CHAPTER 9

Street Lighting

I. INTRODUCTION

This chapter addresses the design of 480-volt street lighting systems including poles, fixtures, controller, concrete anchor bases, cable-in-duct, junction boxes, and other appurtenances.

All proposed developments (commercial, industrial, institutional, and residential) except developments in the ER zoning shall have street lighting installed. In this chapter "residential lighting" shall refer to lighting installed in residential developments; "highway lighting" shall refer to lighting installed in all other developments.

II. STREET LIGHTING DESIGN

A. LIGHTING DESIGN

1. Typical light wattage shall be 100 watt in residential developments and 150 watt in all other developments.

2. For "Level 1" lighting, the minimum horizontal foot candles allowed in residential developments shall be 0.6 foot candles, and 0.8 in all other developments

3. For "Level 1" lighting, the greatest average to minimum foot candle ratio shall be 6:1.

4. For "Level 1" lighting, pole spacing shall be designed to provide the above lighting levels.

5. "Level 2" lighting shall be required for RS-1 and RS-2 residential developments. "Level 2" lighting requires a street light at every intersection, cul-de-sac end, and approximately 200' to 400' spacing elsewhere along the roadways.

6. Street lights shall be installed on the same side of the street as the sidewalk.

B. LOAD OF LIGHTING CIRCUITS

1. The total load of each lighting circuit shall not exceed 80 percent of the rating of each circuit breaker supplying the lighting circuit.

2. The city shall reserve the right to specify lighting circuit load (number of fixtures per circuit) less than 80 percent of each breaker supplying the lighting circuit.

3. Voltage drop calculations shall be submitted to the city for approval prior to installation. Voltage drop shall not exceed NEC limit, which is 5% of the system load.

III. STREET LIGHTING COMPONENTS

All materials provided shall be new and in conformance with the Lighting Specifications and the National Electric Code for the proposed 480-volt system.

In accordance with Section 1.16 of the Lighting Specifications, shop drawings and/or catalog cuts of all street lighting components shall be submitted to the City Engineer's office for approval before installation.

A. CONCRETE BASES

1. Concrete anchor bolt bases for residential lighting shall be 4' in depth, 20" in diameter with an 11" bolt circle. (see Detail Drawing SL-5).

2. Concrete anchor bolt bases for commercial and highway lighting shall be 5' in depth, 24" in diameter with a 9-7/8" to 11-1/4" bolt circle. (see Detail Drawing SL-6).

3. 4 anchor bolts and two 2" conduits per concrete base

4. Bases shall be installed 4' feet behind the back of curb to the center of the base and in no case shall any portion of the base or pole extend to within 2' of the back of the curb

5. A ground rod with AWG No. 4 wire shall be installed at each base.

B. POLES

1. Splices within poles shall be split bolt with Scotch 130-C rubber tape rated for 600 volts and covered with Scotch 33+ plastic. Combination of rubber tape and plastic shall be equal to the insulation of the conductors.

2. All wiring within the pole shall be No. 12 AWG and shall include a 5-amp fuse and holder, for each hot wire.

3. Light poles used for residential lighting shall be a fluted street lighting pole manufactured by Lumec catalog # RA41, with a nominal mounting height of 14 feet, black in color.

4. Light poles used for highway lighting shall be manufactured by Lexington Standard Corporation Model # 2908-40705T4, bronze in color.

5. A transformer base shall be used in conjunction with the mounting of the highway lighting poles, Lexington model 07R1012B17, bronze in color.

6. Highway lighting standards shall have adhesive identification number tag applied in conformance with Drawing No. SL-1 of the Lighting Specifications.

C. CABLE

1. In existing systems, the street lighting cable shall be buried cable-in-duct (C-N-D), three insulated conductors (black = hot, white = neutral, green = equipment ground).

2. In new systems, the street lighting cable shall be buried cable-in duct (C-N-D), three insulated conductors (2-black =hot, green = equipment ground).

3. The size of the conductor (wire) shall be dependent on a voltage drop calculation not to exceed 5 percent over the total length of each individual circuit. The minimum size conductor shall be No. 6 AWG.

4. Replacement of existing conductors shall be of the same wire size and type that is removed from the circuit. Equal type of wire must be approved by the City.

5. The type of wire shall have a rating of USE XLP 7-stranded copper 600 volt.

6. Splicing the cable will only be allowed at each street lighting standard or junction box. No mid-span splices shall be allowed.

7. The 3-wire C-N-D shall be installed 1’ behind and parallel with the back of curb to a depth of 18” to 24”.

D. LUMINAIRES

1. Residential lighting applications shall use the Lumec Model No. Z40G luminaire with 100-watt bulb, typically, however specific alternate project details may be approved by the City Engineer.

2. Highway lighting applications shall use Garco G18-1-3XL-150HPS-480-BRP-RPA2, 150-Watt high-pressure sodium fixture as specified by IES photometric guidelines or as specified in the contract documents.

E. DUCT

1. The duct size shall be 1¼ " for No. 6 AWG wire but shall be increased to 1½" for wire size No. 4 AWG or larger.

2. C-N-D shall be installed one foot behind back of curb, to a depth of 18" to 24".

F. CONDUIT

1. All conduit used for bored cable runs under pavements shall be polyvinyl chloride (PVC), Schedule 40 in conformance with Section 652.2.3 of the State Specifications.

2. Conduit shall be capped on both ends until cabling is placed.

3. 2" or 3" PVC conduit shall be installed under existing pavements, sidewalk, and driveways and shall extend 1' beyond the pavement edge.

G. JUNCTION BOXES

1. Junction boxes shall be 18" diameter galvanized corrugated metal pipe wall section, with Neenah R-5900-C solid lid and frame in conformance with Detail Drawing SL-4.

2. In lieu of the above junction box, a Strongwell Quazite junction box and cover may be installed. The box shall be 13" x 24" x 18" deep. The part numbers are as follows: Box - PG1324BA18, Cover – PG1324HA0041A.

3. Splices within junction boxes shall be with Scotch Cast Kit No. 90-B1, or approved equal.

4. A ground rod with No. 4 wire shall be installed next to all junction boxes.

5. Junction boxes shall be installed 2½' behind back of curb.

H. CONTROLLER

1. The controller shall be housed by a 72"h x 24"w x 18"d NEMA 4 enclosure (Saginaw Control and Engineering Model No. SCE-72EL2418FS, or approved equal), constructed upon a concrete base with maintenance platform - refer to the detail drawings located at the rear of these Detail Specifications.

2. The dimensions for the concrete pad shall be as shown in detail drawing SL-2.

3. The enclosure shall be gray in color, with an adhesive identification tag (detail drawing SL-1), and shall have an access handle and locking mechanism (i.e. lock hasp) to allow the City to install its own pad lock.

4. Provide one 4-terminal meter pedestal (Milbank Model No. U3358-O-KK, or approved equal). For existing systems, a 5th terminal shall be installed in the 9 o'clock position in accordance with WE Energies meter manual.

5. 120-volt power shall be provided in the meter socket for Wisconsin Electric metering (existing street lighting systems only).

6. 480-volt, 1-phase, 3 wire panel board interior (Cutler Hammer Type PRL 3a or approved equal)

7. The panel board shall be rated suitable for use as service equipment and meet the current interrupting rating set by WE Energies.

8. Main disconnecting means shall be a circuit breaker type (Cutler Hammer Types 100A EHD, 200A ED or approved equal)

9. A 60 amp, 4-pole electrically held contactor, 120V coil (Cutler Hammer type ECL03C1C2A-S3 or approved equal)

10. 480V (single phase) to 120V transformer to provide for the control voltage, 1 KV (Cutler Hammer type S20N11S01N or approved equal)

11. Swivel mounting photo eye

12. On/off/auto switch

13. Pull-chain interior cabinet light with 60-watt bulb

14. One 120v duplex receptacle (GFCI protected) in Bell box and cover

15. 40 amp circuit breakers (480V rated)

16. 1-15 amp circuit breaker for the control transformer (480V rated)

17. Provide a 2-pole circuit breaker panel with 2-15amp 120V circuit breakers

18. Adhesive identification tag (detail drawing SL-1)

19. Three 3-inch cable ducts and one 1-inch ground wire duct

20. The controller wiring shall be dependent on either the voltage drop calculations or minimum wire size whichever yields a heavier gage.

21. Two (2) ground rods with No. 4 wire shall be installed next to the controller, spaced a minimum of 6’ apart.

22. The controller (service and control cabinet) will provide 480-volt single phase power for the lighting circuits.

23. With approval from the city, the contractor may install with a factory built unit. Prior to approval, the contractor shall supply all information to city as to wiring diagrams for the unit and all other necessary information. The unit shall meet all NEC codes that apply plus shall be approved by a nationally recognized testing laboratory approved by the State of Wisconsin.

24. On City contracted projects the City shall be responsible for coordination with WE Energies and all related costs for bringing new 480-volt services to the proposed control cabinet locations.

25. On private development projects the developer shall be responsible for coordination with WE Energies and all related costs for bringing new 480-volt service to the proposed control cabinet locations.

IV. ACCEPTANCE

A. LIGHTING OPERATION

1. Before acceptance of lighting projects the following shall be completed:

    a. All lights shall be in working order.

    b. All lighting fixtures and poles shall be level and plumb.

    c. All lighting fixtures lens shall be properly aimed, aligned, and directed.

    d. All trenches shall be backfilled, compacted, and restored to grass cover.