

Article 7 Streetlights

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I. Streetlight Design

A. General

1. Adoption of Standards by Reference
 - a) The NEC shall be followed except as modified in these standards.
2. Design Plans Required
 - a) Design plans shall be submitted to the PSAA for review and approval prior to construction. No work shall begin until approval has been obtained.
 - b) Design plans shall:
 - (1) Indicate location of poles, cables, conduit, photocells, handholes, disconnect cabinet, and transformers.
 - (2) Indicate depth and distance of conduit and cable from the curb.
 - (3) Provide luminaire and pole size, manufacturer, and model number.
 - (4) Show cable and conduit sizes.
 - (5) Contain a note stating: "The City of Ann Arbor Public Works Unit must be contacted prior to and during construction. Final inspection and approval must be made by the Public Works Unit."
 - (6) Plans shall also be furnished to power supply company for review to assure that adequate power is supplied.
3. Photometric Analysis Required
 - a) A photometric analysis shall be performed and an IES file for the proposed luminaire submitted to demonstrate that lighting standards will be achieved.
4. As-Built Plans Required
 - a) As-built drawings shall be submitted to the Public Works Unit prior to acceptance by the City.

B. Streetlight Location and Spacing

1. Location Requirements

- a) Streetlights shall typically be located as shown in Article 12 (Standard Details), SD-GU-9 through SD-GU-11 (Utility Location Plans) of these Standards.
- b) Streetlights designed to illuminate mid-block pedestrian crosswalks shall typically be located 10 feet prior to the crosswalk in each direction of travel.

2. Spacing

- a) Spacing of streetlights shall not exceed 190 feet except in the DDA district where spacing shall be 45 feet apart. In all cases, spacing shall be such that required street lighting levels are met per Section I.H. (Required Lighting Levels) of this Article.

C. Cable and Conduit

1. General Requirements

- a) All cable is required to be in conduit.

2. Conduit Size and Number of Conduit Runs

- a) The minimum allowed conduit size shall be 3-inch diameter except where larger size is required as set forth following.
- b) Where required to adequately contain necessary cables, a larger diameter conduit may be required by the PSAA.
- c) The City may determine that a spare conduit shall be provided. In such cases, a nylon pulling line shall be pulled through the conduit for future use.

3. Material Requirements

- a) All pipe used for Directional Drill must be Schedule 80 polyethylene pipe (HDPE).

D. Photoelectric Control

1. A master street lighting disconnect/lighting controller shall be furnished and capable of handling the electric load on the designed circuit.
2. Wiring shall be in parallel and not in series.

E. Handholes

1. General Location and Spacing Requirements
 - a) Handholes shall be located such that the maximum distance between any two handholes, or a handhole and the adjacent streetlight, is 100 feet.
 - b) Handholes shall be placed at all junctions of conduit pipes.
 - c) Handholes shall be required at every streetlight.
 - d) Wherever possible, handholes shall be placed outside of walking surfaces.
2. Sizing and Placement Requirements
 - a) Handholes shall be in conduit runs.
 - b) Handhole size shall be 17 inches by 30 inches by 18 inches.
 - c) Smaller handhole sizes, 13 inches by 24 inches by 18 inches, may be approved by the PSAA where needed due to space constraints such as some downtown areas.
 - d) Larger handhole sizes, 24 inches by 36 inches by 18 inches, may be required by the PSAA.
3. Requirements within the DDA district
 - a) Handholes are to be placed in the edge of existing concrete walk, out of brick pavers.
 - b) The concrete walk shall be saw cut and a section removed that is large enough to facilitate the installation of the proposed handhole. Minimum removal shall be one flag of sidewalk.

F. Disconnect Cabinet

1. The lighting system shall have a disconnect mounted in a cabinet adjacent to and as close as possible to the power supply.
2. Cable entering the breaker must be minimum #8 or larger as required to adequately handle circuit load.

G. Transformer

1. Transformer location(s) shall be determined by power company.
2. The transformer pad shall be as specified by power company.
3. All work associated with the transformer(s) shall be coordinated with power company.

H. Required Lighting Levels

1. Public street lighting levels are to be achieved per Table A of this Article:

Table A Required Lighting Levels		
Use	Foot-candles: Average Maintained	Uniformity Ratio: Average to Minimum
Residential	0.4	6:1
Intermediate	1.0	3:1 to 6:1
Commercial	2.0	3:1

II. Materials

A. General

1. All material and equipment furnished under this Section shall fully comply with the latest IEEE, NEMA, and ANSI Standards, for that class of equipment and these Standards.

B. Conduit

1. Conduit shall bear the manufacturer's name and trademark.
2. Conduit sizes shall be as shown on the construction drawings.
3. All conduit connections shall be watertight.
4. Conduit for service pole risers shall be rigid galvanized steel for the first 10 feet above ground and of the size required by the NEC. Plastic may be used above 10 feet.

5. For rigid galvanized steel conduit:
 - a) Conduit shall comply with the latest revision of Article 346 of the NEC and shall be hot-dip galvanized inside and out.
 - b) The zinc coating shall be continuous and throughout and shall not scale or blister or be removable by any reasonable process of handling or erection.
 - c) All connections to rigid galvanized steel shall be threaded.
6. For plastic conduit:
 - a) Conduit shall comply with the latest revision of Article 347 of the NEC.
 - b) All plastic conduit shall be Schedule 80 PVC or HDPE SDR11.

C. Cables

1. All poles must have a three-wire system, including dead ends.
2. Cable in poles must be marked to indicate connection to power source (using typical red/blue marking). Color identification shall be repeated at all connections.
3. Cable size shall be as shown on the approved electrical plans.
4. Underground cable shall be 600V, XLPE, U.L. listed USE.
5. Cable may be either 3 single cables in parallel or triplex cable.
6. For direct bury, cable shall be copper, no smaller than #6 AWG.
7. #4 AWG copper cable may be used as a neutral.
8. The conductor coding shall adhere to covering and not be readily removed by rubbing.

D. Cable Connectors

1. The connection of conductors from size #12 AWG and larger to terminal parts or other conductors shall be made with heavy-duty cast alloy solderless connectors of the pressure double indent type.
2. Tap connectors at lighting standards shall be multiple aluminum with four positions for #2 AWG copper and a fifth position for #12 AWG or larger fixture wire.

3. Electrical connections in streetlight pole handholes should be made with aluminum terminal blocks (Connector Cable Tap Alum #8-1/0) and covers (Cover Plastisol F/Utilco SLC4-0), as approved by PSAA.
4. Wire brush and approved corrosion inhibiting compound shall be applied to all connections.
5. All splices shall be accessible through the handhole of the pole and shall extend a minimum of 6 inches outside the handhole. No splices will be allowed which are inaccessible inside the pole.

E. Tape

1. Where Utilco connections are not used, all joints in outlet or junction boxes shall be taped in such manner that the insulating value of the joint or splice will be at least equal to the insulating value of the conductor to which it is applied.

F. Disconnect Cabinet or Box

1. Cable entering the breaker shall be #8 AWG or larger.

G. Lighting Fixtures

1. All threaded fittings shall be lubricated with an anti-seize grease.
2. Luminaire Specifications:
 - a) Allowable luminaires shall be LED.
 - b) Luminaires shall be dark sky compliant unless a luminaire with cutoff shield is approved by the PSAA.
 - c) Luminaires shall be compliant with Illuminating Engineering Society standards IES RP-8.

H. Poles and Foundations

1. Poured concrete foundations shall conform to Article 10 (Construction Specifications) of these Standards.
2. Precast foundations may be permitted with approval by the PSAA. In such case, flowable fill must be poured to the bottom of the conduit entrance and shall conform to Article 5 (Streets), Section II.P. (Flowable Fill) of these Standards.

3. Screw-in base foundations may be permitted with the approval of the PSAA. In such cases, material verification must be provided to verify that the foundation is compatible with and capable of properly supporting the pole.
4. Anchor Bolts
 - a) Contractor shall furnish and install anchor bolts as furnished by the pole manufacturer.
5. Pole and Luminaire Wiring
 - a) Pole and luminaire shall be factory prewired and tested.
 - b) Wires shall be #12 AWG stranded Black, White, and Green.
 - c) Grounding screws shall be provided in pole base and luminaire.
6. Photoelectric controls
 - a) Photoelectric controls shall be subject to the approval of the PSAA.
7. Luminaire Fuses
 - a) Fuses shall be furnished and mounted within post compartment.
 - b) All LED luminaire fuses shall be FNQ % ampere fuses.
 - c) One fuse shall be furnished per luminaire.
 - d) The fuse-holder shall be rated at 600 volts.
 - e) The fuse holder may use crimp-type tubular terminals or set screw type connectors.
 - f) Insulating boots shall be used with the fuse holder to cover connections. Taping will not be permitted.

I. Handholes

1. Handholes shall conform to current Appendix A (Material Requirements) of these Standards and Article 12 (Standard Details), SD-E-1 (Communications Handhole Assembly) and SD-E-3 (Electrical Handhole Assembly).