ADDENDUM TO THE CONTRACT

for the

UNIVERSITY DRIVE LIGHTING UPGRADES

Contract No. BE21-092

ADDENDUM NO.: **TWO** **CURRENT DEADLINE FOR BIDS:** **March 2, 2021**

PREVIOUS ADDENDA: **ONE**

ISSUED BY: City and Borough of Juneau
ENGINEERING DEPARTMENT
155 South Seward Street
Juneau, Alaska 99801

DATE ADDENDUM ISSUED: **February 24, 2021**

The following items of the contract are modified as herein indicated. All other items remain the same. This is a faxed addendum. A confirming copy will not be mailed to you. This addendum has been issued and is posted online. Please refer to the CBJ Engineering Contracts Division webpage at: http://www.juneau.org/engineering-public-works

Question:

1. I performed a site walkthrough and could not identify in-grade junction boxes for replacement but did see existing junction boxes that appeared to be 6"x6" PVC junction boxes, integral to the light base.

   My question is, would the light base go where the existing light base is and the conduits be rerouted? Or, would the junction boxes go where the existing light base is and the light base be relocated? If the light base is to be relocated, is there a typical detail available for its location in reference to the existing light base and elevation in reference to the sidewalk?

Response:

See revised specifications provided with this addendum.

PROJECT MANUAL:

Item No. 1 SECTION 00310 – BID SCHEDULE.

Delete and Replace Section 00310 ***with*** the attached Section 00310.

Item No. 2 SPECIAL PROVISIONS

Delete and Replace the Special Provisions ***with*** the attached Special Provisions.

By: _____

Greg Smith,
Contract Administrator

Total number of pages contained within this Addendum: 41

SECTION 00310 - BID SCHEDULE

Bid Schedule for construction of **BE21-092 University Drive Lighting Upgrades**, in accordance with the Contract Documents.

BID - Furnish all labor, equipment and materials for the demolition of 27 existing concrete light pole bases, light poles and light fixtures and install 27 new precast concrete bases, light poles, and light fixtures. The new light poles bases will be installed in their current existing locations. Additionally, the WORK includes installation of 27 new hand hole junction boxes. The WORK will require the contractor to reroute the existing conduits into the new junction boxes. The location of the junction boxes will be field verified by the contractor. The WORK also includes replacing existing lighting circuits with all new conductors and installation of new 1.5 inch underground PVC conduit between the junction boxes and concrete bases and University Drive lighting system power, coordination with utilities to allow them to perform their work and perform all other associated WORK to provide a turnkey operational lighting system as described in these Contract Documents.

TOTAL BID _____

(Price in Figures)

Date: _____ **Bidder:** _____

(Company Name)

END OF SECTION

SPECIAL PROVISIONS

The Standard Specifications for Civil Engineering Projects and Subdivision Improvements December 2003 Edition, with sixteen (16) Errata Sheets, as published by the City and Borough of Juneau, is part of these Contract Documents and shall pertain to all phases of the contract. The Standard Specifications for Civil Engineering Projects and Subdivision Improvements December 2003 Edition is available for a fee from the City and Borough of Juneau Engineering Contracts Office, (907) 586-0490, or you may view them online at: www.juneau.org/engineering.

Special Provisions - Table of Contents

***Add** the following Section*:

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 GENERAL

A. The WORK to be performed under this contract shall consist of furnishing all plant, tools, equipment, materials, supplies, manufactured articles and furnishing all labor, transportation and services, including all fuel, power, water and essential communications and performing all WORK, or other operations required for the fulfillment of the contract in strict accordance with the Contract Documents. The WORK shall be complete, and all WORK, materials, and services, not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the OWNER.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Furnish all labor, equipment and materials for the demolition of 27 existing concrete light pole bases, light poles and light fixtures and install 27 new precast concrete bases, light poles, and light fixtures. The new light poles bases will be installed in their current existing locations. Additionally, the WORK includes

installation of 27 new hand hole junction boxes. The WORK will require the contractor to reroute the existing conduits into the new junction boxes. The location of the junction boxes will be field verified by the contractor. The WORK also includes replacing existing lighting circuits with all new conductors and installation of new 1.5 inch underground PVC conduit between the junction boxes and concrete bases and University Drive lighting system power, coordination with utilities to allow them to perform their work and perform all other associated WORK to provide a turnkey operational lighting system as described in these Contract Documents.

B. SITE OF WORK. The site of the WORK is on University Drive, the road to UAS Housing in the Auke Bay area of Juneau, Alaska.

C. In addition to the other incidental items of WORK listed elsewhere in the contract, the following items shall also be considered as incidental to other items of WORK under this contract:

1. Maintenance of all services through the Project area including power, water, storm and sanitary sewers, garbage pickup, mail delivery, and emergency vehicles.
2. Traffic control, including flaggers, and installation and maintenance of traffic control devices in accordance with the Manual of Uniform Traffic Control Devices – Millennium Edition (MUTCD) and the current AKDOT&PF supplements.
3. Repair or replacement of existing adjacent facilities including piping, landscaping of disturbed areas, hydro seeding, steel, timber, concrete and asphalt items.
4. Final clean-up and site restoration.
5. All WORK necessary for coordination of work to be accomplished by the private utility companies and property owners within the Project limits.
6. All WORK required to notify utility users of pending utility shut downs.
7. All WORK necessary to comply with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA) and Occupational Safety and Health Standards of the Alaska Department of Labor, Division of Labor Standards and Safety.

1.3 WORK BY OTHERS

A. The CONTRACTOR’s attention is directed to the fact that work may be conducted at the site by other contractors during the performance of the WORK under this contract. The CONTRACTOR shall conduct its operations so as to cause a minimum of interference with the WORK of such other contractors, and shall cooperate fully with such contractors to provide continued safe access to their

respective portions of the site, as required to perform work under their respective contracts.

B. Interference with Work on Utilities. The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the WORK, and shall schedule the WORK so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.4 CONTRACTOR USE OF PROJECT SITE

A. The CONTRACTOR's use of the Project site shall include construction operations and storage of materials, fabrication facilities, and field offices only in those areas identified on the Drawings.

1.5 OWNER USE OF THE PROJECT SITE

A. The OWNER may utilize all or part of the existing site during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate and coordinate with the ENGINEER to facilitate the OWNER's operations and to minimize interference with the CONTRACTOR's operation at the same time. In any event, the OWNER shall be allowed access to the Project site during the period of construction.

1.6 PROJECT MEETINGS

A. Pre-Construction Conference

1. Prior to the commencement of WORK at the site, a Pre-Construction Conference will be held at a mutually agreed time and place which shall be attended by the CONTRACTOR's Project Manager, its superintendent, and its Subcontractors as the CONTRACTOR deems appropriate. Other attendants will be:
   a. ENGINEER and Inspector.
   b. Representatives of OWNER.
   c. Governmental representatives as appropriate.
   d. Others as requested by CONTRACTOR, OWNER, or ENGINEER.
2. Unless previously submitted to the ENGINEER, the CONTRACTOR shall bring to the Pre-Construction Conference one copy each of the following:
   a. Plan of Operation.
   b. Project Overview Bar Chart Schedule.
   c. Procurement schedule of major equipment and materials and items requiring long lead time.
   d. Shop Drawing/Sample/Substitute or "Or Equal" submittal schedule.
   e. Name and telephone number of CONTRACTOR's Project Supervisor.

3. The purpose of the Pre-Construction Conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedure for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date. The CONTRACTOR should be prepared to discuss all of the items listed below:
   a. Status of CONTRACTOR's insurance and bonds.
   b. CONTRACTOR's tentative schedules.
   c. Transmittal, review, and distribution of CONTRACTOR's submittals.
   d. Processing applications for payment.
   e. Maintaining record documents.
   f. Critical WORK sequencing.
   g. Field decisions and Change Orders.
   h. Use of Project site, office and storage areas, security, housekeeping, and OWNER's needs.
   i. Major equipment deliveries and priorities.
   j. CONTRACTOR's assignments for safety and first aid.
4. The OWNER will preside at the Pre-Construction Conference and will arrange for keeping and distributing the minutes to all persons in attendance.
5. The CONTRACTOR and its Subcontractors should plan on the conference taking no longer than three hours. Items listed in paragraph 3 will be covered as well as a review of the Drawings and Specifications with the ENGINEER and OWNER.

B. Progress Meetings

1. The CONTRACTOR shall schedule and hold regular on-site progress meetings at least weekly and at other times as requested by the ENGINEER, or as required by the progress of the WORK. The CONTRACTOR, ENGINEER, and all Subcontractors active on the site must attend each meeting. CONTRACTOR may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.
2. The ENGINEER shall conduct the meeting and will arrange for recording and distributing the minutes. The purpose of the meetings will be to review the progress of the WORK, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the CONTRACTOR is required to present any issues which may impact the WORK, with a view toward resolving these issues expeditiously.

1.7 DEFINITIONS APPLICABLE TO TECHNICAL SPECIFICATIONS

A. The following words have the meaning defined in the Technical Portions of the WORK:

1. Furnish - means to supply and deliver to the site, to unload and unpack ready for assembly, installation, testing, and start-up.
2. Indicated - is a word used to direct the CONTRACTOR to information contained on the drawings or in the Specifications. Terms such as "shown", "noted"," "scheduled", and "specified" also may be used to assist in locating information but no limitation of location is implied or intended.
3. Install - defines operations at the site including assembly, erection, placing, anchoring, applying, shaping to dimension, finishing, curing, protecting, and cleaning, ready for the OWNER's use.
4. Installer - a person or firm engaged by the CONTRACTOR or its subcontract, or any Subcontractor, for the performance of installation, erection, or application WORK at the site. Installers must be expert in the operations they are engaged to perform.
5. Provide- is defined as furnish and install, ready for the intended use.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01550 – SITE ACCESS AND STORAGE, PART 1 – GENERAL, Article 1.3, MAINTENANCE OF TRAFFIC, ***revise*** *paragraph M to read:*

M. Provide pedestrian detours as necessary around areas of construction. The CONTRACTOR shall provide smooth, graded pathways, free of mud, muck and other materials that will be objectionable to people in street shoes. The pathways shall be a minimum of 36-inches wide, and shall be clearly marked with staking, warning ribbons, or other methods to guide pedestrians through the construction areas and to their residence walkways, if applicable.

SECTION 01550 – SITE ACCESS AND STORAGE, PART 1 – GENERAL, Article 1.3, MAINTENANCE OF TRAFFIC, *paragraph S,* ***add*** *the following:*

5. University Drive is the only access into UAS Housing. If street closures are required they will be limited to one lane only for a duration of no more than one hour for each occurrence and shall be limited to the Contractor's work shift only. No street closures shall be permitted overnight. Contractor shall notify CBJ Police, CBJ Fire Department, and University in writing of closures at least 24 hours prior to any street closures.

SECTION 01700 – PROJECT CLOSE-OUT, PART 1 – GENERAL, Article 1.3, FINAL SUBMITTALS, Paragraph A. ***Delete*** items 6, 7 and 8 and ***replace*** *with the following sub-paragraph:*

6. Compliance Certificate and release, signed by the CONTRACTOR, shall be submitted to the Engineering Contract Administrator.

SECTION 01700 – PROJECT CLOSE-OUT, PART 1 – GENERAL, Article 1.3, FINAL SUBMITTALS, ***Add*** *the following paragraph:*

C. Before final payment, the CONTRACTOR shall provide the OWNER with clearance from the Alaska Department of Labor and Workforce Development for the CONTRACTOR and all Subcontractors that have worked on the Project. This clearance shall indicate that all Employment Security Taxes have been paid. A sample form for this propose is at the end of Section 00800 – supplementary General Conditions.

SECTION 01700 – PROJECT CLOSE-OUT, PART 1 – GENERAL, R***eplace*** *the* COMPLIANCE CERTIFICATE AND RELEASE FORM *with the following form:*

COMPLIANCE CERTIFICATE AND RELEASE FORM

PROJECT: University Drive Lighting Upgrade

CONTRACT NO: BE21-092

The **CONTRACTOR** must complete and submit this form to the Contract Administrator with respect to the entire contract and submit completed Subcontractor Compliance forms for each Subcontractor used on the Contract and listed on the Subcontractor report.

Completed forms shall be submitted upon completion of the Project. All requirements and submittals must be met before final payment will be made to the CONTRACTOR.

I certify that the following and any referenced attachments are true:

- All WORK has been performed, materials supplied, and requirements met in accordance with the applicable Drawings, Specifications, and Contract Documents.
- All payments to Subcontractors and Suppliers have been made in accordance with Alaska Statute 36.90.210. If not, please provide written explanation, for each case, why and the specific mutual payment agreement reached with the Supplier or Subcontractor.
- CHECK ONE:

  ☐ All Suppliers and Subcontractors have been paid in full with no claims for labor, materials or other services outstanding.

  ☐ The following Suppliers and Subcontractors are due final payment which will be made upon the release of the final payment by the CBJ. List the Suppliers and Subcontractors and the amount they are due below (attach separate sheet if necessary):

	Supplier or Subcontractor	Amount Owed
1.		$
2.		$
3.		$
4.		$
5.		$

6.		$
7.		$

- All employees have been paid not less than the current prevailing wage rates set by the State of Alaska (or U.S. Department of Labor, as applicable).
- All equal employment opportunity, certified payroll and other reports have been filed in accordance with the prime contract.
- The attached list of Subcontractors is complete (required from CONTRACTOR). The City Engineer was advised and approved of all Subcontractors before WORK was performed and has approved any substitutions of Subcontractors.
- All DBE firms listed as a precondition of the prime contract award must have performed a commercially useful function in order for the WORK to count to a DBE goal. All DBE firms performed the WORK stated and have received at least the amount claimed for credit in the Contract Documents.
- All DBE Subcontractors must attach a signed statement of the payment amount received, the nature of WORK performed, whether any balance is outstanding, and indicate that no rebates are involved.
- If the amount paid is less than the amount originally claimed for DBE credit, the CONTRACTOR has attached approval from the City Engineer for underutilization.

I understand it is unlawful to misrepresent information in order to receive a payment which would otherwise be withheld fi these conditions were not met. I am an authorized agent of this firm and sign this freely and voluntarily. The foregoing statements are true and apply to the following project contractor.

_____ Capacity: CONTRACTOR

Firm Name

_____ _____

Signed Printed Name Date

Return completed form to: Engineering Contracts Division, City and Borough of Juneau, 155 South Seward Street, Juneau, AK 99801 or by email to: contracts@juneau.org

Call (907) 586-0873 if we can be of further assistance, or if you have any questions.

SUBCONTRACTOR COMPLIANCE CERTIFICATE AND RELEASE FORM
PROJECT: University Drive Lighting Upgrade

CONTRACT NO: BE21-092

Each **SUBCONTRACTOR** must complete and submit this form to the Contract Administrator, through the General Contractor, with respect to the entire contract.

Completed forms shall be submitted upon completion of the Project. All requirements and submittals must be met before final payment will be made to the CONTRACTOR.

I certify that the following and any referenced attachments are true:

- All WORK has been performed, materials supplied, and requirements met in accordance with the applicable Drawings, Specifications, and Contract Documents.

- _____(name of firm) has been paid by the Contractor in accordance with Alaska Statute 36.90.210. (If not, please provide written explanation on an attached sheet, for each case. Provide specific details why payment was not made and the specific mutual payment agreement reached with the Contractor if it is still unresolved.)

- CHECK ONE:
  - ☐ I / WE have been paid in full by the Contractor, with no claims for labor, materials or other services outstanding.

  - ☐ I / WE are due the following amount from the Contractor which is included in the Contractors Request for Final Payment. WE are due a total of $_____ for the following individual items that have yet to be paid (attach separate sheet if necessary).

	Outstanding Payment Item	Outstanding Amount Owed
1.		$
2.		$
3.		$

4.		$
5.		$
6.		$
7.		$

- All employees have been paid not less than the current prevailing wage rates set by the State of Alaska (or U.S. Department of Labor, as applicable).
- All equal employment opportunity, certified payroll and other reports have been filed in accordance with the prime contract.

I understand it is unlawful to misrepresent information in order to receive a payment which would otherwise be withheld if these conditions were not met. I am an authorized agent of this firm and sign this freely and voluntarily. The foregoing statements are true and apply to the following project contractor.

_____ Capacity: SUBCONTRACTOR

Firm Name

_____ _____ _____

Sign Printed Name and Title Date

Prime Contractor shall return completed form to: Engineering Contracts Division, City and Borough of Juneau, 155 South Seward Street, Juneau, AK 99801 or email: greg.smith@juneau.org

Call (907) 586-0873 if we can be of further assistance or if you have any questions.

END OF SECTION

SECTION 2050 – DEMOLITION

PART 1 – GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall furnish materials, equipment, and labor necessary to perform and complete demolition WORK called for in the Contract Documents.

B. The existing lights, light poles, bases, and electrical conduits attached to the bases shall be demolished as shown, in an orderly and careful manner being careful not to damage the underground conduits while removing the bases.

C. The WORK shall include, but not be limited to, removal and disposal of existing lights, light poles, bases, and electrical conduits at an approved disposal site.

1.2 CONTRACTOR SUBMITTALS

A. Demolition Schedule: The CONTRACTOR shall submit a complete coordination schedule for demolition WORK including shut-off and continuation of utility services prior to start of the WORK. The schedule shall indicate proposed methods and operations of facility demolition and provide a detailed sequence of demolition and removal WORK to ensure uninterrupted operation of occupied areas.

1.3 JOB CONDITIONS

A. Condition of Facilities: OWNER assumes no responsibility for actual condition of facilities to be demolished. The CONTRACTOR shall visit the site and inspect the existing facilities.

END OF SECTION

SECTION 16060 – GROUNDING AND BONDING

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 grounding and bonding systems and equipment.

1.3 QUALITY ASSURANCE

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. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Burndy; Part of Hubbell Electrical Systems.
2. Dossert; AFL Telecommunications LLC.
3. ERICO International Corporation.
4. Fushi Copperweld Inc.
5. Galvan Industries, Inc.; Electrical Products Division, LLC.
6. Harger Lightning and Grounding.
7. ILSCO.
8. O-Z/Gedney; A Brand of the EGS Electrical Group.
9. Robbins Lightning, Inc.
10. Siemens Power Transmission & Distribution, Inc.

2.2 SYSTEM DESCRIPTION

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. Comply with UL 467 for grounding and bonding materials and equipment.

2.3 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Stranded Conductors: ASTM B 8.
2. Tinned Conductors: ASTM B 33.
3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
4. Bonding Conductor: No. 4 or No. 6 stranded conductor.
5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide

and 1/16 inch (1.6 mm) thick.

6. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors: Copper or copper alloy.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad; 5/8 by 96 inches (16 by 2400 mm).

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install stranded conductors and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches (600 mm) below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

C. Conductor Terminations and Connections:

1. Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Hi compression connectors except as otherwise indicated.
3. Connections to Ground Rods: Bolted connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Handholes: Install a driven ground rod through handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above floor. Bond with all metallic conduits and lid.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all circuits.

END OF SECTION

SECTION 16073 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

C. COORDINATION - Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.
   c. ERICO International Corporation.
   d. GS Metals Corp.
   e. Thomas & Betts Corporation.
   f. Unistrut; Atkore International.
   g. Wesanco, Inc.
2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      1) Hilti, Inc.
      2) ITW Ramset/Red Head; Illinois Tool Works, Inc.

3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1) Cooper B-Line, Inc.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing for Raceway: Space supports for IMC and RMC as required by NFPA 70.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard- weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted- channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions,

and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

1. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field- painted surfaces.

2. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 16075 – ELECTRICAL IDENFIFICATION

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. Identification for conductors.
2. Underground-line warning tape.
3. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEEC2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 191.145

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

D. Write-On Tags: Polyester tag, 0.015 inch (0.38 mm) thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

E. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2.3 CABLE TIES

A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous

exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm)
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg
4. Color: Black.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Apply identification devices to surfaces that require finish after completing finish work.

C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

D. Cable Ties: For attaching tags. Use UV-stabilized nylon.

E. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

3.2 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, and handholes, use color-coding conductor tape to identify the phase.

B. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors

listed below for ungrounded conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:
   1) Phase A: Black.
   2) Phase B: Red.

3) Phase C: Blue.

c. Colors for 480/120-V Circuits:
1) Phase A: Brown.
2) Phase B: Orange.
3) Phase C: Yellow.

C. Locations of Underground Lines: Identify with underground-line warning tape for lighting wiring.

END OF SECTION

Add the following Section:

SECTION 16120 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

A. Catalog cut sheets for all products used.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: In addition to requirements specified in Division 1 Section "Quality Control," an independent testing agency shall meet OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907; or shall be a full-member company of the International Electrical Testing Association.
1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.

B. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

C. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by ENGINEER.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Wires and Cables:
   a. American Insulated Wire Corp.; Leviton Manufacturing Co.
   b. Carol Cable Co., Inc.
   c. Southwire Company.
2. Connectors for Wires and Cables:
   a. AMP Incorporated.
   b. General Signal; O-Z/Gedney Unit.
   c. Monogram Co.; AFC.
   d. Square D Co.; Anderson.
   e. 3M Company; Electrical Products Division.

2.2 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.

B. Rubber Insulation Material: Comply with NEMA WC 3.

C. Thermoplastic Insulation Material: Comply with NEMA WC 5.

D. Cross-Linked Polyethylene Insulation Material: Comply with NEMA WC 7.

E. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.

F. Conductor Material: Copper.

G. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

2.3 CONNECTORS AND SPLICES

A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND INSULATION APPLICATIONS

A. Underground: Type RHW or XHHW, in raceway. Provide cable where shown.

B. Feeders: Type XHHW, in raceway.

C. Branch Circuits: Type XHHW, in raceway.

D. Class 1 Control Circuits: Type XHHW, in raceway.

E. Class 2 Control Circuits: Type XHHW, in raceway.

3.3 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."

B. Remove existing wires from raceway before pulling in new wires and cables.

C. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

E. Support cables according to Division 16 Section 16050 - Basic Electrical Materials and Methods.

F. Identify wires and cables according to Division 16 Section 16050 - Basic Electrical Materials and Methods.

3.4 CONNECTIONS

A. Conductor Splices: Keep to minimum. In underground circuits, the only splices shall be in the electrical service equipment, panels, or wall mounted enclosures.

B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

C. Use splice and tap connectors compatible with conductor material.

D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.

F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection.

B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION

Add the following Section:

SECTION 16130 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1. Raceways include the following:
   a. RMC.
   b. IMC.
   c. EMT.
   d. FMC.
   e. LFNC.
   f. RNC.

2. Boxes, enclosures, and cabinets include the following:
   a. Device boxes.
   b. Outlet boxes.
   c. Pull and junction boxes.
   d. Cabinets and hinged-cover enclosures.

B. Related Sections include the following:

1. Division 16 Section 16050 - Basic Electrical Materials and Methods for raceways and box supports.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFNC: Liquidtight flexible non-metallic conduit.

E. RMC: Rigid metal conduit.

F. RNC: Rigid non-metallic conduit.

1.4 SUBMITTALS

A. Product Data: For raceways and fittings, boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. Comply with NECA's "Standard of Installation."

C. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 MANUFACTURER

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

1. Metal Conduit and Tubing:
   a. Carol Cable Co., Inc.
   b. Grinnell Co.; Allied Tube and Conduit Div.
   c. Monogram Co.; AFC.
   d. Triangle PWC, Inc.

2. Non-metallic Conduit and Tubing:
   a. Duraline.

3. Conduit Bodies and Fittings:
   a. American Electric; Construction Materials Group.

b. Crouse-Hinds; Div. of Cooper Industries.
c. Emerson Electric Co.; Appleton Electric Co.
d. Hubbell, Inc.; Killark Electric Manufacturing Co.
e. Lamson & Sessions; Carlon Electrical Products.
f. O-Z/Gedney; Unit of General Signal.
g. ETCO Speciality Products, Inc.

4. Boxes, Enclosures, and Cabinets:
a. Butler Manufacturing Co.; Walker Division.
b. Crouse-Hinds; Div. of Cooper Industries.
c. Hoffman Engineering Co.; Federal-Hoffman, Inc.
d. O-Z/Gedney; Unit of General Signal.
e. Robroy Industries, Inc.; Electrical Division.
f. Thomas & Betts Corp.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT and Fittings: ANSI C80.3.

1. Fittings: Set-screw or compression type.

D. FMC: Zinc-coated steel.

E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 NON-METALLIC CONDUIT AND TUBING

A. RNC: Schedule 40 PVC or Schedule 80 PVC per NEMA TC 2 or HDPE Conduit per ASTM D2447-95. The HDPE conduit shall have a wall thickness of at least 0.154 inches + 0.020 inches. The conduit shall be cooled to room temperature after manufacture and prior to being rolled on a spool. Provide a conduit straightening mechanism to remove the “reel memory” from the conduit prior to installation. Instead of using a conduit straightening mechanism, the conduit shall be spooled out on the ground and allowed to “relax” for at least 24 hours prior to being placed in the trench. If the conduit still has peaks and valleys, it shall be straightened.

B. RNC Fittings: Double E-Loc Couplings. The couplings shall be friction-fit, water-tight with an elastomeric seal inside a Schedule 80 PVC shell. The seal shall be grooved to enhance the friction fit. The couplings shall have a gripper ring and lock nut on each end. The couplings shall provide an air-tight, water tight splice. All other fittings for HDPE conduit such as elbows, threaded connectors and adapters to flexible conduit, etc. shall be rigid steel conduit. Transitions from HDPE to rigid

steel conduit fittings shall be performed using rigid steel conduit and Double E-Loc couplings. Provide Double E-Loc couplings by ETCO Specialty Products, Inc. or an approved equal. Use rigid steel elbows when using PVC conduit.

2.4 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasket cover.

C. Nonmetallic Boxes: NEMA OS 2.

2.5 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, malleable iron with gasket cover.

C. All boxes installed outside of any building interior shall be hot-dipped galvanized cast steel boxes.

2.6 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

B. Exterior: NEMA 4X. All enclosures and cabinets mounted outside shall be NEMA 4X, stainless steel, unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Schedule 80 PVC.
2. Underground: Schedule 80 PVC within 10’ of light pole foundations, type 1A junction boxes, and concrete structures. Schedule 80 PVC under all road crossings. Schedule 40 PVC all other locations. Rigid Steel Conduit elbows shall be used for all 90’s.
3. Boxes and Enclosures: NEMA 250, Type 4, stainless steel or hot dipped galvanized.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as specified in Division 16 Section 16050 - Basic Electrical Material and Methods.

D. Use temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through slabs. Arrange so curved portion of bends is not visible above the finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

G. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

H. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.
2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

I. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

J. Tighten set screws of threadless fittings with suitable tools.

K. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

L. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

M. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

3.5 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

B. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION

***Add** the following section:*

SECTION 16521 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior lighting units with luminaries, lamps, ballasts, drivers, poles/support structures, and accessories.

1.3 DEFINITIONS

A. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, foundation, or other structure, and mounting and support accessories.

B. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), drivers, when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

1.4 SUBMITTALS

A. Product Data: For each type of lighting unit indicated, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Materials and dimensions of luminaires and poles.
2. Certified results of independent laboratory tests for fixtures and lamps for electrical ratings and photometric data.
3. High-intensity-discharge luminaire ballasts or LED output drivers.
4. Provide information on the candela and lumen output along the vertical axis for each luminaire to show compliance with the requirements on the Drawings.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer. Shop Drawings of the poles for use by the pole fabricator.

C. If an alternate foundation system is proposed by the CONTRACTOR, submit shop drawings and design calculations for the foundation system.

D. Product Certificates: Signed by manufacturers of lighting units certifying that products comply with requirements.

E. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Luminaires and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use, location, and installation conditions by a testing agency acceptable to authorities having jurisdiction.

B. Comply with ANSI C2.

C. Comply with NFPA 70.

D. FM Compliance: Units for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM.

E. Provide UL listed luminaries.

1.6 DELIVERY, STORAGE, AND HANDLING OF POLES

A. Retain factory-applied pole wrappings on metal poles until just before pole installation. For all poles, handle with web fabric straps.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive OWNER of other rights OWNER may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by CONTRACTOR under requirements of the Contract Documents. Provide a general warranty for all materials and workmanship for a period of three years from the date of Substantial Completion.

B. Special Warranty: Written warranty, signed by manufacturer and Installer agreeing to replace external parts of luminaires and poles exhibiting a failure of finish as specified below. This warranty is in addition to, and not a limitation of, other rights and remedies OWNER may have under requirements of the Contract Documents.

1. Protection of Metal from Corrosion: Warranty against perforation or erosion of finish due to weathering.
2. Color Retention: Warranty against fading, staining, and chalking due to effects of weather and solar radiation.
3. Warranty Period: Manufacturer's standard, but not less than five years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: Provide one spare lamp for each luminaire.
2. Glass and Plastic Lenses, Covers, and Other Optical Parts: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
3. Ballasts/Drivers: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
4. Reflectors, Glare Shields, Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated on the Drawings.

2.2 LUMINAIRES

A. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

B. Metal Parts: Free from burrs, sharp corners, and edges.

C. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.

D. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

E. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.

F. Exposed Hardware Material: Stainless steel.

G. Plastic Parts: No plastic parts.

H. Reflecting Surfaces: Minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

I. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.

J. Photoelectric Relays: As follows:

1. Contact Relays: Single throw, arranged to fail in the on position and factory set to turn light unit on at 1.5 to 3 fc (16 to 32 lx) and off at 4.5 to 10 fc (48 to 108 lx) with 15-second minimum time delay.
2. Relay Mounting: In electrical enclosures.

K. LED Drivers: LED lamp drivers shall meet or exceed the following requirements:

1. Voltage range: 120-277V, (+/- 10%).
2. Current: .35A, (+/- 5%).
3. Frequency: 50/60 Hz.
4. Power Factor: >90% at full load.
5. THD: <20% at full load.
6. Load regulation: +/- 1% from no load to full load.
7. Output ripple: <10%.
8. Case temperature: rated for -40º through +80º.
9. Circuit Protection: Self-limited short circuit protection and overload protected.
10. Fusing: Primary fused.
11. Life Rating: Not less than 50,000 hours.
12. Driver Current Output: Field adjustable between 350mA, 525mA, and 700mA.

L. LED Lamps: High bright white, individual LED lamps. Quantity per the Plans. LED lamps shall meet the requirements listed below, see Plans for further requirements.

1. Initial delivered lumens – thermal losses should be less than 10% when operated at a steady state at an average ambient operating temperature of 25°C, and optical losses should be less than 15%.
2. Average Delivered Lumens – Average delivered lumens over 50,000 hours should be minimum of 85% of initial delivered lumens.
3. Light Distribution – Specify light distribution required per the Plans and IESNA luminaire classification (LCS). Luminaire to have independent photometric test reports.

M. Additional Requirements: As shown on the Drawings.

2.3 LUMINAIRE SUPPORT COMPONENTS

A. Description: Comply with AASHTO LTS-3 for pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation. Wind loads shall be in accordance with UBC-1997.

B. Wind-Load Strength of Total Support Assembly: Adequate to carry support assembly plus luminaires at indicated heights above grade without failure, permanent deflection, or whipping with a basic wind speed of 90 mph and with the application of the relevant height, exposure, gust factor, and pressure coefficients. Support assembly includes pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.

1. Strength Analysis: For each pole type and luminaire combination, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

C. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.

D. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Will not cause galvanic action at contact points.
2. Mountings: Correctly position luminaire to provide indicated light distribution.
3. Anchor Bolts, Nuts, and Washers: Hot-dip galvanized after fabrication unless stainless-steel items are indicated.
4. Anchor-Bolt Template: Plywood or steel.

E. Pole/Support Structure Bases: See Drawings.

F. Steel Poles: Tubing complying with ASTM A 500, Grade B, carbon steel with a minimum yield of 46,000 psig (317 MPa); one-piece construction up to 30 feet (12 m) in length with access hand hole in pole wall.

1. Steps: No steps.
2. Intermediate Hand hole and Cable Support: Locate at midpoint of pole height. Weather tight 3-by-5-inch (76- by-127-mm) hand hole with cover provides access to internal welded attachment lug for electric cable support grip. Provide additional hand holes and cable supports as shown on the drawings.
3. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.
4. Entire pole and all associated appurtenances and structures including cross arms shall be hot-dipped galvanized.
5. All lighting poles shall be steel poles. No aluminum, fiberglass, composite, or concrete poles.

G. Concrete for Pole Foundations: See electrical Drawings and the applicable Specification sections for all concrete & backfill WORK.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Aluminum: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

1. 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 607.1.

C. Steel: Grind welds and polish surfaces to a smooth, even finish.

1. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123.
2. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
3. Interior: Apply one coat of bituminous paint on interior of pole, or otherwise treat to prevent corrosion.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Concrete Bases: Construct according to Drawings.

B. Install poles as follows:

1. Install the poles per the manufacturer’s recommendations. Also conform to the following requirements as applicable.
2. Use web fabric slings (not chain or cable) to raise and set poles.
3. If anchor bolts are used, mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
4. Secure poles level, plumb, and square.
5. Grout void between pole base and foundation. Use non-shrinking or expanding concrete grout firmly packed in entire void space.
6. 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.

C. Luminaire Attachment: Fasten to indicated structural supports.

D. Luminaire Attachment with Adjustable Features or Aiming: Attach luminaires and supports to allow aiming for indicated light distribution.

E. Lamp luminaires with indicated lamps according to manufacturer's written instructions. Replace malfunctioning lamps.

F. Utility Coordination: Coordinate with local power utility to perform work as described in the plans. Utility work to be paid for by OWNER.

3.2 CONNECTIONS

A. Ground equipment.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Ground metal poles/support structures according to Division 16 Section 16452 – Grounding.

1. Nonmetallic Poles: Ground metallic components of lighting units and foundations. Connect luminaires to grounding system with No. 6 AWG conductor.

3.3 FIELD QUALITY CONTROL

A. Inspect each installed unit for damage. Replace damaged units.

B. Advance Notice: Give dates and times for field tests.

C. Provide instruments to make and record test results.

D. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source, and as follows:

1. Measure light intensities at night if specific illumination performance is indicated. Use photometers with calibration referenced to NIST standards.
2. Check intensity and uniformity of illumination.
3. Check excessively noisy ballasts.

E. Prepare a written report of tests, inspections, observations and verifications indicating and interpreting results.

F. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

3.4 CLEANING AND ADJUSTING

A. Clean units after installation. Use methods and materials recommended by manufacturer.

B. Adjust luminaires and luminaires with adjustable lamp position to provide required light distributions and intensities.

END OF SECTION

END OF SPECIAL PROVISIONS