

PEABODY GRANDSTAND REPLACEMENT
AND STADIUM RENOVATION
Santa Barbara High School
700 E. Anapamu Street
Santa Barbara, CA 93103

Issued By:
KRUGER BENSEN ZIEMER ARCHITECTS, INC.
30 West Arrellaga Street
Santa Barbara, CA 93101

To all bidders submitting proposal(s) for the captioned project: this Addendum is hereby made part of the Contract Documents to the same extent as though it was originally included therein and takes precedence over the original documents and any previous addenda.

Signatures

DSA STAMP & SIGNATURE

IDENTIFICATION STAMP DIVISION OF THE STATE ARCHITECT FILE NUMBER: 42-H3		
APPL 03-116210		
AC _____	FLS _____	SS _____
DATE _____		

OPSC/DSA TRACKING NUMBER: 76786-18



Acknowledge receipt of the Addendum on Form of Proposal

A. PROJECT MANUAL

ITEM NO. A1: SECTION 011000 - SUMMARY

1. Revised PART 1, Section 1.2, A, to include Exterior Athletic Lighting as work covered by Contract Documents
2. Revised PART 1, Section 1.2 B, to include New Landscape and Irrigation as work under related, separate contracts by owner.

ITEM NO. A2: SECTION 084113 - ALUMINUM FRAMED STOREFRONTS

1. Revised PART 2, Section 2.1, A, to reference Kawneer Trifab 451, or comparable product

2. Revised PART 2 Section 2.1, B, to reference Kawneer Encore, or comparable product
3. Revised PART 2, Section 2.3, A, to reference Type-B Fabrication
4. Revised PART 2, Section 2.6, A, to reference Baked-Enamel or Powder Coat Finish

ITEM NO. A3: SECTION 265619 – LED EXTERIOR LIGHTING

1. Revised PART 1, Section 1.2, B, to include reference to Section 265668 Exterior Athletic Lighting.
2. Revised PART 1, Section 1.4, to remove reference to submittal requirements for LEED

ITEM NO. A4: SECTION 265668 – EXTERIOR ATHLETIC LIGHTING

1. Revised PART 1, Section 1.2, B, to remove reference to Section 265621 HID Exterior Lighting
2. Revised PART 2, Section 2.2. A, to reference 265619 LED Exterior Lighting
3. Revised PART 2, Section 2.2. A, Items 6 and 7 to reference LED Lamps

B. DRAWINGS

ITEM NO. B1: SHEET A-805

1. Details 14/A-805 and 15/A-805, replace 2" mullion width with 1 ¾" mullion width
2. Details 9/A-805, 10/A-805, 16/A-805, 17/A-805 and 18/A-805 no longer included in project scope.

C. ATTACHMENTS

- 1. Section 011000 - Summary Revision
- 2. Section 084113 – Aluminum-Framed Storefronts Revision
- 3. Section 265619 – LED Exterior Lighting Revision
- 4. Section 265668 – Exterior Athletic Lighting Revision

END OF ADDENDUM NUMBER THREE

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SECTION 011000 – SUMMARY

PART 1 – GENERAL

1.1 PROJECT INFORMATION

- A. Project Identification: Peabody Grandstand Replacement & Stadium Renovation.
1. Project Location: Santa Barbara High School
700 E. Anapamu Street, Santa Barbara, CA 93101
 2. Owner: Santa Barbara Unified School District
Director of Facilities: David Hetyonk
720 Santa Barbara Street, CA 93101, (805) 963-4338, ext. 6238
 3. Construction Manager: Lundgren Management Corporation
Contacts: Gina DeTolve (Senior Project Manager) & Norman Raymundo (Project Manager)
26330 Citrus Street, Valencia, CA 91355, (661) 257-1805
 4. Architect: Kruger Bensen Ziemer Architects, Inc.
Principal-In-Charge: Joe S. Wilcox, AIA
Project Architects: Mark L. McFarlin, AIA & Mat Gradias, AIA
Contact: Mat Gradias, AIA (Project Manager)
30 W. Arrellaga Street, Santa Barbara, CA 93101, (805) 963-1726
- B. Consulting Engineers:
1. Civil Engineer: Flowers & Associates Inc., Steve Flowers
201 N. Calle Cesar Chavez, Santa Barbara, CA 93103, (805) 966-2224
 2. Structural: Kanda and Tso Associates, Les Tso
511 Mission Street, South Pasadena, CA 91030, (626) 441-1211
 3. Mechanical: A E Group Mechanical Engineers, Hugh McTernan
838 E. Front Street, Ventura, CA 91031, (805) 653-1722
 4. Electrical: C, Hood Associates Inc., Craig Hood
872 E. Front Street, Ventura, CA 93001, (805) 641-4012
 5. Fire Protection: Collings & Associates, Jack Collings
260 Maple Court, Suite 241, Ventura, CA 93003, (805) 658-0003
 6. Landscape Architect: Earthform Design, Sam Maphis IV
1227 De La Vina Street, Santa Barbara, CA 93101, (805) 963-2006

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Work of the Project includes, but is not limited to, the following:
1. New concrete grandstand structure including: restrooms, under-grandstand rooms, press box and elevator.
 2. New synthetic turf multi-sport field and eight-lane all-weather track.
 3. Site lighting & sound system.
 4. New multi-sport LED scoreboard with wireless controls.
 5. New walkways, stairs, and ADA ramps.
 6. **Exterior Athletic Lighting (LED)**

7. New storm drainage improvements, including off-site work in public right-of-way.
- B. Type of Contract: General Construction Contract.
1. Related, Separate Contracts by Owner:
 - a. Synthetic Turf Field and All-Weather Track Surfaces: Owner will be purchasing and contracting the synthetic turf and all-weather track surfacing products to others utilizing the California Multiple Award Schedule (CMAS) process. Refer to Section 321813 "Synthetic Turf Surfacing" and Section 321823 "Synthetic Track Surfacing" for CMAS products information.
 - 1) General Contractor this Project shall be responsible for coordination and preparation of all necessary subgrade Work with CMAS contractor(s) for the proper installation and warranty of the installed CMAS products/systems.
 - 2) Refer to the following related specification sections for technical requirements of subgrade Work by General Contractor this Project to receive CMAS products/systems installations:
 - i. Section 312000 "Site Grading".
 - ii. Section 321216 "Asphalt Concrete Paving".
 - iii. Section 321313 "Site Concrete".
 - iv. Section 321813.10 "Synthetic Turf Base Preparation".
 - v. Section 321823.10 "Synthetic Track Base Preparation".
 - vi. Section 334600 "Subdrainage Piping".
 - vii. Section 334616.16 "Geocomposite Subdrainage".
 - b. New Landscaping and Irrigation: Owner will be contracting the new landscape and irrigation under separate contract. Refer to Sections 328400 "Planting Irrigation", 329300 "Plants" and Drawing Sheets L-1, L-2, L2.1, L2.1A, L2.2, L2.2A, L-2.3, L-3, L-3.1, L-3.2 and L3.3.
 - 1) General Contractor for this Project shall be responsible for:
 - i. Demolition and clearing of existing landscaping
 - ii. Tree and plant protection
 - iii. Installation and capping of the reclaimed main and lateral water lines up to the point of connection to new irrigation valves
 - iv. Installation of low voltage lines up to point of connection to new valves
 - v. Irrigation valve boxes
 - vi. Sleeving for irrigation water lines and irrigation low voltage wiring lines at walkways, stairs, ramps, walls and curbs
 - 2) Refer to the following related specification sections for technical requirements of necessary Work by General Contractor this Project to provide for and/or coordinate with Work:
 - i. Section 024119 "Selective Demolition".
 - ii. Division 26 "Electrical".

- iii. Section 328400 "Plant Irrigation".
- iv. Section 329300 "Plants".
- v. Section 312000 "Site Grading".

C. Phased Construction: Single phase.

D. Use of Site: Limited to work in areas indicated.

- 1. Owner occupancy and use by public allowed on all areas outside the area(s) of work.

E. Site Access and Parking: Refer to Section 015000 "Temporary Facilities and Controls."

F. Work Restrictions:

- 1. Comply with local jurisdiction's regulations on allowable construction activity operating and noise restrictions.

END OF SECTION 011000

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SECTION 084113 – ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior window storefront framing.

B. Related Documents:

1. Division 01 Section "Indoor Air Quality (IAQ) Management".
2. Division 08 Section "Glazing".

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Failure of operating units.

B. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Environmental Submittals: Reference Standard 2013 California Green Building Standards Code (CGBSC).

1. Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L.

- C. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction.
- D. Samples: For each type of exposed finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality-control reports.
- C. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer Trifab 451, or comparable product.
- B. Basis-of-Design Product at Radiused Frames: Subject to compliance with requirements, provide Kawneer Encore, or comparable product.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Structural Profiles: ASTM B 308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Nonthermal, Type-B Fabrication.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Center.

- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

- E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials

- F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
 - 1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Section 088100 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
 1. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.5 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 4. Physical and thermal isolation of glazing from framing members.
 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 6. Provisions for field replacement of glazing from exterior.
 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2604 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Basis-of-Design: Kawneer Permacoat™.
 2. Color: Custom as selected by Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Section 088100 "Glazing."

END OF SECTION 084113

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SECTION 265619 – LED EXTERIOR LIGHTING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
 - 2. Luminaire supports.
 - 3. Luminaire-mounted photoelectric relays.
- B. Related Requirements:
 - 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
 - 2. Section 265613 "Lighting Poles and Standards" for poles and standards used to support exterior lighting equipment.
 - 3. Section 265668 "Exterior Athletic Lighting" for sports venue lighting.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.
 - 1. Arrange in order of luminaire designation.

2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.

5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.
 - a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

6. Wiring diagrams for power, control, and signal wiring.
7. Photoelectric relays.
8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

- B. Shop Drawings: For nonstandard or custom luminaires.
 1. Include plans, elevations, sections, and mounting and attachment details.
 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Include diagrams for power, signal, and control wiring.

- C. Samples: For each luminaire and for each color and texture indicated with factory-applied finish.

- D. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

- E. Delegated-Design Submittal: For luminaire supports.
 1. Include design calculations for luminaire supports and seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Luminaires.
 2. Structural members to which equipment and luminaires will be attached.
 3. Underground utilities and structures.
 4. Existing underground utilities and structures.
 5. Above-grade utilities and structures.
 6. Existing above-grade utilities and structures.
 7. Building features.

8. Vertical and horizontal information.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of the following:
 1. Luminaire.
 2. Photoelectric relay.
- E. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Source quality-control reports.
- G. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.
 1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
 2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
 2. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
 4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.
- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- E. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- F. Mockups: For exterior luminaires, complete with power and control connections.
 - 1. Obtain Architect's approval of luminaires in mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

- A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.
- B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including luminaire support components.
 - b. Faulty operation of luminaires and accessories.

- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. Lamp base complying with ANSI C81.61.
- F. Bulb shape complying with ANSI C79.1.
- G. CRI of minimum 80. CCT of 3000 K.
- H. L70 lamp life of 50,000 hours.
- I. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- J. Internal driver.
- K. Nominal Operating Voltage: 120 V ac and 277 V ac.
- L. In-line Fusing: Separate in-line fuse for each luminaire.
- M. Lamp Rating: Lamp marked for outdoor use and in enclosed locations.
- N. Source Limitations: Obtain luminaires from single source from a single manufacturer.

- O. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 MATERIALS

- A. Metal Parts: Free of burrs and sharp corners and edges.
- B. Sheet Metal Components: Stainless steel. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.
- D. Diffusers and Globes:
 - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.
 - 3. Lens Thickness: At least 0.125 inch ((3.175 mm)) minimum unless otherwise indicated.
- E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- G. Housings:
 - 1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
 - 2. Provide filter/breather for enclosed luminaires.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage and coating.
 - c. CCT and CRI for all luminaires.

2.4 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
 - 3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - 4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
- D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC- SP 5/NACE No. 1 or SSPC-SP 8.
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected from manufacturer's standard catalog of colors.
 - b. Color: Match Architect's sample of custom color.
 - c. Color: As selected by Architect from manufacturer's full range.

2.5 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements

- for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.
 - C. Examine walls, roofs, and canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.
 - D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Support luminaires without causing deflection of finished surface.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- F. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in walls or attached to a minimum 1/8 inch (3 mm) backing plate attached to wall structural members or attached using through bolts and backing plates on either side of wall.
- G. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.
- I. Coordinate layout and installation of luminaires with other construction.
- J. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.
- K. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables"

and 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 BOLLARD LUMINAIRE INSTALLATION:

- A. Align units for optimum directional alignment of light distribution.
 - 1. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at luminaire location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.5 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

- A. Aim as indicated on Drawings.
- B. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 033000 "Cast-in-Place Concrete."

3.6 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.7 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.8 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Verify operation of photoelectric controls.
- C. Illumination Tests:
 - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):

- a. IES LM-5.
 - b. IES LM-50.
 - c. IES LM-52.
 - d. IES LM-64.
 - e. IES LM-72.
2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.
- E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

3.10 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265619

SECTION 265668 - EXTERIOR ATHLETIC LIGHTING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes lighting for the following outdoor sports venues:
 - 1. Football fields.
 - 2. Soccer fields.
- B. Related Requirements:
 - 1. Section 265613 "Lighting Poles and Standards" for poles and standards used to support lighting equipment.
 - 2. Section 265619 "LED Exterior Lighting" for exterior LED luminaires and photoelectric relays.

1.3 DEFINITIONS

- A. Coefficient of Variation (CV): A statistical measure of the weighted average of all relevant illumination values for the playing area, expressed as the ratio of the standard deviation for all illuminance values to the mean illuminance value.
- B. Fixture: See "Luminaire."
- C. Illuminance: The metric most commonly used to evaluate lighting systems. It is the density of luminous flux, or flow of light, reaching a surface divided by the area of that surface.
 - 1. Horizontal Illuminance: Measurement in foot-candles (lux), on a horizontal surface 36 inches (914 mm) above ground unless otherwise indicated.
 - 2. Target Illuminance: Average maintained illuminance level, calculated by multiplying initial illuminance by LLF.
 - 3. Vertical Illuminance: Measurement in foot-candles (lux), in two directions on a vertical surface, at an elevation coinciding with plane height of horizontal measurements.
- D. LC: Lighting Certified.
- E. Light-Loss Factor (LLF): A factor used in calculating the level of illumination after a given period of time and under given conditions. It takes into account temperature, dirt accumulation on the luminaire, lamp depreciation, maintenance procedures, and atmospheric conditions. An LLF includes a recoverable light-loss factor.
- F. Luminaire: A complete lighting unit, internally lighted exit sign, or emergency lighting unit. Luminaires

include lamps and the parts required to distribute light, position and protect lamps, and connect lamps to power supply. Note that "fixture" and "luminaire" may be used interchangeably and the "IES Lighting Handbook" uses "luminaire" over "fixture."

- G. Pole: Luminaire support structure, including tower used for large area illumination.
- H. Uniformity Gradient (UG): The rate of change of illuminance on the playing field, expressed as a ratio between the illuminances of adjacent measuring points on a uniform grid.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of lighting product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of the luminaires.
 - 4. Ballast, including BF, UL listing and recognition, ANSI certification, and Energy Independence and Security Act of 2007 compliance.
 - 5. Lamps, including life, output (lumens, CCT, and CRI), and energy-efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides," of each lighting luminaire type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the luminaire as applied in this Project.
 - a. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
 - b. Manufacturer Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
 - 7. Photoelectric relays.
 - 8. Means of attaching luminaires to supports and indication that attachment is suitable for components involved.
- B. Shop Drawings: For nonstandard or custom luminaires.
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Luminaires.

2. Luminaire support structures.
 3. Limits of athletic fields.
 4. Proposed underground utilities and structures.
 5. Existing underground utilities and structures.
 6. Athletic field support structures.
- B. Qualification Data: For qualified Installer, manufacturer, testing laboratory providing photometric data for luminaires, and field testing agency.
- C. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Welding certificates.
- E. Product Certificates:
1. For each type of ballast for bi-level and dimmer-controlled luminaire, from manufacturer.
 2. For support structures, including brackets, arms, appurtenances, bases, anchorages, and foundations, from manufacturer.
- F. Field quality-control reports.
- G. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
 2. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 3. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 4. Fuses: Ten for every 100 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Manufacturer Qualifications: Manufacturer's responsibilities include fabricating sports lighting and providing professional engineering services needed to assume engineering responsibility.
- C. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory accredited under the NVLAP for Energy Efficient Lighting Products.
- D. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.
- E. Field Testing Agency Qualifications: An independent testing agency that is accredited under the NVLAP for Energy Efficient Lighting Products, a member company of NETA, or an NRTL as defined in 29 CFR 1910.7, with the experience and capability to conduct field testing according to IES LM-5.
- F. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M.
 - 2. AWS D1.2/D1.2M.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of luminaires, lamps, and luminaire alignment products and to correct misalignment that occurs subsequent to successful acceptance tests. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, and unauthorized repairs and alterations from special warranty coverage.
 - 1. Luminaire Warranty: Luminaire and luminaire assembly (excluding fuses and lamps) shall be free from defects in materials and workmanship for a period of five years from date of Substantial Completion.
 - 2. Lamp Warranty:
 - a. Replace lamps and fuses that fail within 12 months from date of Substantial Completion.
 - b. Provide replacement lamps for lamps that fail within months 13 thru 24 from date of Substantial Completion.
 - 3. Alignment Warranty: Accuracy of alignment of luminaires shall remain within specified illuminance uniformity ratios for a period of five years from date of successful completion of acceptance tests.

- a. Realign luminaires that become misaligned during the warranty period.
 - b. Replace alignment products that fail within the warranty period.
 - c. Verify successful realignment of luminaires by retesting as specified in "Field Quality Control" Article.
- B. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Facility Type: High school.
- B. Illumination Criteria:
1. Minimum average target illuminance level for each lighted area for each sports venue and for the indicated class of play according to IES RP-6.
 2. CV and maximum-to-minimum uniformity ratios for each lighted area equal to or less than those listed in IES RP-6 for the indicated class of play.
 3. UG levels within each lighted area equal to or less than those listed in IES RP-6 for the indicated speed of sport.
- C. Illumination Calculations: Computer-analyzed point method complying with IES RP-6 to optimize selection, location, and aiming of luminaires.
1. Grid Pattern Dimensions: For playing areas of each sport and areas of concern for spill-light control, correlate and reference calculated parameters to the grid areas. Each grid point represents the center of the grid area defined by the length and width of the grid spacing.
 2. Spill-Light Control: Minimize spill light for each playing area on adjacent and nearby areas.
 - a. Prevent light trespass on properties near Project as defined by DSA of authorities having jurisdiction.
 - b. For areas indicated on Drawings as "spill-light critical," limit the level of illuminance directed into the area from any luminaire or group of luminaires, and measured 36 inches (914 mm) above grade to the following:
 - 1) Maximum Horizontal Illuminance: 0.25 fc (2.7 lux).
 - 2) Maximum Vertical Illuminance from the Direction of the Greatest Contribution of Light: 1.0 fc (10.8 lux).
 - c. Calculate the horizontal and vertical illuminance due to spill light for points spaced 20 feet (6 m) apart in areas indicated on Drawings as "spill-light critical," to ensure that design complies with the above limits.
 3. Glare Control: Design illumination for each playing area to minimize direct glare in adjacent and nearby areas.
 - a. Design source intensity of luminaires that may be observed at an elevation of 60 inches (1524 mm) above finished grade from nearby properties to be less than 12,000 candela when so observed.

- b. Design source intensity of luminaires that may be observed at an elevation of 60 inches (1524 mm) above finished grade from designated "spill-light critical" areas to be less than 12,000 candela when so observed.
 4. Determine LLF according to IES RP-6 and manufacturer's test data.
 - a. Use LLD at 100 percent of rated lamp life. LLF shall be applied to initial illumination to ensure that target illumination is achieved at 100 percent of lamp life and shall include consideration of field factor.
 - b. LLF shall not be higher than 70 percent and may be lower when determined by manufacturer after application of the ballast output and optical system output according to IES RP-6.
 5. Luminaire-Mounting Height 100': Comply with IES RP-6, with consideration for requirements to minimize spill light and glare.
 6. Luminaire Placement: Luminaire clusters shall be outside the glare zones defined by IES RP-6.
- D. Football Fields:
1. IES RP-6: Class of Play I, Class of Play II, Class of Play III, Class of Play IV.
 2. Speed of Sport: Fast.
 3. Grid Pattern Dimensions: 30 by 30 feet (9 by 9 m).
- E. Soccer Fields:
1. IES RP-6: Class of Play I, Class of Play II, Class of Play III, Class of Play IV.
 2. Speed of Sport: Fast.
 3. Grid Pattern Dimensions: 30 by 30 feet (9 by 9 m).
- F. Egress Lighting: In case of power failure, provide a minimum of 1.0-fc (10.8-lux) illumination, within 30 seconds, measured at grade in spectator and spectator egress areas.
1. Duration of emergency illumination shall be not less than 90 minutes.
 2. Momentary Power Interruptions: Provide emergency illumination immediately following restoration of power to the lighting circuits. Emergency illumination shall automatically extinguish after 90 minutes.
- G. Lighting Control: Manual, low voltage, or digital; providing the following functions, integrated into a single control station, with multiple subcontrol stations as indicated:
1. Control Station: Key-operated master switch, manual push-button controls, and system status indicator lights. Test switch of egress lighting system.
 2. Light Levels: Two levels of control - 100/50 percent of minimum target illumination.
- H. Electric Power Distribution Requirements:
1. Electric Power: 480 V; three phase.
 - a. Include roughing-in of service indicated for nonsports improvements on Project site.
 - b. Balance load between phases. Install wiring to balance three phases at each support structure.
 - c. Include required overcurrent protective devices and individual lighting control for

- each sports field or venue.
 - d. Include indicated feeder capacity and panelboard provisions for future lighted sports field construction.
- I. Maximum Total Load: 36 A.
 - 1. Maximum Total Voltage Drop from Source to Load: 3 percent, including voltage drops in branch circuit, subfeeder, and feeder.
- J. Seismic Performance: Luminaires, ballasts, and support structures shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational after the seismic event."

2.2 LUMINAIRES, LAMPS, AND BALLASTS

- A. Luminaires: Complying with requirements described in Section 265619 "LED Exterior Lighting".
 - 1. Listed and labeled, by an NRTL acceptable to authorities having jurisdiction, for compliance with UL 1598 for installation in wet locations.
 - 2. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without using tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent their accidental falling during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lens. Designed to disconnect ballast when door opens.
 - 3. Exposed Hardware: Stainless-steel latches, fasteners, and hinges.
 - 4. Spill-Light Control Devices: Internal louvers and external baffles furnished by manufacturer and designed for secure attachment to specific luminaire.
 - 5. Luminaires for football shall be bracket-mounted, full-cutoff type with integral ballasts.
 - 6. Lamps for football Luminaires: LED, rated 1150 W.
 - 7. Lamps for egress/bleacher Luminaires: LED, rated 400 W.
- B. Ballast Mounting: At location of associated luminaires unless otherwise indicated.

2.3 SUPPORT STRUCTURES

- A. Support Structures: Steel poles and other support structures, brackets, arms, appurtenances, bases, anchorages and foundations as complying with requirements described in Section 265613 "Lighting Poles and Standards."

2.4 POWER DISTRIBUTION AND CONTROL

- A. Wiring Method for Feeders, Subfeeders, Branch Circuits, and Control Wiring: Underground nonmetallic raceway; No. 10 AWG minimum conductor size for power wiring.
- B. Overhead-, pole-, or structure-supported wiring and transformers are permitted.

- C. Electrical Enclosures Exposed to Weather: NEMA 250, Type 3R enclosure constructed from stainless steel, with hinged doors fitted with padlock hasps or lockable latches.

2.5 SURGE PROTECTION

- A. Surge Protection: Comply with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" and include surge suppressors with the following requirements:
 - 1. Panelboard type.
 - 2. Nonmodular, with digital indicator lights and one set of dry contacts.
 - 3. Peak Single-Impulse Surge Current Rating: 120 kA per phase.

2.6 POLE AND BASE PROTECTION

- A. Pole Pads: Wraparound pad, with 4 inches (100 mm) of extra-firm polyfoam, 360-degree coverage of ground-mounted poles and supports, continuous hook-and-loop fastening; and not less than 72 inches (1820 mm) high.

2.7 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire electrical and communications conduit to verify actual locations of connections before pole or luminaire installation.
- C. Examine foundations for suitable conditions where luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Wiring Method: Install cables in raceways, except when cables are installed within boxes and

- poles. Conceal raceways and cables.
1. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.
- C. Coordination layout and installation of luminaires with other construction.
 - D. Use web fabric slings (not chain or cable) to raise and set structural members. Protect equipment during installation to prevent corrosion.
 - E. Install poles and other structural units level, plumb, and square.
 - F. Install luminaires at height and aiming angle as indicated on Drawings.
 - G. Except for embedded structural members, grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space. Use a short piece of 1/2-inch- (13-mm-) diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole. Nonshrink grout is specified in Section 055000 "Metal Fabrications."
 - H. Install pole pads at all poles inside playing field boundaries and when located within 20 feet (6 m) of the field boundary.
 - I. Extend cast-in-place bolted base foundations 36 inches (914 mm) above grade, minimum.
 - J. Install protective pipe bollards on three sides of each embedded pole installed in paved areas. See Section 055000 "Metal Fabrications" for pipe bollards.
 - K. Install controls and ballast housings in cabinets mounted on support structure at least 10 feet (3 m) above finished grade.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
 1. After installing sports lighting system and after electrical circuits have been energized, perform proof-of-performance field measurements and analysis for compliance with requirements.
 2. Playing and Other Designated Areas: Make field measurements at intersections of grids, dimensioned and located as specified in "Performance Requirements" Article and as described below:
 3. Make field measurements at established test points in areas of concern for spill light and glare.
 4. Perform analysis to demonstrate correlation of field measurements with specified illumination

quality and quantity values and corresponding computer-generated values that were submitted with engineered design documents. Submit a report of the analysis. For computer-generated values, use manufacturer's lamp lumens that are adjusted to lamp age at time of field testing.

- C. Correction of Illumination Deficiencies for Playing Areas: Make corrections to illumination quality or quantity, measured in field quality-control tests, that varies from specified illumination criteria by plus or minus 10 percent.
 - 1. Add or replace luminaires; change mounting height and aiming; or install louvers, shields, or baffles.
 - 2. If luminaires are added or mounting height is changed, revise aiming and recalculate and modify or replace support structures if indicated.
 - 3. Do not replace luminaires with units of higher or lower wattage without Architect's approval.
 - 4. Retest as specified above after repairs, adjustments, or replacements are made.
 - 5. Report results in writing.

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

- E. Sports lighting will be considered defective if it does not pass tests and inspections.

- F. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Adjust luminaires and supports to maintain orientation and aiming as recommended by manufacturer.

END OF SECTION 265668