

## PWDS APPENDIX H

### Lighting Standards & Dark Sky/Outdoor Lighting Requirements

#### **H.1 GENERAL**

- a. Improperly designed or installed luminaires may cause over lighting and uneven lighting patterns, resulting in light pollution and wasted resources, and can reduce the ability to see clearly at night, therefore creating a safety hazard, and
- b. The people who live in and near Dundee value the natural environment, including the beauty, and visibility of the night sky, and desire to protect it as it adds to the rural character, quality of life and economic well being of the City.
- c. The following Lighting Standards & Dark Sky/Outdoor Lighting Requirements will be cited routinely in the text as the "Standards."
- d. Wherever specific supplementary standards are indicated (ie. IESNA \_\_\_\_\_), it shall be understood to mean the latest revision thereof.
- e. In interpreting these Standards, it is understood that: (1) if the context so requires: (a) the singular pronoun shall be taken to mean and include the plural pronoun; (b) the masculine pronoun shall be taken to mean the feminine and the neuter pronoun; and (2) all captions used therein are intended solely for the convenience of reference and shall in no way limit any of the provisions of these Standards.
- f. In the case of conflicts between the text of these construction standards and the standard details in the PWDS, or between the provisions of these standards and the PWDS, the more stringent as determined by the Building Inspector, City Administrator and/or Supervisor of Public Works shall apply.

#### **H.2 DEFINITIONS AND TERMS**

- a. Unless specifically defined below, words or phrases used in these Standards shall be interpreted so as to give them the meaning they have in common usage and to give these Standards its most reasonable application.
  - 1) Area light: A luminaire equipped with a lamp that produces over one thousand eight hundred (1,800) lumens. Area lights include, but are not limited to, streetlights, parking lot lights, yard lights, floodlight and walkway path lighting.
  - 2) Average horizontal footcandle: The average level of illuminance for a given situation measured at ground level with the light meter placed parallel to the ground.

- 3) Building Official: The City of Dundee Building Official.
- 4) Canopy lighting: Commercial lighting fixtures typically used for service station or similar canopies.
- 5) Cut-off fixture: A fixture that provides a cutoff (shielding) of the emitted light.
- 6) Drop (Sag) lens: A light fixture which includes a reflector (mirror) or refractor (lens), which drops or sags below the fixture itself, producing light pollution and causing light to be directed above a 90 degree angle (see Lighting Appendix A).
- 7) Eighty-five (85) degree cut-off type of luminaries: Luminaires that do not allow light to escape above an eighty-five (85) degree angle measured from a vertical line from the center of the lamp extended to the ground (see Lighting Appendix B).
- 8) Exterior lighting: Temporary or permanent lighting that is installed, located or used in such a manner to cause light rays to shine outdoors. Luminaires that are indoors that are intended to light something outside is considered exterior lighting for the purpose of these Standards.
- 9) Flood light: A lamp that produces up to one thousand eight hundred (1,800) lumens with a beam spread greater than 110 degrees that is designed to flood an area with light.
- 10) Footcandle (fc): The American unit used to measure the total amount of light cast on a surface (illuminance). One footcandle is equivalent to the illuminance produced by a source of one candle at a distance of one foot. For example, the full moon produces .01 f.c as measured with a light meter. One footcandle, the British Unit, is approximately equal to ten (10) lux, the metric unit used to measure illuminance.
- 11) Full cut-off luminaries: A luminaire designed and installed where no light is emitted at or above a horizontal plane running through the lowest point on the luminaire lamp, reflector, refractor, or glass cover.
- 12) Fully shielded: A luminaire incorporating a solid barrier (the shield), which permits no light to escape through the barrier or shine above a horizontal plane through the luminaires' lowest lightemitting part.
- 13) Fully shielded spotlight: A fixture or lamp designed to light only a small area and having a beam spread of less than 110 degrees. The luminaire incorporates a solid barrier (the shield), which permits no light to escape through the barrier or shine above a horizontal plane through the luminaires lowest light-emitting part.

- 14) Illuminance: The amount of light falling on any point of a surface measured in footcandles /lux.
- 15) IESNA: Illuminating Engineering Society of North America (IES or IESNA). The professional society of lighting engineers.
- 16) IESNA Recommended Practices: The current publications of the IESNA setting forth illuminance levels.
- 17) Lamp: The generic term for an artificial light source, to be distinguished from the whole assembly (see Luminaire). Commonly referred to as “bulb”.
- 18) Light: The form of radiant energy acting on the retina of the eye to make sight possible.
- 19) Light pollution: Artificial light emitted from a premises so as to be prejudicial to health, cause a safety hazard or create a nuisance.
- 20) Lighting: Any or all parts of a luminaire that function to produce light.
- 21) Lumen: The unit used to quantify the amount of light energy produced by a lamp at the lamp. Lumen output of most lamps is listed on the packaging. For example, a 60-watt incandescent lamp produces 900 lumens while a 55-watt low-pressure sodium lamp produces 8000 lumens.
- 22) Luminaire: A complete lighting unit, consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power. When used, includes ballasts and photocells. Commonly referred to as “fixture”.
- 23) Luminance: At a point and in an given direction, the luminous intensity of the given direction produced by an element of the surface surrounding the point divided by the area of the projection of the element on a plane perpendicular to the given direction. Units: Candelas per unit area. The luminance is the perceived brightness that we see the visual effect of the illuminance, reflected, emitted or transmitted from a surface.
- 24) Measurement:
  1. Lamp output
    - a. Total output: Measurement of total output is in lumens. This should be understood to be the initial lumens value for the lamp.
    - b. Illuminance: Measurements of illuminance are expressed in initial footcandles.

- c. In measuring illuminance, the light detector should be pointed directly at the light source or sources from ground level. The intervening light path should be free of obstruction.
- 25) Outdoor light fixture: An outdoor illuminating device, outdoor lighting or reflective surface, luminous tube, lamp or similar device, permanently installed or portable, used for illumination, decoration, or advertisement. Such devices shall include, but are not limited to lights used for:
  - 1. parking lot lighting
  - 2. roadway lighting
  - 3. buildings and structures
  - 4. recreational areas
  - 5. landscape lighting
  - 6. billboards and other signs
  - 7. product display area lighting
  - 8. building or structure decoration
  - 9. building overhangs and open canopies
- 26) Nadir: The point exactly downward from a luminaire.
- 27) Partially shielded: A luminaire incorporating a translucent barrier concealing the lamp but allowing some light to pass through. A light fixture with a partial shield around the lamp on the top and or sides.
- 28) Recessed light: A luminaire, no part of which extends beyond the exterior plane of a structure or portion of a structure in which it is installed.
- 29) Replacement: Replacement of a pre-existing outdoor light fixture.
- 30) Shielded: A luminaire constructed so light is projected below a horizontal plane running through the lowest point of the fixture where light is emitted, the lamp is not visible from the elevation of the luminaire, and no light is emitted from its sides. Also considered a full cut-off fixture.
- 31) Skyglow: The overhead glow from light emitted sideways and upwards. Skyglow is caused by the reflection and scattering of light by dust, water vapor and other particles suspended in the atmosphere. Skyglow reduces one's ability to view the night sky.
- 32) Spotlight: A fixture or lamp designed to light only a small area and having a beam spread of less than 110 degrees.
- 33) Stray light: Emitted light that falls away from the area where it is needed or wanted.

- 34) Temporary lighting: Lighting that is intended to be used for a special event for seven days or less.
- 35) Uplighting: Fully shielded lighting that is directed in such a manner as to shine light rays above the horizontal plane.

### **H.3 OUTDOOR LIGHTING**

- a. Purpose: The purposes of the outdoor lighting standards are to:

- 1) Provide adequate light for safety and security;
- 2) Promote efficient and cost effective lighting and to conserve energy;
- 3) Minimize light pollution, glare, and nuisance light sources;
- 4) Consistently and evenly illuminate street area, while minimizing blind spots and shadows created by harsh light;
- 5) Prevent inappropriate, poorly designed or installed outdoor lighting;
- 6) Encourage quality lighting design, especially light fixture shielding;
- 7) Provide an environmentally sensitive nighttime environment that protects and reclaims the ability to view the night sky.

- b. Scope: These Standards shall apply to all new single family residential, multifamily residential, commercial, industrial and public outdoor lighting. Nothing in these Standards shall apply to any residence existing at the time of the adoption of these Standards.

- 1) Conformance under Development or Building Permit: Compliance with the requirements of these Standards shall be required for all new or multi-family residential (triplex or larger), commercial, industrial and public development for which a development or building permit is required.
- 2) Replacement Fixtures: When an existing fixture (excluding replacement bulbs) is replaced in any multi-family residential, commercial, industrial or public development, the replacement fixture shall meet the requirements of these Standards.
- 3) Nonconforming Uses or Structures: If a nonconforming use or structure has been abandoned for more than twelve months, or if the nonconforming use of the structure changes, all outdoor lighting on the property must be brought into full

compliance before reoccupation or reuse.

- 4) Agency Compliance: All governmental agencies, federal state or county, which operate within the Dundee City Limits shall comply with the requirements of these Standards, except as otherwise provided by state or federal law.
  - a) Public Facilities: All exterior lighting fixtures at City owned facilities within the City of Dundee must be brought into compliance with these Standards within two years of adoption of these standards regardless of whether the lighting in question was already in place. This requirement does not apply to street lights owned by the City or utility.
  - b) Power Supplier and Lighting: No street light that lights the public right-of-way may be installed and energized without prior approval by the City Administrator or his/her designee, after the effective date of these Standards.
- c. Design Standards: No person shall install any exterior lighting that fails to meet the requirements of these Standards:
  - 1) Shielding and Orientation:
    - a) Shielding: Outdoor light fixtures shall be shielded or recessed, except as otherwise provided in these Standards.
    - b) Orientation: Outdoor light fixtures shall be directed downward, and away from adjacent residential properties and public rights-of-way, except as provided in these Standards.
  - 2) Use of High Pressure Sodium Lamps: Full cut-off high pressure sodium lamps, not exceeding a maximum lumen rating of 16,000 lumens, may be used in outdoor storage areas and other similar areas not accessible to the general public.
  - 3) Landscaping Lighting: Lighting not exceeding 100 watts or 1600 lumens may be directed at specific landscape features within the property boundaries of the site. Lighting shall be substantially confined to the intended plant(s) or other landscape features.
  - 4) Upward Lighting: Upward lighting is permitted only if the light:
    - a) does not exceed 1600 lumens, or in the case of a flag pole, one luminaire not exceeding 3500 lumens;
    - b) except for a flag pole, is prevented from projecting into the sky by walls,

eaves, or overhands, and

- c) is mounted as close as possible to the ground and to the feature lit.
- 5) Unshielded Lighting Activated by a Motion Sensor: Lighting not to exceed 1650 lumens may be left unshielded if;
- a) The light will go on only when activated;
  - b) Goes off within five minutes of motion cessation; and
  - c) Is not be activated by any movement or activity located on adjacent property except by express permission of the adjacent property owners(s);
- 6) Free Standing "Lamp Post" Luminaires: Luminaires with light output greater than 60 watts (900 lumens) or clusters of lights with more than 3500 lumens must be fully shielded. Lamp post fixtures with light outputs less than 55 watts must be partially shielded.
- 7) Standards for Lights Within or Adjacent to Residential Zoning Districts, Residential Uses or Public Right-Of-Ways: Any light fixture (except public street lights or single family residential structure lights) in a residential zone or existing residential use areas, or within ten feet of a public right-of-way shall be:
- a) Classified as a full cutoff IESNA Type II, III or IV light fixture [but not Type V]; and
  - b) Shielded on and aimed away from, the side closest to the nearest property line, residential structure, or public right-of-way.
- 8) Canopy Lighting: Lighting fixtures mounted under canopies shall be mounted downward and installed such that that bottom of the light fixture is recessed or mounted flush with the bottom surface of the canopy. A full cut off light fixture may project below the underside of a canopy. No lighting except that permitted by the sign ordinance shall be permitted on top or sides of a canopy.
- 9) Decorative Commercial Lighting: Decorative festoon type lights used in a commercial setting is permitted, limited to small individual bulbs on a string where spacing of bulbs is not closer than three inches and where output per bulb is no greater than 7 watts or 50 lumens. Blinking, flashing, moving, revolving, flickering, modulating, and chasing lights are permitted only during the seasonal period.
- 10) Area Lighting: All area lights shall be full cut-off luminaires. Area lights include



but are not limited to streetlights, parking lot lights, yard lights, floodlights, and walkway path lighting.

- 11) Full Cut Off Fixtures: Full cut off fixtures shall be installed in a horizontal position as designed. Sag lens lighting fixtures are not permitted.
- 12) Floodlighting: Floodlights with external shielding shall be angled provided that no light is directed above a twenty-five (25) degree angle measured from the vertical line from the center of the light extended to the ground, and only if the luminaire does not cause light pollution. Floodlights without directional shielding are not permitted.
- 13) Radio Towers: Lighting radio, communication and navigation towers that require lights shall have dual lighting capabilities. FAA requirements for tower lighting are applicable but should not be exceeded.
- 14) Maximum Light Standards: No person shall operate or install any device which produces light in excess of the levels specified in these Standards. In the event an applicant utilizes fixtures producing light at the highest level permitted for a specific use area, such lighting shall be confined to the particular use area.
- 15) Illuminance levels for parking lots, sidewalks, and other walkways affected by side-mounted building lights, and freestanding sidewalk lights and pathways shall not exceed illuminance levels listed in the most current IESNA Recommended Practices. [See References: IESNA RP-33-99 Lighting for Exterior Environments; IESNA RP-20-98 Lighting for Parking Facilities; IESNA DG 5-94 Recommended Lighting for Walkways and Class I Bikeways. See PGE Dark Sky Friendly Fixture Recommendations]
- 16) Streetlights shall be high-pressure sodium, unless otherwise determined that another type is more efficient. Streetlights along residential streets (excluding intersections) shall be limited to one hundred (100) watt high-pressure sodium (hps) fixtures. Street lights along nonresidential streets or at intersections shall be limited to one hundred fifty (150) watts hps fixtures, except that lights at major intersections on state highways shall be limited to two hundred fifty (250) watts hps. If a light type other than high-pressure sodium is permitted, then the output of the alternate light type shall not exceed the equivalent hps fixture. Illuminance levels shall conform with the most current IESNA RP-8-00 Roadway Lighting.
- 17) Streetlights used on residential streets (excluding intersections) may not exceed a nominal twenty five (25) feet in height. Streetlights used on collector streets or intersections may not exceed a nominal thirty (30) feet in height. Streetlights on other rights-of-way may exceed this 25 feet with the recommendation by the



Planning Commission, and only with a finding that exceeding 25 feet is necessary to protect the safety of the residents of Dundee.

- 18) Freestanding Area Luminaires: All freestanding area lights within a residential zone, except street lights, shall conform to the following pole height and distance to the property line requirements.

- a) Height: The post must be at least six feet from the property line, and conform to the following height requirements:

Pole Height	Distance to Property Line
25'	16 feet
8'	15 feet
7'	12 feet
6'	9 feet
5'	6 feet

- 19) Parking lot light poles shall not exceed 25 feet in height. Seventeen (17) feet is the recommended standard.

- 20) Luminaires used for playing fields shall be exempt from the height restriction provided all other provisions of these Standards are met and the light is used only while the field is in use.

- d. Prohibitions: The following types of outdoor lighting fixtures are prohibited in any new or replacement installation:

- 1) The installation of any mercury vapor light fixture or lamp for use as outdoor lighting is prohibited. This does not apply to any replacement bulbs for these fixtures.
- 2) Search lights, laser source lights or any similar high intensity light for outdoor advertising or entertainment is prohibited except in emergencies by police and fire personnel.
- 3) Low pressure sodium lamps.
- 4) Blinking, flashing, moving, revolving, flickering, changing intensity or color, and chase lighting, except light for temporary seasonal displays and light for public safety.
- 5) Any light fixture that may be confused with or construed as a traffic control device.
- 6) Upward lighting except as otherwise provide for in these Standards.

- 7) Drop (sag) lens lighting fixtures are not permitted.
- e. Exceptions: These Standards shall not apply to the following types of exterior lighting:
- 1) Fossil Fuel Light: Fossil fuel light produced directly or indirectly by the combustion of a natural gas or other utility-type fossil fuels is exempt from the provisions of these Standards. All Fossil fuel lighting must include an opaque top so as to minimize skyglow.
  - 2) Ornamental Lighting: Low wattage (24 volt or less) ornamental landscape lighting fixtures, and solar operated light fixtures having self-contained rechargeable batteries, where any single light fixture does not exceed 500 lumens.
  - 3) Police, Fire Department & Public Works and Other Emergency Services Lighting: Vehicular lights and all temporary emergency lighting needed by the Fire and Police Departments, Public Works, or other emergency services shall be exempt from the requirements of these Standards.
  - 4) Recreational Lighting: Luminaires used for sports facilities and playing fields shall be exempt from the height restriction provided all other provisions of these Standards are met and the light is used only while the field is in use. Illumination for outdoor recreation facilities should be shielded, or be so designed or provided with full cut-off capabilities, so as to minimize uplight, light pollution and glare.
  - 5) Seasonal Lighting Displays: Seasonal lighting displays are allowed.
  - 6) Single Family Residential: Existing single family residential uses are exempted from the requirements of these Standards. Permits for new single family residential structures or remodeling of single family residential structures are exempted from the requirements of these Standards.
  - 7) Strings of Light: Strings of light, not exceeding a maximum of 50 lumens per lamp (equivalent of a seven watt C9 incandescent light bulb) on properties located in all residential zoning distraction or on properties that are used exclusively for residential uses shall be exempt from the requirements of this chapter. Decorative festoon type lights used in a commercial, limited to small individual bulbs on a string where spacing of bulbs is not closer than three inches and where output per bulb is no greater than 7 watts or 50 lumens.

#### **H.4 PROCEDURES AND SUBMITTALS**

- a. **Applications:** All applications relating to new commercial, industrial or residential construction shall include an exterior lighting plan to be reviewed for compliance with these Standards. Change of use or change of occupancy for commercial or industrial property following an improvement or change of use will require an exterior lighting plan to be reviewed for compliance with these Standards.
- b. The Building Inspector and City Administrator (or his/her designee) shall review any new exterior lighting or any existing exterior lighting on subject property that is part of an application for design review, conditional use permit or planned unit development approval to determine whether the exterior lighting complies with the standards within the scope of these Standards.
- c. Street lighting plans shall be reviewed and approved by the City Engineer and Public Works Supervisor in conjunction with the review of the street or public improvement plans with which the street lights are associated.
- d. **Lighting Plan Required:** Any non-residential building permit application, conditional use permit, planned unit developments plan, subdivision approval plan, and applicable sign permit (in which outdoor lighting is proposed or required) shall include lighting plans showing location, type, height, wattage/lumen output, and illuminance levels in order to verify that lighting conforms to the provisions of these Standards. The lighting plan shall include:
  - 1) A site plan showing the location of all building and building heights, parking, and pedestrian areas on the lot or parcel;
  - 2) The location and height above grade of all proposed and existing light fixtures on the subject property;
  - 3) The type, initial lumen rating and wattage of each lamp source;
  - 4) The general style of the light fixture. This may include a copy of the manufactures catalog information sheet and IESNA photometric distribution type, including any shielding information such as house side shields, internal and/or external shields;
  - 5) Control descriptions including type of controls (timer, motion sensor, time clock, etc) the light fixtures to be controlled by each type, and control schedule when required;
  - 6) Aiming angles and diagrams if for sports lighting fixtures.

- e. Final Inspection and Certification: Prior to the issuance of an occupancy permit, the applicant shall provide certification that the outdoor lighting as installed complies with these Standards and with the approved lighting plan. The certification may be completed by an architect, electrical engineer, electrical contractor, or lighting consultant licensed in the state of Oregon, or by the property owner for residential construction performed by the owner/occupant;
- f. The City Administrator or his/her designee may certify that an applicant has met the requirements of these Standards by using designs, materials, or methods not specifically prohibited that result in equivalent reduction of light pollution and that meet the requirements of these Standards.
- g. Equivalent Materials: The provisions of these Standards are not intended to prevent the use of any design, material or method of installation not specifically prohibited by this article provided any such alternate has been approved by the City Administrator or his/her designee. The City Administrator or his/her designee may approve any such alternate if the proposed design, materials or methods provide an equivalent method of satisfying the standards in these Standards.
- h. A variance from the provision of these Standards may only be approved if the City finds that both of the following criteria apply.
  - 1) Reasonable safety problems may result from lighting used in accordance with these Standards, and
  - 2) there are occupational safety lighting requirements for activities or processes that occur outdoors that are required by another governmental agency.