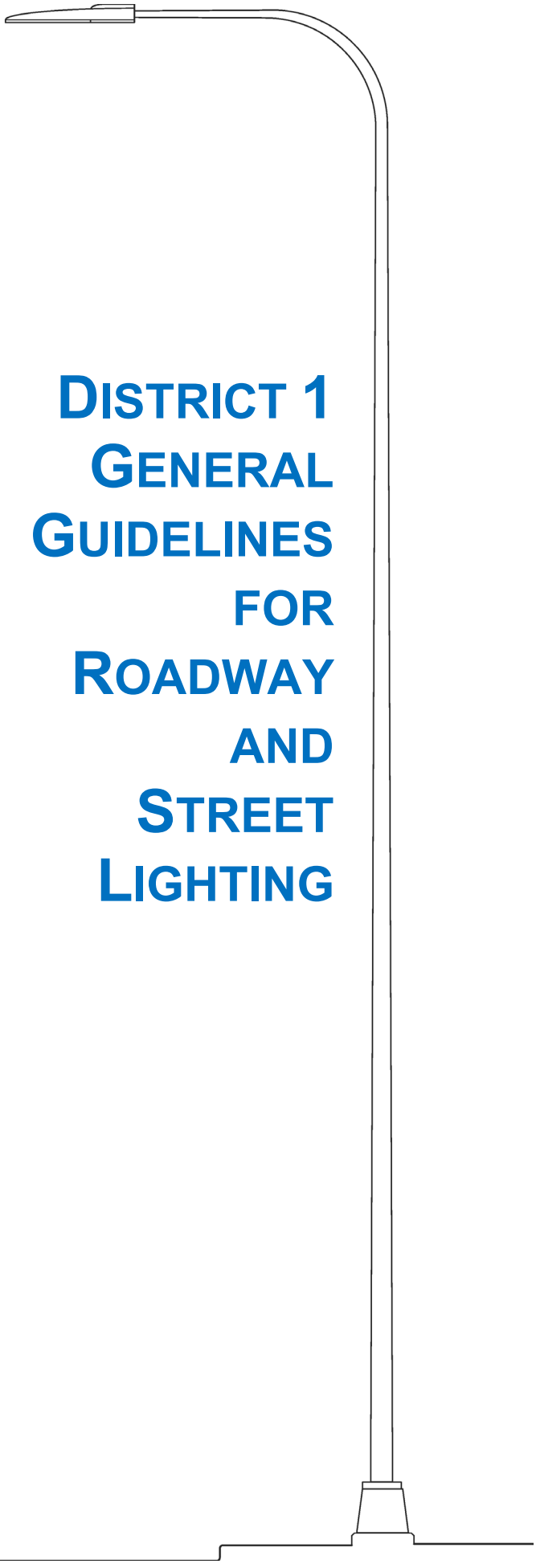

District 1 General Guidelines for Roadway and Street Lighting

State Of Illinois
Department Of Transportation
Division Of Highways
Region 1 / District 1

November 2025

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Introduction

OBJECTIVE:

The general objective of these "Guidelines" is to provide a consistent frame of reference to reduce the review time, eliminate possible construction problems and inquiries, and to improve the quality of lighting design used on roadway lighting projects. This guide also addresses the safety aspects of roadway lighting with respect to the physical layout, electrical distribution, photometric design and supplement the information provided in Chapter 56 of the Bureau of Design and Environment Manual.

APPLICATION:

These guidelines apply to all work, regardless of funding or lead agency/entity, for projects on any State or State maintained highway/roadway, parking lots, commuter stations, and the like which require Department approval for all lighting work including work by permit.

GENERAL:

The construction contract documents prepared shall be complete, concise, with applicable details, and shall be accurate, having been field checked for conflicts with underground and/or overhead utilities, showing R.O.W., centerline, railroads, curb and gutter, sidewalk, multi-use paths, trails, overhead structures, and drainage facilities.

Submittal information shall include the possible types of applicable funding and shall delineate the responsibilities for maintenance and electrical energy charges. In general, the State owned/maintained electrical facilities must be kept separate from the other Agency owned/maintained electrical/traffic systems. The electrical utility company shall be contacted well in advance of the letting date to secure the type of desired electrical service. Associated pay items for contractors' work and electric utility charges shall be stated in the contract.

Pre-design survey of the job site is required to evaluate roadway and area classifications for lighting levels. Internet based reconnaissance is not a substitute for field surveys but may be used to augment information. It is recommended that lighting design information be submitted to I.D.O.T. for review and approval before the actual plan preparation phase. Photographs must be provided to document existing field conditions.

A. Standards For Roadway and Street Lighting

As a minimum, the following standards shall apply to the design and construction of roadway and street lighting: All publications referenced shall be the latest published editions.

1. ***American National Standard Practice for Roadway Lighting***, Publication ANSI/IES RP-8, approved by the American National Standards Institute, published by Illuminating Engineering Society of North America

2. ***Roadway Lighting Design Guide***, published by American Association of State Highway and Transportation Officials (AASHTO)

3. ***National Electrical Code***, NFPA 70, National Fire Protection Association

4. ***National Electrical Safety Code***, approved by the American National Standards Institute, Publication #ANSI/C2, published by IEEE.

5. ***Standard for Electrical Safety in the Workplace***, NFPA 70E, National Fire Protection Association

6. ***Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals***, AASHTO Publication.

7. OSHA, Electrical Systems, Subpart 5, Part 1910 of Title 29 of the Code of Federal Regulations.

8. Professional Engineering Practice Act of 1989 [225 ILCS 325]

9. ***FHWA Lighting Handbook***, Office of Safety, Federal Highway Administration

In addition, the following standards should be applied, as required:

a. ***Standard Specifications for Road and Bridge Construction***, published by IDOT.

b. ***Supplemental Specifications and Recurring Specifications***, published by IDOT.

c. ***Standard Specifications for Traffic Control Items***, published by IDOT.

d. IDOT Bureau of Design and Environment (BDE) Manual, Chapter 56 on Highway Lighting, as applicable.

e. All applicable manuals and policies of FHWA, and specifically FHWA Transmittal 212 vol. 6 chapter 4, sec. 1 regarding proprietary items.

f. ***Manual on Uniform Traffic Control Devices***, published by the FHWA and the Illinois Supplement to the MUTCD published by IDOT.

g. IDOT Bureau of Design and Environment (BDE) Manual, Chapter 58, regarding ADA requirements.

B. Design Information Submittal Requirements

1. LIGHTING DESIGN INFORMATION:

a. Roadway classifications as defined herein and in the American National Standard Practice for Roadway Lighting. A justification for the selected classification should be provided. Note: Area classifications for Major, Collector and Local roadway shall be combination land use/pedestrian references of:

Commercial / High
Intermediate / Medium
Residential / Low

b. Basic lighting layout with complete photometric calculations for all typical roadway configurations of the project in conformance with ANSI/IES RP 8.

c. Light pole set back.

d. Type of light pole base (frangible or non-frangible), complete with the type and dimensions of any frangible devices to be employed.

e. Sidewalk / Pedestrian Facilities Information.

f. Intersection conflict areas

g. Railroad Crossing information.

h. Indicate the responsibilities of construction funding, ownership, electrical energy and maintenance during and after construction.

2. ELECTRICAL SYSTEMS INFORMATION:

a. Service voltage and ampacity. Provide documentation of coordination with the electric utility. Document protection suitable for maximum available fault current. Document the arc flash risk assessment for the equipment involved. Resulting labels shall be specified to be included by the controller manufacturer.

b. Load tabulations for each circuit and overall electric service.

c. Voltage drop calculation and cable sizing. Assure compatibility with characteristics of specified luminaires.

Roadway lighting branch circuit conductors must be sized for a connected load with **voltage drop not exceeding 10 percent from the lighting controller for circuits containing only LED luminaires** and not exceeding 5 percent otherwise. All feeder circuit conductors must be a minimum No. 8 AWG and a maximum No. 2 AWG. The minimum size for above grade conductors (i.e. power for underpass lights) shall be No. 10 AWG.

Pole wire and wiring to underpass luminaires must be No. 10 AWG for both power and ground.

d. Grounding scheme. Must show proper system grounding and proper equipment grounding/bonding in conformance with NEC requirements.

e. Continuously energized circuits supplying flashing beacon lights, video equipment or other ancillary equipment (120 or 480 volts) shall be routed in separate raceway systems installed in parallel with roadway lighting raceways.

f. Conductor splices must be made only within accessible above grade locations such as within pole bases, junction boxes and within enclosures. Below grade conductor splicing is strongly discouraged for IDOT owned systems. In the event a below grade splice cannot be avoided, the splices shall be waterproof of the epoxy encapsulated type. Wiring layout design should preclude the need for grade-level handholes, junction boxes or pull boxes to the extent possible. In no cases are conductor splices permitted in conduit or ducts.

g. A maximum of two (2) circuits shall enter each light standard.

Submittals should be made in a manner allowing sufficient time for review and correction, if required. A Design Concept Submittal Form is included in the appendix to aid the submittal process.

C. General Electrical Design Requirements

1. ELECTRIC SERVICES

a. General

Design submittal information must include adequate documentation of coordination for electric service. If an existing service is involved, complete information regarding the existing service shall be provided, along with a description of any modifications that are necessary for the new work. If a new service is required, submittal information shall include a copy of the request for service to the Electric Utility.

Design submittal information shall include identified photographs of the design area that reflect electric utility distribution in the area, and these shall be cross-referenced to marked plans. Photos shall identify service opportunities and potential lighting conflicts.

The electric service may be metered or un-metered in accordance with utility requirements. Metered service is recommended for most installations and is required for all state-maintained lighting systems except as otherwise permitted by the Department.

b. Basic Requirements

Electric service shall be a low voltage (0-600 volts) grounded system. Service shall terminate in a service disconnecting means that provides main overcurrent protection and is UL listed as *Suitable for Use as Service Entrance Equipment*, with a lockable enclosure rated NEMA 3R, or NEMA 4X. If a standalone utility pole mounted service disconnect is used, the enclosure must be NEMA 4X. The lighting controller shall have a minimum NEMA 3R rating. The service disconnect and/or the lighting controller, as applicable, shall be clearly identified with the name of the government agency responsible for system maintenance.

Electric Service shall be delivered to the roadway right-of way, and service drop or service lateral conductors and service entrance equipment shall be located to permit maintenance without violating legal access limitations.

The plans shall clearly indicate grounding of the grounded circuit conductor (usually a system neutral) and shall clearly define the required service entrance system grounding electrode or ground field. The plans shall clearly define the isolation of ground and neutral downstream of the service entrance equipment.

The plans may provide for a service disconnecting means mounted to a utility pole or a service disconnecting means incorporated within a lighting controller cabinet. Care shall be exercised to minimize the length of electrically unprotected service lateral conductors or unprotected overhead service drop conductors between the utility service point and the service entrance equipment. In general, service lateral conductors shall not be routed below or above pavement and shall be on the same side of the roadway as the controller.

c. Service Requests

Electric Utility service requests shall include requested service voltage, number of phases, load data, a request for available fault current and any other special requirements such as a pad-mounted transformer. Requests shall indicate the mailing address for energy billing. Electric Utility service requests for state-maintained systems shall be prepared for transmittal by the Department as directed.

All correspondence for State owned and maintained installations must include the pertinent contract number and maintenance database number.

Certain state-maintained lighting systems may have energy paid by local agencies, but unless otherwise established, energy billing for state-maintained lighting shall be directed to:

Financial Services
Illinois Department of Transportation
District 1
201 West Center Court
Schaumburg, Illinois 60196

Electric service correspondence for Non-State owned systems shall be directed to the respective agency assuming maintenance with a copy of the final service agreement submitted to IDOT. Electric Service information, such as the Service Entrance Sketch, shall be included in the plans and identified as "for information only".

d. An Arc Flash Risk Assessment shall be performed in accordance with NFPA 70E.

2. UNDERGROUND WIRING REQUIREMENTS

a. Underground wiring runs, when used, shall be 30 inches minimum below grade.

b. Underground splicing of the cables is strongly discouraged and not permitted for State owned and maintained systems. Splicing shall be accomplished in poles and in above-ground junction boxes. Wiring layouts should preclude the need for grade-level handholes or grade-level junction or pull boxes. When splicing is allowed, such as at handholes below grade, splices shall be waterproof of the epoxy encapsulated type.

c. Duct raceways may be spliced using appropriate materials and methods where needed when relocating poles, but shall be continuous for new installations; however, cable spans shall be continuous, without splices.

d. Rigid galvanized steel (RGS) conduit with threaded couplings or steel-reinforced concrete-encased Schedule 40 PVC, shall be installed under traveled pavement to provide protection for the lighting feeder duct/cables. The RGS conduit or duct banks shall be used under roadways and shall extend not less than 2 feet on either side of the crossing. RSG conduit or duct bank is recommended under sidewalk or residential driveways.

e. Conduit raceways in concrete foundations shall be non-metallic and they always shall extend above the top of the foundation to preclude the entry of water.

3. GROUNDING REQUIREMENTS

a. All equipment shall be grounded in accordance with the NEC, using a continuous equipment grounding conductor throughout all wiring, properly bonded to poles, handholes, metallic collars, boxes, etc. Particular attention is directed to NEC Articles:

- 250-6(A), *Objectionable Current*.
- 250-24, *Grounding Service-Supplied Alternating-Current systems*.
- 250-90, *Bonding*.
- 250-96(A), *Bonding Other Enclosures.*

The earth shall not be considered as an equipment grounding conductor, i.e. equipment grounding conductor must be incorporated in all circuit runs and the equipment grounding conductor shall be an insulated conductor (green insulation color) run together with the circuit conductors in the same raceway (or, where direct-burial cable is permitted, the grounding conductor shall be part of the multi-conductor cable assembly). A bare grounding wire, run separate from the circuit conductors, will not be allowed. Continuity of grounding (bonding) conductors and the equipment ground conductor shall not be dependent upon terminations at poles and other intermediate points. At such points, connections shall be made via a splice and pigtail.

b. Ground Rods shall be installed for electrical service grounding at service entrance locations, and they may also be installed at concrete pole foundations for lightning protection and to supplement the system ground. Connections at the rods shall be with exothermic welds and connections at the poles shall be made to foundation anchor bolts with approved compression ground fittings.

c. Convenience receptacles installed for any purpose shall be UL Listed, of the GFCI type, with weatherproof in use covers suitable for wet locations for use in compliance with NEC Article 406.9, *Receptacles in Damp or Wet Locations*, positioned to be not less than 36 inches above grade. All outlets must be properly supported in accordance with NEC Article 314, *Outlet, Device, Pull, and Junction Box; Conduit Bodies; Fittings; and Handhole Enclosures*, and in addition to NEC requirements, **outlets cannot be supported by raceways alone**. All receptacles shall be shown on the plans, including wiring diagrams. GFCI outlets are not required provided the circuit the outlets are connected to is protected by a GFCI circuit breaker.

Sources must be derived in accordance with the NEC.

Festoon receptacle circuits shall be sized taking into consideration the size of the conductors and the allowable voltage drop. NEC requirements shall be followed.

4. ENVIRONMENTAL

All projects administered by IDOT must meet applicable Federal and State laws and regulations requiring identification and evaluation of the project's environmental impacts. In aggregate, Part III of the BDE Manual describes the applicable environmental procedures for State highway projects. All lighting projects shall adhere to these procedures.

D. Basic Roadway Lighting Design Requirements

Basic pole placement characteristics must be established before the lighting design can proceed.

1. POLE BREAKAWAY REQUIREMENTS

a. Because of the potential hazard posed to vehicle occupants by roadside fixed objects, the general approach to lighting standards will be to use breakaway supports wherever possible. All new lighting standards located within a clear zone of a roadway where no pedestrian facilities exist shall be placed on breakaway supports, unless they are located behind or on a barrier, or protected by impact attenuators which are necessary for other roadway design reasons. Poles outside the clear zone on these roadways should be breakaway where there is a possibility of being struck by errant vehicles. For State owned and maintained systems, breakaway bases shall be utilized.

b. Frangible poles shall be poles with AASHTO and FHWA approved breakaway base devices.

c. On roadways where pedestrian facilities exist, the designer should review the level of pedestrian traffic to determine if a breakaway support would present a greater potential hazard to the pedestrian traffic than a non-breakaway support would present to the vehicular traffic. Examples of locations where the hazard potential to pedestrian traffic could be greater include the following: transportation terminals; sports stadiums and associated parking areas; tourist attractions; school zones; central business districts and local residential neighborhoods where the speed limit is 30 mph or less. In these types of locations, non-breakaway supports may be used, based on engineering judgment.

2. POLE SET BACK REQUIREMENTS:

Poles should be set back from the roadway to eliminate fixed object hazards in the clear zone and to minimize knock-down potential. Poles should be set back as far as possible within the constraints of practical lighting design and available right-of-way. Poles with AASHTO approved breakaway devices (frangible poles) should be used, regardless of set-back, except that non-frangible poles should be considered for high-pedestrian locations having speed limits of 30 mph or less, as noted herein.

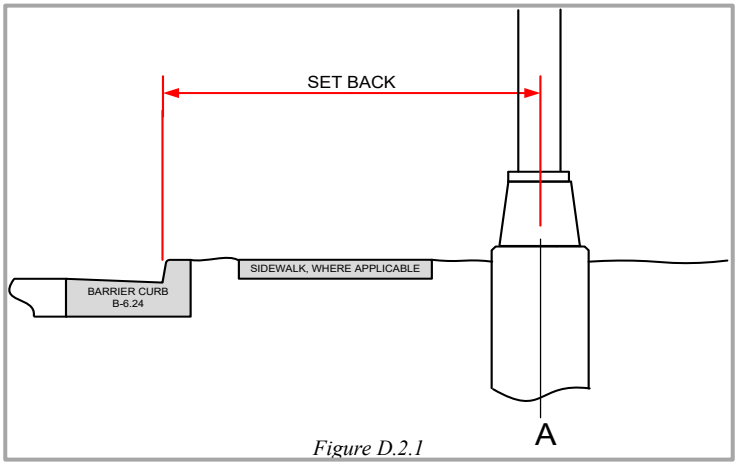


Figure D.2.1

Unless otherwise indicated, minimum pole set-back requirements shall be applied from face of curb, or where curb is not present, edge of traveled pavement to the centerline of the pole or the centerline of any base.

When local agency Motor Fuel Tax (MFT) funds are applied, the 3R (Resurfacing, Rehabilitation & Restoration) policies for local agency MFT improvements may be applied for set-back distance when applicable. Otherwise, except for lighting units mounted atop barrier wall or other permitted structures, poles shall be subject to minimum pole set-back conditions as follows, or clear zone; whichever is greater.

Posted Speed	Pole Type	Lane Edge	Set Back (Feet)[1,2]
>45 mph	Frangible	Barrier Curb	11
	Non-Frangible	Barrier Curb	18
	Frangible	No Curb	21
	Non-Frangible	No Curb	32
≤ 45 mph	Frangible	Barrier Curb	3
	Non-Frangible	Barrier Curb	7
	Frangible	No Curb	18
	Non-Frangible	No Curb	21

Table D.2.1

For optional set-back using local agency MFT 3R policies, when necessary:

Urban/Suburban Area Local Agency MFT 3R		
Speed Limit	**Face Barrier Curb**	**Without Barrier Curb**
< 45 mph	2.5 Ft.[1,2]	Shoulder Width
45 mph	2.5 Ft.[1,2]	11 Ft.
> 45 mph	2.5 Ft.[1,2]	15 Ft. or behind non-traversable ditch
Rural Area Local Agency 3R		
ADT	**Set Back**	
Under 400	8 – 11 Ft. [1]	
400 and Over	15 Ft. or behind the non-traversable ditch.	

Table D.2.2

Notes for Tables D.2.1 and D.2.2

1. Face of curb to centerline of Pole.
2. Where parallel parking lanes are included, 2-foot clearance to the centerline of the pole to the face of curb may be considered.

For purposes of these requirements, urban/suburban areas are characterized as locations having continuous or moderately spaced residential and commercial land uses and rural areas are characterized as locations having primarily continuous agricultural or otherwise unpopulated and undeveloped land uses.

Type B barrier curb (vertical face) shall be as defined in Section 34-2.04(b) of the Bureau of Design and Environment Manual and IDOT Highway Standard Detail 606001-02. Locations with Type M mountable curb (sloping face) or other non-barrier curbs shall be considered as locations without barrier curb.

In all cases, the placement of light poles and other appurtenances shall be in compliance with the Americans with Disabilities Act. Special attention shall be given to location of light poles where they may encroach on the sidewalk or other pedestrian facilities.

3. STREET LIGHTING

As stated in IESNA RP-8, street lighting is provided for major, collector, and local roads were pedestrians and cyclists are generally present. The primary purpose of street lighting is to help the motorist identify obstacles, provide adequate visibility of pedestrians and cyclists, and assist in visual search tasks, both on and adjacent to the street.

Street lighting on arterial roads shall be either continuous lighting terminating at logical transitions or complete intersection lighting with transitions. Street lighting shall not be implemented in a manner that reduces safety due to eye adaptation difficulties. As such, street lighting should avoid producing lighted approaches to unlighted intersection and should not result in short unlighted gaps between adjacent lighted roadway segments. Lighted approaches to unlighted intersections generally must terminate away from the intersection as follows:

Posted Speed limit	Minimum Termination Distance (Last luminaire to crossroad centerline)
30 mph and less	500 ft.
Over 30 to 45 mph	750 ft.

Table D.3.1

Lighted segments generally must close unlighted gaps between adjacent lighted roadway segments unless those gaps exceed the adaptation distances as follows:

Posted Speed limit	Allowable unlighted Gap
30 mph and less	500 ft.
Over 30 to 45 mph	750 ft.
Over 45 mph	1500 ft.

Table D.3.2

Street lighting installations shall be expanded to include intersection and/or close unlighted gaps if the conditions above are not satisfied.

4. LIGHTING LEVELS

ROADWAY LIGHTING

As stated in IESNA RP-8, roadway lighting is provided for freeways, expressways, limited access roadways, and roads on which pedestrians, cyclists, and parked vehicles are generally not present. The primary purpose of roadway lighting is to help the motorist remain on the roadway and help with the detection of obstacles within and beyond the range of the vehicle's headlights.

Interstates within District 1 shall be lighted to the following levels:

County	Interstate Level Cd/m^2
Cook	0.80
DuPage	0.80
Will (I-80 and North)	0.80
Will (south of I-80)	0.60
Lake	0.80
Kane	0.60
McHenry	0.60

Table D.4.1

A Total Light Loss (LLF) factor of 0.75 shall be used for LED roadway lighting and a LLF of 0.65 shall be used for underpass lighting calculations.

On any improvement where the new lighting system utilizes LED luminaires, all existing HPS luminaires within the project limits (entire lighting controller) must be replaced with new LED luminaires even if there is no adjacent pavement work occurring.

Adaptive lighting shall not be utilized.

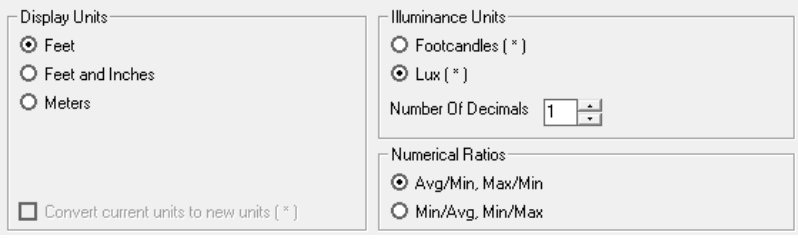
STREET LIGHTING

Unless otherwise approved by the Engineer at the beginning of the project, the total Light Loss Factor (LLF) to be used shall be 0.75 for Street lighting. A factor of 0.65 shall be used for underpass lighting calculations.

Adaptive lighting shall not be utilized on State maintained roadways.

5. LIGHTING LAYOUTS

The basic lighting layout shall include pavement luminance calculations for all typical roadway configurations of the project in conformance with ANSI/IES RP-8. All lighting calculations shall be performed with AGi32. The levels defined in IES RP 8 are minimum acceptable levels and the design approach shall be to achieve but not significantly exceed these levels. Calculated lighting levels shall not exceed the values for the next higher roadway classification for the respective combination land use / pedestrian area. For example, if a roadway is determined to have a classification of Collector/High, the maximum levels for this roadway shall not exceed the classification of Major/High. Calculated lighting levels shall be in metric units.



A luminaire Performance Comparison Table shall be included to ensure the proposed design can be obtained by more than one manufacturer. All calculations shall also be submitted in a mutually agreed format with the associated CADD roadway and photometric files and shall be cross referenced with printouts, comparison sheets and specifications.

Lighting levels shall be calculated using a R3 pavement type regardless of actual pavement unless specifically allowed for by the Engineer. Calculations shall be made for the entire roadway width; including existing or proposed part-time parking lanes. Where full-time parking lanes are existing or proposed and there is no chance the parking lane will be used as a traveled lane, calculations are not required.

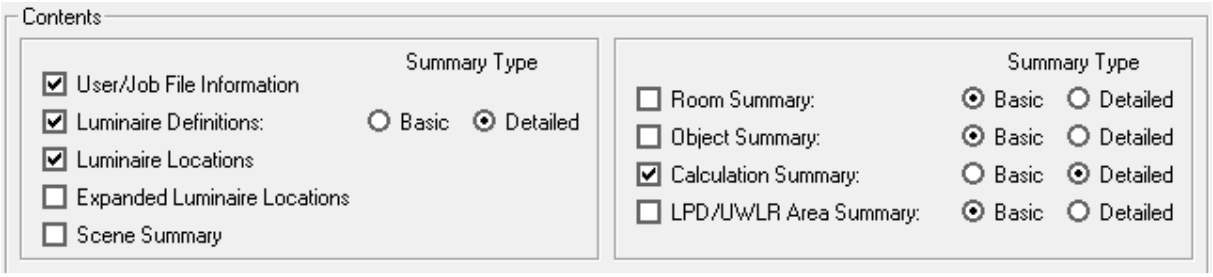
Continuous center left turn lanes, and other turn bays adjacent to the through lanes unless the directions of travel are separated by a barrier wall, barrier median or an unpaved median 10 feet wide or more shall be calculated.

Performance tables included in the contract documents shall not include complex roadway configurations such as intersections or merge areas as these calculations are virtually impossible to duplicate without the CADD files which will not be available to bidders. If such calculations are needed, a complete definition of the area including the calculation area and pole coordinates must be included. Performance tables for a typical roadway segment shall not include more than one entry per line, i.e. a mast arm length cannot be stated as “8 & 15” or “varies”. A diagram must be included. The final performance table included in the contract documents must be cross-referenced to a Luminaire Performance Comparison Table submitted with the final documents.

Performance table requirements shall not be specified at 100% of the calculated values.

The designer must demonstrate sound engineering practices, ensuring that the bid documents contain requirements which can be achieved by currently produced equipment.

Submitted calculations shall, as a minimum, include a plan view indicating the roadway, pole locations, and calculation area shall be included in the submittal. The report settings in AGi32 shall include the following settings:



See Appendix A for further examples when available.

Pole spacing shall be specified at increments of 5 feet. Pole spacing used shall allow for field adjustments if required.

Notes: It is recommended that, where possible, pole layout schemes be one side, opposite, or median layouts where applicable rather than staggered layouts. Furthermore, the use of median mounted poles close to intersections shall be avoided to reduce the number of fixed objects as well as to minimize knockdown potential.

Lighting Near Overpasses

Poles supporting lighting for roadways beneath overpasses should be placed no closer than 100 feet from the overpass to reduce glare on the overpass.

6. INTERSECTION LIGHTING

a. Except as permitted elsewhere herein, isolated intersection lighting should include transition lighting. Intersection transition lighting shall be designed to adequately enhance visual cues to the driver approaching an intersection and to mitigate sight adaptation for the driver leaving the lighted intersection. Where departure lanes receive lighting contribution from approach lane lighting, departure lane transition lighting should be generally extending a shorter distance than the approach lane lighting, thereby improving a gradual transition effect.

Transition lighting requirements are as follows:

Case 1, no existing lighting. The proposed lighting system should include transition lighting unless all the specific criteria for omitting transition lighting are met.

Case 2, existing partial intersection lighting. If the proposed roadway improvement involves channelization, geometric changes, and/or a change in speed limit to greater than 35 mph, transition lighting should be installed.

Case 3, existing intersection lighting with transition lighting. The proposed lighting system should have transition lighting. An existing lighting system with transition lighting should not be reduced to partial intersection lighting.

Omitting transition lighting:

Roadways, other than Interstates, with designed luminance equal to or less than 0.6 cd/m^2 are not required to have transition lighting.

Intersection transition lighting on a given approach may be omitted provided all of the following conditions are met:

i. The posted speed limit on the given approach and the approach opposite the given approach to the intersection is 35 mph or less, and

ii. The given approach, and the approach opposite, (where present), are each unlighted for 750 feet away from the center of the intersection for approaches with posted speed of 35 mph, or 500 feet for approaches with posted speed limits less than 35 mph, (if there is adjacent existing lighting less than these prescribed distances, then the resulting lighting gap must be lighted on that particular approach) and

iii. Each approach having channelization of any kind has at least one luminaire oriented and dedicated to it, and

iv. Pole positions are compatible with those suggested in IES RP-8 for partial lighting of the applicable configuration, and

v. Luminaires lighting the intersection are mounted not lower than 40 feet above the pavement, and

vi. The geometry of the intersection is without limitations to sight distance, such as curves, hills or other conditions which may limit the drivers view and is conducive to allowing elimination of transition lighting.

Design of Transition Lighting:

As a minimum, the transition lighting shall meet the following:

i. Except as otherwise required for channelization, intersection transition lighting shall extend beyond the defined intersection calculation area as indicated in the following table:

Posted Speed Limit (MPH)	25	30	35	40	45	50	55
Minimum Transition Lighting Distance (Feet)	125	150	175	200	250	300	350

Table D.6.1

ii. Where the roadway is divided, intersection transition lighting extensions shall be provided on both the approach lanes and the departure lanes.

iii. Where the roadway is not divided, intersection transition lighting should be provided on at least the approach lanes.

iv. Where an intersection approach is channelized, intersection transition lighting should be provided at least to the limits of channelization, preferably 100 feet past, except that where there are jurisdictional limitations, transition lighting may be reduced to the minimum coverage noted above if there are no complications from unusual geometric or site considerations which would otherwise compromise safety.

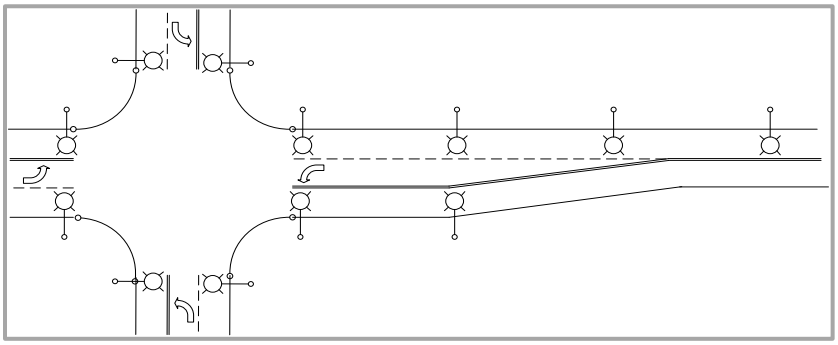


Figure D.6.1

b. Intersection lighting calculations are required for all signalized intersections and complex non-signalized intersections as determined by the Engineer. In general, driveways shall be treated as intersections with respect to pole placement but only signalized driveways (such as business centers, etc.) shall require calculations and transition lighting. Requirements for signalized driveway intersections need only to address the mainline roadway for calculations.

Intersection lighting shall be designed using the illuminance design method. Illuminance calculations shall be made for the complete area bounded by the intersection limits indicated in IES RP-8 and shall include any islands.

Lighting levels for the intersections shall be as follows:

i. **Intersections of Continuously Lighted Roadways**. Intersections of continuously lighted roadways and/or intersections at locations with high adjacent area lighting shall have illuminance values equal to the values in IES RP-8 Section 5.1, Table 8, *Recommended Illuminance for the Intersections*.

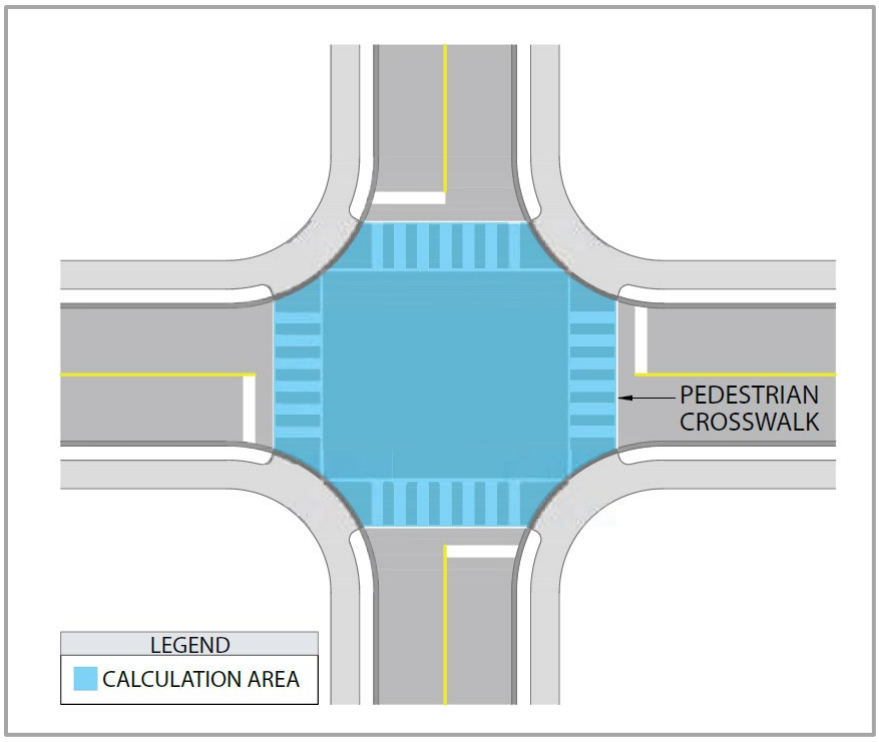


Figure D.6.2
Intersection calculation area defined by crosswalks

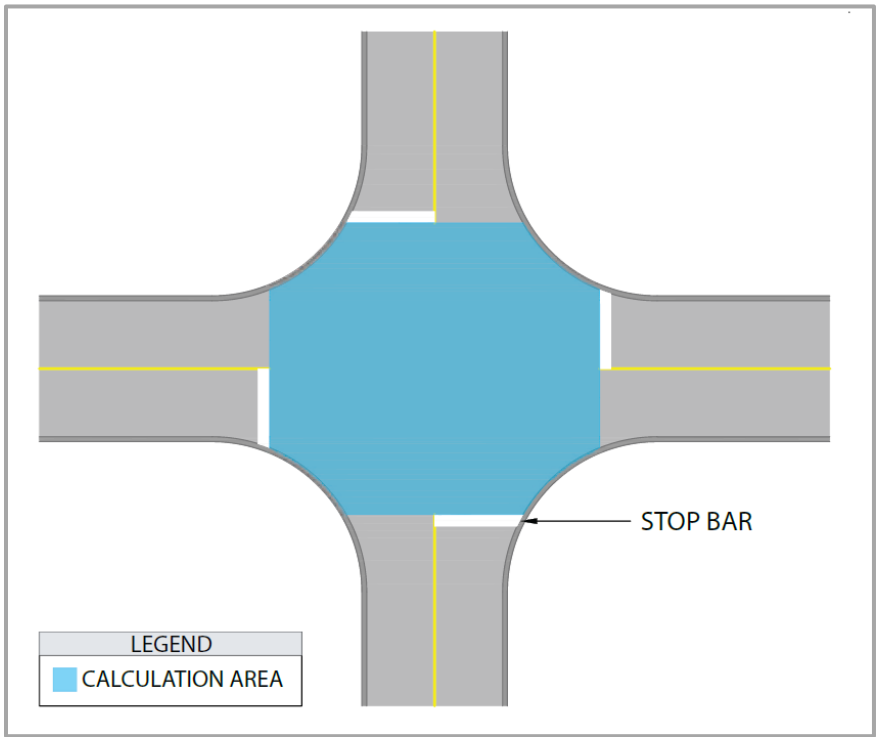


Figure D.6.3
Intersection calculation area defined by stop bars

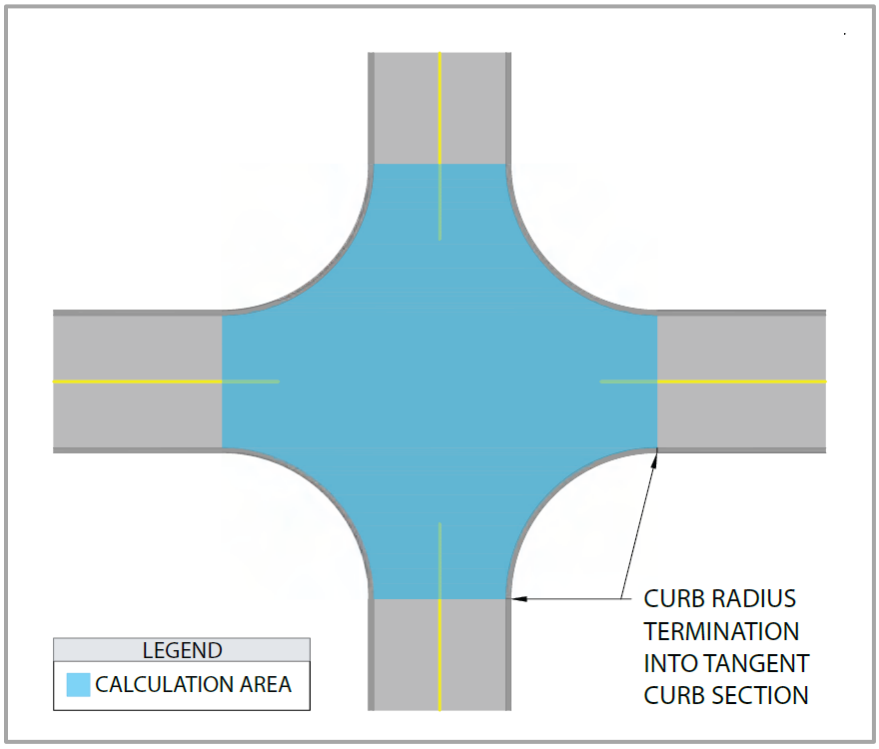
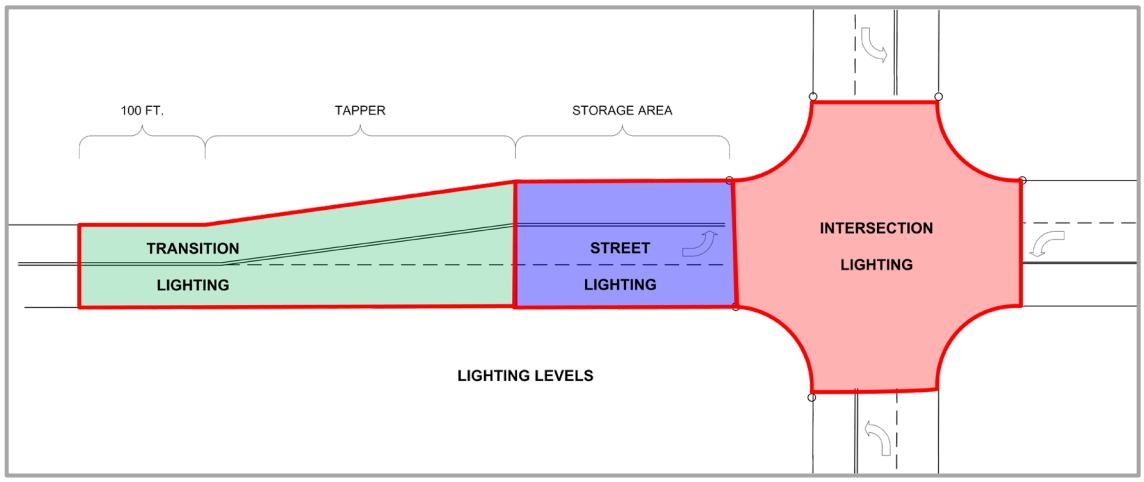


Figure D.6.4
Intersection calculation area defined by the points of tangency

ii. **Isolated Intersections Having Transition Lighting**. Intersections of roadways that are not continuously lighted but that have transition lighting on any approach shall have an average illuminance values equal to the values in IES RP-8 Section 5.7, Table 9, *Illuminance for Isolated Intersections.*

Figure D.6.5



Typical Intersection Areas

iii. **Isolated Intersections Without Transition Lighting**. Intersections that have transition lighting omitted on all approaches in accordance with paragraph 4c of these Guidelines shall have illuminance values in accordance with IES RP-8, Table D1 Section 5.7, Table 9, *Illuminance for Isolated Intersections*. This is not intended to apply for Beacon Lighting applications.

When designing lighting for isolated intersections, (intersections of roadways that are not continuously lighted) it is desirable to produce an installation that is easily and inexpensively retrofitted (such as with the change of luminaire to a higher wattage) to produce acceptable lighting performance should the roadways receive continuous lighting in the future, i.e. it is desirable for the designer to plan ahead for continuously lighted roadways.

When providing transition lighting for isolated intersections, the approach lanes to an intersection should generally receive a longer transition treatment than the departure lanes, with lighting on the opposing approach lanes contributing to the transition effect on the departure lanes. Where lighting from both sides of an undivided roadway is involved, the designer should not abruptly terminate both sides at the same location; transition should be more gradual.

d. Intersection Combination Poles.

The use of combination poles is encouraged, particularly for large intersections. However, under no circumstances should a design produce a mix of State and other (county, municipal, etc.) maintenance responsibilities within the same pole or control cabinet. To this end, at intersections with State owned and maintained traffic signals, the combination luminaires (if required) shall be powered from the traffic signal cabinet. Maintenance responsibilities shall be clearly defined and shall be designed to foster a safe work environment.

Intersection transition lighting, the presence of continuous lighting beyond the intersection, and the potential hazards posed from a darkened intersection with lighted approaches must be carefully considered in determining the extent of maintenance responsibilities. In most cases, intersection transition lighting should be part of the same system as all intersection lighting.

e. Crosswalk Lighting.

FHWA-HRT-08-053 provides information for consideration regarding the lighting of midblock crosswalks as well as a discussion of considerations in lighting crosswalks collocated with intersections. Both FHWA and IES guidelines should be consider when pedestrian crosswalks are involved at intersections.

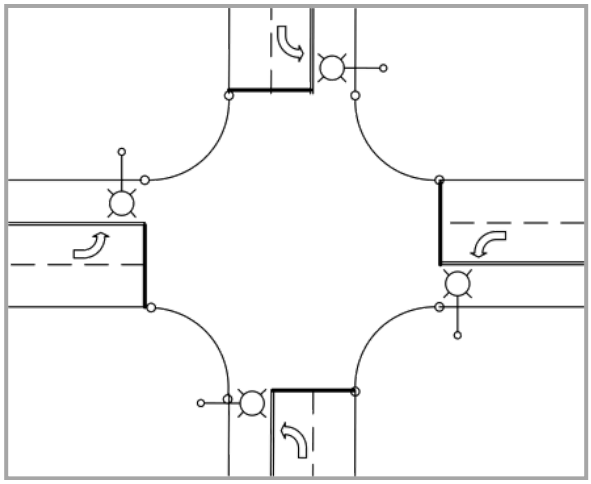


Figure D.6.6
IES Recommendation
No Crosswalks

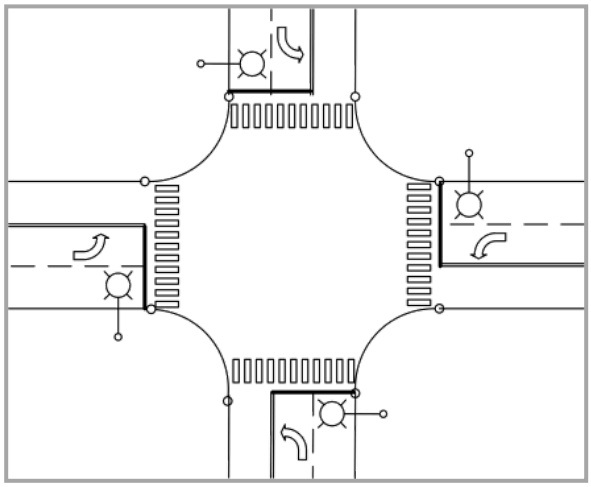


Figure D.6.7
FHWA Recommendation
With Crosswalks

f. Mid-Block crosswalk lighting.

The lighting of Mid-block pedestrian crosswalks should be given consideration as discussed in *FHWA-HRT-08-053.*

7. UNDERPASS REQUIREMENTS

Underpass illumination is typically warranted where the adjacent roadway is illuminated.

Exceptions include underpasses for single-lane or two-lane bridges generally 35 feet or less in width, where the adjacent roadway lighting standards can be positioned to provide adequate illumination beneath the underpass. Additionally, the Designer shall evaluate on

an individual basis all locations where a crossing bridge is oriented on a skew or at an elevation higher than 20 feet to determine if underpass illumination is warranted.

As recommended by AASHTO, nighttime lighting levels and uniformities should target the lighting levels on the adjacent roadway. Increased illumination levels due to physical luminaire mounting conditions should not exceed approximately twice that of the adjacent roadway.

Underpasses which are illuminated during the daylight hours, shall have nighttime lighting levels equal to the adjacent roadway lighting, but shall not exceed twice that of the adjacent roadway.

If there is no adjacent roadway lighting, the nighttime underpass lighting levels shall be no higher than 1.5 times the adjacent IES roadway classification to minimize eye adaptation time.

Special attention shall be given to pedestrian areas of the underpass when pedestrians are present as indicated in IES RP-8. Special design considerations are as follows:

- Underpass lighting plans shall be drawn at a scale of 1” = 20’ (1:250 metric). The plans must show bridge beams, elevations, spacing, expansion joints etc.

- The Consultant shall confirm that the junction box sizing meets the NEC by submitting calculations. Junction box sizing should not be based on NEC minimum requirements alone but shall take into consideration splicing and/or connections which may need to be made in the junction box which may necessitate a larger box.

- Plans shall indicate the details of conduit layout and wire counts.

- Attachment of equipment to concrete beams is prohibited. Attachment of equipment to the bottom of the steel beams, provided sufficient clearance exists, with beam clamps is the preferred installation method.

- PVC coated rigid galvanized steel conduit is to be used for State maintained installations and it is recommended for all underpass wiring. Expansion / deflection coupling shall be utilized wherever movement is expected.

- The underpass luminaires shall be positioned five (5) feet minimum to ten (10) feet maximum from each face of the bridge structure.

- Underpass luminaires shall be installed on a bridge structural pier or abutment whenever possible provided there is adequate shoulder or barrier curb to prevent damage to the luminaires from vehicles. For bridges with slope walls which are not provided with an outside pier or abutment or at bridges which do not include a median pier, the underpass luminaires may be suspended from the bridge substructure. Underpass luminaires mounted suspended shall be placed setback one (1) foot from the outside edge of the adjacent shoulder pavement as far from the roadway pavement as possible.

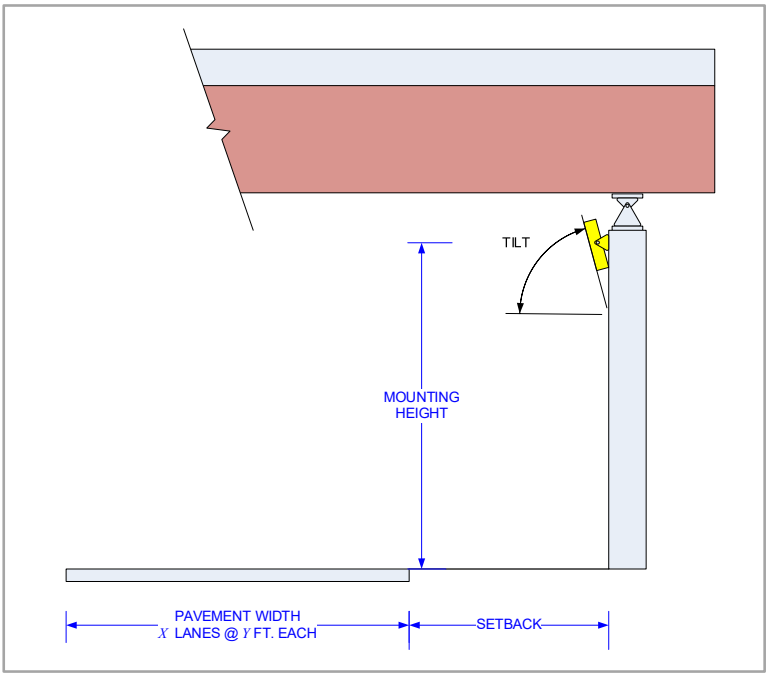


Figure D.7.1

- When underpass luminaires are installed suspended from the bridge substructure, the length of the hanger assembly shall be limited to five (5) feet. Where the girder bays are deeper than this, the Designer shall provide a method for attachment of the hanger assemblies in such a way that they do not exceed the above specified length. All suspended luminaires shall at a minimum include four (4) points of attachment.

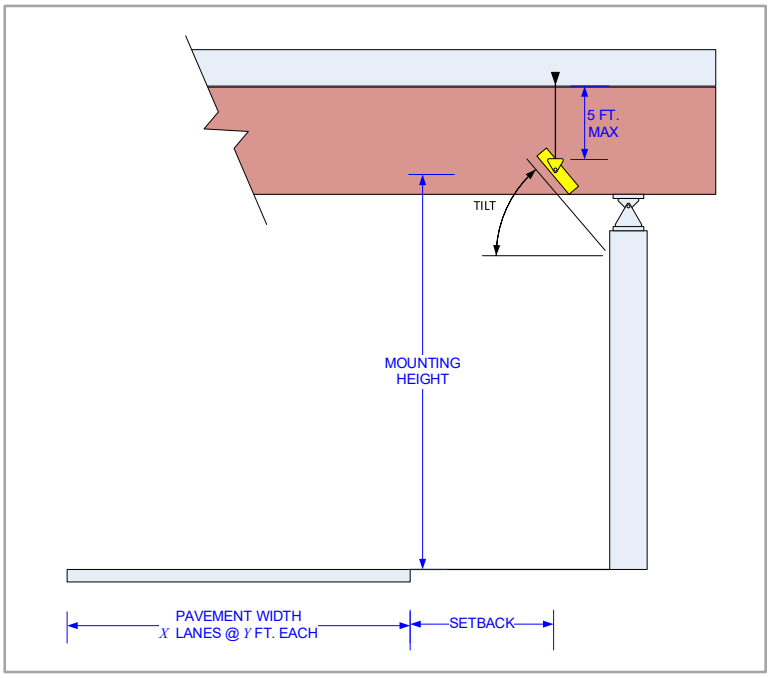


Figure D.7.2

If a roadway underpass conforms to the IES definition of a short tunnel, the State shall be consulted regarding this definition prior to the beginning of any design work.

Typical LED Underpass Luminaire Spacing Expressway – Intermediate (Medium) Classification						
Number of 12' Lanes	**Configuration**	**Set Back From E.O.P.**	**Lumens**	**Tilt in Degrees**	**Dist.**	**Spacing**
1*	Single Side	5	10,000 – 13,500	0-30	III	40
2	Single Side	2	10,000 – 13,500	0-30	III	35
3	Opposite Side	2	10,000 – 13,500	0-30	III	50
4	Opposite Side	2	10,000 – 13,500	0-15	IV	45
5	Opposite Side	2	10,000 – 13,500	0-15	IV	40
>5	Consult IDOT D1 Bureau of Traffic Operations, Electrical Design Section					
*Single lane assumes a 16' wide ramp						
NOTES:	• Luminaires are wall mounted. • E.O.P. = Edge Of Pavement • Mounting Height is assumed to be 16 Ft., but luminaires shall not be lower than the bottom beam flange. IDOT will supply sketch for detail. • The luminaire distance from the front of the facia beam shall not be greater than half the charted spacing. • This configuration provides for a 50% higher level, as recommended by AASHTO, than a surrounding IES Expressway – Intermediate (Medium) classification. • Combined LLF = 0.65					

Table D.7.1

8. RAILROAD CROSSING REQUIREMENTS

Lighting shall be considered for railroad grade crossings with passive traffic control devices, as defined in the *Railroad-Highway Grade Crossing Handbook* (FHWA-SA-18-040/FRA-RRS-18-001).

Lighting design shall include the treatment of railroad crossings within or adjacent to the lighted roadway. Continuous or intersection lighting should avoid creating an unlighted distance between lighted roadways and railroad crossings.

Railroad crossing areas shall be as defined in IES RP-8 and they shall be lighted to the values specified for the adjacent roadway Illuminance values of IES-RP8, table 2.

9. TEMPORARY LIGHTING

Temporary lighting must be provided for those roadways which have existing lighting systems which will be affected by road work or complex traffic patterns will be involved during construction such as interstate highway crossovers. The temporary lighting generally shall be designed to the levels and uniformities of the proposed permanent lighting system. Temporary lighting should be avoided by careful coordination of construction staging and use of existing lighting. However, under no circumstances shall a roadway which is lighted have the existing lighting removed until the temporary lighting system is operational unless the road is completely closed to traffic. For standard single lane staging, temporary lighting standard BE-805 should be applied. In this case lighting calculations will not be required.

From IES RP-8, Table 19-1

Highway Type	Activity	Existing Lighting	Permanent Lighting Required	Maintain Existing Lighting	Provide Temporary Lighting
Rural	No ongoing work at night	No	No	N/A	No
		Yes	Yes	Yes	N/A
	Work ongoing at night	No	Yes	N/A	**Yes**
		Yes	Yes	Yes	N/A
Urban Streets	No ongoing work at night	No	No	N/A	No
		Yes	Yes	Yes	N/A
	No ongoing work at night, major diversions in alignment	No	Yes	N/A	**Yes**
	Work ongoing at night	Yes	Yes	Yes	N/A
		No	Yes	N/A	**Yes**
Freeway	No ongoing work at night	No	No	N/A	No
		Yes	Yes	Yes	N/A
	No ongoing work at night, major diversions in alignment	No	Yes	N/A	**Yes**
	Work ongoing at night	No	Yes	N/A	**Yes**
		Yes	Yes	Yes	N/A

Existing lighting shall be defined as continuous permanent lighting which met IES guidelines at the time it was installed.

The connection of temporary aerial cables to ground mounted lighting units with breakaway devices is prohibited. Aerial cables are required to have a minimum vertical clearance of 18 ft.

10. HIGH MAST LIGHTING

The use of high mast lighting shall be avoided due to the high cost of equipment and future maintenance costs.

In general, the design of high-mast lighting systems follows the same design procedures as discussed herein. High mast lighting is at the discretion of the Department. In addition, the following should be considered:

a. Light Source, LED. The number of luminaires required will be determined by the area to be lighted.

b. Mounting Heights. Mounting heights in high-mast lighting applications range from 100 ft. to 150 ft). In general, heights of 100 ft to 120 ft have exhibited the most practical designs. For elevated roadways, a consistent mounting height above the pavement is desirable. However, the number of tower height should be kept to a minimum.

c. Location. In determining the location of light towers, review the plan and profile view of the area to determine the critical areas requiring lighting. In selecting tower locations, consider the following:

- Critical Areas. Locate light towers so that the highest localized levels of illumination fall within the critical traffic areas (e.g., freeway/ramp junctions, ramp terminals, merge points).

- Roadside Safety. Locate light towers outside the roadside clear zone and a sufficient distance from the roadway so that the probability of a collision is virtually eliminated. Do not place light towers on the end of long tangents. If high mast towers are placed within the clear zone, appropriate impact attenuation must be considered.

- Signs. Locate light towers so that they are not within the driver's direct line of sight to highway signs.

d. Soil borings shall be made for the proposed tower locations to adequately assess soil conditions and foundation design.

e. Light towers shall include a concrete work pad and retaining wall as appropriate around the tower foundation as required. The use of block retaining wall is not permitted.

11. GUIDE SIGN LIGHTING

As stated in the BDE Design Manual, sign illumination should be considered where background (roadway and/or non-roadway) lighting obscures the legend of the sign or the sign is not adequately visible by vehicular headlights. In urban areas with high-ambient lighting, the external illumination of overhead sign panels is generally warranted.

Overhead highway signs fitted with long-lasting, highly reflective sheeting may be adequately illuminated by vehicular headlights. Internally or externally illuminated signs with non-reflective, lower grade sheeting, may be illuminated by a direct light source. Roadway lighting alone does not meet the requirements for external sign illumination.

External lighting for all other overhead sign panels along lighted highway facilities will be illuminated on a case-by-case basis. See the IESNA Recommended Practice for Roadway Sign Lighting, IESNA RP-19 for additional information on when to light signs. Also, apply the requirements of this publication when designing lighting for sign panels.

For further information, see Section 56-2.10 of the BDE Manual and Section 2A.07 of the MUTCD

12. INTERSTATE INTERCHANGE LIGHTING.

Interstate interchanges within District One shall be lighted. Lighting levels shall be as specified in section D4.

13. ROUNDABOUTS

Lighting shall be provided at roundabouts as stated in the IDOT BDE manual and recommended by the AASHTO publication *Roadway Lighting Design Guide*. Additional lighting requirements are outlined in the *Design Guide for Roundabout Lighting, IESNA DG-19* as well as *NCHRP REPORT 672, Roundabouts: An Informational Guide, Second Edition.* Lighting shall extend through the tapper. Pedestrian lighting should be provided as applicable, in addition to lighting in the roundabout, at crosswalks and on the approaches.

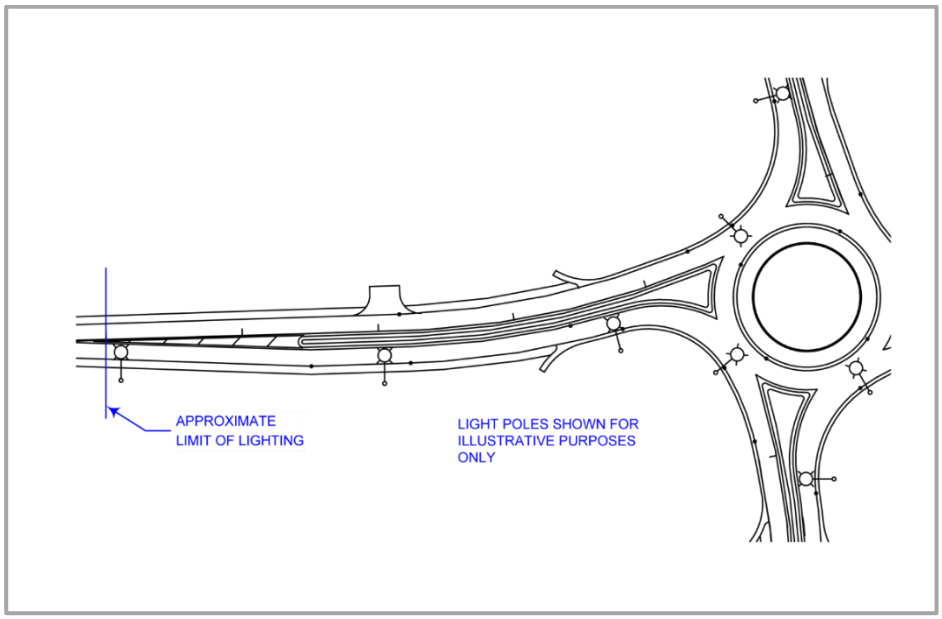


Figure D.13.1
Roundabout Lighting Limits

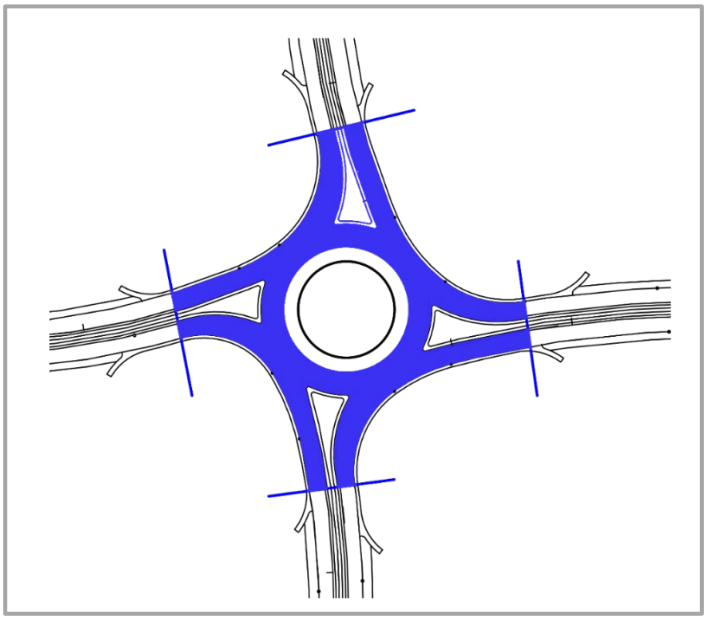


Figure D.13.2
Roundabout Illuminance Calculation Area

14. DIVERGING DIAMOND INTERCHANGES

The Diverging Diamond Interchange (DDI) is an alternative interchange design. It includes reverse curve designs with limited tangents through the crossover, uncommon lane assignment patterns at approaches, and changes in lane width through the crossovers that provide opportunities for last minute adjustments to lane assignment. Consequently, the DDI shall be lighted. Additional information can be found in Chapter 8 of the FHWA publication, *Diverging Diamond Interchange Informational Guide*, FHWA-SA-14-067.

15. NAVIGATION AND OBSTRUCTION LIGHTING

Highway structures over navigable waterways require waterway obstruction warning luminaires in accordance with US Coast Guard requirements. Design navigable waterway obstruction lighting in accordance with the US Coast Guard Bridge Administration Manual COMDTINST M16590.5C, Bridge Lighting and Other Signals and the Code of Federal Regulations, 33 CFR 118.

For information on lighting for navigable airspace obstructions, consult the FAA Advisory Circular AC 70/74602-1L Obstruction Marking and Lighting.

16. OTHER REQUIREMENTS

a. The specifications for lighting shall be written to identify performance criteria. Performance criteria should be complete with accurate descriptions, and measurable, identifiable performance standards.

b. Agreements shall be executed and/or cleared before submittal of final plans. Key items of coordination such as electrical utility service, conflicts with railroads, airport and Federal Aviation Authority height clearances, clearances from electric utility lines, (water, gas, sewer lines and other utilities) should be shown on the plans and documented prior to submittal of plans.

c. All equipment shall be located on public right-of-way and the control equipment shall be located as to minimize potential damage as well as to foster the safety of maintenance personnel. Control equipment shall be in areas which are accessible through public ways and shall be easily maintainable. Equipment shall be oriented such that personnel working on the equipment shall have a clear view of oncoming traffic.

d. Municipal and Residential Street Lighting. IDOT will not participate in highway lighting on facilities located within an incorporated area except as described in Sections 56-2.02, 56-2.03, and Chapter 5 of the BDE Manual.

E. Requirements For Plans and Specifications

1. GENERAL:

The plans and specifications should completely and accurately define the work. This should be coordinated and achievable, i.e. biddable and buildable. The plans and specifications should completely define the work and leave no ambiguity as to payment for indicated work. The plans and specifications also need to be fully coordinated with all other disciplines involved in the project.

2. PLANS:

The title sheet should show the consultant's (or preparing agency's) name, and the responsible designer's name. In addition to conforming to Chapter 63 of the BDE Manual, plans should include the following:

- Symbols legend for all symbols used. District 1 MicroStation CADD cell libraries for lighting shall be used.
- Critical dimensions.
- Identification and depiction of utilities which might pose a conflict to the lighting installation. Right-of-Way and any walk or bikeways must be shown.
- Existing lighting systems shall be shown on separate plan sheets. These sheets shall also include any temporary lighting that may be needed. A single line diagram of the existing and temporary systems shall be included with maintenance requirements clearly identified.
- Adequate identification of pole locations, etc., by stationing or other means, and pole set-back. Pole set back from face of curb or edge of pavement to the center of the pole is the preferred method to indicate setback.
- Proposed light pole, light tower and controller locations shall be included in proposed roadway cross sections of the contract plans at the proposed light pole setback. This will aid in determining if the proposed equipment locations are maintainable.
- Identifications of circuiting.
- The plans shall include an overall, one line wiring diagram of the entire lighting system with the roadway centerline and cross streets identified. The diagram shall clearly define the limits of lighting maintenance.
- Identifications of cable quantity and sizing.
- Proper delineations between existing, temporary and proposed new items and work.
- Electrical service voltage, location, sizing, arc flash category, and any special requirements.
- Locations and types of all pavement crossings.

- Details as required to clearly define the work, such as: trench and cable section, conduit pushes, splicing details, pole, arm, base and foundation and wiring details for lighting controllers.

- General Notes to identify especially important or job-specific considerations.

- The plan Cover Sheet shall clearly indicate that the State Electrical Maintenance Contractor (EMC) shall be called for facility locates in additional to J.U.L.I.E. and DIGGER.

- The final set of plans shall be prepared to facilitate the maintenance of the entire system.

- Electrical work shall be more prominently presented than background information so that the electrical work is clear and easily recognized. Plan notes shall easily and clearly reference from note to plan and from plan to note.

- Where documents require the seal and signature of a licensed Professional Electrical Engineer, such seal and signature shall be provided, consistent with paragraph 5214 and 5241 of the State of Illinois Professional Engineering Practice Act of 1989 and Section 1380.300 of the Rules for the Administration of The Illinois Professional Engineering Act, Part 1380.

  A Registered professional Electrical Engineer shall seal all documents prepared by or under the direct supervision and control of the professional engineer. Plans prepared by personnel not under the direct supervision of the professional engineer will be unacceptable. The seal and date of signing, along with the date of license expiration may be electronically affixed to the plans (stickers are unacceptable). The signature must be in the original handwriting of the licensee. Signatures generated by computer or by any other means shall not be permitted.

- A Bill of Material for roadway lighting is not required to be included in the drawings however, quantity calculations shall be provided that verify the quantities for all roadway lighting pay items included in the Project Summary of Quantities. Standalone lighting contracts any other quantity calculations such as earthwork shall also be provided.

- Other drawings which define the work of other disciplines in the same areas shown on the roadway lighting plans shall be referenced by their given drawing number on each related roadway lighting drawing together with references to other roadway lighting drawings or details as necessary.

- Non-lighting devices such as ITS equipment shall not be powered out of the lighting controller cabinet but may share an electric service pedestal when the service is billed at an hourly rate by the utility.

3. SPECIFICATIONS:

Specifications, and special provisions as required, shall be prepared to include pay items for work performed; each pay item to be complete with description of work, units of measurement and basis of payment. Any material and work made incidental to pay items, where absolutely necessary and prudent, shall be kept to minimum and be incidental to like items only. Incidental items shall be highlighted. Wording of pay items shall match any summary listing of quantities. Specifications should be clear, concise and complete and shall include performance requirements.

F. Submittal Requirements for Permit Applications

Per 605 ILCS 5/4 209, IDOT requires a permit when working within the right-of-way of an Interstate, U.S. state route, Illinois state route, or state-maintained roadway. All electrical work performed and installed on State Right-of-Way shall comply with the applicable requirements in this guide. A permit application for lighting shall have, as a minimum, the following information, as applicable, submitted in duplicate:

1. A description of the roadway and location involved, including the limits of the desired installation and the scope of the project including ownership identification.

2. Designation of the requested permit lighting as roadway, ornamental or beacon lighting.

3. A plan of the installation. The plan must indicate lighting locations including set back, stationing as well as wiring. Where existing lighting is adjacent to the proposed lighting, the existing lighting must also be shown. Information relative to future existing adjacent lighting and/or concurrent plans for additional proposed lighting.

4. Submitted plan sheets shall be ANSI size B and in PDF format.

5. Luminaire information including type, descriptive literature, light source, lumens, and wattage. Information on luminaires for roadway lighting shall include full photometric data.

6. Pole/mounting information. Information shall include a general description and/or descriptive literature, the pole material, an indication of either frangible or non-frangible mounting and mast arm information. When used, descriptive information relative to frangible mounting devices shall be included.

7. Foundation details complete with responsible certification of structural adequacy.

8. Complete wiring information, including electric supply, overcurrent protection, circuit distribution, complete pole-to-pole and handhole wiring, grounding and lighting control information.

9. Documentation of electric service/supply.

Except for beacon lighting, permit applications shall also include the following additional items:

10. A selection of IES roadway and area classifications for the installation, complete with reasoning and justification.

11. A selection of IES lighting criteria based on the roadway and area designations.

12. Complete AGI32 generated lighting calculations for the proposed installation demonstrating achievement of the designated lighting criteria. Calculations shall address all typical pavement configurations involved, and they shall be performed as indicated in Section D.4. Where intersections are included, separate calculations shall be performed for the intersections.

13. Information relative to adjacent existing lighting and demonstration of integration of the proposed lighting into an established plan.

14. A letter of commitment for the acceptance of maintenance, energy costs and locate responsibility by a suitable government agency. Refer to the attached sample, (Exhibit "A"). The letter shall also include the following:

    a. Record Drawings. Upon completion of the permitted work, detailed record drawings, of the installed system shall be provided to the Department. The commitment letter,

described elsewhere herein, shall acknowledge the permittee's obligation and intent to provide record drawings.

b. Contactor shall record GPS coordinates of the following electrical components being installed on State Right-of-way, modified or being affected in other ways by this contract:

- Last light pole on each circuit
- Conduit roadway crossings and handholes
- Controllers and electric service locations.
- Structures with electrical connections, i.e. DMS, lighted signs.

Datum to be used shall be North American 1983.

Data shall be provided electronically and in print form. The electronic format shall be compatible with MS Excel and ESRI ArcMap. Latitude and Longitude shall be in decimal degrees with a minimum of 6 decimal places. Each coordinate shall have the following information:

- Description of item
- Designation or approximate station if the item is undesignated
- Latitude
- Longitude

Prior to the collection of data, the contractor shall provide a sample data collection of at least six data points of known locations to be reviewed and verified by the Engineer to be accurate within 100 feet. Upon verification, data collection can begin. Data collection can be made as construction progresses, or can be collected after all items are installed. If the data is unacceptable the contractor shall make corrections to the data collection equipment and or process and submit the data for review and approval as specified.

Accuracy. Data collected is to be mapping grade. A handheld mapping grade GPS device shall be used for the data collection. The receiver shall support differential correction and data shall have a minimum 5 meter accuracy after post processing.

GPS receivers integrated into cellular communication devices, recreational and automotive GPS devices are not acceptable.

The GPS shall be the product of an established major GPS manufacturer having been in the business for a minimum of 6 years.

c. The permit applicant shall be obligated to provide location marking of buried work, electrical or other, when requested within a reasonable time. The commitment letter shall acknowledge the permittee's obligation to provide location marking, and shall include a contact phone number for locate marking requests.

d. A letter of commitment acknowledging all of the requirements contained herein shall be submitted along with submittal. Refer to attached sample letter, Exhibit "A".

15. Other systems not expressly covered by the subparts of these standards such as custom lighted signs, irrigation systems, etc. shall nevertheless be designed and constructed within the general precepts of these standards.

16. If the permit work involves the modification of existing State-owned facilities, and/or installs facilities which will be owned and maintained by the State after the completion of the project, catalog cut submittals during construction must be made to document the materials and equipment used.

17. Conversion of Light Source

Existing lighting systems on State Routes by permit may be converted from one light source to another, i.e. HPS to LED, provided the following requirements are met:

The following must be submitted:

- Verification of ownership of lighting system.
- Identify IES roadway Classification.
- Submit lighting calculations demonstrating compliance with the IES recommended lightning levels. Calculations shall be performed as described in Section D5
- Submit an electronic file with GPS coordinates (decimal degrees) of the poles to be converted.

If the new luminaires do not provide lighting which complies with the current IES guidelines, then calculations shall be performed to determine the existing lighting levels and uniformities. The proposed luminaries must provide an improvement over the existing lighting. Under no circumstances will a light source conversion be allowed which results in a degradation of the existing lighting.

G. Special Requirements for State Owned and Maintained System

1. A meeting with the Bureau of Traffic Operations, Electrical Design Section must be held to establish the scope of work and the general goals of the project.

2. Design work must be submitted for review and approval by the Bureau of Traffic Operations, Electrical Design Section on a staged basis which shall generally be as follows:

Submittal Stage	Included, but not limited to
25% **Initial Submittal** *(Essentially the equivalent of Phase I work)*	Project description including the IES Roadway classification w/justification and photographs. Approvable Photometric Calculations performed with AGI32 with any design alternatives discussed. A preliminary lighting layout, or layouts if alternatives are presented, shall be included.
75% **Preliminary**	Tentative equipment selection and a list or sketches of necessary details, electrical distribution shown on the plans, voltage drop calculations, list of special provisions and pay items. This stage must also address any existing lighting as well as the need for temporary lighting if needed and electric service coordination.
95% **Pre-Final**	Essentially complete drawings and specifications including draft summary of quantities, estimate of cost and all details.
100% **Final**	Completed, corrected and checked final documents incorporating all review comments ready for bidding incorporating any minor revisions or corrections. The deliverables shall also include all lighting related CADD files in MicroStation format.

Specific dates may be established for the staged submittals and the State will not be responsible for changes resulting from the failure to gain staged approval as outlined above certain stages, upon prior understanding with the Bureau of Traffic Operations, Electrical Design Section. An initial submittal that includes essentially completed plans is strongly discouraged. Submittals shall address point-by-point, comments made in previous stages.

3. The electric utility must be contacted relative to any new service or service revisions. All agreements must be signed by the State. The State must be kept advised of all contact with the utility. The design work will not be considered complete without contact and coordination with the utility. The maximum available fault current shall be calculated and the arc flash risk assessment study shall be performed and documented.

4. A field inspection of the site, with file documentation, including photographs, is required. Failure to perform adequate site inspection will not relieve the consultant from responsibility for errors. All utility working and safety clearances must be followed in the preparation of the plans.

5. The plans must include a one sheet, one-line drawing of the lighting system connected to each controller. This drawing shall note new and old equipment and appurtenances; note the line wattages; note the lamp wattages; and will provide a table of circuit loads. Feeder circuits shall be sized in accordance with circuit breakers in the lighting controller detail.

6. Luminance calculations of photometric performance will be emphasized. Failure to provide luminance calculations for straight roadways will result in rejected design submittals.

7. I.D.O.T. District One standards must be employed in the design work. As such, the Bureau of Traffic Operations, Electrical Design Section will provide considerable information relative to specifications and standard drawings. The consultant is expected to adapt the material provided to the specific project, and to develop the remainder of needed design material, consistent with established design criteria and District One standards.

8. At the conclusion of the design, the consultant shall deliver to the State a complete design file including field data, design material, correspondence, CDROMs and other pertinent information relating to the design. The file shall be neatly arranged in reverse chronological order, with all materials held in place (not loose). Failure to furnish the design file will cause the design work to be considered incomplete.

H. Special Requirements for Beacon Lighting

1. SCOPE:

The purpose of these requirements is to establish the condition under which the District may approve the installation of a beacon light at an intersection involving a State highway. A "beacon light" is defined as a single luminaire on one pole, which would normally not meet the partial intersection lighting standards as defined by IES. The purpose of the beacon light shall be to identify the presence of an intersection and to serve as a warning or guide. Recognizing that partial lighting may cause sight adaptation problems for the night driver, this policy imposes various restrictions to minimize these potential problems.

2. APPLICATION:

The intersections for which this policy will be implemented would be the intersection of a State Route, considered a "major" roadway, with a "local" roadway. (The definition of these roadway classes is to be found in the publication: American National Standard Practice for Roadway Lighting IES/RP 8). This treatment will be used restrictively at isolated intersections only and would not be either appropriate or indicated for an intersection of two State Routes.

Since a beacon light is for purposes of identifying a cross-route, such lighting is not appropriate for signalized locations. If lighting is a needed safety improvement at a signalized intersection, it should be properly designed complete intersection lighting. If beacon lighting exists at a given un-signalized intersection and the intersection is to be signalized; the beacon lighting must be removed, or complete intersection lighting must be installed.

3. REQUIREMENTS:

a. Initial lamp lumens shall be less than 10,000. The luminaire be of the flat glass, full cut off type. The minimum luminaire height is to be 30 ft.

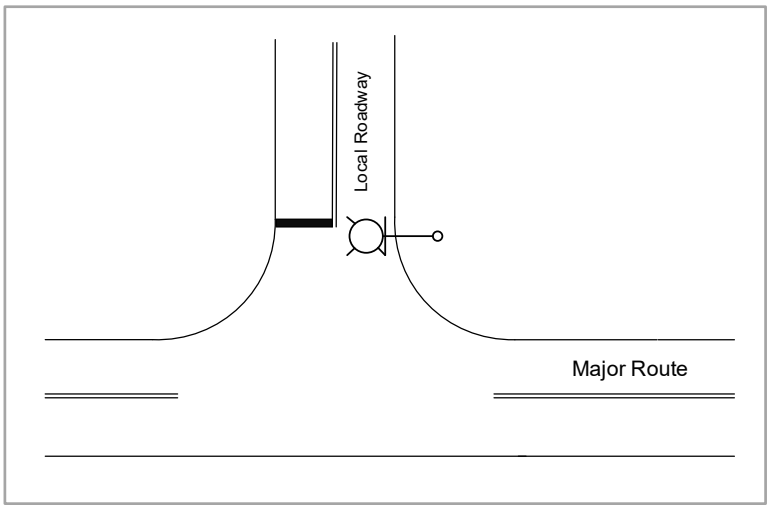


Figure H.3.1

b. That the lighting is directed to the minor street and that therefore the mast arm of the installation is accordingly oriented perpendicular to the local roadway.

c. That the pole anchorage and set back conform to IDOT, District 1 standards described elsewhere herein.

d. That a single pole may be used for a "T" intersection and two poles must be used for a four-way intersection.

e. That a government agency other than the State assumes full responsibility for ownership, operation, and maintenance of the installation.

f. The review for approval will be made in the context that, from the information presented, the proposed installation shall pose no adverse effect upon the vision or driving task of the motoring public.

g. Except as otherwise stated, all other general requirements for permit lighting shall apply.

I. Special Requirements for Ornamental or Decorative Lighting

1. SCOPE

These specialized requirements establish conditions for ornamental lighting that is used in a limited, localized installation. They can be intended for installations that are more extensive and that could be construed as street lighting. The objective of these requirements is to recognize the community benefits of isolated ornamental lighting while minimizing the potential negative effects on motoring and pedestrian safety from glare, improper pole placement, or other factors.

2. APPLICATION

Ornamental or decorative whether developed as a standalone system or as a part of a supplemental to a conventional lighting system on State Routes shall be viewed in aggregate as street lighting. Permit ornamental or decorative lighting may be allowed, in areas where the speed limit is 35 mph or less, generally in municipal central business districts, historical locations, strictly residential areas. No commercial advertising shall be part of an installation. Banner arms installed on the luminaire supports shall comply with the banner requirements contained elsewhere within. Other appurtenances, such as hanging baskets, shall comply with all electrical and safety codes and not pose a hazard to the general public and maintenance personnel.

Appropriate standards for pedestrian walks and bike paths may be separately applied when such facilities are sufficiently distant from the roadway so as to be distinctly separate and where the lighting would not be construed as roadway lighting.

3. REQUIREMENTS

a. Except as otherwise stated, all other requirements for permit lighting shall apply.

b. Ornamental lighting may incorporate single unit luminaires or multi-unit luminaire clusters on a common pole. Luminaire initial lamp lumens for supplementary pedestrian poles shall be generally restricted to a maximum combined output of 10,000 lumens.

   The use of Red, Green and Blue (RGB) light sources which produce colored or color changing light is prohibited within the State Right of Way. Luminaires for roadway and pedestrian lighting shall be within the 2700K to 4000K temperature range. Flashing, oscillating, rotating, laser lights or pulsating lights are prohibited within and adjacent to the State right of way.

c. To minimize glare, ornamental luminaires shall have:

   1. Diffuse lenses/globes or

   2. A completely hidden source, i.e. lamp and all reflectors completely cut off (shielded from view) at any angle above horizontal.

   3. Refractor lenses with proven, tested full or semi-cutoff optics.

d. Complete illuminance and pavement luminance calculations, which conform to the IES format, shall be submitted for a proposed installation not meeting the above requirements, to demonstrate that it is within the recommended IES limits for veiling luminance ratio (glare).

Special custom installations, such as lighted signs, markers, etc. will be reviewed and approved on a case-by-case basis, but in keeping with the general objectives of minimized glare and maintenance of visibility for the motorist.

e. The lighting system design must minimize the number of fixed objects presented to the motorist. Excessive poles constitute a roadway safety hazard and long-term maintenance liability. Primary pole spacing should be no closer than 150' with shorter supplementary pedestrian poles no closer than half the primary pole spacing. Furthermore, no luminaire support shall be less than ten feet in mounting height.

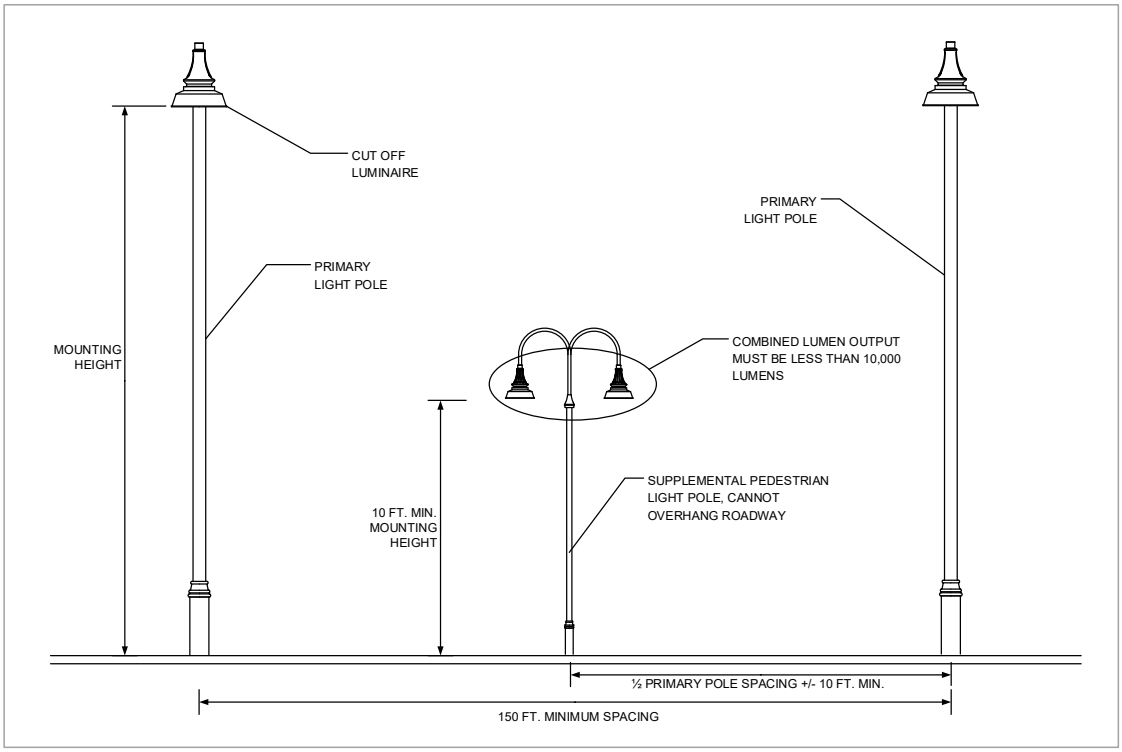


Figure I.3.1

f. All breakaway requirements must be met including ornamental bases.

g. All components shall be classified or listed by an OSHA recognized United States national testing organization such as Underwriters Laboratories.

h. The installation shall be in accordance with the NEC.

i. Domestic steel requirements are required for all Federal and State funded lighting.

j. The review for approval will be made in the context that, from the information presented; the proposed installation shall pose no adverse effect upon the vision or driving task of the motoring public.

k. Sole source items shall comply with Title 23 CFR 635.411

J. Requirements For Landscape or Other Decorative Lighting

1. SCOPE

These specialized permit requirements establish the limited conditions under which decorative lighting may be utilized on the right of way of state highways. They are not intended to encourage or promote the use of state right-of-way for such purposes. They are intended to foster good visibility by restricting glare and obtrusive light. These requirements are also intended to foster electrical safety in permitted systems and to protect state highway electrical systems from damage or interference resulting from systems installed by permit.

2. APPLICATION

Landscape or sign floodlighting may be allowed restrictively, to serve a local community purpose, under the responsibility of a local government agency. It shall be limited to concentrated locations, and it shall not be continuous along a state highway. Such installations shall be in locations with limited pedestrian access and that are otherwise not likely to be vandalized. The lighting so permitted shall be designed and maintained in a manner that it does no harm to the visibility of the motorist and that it limits light pollution and light trespass.

Nuisance lighting such as flashing, blinking, sequential, rotating, laser source lights or pulsating lights are prohibited adjacent to the State right of way.

Installations shall be electrically safe and shall not interfere with the operation or maintenance of state systems. Installations may not contain advertising in any manner.

A letter of commitment for maintenance and energy, as described elsewhere herein, is required, and this commitment shall also confirm the understanding that the Department shall retain the right to repair or remove, at the owner's expense, systems that are found damaged or deficient in maintenance. The commitment shall acknowledge the permittee’s obligation to provide detailed record drawings of the installed system and to provide locates of buried work when requested.

3. REQUIREMENTS

Except as otherwise stated, all other requirements for permit lighting shall apply.

Lighting shall be arranged such that it produces no glare to the motorist and shall be placed such that even mis-adjustment of luminaires is unlikely to produce glare to the motorist.

Lighting shall utilize energy efficient light sources, preferably LED, as applicable and care shall be taken to minimize the amount of lighting installed to produce the desired effect. Luminaires shall be sealed and UL listed as suitable for wet locations. Luminaire installation shall conform to the manufacturer's recommendations.

Except as may be otherwise permitted by the Department, permitted decorative lighting shall be electrically served by a separate electrical service and shall have controls in an assembly that is UL listed or labeled for compliance with OSHA regulations.

Circuit runs shall be as tightly grouped as possible to minimize interference with IDOT systems and use of the right-of-way, and all buried runs shall be no less than 36 inches deep, installed with a detectable tape marker above the runs. Non-metallic raceways, if used, must be encased in concrete.

K. Decorative Banners

1. General

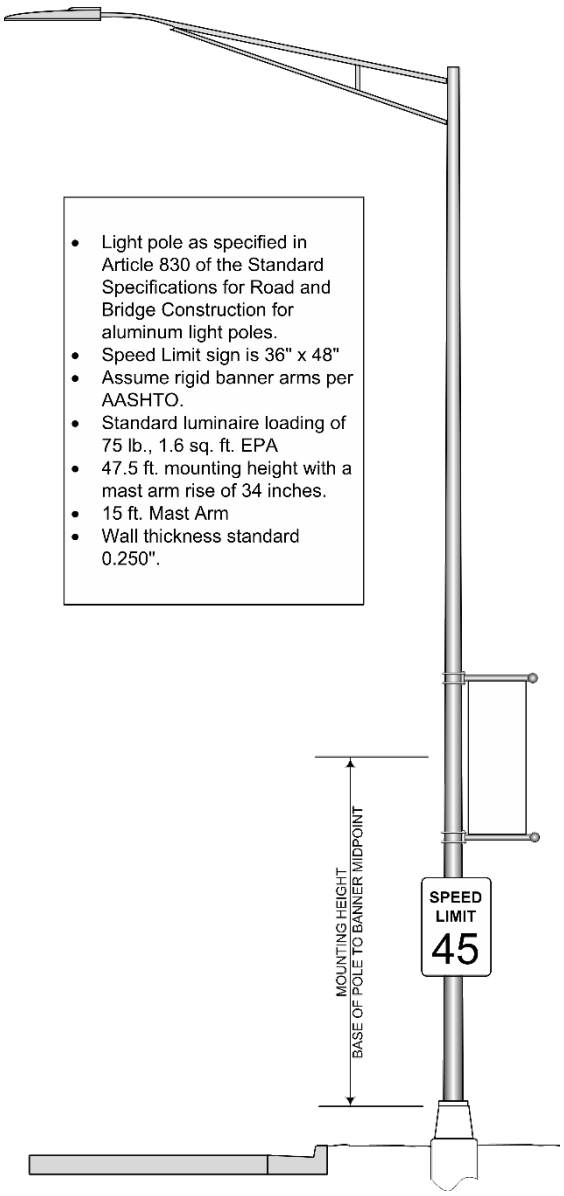
Controls and limitations on banner use are necessary to foster motorist safety by limiting distractions and maintaining visibility of roadway signs, assuring structural adequacy of supports, restricting advertising on State routes and minimizing encroachments into the traveled right-of-way.

Light pole banner placement along a state route shall require a state permit. This requirement applies to light poles that are owned and maintained by a Local Agency, and it also applies to State light poles only within Local Agency boundaries.

Banners shall be in conformance with Illinois Statue 225 ILCS 440.

Permits for banner placement shall only be issued to a responsible local government agency. No banner placement permits shall be issued to non-government entities of any kind. A Local Agency shall only be allowed permits for banner placement within its own boundaries.

The Department reserves the right to prohibit banner placement at specific locations where it believes the banners or their maintenance will create an adverse impact on traffic or safety.



2. Loading

Poles to which banners are applied must be structurally adequate for the applied lighting and banner loading, all in accordance with current AASHTO loading and calculation requirements, typically for 90-mph 3-second wind speed.

All calculations for pole loading shall include a typical 36-inch by 48-inch aluminum highway sign (such as a speed limit sign), with the bottom of the sign at 7-feet above the base of the pole, as extra potential loading.

Calculations shall be based on solid banners, without any de-rating factor applied for banner perforations, banner arm flexibility or other assumed loading reduction techniques.

Calculations for loading of existing poles shall be based on existing features of poles and appurtenances. Calculations for loading of proposed Local Agency poles shall be based on lighting loading as proposed, or, if documented as matching typical state pole conditions as identified herein, calculations for proposed poles may be omitted.

3. Installation

Banners and all appurtenances shall not cover or otherwise obscure roadway signs or light pole identification, nor shall they hinder light pole maintenance in any way. Banners shall not obstruct the view of any traffic signals or other traffic control devices.

Banners shall be supported top and bottom, from arms either built into a new pole structure or from arms otherwise attached with non-invasive stainless steel bands. Poles shall not receive post-manufacture modification such as drilling or welding for mounting of banner arms. If breakaway banner arms are used, the arms shall be secured with safety chains.

Banners shall be prohibited on light poles that have or that even subsequently receive multiple roadway signs (regulatory, guidance, warning).

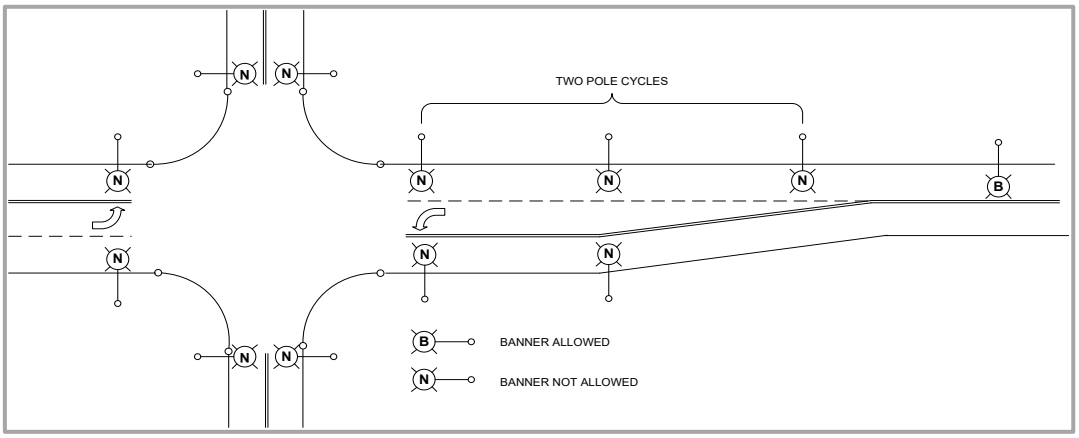
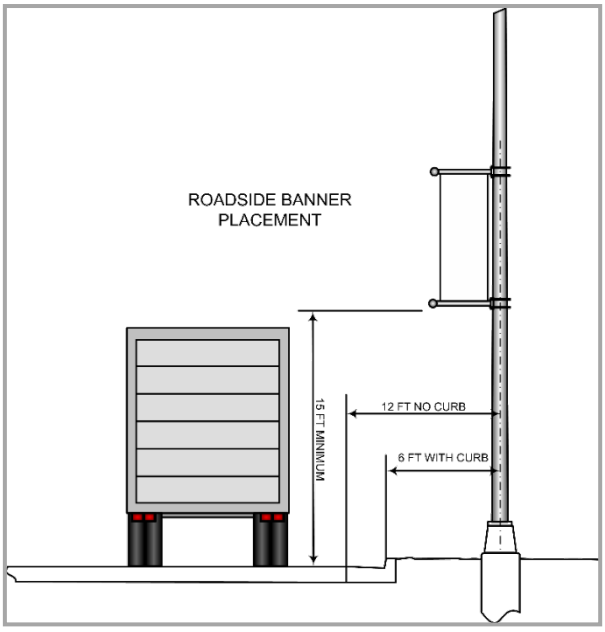


Figure K.1

Except where the speed limit is 30 mph or less on all approaches to a signalized intersection, banners shall be prohibited on light poles within two pole cycles (3 poles) or 150 feet, (whichever is greater), beginning with the light pole, (not combination) closest to the signalized intersection. Banners shall also be prohibited adjacent to RR crossings. Banners are also prohibited on traffic signal poles.



Banners (including support arms) shall not encroach into roadway traveled lanes or parking area along the roadway. A banner shall not be placed on the roadway side of a supporting light pole unless:

the supporting light pole is behind barrier curb and the face of the pole base is 6 feet or more behind the back of the barrier curb, or the face of the supporting light pole base is 12 feet or more outside of the edge of the traveled lane, including any channelized turn lane, or the supporting light pole meets normal lighting set-back requirements and the banners are mounted with the bottom support bracket at 15 feet or more above roadway grade.

Banners shall be prohibited on light poles of interchange lighting, including poles on, between and 150 feet of ramp terminals.

4. Maintenance

Banners, as permitted, shall conform to IDOT policy relative to permissible content, limiting advertising. In addition, banners permitted on state poles shall contain no advertising or sponsor identification (see Additional Requirements for Banners on State Poles, below).

Banners, as permitted, shall be well-maintained and presentable. Banners that become tattered, faded or otherwise worn or a potential hazard shall be removed. If banner placement is discontinued, the associated support arms shall be removed. If the Department determines that banners are improper or are not being adequately maintained, the Department reserves the right to remove the offending banners regardless of the ownership of the supporting pole.

5. Additional requirements for banners on state poles

The Department reserves the right to change its lighting installation at any time without responsibility for any changes necessitated to any associated Local Agency banners.

If the Local Agency seeks to install banners on state poles which deviate from the assumed typical pole and appurtenances represented in the typical loading exhibit, the Local Agency shall be responsible for providing approvable calculations and documentation for approval.

The installation of banner support arms shall be inspected and approved by the Department or the Local Agency may contract with the District's Electrical Maintenance Contractor for installation of support arms.
In the event of a pole knock-down or other damage to a light pole having a Local Agency banner, the Local Agency shall be wholly responsible for the any damage to, or caused by the banner and its appurtenances, and the Local Agency shall be wholly responsible for its replacement.

Non-compliant banners found on state poles are subject to immediate removal and the responsible Local Agency shall be subject to revocation of its permit.

6. Banner permit submittal requirements

The permit submittal shall include all information necessary to confirm compliance with the requirements outlined herein. This shall include, but not be limited to:

- Documentation of pole features (material, height, wall thickness, dimensions, etc.)
- Banner and arm mounting details and dimensions,
- Calculations and vendor loading certification as necessary,
- Plan layout of proposed banner poles

A letter from the Local Agency accepting responsibility and committing to maintenance all in accordance with the provisions of these permit requirements. For banners on state poles, the letter shall affirm understanding of the additional requirements for banners on state poles and the submittal shall indicate if installation by the District's Electrical Maintenance Contractor is intended.

L. Decorations and Holiday Lighting

Controls and limitations on decorations and holiday lighting are necessary to foster motorist safety by limiting distractions and maintaining visibility of roadway signs, assuring structural adequacy of supports, restricting advertising on State routes and minimizing encroachments into the traveled right-of-way.

Holiday lighting installations shall comply with the NEC, Articles 410.160 and 590.

Holiday lighting installations shall be temporary and remain in place for a maximum of 90 days.

Decorative lighting used for holiday lighting and similar purposes, shall be listed and shall be labeled on the product.

Suspending conductors aerially from pole to pole is not allowed.

Ground mounted holiday lighting and or decorations shall not be installed in the roadway median.

Nuisance lighting such as flashing, blinking, sequential, rotating, laser source lights or pulsating lights are prohibited in or adjacent to the State right of way.

Holiday lighting and decorations shall comply with Illinois Statue 225 ILCS 440 in particular §6.02