

5.000 Design Standards for New Construction

5.100 Applicability

The design standards set forth in Section 5.100 to 5.220 of these Rules apply only to a Developer's new construction or installation of Poles, Luminaires, circuits, Junction Boxes, Service Cabinets, foundations, or other related facilities that are or will become a District Facility. District Facilities that exist as of 8/18/2021 are not required to meet these design standards until a Developer proposes development or redevelopment that interferes with or otherwise impacts existing District Facilities, at which point the Developer must apply for a permit and bring the impacted District Facilities into compliance with the design standards set forth in these Rules.

5.110 Developer Responsibilities

- A. Developer is responsible for all design and construction of new or altered District Facilities in accordance with these Rules and any other local, state, and federal rules, regulations or permit requirements.
- B. Developer is responsible for designing and constructing new or altered District Facilities to the District's Design Standards and standard details.
- C. Developer is responsible for all costs associated with connecting the District Facilities to the utility system and powering the District Facilities until the District accepts ownership of the facilities.
- D. Developer is responsible to coordinate with PGE on a Point of Demarcation within the Public ROW or PUE to power District Facilities, and comply with PGE's rules and standards for Municipal Option C streetlights.

5.120 Lighting Level Design Standards

A. The required light levels for roads within the District’s service area and measured in Footcandles (Fc) are as follows:

Functional Class	Minimum Average Illuminance	Uniformity (Average to Minimum Ratio)
Arterial	0.9 - 1.8 Fc	3.0:1 - 3.5:1
Collector	0.6 - 1.2 Fc	3.0:1 - 4.0:1
Local Residential	0.45 - 0.9 Fc	6.0:1

1. Reference Oregon Department of Transportation, Traffic Lighting Design Manual.

B. At intersections with continuous lighting on all approaching roadways, the light level calculation shall be made for the entire area within the stop lines. The minimum average illuminance values for full intersection lighting are shown in the table below

Functional Class	Minimum Average Illuminance	Uniformity (Average to Minimum Ratio)
Arterial/Arterial	1.7 - 3.2 Fc	3.0:1
Arterial/Collector	1.4 - 2.7 Fc	3.0:1
Arterial/Local	1.2 - 2.4 Fc	3.0:1
Collector/Collector	1.1 - 2.2 Fc	4.0:1
Collector/Local	0.9 - 2.0 Fc	4.0:1
Local/Local	0.7 - 1.7 Fc	6.0:1

1. Reference Oregon Department of Transportation, Traffic Lighting Design Manual.

When only one intersecting roadway has continuous lighting, use the minimum average illuminance values in the following table for the intersection lighting design.

Functional Class	Minimum Average Illuminance	Uniformity (Average to Minimum Ratio)
Arterial	0.8 - 1.5 Fc	3.0:1
Collector	0.6 - 1.2 Fc	4.0:1
Local	0.4 - 0.8 Fc	6.0:1

1. Reference Oregon Department of Transportation, Traffic Lighting Design Manual.

C. Crosswalks shall be illuminated as follows:

1. **Crosswalks at signalized intersections:** illuminate consistent with the corresponding intersection.
2. **Marked crosswalks at unsignalized intersections:** illuminate consistent with the corresponding intersection. The maintained average vertical illuminance at the marked crosswalks shall be consistent with the intersections's light levels.
3. **Signalized marked mid-block crosswalks:** (including midblock crossings with flashing beacons): illuminate to the roadway segment level. The maintained average vertical illuminance shall be at least 1.0 foot-candles (Fc). For areas with high pedestrian conflict, the maintained average vertical illuminance shall be 1.5 Fc. Areas of high pedestrian conflict would include facilities with significant numbers of pedestrians expected to be on the sidewalks or crossing the streets during darkness. Examples are school zones, downtown retail areas, near theaters, concert halls, stadiums, and transit terminals.
4. **Marked Crosswalks at unsignalized midblock crossings:** the maintained average vertical illuminance shall be at least 1.5 Fc. For areas with high pedestrian conflict the maintained average vertical illuminance shall be 2.0 Fc. Areas of high pedestrian conflict would include facilities with significant numbers of pedestrians expected to be on the sidewalks or crossing the streets during darkness. Examples are school zones, downtown retail areas, near theaters, concert halls, stadiums, and transit terminals.

5. **Maintained average vertical illuminance** shall be measured in a line at the center of the crosswalk, parallel to the direction of pedestrian travel, five feet above the roadway surface, with calculation points oriented toward oncoming traffic. Spacing of grid points shall be 2 ft.
- D. For roundabouts, train crossings, tunnels, and other special traffic features, the illumination should be consistent with the recommendations in the current version of Illuminating Engineering Society RP-8.
- E. Temporary lighting standards during construction should follow the following requirements:
1. Average illuminance = 0.8 Fc minimum; uniformity 4:1 to 6:1.
 2. Critical (decision points) areas of roadway = 1.2 Fc.
 3. Use wood poles for temporary illumination. When the temporary installation is for construction lasting over one year, treatment on the wood poles is required.

5.130 Standard Street Light Layout and Type

All new District Facilities must follow the layout requirements outlined in the table below and further identified in the District’s Streetlight Sheets:

Zone	Functional Class	Mounting Height (ft)	Color Temperature	Street Side	Luminaire
Standard ¹	Arterial	35	4000K	Both	Cobrahead
	Collector	35	4000K	Both or One Side	Cobrahead
	Local	25	3000K	One Side	Cobrahead
Neighborhood Decorative ²	Arterial	16	3000K	Both	Neighborhood Post Top
	Collector	16	3000K	Both	Neighborhood Post Top
	Local	14	3000K	One Side	Neighborhood Post Top
Troutdale Town Center ³	Collector	16	3000K	Both	Troutdale Halsey Post Top
	Local	14 or 16	3000K	One Side	Troutdale Halsey Local Post Top

Troutdale Historic Downtown ⁴	Local	11 or 12	3000K	Both	Historic Post Top
Fairview Halsey ⁵	Arterial	16	3000K	Both	Fairview Halsey Post Top
Portland Urban Pocket ⁶	Arterial	35	4000K	Both	Cobrahead
	Collector	35	4000K	Both or One Side	Cobrahead
	Local	14	3000K	One Side	Neighborhood Post Top

1. Reference Exhibit A for detailed map of Standard Street Light Zone
2. Reference Exhibit B for detailed map of Neighborhood Decorative Zone
3. Reference Exhibit C for detailed map of Troutdale Town Center Zone
4. Reference Exhibit D for detailed map of Troutdale Historic Downtown Zone
5. Reference Exhibit E for detailed map of Fairview Halsey Zone
6. Reference Exhibit F for detailed map of Portland Urban Pocket Zone

5.140 Pole Location

All Poles shall be located in the Public ROW consistent with the following requirements:

- A. Poles shall be located a minimum of 24 inches from the face of curb, measured from the center of Pole.
- B. Poles shall be located 5 feet or more from the wing of any style Private Driveway.
- C. If located within the sidewalk, Poles shall be located to provide a minimum of 4 feet clear pedestrian space. In constrained areas, a Developer may apply for a variance under Section 5.220 for the clear pedestrian space to be reduced to less than 4 feet.
 - 1. Poles shall not be centered in sidewalks that are wide enough to accommodate 4 feet of clearance on either side of the Pole.
- D. The location of the Pole shall meet any clear space requirements of the Americans with Disabilities Act.
- E. The location of the Pole shall maintain required clearance to existing utilities. Some utilities may be located behind the curb, near the preferred Pole location. In such cases, the Pole may be located farther behind the curb, provided that recommended light levels and Americans with Disabilities Act clearances are met.
- F. Poles located in intersections should be located on the radius line at point of curve/point of tangent location.
- G. Poles located in cul-de-sacs are preferably located at the entry throat.
- H. For dead-ends streets, at least one Pole shall be located within 50 feet of the end of the street.
- I. Poles shall be located on lot lines where required lighting levels can be achieved.

5.150 Circuits

All new District Facilities must be compliant with the National Electric Code (NEC). In addition, the Developer shall design the circuit to meet the following standards:

- A. The wiring shall be sized to provide a maximum voltage drop of 2% from the utility service point to the panel and a maximum voltage drop of 3% from the panel to the light farthest from the panel on each circuit.

- B. Maximum wire size shall be No. 2 AWG.
- C. Minimum wire size shall be No. 10 AWG.
- D. All Conduits between Junction Boxes must have a #14 AWG locate wire that is orange with either blue stripe or blue markings. Locate wires must be tied together in each Junction Box and a spare 18" must be looped in each Junction Box. Empty Conduits must have a poly pull line, 500 lb. rated, with 6' of line extending from each end.
- E. Inline fused disconnects with 5 amp slow blow fuses are required in each Junction Box or Pole base.
- F. Street lighting electrical system and Service Cabinets shall be isolated from all other electrical systems. No other electrical systems will be allowed in Service Cabinets.
- G. Multi-phase conductors shall be color-coded.
- H. When more than one circuit is contained in a Conduit run, each load conductor shall have its own separate neutral. No "shared" neutrals shall be permitted.
- I. Street lighting systems behind a service panel or Service Cabinet shall be controlled by a single master photo-electric cell per panel on the Pole nearest the panel or Service Cabinet.
- J. In systems with lights on both sides of a street, the circuitry shall be designed such that the lights on one side of the street can be de-energized without affecting the operation of the lights on the opposite side of the street.
- K. #10 AWG Copper TC cable shall be used between the fused disconnect and the light fixture.
- L. Install grounding and bonding per the NEC and Section 00960.45 of the Oregon Standard Specifications for Construction Latest Edition

5.160 Conduit

All Conduits installed as part of District Facilities must meet the following standards:

- A. All Conduits must be gray electrical grade schedule 40 PVC.
- B. Flex duct is allowed only for:
 1. Installation inside Poles to provide separation between utility and District wiring, or
 2. Separation between electrical wiring and irrigation.

- C. Two-inch diameter Conduit is required for all runs, except that one-inch diameter Conduits may be used to run from the Junction Box to the Pole.
- D. For Conduit runs longer than 150 feet or containing bends of 270 degrees or more, elbows are to be Intermediate Metal Conduit (IMC), rigid steel, or PGE approved fiberglass as identified on the “PGE Approved Street Lighting Equipment for New Installations - Outdoor Lighting Services.”
- E. 36-inch radius elbows are required for all Conduit runs longer than six feet.
- F. 24-inch radius elbows are allowed for one-inch Schedule 40 PVC Conduit runs of six feet or less.
- G. All elbow bends must be factory made.
- H. All Conduit and elbow ends shall be smooth and free of burrs and rough edges.
- I. For Conduit end treatment, refer to Oregon Standard Specifications for Construction Latest Edition Section 00960, and Oregon Standard Drawing Latest Edition TM472.
- J. All Conduit runs must be marked with an underground marking tape per Oregon Standard Drawing Latest Edition TM472.

5.170 Trenching

All trenching installed as part of District Facilities must meet the requirements of Oregon Standard Drawing Latest Edition TM471 and Oregon Standard Specification for Construction Latest Edition, Section 00960.

5.180 Junction Boxes

Junction Boxes installed as part of District Facilities must meet the following standards:

- A. 13”x24”x18” Junction Box must be installed adjacent to each Pole.
- B. 17”x30”x18” Junction Box must be installed on each side of all street crossings.
- C. Junction Boxes installed in unpaved areas must include a 1’ concrete apron.
- D. Location for Junction Boxes is within the sidewalk, and, if present, outside the pedestrian through zone.

- E. Junction Boxes shall not be installed in travel lanes, shoulders, Private Driveways, or other areas exposed to traffic.

5.190 Service Cabinet

Service Cabinets installed as part of District Facilities must meet the following standards:

- A. Coordinate with the District Administrator to connect to an existing Service Cabinet in the project vicinity, or install a new Service Cabinet when connection to an existing Service Cabinet is not possible.
- B. Service Cabinets shall be 120/240 Volt, 100 Amp, unmetered, and ground-mounted, except under the following circumstances:
 - 1. A pole-mounted Service Cabinet may be allowed where only 1 to 3 lights will be connected to a service, and there is no possibility of future extension of the lighting circuit or future installation of additional lighting circuits; or
 - 2. A utility metered service shall be required for installations including GFCI circuits.
- C. Service Cabinets shall be installed behind the sidewalk with the load side oriented toward the sidewalk.
- D. When installing long runs of street lighting, the Service Cabinet shall be located near the center of the run to conform with the District's voltage drop requirements in 5.150 (A).
- E. Service Cabinets shall be installed on property lines between lots if feasible.
- F. Service Cabinets shall be installed in the Public ROW or PUE.
- G. Install the Service Cabinet and associated equipment early on to allow the utility to schedule its work prior to project completion.

5.190 Variance from Design Standards

- A. A Developer may apply in writing to the District Administrator for a variance from the following design standards:
 - 1. Pole location (Section 5.140); and
 - 2. Materials listed on the Streetlight Sheets.
- B. An application for a variance to the Pole location standard shall be made in writing to lightout@multco.us or through the Permit Portal and must include:

1. The current or required Pole location;
 2. The standard sought to be varied;
 3. What variance is sought; and
 4. An explanation for why a variance is necessary under the criteria outlined below.
- C. An application for a variance to the materials listed on the Streetlight Sheets may be made on the Streetlight Sheets when submitted and shall include:
1. The materials on the Streetlight Sheets sought to be varied;
 2. A description of the materials sought to be used;
 3. A manufacturer's specifications sheet or cut sheet describing the materials sought to be used; and
 4. An explanation for why a variance is necessary under the criteria outlined below.
- D. A Variance from District design standards may be allowed by the District Administrator based on the following general criteria:
1. Special circumstances or conditions apply to the property or intended use that do not apply to other properties or uses in the same area. The circumstances or conditions may relate to the size, shape, natural features and topography of the property; the location or size of physical improvements on the site; or the nature of the use compared to surrounding uses;
 2. The variance is necessary for the preservation and enjoyment of a substantial property right of the Developer and extraordinary hardship would result from strict compliance with the standards;
 3. The authorization of the variance will not be materially detrimental to the public welfare or injurious to other property in the vicinity, or adversely affect the appropriate development of adjoining properties; and
 4. The circumstances of any hardship are not of the Developer's making.

5.200 Miscellaneous Items

All workmanship and materials installed as part of District facilities not covered within the project plans, the project special provisions, Section 5, or the District's Streetlight Sheets shall conform to Oregon Standard Specifications for Construction Latest Edition Section 00960, and Oregon Standard Drawings.

5.210 Removal of Streetlight Facilities

Removal of District Streetlight Facilities shall conform to Oregon Standard Specifications for Construction Latest Edition, Section 00960, the project plans, and the project special provisions.