CITY OF FULLERTON

STANDARD SPECIFICATIONS

FOR

ORNAMENTAL STREET LIGHTING SYSTEMS

These specifications, together with the plans on file in the office of the Fullerton Director of Engineering, define the location, manner of construction and material to be used in the installation of a complete, operable, non-hazardous street lighting system.

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CITY OF FULLERTON STANDARD DRAWINGS FOR STREET LIGHT CONSTRUCTION ARE ATTACHED HERETO AND MADE A PART HEREOF.

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SECTION 1 SCOPE

1-1 The work shall consist of furnishing, installing, modifying or removing either 6.6 amp. series type high voltage or 120 volt multiple-type ornamental street lighting systems and appurtenances, in accordance with these specifications, the standard drawings therefor on file in the office of the Director of Engineering, the applicable provisions of the "Standard Specifications for Public Works Construction", 2003 or later edition, and the latest State of California, Department of Transportation, "Standard Specifications" and the other regulations and codes referenced to therein. In the event of a conflict, these specifications shall apply.

1-2 These specifications apply only to the installation of street lighting systems. Installation and construction of traffic signal and safety lighting systems are not included herein, but are governed by separate specifications and special provisions.

SECTION 2 "OR EQUAL" PROVISIONS"

2-1 Throughout these specifications, various types of products are specified with an "Or Equal" provision. It shall be the contractor's responsibility to verify the equality or suitability of any non-specified product or fixture in advance of installation or bidding by confirming its acceptability with the City Electrician. Failure to do so shall be grounds for rejection of the installation.

SECTION 3 NOTIFICATION AND PERMITS

3-1 Before starting any construction, the street light contractor must obtain a permit from the City Engineering Department, Room 207, Fullerton City Hall, 303 West Commonwealth Avenue, Fullerton, CA, Telephone (714) 738-6845.

3-2 Twenty-four (24) hour advance notice of time of commencement of work must be given to the City Electrician at (714) 738-6371. Upon notification, requests for inspections are to be made no later than 3:00 p.m. of the day before inspection is required.

3-3 When the street light work involves working on existing lighting circuits, the contractor shall determine from the City Electrician whether City maintenance or repair work is underway at other locations on the same circuit. Circuit shutoffs shall be done by City forces upon the contractor's request.

3-4 Construction within a State highway requires an approved State Highway Encroachment Permit.

SECTION 4 MATERIALS

4-1 All poles, luminaries, cable, conduit, and all other materials and appurtenances furnished shall be new, except materials specifically shown on the construction plans to be reused.

SECTION 5 LICENSE REQUIREMENTS AND RESPONSIBILITY

5-1 All contractors doing work in the City of Fullerton within any public street, parkway, alley or easement shall be licensed in accordance with the provisions of Chapter 9 of Division III of the State Business and Professions Code, Section 7000, et seq. All contractors shall obtain and have in their possession during work a valid City of Fullerton business license.

5-2 The contractor shall assume full responsibility and liability for the project and take all necessary measures to protect the work and prevent accidents during construction. He shall provide and maintain all safety equipment such as barricades, delineators, guards, temporary bridges, walkways, watchmen, flagmen or flashers, as required.

5-3 The contractor shall be responsible for all work, equipment and facilities until final completion and acceptance of the system. He shall remove all surplus material and rubbish from the work site immediately after its completion.

5-4 The contractor shall observe all ordinances of the City of Fullerton, particularly in relation to the obstruction of streets and sidewalks, keeping open passageways and protecting same when they are exposed or dangerous.

5-5 All lane closures, street closures and detours shall be approved in advance by the City Traffic Engineer.

5-6 The contractor shall furnish and install all appurtenances necessary or required by the Southern California Edison Company for completion of the power supply to the street lighting system and shall pay all applicable connection or energization charges. When the street lighting work is being done under a direct contract with the City, the City shall pay such fees.

5-7 Should any equipment or details to make a complete, working installation be found missing from the construction plans and specifications, or from the facilities as installed, same shall be supplied by the contractor at no extra charge as if distinctly specified or shown.

SECTION 6 ELECTROLIERS

6-1 Electroliers for street lights shall be octagonal, centrifugally spun, prestressed concrete poles, having a shaft width of six inches (6") at the top of the pole. The poles shall have a black and white marble, exposed-aggregate-type finish. The electroliers shall be AMERON POLE PRODUCTS DIVISION, or equal and shall be of the size, type and location shown on the construction plans.

6-2 a. AMERON 22CT10, or equal, with a 17-3/4 inch diameter bolt circle, a nominal pole height of 9'-7" and a lamp center mounting height of approximately 10'-6".

b. AMERON 4C1-16-F4, or equal, with a 17 inch diameter bolt circle, a 4-foot-long mast arm, with a nominal pole height of 17'-3", and a luminaire mounting height of approximately 19'-3", with a shaft width of 7.7 inches at the top of base.

c. AMERON 4C1-23-F6, or equal, with a 17 inch diameter bolt circle, a 6-foot long mast arm, with a nominal pole height of 24'-3", and a luminaire mounting height of approximately 27'-0", with a shaft width of 8.5 inches at the top of base.

d. AMERON 5C1-25-F8, or equal, with a 23 inch diameter bolt circle, an 8-foot-long mast arm, with a nominal pole height of 28'9", and a luminaire mounting height of approximately 32'-2", with a shaft width of 8.7 inches at the top of base.

SECTION 7 BRACKETS AND ARMS

7-1 The mounting brackets, caps, mast arms and appurtenances shall be supplied and installed per manufacturer's specifications for the type of electrolier specified on the construction plans. Arms shall be aluminum or galvanized steel, arranged to accommodate a slip fitter type of luminaire. The diameter of the end of the arm shall be as required to attach the specified luminaire. The arms shall be of the length specified by the manufacturer's catalog number.

SECTION 8 FOUNDATIONS

8-1 Electroliers having a pole height of 9'-7" (Type 500 or 22CT10) shall be mounted upon a Portland cement concrete foundation; thirty inches (30") square laid four inches (4") below top of curb grade, with a minimum depth of twenty-four inches (24").

8-2 Electoliers having a luminaire mounting height of 19'-3" (41D4 or 4C1-16-F4) and 27'0" (45D6 or 4C1-23-F6), shall be mounted upon a Portland cement concrete foundation thirty-six inches (36") square, laid four inches (4") below top of curb grade, with a minimum depth of forty-two inches (42")

8-3 Electroliers having a luminaire mounting height of 32'2" (56D8 or 5C1-25-F8) shall be mounted upon a Portland cement concrete foundation thirty-six inches (36") square, laid four inches (4") below top of curb grade, with a minimum depth of forty-two inches (42").

8-4 Where foundations are augered or bored, the foundation shall be no less than forty-two inches (42") in diameter. Foundations for electroliers having a pole height of 9'7" shall be no less than thirty-six inches (36") in diameter. Depths shall be the same as for square foundations.

8-5 Foundations for other types or sizes of poles and electroliers shall be as specified by the representative manufacturers and/or as shown on the construction plans.

8-6 All foundations shall be constructed using Class 560-C-3250 (6 sacks per yard) concrete, as specified in the "Standard Specifications for Public Works Construction", 2003 or later edition.

8-7 Anchor bolts shall be supplied and installed as required by the respective manufacturers and shall conform to their specifications and to applicable City Standard Drawings.

8-8 The anchor bolts shall be held in place during construction by the use of a bolt-circle template. The threaded ends of the bolts shall project 3-1/4 inches above the top of the foundations.

8-9 Foundations for electroliers having a pole height of 9'-7", and foundations for electroliers having luminaire mounting heights of 19'-3", 27'-0" and 32'-2 shall be located so that the center of the poles will be thirty-four inches (34") back of the face of curb. Locations for the centers of other types of foundations shall be as shown on the plans or as approved by the Director of Engineering.

8-10 A foundation cap of similar color and finish as any adjoining sidewalk and/or curb shall be constructed for all electroliers. The cap shall be not less than four inches (4") thick and rectangular in shape, thirty inches by forty-three inches (30"x43") for electroliers having a pole height of 9'-7" and thirty-six inches by forty-six inches (36"x46") for electroliers having luminaire mounting heights of 19'-3", 27'-0" and 32'-2". The cap shall be constructed to adjoin the back of curb and meet finished grade.

SECTION 9 ERECTION OF ELECTROLIERS

9-1 Foundations shall be cured at least 3 days prior to erection of electroliers.

9-2 After the electrolier is erected in a true vertical plane with the mast arm at right angles to the street, it shall be plumed on the foundation by use of the leveling nuts.

9-3 All electroliers shall be grounded to metallic conduit by means of a ground bushing with a solid copper conductor, equivalent to No. 6 A.W.G., looped over one steel anchor bolt in the electrolier base, held in place by an anchor bolt nut and heavy washer. See "Conduit" in these specifications for grounding requirements where non-metallic facilities such as direct-burial cable or CIC, are used in the foundation.

SECTION 10 LUMINAIRES

10-1 Luminaires on 9'-7" AMERON 22CT10 electroliers shall be high pressure sodium vapor units with power packs suitable for 120 volt multiple-type circuits, as shown on the construction plans. Luminaires shall be equipped with 50 watt (4,000 lumens) high pressure sodium vapor lamps with General Electric Ornamental Post-Top Kit Ballasts (Catalog No. 35-961520-45 for 6.6 amp. series and Catalog No. 35-961520-50 for 120 volt multiple), Unicorn Electrical Products Post Top Kits (Catalog No. UKS-PT-A66-50-X for 6.6 amp. series and Catalog No. UKR-PT-VI-50 for 120 volt multiple), or equal, and Formed Plastics Company globe assembly and adapter ring (Catalog No. FP 199-8000-1), or equal.

10-2 Luminaires on (19'-3" or AMERON 4C1-16-F4) electroliers and on 27'-0" or AMERON 4C1-23-F6) electroliers shall be high pressure sodium vapor units with internal power packs suitable for use on 6.6 amp. series or 120 volt multiple-type circuits, as shown on the construction plans. All luminaries shall be equipped with high pressure sodium vapor lamps of the size specified on the plans, and shall be General Electric M-250R2 cut off "POWR/DOOR" type (See spec. sheet), Hubbell Lighting Division RM-150 type with glass refractors, or equal. (All 120 volt multiple luminaries on 19'-3" electroliers shall be equipped with high power factor reactor type ballasts and all 120 volt multiple luminaries on 27'-0" electroliers shall be equipped with magnetic regulator type ballasts, unless otherwise shown on the construction plans.) All cut off lens type.

10-3 Luminaires on 32'-2" or AMERON 5C1-25-F8) electroliers shall be high pressure sodium vapor units with internal power packs suitable for use on 6.6 amp. series 120 volt multiple-type circuits, as shown on the construction plans. All luminaries shall be equipped with 200 watt (22,000 lumens) high pressure sodium vapor lamps and shall be General Electric M-400 "POWR/DOOR" with cut off optics (See spec. sheet) type, Hubbell Lighting Division RL-400 type with glass refractors, or equal. (All 120 volt multiple luminaries shall be equipped with magnetic regulator type ballasts.)

10-4 The wattage and/or lumen output for the luminaries shall be as indicated on the construction plans.

10-5 Where specified on the construction plans, the luminaries shall have receptacles capable of receiving Fisher-Pierce Photo Electric Control, Model #7790B 105/305 volt.

10-6 All luminaries shall be clearly marked with a number identifying the lamp wattage. Such numbers shall be: 5 for 50 watt high pressure sodium vapor; 10 for 100 watt high sodium vapor; 15 for 150 watt high pressure sodium vapor; and 20 for 200 watt high pressure sodium vapor.

SECTION 11 PULLBOXES

11-1 Pullboxes shall be standard precast reinforced concrete pullboxes, type 3-1/2, with lockable covers inscribed "Street Lighting" (for 120 volt multiple), "Street Lighting High Voltage" (for 6.6 amp. series), and shall be installed upon a 12-inch thick bed of crushed rock at the locations shown on the construction plans. Pullboxes shall be installed with covers at top of curb and sidewalk grade or one inch (1") above surrounding ground when no finished grade is established. When susceptible to vehicular traffic, cover shall be of steel construction.

11-2 Continuous conduit runs shall not exceed 200 feet in length without there being a pullbox installed. Pullboxes shall also be placed at other locations as shown on the construction plans.

SECTION 12 CONDUIT

12-1 Conduit and conduit bends shall be galvanized steel or equal and shall comply with all requirements of the "Underwriters Laboratories Standards for Rigid Steel Conduit", with each length of conduit bearing the UL label.

12-2 All electroliers fed by direct-burial cable or other non-metallic facility such as CIC shall be grounded by the use of 5/8" diameter copper-clad ground rods at least eight feet (8') in length, having their upper ends extending not more than three inches (3") above the tops of the foundations.

12-3 The conduit size shall be as designated on the plans, with a minimum size being one inch (1") diameter (electrical trade size). The contractor, at his option, may use larger size conduit at his own expense. If so used, the conduit shall be uniform in size from outlet to outlet for the entire run. Reducing couplings will not be permitted.

12-4 Conduit bends in a vertical plane shall have a minimum radius of twelve inches (12") on factory bends, or fifteen inches (15") on all field bends, without crimping or flattening. Bends used in a horizontal plane shall have a radius of not less than thirty inches (30").

12-5 Conduit terminating in electroliers shall extend approximately two inches (2") above the top of foundation and be inclined at a thirty degree (30°) angle toward the handhole in the base of the electrolier.

12-6 Conduit stubs shall be installed at the locations shown on the construction plans and extend at least six inches (6") from face of foundation and at least fifteen inches (15") below top of foundation. All stubs are to be one-inch (1") conduit, unless otherwise noted. All stubs are to be capped at both ends.

12-7 All conduit ends shall be threaded and capped with standard pipe caps or conduit pennies until contractor is ready to install cable. When caps are removed, <u>the threaded ends</u> shall be provided with approved conduit bushings.

12-8 The ends of each length of conduit shall be reamed when necessary to remove all burrs and rough edges. <u>All threads</u> shall be painted with a rust preventative, similar or equal to "KOPR-SHIELD", before couplings are made up. When a standard coupling cannot be used, an approved threaded union coupling shall be used. All couplings shall be screwed together until conduit ends butt for the full circumference to provide a good electrical connection. Slip joints or running threads shall not be used for connections at coupling.

12-9 In parkways, all conduit shall be installed directly behind the back of the curb, and not less than fifteen inches (15") or more than twenty-four inches (24") below top of curb. Where crossing streets, alleys, or driveway approaches, conduit shall be installed not less than twenty-four inches (24") or more than thirty-six inches (36") below the subgrade of the street, alley, driveway approach or as shown on the construction plans. When placed in State highways, the conduit depth and location shall conform to State Standards.

12-10 Conduit placed under existing pavement shall be installed by jacking or drilling methods. Jacking or drilling pits shall be kept two feet (2') clear of edge of pavement wherever possible.

12-11 Excessive use of water such that pavement or other improvements will be undermined will not be permitted.

12-12 Conduits terminating in pullboxes and electroliers shall be electrically connected to each other by means of ground bushings and a No. 6 A.W.G. solid copper wire.

12-13 Conduit shall be grounded at least every five hundred (500') by means of a 5/8" diameter copper-clad ground rod driven to a depth of least eight feet (8'), having its upper end not more than three inches (3") above the conduit. The ground rod and the conduit shall be thoroughly scraped and cleaned before installing brass fitting or ground bushings and wire to secure the bond.

12-14 Any change in a conduit run to clear an obstruction or some unforeseen difficulty shall require prior approval of the City Electrician before commencing with said change.

12-15 Conduit laid in an open trench shall not be covered, nor shall any trench or inspection hole be backfilled until the installation has been inspected and approved. After inspection, all trenches shall be backfilled and thoroughly compacted.

12-16 Conduit shall be blown clean with compressed air prior to installing conductors. In the presence of the City Electrician, the contractor may be required to pass a proper size testing mandrel through all conduit.

12-17 All conduit terminating without a pullbox shall be capped and identified by chipping the standard "XX", at least three inches (3") high, on the sidewalk or curb at the point of termination.

12-18 A No. 12 A.W.G. pull wire or equivalent strength cord shall be installed in all conduits which are to receive future conductors. At least two feet (2') of pull wire shall be extended beyond the end of the conduit run and secured.

12-19 When more than one conduit terminates in a pullbox, the direction of the conduit runs shall be marked on the conduits in a suitable manner, such as metal stamping the conduit stub or the installation of brass or plastic tags.

12-20 Abandoned conduits in pullboxes or pole bases will be removed, marked or capped.

SECTION 13 CONDUCTOR

13-1 Conductor for 6.6 amp. series circuit shall be No. 8 A.W.G. single-conductor solid copper, unless otherwise shown on the construction plans.

13-2 Conductor for 120/240 volt or 240 volt multiple circuit shall be No. 8 A.W.G. single-conductor stranded copper, unless otherwise shown on the construction plans.

13-3 Conductor within the electroliers which directly feed the luminaries from the main circuit shall be no smaller than No. 10 A.W.G. copper. (Single-conductor solid copper for 6.6 amp. series circuit and single-conductor stranded copper for 120 volt multiple circuit.)

13-4 Insulation for 6.6 amp. series circuit shall be polyethylene compound of the type specified in the current "Insulated Power Cable Engineers' Association Specifications for Polyethylene" per A.S.T.M. Designation D-1248, designed for operation at 5,000 volts.

13-5 Insulation on conductor for 120/240 volt or 240 volt multiple circuits shall be Highgrade MTW, with a rating equal to THHN, or THWN and shall be moisture, heat and oil resistant thermoplastic, having a nylon jacket, all conforming to A.S.T.M. designation D-2 219 (see Table 310-13, of the National Electric Code, 1981 or later edition).

13-6 The insulation on all neutral conductor shall be white. Where a conduit contains a single circuit, the insulation on "hot" conductor shall be black.

13-7 Where a conduit contains more than one circuit, each circuit shall be identified by individual colors, except that green, gray or white insulation shall not be used for "hot" conductors.

13-8 The conductor shall be installed in a complete loop system between adjacent electroliers and pullboxes to form a complete circuit as shown on the construction plans.

13-9 Conductor shall be installed without injury to the insulation. The pull or fish wire shall be connected to the conductor in a manner that will place both the wire and the conductor under equal tension. Only approved lubricants may be used in placing conductors in conduit.

13-10 At least four feet (4') of conductor shall be neatly coiled and left suspended in the base of each electrolier. Within each pullbox, sufficient slack shall be left to extend the conductor eighteen inches (18") above the top of pullbox grade.

SECTION 14 SPLICES

14-1 No splices whatsoever will be allowed in pullboxes or conduit on 6.6 amp. series circuits. In 120/240 volt or 240 volt multiple systems, splices will be permitted only where indicated on the construction plans, and will be permitted only in the neutral conductor. No splicing will be permitted in the "hot" conductor.

14-2 Prior to splicing, the conductor insulation shall be well penciled, trimmed to a conical shape and roughened before applying splice insulation. Splice insulation shall consist of layers of vinylchloride electrical insulating tape, conforming to A.S.T.M. D2301 Type 1, applied to a thickness equal to and well lapped over the original insulation, or use heat shrink insulation tube equivalent to Raychem, WCSM-19/6-150-S (B50) UL listed 96J4.

14-3 All splices shall be watertight, State-approved types, capable of satisfactory operation under continuous submersion in water.

SECTION 15 FEED POINTS

15-1 Feed points shall be at the locations shown on the construction plans. Where a feed point is designated on a Southern California Edision power pole, the contractor shall run the conduit and conductor up the pole in the quadrant

designated by Edison, to a breaker box or terminal box to be supplied by the contractor which shall be adequately grounded. The height of the box, grounding installation at the feed point and other pertinent details shall be as specified or referenced to on the construction plans.

15-2 When the feed point is designated as an underground Edison handhole or vault, the contractor shall install a steel cabinet, or other facility, as detailed or referenced to on the construction plans and/or standard drawings.

15-3 When the street lights are fed by an Edison cable or CIC, a sleeve shall be provided in the foundation, as specified in the "Foundations" portion of these specifications.

SECTION 16 FUSES

16-1 All electroliers on 120 volt or 240 volt multiple systems shall be provided with a fuse connector kit in the base. Such fuse shall be an ESNA Fuse Connector Kit, BUSSMANN "TRON", No. HEB-AA, or equal. Fuses shall be rated not less than 5 amps. for use with 50 watt (4,000 lumens) high pressure sodium vapor luminaries, 100 watt (9,500 lumens) high pressure sodium vapor luminaries and 150 watt (16,000 lumens) high pressure sodium vapor luminaries and 15 amps. for use with 200 watt (22,000 lumens) high pressure sodium vapor luminaries.

16-2 The fuse shall be located in the circuitry such that its removal will de-energize the electrolier and luminaire only.

16-3 All work on, in, or upon Edison Company facilities shall be performed in accordance with Edison Company procedures, standards and specifications.

SECTION 17 INSPECTION AND ACCEPTANCE

17-1 The contractor shall arrange in advance for inspection at various stages of construction of the street lighting system. Inspections shall be made of the excavations for the electrolier bases the location and placement of the conduit, the wiring itself, splices and other phases of construction as required. All inspection appointments shall be made 24 hours in advance of the inspection. A final burn test shall be made in the presence of the City Electrician or his authorized representative. The test shall be made under conditions simulating those which will be encountered during normal operation.

17-2 All instruments, equipment and labor required to test the circuits and lights and to inspect the system shall be provided by the contractor, as required by the City and at no cost to the City.

17-3 All deviations made from the approved plans, or other changes made without City approval, shall be corrected before approval of the system.

SECTION 18 AS-BUILT PLANS

18-1 Prior to City acceptance of the street lighting system, the contractor shall prepare and file with the City Electrician an as-built print of the circuits, electroliers and appurtenances. All changes in wiring, location of facilities, or other changes in the original plan shall be clearly shown. Acceptance of the system (and/or final

payment in the case of City contractors) shall not be made until receipt and acceptance of this plan.

SECTION 19 INTERPRETATION

19-1 If there is any doubt in the contractor's mind as to the meaning, interpretation, or intent of these specifications, or if he has any questions regarding the plans, circuitry, fixtures, or other items shown or specified, then it shall be his responsibility to contact the City in advance of construction for clarification and/or interpretation. Failure to do so shall likewise be grounds for rejection of any or all of the street lighting system.

19-2 In all questions regarding wiring, circuitry, grounding, connections, lamps, electrical equipment, parts, splices and other items relating to the electrical sufficiency, operation, or safety of the street lighting system, the opinion and decision of the City Electrician, or his authorized representative, shall be final.

19-3 On questions regarding location and erection of electroliers, coordination with other on or off-site construction, issuance of permits, final acceptance, bond releases, etc., the opinion and decision of the Director of Engineering, or his authorized representative, shall be final.

19-4 These specifications are effective as of June 22, 2005.

Don Hoppe
Director of Engineering

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