

Lighting Policy and Guidelines

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**Delivery & Operations Division
Traffic-Roadway Section**

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1.0 – General

The Oregon Department of Transportation is generally responsible for providing the design, installation and maintenance of roadway lighting on the state highway system. Individuals and/or local agencies may request to provide the design, installation and maintenance of a lighting system on state highways.

The purpose of the Lighting Policy and Guidelines is to assist in the lighting design of future construction and reconstruction projects on state highways. It is not intended that existing lighting systems be modified as a result of this policy. For detailed design practices, please refer to the Traffic Lighting Design Manual.

This policy draws from several sources documented in the reference section. The American Association of State Highway and Transportation Officials (AASHTO) provides general lighting policy Roadway Lighting Design Guide (2018) for the national standards. Therefore, this policy addresses items not included in the AASHTO guide or provides additional information on included items.

2.0 – Roadway Lighting Warrants

ODOT does not use specific lighting warrants to determine whether lighting is provided on a project. The decision to install lighting is made after an investigation is conducted. ODOT uses engineering judgement of local conditions, considering such factors as traffic and crash data, roadway characteristics, and availability of funds, to support lighting installation decisions. AASHTO provides the threshold, or minimum conditions, of when to consider lighting.

In order to conserve energy, while providing necessary lighting for motorist safety, crash rates and geometric layouts are the primary considerations for warranting lighting.

Traffic volumes are a supplemental measure in evaluating warrants for lighting. Use engineering judgment in instances where an operational or safety concern is not indicated by the crash rate. Consider the type and circumstances of crashes in an investigation, as well. The investigation should consider non-motorized modes, such as pedestrians and bicyclists safety, as well as motor vehicle safety.

For luminaire selection, light emitting diode (LED) luminaires are the preferred choice for improved energy efficiency and low maintenance requirements. LED luminaires are now ODOT standard for new lighting installations on state highways. High Pressure Sodium (HPS) lighting may be installed when the project work replaces and matches the existing lighting system. Detailed specifications for LED luminaires are in the [Oregon Standard Specification for Construction](#) and project-specific special provisions.

The following sections describe warranting conditions for specific facility types. Meeting these warranting conditions does not obligate ODOT to provide lighting, nor is it a requirement for installation of lighting in special circumstances.

2.1 – Freeways and Freeway-like Facilities (Expressways) with Full Access Control

Consider the following when evaluating whether lighting is appropriate for highways that are freeway, or freeway-like, facilities with full access control.

2.1.1 – Interchanges

Lighting is usually considered for interchange locations that meet the minimum AASHTO warranting conditions. For those that do, partial interchange lighting is the standard design method on freeways. Additional interchange lighting may be considered with one or more of the following characteristics:

1. Ramps, interchange alignments, or grades are complex or unusual. This includes ramps with substandard deceleration or acceleration lanes.
2. High levels of pedestrian or bicyclist activities are present or expected during times of darkness and where pedestrian and bicycle route connections are nearby.
3. Partial interchange lighting would not cover important decision point(s) or existing roadside hazard areas.
4. Operational analysis indicates the need for lighting. Use volume and crash data to support the analysis.
5. Mainline sections have full lineal lighting.
6. Roundabouts installed at highway sections or ramp terminals.

2.1.2 – Lineal Sections

Lineal lighting may be considered on facilities with one or more of the following characteristics:

1. Outside or median shoulders of the roadway do not meet standard minimum widths in the AASHTO Policy on Geometric Design of Highways and Streets (2011).
2. High traffic-volume sections with vertical or horizontal alignments are such that lighting would be beneficial to drivers and bicyclists at nighttime.
3. A crash analysis indicates both of the following:
 - a. At least 30 percent of crashes occur at night.
 - b. The total crash rate for the section exceeds the critical crash rate, as defined in the Highway Safety Manual (HSM).

4. A crash analysis indicates a higher than expected frequency of nighttime crashes and the analysis indicates that lighting would be a cost effective measure.
5. There are three or more successive interchanges with complete interchange lighting located one mile or less between adjacent interchanges.
6. Sections adjacent to a developed area where the presence of off-highway lighting affects visibility on the mainline.
7. Where a new pedestrian/bikeway crossing is installed in expressway.

2.2 – Highways Outside City Limits (Non-Freeways)

Consider the following when evaluating whether lighting is appropriate for highways that are not freeway, or freeway-like, facilities with full access control.

2.2.1 – Lineal Sections

Lighting may be considered if a crash analysis indicates that both 1) at least 30 percent of crashes occur at night, and 2) the total crash rate for the section exceeds the critical crash rate as defined in HSM.

As an alternative, HSM methods may be used to analyze frequency of nighttime crashes for the evaluation and selection process of the project. Also, high-speed high-volume sections with pedestrian/bikeway facilities may be considered for lighting installation.

2.2.2 – Intersections

An intersection without traffic signal may be considered for lighting when at least 30 percent of crashes occur at night and the total crash rate for the section exceeds the critical crash rate, or when crash data show higher-than-usual occurrence of pedestrian and or bicyclist involvement at night. Calculate crash rates for intersections on per million entering vehicle basis. Consider engineering judgment and other factors such as total lighting cost and fund availability. Also, intersections with high traffic volume or higher levels of pedestrian and or bicyclist activity at nighttime may be considered for lighting installation.

For the signalized intersections, see section 3.1 in this document.

2.3 – Highways Inside City Limits (Non-Freeways)

ODOT does not provide lighting inside city limits on state highways for new construction. Relocation of existing lighting may be paid for by project funds, if it is disturbed by construction activities. An entire system may be upgraded, albeit under unusual circumstances.

Cities and counties are responsible to provide new lighting, using their lighting plans. An exception to this policy is possible if the state plans to install traffic signals and joint use of the signal and illumination pole is advantageous for both parties. Signal design should provide illumination details in signal plans. The local agency is responsible for energy cost and

maintenance. When illumination is installed at intersection, the design should provide lighting for pedestrian crossings, as well as vehicle traffic safety. For pedestrians and crosswalk lighting installation inside city limits, see section 3.3, below.

2.4 – Replacement of Existing Lighting

If a lighting system designed and installed by ODOT on a state highway is removed because of a road construction project, it should be replaced as a part of the new construction, unless current lighting policy does not support the replacement of the lighting.

3.0 – Special Lighting Applications

As part of a comprehensive lighting strategy, ODOT also considers location-specific needs. In addition to vehicles traveling on the highway, we also consider the needs of those who interact with motorists in, and adjacent to, the roadway.

3.1 – Lighting on Signalized Intersections

Lighting on signal poles shall be included as a standard practice when:

- Installing new traffic signal poles.
- Replacing all existing signal poles at an intersection on state highways.

This standard does not require lighting installation on existing signal poles that do not have lighting and are not being replaced.

When replacing some, but not all, signal poles at an intersection, the designer should evaluate lighting condition and use engineering judgement to determine whether lighting should be added to the replacement poles or not. Additional light poles may be installed for the intersection to meet the recommended light levels.

Luminaire locations and specifics for the intersection lighting on signal poles shall be planned with proper lighting design process. Create the plans in accordance with the direction of the region traffic manager and or engineer. The designer may consider approaching highway sections and turning lanes adjacent to the intersection for additional lighting, as necessary.

ODOT coordinates with local jurisdiction for the intersection and crosswalk illumination within the city boundaries per section 3.3 and 4.3, below.

3.2 – Bridge Lighting

Bridges are investigated for lighting as other lineal highway sections, and lighting installation may be justified for safety reasons. Physical constraints, such as narrow travel lanes with no sidewalks or frequent nighttime pedestrians and or bicyclists, may be justification for bridge lighting.

If a local jurisdiction wants lighting for historic or aesthetic purposes, they must take the financial responsibilities for its installation, energy cost and maintenance. Aviation and/or navigational warning lights are warranted according to state and federal requirements. Other situations require approval of the state traffic engineer.

3.3 – Pedestrian and Bicyclist Lighting

Lighting can be beneficial to pedestrians and bicyclists at night by providing enhanced safety and convenience, especially at crosswalks. The region traffic operation / investigation unit shall conduct a traffic investigation to determine whether a pedestrian way, bicycle path or crosswalk needs illumination. Give consideration to traffic volumes, nighttime crash rate, pedestrian and bicyclist activities and other roadway conditions, such as post speed, road width and road condition. Refer to the [Traffic Lighting Design Manual](#) for guidelines on illumination installation at pedestrian crosswalks. Access a worksheet to provide recommendation on the lighting installation for new marked crosswalks on ODOT's [illumination webpage](#). ODOT coordinates with local jurisdiction for the crosswalk illumination installation within the city boundaries per section 4.3, below.

Generally, pedestrian and multi-use path lighting inside the city limits is the responsibility of the local agency, especially lineal lighting such as pedestrian scale and ornamental lighting. When lineal lighting is installed on state highways, it should be designed to provide appropriate lighting for pedestrians and bicyclists safety, as well as for the vehicles traffic safety.

3.4 – Rest Area, Park-and-Ride Lots or Chain-up Area

ODOT provides recommended illumination for public safety purposes at both rest area and park-and-ride lots. Chain-up area may also be considered for illumination.

3.5 – Roadway Sign Lighting

ODOT uses wide-angle prismatic legend or sheeting on all signs mounted overhead. Sign lighting will only be considered when adverse vertical or horizontal alignment requires its use. During installation, aim the luminaire downwards to avoid glares and trespassing.

3.6 – Temporary Lighting

Construction activities often create conditions on or near a project that are hazardous at night. Use engineering judgment when considering temporary lighting needs for a project. The illumination designer and traffic control designer should jointly determine the need for temporary lighting. In addition, consult the construction project manager about general requirements or special needs for temporary lighting. Temporary lighting should provide appropriate light for the movement of pedestrians and bicyclists through construction zones at night.

3.7 – High Mast Lighting

The design and installation of high mast lighting is more complex and presents unique maintenance issues compared to conventional lighting. Illumination design using high mast lighting requires justification and the state traffic engineer must approve its use at the scoping stage of the project development.

3.8 – Underpass and Tunnel Lighting

Project teams may consider underpass lighting for traffic conflict and pedestrian safety. ODOT will provide tunnel lighting on highways and pedestrian/bike paths, at appropriate light levels, based on national illumination standards and engineering study results. ODOT coordinates with local jurisdiction for the underpass and tunnel lighting within the city boundaries per section 4.3, below.

4.0 – Design, Construction, Operation and Maintenance

As stated in the introduction, ODOT is generally responsible for providing the design, installation and maintenance of roadway lighting on the state highway system, except highway sections identified in section 4.3, below.

Individuals or local agencies may request to provide the design, installation and maintenance of a lighting system on state highways. ODOT will review these functions and, if granted, a permit to occupy or operate on a state highway is required. This section describes the design, construction, operation and maintenance policy for each facility type.

4.1 – Freeways, Freeway-like Facilities (Expressways) with Full Access Control.

ODOT is responsible for the design, contract, inspection, energy cost and maintenance for warranted lighting on state-owned freeways and expressways.

4.2 – Highways Outside City Limits (Non-freeways)

ODOT will ordinarily be responsible for the design, contract, inspection, energy cost and maintenance, if ODOT agrees to the necessity of lighting. Cost sharing with other jurisdictions may be negotiated in accordance with the [Policy Statement for Cooperative Traffic Control Projects](#).

4.3 – Highways Inside City Limits (Non-freeways)

The city is responsible for the design, contract, inspection, energy cost and maintenance of highways inside the city limits. On exception, ODOT may assume some or all these responsibilities for roadway lighting through an inter-governmental agreement. Cost sharing is determined in accordance with the [Policy Statement for Cooperative Traffic Control Projects](#).

5.0 – References

Roadway Lighting Design Guide. American Association of State Highway and Transportation Officials (AASHTO), Washington D.C., 2018.

American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, Washington, D.C., 2011.

American Association of State Highway and Transportation Officials, *Highway Safety Manual (HSM)*, Washington, D.C., 2010.

Traffic Lighting Design Manual. Oregon Department of Transportation, Salem, OR, (the current edition)

Walton, NE., *Roadway Lighting Handbook*, Report IP 78-15, Federal Highway Administration, U.S. D.O.T., Washington D.C., December 1978.

Janoff, MS., Freedman, M, Decina, LE., *Partial Lighting of Interchanges*, NCHRP Report 256, Transportation Research Board, Washington D.C., December 1982.

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Policy Statement for Cooperative Traffic Control Projects. Oregon Department of Transportation, Traffic Management Section, Salem, OR, June 2002.

