards, switchboards, and motor control centers.
 - 2. Circuit designation of panel, equipment-controlled or device-controlled on disconnect switches and on circuit breakers, starters, and controls which are individually enclosed.
 - 3. Voltage rating and circuit designation of all outlets larger than 120V, 20A rating and more than 2 poles.
 - 4. Designation of control and terminal cabinets including CUTC, as indicated.
 - 5. Designation of each contactor and relay in control cabinets.
 - 6. Designate area controlled for each dimmer in dimmer cabinet or rack.
 - 7. Circuit designation at all ground fault detectors and ground fault test receptacles.
 - 8. Equipment designation on front of switchboards, distribution panelboards, branch circuit panelboards, and load centers.
- D. Secure nameplates with at least two rivets. Cementing and adhesive installation is not acceptable.
- E. Provide two copies of a typewritten directory for each branch circuit panelboard, showing each circuit and its use. Attach one copy to panelboard door and deliver the other copy to Owner.

- F. Provide caution label on branch circuit panelboards with integral control compartments. Caution label shall be red with white letters reading "CAUTION, EXTERNAL CONTROL VOLTAGE CIRCUIT WITHIN THIS PANEL."
- G. Conductor identification:
 - 1. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices, and in pull boxes.
 - 2. Branch circuits: Identify with corresponding circuit designation at overcurrent device and at all splices.
 - 3. Control wires: Identify with indicated number and or letter designation at all terminal points and connections, including manufacturer pre-wired control sections and cabinets.
 - 4. Alarm and detection wires: Identify with indicated wire and mnemonics numbers at all connections, terminal points, and coiled conductors within cabinets for future termination by Owner.
 - 5. For identification of conductors, use heat shrinkable white marking sleeves such as Brady Permasleeve with type written identification.

END OF SECTION

SECTION 26 0050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

- 1.01 DESCRIPTION: Division 1 applies to this Section. This Section contains general requirements for the Sections in Division 26.
- A. Related Work Not in Division 26: Refer to individual Division 26 Sections.
- 1.02 QUALITY ASSURANCE:
- A. Codes: Entire installation shall comply with requirements of authorities having jurisdiction.
- B. Permits: Contractor shall pay for all permits required by work under this Division.
- C. Inspections: Contractor shall arrange for all inspections and correct non-complying installations.
- 1.03 SUBMITTALS: Refer to Division 1 for procedures.
- A. Material and Equipment: Prior to start of work, 6 copies of a list of all materials and equipment covered by Division 26 shall be submitted for approval. Contractor shall allow ample time for checking and processing and shall assume responsibility for delays incurred due to rejected items. No installation of material concerned shall be made until such written approval has been obtained. Approval of materials and equipment shall in no way obviate compliance with the Contract Documents. Each item proposed shall be referenced to the applicable Section, Page, and Paragraph of Division 26. For each item proposed, give name of manufacturer, trade name, catalog data, and performance data.
- B. Equipment Layout Drawings: Submit "Equipment Layout Drawings" for each equipment room or area containing equipment items furnished under this Division. Layout Drawings shall consist of plan view of room, to scale, showing projected outlines of all equipment, complete with dotted line indication of all required clearances including all those needed for removal or service. Location of all conduit and pull boxes shall be indicated.
- C. Service Manuals: NOT APPLICABLE
- D. Record Drawings: Prepare and submit in accordance with requirements. Contractor shall make notations, neat and legible, daily as the work proceeds. Drawings shall be available for inspection at all times and kept at the job site. All buried conduit and/or indicated future connections outside any building shall be located both by depth and by accurate measurement from a permanently established landmark such as a building or structure.
- E. Spare Parts: Conform to the Submittal Section. Deliver following spare parts to Owner and obtain receipts. Submit at same time as Operating Instructions:
- F. Special Tools: If any part of the equipment furnished under Division 26 requires a special tool for assembly, adjustment, resetting, or maintenance thereof and such tool is

not readily available on the commercial tool market, it shall be furnished with the equipment as a standard accessory and delivered to the Owner.

- G. Maintenance Paint: One (1) can of touch-up paint shall be delivered to Owner for each different color factory finish which is to be the final finished surfaces of the product.

1.04 DRAWINGS:

- A. Diagrammatic Drawings: For purposes of clarity and legibility, drawings are essentially diagrammatic although size and location of equipment is drawn to scale wherever possible, Contractor shall make use of data in all the Contract Documents and verify information at building site.
- B. Routing of Conduit and Piping: The drawings indicate required size and termination of conduits and raceways. It is not intent to indicate all necessary offsets and it shall be the responsibility under this Division to install conduit in such a manner as to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and make all equipment requiring inspection, maintenance and repair accessible without extra cost to the Owner.
- C. Coordination with Other Trades: Check with other Divisions of the Specifications so that no interference shall occur and in order that elevations may be established for the work. Installed work which interferes with the work of other trades shall be removed and rerouted at the discretion of the Architect.

1.05 DAMAGE AND REPAIRS:

- A. Emergency Repairs: Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding Contractor's warranty or relieving Contractor of his responsibility during warranty period.
- B. Responsibility for Damage: Contractor shall be responsible for damage to grounds, buildings, or equipment due to work furnished or installed under this Division 26.

1.06 PROTECTION, CARE, AND CLEANING:

- A. Protection: Provide adequate protection for finished parts of materials and equipment against physical damage from any cause during progress of work and until final completion. Sensitive electrical equipment shall not be installed until major construction is completed.
- B. Care: During entire construction, properly cap all lines and equipment to prevent entrance of sand and dirt. Protect equipment against moisture, plaster, cement, paint or work of other trades by covering with polyethylene sheets.
- C. Cleaning: After installation is completed, clean all systems as follows in addition to requirements specified:
 - 1. Field Painted Items: Clean exterior of conduits, raceways, piping and equipment exposed in completed structure; removing all rust, plaster, cement and dirt by wire brushing. Remove grease oil and similar materials by wiping with clean rags and suitable solvents.

2. Factory Finished Items: Remove grease and oil on all factory finished items such as cabinets and controllers, and leave surfaces clean and polished.
- D. Connection: Prior to energizing, check all electrical connection hardware and torque where necessary.

PART 2 - PRODUCTS

- 2.01 PRODUCTS: Products and materials shall be as specified in the pertinent Sections of Division 26.
- 2.02 MATERIALS AND EQUIPMENT: Wherever possible, all materials and equipment used in installation of this work shall be of same manufacturer throughout for each class of material or equipment. Materials shall be new and bear UL label, wherever subject to such approval. Comply with ANSI, IEEE and NEMA standards, where applicable.

PART 3 - EXECUTION

- 3.01 GENERAL LATERAL BRACING REQUIREMENTS: As shown on Drawings. Additional bracing requirements shall conform to specific requirements shown on Drawings or in other Sections of Division 26. Anchorages for equipment subject to thermal expansion and movement shall conform to manufacturer's recommendation and intent of general bracing requirements. When general and specific bracing requirements enumerated above are in conflict with referenced standards, the most stringent requirements shall govern.
- 3.02 EXCAVATION AND BACKFILL: Perform all excavation and back fill required to install Work of Division 26, both inside and outside. Perform all excavation and backfilling in accordance with Division 2.
- A. Excavation: Bury conduits outside building to a depth of not less than 24" (or as required by Code) below finish grade, unless noted otherwise.
 - B. Backfilling: Do not backfill until after final inspection and approval of conduit installation by all legally constituted authorities and recording of the buried items on the Record Drawings.
- 3.03 PAINTING: Finish painting of electrical equipment will be per manufacturers standards, unless equipment is herein specified to be furnished with factory applied finish coats. Equipment to be field painted shall be furnished with a factory applied prime coat.
- A. Touch-Up: If factory finish on any equipment furnished under Division 26 is damaged in shipment or during construction of building, the equipment shall be refinished by Contractor to satisfaction of Architect.
 - B. Concealed Equipment: Uncoated cast-iron or steel that will be concealed, or will not be accessible when installations are completed, shall be given one heavy coat of black asphaltum before installation.
- 3.04 OPERATING INSTRUCTIONS: Contractor to provide services of an experienced Engineer to instruct Owner in operation of entire installation. Instructional period

shall be during normal work day hours. This instruction period may be simultaneous with compliance tests.

- 3.05 COMPLIANCE TESTS: Conduct such tests of all portions of installation as may be necessary to ensure full compliance with the Drawings and Specifications. Tests shall be made in the presence of the Owner. Costs of test shall be borne by Contractor and Contractor shall provide all instruments, equipment, labor and materials to complete all the tests. Tests may be required on any item between installation of Work and the end of 1 year warranty period. Should these tests develop any defective materials, poor workmanship or variance with requirements of Specifications, Contractor shall make any changes necessary and remedy any defects at his expense.
- A. All Feeders: Measure and record as follows:
1. 600 volt conductors shall be tested with 500 volt megger to ground on each phase. megger to be on test for one minute before any readings are taken. The minimum values on all feeders shall be 100,000 OHMS.
 2. Copies of the certified test readings shall be transmitted to Owner.
- 3.06 SYSTEM ACCEPTANCE:
- A. Final Review: The Contractor shall request a final review prior to system acceptance after:
1. Completion of installation of all systems required under the Contract Documents.
 2. Submission and acceptance of operating and maintenance data.
 3. Completion of identification program.
- B. Acceptance: Is contingent on:
1. Completion of final review and correction of all deficiencies.
 2. Satisfactory completion of acceptance tests demonstrating compliance with all performance and technical requirements of Contract Documents.
 3. Satisfactory completion of training program and submission of manuals and Drawings required by Contract Documents.
- 3.10 PRELIMINARY OPERATION: The Owner reserves the right to operate portions of the electrical system on a preliminary basis without voiding the warranty or relieving the Contractor of his responsibilities.
- 3.11 CLEAN-UP: Conform to the Submittal Section. Upon completion and at other times during progress or Work, when required, remove all surplus materials, rubbish, and debris resulting from Work of Division 26.

END OF SECTION

SECTION 26 0060

MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner and Architect/Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect and make safe all electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with Owner's representative.
- C. Provide temporary wiring and connections to maintain required existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and

connections. Obtain permission from Owner at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area when outage affects business operation.

- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire service at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- F. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service and new system is accepted. Disable system only to make switchovers and connections. Notify Owner and Telephone Utility Company at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.
- G. Existing Security System: Maintain existing system in service until new system is complete and ready for service and new system is accepted. Disable system only to make switchovers and connections. Obtain permission from the Owner and security company at least 72 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply and re-label devices as spares.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- I. Disconnect and remove abandoned conduit.

- J. Repair adjacent construction and finishes damaged during demolition and extension work.
- K. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- L. Extend existing installations using materials and methods compatible with existing electrical installations, and in compliance with new project specifications.
- M. Modify existing as-built drawings to note changes.

3.04 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.05 INSTALLATION

- A. Install relocated materials and as required by this section and Owner's representative.

END OF SECTION

SECTION 26 0111

CONDUITS

PART 1 - GENERAL

- A. The general provisions apply to this section.

1.01 WORK INCLUDED

- A. Conduits; including:
 - 1. Electrical metallic tubing (EMT).
 - 2. Polyvinyl chloride conduit (PVC).
 - 3. Flexible metal conduit.
 - 4. Liquid-tight flexible metal conduit.

1.02 DEFINITION

- A. Conduit: This term shall be construed to mean conduit and conduit fittings; and tubing and tubing fittings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION - ALL MATERIALS SHALL BE MANUFACTURED IN THE USA.

- A. Electrical Metallic Tubing: Manufactured in accordance with ANSI C80.3 and UL 797.
 - 1. Provide compression fittings in walls, ceiling spaces or exposed construction areas.
 - 2. Provide compression (water tight) fittings in damp areas or areas exposed to weather.
- B. Polyvinyl Chloride Conduit: Schedule 40 and schedule 80, manufactured in accordance with ANSI C33.91, UL 651, and Nema TC-2.
 - 1. Cemented type fittings of the same manufacturer as the conduit.

- C. Flexible Metal Conduit: Hot-dipped galvanized steel, manufacturer in accordance with UL 1.
 - 1. Squeeze type, malleable iron, cadmium plated, straight and angle connectors for all sizes and twist-in connectors for 1/2-inch and 3/4-inch flexible metal conduit.
- D. Liquid-Tight Flexible Conduit: Hot-dipped galvanized with liquid-tight vinyl jacket.
 - 1. Liquid-tight fittings.

PART 3 - EXECUTION

3.01 USE

- A. EMT for all exposed and concealed work except as indicated in Paragraphs B, C, D, E, F, and G.
- B. Schedule 80 PVC in areas where exposed conduit could be subject to physical damage or where conduit is exposed and conductor phase to ground voltage exceeds 300 volts.
- C. PVC Conduit:
 - 1. Schedule 40 for runs below grade in direct contact with earth.
 - 2. Schedule 40 in concrete floors, walls or roofs.
 - 3. Schedule 80 for risers and above grade (with UV protection)
- D. Flexible Conduit (steel only permitted):
 - 1. For connection to equipment subject to vibration, maximum length 18 inches. In wet locations use liquid-tight flexible conduit.
 - 2. For connection to lighting fixtures above suspended ceilings. Lengths limited to 72 inches.
 - 3. Install ground conductors in all flexible conduits.
- E. Where 3/4-inch conduit runs are concealed in walls or ceilings and these runs are through wood studs and wood joists, flexible steel conduit may be used up to a maximum length of 6'0".
- F. All risers shall be schedule 80 PVC with bushings.
- G. In concrete or below grade use conduit not smaller than 1 inch. Maximum size in concrete slab: 1 inch. Run larger sizes under slab.

- H. Use long sweep elbows with minimum radius 10 times nominal conduit diameter for all telephone and communication runs.

3.02 INSTALLATION

- A. Provide conduit support and bracing in accordance with the latest published SMACNA guidelines.
- B. Perform excavating, trenching, backfilling, and compacting.
- C. Minimum cover for runs below finished grade outside buildings: 24 inches except where noted or required by the serving utility. Minimum cover for conduit in concrete floors, walls or roof: 1/3 thickness of slab. Minimum cover under building slabs is 12-inches.
- D. Minimum separation from uninsulated hot water pipes, steam pipes, heater flues or vents: 6 inches. Avoid running conduit directly under water lines. Minimum distance to low voltage and audio systems is 12".
- E. Protect inside of conduit from dirt and rubbish during construction by capping all openings with plastic caps intended for the purpose.
- F. Provide conduit bodies for exposed conduit runs at junctions, bends or offsets where required. Do not use elbows or bends around outside corners of beams, walls or equipment. Make conduit body covers accessible.
- G. Make conduit field cuts square with saw and ream out to full size. Shoulder conduits in couplings.
- H. Run a minimum of one 3/4-inch empty conduit for every three single pole spare circuit breakers, spaces or fraction thereof and not less than two 3/4-inch conduits from every flush mounted panel to an accessible space above the ceiling and below the floor.
- I. Make conduit projections from covered areas to areas exposed to the weather watertight by proper flashing. Extend flashing a minimum of 6 inches in all directions from conduit.
- J. Where conduit is to remain empty, install polypropylene or nylon pull-line 3/16" minimum diameter from end to end with tag at each end designating opposite terminations.
- K. Run conduit parallel and at right angle to building lines, when visible in finished construction.
- L. Cap conduits indicated to be stubbed-out underground using glued-on PVC caps intended for this purpose.
- M. Install a coupling flush with the floor on all conduits stubbed up through floors on grade.

- N. Make no bends with a radius less than 12 times the diameter of the cable it contains nor more than 90 degrees. Make field bends with tools designed for conduit bending. Heating of metallic conduit to facilitate bending is not permitted.
- O. Where conduit installed in concrete or masonry extends across building construction joints, provide expansion fittings as manufactured by O.Z.; Crouse-Hinds; Appleton; or equal, with approved ground straps and clamps.
- P. Concrete Wall or Slab Penetrations: All core drilling, sleeves, blockouts or other penetrations must be approved by the Structural Engineer prior to installation.
 - 1. Space sleeves and core drills to insure a minimum dimension of 3 times the nominal trade diameter of the largest adjacent conduit between sleeves or core drills.
 - 2. Use blockouts for concentrations of conduits in a confined area.
- Q. Do not penetrate walls with flexible conduit where subject to physical damage. Use recessed box with extension ring for transition from interior to exterior of wall.
- R. All homeruns shown shall be run to the panel indicated independently of all other homeruns. Provide pull points so as not to exceed total bends of 360 degrees between them unless otherwise indicated.
- S. At switchboards, manholes and floor standing distribution panelboards, provide insulated throat bushings or bell ends on all non-metallic conduit entries and bushings on all metallic conduit entries.
- T. Provide bushings on all conduit terminations sized 1" and larger.
- U. Provide weatherproof boxes and connectors for all exposed parking structure raceways and boxes.
- V. Provide bell ends on all conduits into pullboxes and manholes, seal all conduits after conductors are pulled.
- W. Cap all unused conduits with end cap. Do not tape.

END OF SECTION

SECTION 26 0120

CONDUCTORS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Conductors; for power, lighting, sound, communication and control, including conductors for general wiring, flexible cords and cables, and ground conductors.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260000.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Conductors for General Wiring: Thermoplastic insulated rated for 600V manufactured in accordance with UL 83.
 - 1. Provide 3/4 hard drawn copper conductors. Provide solid conductor for #14 AWG and smaller. Provide stranded conductors for #12 AWG and larger.
- B. Conductor Connectors for General Wiring:
 - 1. Sizes No. 14 to No. 8: Splice with insulated spring wire connectors.
 - a. Ideal No. 451, 455 and 453.
 - b. Minnesota Mining: Types Y, R, G, and B.
 - c. Buchanan No. B1, B2 and B4.
 - 2. Size No. 6 or Larger, Copper: Splice and terminate with compression or pressure type connectors and terminal lugs.
- C. Provide connector sealing packs for all area lighting and exterior box splices which require complete protection from dampness and water.
 - 1. Scotchlok No.'s 3576, 3577 and 3578, by 3M Company.

PART 3 - EXECUTION

3.01 USE

MOORPARK COLLEGE FOOTBALL FIELD LIGHTING
VENTURA COUNTY COMMUNITY COLLEGE DISTRICT

CONDUCTORS
26 0120-1

- A. Conductors for General Wiring:
1. Minimum 90 degrees C temperature rated insulation on conductors, except use minimum 90 degrees C temperature rated insulation on conductors in conduits exposed on roof, or where required due to ambient temperature.
 2. Stranded conductors at motors, audio video and other applications where subject to vibration.
 3. Minimum size conductors for power and lighting #12 AWG, except where noted.
 4. Minimum size conductors for control circuits #14 AWG stranded with THHN/THWN insulation.
- B. Use flexible cords and cables for connection of special equipment as indicated. Length not to exceed 72 inches.
- C. Ground Conductors:
1. Provide an insulated green ground conductor for all branch circuit wiring where indicated.
 2. Bare copper conductor may be used.
 - a. Install ground conductors in all non-metallic conduits as required by code. Install ground conductors in all motor branch circuits and all feeders. Where ground conductor size is not indicated, provide size as required for an equipment ground conductor by the National Electrical Code.
 - b. Install ground conductors in all flexible metal conduits.
- D. Install XHHW – 2, 90°C copper conductors for all underground installations unless noted otherwise on the plans.
- E. Install for all dimmers, stranded THHN/THWN – 2 copper 90°C conductors with dedicated neutrals.

3.02 INSPECTION

- A. Check conduit system for damage and loose connections, replace damaged sections.
- B. Check for caps at conduit openings. Make sure that inside of conduit is free of dirt and moisture.
- C. Pull mandrel, one size smaller than the conduit, through entire length of all underground conduits prior to conductor installation.

3.03 INSTALLATION

A. Conductors for General Wiring:

1. Color code conductors insulation as follows:

CONDUCTOR	SYSTEM 208Y/120	VOLTAGE 480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow

2. For conductors #6 AWG or larger, permanent plastic colored tape may be used to mark conductor in lieu of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.
 - a. Provide color tape on each end and at all terminal points and splices on wire enclosed in conduit.
 - b. Provide color tape every 3 feet on wire not enclosed in a listed wireway.
3. When pulling conductors, do not exceed manufacturer's recommended values.
4. Use polypropylene or nylon ropes for pulling conductors.

B. Insulate splices with plastic electrical tape: Scotch No. 33+, Tomic No. 1T, or equal.

C. Terminate all control wires with terminal lugs on terminal boards not designed with pressure plates. If splices are needed, use same procedure, installing a terminal board in a junction box for protection.

D. All splices or connections shall be compression type Thomas & Betts or Burndy, no split bolt connections are allowed.

3.04 IDENTIFICATION

A. Feeders: Identify with the corresponding circuit designation at over-current device and load ends, at all splices and in pull boxes.

B. Branch Circuits: Identify with the corresponding circuit designation at the over-current device and at all splices and devices.

C. Control Wires: Identify with the indicated number and/or letter designation at all terminal points and connections.

D. Alarm and Detection Wires: Identify with the indicated wire and zone numbers at all connections, terminal points, and coiled conductors within cabinets.

E. Conductors Terminated By Others: Indicate location of opposite end of conductor, i.e., Pull Box-Room 101.

- F. For identification of conductors, use heat shrinkable white marking sleeves such as Brady Permasleeve with type written identification.
- G. Circuit designation is construed to mean panel designation and circuit number, i.e., LA-13.

END OF SECTION

SECTION 26 0130
ELECTRICAL BOXES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Boxes; including:
 - 1. Outlet boxes.
 - 2. Pull and junction boxes.
 - 3. Cabinets.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260000.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Outlet Boxes:
 - 1. Pressed Steel Boxes: Knockout type, hot-dipped or electro-plate galvanized.
 - 2. Cast Iron Boxes: Hot-dipped or electro-plate galvanized with threaded hubs.
 - 3. Cast Iron Conduit Bodies: Hot-dipped or electro-plate galvanized with threaded hubs.
 - 4. Cast copper free aluminum conduit bodies with threaded hubs.
 - 5. Covers for Pressed Steel Boxes: Hot dipped or electro-plate galvanized.
 - 6. Outlet boxes manufactured in accordance with UL 514.
- B. Pull and Junction Boxes:
 - 1. Sheet steel, hot-dipped or electro-plate galvanized, or prime coated and a final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.

- a. Where exposed to weather, provide raintight hubs for conduits entering the boxes, top and sides only.
- 2. Floor Boxes:
 - a. Single gang, similar to Hubbell #B-2536.
 - b. Covers:
 - 1) Combination, similar to Hubbell #S-2525.
 - 2) Duplex receptacle, similar to Hubbell #S-3925.
 - c. Carpet flange, similar to Hubbell #S-3075 thru #S-3079.
 - d. Hubs: Provide hubs as required to suit the conduit arrangement.
- 3. Pre-Cast Concrete Pull Boxes: As manufactured by Jensen Pre-Cast or Utility Vault and shown on drawings.
- 4. High impact resistant PVC boxes: As manufactured by Carlon, Sedco, or R & G Sloan.
- C. Cabinets: Sheet metal, prime coat and final coat of manufacturer's standard enamel or lacquer finish. Manufactured in accordance with UL 50.
 - 1. Control Cabinet: NEMA 1 enclosure, door with butt hinges and flush handle latches.
 - a. Provide with removable steel back panel.
 - 2. Terminal Cabinets: NEMA 1 enclosure, door with concealed hinges and spring catch type flush cylinder locks. Key locks alike, provide two keys with each lock.
 - 3. Provide engraved plastic nameplates with 1/2" minimum height letters indicating designation of control and terminal cabinets as shown on the drawings.
 - 4. Secure nameplates with at least two screws or rivets. Cementing and adhesive installation not acceptable.

PART 3 - EXECUTION

3.01 USE

A. Outlet Boxes:

- 1. Ceiling Outlet Boxes: Not less than 4" octagonal by 2" deep.

2. FDD cast iron or cast aluminum device boxes and conduit bodies with metal covers for exposed conduit installation. Provide gasket for covers in wet areas.
3. Intercom, Microphone and TV Outlet Boxes: Not less than 4-11/16" square x 2-1/8" deep.
4. Provide floor boxes with quantity of gangs as required for power, communication or control as indicated. Use boxes with barriers where required. Provide carpet flanges in carpeted areas.

B. Pull and Junction Boxes:

1. Use sheet steel boxes NEMA Type 1 for indoor and NEMA Type 3R for outdoor installation, except as follows.
2. Use pre-cast concrete boxes for boxes flush in finish grade where requiring a nominal capacity greater than 144 cubic inches, where located in vehicular traffic areas, or where indicated.
3. Use polyvinyl chloride (PVC) boxes flush in finish grade when the nominal internal volume is less than or equal to 144 cubic inches or where indicated.
4. Use cast iron boxes for boxes flush in slab on grade.

3.02 INSTALLATION

- A. Provide 3/8" fixture studs in wall bracket and ceiling boxes.
- B. Provide covers suitable for the fixtures or devices used.
- C. Make outlet box covers flush with finished surfaces.
- D. Close unused open knockouts with knockout seals.
- E. Provide 1" deep plaster rings on recessed outlet boxes installed in areas where concrete will be exposed after construction is complete.
- F. Where boxes are concealed in exposed concrete unit masonry, use square cornered types or boxes fitted with rings of sufficient depth for the box to be recessed completely within cavity of block or tile. Install box to insure that ring fits an opening sawed out of the masonry, so that no mortar is required to fill between ring and construction.
- G. Provide a 6" base of compacted crushed rock under pre-cast concrete pull boxes.
- H. Adjust floor boxes so they are level with top of finished floors.
- I. Provide pull boxes and junction boxes in all branch circuit and feeder runs as indicated. Do not provide pull boxes unless they are indicated or required by the Electrical Code.

3.03 IDENTIFICATION

- A. Junction Boxes: Use permanent black marker, 2" high lettering, and on each cover plate indicate the power source and circuits contained within that junction box.

END OF SECTION

SECTION 26 0142

NAMEPLATES AND WARNING SIGNS

PART 1 - GENERAL

Not Used.

PART 2 - PRODUCTS

2.01 NAMEPLATES

- A. Nameplate shall be plastic laminate with 3/4" high letters in white on black background screwed onto equipment designations shall clearly state:
1. Equipment Enclosure Nameplates.
 - a. Manufacturer's nameplate including equipment design rating of current, voltage, KVA, HP, bus bracing rating, or as applicable.
 - b. Equipment nameplate designating system usage and purpose, system nominal voltage, equipment rating for KVA, amperes, HP and RPM as applicable. Designation data per drawings or to be supplied with shop drawings approval.
 2. Device nameplates: Device usage, purpose, or circuit number; manufacturer and electrical characteristic ratings including the following:
 - a. Circuit Breakers: Voltage, continuous current, maximum interrupting current and trip current.
 - b. Switches: Voltage, continuous current, horsepower or maximum current switching. If fused, include nameplate stating "Fuses must be replaced with current limiting type of identical characteristics."
 - c. Contactors: Voltage, continuous current, horsepower or interrupting current, and whether "mechanically-held" or "electrically-held".
 - d. Motors: Rated voltage, full load amperes, frequency, phases, speed, horsepower, code letter rating, time rating, type of winding, class and temperature.
 - e. Controllers: Voltage, current, horsepower and trip setting of motor running over current protection.

2.02 WARNING SIGNS

- A. Warning signs shall be minimum 18 gauge steel, white porcelain enamel finish with red lettering. Lettering to read "DANGER - HIGH VOLTAGE" in 1" letters. Warning signs to be included on door or immediately above door of all electrical equipment rooms, vaults or closets containing equipment rooms, vaults or closets containing equipment energized above 150 volts to ground, except where such spaces are accessible from public areas.

2.03 WARNING SIGN DESIGNATION

- A. Warning designation in 1" red letters shall be painted by stencil or pre-printed adhesive on each pull box, cabinet or 1-foot length of exposed conduit stating "DANGER" and giving voltage of enclosed conductors such as "DANGER - 480 VOLTS", for all systems over 150 volts to ground.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Nameplates shall be mounted by self-tapping or threaded screws and bolts or by rivets.
- B. Signs shall be permanently mounted with cadmium plated steel screws or nickel-plated brass bolts.

END OF SECTION

SECTION 26 0164

BRANCH CIRCUIT PANELBOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Branch circuit panelboards.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Submittals: Section 260000.
- B. Overcurrent Protective Devices: Section 260180.
- C. Control Devices: Section 264901.

PART 2 - PRODUCTS

2.01 MATERIAL AND FABRICATION

- A. Provide factory assembled, enclosed panelboards in dead front cabinets, with doors, surface mounted or recessed as indicated, not less than 20" wide and 5-3/4" deep. Height will depend on the number of breakers and spaces.
- B. Where a control compartment is indicated, provide an integral compartment with a separate hinged lockable door held with captive screws. Identify all internal control wiring with manufacturers wire numbering or control wire numbering when indicated, at all terminal points and connections.
- C. Provide feeder terminal lugs for both main lugs only and main breakers rated for use with copper conductors.
- D. Provide full length copper bussing including areas indicated as space only.
- E. Provide full size neutral bus where neutral bus is indicated. Provide equipment ground bus and bolt-on circuit breakers.
- F. Key all door locks alike.
- G. 120/208V, 3 Phase, 4 Wire Panelboards: Square-D Co. Type NQOD or Powerlink G3 NF with programmable module where designated, alternate bid for General Electric type AQ.

- H. 277/480V, 3 Phase, 4 Wire Panelboards: Square-D Co. Type NF, alternate bid for General Electric type CCB.
- I. All equipment shall be listed to meet or exceed the available fault current by 10%.
- J. Doors shall be hinged.
- K. All placards are welded steel type.
- L. Provide hinged deadfront doors to allow internal access to panel without totally rewiring cover panel.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Secure panelboards to building structure to withstand wire pulling strains.
- B. Secure surface mounted panelboards to wood studs or channel material spanning metal studs.
- C. Do not use toggle bolts.
- D. Contractor shall program lighting control Powerlink panelboard per owner's requirements.

3.02 LABELING AND IDENTIFICATION

- A. Provide engraved plastic nameplates on all branch circuit panelboards shown on the single line diagram.
- B. Provide panelboard and source feed designation on nameplates with 3/8" minimum height lettering for the panel name and 1/4" height lettering for the source feed designation.

EXAMPLE: LA

FED FROM: DLA

- C. Secure nameplates with at least two spaces or rivets. Cementing and adhesive installation not acceptable.
- D. Provide a typewritten directory for each branch circuit panelboard, showing each circuits and its use. Provide metal directory frame with plastic window.

END OF SECTION

SECTION 26 0190
SUPPORT DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Support devices for conduit, boxes, lighting fixtures and equipment.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Hangers, Straps and Beam Clamps:
 - 1. Efcor.
 - 2. Raco, Inc.
 - 3. Steel City.
 - 4. O.Z./Gedney Co.
 - 5. Caddy Fastening System by ERICO Products Inc.
- B. Channels and Fittings:
 - 1. Kindorf.
 - 2. Unistrut Corp.
- C. Anchors:
 - 1. Acherman-Johnson Corp.
 - 2. Phillips Drill Co.
 - 3. Rawl Products Co.

2.02 MATERIAL AND FABRICATION

- A. Hangers: Steel cadmium plated.

- B. Straps: One-hole and two-hole malleable iron, hot-dipped galvanized or steel, cadmium or zinc plated.
- C. Beam Clamps: Malleable iron, hot-dipped galvanized or cadmium plated.
- D. Channels and Fittings:
 - 1. Channels: Hot-dipped galvanized.
 - 2. Fittings: Galvanized.
- E. Anchors: Self drilling and expansion bolt types. No wood or fiber plugs or concrete nails are acceptable.

PART 3 - EXECUTION

3.01 USE

- A. Use one-hole or two-hole straps for single conduit runs on walls or ceilings.
- B. Use hangers with solid steel rods for hanging single conduits.
- C. Use formed channel trapezes for groups of two or more conduits.
- D. To fasten boxes and supports to:
 - 1. Wood: Use wood screws or screw type nails of equal holding power.
 - 2. Brick and Concrete: Use bolts and expansion shields.
 - 3. Hollow Masonry Units: Use toggle bolts.
- E. Support sheet metal boxes from building structure directly or by bar hangers.
- F. Do not penetrate reinforced concrete beams with fastenings more than 1-1/2" or reinforced concrete joints with more than 3/4" fastenings to prevent contact with reinforcing steel.

END OF SECTION

SECTION 26 2450

GROUNDING

PART 1 - GENERAL

1.01 REFERENCES

- A. N.E.C.: Article 250 "Grounding".
- B. Underwriter's Laboratories (U.L.). Standard A67 - "Grounding and Bonding Equipment". STD 869 - Grounding and Bonding.
- C. ITEE - Standards 142 and 241.

1.02 DESCRIPTION OF SYSTEM:

- A. A permanent grounding system with methods and materials in accordance with applicable Codes and Standards, able to conduct ground fault currents to the grounded neutral of electrical distribution systems, and limit potential differences between grounding conductors, raceways and enclosures.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's data on grounding systems and accessories.
- B. Shop Drawings: Submit layout drawings of grounding systems and accessories including, but not limited to, ground wiring, copper braid and bus, ground rods, and plate electrodes.

1.04 QUALITY ASSURANCE:

- A. Installer qualifies with at least 3 years of successful installation experience on projects with electrical grounding experience similar to that required for project.

1.05 DELIVERY, STORAGE, AND HANDLING:

- A. Handle electrical grounding accessories and components carefully to avoid damage. Store in location that will protect from dirt and weather.

PART 2 - PRODUCTS

2.01 GROUND RODS:

- A. Copper clad steel, unless indicated otherwise. Minimum dimension of 5/8" diameter by 8' long or larger if indicated and sectional rods with couplings where lengths exceeding 12' are specified or indicated, or where added driving depth is required to achieve a specified minimum resistance.

2.02 GROUNDING ELECTRODE:

- A. Bare stranded copper, 3/0 AWG unless indicated otherwise, for installation in soil or embedded in concrete and cable with type TW insulation when installed in raceway. Install without splice from connection to connection.

2.03 GROUNDING CONDUCTORS:

- A. Type TW insulation, unless specified or indicated otherwise with a continuous green outer insulating jacket for size #6 AWG and smaller and with green tape banding for #4 AWG and larger, marked at each access point (e.g.: Junction boxes, Enclosures).

2.04 CLAMPS AND PRESSURE CONNECTORS:

- A. Cast copper, copper alloy, or bronze alloy suitable for use with aluminum and copper. Double bolt type with formed shoe and "U" cable clamp for connection to pipe or conduit; Single bolt type with cable shoe and "U" clamp for connections to flat bar or metal; and double bolt, parallel conductor split clamp type for cable to cable connections.

2.05 WELDED CONNECTIONS:

- A. Exothermic process (Cadweld or Thermoweld).

2.06 EQUIPMENT ROOM GROUND TERMINAL BAR:

- A. Copper 1/4" X 2-1/2" X 24", unless otherwise indicated. Two rows of holes on 1-1/2" centers for 1/2" bolt, to receive cables from two directions.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Ground conductive raceways, cable trays and enclosures for electrical systems wiring. Make ground circuits complete to form permanent conductive paths. Solidly ground each low voltage electrical system unless indicated or specified as ungrounded, or grounded through an impedance of a specified value. Provide bare conductors when in open air or soil and provide 600 volt, green, insulated conductors when in raceway.

3.02 MAIN GROUNDING JUMPER:

- A. Install a main grounding jumper between the system neutral and the enclosure ground bus (or directly to enclosure where ground bus is not present) at each location where system grounding is required. Main grounding jumper:
 1. Formed bus in switchboards and panelboards.
 2. Formed bus or copper cable in transformers not coupled in unitized assembly with distribution equipment.

3.03 GROUND CONNECTIONS:

- A. Make grounding electrode connections electrically ahead of any overcurrent or disconnect device or tap connection such that disconnection of neutral load conductors does not interfere with or remove the system ground connection. Use separate lugs on the transformer neutral terminals for neutral and main grounding jumpers when cable is used for transformer connections.

3.04 SEPARATELY DERIVED SYSTEMS:

- A. For each separately derived system, grounded or ungrounded, install a grounding electrode conductor between each system enclosure ground bus (or bolted connection to enclosure where ground bus is not present) and a cold water pipe or building structural steel of one (1) inch size or larger near the separately derived system ground connection. Make connections to water pipes or steel accessible for easy inspection. Provide a separate ground conductor for each audio, video, isolated panels and UPS as noted on the plans.

3.05 SERVICE GROUND:

- A. For each low voltage service, install a grounding electrode conductor between the system enclosure ground bus and the water service entrance to the building and install bonding jumpers around insulating unions and removable fittings in the water pipe between the grounding electrode conductor connection to the water pipe and the water service entrance.

3.06 GROUNDING ELECTRODE SYSTEM:

- A. Install a complete grounding electrode system with interconnecting cables and terminations at the equipment room ground terminal bar. Make connections to the grounding electrode system accessible. Install the following grounding electrode systems:
 1. Metal frame of building.
 2. Grounding electrode encased by at least two inches of concrete, within and near the bottom of the building foundation or footing of the type specified in Part 2 - Products, at least 20 feet in length without splice from connection to connection.

3. Connection of other metal piping systems as required by National Electrical Code Article 250.
4. Driven ground rods.
5. Driven steel piles.
6. Connection to water service with bonding jumper around water meter.

3.07 GROUNDING ELECTRODE CONDUCTORS:

- A. Install grounding electrode conductor in PVC or other non-conductive, non-metallic enclosure where a raceway system is indicated or necessary for conductor installation. Install grounding electrode conductors without splice from the enclosure ground bus to the connection at the grounding electrode system.

3.08 GROUND RODS:

- A. Install a vertical position, full length below grade unless specified otherwise, and with conductor and top of rod 6" minimum below grade. Provide exothermic welds at all connections.

3.09 EQUIPMENT ROOM GROUND TERMINAL BAR:

- A. Install in equipment rooms where indicated. Mount bar by anchors and bolts using 1-1/2" long segments of 1/2" rigid conduit as spacer between bar and wall. Use a minimum of two supports, 18" on center. Connect grounding electrode system conductors, system enclosure ground bus, and other indicated electrode systems to the terminal bar. Label permanently all ground conductors as to destination location, e.g. TR1, panel IPS, etcetera.

3.10 EQUIPMENT GROUND:

- A. Form the equipment ground circuits with rigid metallic raceways (e.g., EMT, rigid steel conduit) unless indicated otherwise. Make all threaded coupling connections wrench tight. Install bonding jumpers for continuity around fittings and terminations where the conductive raceway is made non-continuous. Where indicated or specified, install ground conductors in raceways to augment the circuits formed by the metallic raceway system. Bond the conductors to boxes or enclosures in which access is possible. Size conductors as specified, indicated, or required by code, whichever is larger. Install grounding bushings and bonding jumpers to enclosures or ground bussing for the following: Service entrance feeder; each location where multiple ring knockouts are damaged during conduit installation; each location where conduits are stubbed up into floor mounted and each conduit termination at a painted enclosure where paint is not removed before installation of raceway.

3.11 FLEXIBLE RACEWAY GROUNDING:

- A. Install a ground conductor inside all flexible raceways (e.g., Flexible steel, liquid tight) regardless of length. Bond the conductor to the enclosure or ground bus in the nearest box or access on either side of the flexible section. Size conductor as specified, indicated, or required by code, whichever is larger.

3.12 NON-CONDUCTIVE RACEWAY:

- A. Install a ground conductor in raceways of non-conductive materials. Bond conductor to conductive enclosures in which access is possible. Bond non-current carrying conductive equipment contained in a non-conductive enclosure. Install insulated or bare conductors, sized as specified, indicated, or required by code, whichever is larger.

3.13 SECTIONAL RACEWAY:

- A. Install a ground conductor in sectional raceways with removable covers for access (e.g., Plug-in strips, surface raceway systems, and wireways) unless specified otherwise. Size conductor in accordance with the N.E.C. for the largest phase conductor size installed in raceway, or as indicated. Bond sections of the raceway to the ground conductor. Connect receptacle ground terminals in the raceway to the ground conductor, and make other ground connections indicated on the drawings.

3.14 CABLE SUPPORT SYSTEMS:

- A. Ground elements of the cable support system to panelboards, cabinets and switchboards from which their circuits originate. Install a ground conductor sized as required by code, as indicated, or #12 AWG, whichever is larger.

3.15 MULTI-CONDUCTOR CABLE, METALLIC SHEATH:

- A. Use multi-conductor cable with metallic sheath or armor approved for use as ground circuit conductor or install ground conductor(s). Size ground circuit conductor as required by code, as specified, or as indicated on the drawings, whichever is larger. Terminating devices for cable using the sheath or armor as the ground circuit conductor shall be approved for use as the connecting device between the cable and the enclosure. Terminate internal ground circuit conductors by lug to the interior of the enclosure or to the contained ground bus where present. Use bare or clearly identified internal grounding conductors.

3.16 MULTI-CONDUCTOR CABLE, NON-METALLIC SHEATHED:

- A. Use only non-metallic sheathed multi-conductor cables having a ground circuit conductor enclosed in the sheath the same size as the ungrounded conductors. Use bare

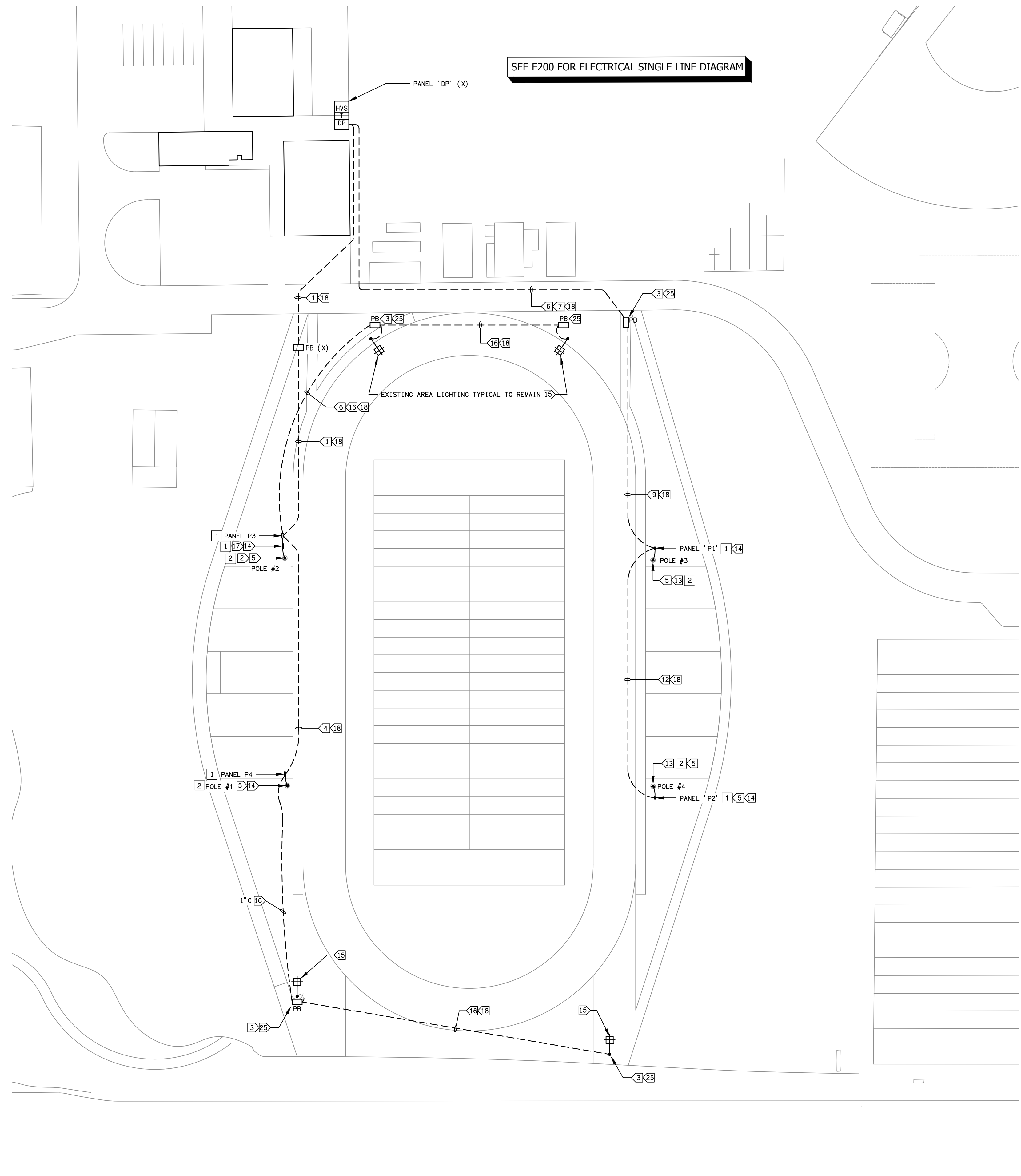
or clearly identified internal grounding conductors. Terminate ground circuit conductor by lug to the enclosure ground bus where present or to the interior of the enclosure.

3.17 GROUND CONDUCTOR BONDING:

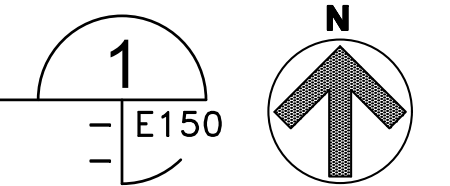
- A. Bond grounding conductors to boxes or enclosures at each access point. Do not use building steel as equipment grounding path. Use welded ground connections, at least where such are buried in soil, installed below slabs on grade, or embedded in concrete.

END OF SECTION

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 DATE: OCT 11, 2019
 TIME: 2:40 PM



EXISTING PARTIAL SITE LIGHTING AND POWER PLAN
 SCALE: 1"=50'-0"



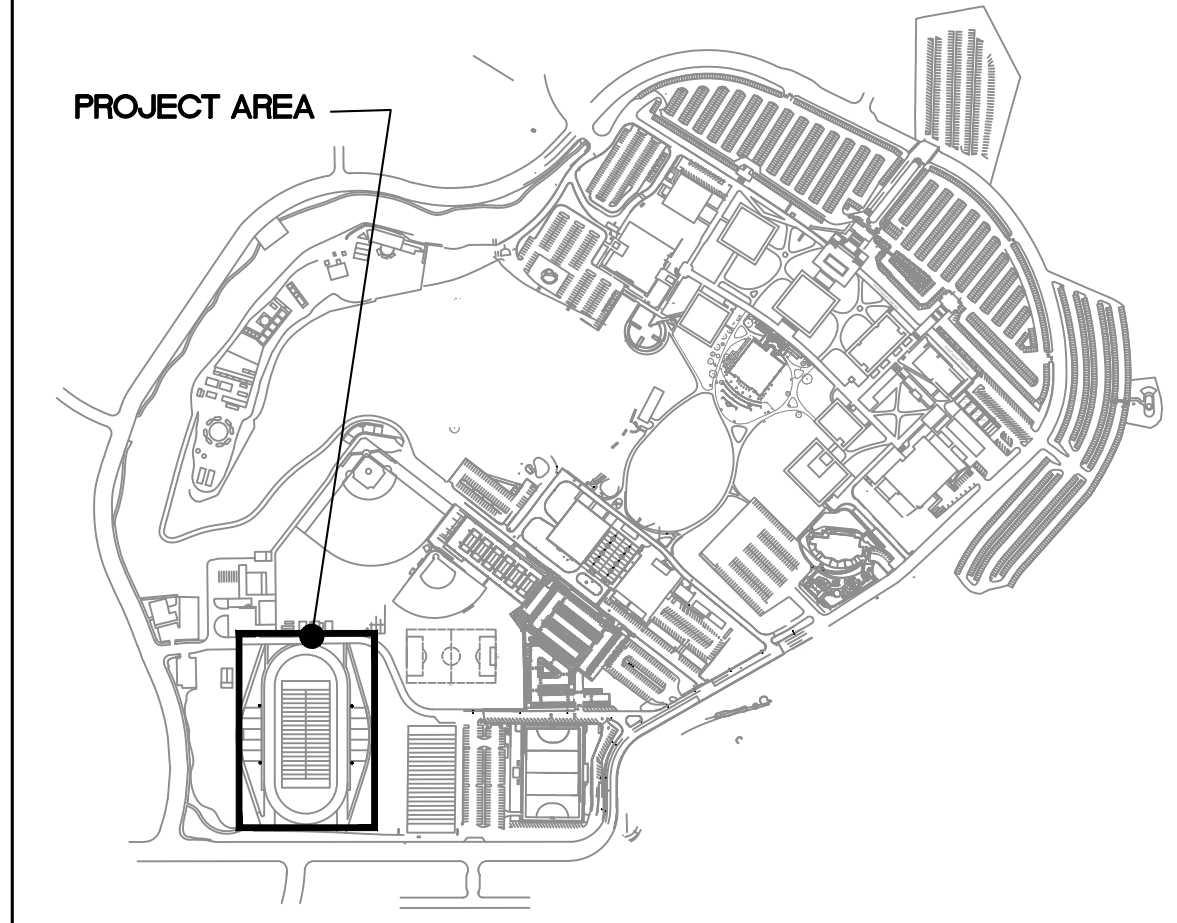
KEY NOTES (EXISTING EQUIPMENT/FEEDERS TO REMAIN UNLESS OTHERWISE NOTED):

- 1 EXISTING 3"C-(4) #350MCM CU & 1#2/0 CU.
- 2 EXISTING 3"C-(4) #350MCM CU, 1#2/0 CU, (3) #1/0 CU & 1#4 CU.
- 3 EXISTING 17"x30" CONCRETE PULLBOX. TYPICAL 4 LOCATIONS.
- 4 EXISTING 2"C-(3) #1/0 CU & 1#4 CU.
- 5 EXISTING STADIUM LIGHTS. TYPICAL 4 LOCATIONS.
- 6 TO EXISTING MAINTENANCE DISTRIBUTION BOARD.
- 7 EXISTING 4"C-(3) #500MCM CU, 1#4/0 CU & 1-4" C.O. SPARE.
- 8 NOT USED.
- 9 EXISTING 4"C-(3) #500MCM CU & 1#4/0 CU.
- 10 NOT USED.
- 11 NOT USED.
- 12 EXISTING 4"C-(3) #1/0 CU & 1#4 CU.
- 13 EXISTING LIGHT POLE.
- 14 EXISTING NEMA 3R POWER PANEL: 208V, 3Ø, 4W TO BE REPLACED, SEE 1.
- 15 EXISTING POLE LIGHT FIXTURE.
- 16 EXISTING UNDERGROUND CONDUIT 1"C 2#10 & 1#10 GND TO 20A-1P BREAKER IN BREAKER PANEL.
- 17 EXISTING TIME CLOCK IN NEMA 3R ENCLOSURE MOUNTED ADJACENT TO PANEL ON A UNISTRUT SUPPORT.
- 18 EXISTING TO REMAIN.
- 19 NOT USED.
- 20 NOT USED.
- 21 NOT USED.
- 22 NOT USED.
- 23 NOT USED.
- 24 CONNECTED TO EXISTING CIRCUIT BREAKERS IN EXISTING PANEL, 20A-1P CIRCUIT BREAKERS.
- 25 EXISTING IN-GROUND PULLBOX.

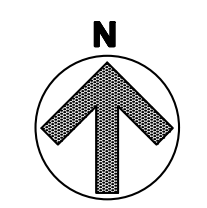
NEW WORK KEY NOTES:

- 1 REPLACE PANEL WITH NEW SQUARE D, NEMA 3R PANEL @120/208VAC WITH MAIN & SUB BREAKERS AS NOTED ON E201.
- 2 REPLACE EXISTING POLE LIGHT FIXTURES WITH NEW FIXTURES PER E300/E301/E303/E304. CONNECT/EXTEND TO EXISTING CIRCUITS AT TOP OF POLE. LABEL PANEL BREAKERS TO MATCH POLE LIGHT FIXTURES.

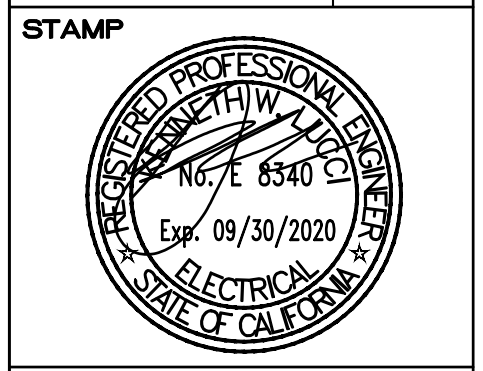
ALL ITEMS NOT SHOWN AS EXISTING ARE NEW



KEY PLAN



REVISIONS	BY



LUCCI & ASSOCIATES, INC.
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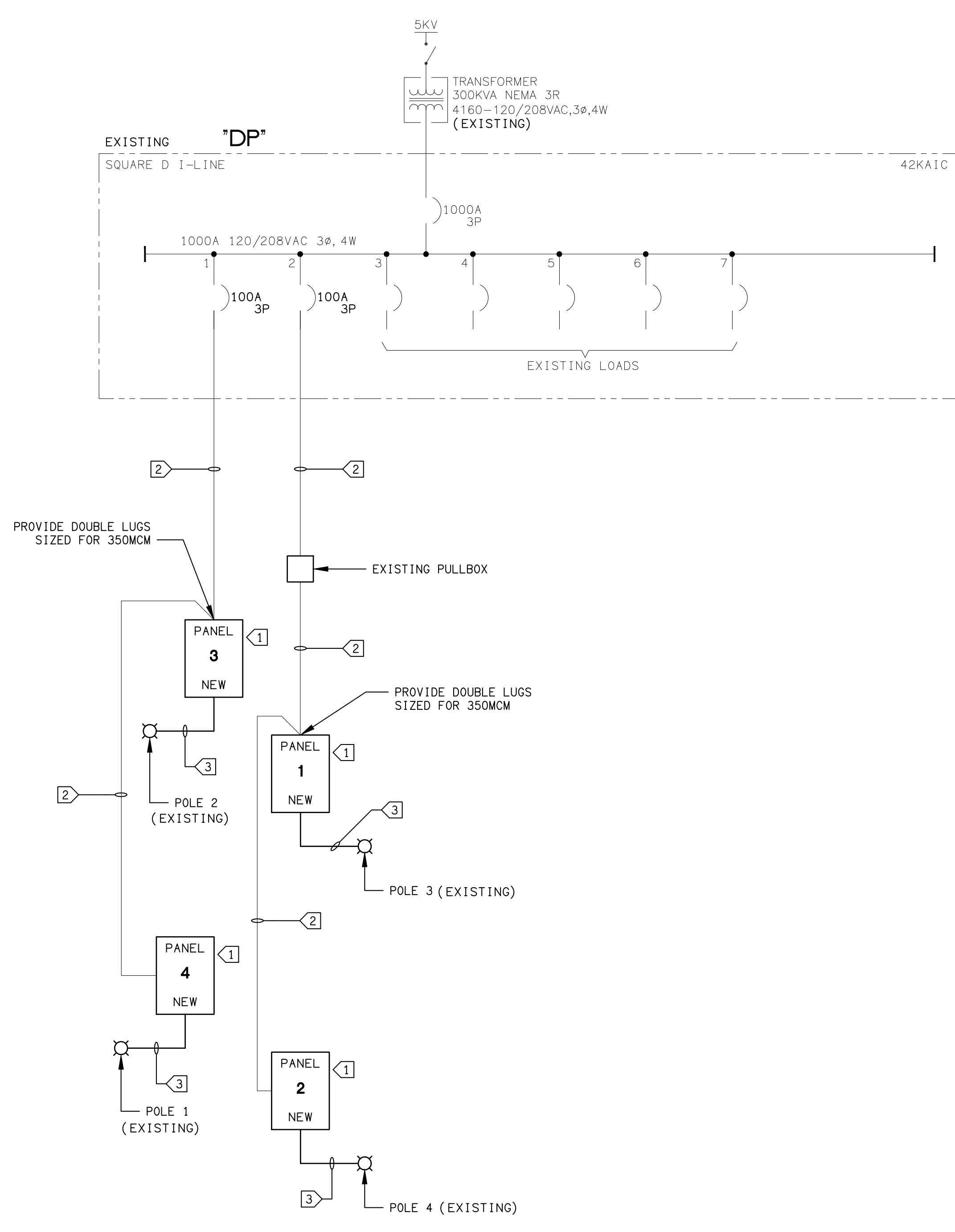
SHEET TITLE:
EXISTING PARTIAL SITE LIGHTING AND POWER PLAN

PROJECT:
MOORPARK COLLEGE FOOTBALL FIELD LIGHTING PROJECT

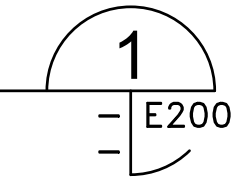
DRAWN: L. K.
 CHECKED: K. LUCCI
 DATE: 10/27/2019
 SCALE: AS NOTED
 JOB NO: 19759
 SHEET:

E150
 OF SHEETS

DRAFT: Lee Keener
 DATE: 27 October 2019
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 DRAFTER: Lee Keener
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 SCALE: 3/4" = 1'-0"
 PLOT SCALE: 1/8" = 1'-0"
 DRAFTER: Lee Keener
 DATE: 27 October 2019
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 SAVE DATE: 10/27/2019 11:33:20 AM
 PLOT BY: Lee Keener
 DRAFTER: Lee Keener
 DRAWING: G:\19759\EL\Sheets\19759E200.dwg



ELECTRICAL SINGLE LINE
 SCALE: NONE



SHEET NOTES:

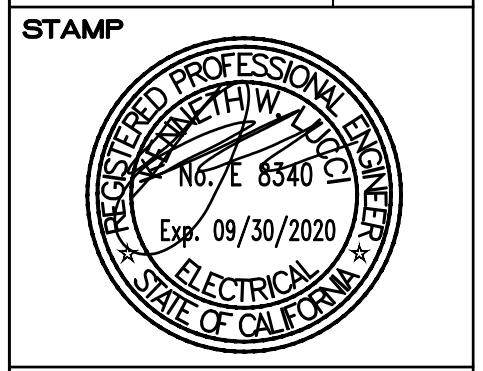
1. CONTRACTOR SHALL VERIFY LOCATION & REQUIREMENTS OF ALL ELECTRICAL DEVICES PRIOR TO BID, ROUGH-IN & INSTALLATION.
2. FIELD VERIFY LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO TRENCHING. SCHEDULE AND COORDINATE ALL SITE WORK WITH OWNER PRIOR TO ANY TRENCHING.
3. MINIMUM CONDUIT BURIAL DEPTH IS 24", 36" MINIMUM BELOW STREETS & PARKING LOTS FOR 0-600 VOLT SYSTEMS.
4. CONTRACTOR TO PROVIDE GROUND CONDUCTORS IN ALL CONDUITS.
5. 1" CONDUIT MINIMUM UNDERGROUND.
6. COORDINATE WORK WITH OTHER TRADES. OBTAIN ALL DRAWINGS THAT WILL REQUIRE COORDINATION AND PROVIDE ALL ELECTRICAL CONNECTIONS, DEVICES, AND WIRING REQUIRED WHETHER SHOWN ON ELECTRICAL DRAWINGS OR NOT.
7. CONTRACTOR SHALL FURNISH AND INSTALL PULL BOXES AS REQUIRED TO INSTALL CONDUCTORS PER CONDUCTOR MANUFACTURERS RECOMMENDATIONS, PER THE NATIONAL ELECTRICAL CODE AND PER LOCAL AUTHORITIES HAVING JURISDICTION.

KEY NOTES:

- ① NEW POWER PANEL PER E201.
- ② EXISTING FEEDERS / CONDUCTORS TO REMAIN.
- ③ EXISTING FEEDERS / CONDUCTORS TO REMAIN / EXTEND AS REQUIRED RECONNECT TO NEW LIGHTING FIXTURES.

ALL NEW FEEDERS SHALL BE XHHW-2 COPPER, 90°C

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SHEET TITLE:
ELECTRICAL SINGLE LINE DIAGRAM

PROJECT:
MOORPARK COLLEGE FOOTBALL FIELD LIGHTING PROJECT

DRAWN:
 L. K.
 CHECKED:
 K. LUCCI
 DATE:
 10/27/2019
 SCALE:
 AS NOTED
 JOB NO.
 19759
 SHEET:

E200
 OF SHEETS

DATE: 27 October 2019
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 SAVE DATE: 10/27/2019 11:33:31 AM
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 DRAFTING: G:\19759\EL\Sheets\19759E201.dwg
 Plot Size: 36x48
 Plot Scale: 1/8"=1'-0"
 Plot Orientation: Landscape
 Plot Method: Plot as Image

NEW REPLACEMENT PANEL

PANEL NUMBER P4 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE PER E200 A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPARE						SPARE			
POLE LIGHTS	1914	1914	2	40	11	SPARE			
SPARE						SECURITY LIGHTS			125
TOTALS	3828	3828	3828			TOTALS			125

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 11734 PHASE A 3828 PHASE B 3953 PHASE C 3953
 TOTAL AMPS: 31.9 PHASE A 31.9 PHASE B 31.9 PHASE C 31.9

NEW REPLACEMENT PANEL

PANEL NUMBER P2 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE PER E200 A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPARE						SPARE			
POLE LIGHTS	1914	1914	2	40	11	SPARE			
SPARE						SECURITY LIGHTS			125
TOTALS	3828	3828	3828			TOTALS			125

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 11734 PHASE A 3828 PHASE B 3953 PHASE C 3953
 TOTAL AMPS: 31.9 PHASE A 31.9 PHASE B 31.9 PHASE C 31.9

EXISTING PANEL

PANEL NUMBER P4 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE P3 A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPACE						SPACE			
SE LIGHTS	2000	2000	2	40	9	SPACE			
SPACE						SECURITY LIGHTS			500
SE LIGHTS	2000	2000	2	40	17	SPACE			
SPACE						SECURITY LIGHTS			500
SE LIGHTS	2000	2000	2	40	27	SPACE			
TOTALS	4000	4000	4000			TOTALS			500

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 13000 PHASE A 4000 PHASE B 4500 PHASE C 4500
 TOTAL AMPS: 36.1 PHASE A 33.3 PHASE B 37.5 PHASE C 37.5

EXISTING PANEL

PANEL NUMBER P2 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE P1 A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPACE						SPACE			
SW LIGHTS	2000	2000	2	40	7	SPACE			
SPACE						SECURITY LIGHTS			500
SW LIGHTS	2000	2000	2	40	17	SPACE			
SPACE						SECURITY LIGHTS			500
SW LIGHTS	2000	2000	2	40	27	SPACE			
TOTALS	4000	4000	4000			TOTALS			500

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 13000 PHASE A 4000 PHASE B 4500 PHASE C 4500
 TOTAL AMPS: 36.1 PHASE A 33.3 PHASE B 37.5 PHASE C 37.5

NEW REPLACEMENT PANEL

PANEL NUMBER P3 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE PER E200 A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPARE						SPACE			
POLE LIGHTS	1914	1914	2	40	11	SPACE			
SPARE						SECURITY LIGHTS			125
TOTALS	7656	7656	7656			TOTALS			125

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 23218 PHASE A 7656 PHASE B 7781 PHASE C 7781
 TOTAL AMPS: 63.8 PHASE A 63.8 PHASE B 63.8 PHASE C 63.8

NEW REPLACEMENT PANEL

PANEL NUMBER P1 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE PER E200 A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPARE						SPACE			
POLE LIGHTS	1914	1914	2	40	11	SPACE			
SPARE						SECURITY LIGHTS			125
TOTALS	7656	7656	7656			TOTALS			125

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 23218 PHASE A 7656 PHASE B 7781 PHASE C 7781
 TOTAL AMPS: 63.8 PHASE A 63.8 PHASE B 63.8 PHASE C 63.8

EXISTING PANEL

PANEL NUMBER P3 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE DP A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPACE						SPACE			
NE LIGHTS	2000	2000	2	40	7	SPACE			
SPACE						SECURITY LIGHTS			500
NE LIGHTS	2000	2000	2	40	17	PANEL P4			500
SPACE						PANEL P2			4500
NE LIGHTS	2000	2000	2	40	27	SPACE			
TOTALS	4000	4000	4000			TOTALS			5000

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 26000 PHASE A 8000 PHASE B 9000 PHASE C 9000
 TOTAL AMPS: 72.2 PHASE A 66.7 PHASE B 75 PHASE C 75

EXISTING PANEL

PANEL NUMBER P1 VOLTAGE 120/208 PHASE 3 WIRE 4
 SOURCE DP A.I.C. 10,000
 PANEL LOCATION PER E150 BUS AMPERE RATING 225

CIRCUIT DESCRIPTION	LOAD(VA)			BRKR	PHASE	CIRCUIT DESCRIPTION	LOAD(VA)		
	A	B	C				A	B	C
SPACE						SPACE			
NW LIGHTS	2000	2000	2	40	7	SPACE			
SPACE						SECURITY LIGHTS			500
NW LIGHTS	2000	2000	2	40	17	PANEL P2			4500
SPACE						SPACE			
NW LIGHTS	2000	2000	2	40	27	SPACE			
TOTALS	4000	4000	4000			TOTALS			5000

L.C.L. VOLT AMPS: PHASE A . PHASE B . PHASE C .
 TOTAL VOLT AMPS: 26000 PHASE A 8000 PHASE B 9000 PHASE C 9000
 TOTAL AMPS: 72.2 PHASE A 66.7 PHASE B 75 PHASE C 75

REVISIONS	BY

STAMP

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ELECTRICAL PANEL SCHEDULE

PROJECT: MOORPARK COLLEGE FOOTBALL FIELD LIGHTING PROJECT

DRAWN: L. K.
CHECKED: K. LUCCI
DATE: 10/27/2019
SCALE: AS NOTED
JOB NO: 19759
SHEET:

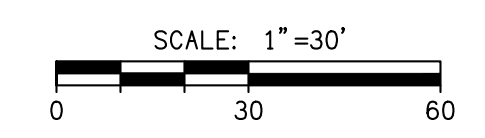
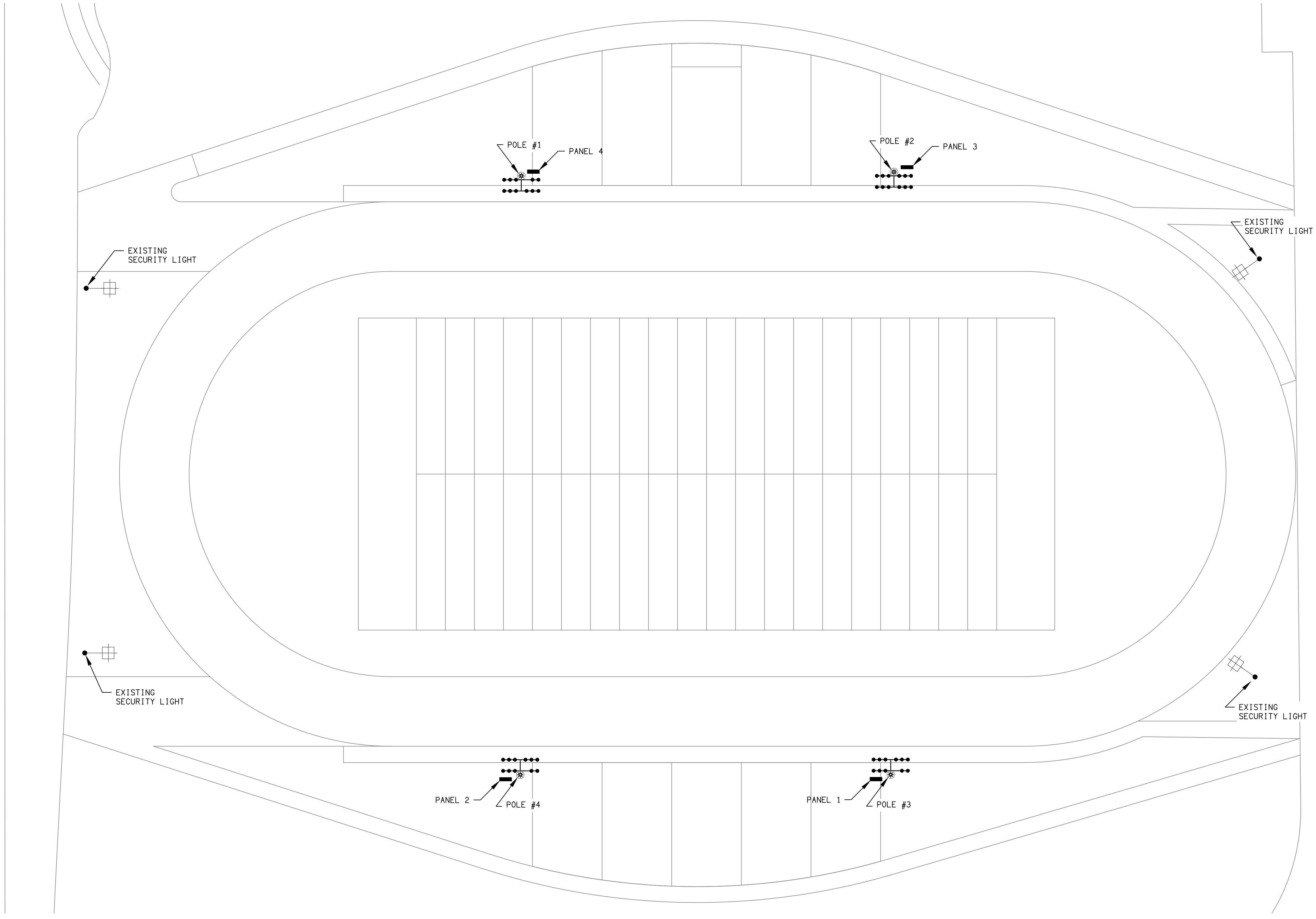
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(N) P3	(N) P1
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E201 OF SHEETS

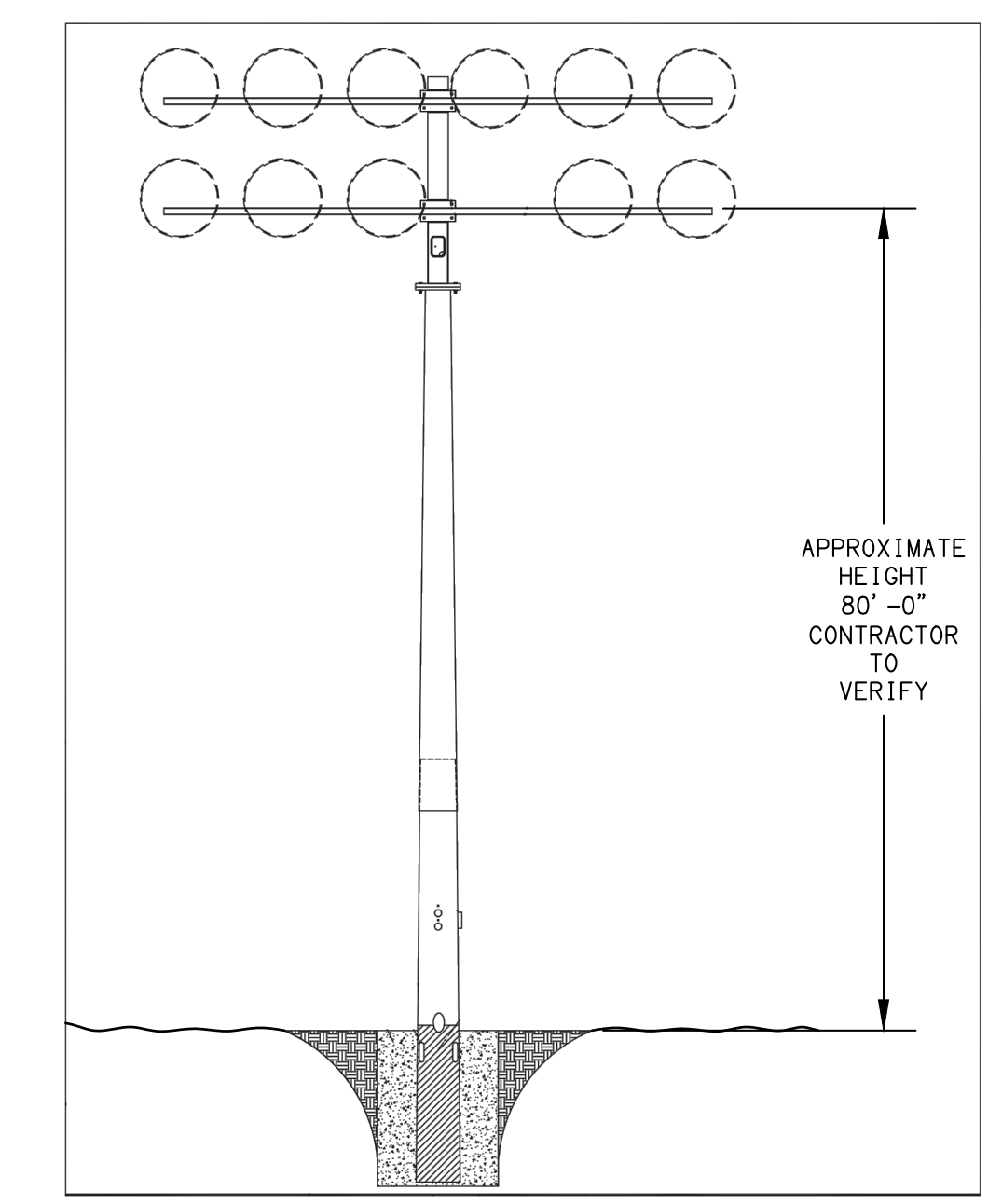
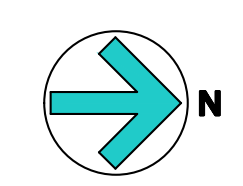
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CAMPUS PARK DRIVE

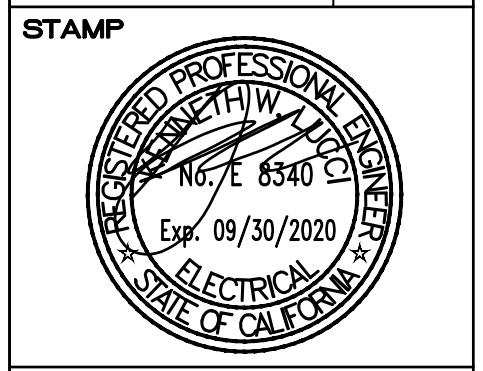


SITE LIGHTING PLAN - EXISTING 1
SCALE: 1"=30'-0" E300



EXISTING TYPICAL POLE & FIXTURES 2
SCALE: NONE POLE 1, 2, 3 & 4 E300

REVISIONS	BY



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SITE LIGHTING PLAN - EXISTING

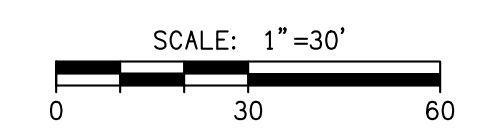
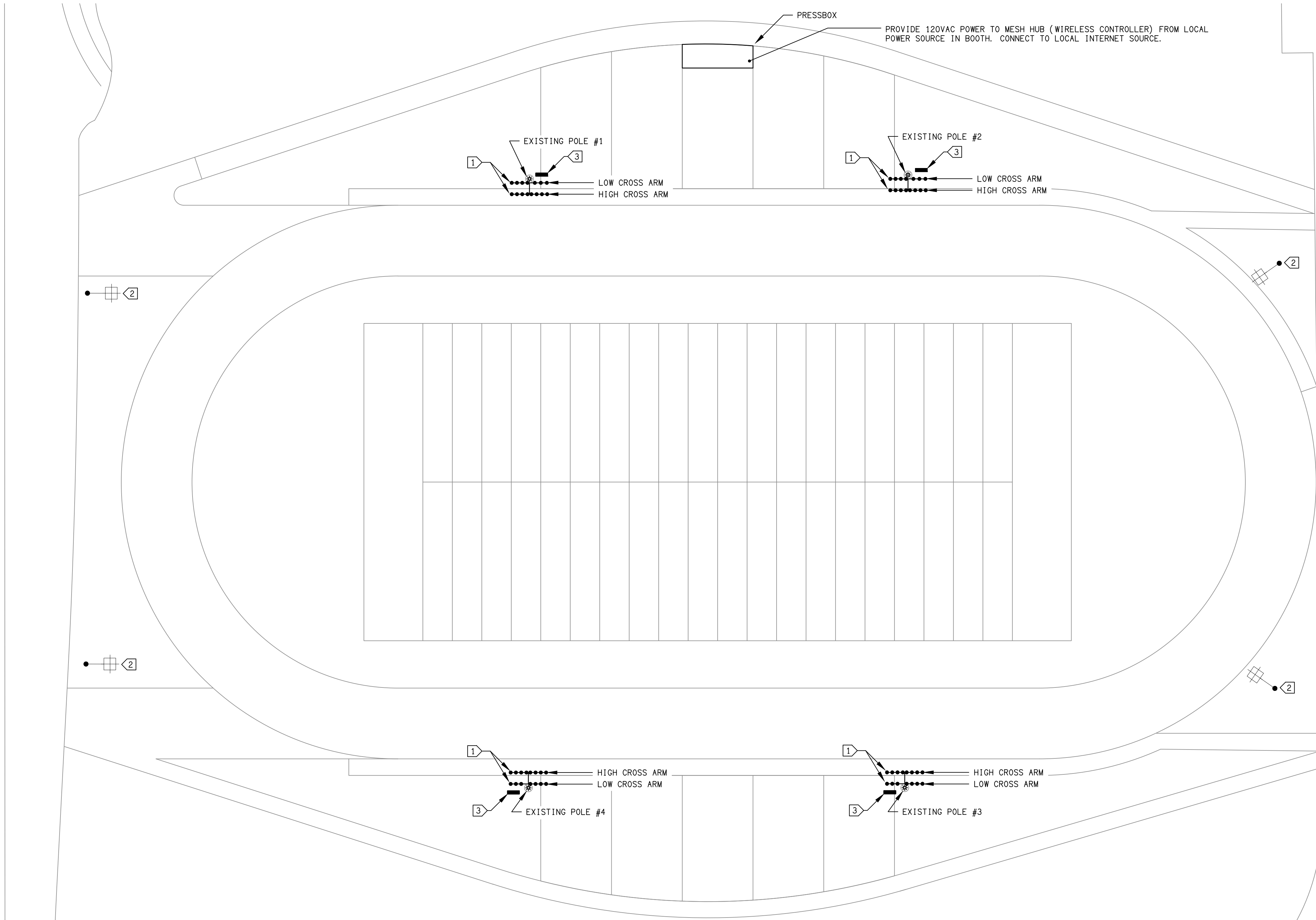
PROJECT:
MOORPARK COLLEGE FOOTBALL FIELD LIGHTING PROJECT

DRAWN: L. K.
 CHECKED: K. LUCCI
 DATE: 10/27/2019
 SCALE: AS NOTED
 JOB NO: 19759
 SHEET:

E300
 OF SHEETS

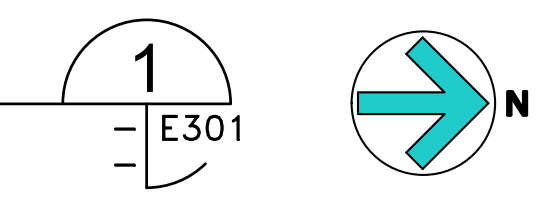
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 SAVE DATE: 10/27/2019 12:44:04 PM
 PATHNAME: G:\19759\EL\Sheets

CAMPUS PARK DRIVE



SITE LIGHTING PLAN - NEW WORK

SCALE: 1"=30'-0"



SHEET NOTES:

- CONTRACTOR TO PROTECT FOOTBALL FIELD & TRACK DURING CONSTRUCTION EFFORT.
- CONTRACTOR TO SCHEDULE ALL WORK TO BE COMPLETED PER MOORPARK COLLEGE'S SCHEDULE & COMPLETE WORK ON PREMIUM TIME IF REQUIRED.

KEY NOTES:

- REMOVE EXISTING MH FIXTURES (ON EXISTING CROSS ARMS) WHICH ARE HEAVIER & LARGER (EPA) THAN THE NEW LIGHTING FIXTURES TO BE INSTALLED AS NOTED ON E310, E302, E304, & E305. REUSE EXISTING CONDUCTORS IN POLES FROM LOCAL PANELS (LOCAL PANELS TO BE REPLACED AS NOTED ON E201) TO PROVIDE POWER TO NEW FIXTURES. PROVIDE STANDARD MANUFACTURER RECOMMENDED LIGHTING BRACKETS PER E305 FOR FIXTURE MOUNTING. CONTRACTOR TO EXTEND CONDUCTORS (PROVIDE COMPRESSION SPLICES & UV SHRINK TUBING) TO FIXTURES AT CROSS ARMS AS REQUIRED TO COMPLETE CIRCUITRY. SINCE EACH FIXTURE IS CONTROLLED WIRELESSLY & ARE MULTI-VOLTAGE FIXTURE DRIVERS, PROVIDE A MAXIMUM OF 5 FIXTURES ON EACH 40A/2 POLE BREAKER & AS BUILT THE INSTALLATION CONDITIONS TO DOCUMENT WHICH FIXTURES ARE ON WHICH BREAKERS. CONTRACTOR MOUNT EACH FIXTURE AT LOCATION NOTED ON THESE PLANS & AIM EACH FIXTURE PER "DIMMING TABLE" PROVIDED ON E303.
- EXISTING TO REMAIN.
- EXISTING PANEL TO BE REPLACED AT SAME LOCATION BUT WITH NEW LOCAL GROUND ROD PER E201/E600.

REVISIONS	BY

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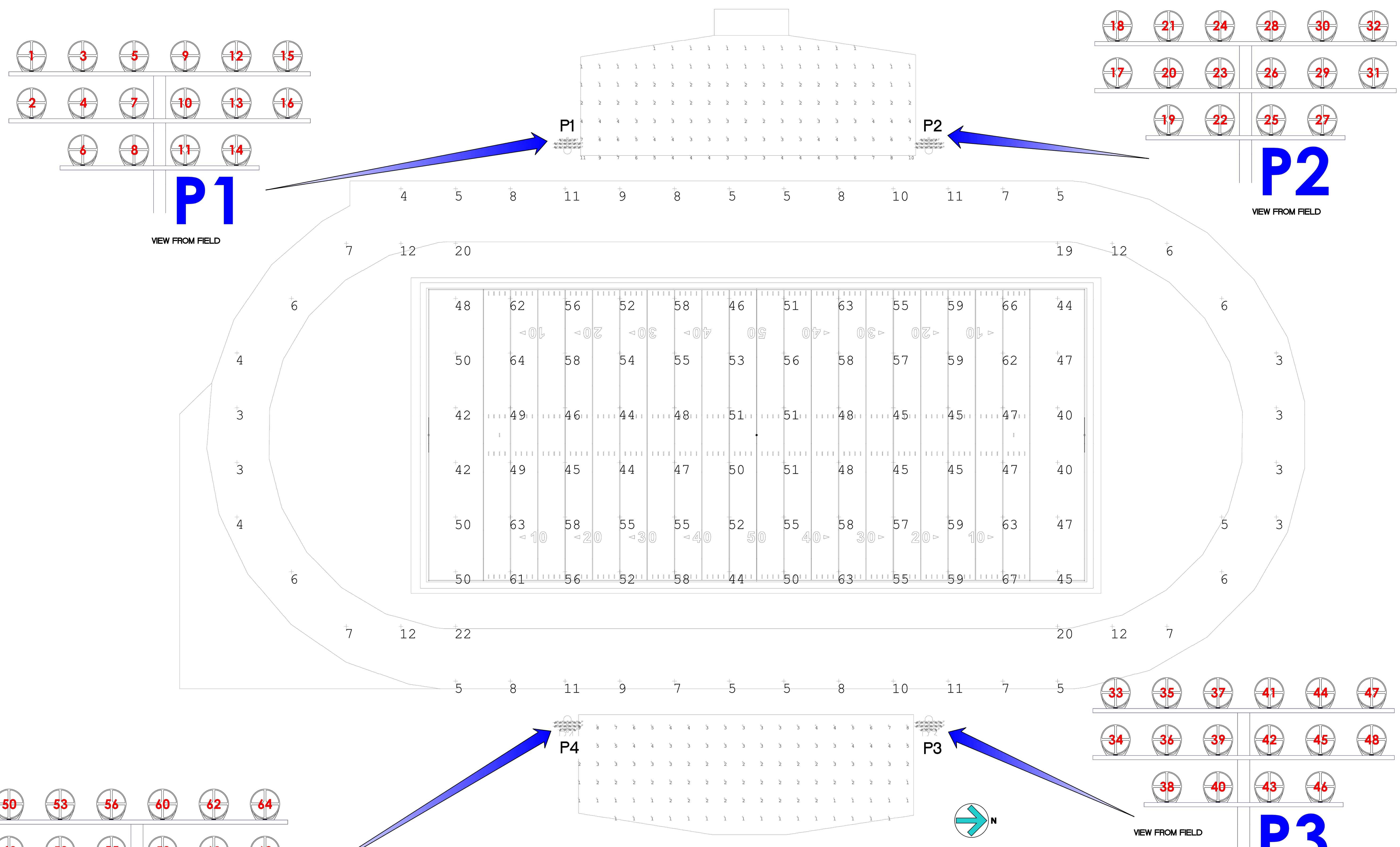
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**SITE LIGHTING PLAN -
 NEW WORK**

PROJECT:
**MOORPARK COLLEGE
 FOOTBALL FIELD
 LIGHTING PROJECT**

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 L. K.
 CHECKED:
 K. LUCCI
 DATE:
 10/27/2019
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 AS NOTED
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 SHEET:

E301
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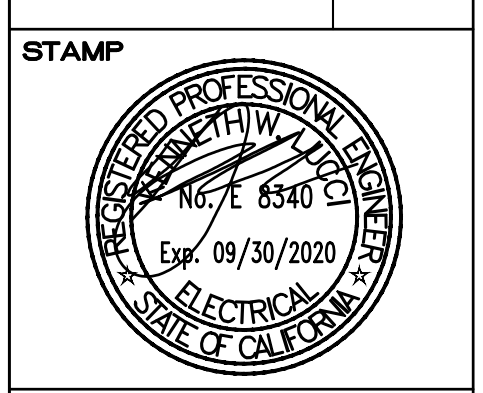
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 DRAFTER: Lee Keener
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 Plot Orientation: Landscape
 Plot Date: 10/27/2019 1:11:02 PM
 Plot By: Lee Keener



Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
01 Field Horizontal - 50 fc	Illuminance	Fc	52.42	67	40	1.31	1.68
02 Track Horizontal - NA fc	Illuminance	Fc	7.96	22	3	2.65	7.33
03 West Stands Calc	Illuminance	Fc	2.81	11	1	2.81	11.00
04 East Stands Calc	Illuminance	Fc	2.63	9	1	2.63	9.00

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SHEET TITLE:
**MOORPARK COLLEGE
 FOOTBALL FIELD
 LIGHTING PROJECT**

PROJECT:
**MOORPARK COLLEGE
 FOOTBALL FIELD
 LIGHTING PROJECT**

DRAWN:
 L. K.
 CHECKED:
 K. LUCCI
 DATE:
 10/27/2019
 SCALE:
 AS NOTED
 JOB NO.
 19759
 SHEET:

E302
 OF SHEETS

Note:

- Actual light levels may vary from those shown here due to multiple factors including: Variation in mounting heights and locations, obstructions or improper aiming or movement of luminaires, line voltage variations or poor luminaire maintenance.

LumNo	Label	Z	Orient	Tilt
1	AF-750-NEMA2-SILIC 60	244	244	65
2	AF-750-NEMA2-SILIC 57	237	237	62
3	AF-750-NEMA2-SILIC 60	252	252	69
4	AF-750-NEMA2-SILIC 57	249	249	70
5	AF-750-NEMA2-SILIC 60	259	259	68
6	AF-750-NEMA2-SILIC 54	215	215	75
7	AF-750-NEMA2-SILIC 57	266	266	69
8	AF-750-3-57	54	262	60
9	AF-750-NEMA2-SILIC 60	273	273	68
10	AF-750-NEMA2-SILIC 57	282	282	70
11	AF-750-3-57	54	287	61
12	AF-750-NEMA2-SILIC 60	289	289	69
13	AF-750-NEMA2-SILIC 57	296	296	71
14	AF-750-NEMA2-SILIC 54	315	315	66
15	AF-750-NEMA2-SILIC 60	301	301	70
16	AF-750-NEMA2-SILIC 57	308	308	67
17	AF-750-NEMA2-SILIC 57	235	235	66
18	AF-750-NEMA2-SILIC 60	241	241	69
19	AF-750-NEMA2-SILIC 54	228	228	64
20	AF-750-NEMA2-SILIC 57	246	246	70
21	AF-750-NEMA2-SILIC 60	254	254	68
22	AF-750-3-57	54	258	60
23	AF-750-NEMA2-SILIC 57	261	261	69
24	AF-750-NEMA2-SILIC 60	270	270	67
25	AF-750-3-57	54	283	60
26	AF-750-NEMA2-SILIC 57	277	277	69
27	AF-750-NEMA2-SILIC 54	326	326	75
28	AF-750-NEMA2-SILIC 60	284	284	68
29	AF-750-NEMA2-SILIC 57	294	294	70
30	AF-750-NEMA2-SILIC 60	291	291	69
31	AF-750-NEMA2-SILIC 57	306	306	63
32	AF-750-NEMA2-SILIC 60	299	299	65
33	AF-750-NEMA2-SILIC 60	60	60	65
34	AF-750-NEMA2-SILIC 57	53	63	63
35	AF-750-NEMA2-SILIC 60	68	69	69
36	AF-750-NEMA2-SILIC 57	65	70	70
37	AF-750-NEMA2-SILIC 60	75	68	68
38	AF-750-NEMA2-SILIC 54	33	75	75
39	AF-750-NEMA2-SILIC 57	82	69	69
40	AF-750-3-57	54	76	60
41	AF-750-NEMA2-SILIC 60	89	67	67
42	AF-750-NEMA2-SILIC 57	98	69	69
43	AF-750-3-57	54	101	60
44	AF-750-NEMA2-SILIC 60	105	68	68
45	AF-750-NEMA2-SILIC 57	113	70	70
46	AF-750-NEMA2-SILIC 54	131	64	64
47	AF-750-NEMA2-SILIC 60	118	69	69
48	AF-750-NEMA2-SILIC 57	124	66	66
49	AF-750-NEMA2-SILIC 57	52	67	67
50	AF-750-NEMA2-SILIC 60	59	70	70
51	AF-750-NEMA2-SILIC 54	45	66	66
52	AF-750-NEMA2-SILIC 57	64	71	71
53	AF-750-NEMA2-SILIC 60	71	69	69
54	AF-750-3-57	54	73	61
55	AF-750-NEMA2-SILIC 57	78	70	70
56	AF-750-NEMA2-SILIC 60	87	68	68
57	AF-750-3-57	54	98	60
58	AF-750-NEMA2-SILIC 57	94	69	69
59	AF-750-NEMA2-SILIC 54	145	75	75
60	AF-750-NEMA2-SILIC 60	101	68	68
61	AF-750-NEMA2-SILIC 57	111	70	70
62	AF-750-NEMA2-SILIC 60	108	69	69
63	AF-750-NEMA2-SILIC 57	123	62	62
64	AF-750-NEMA2-SILIC 60	116	65	65



Luminaire Schedule

Symbol	Qty	Label	LLF	Description	Lum. Lumens
⊙	56	AF-750-NEMA2-SILIC 0.950	0.950	All Field 750, NEMA 2 Silicone Lens, 5700K	90892
⊙	8	AF-750-3-57	0.950	All Field 750, NEMA 3 Lens, 5700K	87408

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SHEET TITLE:
 LIGHTING FIXTURE LAYOUT
 DETAIL

PROJECT:
 MOORPARK COLLEGE
 FOOTBALL FIELD
 LIGHTING PROJECT

DRAWN: L. K.
CHECKED: K. LUCCI
DATE: 10/27/2019
SCALE: AS NOTED
JOB NO: 19759
SHEET: E303
 OF SHEETS

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 Plot Date: 10/27/2019 1:11:38 PM

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Installation Instructions - All Field LED Luminaire

SUPPLY POWER SPECIFICATIONS
 Ephesus LED light fixtures are not traditional incandescent lights, they are high-tech, new generation solid-state devices. To protect your valuable investment, the electrical power shall be clean and have stable voltage and current and undistorted waveforms.

Power Configuration
 The power transformer secondary feeding the electrical distribution system must be a three-phase, four-wire wye configuration. If any other transformer configuration is present, notify Ephesus before proceeding with installation.

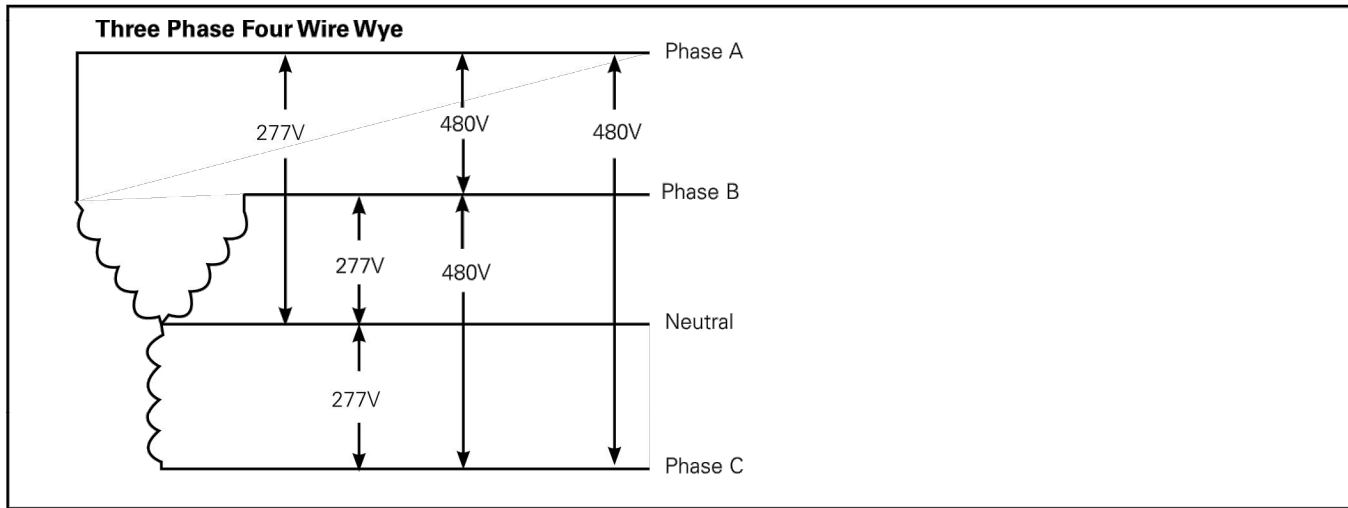


Figure 1. Acceptable Power Configurations

WARNING

Follow proper grounding methods: Electrical system must be grounded. If you are not sure if your power system is grounded, DO NOT install the luminaire. Contact a licensed electrician for information on proper grounding methods as required by the electrical code. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

Circuit Voltage
 Branch power circuits feeding All Field fixtures shall be 277V, 347V, or 480VAC only.

WARNING

Do not attempt to connect All Field fixtures to any circuits with nominal voltage below 277V or above 480VAC. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO LUMINAIRE INTERNAL DAMAGE AND FAILURE.

The voltage on the lighting circuits must stay within 3% of nominal at 60Hz. Voltage that is consistently too high or low shall be corrected before LED luminaires are installed.

Fusing
 If individual branch circuit protection is required, Table 2 shows the minimum fuse ratings for each individually circuited luminaire. Fuses must be Time delay type.

Circuit Voltage (VAC)	Minimum Fuse Rating (amps)
277	4
347	4
480	3

Minimum Fuse Ratings

EATON MN507001EN All Field Installation Manual rev 20170324 3

Installation Instructions - All Field LED Luminaire

Power Quality
 The lighting circuits shall have surge protection. If you require assistance in checking your power system or designing or implementing solutions, contact Eaton's Electrical Engineering Services and Systems. Find more information at www.eaton.com.

INSTALLATION INSTRUCTIONS

Step 1 – Mount The Luminaire
 The first step is to attach the luminaire to the mounting structure. The mounting structure may be a light pole cross arm, an indoor catwalk bracket, or other structural component that will hold the fixture in place. Refer to photometric drawings or project Installation Drawings for luminaire installation locations and any additional mounting instructions.

WARNING

It is the responsibility of the installer to verify that all proposed mounting structures including poles, cross arms, catwalk brackets, and other mounting structures are certified to support the weight of the luminaires, withstand wind loads, and meet all other applicable codes and regulations. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

WARNING

Do not suspend any luminaire by electrical or control wires, as these will not support the weight of the fixture, resulting in the potential for the fixture to fall and cause damage or injury. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

Equipment Required:

- Mounting Hardware
- Socket wrenches and/or crescent wrenches sized to fit mounting hardware
- Cable ties or wire management – For outdoor installations use UV rated

Hardware Required	Size	Quantity per luminaire
Hex bolt	5/8" - 3/4" (16mm-19mm)	1
Flat washers	5/8" - 3/4" (16mm-19mm) ID	2
Hex Locknut	5/8" - 3/4" (16mm-19mm)	1

Mounting Hardware Required


Mounting hardware shall be stainless steel or other high-strength, corrosion-resistant material. Length of Hex bolt shall be determined in the field; size the bolt appropriately to allow secure fastening of the luminaire to the mounting structure.

WARNING

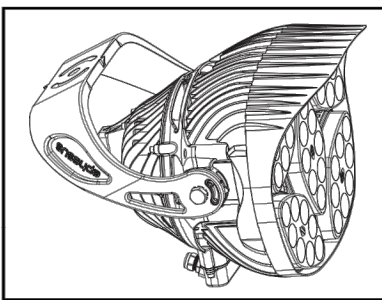
An impact driver may be used on mounting hardware while the power is off, but NEVER use any power tools on the fixture while the power is on. The vibration caused by power tools may damage the fixture. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO LUMINAIRE INTERNAL DAMAGE AND FAILURE.

There are two different ways to mount the All Field fixture – Standard and Inverted. Standard mounting is when the luminaire sits on top of the mounting structure, and Inverted is when the luminaire hangs from underneath the structure.

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MN507001EN 

Installation Instructions - All Field LED Luminaire



This manual applies to the following models:
 All Field 750/550
 Arena 750/650/550

SAFETY INSTRUCTIONS

Read and understand this entire manual before attempting to assemble, operate, or install the LED Luminaire. If you have any questions regarding the product, please call Ephesus Customer Service at (800) 573-3600.

- All electrical work must conform to the National Electric Code (NEC) and all applicable local codes and ordinances.
- Only qualified personnel shall install and maintain the luminaires. Ephesus recommends that a licensed electrician install and maintain the luminaire. Verify the safety of existing power distribution system before beginning installation. Failure to follow Operating Instructions may lead to death, Severe Injury, or Property Damage.

WARNING

Turn off power before performing any electrical or control work. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

DO NOT make or alter any open holes in the luminaire. Do not modify the luminaire.

WARNING

Follow all applicable safety procedures and use Personal Protective Equipment such as hardhats, safety glasses, reflective vests, electrical safety gloves, fall protection equipment and safety toe boots during the installation, operation, and maintenance of the luminaire. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

WARNING

Risk of eye injury! Eye protection is required at all times during the installation, operation, and maintenance of the luminaire. The high intensity light produced by the luminaire can cause severe damage to the eye if viewed directly at close range. Avoid being in front of a luminaire that is on or wear suitable light blocking protective eyewear such as welding goggles. The luminaire should be positioned so that prolonged staring into the luminaire at a distance closer than 10m is not expected.

Store luminaires in a clean, dry place, protected from dirt, water, and sunlight. See table for required storage and operating conditions:

Storage Temperature	Operating Temperature	Humidity
-40°C to +75°C (-40°F to 167°F)	-40°C to +55°C (-40°F to 131°F)	5% to 95% non-condensing

Storage and Operating Conditions

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Installation Instructions - All Field LED Luminaire

TABLE OF CONTENTS

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- Step 3 – Make Electrical Connections7
- Step 4 – Aim the Luminaires9
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- Care and Maintenance14
- Troubleshooting14
- Appendix14


Required Materials & Tools

Required Material	For more information refer to Section:
Mounting Hardware	Step 1 - Mount the Luminaires
Power cable	Step 3 - Make Electrical Connections
Electrical splicing connectors	Step 3 - Make Electrical Connections
Cable ties or wire management	Step 4 - Aim the Luminaires

Required Tools	For more information refer to Section:
Socket wrenches and/or crescent wrenches sized to fit mounting hardware	Step 1 - Mount the Luminaires
3/16" Hex driver (or metric equivalent)	Step 3 - Make Electrical Connections
Torque wrench(es) rated from 35 to 75 in-lbs (4 to 8 N-m) and 25 to 45 ft-lbs (34 to 61 N-m)	Step 4 - Aim the Luminaires
Calibrated light meter	Step 4 - Aim the Luminaires

Note: Charge the provided laser battery before installation begins.

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DESCRIPTION

The All Field series is the ideal solution for professional caliber outdoor sports lighting with features designed with municipal, high school, collegiate and semi-professional outdoor sports venues in mind. Offering versatility for any outdoor sport including football, soccer, baseball, lacrosse and field hockey, the All Field luminaire delivers maintenance-free, professional sports lighting with a great return on investment.

Catalog #	Type
Project	Date
Comments	
Prepared by	

SPECIFICATION FEATURES

Construction
 Solid-state design means no moving parts and nothing to wear out or replace, providing maintenance-free operation for hundreds of thousands of hours.


Feedback
 Telemetry to monitor health and status of each light is enabled through AirMesh control system capabilities.

Electrical
 Ultra-low EMI noise generation eliminates interference with surrounding electrical systems.

Finish
 Rugged, weather-tight design ensures durability even in harsh environments.

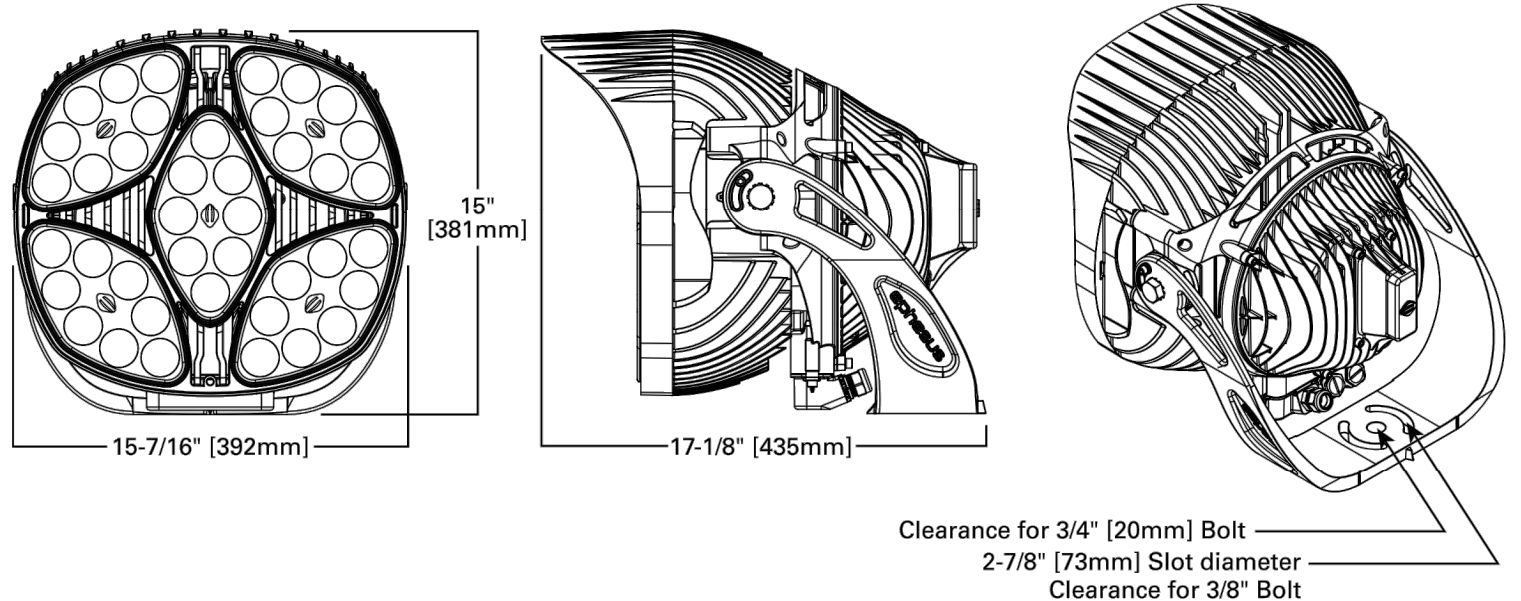
Optics
 Custom-engineered optics direct light precisely where needed while minimizing glare.

Customization
 Multiple control options available for operational flexibility and fan experience effects.



ALL FIELD SERIES
 SPORTS LIGHTING

DIMENSIONS



Clearance for 3/4" [20mm] Bolt
 2-7/8" [73mm] Slot diameter
 Clearance for 3/8" Bolt

ORDERING INFORMATION

Sample Number: AF-550-2-VL-57-BLK-AM

Series 1,2	Model	Optics	Voltage	CCT	Fixture Color	Controls
AF=All Field	400=400 550=550 750=750	2S=NEMA2 Silicone 2=NEMA2 3=NEMA3 4=NEMA4 5=NEMA5	VH=High Voltage (277-480VAC) VL=Low Voltage (120-240VAC)	40=4000K 57=5700K	WHT=White BLK=Black	AM=All Field AirMesh LB10=All Field LandBurst 0-10V 3 LB=All Field LandBurst DMX NC=No Controls - ON/OFF 4

ENERGY AND PERFORMANCE DATA

	All Field 400	All Field 550	All Field 750
Lumen Output	>48,000	>64,000	>85,000
System Wattage	400	550	750
Input Voltage (High Voltage)	277-480VAC	277-480VAC	277-480VAC
Input Voltage (Low Voltage)	120-240VAC	120-240VAC	120-240VAC
CRI (Color Rendering Index)	>70	>70	>70
L70 Hours	>160,000 at 25°C	>160,000 at 25°C	>160,000 at 25°C
Operating Temperature Range	-40°C to 55°C	-40°C to 55°C	-40°C to 50°C
Surge (Common Mode / Differential Mode)	6kV	6kV	6kV
IP Rating	IP66	IP66	IP66
NEMA Rating	NEMA 4X	NEMA 4X	NEMA 4X
Effective Projected Area (EPA)	1.4 (sq. ft.)	1.4 (sq. ft.)	1.4 (sq. ft.)
Approximate Weight 4	45 lbs. (20.45 kgs.)	45 lbs. (20.45 kgs.)	45 lbs. (20.45 kgs.)

NOTES:

- DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products under Family Models for details.
- The specifications listed were obtained under optimal testing conditions. Changes in options, features and conditions may result in slightly different performance specifications among fixtures.
- To provide full range dimming capability across a wide array of 0-10V dimming systems, the LandBurst 0-10V controls provide 1%-100% dimming across a control voltage input range of 1V to 7.5V. Full dimming curve is available upon request. Eaton cannot guarantee compatibility with all dimming control systems from all manufacturers. To ensure compatibility, please consult our control compatibility reference guide or contact Eaton for further assistance.
- If the "no controls" option is selected, note that it is not possible to install a control system at a later time.
- Weight may vary depending on mounting bracket selection.
- The All Field is equipped with rapid switching protection that requires a time delay between ON/OFF switching. In the event of a power disruption, the power must remain off for a period of 6 seconds (at 480VAC) and 12 seconds (at 120VAC) to ensure proper fixture operation.

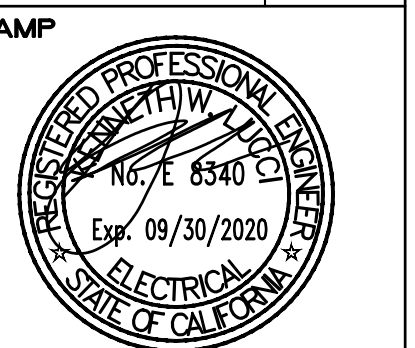
DRAWN: L. K.
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 DATE: 10/27/2019
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 JOB NO. 19759
 SHEET:

E304

OF: SHEETS

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SHEET TITLE:
 LIGHTING FIXTURE CUT SHEETS AND INSTALLATION GUIDE

PROJECT:
 MOORPARK COLLEGE FOOTBALL FIELD LIGHTING PROJECT

DRAWN: L. K.
 CHECKED: K. LUCCI
 DATE: 10/27/2019
 SCALE: AS NOTED
 JOB NO. 19759
 SHEET:

E304

OF: SHEETS

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 SHEETS: 19759E305.dwg
 DATE: OCT 26, 2019
 TIME: 2:23 PM

Installation Instructions - All Field LED Luminaire

WARNING

Do not damage or cut the wire insulation (covering) during installation. Do not permit wires to contact any surface having a sharp edge, as this may damage the wire insulation and create the risk of electrical shock. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

Control Wiring

WARNING

Always turn power to fixture OFF before performing any work on control wiring. Turn transmitters off before working on main control lines. Performing any work on control connections while fixtures are receiving the signal may result in transient or fluttering control signals which can cause damage to the luminaire. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO LUMINAIRE INTERNAL DAMAGE AND FAILURE.

Control Standards

All control work shall conform to ANSI E1.11-2009 (2013), USITT DMX512-A, Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories. At a minimum DMX cable shall be 1-pair (24AWG, 7x32 Stranding) Twisted (minimum of 4.8 twists/foot), Shielded, minimum of 100 ohms impedance, and <25pF/ft. Capacitance.

WARNING

Use caution when connecting any 24AWG wires as they are more susceptible to breaking.

- If using wireless controls, cap off each control wire in the luminaire junction box individually with splicing connector or wire nut.
- If using wired controls, route the incoming control line into the left side of the fixture junction box by removing the plug and providing and installing a 1/2" (or metric equivalent) cord grip appropriately sized to hold the control wires securely.
- Connect the incoming control wires to the fixture control wires. If connecting multiple fixtures in daisy-chain configuration, connect the incoming wires to both the fixture wires and the outgoing wires.
- Ensure all power and control wires are securely terminated and there are no exposed conductors. Carefully push power and control wires down into their respective halves of the junction box to ensure no wires get pinched by the cover.
- Reinstall fixture junction box cover and torque screws to 35-75 in-lbs (4-8 N-m).

Fixture control wire color	Designation
Purple	Data +
Grey	Data -
Yellow	Shield

Control Wiring Connections

Step 4 - Aim The Luminaires

Aiming the luminaires is a critical part of the LED lighting solution to ensure that light is evenly distributed on the playing surface. There are two basic methods to properly aim a sports venue - Precision Laser Aiming by Coordinates, and Orient-Tilt.

Precision Laser Aiming by Coordinates

Laser aiming is the most effective and preferred technique for aiming Ephesus LED sports lighting. This method uses a laser mounted to the luminaire to point the fixture at a predetermined point on the playing surface using (X,Y) coordinates.

Unless otherwise noted, aiming coordinates on Ephesus photometrics or project Installation drawings are based on the origin (0,0) placed at center field, court, or ice. All dimensions from that point are in feet along the playing surface unless otherwise noted.

Installation Instructions - All Field LED Luminaire

Step 2 - Label the Luminaires (If Required)

For outdoor applications where smaller groups of luminaires are installed on poles, it is not necessary to label the fixtures. If you are installing fixtures on poles or other applications where labeling is not required, skip this step and proceed to step 3.

For indoor applications where many luminaires are installed in a row along a catwalk, the fixtures are typically labeled to facilitate identifying each one at a glance from the catwalk.

- Label each fixture with Luminaire Number as indicated on schedules in the project Installation drawings.
- Labels shall be white background with black lettering. Text shall be at least 1/4" (6mm) tall.
- Affix the label to the mounting bracket in a prominent location, avoiding manufacturer labels.



Figure 5. Luminaire Label

Step 3 - Make Electrical Connections

WARNING

Never connect the luminaire to an electrical system that is not grounded. Installing a luminaire in an ungrounded electrical system could allow the metal housing to become energized in the event of an electrical short, resulting in the risk of electrical shock for anyone who comes into contact with the fixture. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

Installation Instructions - All Field LED Luminaire

Standard Mounting

This is the most common mounting. The luminaire sits on top of mounting structure.

- Refer to the project Installation Drawings to determine luminaire installation locations and lens type.
- For each fixture location, install a luminaire that has the correct lens type. Unless otherwise noted, fixtures that share the same lens type are identical.
- Set luminaire in place and install bolt, flat washers, and nut to securely fasten the fixture mounting bracket to the mounting structure. Tighten hardware hand tight so that fixture is secure but do not fully torque hardware until aiming is complete.
- Remove the clear protective film from the front of the lenses, if present.

Note: Example mounting structure shown for illustration purposes only.

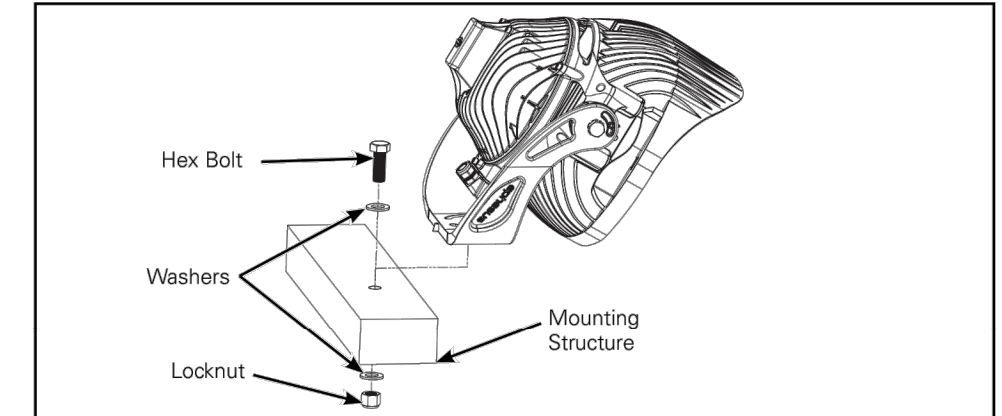


Figure 2. Standard Mounting

Inverted Mounting

The luminaire hangs from underneath mounting structure.

WARNING

When using inverted mounting, flip the mounting bracket so that the luminaire stays upright. NEVER install the luminaire upside down. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO LUMINAIRE INTERNAL DAMAGE AND FAILURE.

- To install the luminaire underneath a mounting structure, the fixture mounting bracket must first be inverted.
 - Remove Hex bolt and set screw on each side of the fixture.
 - Remove Fixture Mounting bracket and flip it so that the bracket faces up.
 - Reinstall hex bolts and set screws on each side of the fixture.
- Refer to the project Installation Drawings to determine luminaire installation locations.
- For each fixture location, install a luminaire that has the correct lens type. Unless otherwise noted, fixtures that share the same lens type are identical.
- Hold luminaire in place and install bolt, flat washers, and nut to securely fasten the fixture mounting bracket to the mounting structure. Tighten hardware hand tight so that fixture is secure but do not fully torque hardware until aiming is complete.
- Remove the clear protective film from the front of the lenses, if present.

Installation Instructions - All Field LED Luminaire

Equipment Required:

- 3/16" Allen driver (or metric equivalent)
- Power cable
- Electrical splicing connectors. For all outdoor installations, silicone filled water resistant connectors are highly recommended.

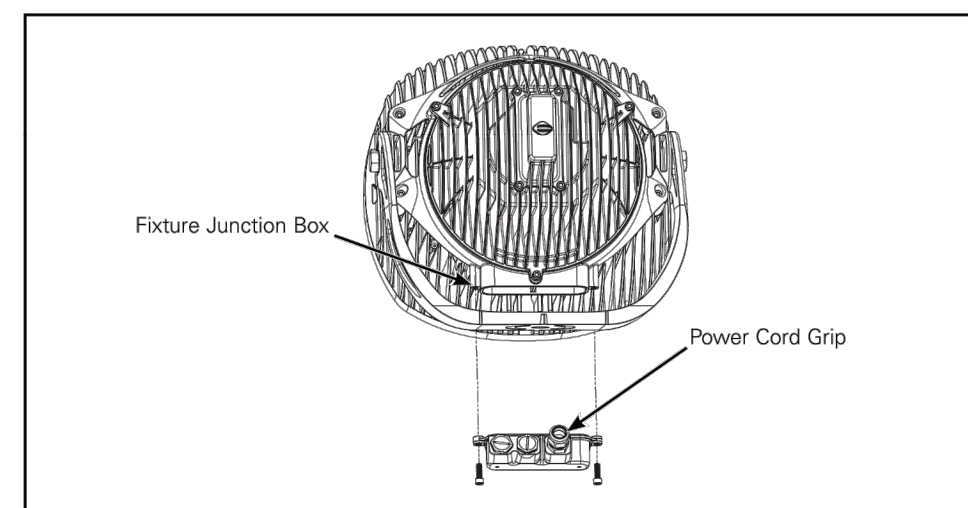


Figure 6. Electrical Connections

Power wiring

Incoming power cable shall be SOOW style 3C cable with a minimum of 14AWG annealed stranded bare copper per ASTM B-174 with a minimum temperature range of -40°C to +90°C. Cable must be water resistant, UV rated/sunlight resistant, UL listed and CSA certified for indoor and outdoor use. International applications shall be harmonized (HAR) or IEC equivalent.

- Remove cover from junction box at the base of the luminaire.
- Route incoming power cable through the cord grip in the junction box cover.
- Strip outer jacket of incoming power cable back 3" (7cm). Connect the incoming power wires to the fixture power wires on right side of junction box.

Fixture power wire color	Designation
Black	Line
White	Line or Neutral
Green	Ground

Power wiring connections

WARNING

NEVER connect the fixture's green insulation (GROUND) wire to the black (LINE) current-carrying or white (NEUTRAL) supply wire, as this could energize the metal housing and create the risk of electrical shock. FAILURE TO FOLLOW THIS WARNING MAY LEAD TO DEATH, SEVERE INJURY, OR PROPERTY DAMAGE.

Installation Instructions - All Field LED Luminaire

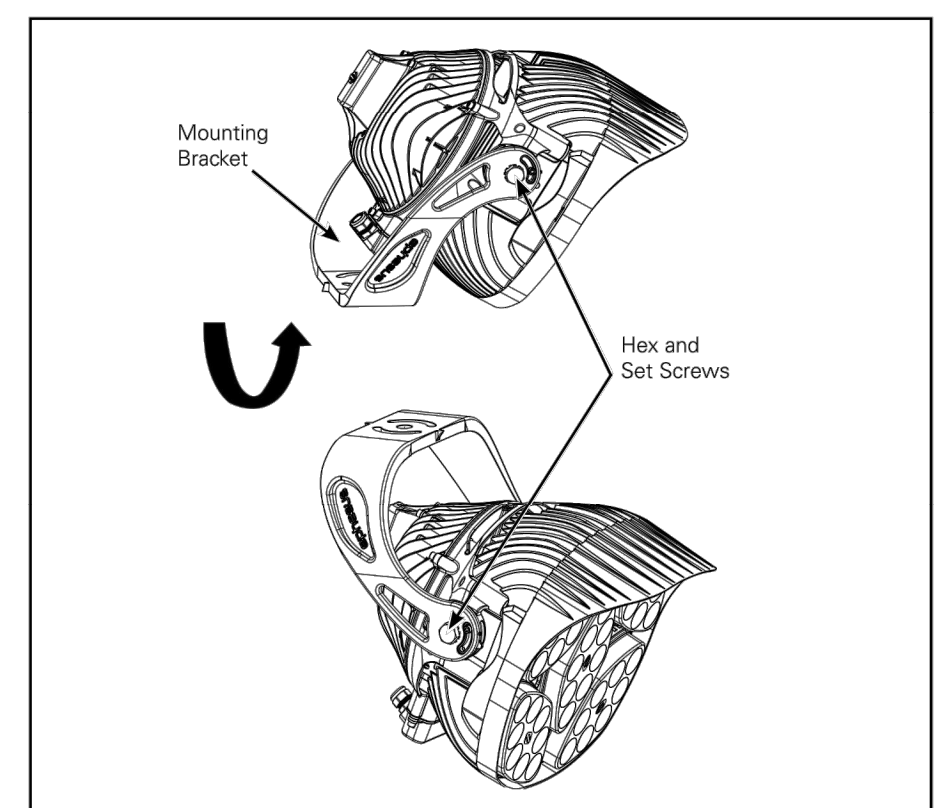


Figure 3. Inverting the Mounting Bracket

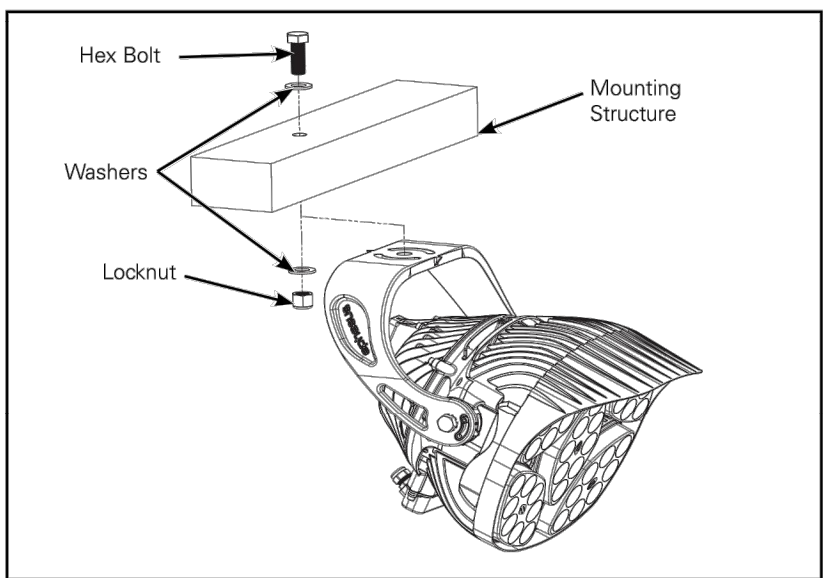


Figure 4. Inverted Mounting

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SHEET TITLE:
INSTALLATION GUIDE

PROJECT:
**MOORPARK COLLEGE
 FOOTBALL FIELD
 LIGHTING PROJECT**

DRAWN:
L. K.
 CHECKED:
K. LUCCI
 DATE:
10/27/2019
 SCALE:
AS NOTED
 JOB NO.
19759
 SHEET:

E305
 OF SHEETS

DRAWING FILENAME: 19759E306
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 DRAFTING: G:\19\759\EL\Sheets\19759E306.dwg
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 DRAFTER: Lee Keener
 DRAFTING: G:\19\759\EL\Sheets\19759E306.dwg
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 PLOT BY: Lee Keener
 TIME: 1:12 PM
 PLOT DATE: 10/27/2019 1:12:26 PM

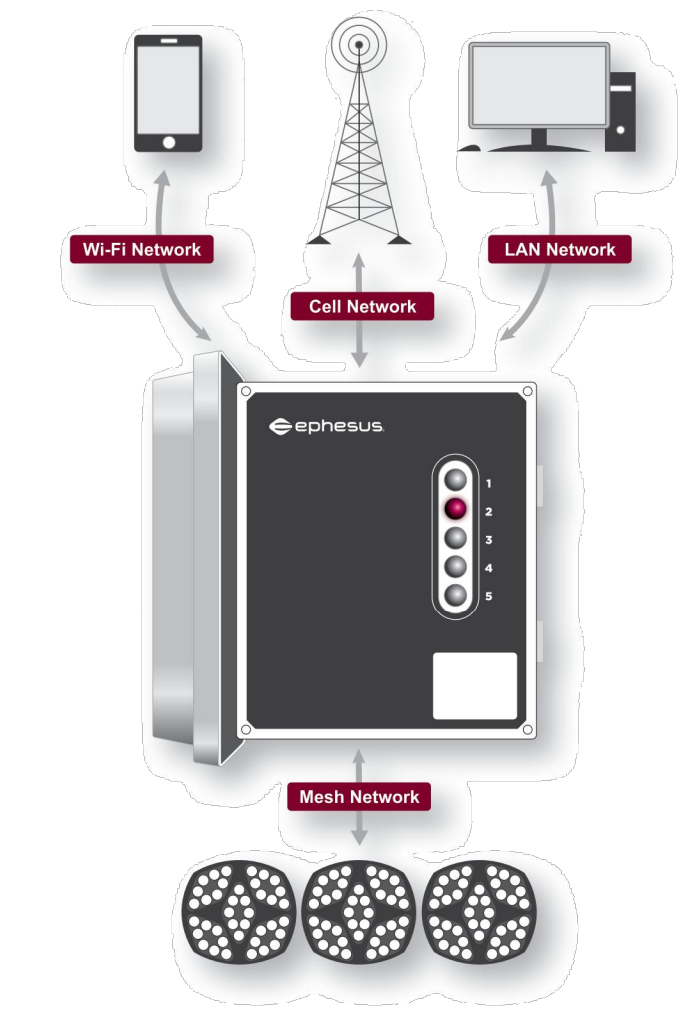


Ephesus AirMesh Hub

Control and monitor Ephesus LED lights via a secure network, an ideal solution for facilities that may not have access to the outside world via an internet connection.



The AirMesh Hub is a key component of the entire LED lighting system. It can switch lights off or on, or dim them to a specified level. Zones can be established so that lights in a particular area can be controlled separately from others. The system stores power data, behaviors, alarms and critical events locally for maintenance and troubleshooting.



Features & Benefits

- The Hub can be installed anywhere you need wireless, push-button control, such as in fieldhouses, controlrooms or on poles
- Five-button, pre-programmed switch provides easy control of all lights at specified dimming levels (0%, 25%, 50%, 75%, 100%)
- Hub can communicate via LAN connection, wi-fi, or through a cellular network*
- Weather-protected for outdoor venues
- Includes internal surge protection
- Enables optional dynamic scenes

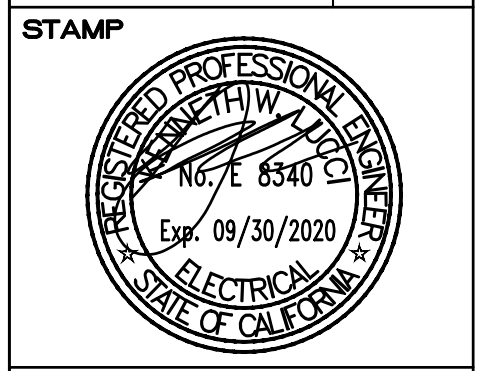
POWER	OPERATING PARAMETERS	RADIO	PHYSICAL	CERTIFICATIONS	ENCLOSURE
90-150VAC 8W max, 6kV surge protection	-20°C to 55°C IP65	2.4GHz 82.15.4 Wi-Fi 2.4 GHz 802.11 b/g/n	25lbs. 13.5"L X 15.5" W 7.7"H	FCC/IC	NEMA 4X, molded fiberglass, with internal gasket and stainless steel latches, with ability to lock

AirMesh Function	Description
Maximum number of lights controlled by hub	Up to 1000
Maximum distance of fixture from location of hub	500 feet
Maximum allowable distance from one fixture to next	500 feet
Maximum number of programmable pre-set scenes	25 (5 per button)
Individual light control	Yes, preprogrammed via 5-button hub. Additional scenes and light control obtained via Wi-Fi connection with hub
Health monitoring	Real-time monitoring of lighting status at the fixture and system level, outage notifications, storage of power consumption, temperature and other system parameters which can be retrieved for later analysis*
Remote Connectivity	Web interface can be accessed by direct Wi-Fi connection or through internet via Ethernet or built-in cellular*
Alerts	Email alerts available when connected to internet via Ethernet or built-in cellular*
Users	User and administrative accounts with multiple permission levels available
Sensors	Voltage-sourcing sensors can be added to the system to turn lights on/off with daylight or occupancy sensors. Multiple output levels in response to light sensors (daylight harvesting)
Map View	Ability to view light state (on/off/alarm) in graphical map/satellite view
Scheduling	Ability to schedule recurring events at fixed times or based on astronomical clock
Compatibility	Ability to add control modules to existing lighting fixtures to add Air-Mesh functionality to entire facility

315-579-2873 | ephesuslighting.com

Due to our continuous improvement efforts, specifications are subject to change without notice. *Cellular and/or data charges may apply

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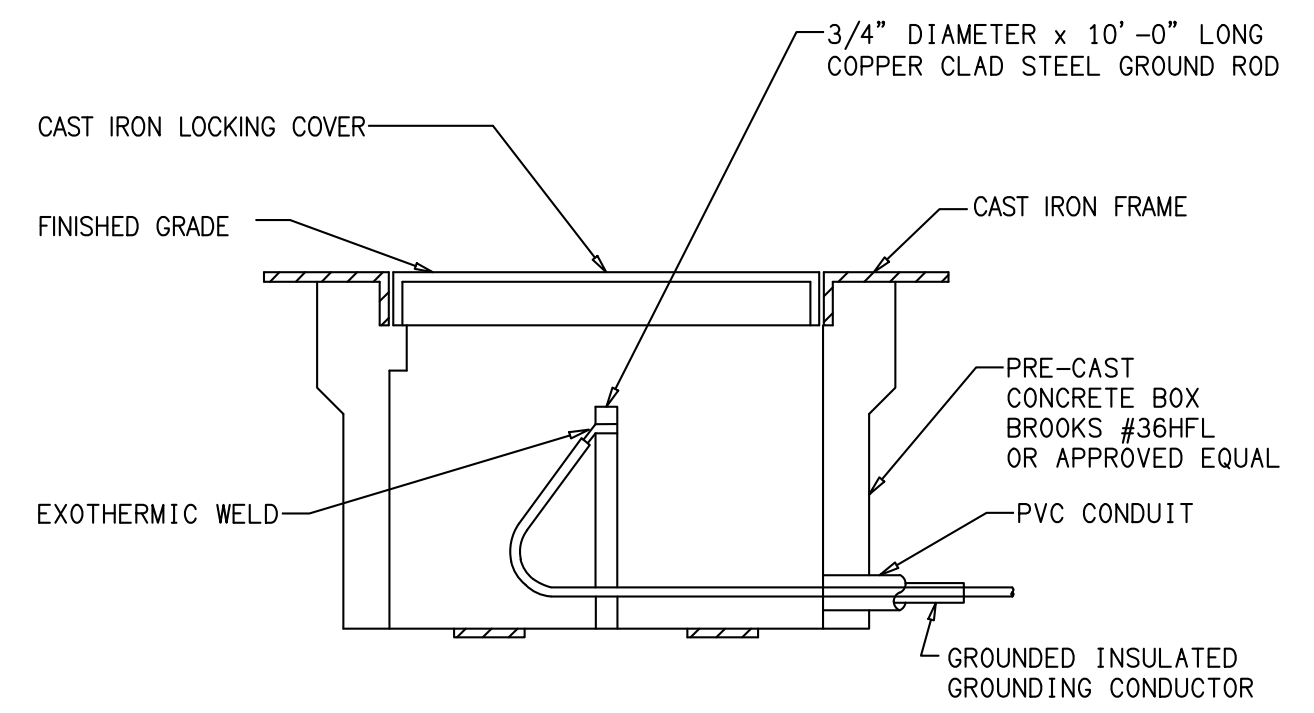
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AIRMESH HUB DETAIL - CUT SHEETS

PROJECT:
MOORPARK COLLEGE FOOTBALL FIELD LIGHTING PROJECT

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 L. K.
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 K. LUCCI
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10/27/2019
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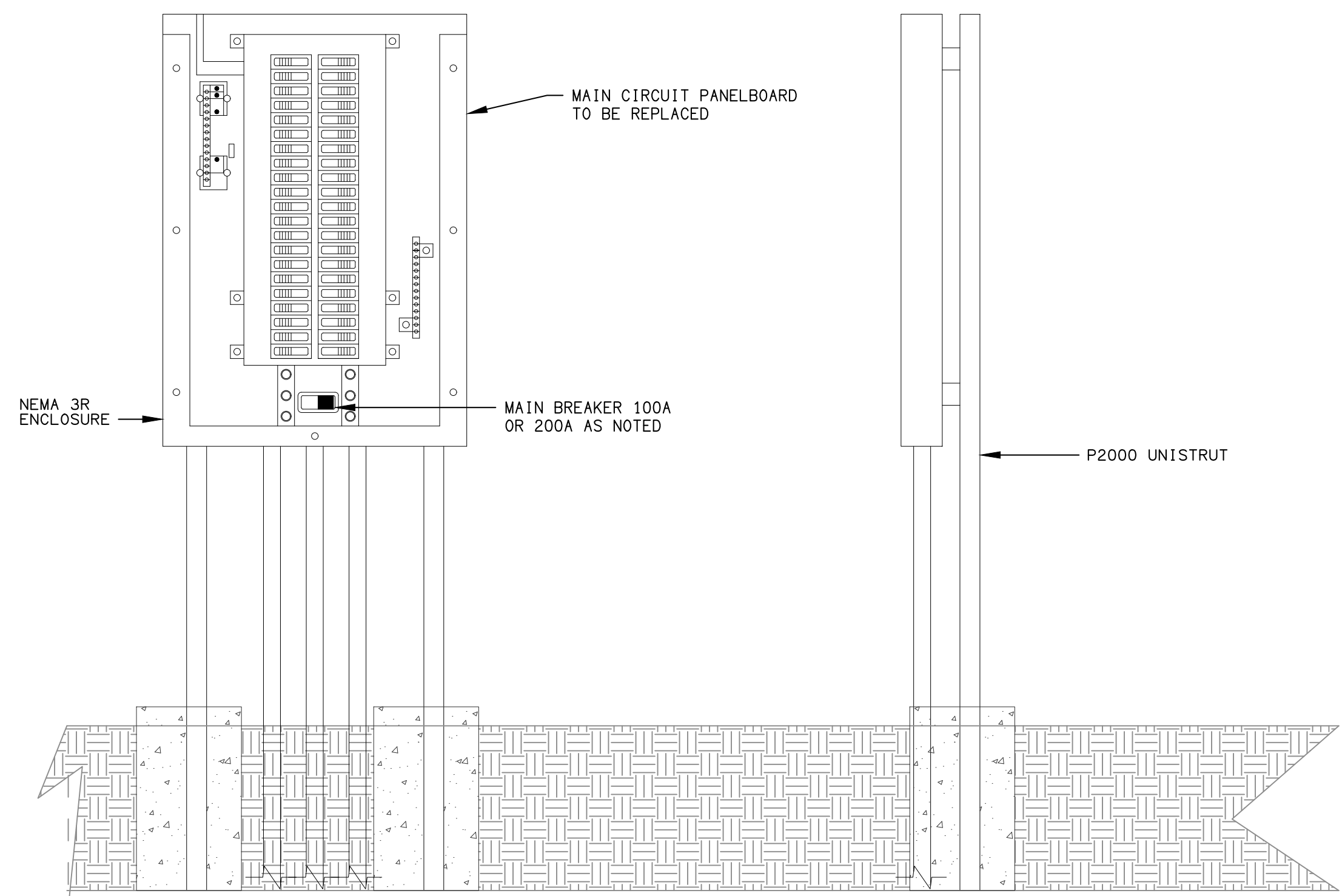
E306
 OF: SHEETS

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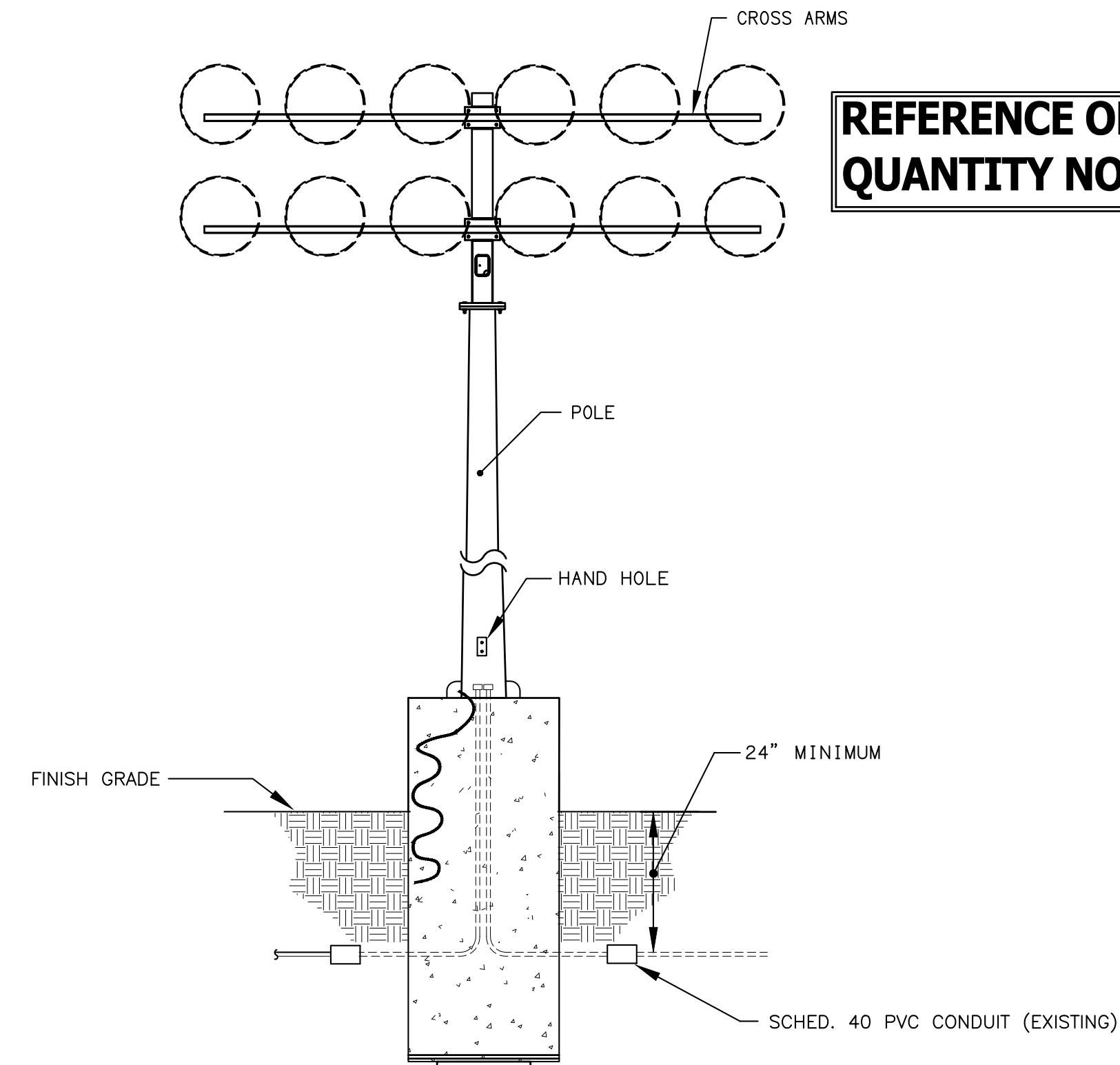
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 SCALE: NONE

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 E600



PANEL MOUNTING DETAIL
 SCALE: NONE

2
 E600



TYPICAL POLE LIGHT DETAIL
 SCALE: NONE

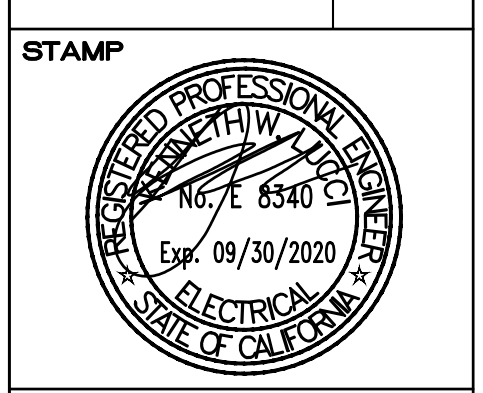
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**REFERENCE ONLY
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 SCALE: NONE

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 E600

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SHEET TITLE:

**ELECTRICAL
 DETAILS**

PROJECT:
**MOORPARK COLLEGE
 FOOTBALL FIELD
 LIGHTING PROJECT**

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 10/27/2019
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E600

OF SHEETS