

***LAFAYETTE CITY-PARISH CONSOLIDATED GOVERNMENT***

***LAFAYETTE UTILITIES SYSTEM***

***STREET LIGHTING STANDARDS***

These standards are meant to provide uniform street lighting specifications and establish standard street lighting material for the Lafayette City-Parish Consolidated Government (LCPCG). Any deviation from these standards shall be approved by the Lafayette Utilities System (LUS) Engineering and Power Production Manager, in writing, in advance of any construction.

I. Street Lighting Design Criteria.

A. Major/Arterial Streets.

1. Definition – A highway, primarily for through traffic, carrying heavy loads and large volumes of traffic, usually on a continuous route or any other street so defined by the Department of Public Works (DPW) and Department of Traffic and Transportation (DTT).
2. The street lighting system on all Major/Arterial Streets shall meet the criteria for minimum average maintained horizontal illumination that applies as set forth in the Illuminating Engineering Society of North America (IES) publication number RP-8, titled “American National Standard Practice for Roadway Lighting”, latest edition in effect. The criteria for average maintained illumination at street intersections and for proper uniformity ratios shall also comply with the above publication.
3. An Engineering Analysis Report shall be provided by the designing Engineering Consultant (Consultant). This analysis shall take into account various lighting layouts using 250 watt and 400 watt high pressure sodium fixtures, and using 30 foot and 40 foot mounting height poles. The lighting levels shall be as dictated in Item (2) above. The analysis shall provide a detailed cost of construction and anticipated maintenance and energy costs. A present worth analysis of these costs shall be amortized over a ten-year period of time. A set of recommendations by the Consultant shall accompany the report. The Analysis shall be performed by a Professional Engineer registered in Electrical Engineering in the state of Louisiana. A decision on the recommendations will be made by the LUS Engineering and Power Production Manager.
4. The electrical design of the lighting system shall be performed and stamped by a Professional Engineer registered in Electrical Engineering in the state of Louisiana. The same engineer shall perform the review and approval of shop drawings.
5. The Consultant has the option of submitting Preliminary Plans (clearly identifiable as Preliminary Plans) for review prior to submitting Final Plans. For Preliminary Plans

submitted by the Consultant, copies of computer printouts of the lighting design for each roadway situation of the project shall be provided in a formal report. The printouts shall include but not limited to:

- a) All input information.
  - b) Maximum, minimum and average maintained illumination levels.
  - c) Uniformity ratios.
  - d) Preliminary Plans indicating recommended design
  - e) Roadway classification as determined by DPW
6. For Final Plans submittal from the Consultant, the following items shall be submitted in a formal report: complete calculations including load calculations, wire sizing and voltage drops. Final plans shall include the indication of roadway stations for each pole, as also the distance from the centerline of the roadway to the center of the pole. Final plans shall incorporate in its design the use of existing utility poles as a mounting device for the street lighting luminaire, if it is technically and aesthetically feasible. This is in keeping with the spirit of elimination of excessive poles.
  7. Poles, brackets, fixtures and photocontrols shall be as defined by the LUS Material Standards (see Section II and Appendix A). The Consultant shall make use of existing wood utility poles where practical.
  8. All fixtures are to be placed on a relay controlled circuit, unless design constraints prohibit their use. Each fixture shall be individually fused at the base of the pole. Street light circuits shall have a main disconnect device. The main disconnect panel for the street light circuits shall be compact and lightweight. The main disconnect, wiring, fusing, conduit and all other components used for the street lighting system shall be sized according to the National Electrical Code (NEC) (latest revision).
  9. Foundations shall be flush with finished grade. The centerline of the footing shall be flush with the existing ground line slope. A six (6) foot octagonal concrete pad, 4 inches thick to be constructed around each foundation, flush with the existing ground within existing rights of way. Modifications may be required in restricted rights of way.
  10. On curbed sections of the roadway, the face of the standards shall be a minimum of six (6) feet (8 foot is desirable) from the back of the curb. In instances where right of way restrictions prohibit this minimum distance, it may be necessary to acquire electrical easements. On curbed sections of median where the median width has been reduced due to turn lanes, this minimum distance may be reduced but shall not be less than 1.5 ft from back of curb (NOTE: The 1.5' set back distance from back of curb is the minimum required set by ASHTO 2007 edition guideline).
  11. The Consultant shall make sure that all poles and fixtures are within the National Electrical Safety Code (NESC) (latest revision) requirements for clearances from existing electrical lines and notify LUS of any conflicts upon submission of

Preliminary/Final Plans.

12. The standard conduit size to be used in street lighting is two (2) inches in diameter. Normally, conduit shall be polyvinylchloride (PVC), Schedule 40. Road crossings shall be made using PVC Schedule 80. Conductors shall be stranded copper, THHN insulation, 600 volt rated. Current carrying conductors shall range from a minimum size of #6 AWG to a maximum size of #2 AWG. Upon completion of installation of conductors, LUS shall inspect installation of streetlights and energize the streetlight conductors and fixtures for a minimum of seventy-two (72) continuous hours in order to identify any faulty conductors, connections, or fixtures. Contractor shall be responsible to cover photocells for 72-hours test and uncover same upon completion of test.

B. Collector Streets

1. Definition – A thoroughfare, whether within a residential, industrial, commercial, or other type of development, which primarily carries traffic from Local Streets to Major/Arterial Streets.
2. The street lighting system on all Collector Streets shall be designed to provide a minimum average maintained horizontal illumination as defined by the Illuminating Engineering Society (IES), publication RP-8, for Collector Streets in an urban intermediate area. This also applies to the average maintained uniformity ratio. The average maintained illumination within all Collector intersections shall be increased by a factor of 1.5 of the normal minimum average. A Collector intersection is defined as an intersection of two Collector Streets or any intersection so defined by DPW and DTT.
3. Street lighting systems for Collector Streets will be designed in the same fashion as described for Arterial Streets above.

C. Local Streets

1. Definition –A street intended primarily to provide pedestrian and vehicular access to abutting properties and designed to carry vehicular traffic from one or more individual lots to or from a Collector or Major/Arterial Street or any street so defined by DPW and DTT.
2. The street lighting system on all Local Streets shall be designed to provide a minimum average maintained horizontal illumination as defined by the IES publication, RP-8, for Local Streets.
3. The average illumination within all Local intersections shall be increased by a factor of 1.5 of the normal average. A Local intersection is defined as an intersection of two Local Streets or any intersection so defined by DPW and DTT.
4. Street lighting systems for new Local Streets that are identified as street projects in the

Capital Improvements Program shall be designed by DPW. All other residential streets including new or existing residential subdivision developments shall be designed by LUS.

## II. Street Lighting Material Specifications

### A. Major Arterial and Collector Streets.

1. Poles and Brackets – all poles and brackets used for new street lighting project on Major/ Arterial and Collector Streets must adhere to the following LUS Material Standards:

Specification Numbers – 10608003, 10610002, 10610003, 10610008 & 10610023. See Appendix A for details.

2. Fixtures – all fixtures used for new street lighting projects on Major/Arterial and Collector Streets must adhere to the following LUS Material Standards:

Specification Numbers – 10609004 & 10610009. See Appendix A for details.

3. Photocontrols – all photocontrols used shall be as per LUS Material Standard Number 10605010.
4. All other materials are to be specified by the Consultant. The manufacturer, catalog number, and technical data shall be submitted by the Consultant for approval to both the DPW and LUS and a copy of same is to be kept in the project file.

### B. Local Streets.

1. Poles and Brackets – all poles and brackets used for new street lighting projects on Local Streets must adhere to the following LUS Material Standards:

Specification Numbers – 10608002, 10608003, 10608016, 10610012, 10610102, 10610104, 10610108, 10610112, & 10610113. See Appendix A for details.

2. Fixtures – all fixtures used for new street lighting projects on Local Streets must adhere to the following LUS Material Standards:

Specification Numbers – 10609004, 10609102, 10610009, 10610101, & 10610109. See Appendix A for details.

3. Photocontrols – all photocontrols used shall be as per LUS Material Standard Number 10605010. (Exception: Decorative fixtures shall have button type photocells (10605004))

4. All other materials are to be specified by the Consultant. The manufacture, catalogue number, and technical data shall be submitted by the Consultant for approval to LUS and a copy of the same is to be kept in the project file.

### III. Areas of Responsibility: DPW & LUS

#### A. Department of Public Works (DPW).

1. Capital Improvement Projects – DPW shall provide for new street lighting systems for all new Major/Arterial and Collector road construction and road improvement projects, as funds are available. DPW shall also provide for new street lighting systems for all new Local Streets that are identified as street projects in the Capital Improvements Program, as funds are available. DPW shall meet with LUS's Utility Marketing Supervisor prior to commencement of any project. DPW shall inspect all materials (prior to installation) and workmanship on all capital improvement projects. (LUS shall be given the opportunity to inspect materials and workmanship also.)
2. Existing Major/Arterial and Collector Streets – DPW and LUS shall maintain a list of all Major/Arterial and Collector Streets which have minimal or no street lighting systems.
3. Operation and Maintenance of Existing Street Lighting Systems – Department of Finance and Management is responsible for the energy consumption charge (rate schedule L-2) plus the fuel adjustment charge, per kilowatt-hour as defined in the LUS rate structure. The kilowatt-hour consumption of all streetlights shall be calculated based on a ten (10) hour per day usage. A deduction of 5% from the total calculated consumption shall be made for possible non-operating lights.

#### B. Department of Utilities (LUS).

1. Operation and Maintenance of Existing Street Lighting Systems – LUS is responsible for the maintenance of all public street lighting systems owned by the LCPCG. LUS is responsible for keeping a record of the number and size of street lights within the City and providing DTT & DPW with monthly updates of the same.
2. Local Street Lighting Systems – LUS is responsible for design and construction of all Local Street lighting systems for those streets other than the ones which are the responsibility of DPW as per Section III.A.1. LUS shall maintain a list of residential areas that have minimal or no street lighting systems. This list shall be prioritized by LUS. LUS shall provide DTT & DPW with an up-to-date copy of this list as needed. These projects shall be constructed when requested by a majority of the property owners or as directed by the Administration. These property owners may be liable for part or all of the initial installation costs, as determined by the LUS.

3. LUS shall design or give approval on all street lighting projects within the City and Parish of Lafayette. LUS shall also serve as a co-inspector for all street light projects.
4. LUS shall be responsible for receiving requests for additional lighting on arterial and collector streets, from the public. LUS shall notify DPW and DTT of these lighting request. DPW and DTT shall be responsible handling such request.

## SECTION 16010

### BASIC ELECTRICAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 GENERAL REQUIREMENTS

- A. Furnish all labor and materials necessary to provide and install the complete electrical portion of this contract, including all materials and electrical equipment as shown on the drawings. It is the intention of these Specifications that all electrical systems be furnished complete with whatever necessary items that are required to produce a satisfactory installation. . The Contractor shall be responsible for bringing to the attention of the Engineer any shortcomings of the design, or thereby, shall be responsible in full to meet the conditions set forth, that being, the system is to be in a satisfactory working order.
- B. All electrical equipment shall be installed in accordance with the instructions of the manufacturers. The work shall be done in strict compliance with state and local ordinances governing this class of work. The Contractor shall visit the job site and install his work to meet existing conditions found at the site. The Contractor shall acquaint himself with all existing factors and conditions which affect his work. Failure to do so shall not relieve him of meeting the responsibility to install his work correctly.
- C. The Contractor shall protect the entire electrical system from injury on the project until final acceptance. Failure to do so shall be sufficient cause for the Engineer to reject any equipment.
- D. The Contractor shall be responsible for maintenance and repair of all equipment installed by him which fails due to substandard workmanship.

##### 1.02 SYSTEM DESCRIPTION

- A. The work under this project shall consist of but is not limited to the following:
  - 1. Furnish and install lighting control equipment.
  - 2. Furnish and install street lighting standards.
  - 3. Furnish and install a conduit system and the associated conductors.
- B. At no time shall the Contractor deviate from the intent of the drawings or these

specifications unless the Engineer approves these deviations in writing. The drawings are intended to describe and illustrate the desired layout of the project. The dimensions shall be modified only if a conflict in construction arises and the Engineer agrees such modifications are necessary.

### 1.03 UNIT PRICES

- A. Electrical system, other products and work described in Division 16 will be bid on a unit basis. The proposal bid includes only the material listed on the corresponding construction drawings or description of unit where no drawing exists.
- B. The bidder understands and agrees that the quantities called for in the bid proposal are approximate, and that the total number of units upon which payment shall be made is that of the actual quantities set in place.

### 1.04 REFERENCES

- A. National Electrical Code
- B. National Electrical Safety Code
- C. American National Standards Institute
- D. American Society for Testing and Materials
- E. National Electrical Manufacturers Association
- F. National Electrical Contractors Association
- G. Underwriter's Laboratories

### 1.05 SUBMITTALS

- A. The Contractor shall base his approval on materials as herein specified. Reference to specific manufacturer's or trade names is not intended to limit or indicate preference to specific manufacturers, but to indicate a standard of quality. Contractor shall submit six (6) copies of shop drawings on the following:
  - 1. Poles
  - 2. Luminaires
  - 3. Lighting Controller
  - 4. Fuse holders and fuses
- B. The Engineer's approval of shop drawings shall not relieve the Contractor from the responsibility of incorrectly figured dimensions or any other errors that may be contained in these drawings. The omission from the shop drawings, or specifications, even though approved by the Engineer, shall not relieve the Contractor from furnishing and erecting same.
- C. The Contractor shall be responsible to meet specifications, as also the intent of the

specification. Deviation from specifications in any form, whether reviewed by the Engineer in the shop drawings or not, shall imply that the Contractor is intending to present a substitution to the materials specified. The Contractor shall give specific written notice of each variation that the shop drawings may have from the requirements of the specifications and in addition, shall cause a specific notation (in a very clear manner) to be made on each shop drawing for review of each variation.

#### 1.06 REGULATORY REQUIREMENTS

- A. The work shall be performed in accordance with the National Electrical Code and the National Electrical Safety Code, edition in effect at the time of construction. Said work shall also comply with all local codes and ordinances. Contractor shall be responsible for complying with applicable rules and regulations of the Utility Power Company governing the service, and obtain and bear the cost of all permits and inspections required.
- B. The Contractor shall provide and install an electric service to this project as called for in the drawings. The Contractor shall consult with the power company as to the proper guidelines for this service, according to the power company's policies. All service equipment provided to, and installed by the Contractor shall be included in the bid. All charges for permits, fees, etc., required by the power company shall be included in the bid.

#### 1.07 SITE CONDITIONS

Prior to the submission of the bid proposal, the Contractor shall make and shall be deemed to have made a careful examination of the project site, the plans, and specifications. The Contractor shall become informed as to the location and nature of the proposed construction, the kind and character of soil and terrain to be encountered, the kind of facilities required before and during the construction of the project, general local conditions and all other matters that may affect the cost and the time of completion of the project.

#### 1.08 QUALITY ASSURANCE

- A. The Contractor shall guarantee new materials and workmanship for one year after formal acceptance of the project. The Contractor will replace defective material and repair all workmanship defects promptly and absorb all costs. Lamps and fuses burned out in normal usage are exempt after acceptance.
- B. The workmanship shall conform to the best accepted electrical construction practice. Should it become evident during the course of construction that the electrical items indicated on the plans, routing of raceways or wiring is for any reason undesirable, the Contractor shall immediately bring the situation to the attention of the Engineer for a decision. The Contractor shall be responsible for installing the proper materials as described by the drawings and specifications. All materials furnished for this project shall be new, undamaged, and bear the label of the Underwriter's Laboratories, Inc.

## PART 2 - PRODUCTS

For specifications of products, see other sections pertaining to electrical equipment and materials.

## PART 3 - EXECUTION

### 3.01 SYSTEM INSTALLATION

- A. The Contractor shall test the completed installation for operation, continuity, grounds and insulation resistance in accordance with the National Electrical Code. The tests shall be made between all conductors and between all conductors and ground. The Contractor shall perform tests as called for in other sections.
- B. Tests shall be performed in the presence of the Engineer and written test data submitted upon completion for approval. If in the process of testing, a fault is detected, fault shall be located, and conductors withdrawn from that conduit, re-pulled and re-tested. Care shall be exercised not to damage electrical equipment while testing.
- C. The Contractor shall provide and install temporary electrical service for job construction. All work involved with the temporary service shall conform to Article 305 of N.E.C. The Contractor shall be responsible for acquiring the temporary service from the power company and shall be responsible for all charges incurred therein.

## SECTION 16111

### CONDUIT

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES:

- A. Galvanized Rigid Conduit
- B. Non-metallic Conduit
- C. Fittings and Conduit Bodies

##### 1.02 RELATED SECTIONS:

- A. Section 16010 – Basic Electrical Requirements
- B. Section 16120 – Wire and Cable
- C. Section 16530 – Roadway Lighting

##### 1.03 REFERENCES

- A. ANSI C80.1 – Rigid Steel Conduit, Zinc Coated
- B. ANSI/NEMA FB1 – Fittings, Cast Metal Boxes and Conduit Bodies for Conduit and Cable Assemblies
- C. NEMA TC2 – Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
- D. NEMA TC3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing

##### 1.04 UNIT PRICES

###### A. Method of Measurement:

1. Conduit: Placing of Conduits above and below grade and associated work as described in this section will be measured by the linear foot. Conduit required with certain electrical equipment will be included in the item for that equipment.
2. Hand holes: Concrete structure and associated work as described in this section will be counted and measured by the unit basis.

###### B. Basis of Payment:

1. Conduits: Conduits installed will be paid for by the linear foot and includes trenching and backfilling, jacking or boring if required, fittings, glue, tools and labor to complete the work of this section in accordance with the drawings and contract documents.

2. Hand holes: Hand hole will be paid for per each and includes excavation, backfilling, concrete structure, grounding, stub outs, tools and labor to complete the work of this section in accordance with the drawings and contract documents.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site, preventing any damage to products.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

#### 1.06 PROJECT CONDITIONS

- A. Verify field measurements as shown on drawings.
- B. Verify routing and termination locations of conduit prior to installation.
- C. Route conduit as required to complete wiring system.

### PART 2 PRODUCTS

#### 2.01 RACEWAYS

- A. Rigid conduit shall be composed of galvanized steel conforming to UL-6, and ANSI C80.1.
- B. Rigid non-metallic conduit shall be PVC Schedule 40, conforming to UL-651, and NEMA Standard TC2, 1970, EPC-40-PVC or PVC Schedule 80, in accordance with NEMA Standard TC2, 1970, EPC-80-PVC.
- C. Fittings: All outdoor conduit fittings shall be watertight. Rigid conduit fittings shall be of the threaded type.

#### 2.02 TERMINAL BOXES AND JUNCTION BOXES

- A. All terminal boxes and junction boxes shall be suitable to be used as oil tight enclosures. They are to be provided with a heavy-duty continuous hinged cover, and a neoprene gasket attached to the door with an oil resistant adhesive. The enclosure is to be constructed in accordance with UL standards from code gauge steel. The finish is to be a standard gray prime finish inside and out. All seams are continuously welded. Door screws are stainless steel, and are to be captivated and threaded into sealed wells. Collar studs are to be provided for mounting back plates. External heavy gauge steel feet are to be furnished for mounting, welded to the enclosure.

## 2.03 HANDHOLES

- A. Handholes shall be provided where indicated on the plans. Handholes may be pre-cast concrete, or 4" concrete formed and poured in place with #3 reinforcing steel bars. All handholes shall be of the same type throughout the project. Contractor to provide a Vulcan Foundry VM-6 series 24" diameter nominal cast iron ring with solid cover. Ground frame to ground rod, as shown. Handholes are to be installed flush with sidewalks or 1" above grade in turf areas.
- B. Handholes placed in sidewalks shall be made an integral part of the sidewalk, joints shall be installed between sidewalks and handhole (see details in plans).
- C. In pulling conductors through the handholes, two complete loops around the interior of the handhole shall be made with conductors of each circuit; no splices shall be made in the handholes. Conductors are to be continuous from fuseholder to fuseholder. All connections are to be made at fuseholders only.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Rigid galvanized conduit shall be used as raceways between adjacent equipment, in areas where its strength deems its use necessary, and as raceways above grade.
- B. Rigid non-metallic conduit shall be used as underground raceways, and encased in concrete, if required.
- C. All secondary buried raceways shall have a depth as shown in the plans.
- D. All bends shall be made with standard ells, at a radius not less than allowed by N.E.C., or threaded conduit fittings.
- E. Exposed conduit shall be parallel or at a right angle to vertical and horizontal lines.
- F. Each entire conduit system shall be installed completely before any conductors are pulled.
- G. Conduit ends shall be capped or plugged with standard accessories as soon as they have been permanently installed in place.
- H. Conduits shall be properly supported by applicable accessories not less than five feet (5') apart or greater than six feet (6') apart.
- I. Cement glue shall be brushed on or sprayed liberally on all joints prior to assembly. Multiple conduits shall have a 6" earth separation in all directions. Bell ends shall be installed at the

entries into structures, and shall extend at least  $\frac{1}{2}$ ", but no more than 1", into the structure. Pull strings shall be installed in all empty conduits unless approved otherwise by the Engineer.

J. All 90 degree bends shall have the following criteria:

a. For conduits of a diameter 1" or less, the radius shall be a minimum of 12".

b. For conduits of a diameter  $1\frac{1}{4}$ " to 2" the radius shall be a minimum of 24".

K. Conduits that do not meet the minimum cover required shall be encased in concrete.

L. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

### 3.02 TRENCHING

A. Trenches shall be straight with centerline as shown on the drawings. A chalk line or other accepted means shall be used to maintain a straight trench. Depth shall be as shown in the plans.

B. All excavated material shall be placed in such a manner so that the public will not be inconvenienced. Reasonable provisions shall be made to clear driveways, crosswalks, sidewalks, streets and private roadways. No streets shall be closed to through traffic without permission of the DPW, DTT and the Engineer. All drains, gutters and sewers for surface drainage shall be kept open or if unavoidably closed, other provisions shall be made for drainage. Sufficient flares, redlights and barricades shall be placed along the trenches on right-of-ways and other locations if the Engineer considers them dangerous to the public.

C. The bottom of the trench shall be smooth and free of coarse aggregate and loose dirt. All trenches shall be backfilled the same day that they are trenched. The Contractor shall compact the backfill to 95% standard proctor. In all backfilling, if the backfill material is too dry to compact to the desired density, it shall be wetted as required. If the backfill is too wet to compact, fresh backfill shall be used in its place.

D. Regarding the backfill in situations where required, backfill shall be placed in 6" layers (loose depth) and mechanically tamped to a compaction equal to or greater than the density of the surrounding undisturbed earth or to the satisfaction of the Engineer.

### 3.03 JACKING OR BORING

Where required, conduit shall be placed under existing concrete pavement by approved jacking or boring methods. Pits for boring shall not be closer than two feet (2') to the back of the curb unless otherwise directed by the Engineer. Water jetting will not be permitted. Pits installed for this purpose shall be backfilled, thoroughly tamped and watered so that settlement does not occur. Backfilling shall be in accordance with regulations of LUS.

### 3.04 STREET CROSSINGS

- A. Street crossings are the means of installing multiple conduits under the roadway. In a single conduit installation, the means will be referred to as trenching method.
- B. Street crossings shall consist of Schedule 80 conduits, placed 36" below the roadway surface and backfilled with approved soil. Backfill shall be compacted in accordance with specifications for backfilling of storm sewer system located in roadway section. Street crossings shall be measured from back of curb to back of curb.

### 3.05 RISER POLES AND CONDUIT SUPPORTS

- A. Conduit for riser poles shall be placed one foot (1') below transformer. Conduits shall be secured to pole by means of 6" standoffs with conduit hangers, by means of channel brackets with conduit hangers or by means of two-hole straps as indicated on plans. All above materials to be galvanized steel. Means of securement shall be every five feet (5').
- B. Conduit above lighting controller shall be galvanized rigid conduit and shall have a galvanized steel clamp-on service entrance fitting. Conduits below the lighting controller shall be PVC Schedule 80 conduits, to one foot (1') below grade.

SECTION 16120  
WIRE AND CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Conductors
- B. Wiring Connections and Terminations

1.02 RELATED SECTIONS:

- A. Section 16010 – Basic Electrical Requirements
- B. Section 16111 – Conduit
- C. Section 16530 – Roadway Lighting

1.03 REFERENCES

NEMA WC5 – Thermoplastic-insulated wire and cable for the transmission and distribution of electrical energy.

1.04 UNIT PRICES

A. Method of Measurement:

Providing 600 volt copper conductors in conduit and associated work as described in this section will be measured by the linear foot, the same measurement as the conduit it is contained in. Conductors required in certain electrical equipment will be included in the item for that equipment.

B. Basis of Payment:

Conductors installed in conduit will be paid for by the linear foot, the same measurement as the conduit it is contained in. Installation includes conductors, pulling lubricant, connectors, insulating materials, tools and labor to complete the work of this section in accordance with the drawings and contract documents.

## PART 2 PRODUCTS

### 2.01 WIRE AND CABLE

- A. All wire and cable using copper conductors shall be of soft drawn bare annealed copper wire having a conductivity of not less than 90% of that of pure copper, per ASTM B-3 & B-8.
- B. Aluminum conductors shall be EC grade, ¾ hard drawn aluminum wire, per ASTM B-262 and B-231.
- C. All conductors shall be Type THWN or THHN 600 volt insulation.
- D. All wire #10 and larger shall be stranded.

### 2.02 GROUNDING

- A. The main service shall be grounded using a ground mat consisting of 5/8" x 8' copper ground rods and a #6 soft drawn bare copper conductor.
- B. Each standard shall have installed a copper ground rod, 5/8" in diameter. Lengths are indicated in drawings. Ground connections to the ground rods shall be made with #G5 Blackburn clamps, or equal. Ground connections made to bolts in standards shall be Buchanan Type L lug, or equal. Pole shall be bonded to ground rod with #10 bare copper wire.
- C. The electrical system shall contain a grounding conductor (#8 AWG copper wire type THW, green colored insulation), which shall be continuous throughout and shall interconnect all metal poles to the controller and to each other, per N.E.C. Requirements.

## PART 3 EXECUTION

### 3.01 WIRING METHODS

- A. Conductors shall be copper type 600 Volts stranded, sized as indicated in the drawings. Conductors in light standard (loadside) shall be #12 AWG stranded THWN or THHN copper. Line conductors shall be #6 AWG minimum and #2 AWG maximum.
- B. Conductors shall be installed in continuous lengths, without splices, from terminal to terminal. Make connections in pole bases with in-line connectors. Make permanent connections with split-bolt lugs only. Insulate with ample laps of Scotch 33+ electrical tape and high voltage rubber tape for above ground. Insulate with underground splice kit for waterproofness, for below ground.
- C. All feeder circuits shall be run the entire length in continuous pieces without joints or

splices from point of origin to point of termination.

- D. Wire pulling lubricant shall be used in pulling conductors in conduit. All conductor ends shall be taped to exclude moisture.

### 3.02 SPLICES, TAPS, LUGS

- A. Splices and taps shall occur only where such circuits divide as shown on drawings. No splices shall be made in conductors except in junction boxes. Lugs shall be of the solderless type, and shall be made mechanically secure.
- B. Lugs shall be of correct sizes for the conductors joined and in no case shall strands be cut from a conductor in order to fit the conductor into a lug. Contractor to allow sufficient slack in conductors to insure that there is no binding at the bushings or elsewhere.
- C. All #12 and smaller copper conductors shall be spliced with Scotchlok pre-insulated spring connectors.
- D. All #10 and larger copper conductors shall be spliced with crimp type connectors, or split bolt connectors.
- E. All aluminum splices on taps shall be of the compression type. Compression type stud connectors shall be used where aluminum conductors must be installed in a lug, as on disconnects. Connectors shall be Blackburn Type ICS or Type WR. When aluminum conductor is to be spliced to a copper conductor, Contractor to use an all-purpose type connector.

### 3.03 TESTING

Upon completion of installation of conductors, LUS shall inspect installation of street lights and energize the street light conductors and fixtures for a minimum of seventy-two (72) continuous hours in order to identify any faulty conductors, connections, or fixtures. Contractor shall be responsible to cover photocells for 72-hours test and uncover same after test.

SECTION 16530  
ROADWAY LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Exterior Poles and Arms
- B. Exterior Luminaires, Accessories and Lamps
- C. Lighting Controller and Fusing
- D. Pole Foundations

1.02 RELATED SECTIONS:

- A. Section 16010 – Basic Electrical Requirements
- B. Section 16111 – Conduit
- C. Section 16120 – Wire and Cable

1.03 REFERENCES

- A. ANSI C82.4 – Ballasts for High-Intensity Discharge Lamps
- B. ANSI/IES RP-8 – Recommended Practice for Roadway Lighting

1.04 UNIT PRICES

A. Method of Measurement:

1. Electrical Service Point: Electric distribution panel along with required service entrance fittings and hardware, and associated work as described in this section will be counted and measured by the unit basis.
2. Street Light: Pole, luminaire, foundation and associated work as described in this section will be counted and measured by the unit basis.

B. Basis of Payment:

1. Electric Service Point: The electric service point will be paid for per each and includes conduit risers, fittings, hardware, circuit breaker panel, mounting devices, conductors, grounding, tools and labor to complete the work of this section in accordance with the

drawings and contract documents.

2. Street Light: Street lights will be paid for per each and includes foundations, conduits, conductors, grounding, fusing, pole, luminaire, lamp, tools and labor to complete the work of this section in accordance with the drawings and contract documents.

## PART 2 PRODUCTS

### 2.01 POLES, LUMINAIRES, LAMPS

For all materials to be used on all Major/Arterial, Collector, and Local Street lighting projects refer to Section II (Street Lighting Material Specifications) on page 4.

### 2.02 ELECTRIC SERVICE POINT

The service entrance shall be a circuit breaker load center with a main circuit breaker 10,000 A.I.C. UL listed. The loadcenter shall have ample space for the required branch breakers (as scheduled in the plans) plus an adequate amount of space for future branch breakers. The enclosure should be rated for its proper usage whether indoor or outdoor (NEMA 3R minimum), and shall be manufactured in such a fashion for its proper mounting facilities. Branch breakers shall be plug in type, compatible with the loadcenter, and rated 10,000 A.I.C. (see plans for schedule of branch breakers).

### 2.03 IN-LINE CONNECTORS AND FUSES

- A. The connectors shall be Bussman waterproof in-line fuseholders, Catalog Number HEB-AW-RYC. The insulating boots are inclusive with fuseholders. Two (2) fuseholders are to be installed in the base of each standard, and ample slack of wire allowed in the base to easily draw out the connectors from the pole.
- B. The fuses shall be Buss fuses laminated tube type FNM rated at 10 amps and 250 volts, sized 12/32 x 1 ½ inches.

### 2.04 CONCRETE AND REINFORCEMENT

- A. Concrete shall be gravel concrete, attaining a compressive strength of 3,000 psi in 28 days. Concrete mix shall be a minimum of 5.5 sacks of cement per cubic yard and mixing water shall be limited to 6 gallons and shall be poured carefully around reinforcing steel so as to have a complete continuous medium throughout. Concrete shall be thoroughly mixed before pouring.
- B. Reinforcing rods shall be intermediate grade deformed steel, as per ASTM A15 and A305,

allowable stress of 20,000 psi; welded wire fabric to meet requirements of ASTM A15.

## PART 3 EXECUTIONS

### 3.01 FOUNDATIONS

- A. Provide all concrete, reinforcing steel, ground rods and anchor bolts necessary for a complete foundation. Set bolts in accordance with the light standard manufacturer's anchor bolt setting template, and specifications. Foundations shall be flush with existing ground for flat terrain. The centerline of the footing shall be flush with existing ground on slopes. A six foot (6') diameter octagonal concrete pad four inches (4") thick is to be constructed around each foundation flush with existing ground within right of way, or an apron shall be constructed as per plans.
- B. Foundations and aprons shall be made an integral part of the sidewalks; a bond breaker shall be installed between the sidewalk and the foundation or apron.

### 3.02 SETTING AND ALIGNING STANDARDS

- A. Poles shall be set level with true vertical, and shall be done so after the luminaire is mounted. For installation in the vicinity of open ditches, street light standards shall not be installed until the final contour of the ditch is attained; in the vicinity of curbs and subsurface drainage, the street light standards shall not be installed until the curbs have been installed by the paving contractor. Conduits may be installed prior to the installation of curbs, as desired by the Contractor, but the cost of adjusting shall be borne by the Contractor. Poles shall be set in the locations as dictated by the Engineer.
- B. Poles and standards shall be leveled with double nut arrangements.
- C. The poles and standards shall be aligned in as near a perfect line as practical and shall be set back from the edge of the curb as dictated on the plans.
- D. Standards shall not be placed onto foundations until 72 hours after concrete has been poured.
- E. At signalized intersections, if light poles are within 10' of traffic signal poles eliminate light pole standard and install arms on traffic signal poles.

### 3.03 LUMINAIRES

- A. All street lights shall have photocells and each shall be fused in the base of the pole.
- B. The bidder agrees to replace any lamps having burned out prior to 1000 hours of operation. The bidder shall furnish with the bid the complete warranty applicable to the lamps.

