

Street Lighting

Design and Construction Standards

Section 16500



All information on these pages is subject to change without notice. These documents are provided as a general guideline and should be verified with the West Jordan Engineering Department at (801) 569-5070.

STREET LIGHTING STANDARDS

SECTION 16500

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GENERAL

According to AASHTO "Good visibility under day or night conditions is a fundamental requirement that enables motorists to move on roadways in a safe and coordinated manner. Street lighting properly designed and maintained should produce comfortable and accurate night visibility, which should facilitate vehicular and pedestrian traffic.

The work includes the furnishing and installation of new materials and equipment for a complete and operable residential roadway lighting system, as indicated on the Drawings and as specified herein, all in accordance with the requirements of the City's "Public Improvement Standards, Specifications and Plans". The end result shall be a system complete and operational to the satisfaction of the Director of Public Works. The Developer/Contractor shall show street light locations on all residential, commercial, and industrial development plans (see street lighting layout detail). Street lights shall be placed on alternating sides of the street as required to achieve the illuminance criteria specified herein. Additionally, one street light shall be required at each road intersection and at each cul-de-sac. Street lights should be placed at lot line boundaries to avoid unnecessary obstruction along the property frontage. Occasionally, the case may require a street light to be placed at a location other than at the property boundary; for example, this may occur on a lot with an unusually long frontage. The City Engineer may require additional or fewer street lights at his discretion. Additional street lights may be required in locations where safety hazards or special traffic needs exist; examples include locations such as half block intersections, pedestrian crosswalks, sidewalks or trails, bending roadways, parking lot entrances and exits, busy intersections, bridges and busy private or commercial driveways. In medium and high-density areas, midblock street lighting is also desirable in accordance with the recommendations of the Illuminating Engineering Society. These are published as an American National Standard Practice. The most recent edition of this Practice provides for a residential and commercial area minimum lighting. Local residential streets require 0.4 (horizontal) foot-candles average, with a uniformity ratio of not greater than 5 to 1 (average to minimum). Collector streets (Minor and Major) require 0.6 foot-candles average, with a uniformity ratio of not greater than 4 to 1 (average to minimum). Intersections and roundabouts on collector streets (Minor and Major) require 0.9 foot-candles average, with a uniformity ratio of not greater than 3 to 1 (average to minimum). Arterial streets require 0.6 foot-candles average in residential areas, and 0.9 foot-candles average in commercial areas, with a uniformity ratio of not greater than 3 to 1 (average to minimum). Intersections and roundabouts on arterial streets require 0.9 foot-candles average in residential areas, and 1.1 foot-candles average in commercial areas, with a uniformity ratio of not greater than 3 to 1 (average to minimum). A Developer/Contractor must

provide a street lighting plan (indicating luminaire/pole locations, spacing and specification) and illumination analysis (photometry) plan to the City for review and approval. The photometry plan shall also include all illuminance from existing public right of way lighting adjacent to the proposed development, as that lighting may result in a reduction to the new lighting for the proposed development. The photometry plan shall also include all illuminance from future phases of the same development to produce the most efficient lighting plan for the current phase and future phase(s) of the same development. The effectiveness of illumination is a direct product of the distribution type selected for the luminaire, coupled with mounting height, bracket length, and luminaire orientation with respect to the geometrics of the roadway. For this reason, a competent electrical/illuminating engineer shall be retained to produce the street lighting design and illumination analysis. The Developer/Contractor shall incur all costs for and provide trenching in which subsurface electrical lines may be installed to power the street lighting system as shown on the development plat. Trenching shall be to the depth, width and standards specified by the City. The Developer/Contractor assumes all responsibility, expense, and liability for the street lighting system until the complete lighting system is accepted by the City. It is recommended that poles and fixtures be inspected for shipping damage, manufacturing flaws, etc., upon delivery. The City reserves the right to reject damaged or flawed materials with all costs associated to be incurred by Developer/Contractor. The Developer/Contractor shall restore all compromised surfaces to original or better condition. This includes, but is not limited to, landscaping, sidewalk, curb and gutter, roads, etc.

1.01 DEFINITIONS

- A. Approved Plan shall mean a plan and supporting documents prepared to indicate the type and placement of street lights within the scope of a development. Placement and type of street lights shall conform to specifications as approved by the Director of Public Works.
- B. As-Built Drawings shall mean a plan prepared after street light installations have been completed indicating actual utility easements, location of street lights, wiring diagrams and any others pertinent information relating to the installation of street lights within a development. As-built shall also include dimensions of the actual location of conduits.
- C. Commercial Development shall mean any development occupied with or engaged in commerce.
- D. Contractor company or person under contract: a company or person with a formal contract to do a specific job, supplying labor and materials
- E. Developer shall mean any sub divider or any person or organizations that develops, or intends to develop or sell property for the purpose of future development.
- F. Ground Box known as box, vault, flush mount, pull box, enclosure and junction box.
- G. Public Street, Trail or Open Space shall be that street, park strip, and sidewalk or trail, open space or pedestrian walkway area dedicated to a political jurisdiction for public transportation and use.
- H. Residential Development shall mean any development providing permanent living accommodations.

- I. Streetlight shall mean any combination of luminaire(s), pole, anchor base (if required), appurtenances, and underground wiring required to provide roadway lighting.
- J. Streetlight Specifications shall mean those specifications, standards and requirements as established and approved by the Director of Public Works pertaining to the type of luminaire, pole, anchor base (if required), wiring, appurtenances and installation procedures for the installation of a street lighting system.
- K. Streetlight Standard shall mean the classification of street light based on the width of the street right-of-way in which that street light will be installed. Street Light Standards are as follows:
 - a. Arterial shall mean those streets with a dedicated Right-of-Way of 106+ feet.
 - b. Collector shall mean those streets with a dedicated Right-of-Way greater than 50 feet and less than 106 feet.
 - c. Local (Residential) shall mean those streets with a dedicated Right-of-Way of 50 feet or less.
- L. PUD: shall mean either a residential or commercial Planned Unit Development.
- M. Public Utility Easement shall mean the area designated for access to construct or maintain utilities on privately or publicly owned land, as defined by State Code.
- N. TOD: shall mean either a residential or commercial Transit Oriented Development.

1.02 CONSTRUCTION WORK INCLUDED

- A. Wire/Conductors
- B. Conduit
- C. Concrete base installation
- D. Light pole installation
- E. Light fixture installation
- F. In-ground junction boxes
- G. Connections and fuse installation
- H. Grounding and bonding
- I. Location and spacing
- J. As-built submittals
- K. Warranty

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. All earth work required for the installation or construction of any of the work specified herein shall be performed in accordance with the requirements of APWA Section 02200 entitled, ["Earthwork."]
- B. All concrete work required for installation or construction of any of the electrical work specified herein, shall conform to the requirements of APWA Section 03304 entitled, ["Minor Concrete."]

1.04 REFERENCE SPECIFICATIONS AND STANDARDS

- A. General: Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to, or exceed, the applicable requirements of the National Electric Code (N.E.C), all applicable City of West Jordan codes and ordinances, Rocky Mountain Power (R.M.P.) Standards, and American Public Works Association (A.P.W.A.), Manual of Standard Specifications.

1.05 PERMITS AND INSPECTION

- A. Permits shall be obtained, and inspection fees shall be paid for as specified in the City's Development Processing Manual. The Developer/Contractor shall notify and arrange inspection of any improvements prior to backfilling of trenches. A minimum of 24-hour notice shall be given prior to any inspection request. The Contractor shall conduct his work during "normal" working hours, which are 7:00 a.m. to 3:30 p.m., Monday through Friday, and excludes holidays.

1.06 CONTRACTOR SUBMITTALS

- A. Streetlight Plans: The Developer/Contractor shall provide and maintain a complete set of up-to-date streetlight plans in good order on the site. All differences between the location and arrangements indicated on the drawings and those of the actual installation shall be dimensioned and noted on the "As-Built" drawing set. Plans shall show the location and type of poles, show type of wire and gauge, conduit runs, fuse boxes, junction boxes, meter enclosure, power source, etc.
- B. Shop Drawings and Product Data: A complete, bound, indexed, shop drawing and product data binder large enough for all items to be included, shall include shop drawings and product data shall be submitted for all equipment items to be used on the work unless otherwise indicated by the Engineering Department. When requested, supplement the following list by such other data as may be required, including detailed scale drawings and wiring diagrams of any special equipment and of any proposed deviation from the Street Light Specifications.
- C. Approval Required: No materials, equipment, apparatus, or fixtures shall be purchased or installed unless and until such materials, and other items have been approved in writing by the City Engineer. Any and all materials installed in violation of these provisions shall be removed and replaced at the Developer's own expense with materials acceptable to the City Engineer.
- D. As-Built Submittal: at the end of the project, the Developer/Contractor shall transfer all changes and reference in ink to 2 sets of black and white prints and one electronic copy and shall submit said "As-Built" drawings to the Engineering Inspector. The final sheet of each set shall be

initialed by the Developer/Contractor as being correct and accurate records of the installation as constructed.

- E. Guarantee: In addition to the guarantee specified in Section entitled, ["Project Closeout"] the Developer/Contractor shall guarantee his work against any defects in material and/or workmanship for a minimum of one-year from the official project acceptance date, or the specified guarantee period, including damage resulting from negligence and vandalism. Said guarantee shall be in written form and shall be acceptable to the [Engineer,] to whom it shall be delivered before final acceptance and before bond release. Any latent defects in Developer/Contractor furnished material or workmanship, which is discovered during the time of the guarantee, shall be repaired or replaced by the Developer/Contractor at no cost to the City. The Developer/Contractor shall be responsible for all blue-staking, maintenance, repair of underground lines, poles, shrouds or luminaries of the lighting system until final acceptance by the City. A final inspection shall be performed when the Developer/Contractor reaches total project completion and before the 100-percent bond release.
- F. Field Control of Location and Arrangement: The Drawings indicate diagrammatically the desired location and arrangement of conduit runs, equipment, and other items. All poles shall be located as specified on the plans, unless approval is granted in writing by the City Engineer. The power company shall approve the final location of all poles located near a collector street, or near overhead lines.
- G. Workmanship: All materials and equipment shall be installed in accordance with the manufacturer's recommendations and the requirements of these specifications. The installation shall be accomplished by workmen skilled in this type of work and installation shall be coordinated in the field with other trades so that interferences are avoided. The Developer/Contractor shall not allow or cause any of his work to be covered up or enclosed until it has been inspected and approved by the Engineering Inspector. Should any of the work be enclosed or covered up before such inspections, the Developer/Contractor shall, at his own expense, uncover the work, and after it has been inspected and approved, make all repairs with such material as may be necessary to restore all work to its original and proper condition.
- H. Product Protection: The Developer/Contractor shall provide adequate means for and shall fully protect all materials, both in storage and during construction so that not finished surfaces will be damaged or marred.
- I. Tests: All wiring and connections shall be tested for continuity, short circuit, and improper grounds under the observation of the City Inspector. A minimum of 48-hour notice is required for observation of testing.

- a. Any failure shall be corrected in a manner satisfactory to the Engineering Inspector. The Contractor shall pay all costs of testing, including costs of correcting failures and of replacing or repairing any damage to associated work or surrounding areas resulting there from.
- b. The Contractor shall make all tests required by the City Engineer under the observation of the City inspector for the project. The Contractor shall furnish all necessary testing equipment and pay all costs of tests, including all replacement parts and labor necessary due to damage resulting from damaged equipment or from test and correction of faulty installation. The testing shall demonstrate the following to the satisfaction of the [Engineer:]
- c. That all lighting power and control circuits are continuous and free from short circuits.
- d. That all circuits are free of unspecified grounds.
- e. That all circuits are properly connected in accordance with applicable wiring diagrams.
- f. That all circuits are operable. Tests shall be conducted that include operation of each lighting and power circuit for not less than 48 hours.

PART 2 -- INSTALLATION

2.01 GENERAL

- A. Components of the street lighting systems shall be in compliance with the standards, specifications and styles currently adopted by the City of West Jordan for use in the municipal right-of-way. All materials furnished under this specification shall be new, and shall comply with the requirements of the current editions of referenced specifications, codes, and standards. Any deviation of part numbers or submittals of approved equal specifications must be approved by the Public Works Electrical Department in writing prior to ordering or installation of product.

2.02 WIRE/CONDUCTORS

- A. All wires shall be copper; all sizes shall use American Wire Gauge (AWG). Developer/Contractor shall submit a load calculation prepared by an Electrical Engineer for the proposed wire gauge. The minimum wire size shall be #10 AWG Type THHN from power source to the pole base or hand hole. All wiring shall be installed in approved conduit.
- B. Wire from pole base or hand hole to fixture shall be minimum #12 AWG Type THHN copper wires.
- C. Aluminum wiring is not allowed. Romex cable is not allowed.

- D. See RMP point of disconnect drawing for additional information and requirements.
- E. Connections shall only be made by a licensed electrician regularly engaged in this type of work.
- F. Wire nuts will be allowed in the pole base only.
- G. Mechanical lugs Tyco Gel Cap SL or equivalent must be used in the ground box and shall meet NEC specifications, UL labeled and listed to be designed for this purpose.
- H. A Homac SLK-M inline watertight, mechanical 600 V rated fuse kit or equivalent shall be used on all hot leads per RMP point of disconnect requirements.
- I. Splice only at junction boxes, transformer leads, in accessible pole bases, or at control equipment. All splices within boxes shall be watertight; heat shrink splices, gel cap, etc. Splice conductors as per manufacturer's recommendations and codes.
- J. Leave minimum 2-feet of slack at each pole. Leave 2-feet of slack above top of pull box grade.

2.05 GROUND BOXES AND LIDS

- A. Use Carson H Series 1118-12 or approved equal (ANSI/SCTE Tier 22 loading) heavy duty box; polymer concrete and fiberglass with polymer cover or concrete box with steel cover in high traffic areas and driveway approach areas.
- B. All covers to be permanently marked "Street Lighting" and secured with recessed stainless steel nuts, screws, and washers.
- C. Junction boxes placed in non-typical applications (more than 10' from a pole or source box) shall be equipped with a locate ball or disc in each box.
- D. Point of disconnect box is to be placed as per Rocky Mountain Power specifications, typically within 4 to 10 feet of the power source.
- E. Top of ground box shall be placed at finished grade and level. Place long side of box parallel to curb/sidewalk (improvements) unless otherwise indicated. See Rocky Mountain Power Point of Disconnect Standard.
- F. A minimum of 8 inches of $\frac{3}{4}$ minus gravel shall be placed prior to setting junction box. Hand tamp gravel around the junction box collar. Fill and compact soil to grade, level with cover on box.

- G. In concrete base installations all conduit shall extend a minimum of 3 inches above the gravel base with a minimum clearance of 3 inches from the box lid.
- H. Wire must extend a minimum of 24 inches above grade to splice in ground box.
- I. Any box installed during construction is not to be buried.
- J. Any junction box extensions shall be installed as per manufactures recommendations.

2.06 CONDUIT

- A. Unless otherwise specified, buried electrical conduits shall be 1-1/2-inch minimum, grey schedule 40 PVC electrical conduit between junction box and anchor base.
- B. Run conduit in straight lines, in the public utility easements as indicated on plans with a minimum of 24 inches of cover at final grade.
- C. Conduit must sweep into junction box and anchor base.
- D. Conduits shall be of the size indicated on the WJ Standard Drawings. It shall be the option of the Contractor to use larger conduit than that specified, provided that where such substitution is made, it shall be for the entire length of the conduit run. No reducing fittings will be permitted.
- E. The maximum bend of a conduit shall be 90 degrees with a 24 inch maximum radius and a minimum of 18 inch radius.
- F. All conduits shall have an approved cap or duct seal on ends to prevent debris from entering conduit during construction.
- G. All empty conduits shall have a pull string. Leave at least 2-feet of pull string extending beyond each end of the conduit run and secure.
- H. Conduit shall extend a maximum of 3 inches and a minimum of 1 inch above the finished streetlight concrete base.
- I. In areas specified by the City Engineer for high traffic areas, or special installations schedule 80 PVC may be required.
- J. All conduit locations shall be accurately located and documented on the "as-built" drawings. Documentation at a minimum shall include conduit size, depth from finished grade to top of conduit and distance from back of curb at intervals not to exceed 100'.

2.07 POLE FOUNDATION

- A. Construct foundation as per manufactures requirements, other construction standards referring to Minor Concrete and Earthwork shall also apply.
- B. All bases shall be a maximum of 2 inches above sidewalk or top back of curb grade, whichever is higher. In cases where bases are not adjacent to curb or sidewalk, top of base shall be a maximum of 2 inches above adjacent grade.
- B. Bases shall be centered in park strips unless otherwise indicated.
- C. Center conduit ends within the bolt circle.
- D. Where approved helical foundations (stingers) will be placed with verification of placement from City inspector.
- E. Fiberglass poles for residential may be direct buried when under 20 feet in overall length.
- F. Concrete for bases must meet APWA 2012 Standard Specification, Section 30-30-4 table 5.

2.08 Anchor Bolts

- A. Anchor bolts shall be supplied by the pole manufacturer.
- B. Anchor bolts shall conform to ASTM A 307, and shall be provided with two nuts and washers each. Anchor bolts, nuts, and washers shall be fully galvanized by the hot-dip process conforming to ASTM A 153, or cadmium plated with Type NS coating conforming to ASTM A 165.
- C. All nuts shall be symmetrically formed with the hole centered and at right angles to the face, tapped to fit a corresponding thread so that nut can be run the entire length of the thread by the fingers without undue forcing, and without noticeable play or rocking.
- D. Verify proper final orientation for hand hole placement. Final hand hole location/orientation shall be on the sidewalk side of pole (opposite vehicular traffic).

2.09 POLES AND LUMINAIRE SUPPORTS

- A. Approved poles model numbers are subject to change, submit data sheets for review and approval prior to ordering product.

B. All hardware shall be corrosion resistant stainless steel.

C. Residential:

1. Holophane Wadsworth #W14S4/17-CA-BK
2. Shakespeare BS18-01S1BC09

D. Collector/Arterial:

1. Holophane RT34-30-AB-BLK-SMS
 - i. Spoke Arm SMACS 10 T20-24 DBL
2. Shakespeare ASW30-02S1BB
 - i. Spoke Arm SMACS 10 T20-24 DBL

E. Commercial, PUD or TOD only as directed by City Staff:

1. Holophane Wadsworth W12S4/17-CA-BK
2. Holophane Wadsworth W14S4/17-CA-BK
3. Holophane Wadsworth W16S4/17-CA-BK
4. Holophane North Yorkshire NY14/17-CIS-BK
 - i. Cross Arm NP-28-CA/BK
 - ii. Banner Arm BA30H/1/BO-CA/BK
 - iii. Planter Bracket OSPA/COXX-CA/BK
5. Shakespeare ASW30-02S1BB
 - i. Spoke Arm SMACS 10 T20-24 DBL

F. Paint: Black.

2.09 Luminaire

- A. Approved luminaires model numbers are subject to change, submit data sheets for review and approval prior to ordering product.
- B. Residential Roadway: The luminaire shall be of the traditional acorn shape; approved manufacture and model numbers are as follows:
1. Sternberg Lighting, Model A850ASRLED/993PT/2ARC40T2-MDL03/R-7P/TB/BKT
 2. Sternberg Lighting, Model A850ASRLED/993PT/2ARC40T3-MDL03/R-7P/TB/BKT
 3. Sternberg Lighting, Model A850ASRLED/993PT/3ARC40T2-MDL03/R-7P/TB/BKT
 4. Sternberg Lighting, Model A850ASRLED/993PT/3ARC40T3-MDL03/R-7P/TB/BKT
 5. Sternberg Lighting, Model A850ASRLED/993PT/6ARC40T2-MDL03/R-7P/TB/BKT
 6. Sternberg Lighting, Model A850ASRLED/993PT/6ARC40T3-MDL03/R-7P/TB/BKT
 7. Sternberg Lighting, Model A850ASRLED/993PT/6ARC40T4-MDL03/R-7P/TB/BKT
- C. Collector Roadway: The luminaire shall be of the LED cobra head type; approved manufacture and model numbers are as follows:
1. Leotek, Model GCJ2-20G-MV-NW-2-BK-1000-4B-PCR7-WL
 2. Leotek, Model GCJ2-20G-MV-NW-3-BK-1000-4B-PCR7-WL
 3. Leotek, Model GCM2-40F-MV-NW-2-BK-1000-4B-PCR7-WL
 4. Leotek, Model GCM2-40F-MV-NW-3-BK-1000-4B-PCR7-WL
 5. Leotek, Model GC2-90F-MV-NW-2-BK-700-PCR7-WL
 6. Leotek, Model GC2-90F-MV-NW-3-BK-700-PCR7-WL
- D. Arterial Roadway: The luminaire shall be of the LED cobra head type; approved manufacture and model numbers are as follows:
1. Leotek, Model GCJ2-20G-MV-NW-2-BK-1000-4B-PCR7-WL
 2. Leotek, Model GCJ2-20G-MV-NW-3-BK-1000-4B-PCR7-WL
 3. Leotek, Model GCM2-40F-MV-NW-2-BK-1000-4B-PCR7-WL
 4. Leotek, Model GCM2-40F-MV-NW-3-BK-1000-4B-PCR7-WL
 5. Leotek, Model GC2-90F-MV-NW-2-BK-700-PCR7-WL
 6. Leotek, Model GC2-90F-MV-NW-3-BK-700-PCR7-WL

E. Commercial, PUD or TOD: The luminaire shall be of the LED cobra or acorn head type only as directed by City staff; approved manufacture and model numbers are as follows:

7. Leotek, Model GCJ2-20G-MV-NW-2-BK-1000-4B-PCR7-WL
8. Leotek, Model GCJ2-20G-MV-NW-3-BK-1000-4B-PCR7-WL
9. Leotek, Model GCM2-40F-MV-NW-2-BK-1000-4B-PCR7-WL
10. Leotek, Model GCM2-40F-MV-NW-3-BK-1000-4B-PCR7-WL
11. Leotek, Model GC2-90F-MV-NW-2-BK-700-PCR7-WL
12. Leotek, Model GC2-90F-MV-NW-3-BK-700-PCR7-WL
13. Sternberg Lighting, Model A850ASRLED/993PT/2ARC40T2-MDL03/R-7P/TB/BKT
14. Sternberg Lighting, Model A850ASRLED/993PT/2ARC40T3-MDL03/R-7P/TB/BKT
15. Sternberg Lighting, Model A850ASRLED/993PT/3ARC40T2-MDL03/R-7P/TB/BKT
16. Sternberg Lighting, Model A850ASRLED/993PT/3ARC40T3-MDL03/R-7P/TB/BKT
17. Sternberg Lighting, Model A850ASRLED/993PT/6ARC40T2-MDL03/R-7P/TB/BKT
18. Sternberg Lighting, Model A850ASRLED/993PT/6ARC40T3-MDL03/R-7P/TB/BKT
19. Sternberg Lighting, Model A850ASRLED/993PT/6ARC40T4-MDL03/R-7P/TB/BKT

F. Paint: Black.

2.10 CONTROL EQUIPMENT

A. Individual twist lock photo-electric control long life for LED applications is standard.

1. LED DLL Elite 127_1.5 or approved equal
2. Multiple voltage 120-277 model
3. Photo-electric control turn on level 1.5
4. Fail to On
5. Adjust to “North Sky” position

B. Milbank or Strongbox control cabinet may be specified for use in collector, arterial, PUD, TOD or commercial applications at the discretion of the City Engineer.

1. Cabinet to be installed as per manufactures recommendations.

*** END OF SECTION ***