

# Design Standards Letter

**Letter Number: G-1970-07**

**Letter Date: 01/26/1970**

**Effective Date: 01/26/1970**

**Section/Plan No.: P901.3, P901.4**

**Subject: Instructions for Implementing 45' Mounting Heights for Highway Lighting**

## Body

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ALL DIVISION AND DISTRICT ENGINEERS

This letter with enclosures voids General Letter No. 43, 1969.

Attached hereto is the following material to be used in implementing the 45' mounting heights for highway lighting:

1. Instructions for designing continuous lighted facilities.
  - a. Iso-footcandle templates for 250', 270' and 300' longitudinal spacings with 700 watt luminaries.
  - b. Photometric data and utilization curve for 700 watt luminaries.
- Clear overlays for the iso-footcandle templates are available on request.
2. Instructions for designing basic lighted facilities.
3. Special Provision for 45' mounting heights.
4. Two special sheets for Highway Lighting Details.
5. The lamp and ballast operating currents for 700 watt luminaries to be used in conjunction with Table 15.2 of the Design Manual are as follows:
  - a. 208 Line Volts, 3.85 Line Amps
  - b. 240 Line Volts, 3.34 Line Amps
  - c. 480 Line Volts, 1.67 Line Amps
  - d. Lamp and Ballast, 800 Line Watts

The new designs will be incorporated on new installations on which the lighting design has not been started. If a District wishes to use the present 30' mounting heights on a project,

please give your reasons to this office prior to submitting plans. One reason that will receive special consideration will be that the plans have been completed or substantially completed.

Light poles located in a median will be placed on or behind a median barrier.

Light poles located on the outside of the roadway will be placed 30 feet from the nearest edge of the through lane.

Light poles located on ramps will be placed 20 feet from the ramp shoulder.

Light poles located adjacent to auxiliary lanes will be placed 30 feet from the nearest edge of the through lane of the mainline.

A transformer base will be provided for those poles that cannot be located 30 feet from the edge of the through pavement or 20 feet from the shoulder, if not behind guardrail. Consideration will be given to eliminating the requirement for transformer bases under special circumstances, such as design speed of 40 mph or less, and heavy pedestrian traffic.

When lighting two lanes or less from outside, provide 300 foot longitudinal spacing of 700 watt Type III Medium Distribution Cutoff Luminaries on a 15-foot bracket arm.

When lighting three lanes from one side, provide 270 foot longitudinal spacing of 700 watt Type III Medium Distribution Cutoff Luminaries.

When lighting four lanes from one side, provide 250 foot longitudinal spacing of 700 watt Type III Medium Distribution Cutoff Luminaries.

When lighting from a narrow median, provide 270 foot longitudinal spacing of 700 watt Type III Medium Distribution Cutoff Luminaries on a six-foot (6') bracket arm.

When lighting irregular areas, the designer will use the enclosed iso-footcandle diagrams in conjunction with the formulae in 15.1.7.3 of the Design Manual in order to provide a uniformity ratio of 4:1 or better, with a maintained intensity of approximately 0.6 footcandle. A maintenance factor of 0.7 will be used in the formulae.

Adaptation lighting should be provided at the exit end of a continuous lighted facility. The same spacing should be used for the adaptation lighting that is used for the continuous lighted facility with wattage reduced from 700 watts to 400 watts for two poles, then to 250 watts for two poles. The poles with the reduced wattage should be wired and computed on the basis of 700 watts in order to provide for continuing the lighting system in the future.

A variance of plus or minus 30 feet is acceptable for all longitudinal spacings.

Poles for basic lighting will be located in accordance with the attached sketches.

Four hundred watt Type III Medium Distribution Cutoff Luminaries will be provided for basic lighting. When the possibility exists for a future continuously lighted facility, the

circuits for basic lighting should be designed for 700 watt luminaries.

Light poles located on the outside of the roadway will be placed 30 feet from the nearest edge of the through lane of the mainline.

Light poles located on ramps will be placed 20 feet from the ramp shoulder.

Light poles located adjacent to auxiliary lanes will be placed 30 feet from the nearest edge of the through lane.

Only two bracket arm sizes will be provided - six foot (6') and fifteen foot (15'). A bracket arm will be specified that will place the luminaire no further than five feet horizontal from the shoulder. This requirement is necessary for maintenance purposes.

A transformer base will be provided for those poles that cannot be located 30 feet from the edge of the through pavement or 20 feet from the shoulder, if not behind guardrail.

Consideration will be given to eliminating the requirement for transformer bases under special circumstances, such as design speed of 40 mph and heavy pedestrian traffic.

General Letter No. 7, with enclosures, voids General Letter No. 43, 1969. For your information, additions and corrections to General Letter No. 43, 1969, are summarized as follows:

1. First page. A statement is added concerning city owned lighting facilities.

An instruction was added which sets out the procedure for providing light poles on existing bridges.

Added tabular values for 700 watt luminaries for Table 15.2 of the Design Manual.

2. Instructions for Continuous Lighted Facilities deletes the statement providing for transformer base when poles are placed 30 feet from the edge of pavement.

Adds conditions under which the transformer base may be deleted, i.e., low speed, heavy pedestrian traffic.

Adds instructions for lighting three- and four-lane facilities.

3. The special sheets "Highway Lighting Details for 45' Mounting Height" and the Special Provision "45' Mounting Heights" have been completely revised and rewritten in order to allow more suppliers to provide the poles. The special sheets and special provision will be inserted in the plans by this office until a Standard Drawing is issued.

4. Instructions for Basic Lighting changes the bracket arm sizes from 6' and 12' to

6' and 15'.

Added Iso-Footcandle diagram for 400 watt luminare at 45' mounting height.

Delete Section 901.3.1 and substitute the following:

901.3.1 Lighting Poles. Lighting poles shall be steel or aluminum meeting the requirements of these specifications and the plans, and shall be of the same materials and design throughout the project. The poles shall be Type AS, Type AT, Type B, or Type MB as designated on the plans. The mounting height of the slip fitter above the pavement, and the pole design numbers will be designated by numbers following the pole type designation. The contractor shall furnish the length of pole and bracket rise designated on the plans. Clamps shall be provided for connecting bracket arms to poles to obtain the designated mounting height. The cable entrance at the bracket arm shall be field drilled. The edges of the hole in steel poles shall be coated with commercially available zinc-rich paint.

(a) Type AS poles shall be either a pole with integral butt base for direct embedment in the ground, or a pole with a shoe base or approved base plate for anchoring to a foundation, as indicated on the plans. Type AS poles shall have a wiring handhole with a suitable metal cover near the base or above the sleeve of the butt base pole as indicated on the plans. Butt base poles may be manufactured with an integral base or at the contractor's option a straight, no-taper section may be shop welded with a butt weld and the sleeve welded with a continuous circumferential weld. All butt base poles will be provided with an underground slot entrance for cable-conduit, and a ground sleeve to extend above and below the ground line welded to the outside of the pole with a continuous circumferential weld. Type AT poles shall have a wiring handhole with a suitable metal cover in the transformer base. Poles shall have a removable rain-tight metal pole cap that will cover poles throughout the range of diameters for pole design numbers 1 through 5. If a photoelectric control is specified, a suitable adapter shall be provided in lieu of the rain-tight pole cap. The ground rod shall be attached to the grounding lug shown on the plans with No. 6 AWG bare copper wire.

(b) Type B poles shall have a wiring handhole with a suitable metal cover near the base, a grounding lug for No. 6 AWG bare copper wire inside the pole convenient to the handhole, and a removable rain-tight pole cap that will cover poles throughout the range of diameters for pole design numbers 1 through 5. If a photoelectric control is specified, a suitable adapter shall be provided in lieu of the rain-tight metal pole cap.

Delete Section 901.3.1.1 and substitute the following:

901.3.1.1 Steel lighting poles shall be round or octagonal shaft poles. The shaft sections shall be fabricated from one length of basic oxygen or open hearth steel

sheet, No. 11 gage. The sheet shall be formed into a tube with one continuous welded longitudinal seam. After manufacture the material shall have a minimum yield strength of 48,000 psi. Shoe base type poles shall be manufactured with a steel shoe base or base plate attached to the lower end of the shaft. The shoe base shall be a one-piece casting conforming to ASTM A 27-65, Grade 65-35, with four anchor bolt holes. It shall be equipped with four cast-steel or cast-iron bolt covers conforming to ASTM A 27-65 or A 48-64, and shall have four galvanized or stainless steel screws for securing covers to the shoe base. The shoe base shall consist of a collar, flange, and gussets, all integrally cast. Ample fillet radii shall be provided at the juncture of these components to reduce the effects of stress concentration. The flange of the base shall be flat and continuous around the outside of the collar. The base shall telescope the shaft and be secured by two continuous welds. One weld shall be on the inside of the base at the end of the shaft, while the other weld shall be on the outside at the top of the base. The shoe base shall be arranged for bolting to a transformer base or to a foundation. Poles, shoe bases, base plates, and covers shall be hot-dip galvanized inside and out after fabrication. The steel base plate shall telescope the shaft and be secured by two continuous circumferential welds. The base shall be not less than 14 inches square and not less than 1 1/4 inches in thickness conforming to ASTM A 36-67. It shall be equipped with four cast-steel or cast-iron bolt covers conforming to ASTM A 27-65 or A 48-64, and shall have four galvanized or stainless steel screws for securing covers to the pole, and shall be arranged for bolting to a transformer base or to a foundation.

Delete Section 901.3.1.2 and substitute the following:

901.3.1.2 Aluminum lighting poles shall be round shaft poles. The shafts shall be manufactured by the spun drawn method from seamless extruded aluminum tubing, ASTM B 221-67, Alloy 6063-T6, and shall have a nominal wall thickness for the lower section of 0.250 inches, and a nominal wall thickness for the upper section of 0.188 inches. Shoe base type poles shall be manufactured with a heavy cast aluminum shoe base attached to the lower end of the shaft. The shoe base shall be a permanent mold casting conforming to ASTM B 108-66, Alloy SG 70A-T6, and shall be free from cracks, pits, and blow holes. The base shall have four anchor bolt holes, shall be equipped with four cast aluminum bolt covers, and shall have four stainless steel fasteners for securing covers to the shoe base. The shoe base shall consist of a collar, flange, and gussets, all integrally cast. Ample fillet radii shall be provided at the juncture of these components to reduce the effects of stress concentration. The flange of the base shall be flat and continuous completely around the outside of the collar. The base shall telescope the shaft and be secured by two continuous welds. One weld shall be on the inside of the base at the end of the shaft, while the other weld shall be on the outside at the top of the base. The shoe base shall be arranged for bolting to a transformer base or to a foundation.

901.3.1.4 Delete the first sentence of this section and substitute the following: Steel pile foundations for steel or aluminum lighting poles shall be of 10 inch by 0.250 inch circular steel pile meeting the requirements of ASTM A 252-63 T, Grade 2, and of the dimensions shown on the plans.

Add the following between the fourth and fifth sentence:

High strength bolts shall conform to ASTM A 325-66B and shall be hot-dip galvanized.

901.4.4.1 Concrete Foundations for Ground Mounted Poles.

Add the following to the end of this section:

Installation of poles on integral concrete median and foundation shall be to the dimensions and design as shown on the plans.

Measurement of Type MB poles, complete in place, will be made as a single item including footing and integral portion of median barrier. No direct payment will be made for footing or integral portion of median barrier for Type MB poles.

901.4.8.3 Modify the fifth sentence of this section to read:

Cable splicing in all types of poles shall be accomplished with a pre-molded fused splice as shown on the plans.

Modify the last sentence of this section to read:

For cable splicing in pull boxes or junction boxes, a heat-shrinkable self-sealing splice may be used in lieu of the above, at the contractor's option.

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Surveys and Plans