



Title Rural Intersection and Destination Lighting		Policy No. 630.01
Responsible Office Office of Traffic and Safety		Related Policies and Procedures
Effective/Revision Dates 10-15-90/ 3-16-04	Approval(s) Kevin M. Mahoney	

Authority: Director of the Highway Division in accordance with administrative rules 761 IAC Chapter 136, *Lighting* (reproduced in **Appendix**).

Contents: This policy establishes or references warrants, design requirements, responsibilities, and procedures for the installation of intersection or destination lighting within the limits of primary road right-of-way at rural primary/primary, rural primary/secondary, and other rural primary/minor road intersections.

Affected Offices: District Offices; Offices of Local Systems, Maintenance, Program Management, and Traffic and Safety.

Who to Contact for Policy Questions: Office of Traffic and Safety.

Definitions:

Destination lighting - Lighting of an intersection for the purpose of providing a means for the driver of a vehicle to visually locate the intersection at a distance and to be guided to the intersection with minimum distraction to through traffic. A destination lighting installation consists of a single luminaire per intersection.

Intersection lighting - Lighting of an intersection for the purpose of facilitating traffic movements and enhancing safety by improving the visibility of roadway features and objects on or near the roadway. The number of luminaires in this type of lighting installation will vary depending on the intersection configuration and the required lighting level.

Minor road - For the purpose of this policy, a minor road is an entrance to a primary road from a frontage road, a rural commercial establishment, a governmental agency facility, a generator of substantial traffic volume, or a secondary road.

Right-of-way - Land for any public road, street, or highway, including the entire area between the property lines.

Rural intersection - An intersection occurring on or outside a corporate line.

Forms:

810025 - *Application for Use of Highway Right-of-Way for Utilities Accommodation*

Policy and Procedure:

I. Lighting Warrants

The following criteria (warrants) shall be used to determine if a rural primary/primary, rural primary/secondary, or other rural primary/minor road intersection is a candidate for lighting. However, meeting the criteria does not obligate the Department to provide lighting or to

participate in lighting costs. Funding for lighting projects is measured in relation to the needs of the entire highway system and not by the criteria established by this policy.

If a rural primary/primary or a rural primary/secondary intersection does not qualify for intersection lighting under the established warrants, it will be evaluated under destination lighting warrants.

A. Intersection Lighting for Rural Primary/Primary Intersections

1. Proposed new or redesigned/reconstructed intersection: The intersection is a candidate for intersection lighting if the current average daily traffic (ADT) is 3500 entering vehicles for the intersection AND:
 - The intersection is channelized, OR
 - The intersection is a "T", OR
 - A change in the direction of the major route occurs.
2. Existing intersection: The intersection is a candidate for intersection lighting if:
 - It meets the criteria listed in administrative rule 761 IAC 136.1 (see **Appendix**) for the lighting of rural primary/secondary intersections, OR
 - It meets the criteria listed in paragraph A.1. above for the lighting of new or redesigned/reconstructed rural primary/primary intersections.

B. Intersection Lighting for Rural Primary/Secondary Intersections

See administrative rule 761 IAC 136.1 (reproduced in **Appendix**).

C. Destination Lighting for Rural Primary/Primary, Rural Primary/Secondary, and other Rural Primary/Minor Road Intersections

1. Proposed new or redesigned/reconstructed intersection: The intersection is a candidate for destination lighting if the current average daily traffic (ADT) is 1750 entering vehicles for the intersection AND:
 - The intersection is channelized, OR
 - The intersection is a "T", OR
 - A change in the direction of the major route occurs.

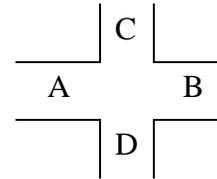
Regardless of volume, the intersection is also a candidate for destination lighting if the district has documentation of motorists experiencing operational problems which might be expected to be reduced by a destination light.

2. Existing intersection: The intersection is a candidate for destination lighting if one of the following is met:
 - The night-to-day crash ratio is 1.0 or greater with a minimum of 2 reportable nighttime crashes in a 5-year period (night-to-day ratio = 3 x nighttime crashes/daytime crashes).

- The warrants for destination lighting of new or redesigned/reconstructed intersections are met.
- After making the following calculations, the value of "c" exceeds 1000 points:

Calculation of "c":

Major traffic flow: A to B & B to A
 Minor traffic flow: C to D & D to C
 Possible left turns: A to C, B to D, C to B, & D to A



	Sight Distance	Speed Limit	Approaching Traffic
Actual A:	_____	_____	_____
Actual B:	_____	_____	_____
Standard:	2000 ft.	55 mph	
	1800 ft.	50 mph	
	1700 ft.	45 mph	
	1500 ft.	40 mph	

SAF = Safety Adjustment Factor

$$\text{SAF} = \frac{\text{Standard sight distance}}{\text{Actual sight distance}} \times \frac{\text{Actual approaching traffic}}{1000}$$

"A" SAF = _____ x _____ = _____
1000

"B" SAF = _____ x _____ = _____
1000

GSAF = Greater Safety Adjustment Factor
 = Greater "A" SAF or "B" SAF

GSAF x Traffic from C to D	=
GSAF x Traffic from D to C	=
GSAF x Traffic from C to B x 1.5	=
GSAF x Traffic from D to A x 1.5	=
"A" SAF x Traffic from B to D x 1.5	=
"B" SAF x Traffic from A to C x 1.5	= _____
"c" =	= _____

II. Design Requirements

The design of a lighting installation for a rural primary/primary, rural primary/secondary, or other rural primary/minor road intersection shall comply with Departmental specifications and Standard Road Plans for highway lighting, with the following general requirements:

- A. The electrical distribution system shall be adequate for the intended loads. Where breakaway poles are to be installed, the electrical distribution system shall be underground from the point of delivery. Where wood poles are allowed, the electrical distribution system may be underground or overhead. All underground circuits shall be in conduit. Conduit risers on wood lighting poles shall be placed away from traffic.
- B. The luminaire shall normally be placed to the left of traffic approaching the primary road from the secondary or minor road. For rural primary/primary intersections, the minor road shall be the primary road with the stop control. "All way" stop intersections shall be evaluated on a case-by-case basis.
- C. The typical distance from the near edge of the primary road traveled way to a light pole on the shoulder of the secondary or minor road shall be 48 feet for both a two-lane primary road and a four-lane divided primary road.
- D. All light poles adjacent to paved roadways shall be mounted on breakaway bases. The pole footings shall be constructed with the top surfaces flush with the ground surface.
- E. A breakaway light pole shall be placed with optimum lateral clearance. Lateral clearance is the distance between the edge of shoulder and the face of the pole. The breakaway pole must be placed within a zone that will optimize the height of impact due to the bumper trajectory of a vehicle leaving the shoulder at high speed, yet provide a minimum clearance for snow removal. The optimum lateral clearance is typically achieved when the breakaway pole is placed 2 feet beyond the shoulder-foreslope break point.

For unpaved roads, where breakaway design is not required, the maximum normal horizontal mastarm span of 15 feet should be used. Location of the pole in relation to the centerline of the minor road should be determined such that an acceptable compromise between illumination, clear zone, drainage, and right-of-way considerations is achieved.

- F. Typically, placement of the mastarm and luminaire in relation to the secondary or minor road shall be as follows:
 - 1. The mastarm shall be placed at a horizontal 90 degree angle to the centerline of the secondary or minor road, with an allowable tolerance of minus 2 to plus 2 degrees. The mastarm requirements are as follows:

Type of Roadway	Shoulder Width	Mastarm Length	Lateral Clearance
paved	2 feet	4 feet	2-3 feet
paved	4 feet	6 feet	2-3 feet
paved	6 feet	8 feet	2-3 feet
paved	8 feet	10 feet	2-3 feet
paved	10 feet	12 feet	2-3 feet
unpaved	none	15 feet	as app'l

Mastarm length may vary from the chart only if the requirements for overhang and lateral clearance are met.

- 2. The luminaire should be mounted so that the center of the light source, approximately 1.5 feet from the edge of the luminaire, overhangs the near edge of the pavement (or if unpaved, the edge of the roadbed) from minus 1 to plus 3 feet.

- G. The luminaire shall be specifically designed for highway lighting. The luminaire shall have a totally prismatic, enclosed refractor designed for horizontal lamp operation. The luminaire shall be rigidly mounted and shall have ANSI/IES "CUTOFF" glare control. Recommended light distribution is ANSI/IES Type II-M or Type III-M. The use of high pressure sodium luminaires is recommended.
- H. The vertical distance between the center of the light source and the surface of the roadbed is the mounting height.
 - 1. For intersection lighting, the recommended mounting height is 50 feet. Lower mounting heights will be considered with adequate justification; however, the minimum mounting height is 40 feet.
 - 2. For destination lighting, the minimum mounting height is 30 feet. A mounting height of 35 or more feet is desirable.
 - 3. Maximum lumen outputs for corresponding mounting heights are as follows:

Mounting Height	Maximum Lamp Lumen Output	Mercury Vapor	High Pressure Sodium
30-34 feet	11,000	H37KB-250	S54SB-100
35-49 feet	20,000	H33-1CD	S55SC-150
50 feet	30,000	H33-1CD	S50VA-250

III. Financial Responsibilities

A. Rural Primary/Primary Intersections

If warranted, the Department may install intersection or destination lighting at a rural primary/primary intersection. The Department shall be responsible for the installation and future energy and maintenance costs of this lighting. However, if the intersection falls on the corporate line, the future energy and maintenance costs shall be distributed in accordance with administrative rule 761--150.3(3)"b".

B. Rural Primary/Secondary and other Rural Primary/Minor Road Intersections

See administrative rules 761 IAC Chapter 136 (reproduced in **Appendix**).

IV. Procedures

A. Rural Primary/Primary Intersections

- 1. Proposed new or redesigned/reconstructed intersections: The Office of Traffic and Safety shall evaluate, during design, proposed new intersections and those proposed for redesign/reconstruction to determine if intersection lighting is warranted. If the intersection does not qualify for intersection lighting, it will be evaluated under destination lighting warrants.

The Office of Traffic and Safety is responsible for preparing the lighting plans for letting.

2. Existing intersections:

- a. A request for lighting an existing intersection shall be submitted to the district office. The district office shall submit the request to the Office of Traffic and Safety for evaluation.
- b. The Office of Traffic and Safety shall evaluate the request against intersection and destination lighting warrants and notify the district office as to whether intersection or destination lighting is recommended.
- c. The district office shall notify the requester of the results of the review. If lighting is recommended, the district office is responsible for initiating action to obtain program approval and funding.
- d. The Office of Traffic and Safety is responsible for preparing the lighting plans for letting.

B. Rural Primary/Secondary and other Rural Primary/Minor Road Intersections

1. Proposed new or redesigned/reconstructed intersections: The Office of Traffic and Safety shall evaluate, during design, proposed new intersections and those proposed for redesign/reconstruction to determine if intersection lighting is warranted. If the intersection does not qualify for intersection lighting, it will be evaluated under destination lighting warrants.

2. Existing intersections:

- a. A request for lighting an existing intersection shall be submitted to the district office. The district office shall be responsible for approval of any requests in accordance with administrative rules 761 IAC 136.1 and 761 IAC 136.2 (see **Appendix**).
- b. For rural primary/secondary intersection lighting requested by a county or other applicant (see rule 761 IAC 136.1), the district office shall ask the Office of Traffic and Safety to review the request.

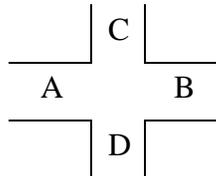
The Office of Traffic and Safety shall evaluate the request against intersection lighting warrants, notify the district office as to whether funding for intersection lighting is recommended, and advise the district office of possible funding sources and responsibilities.

- c. For destination lighting requested by a county or other applicant (see rule 761 IAC 136.2), the district office may ask the Office of Maintenance to review the request.
- d. The Office of Traffic and Safety shall review rural primary/secondary intersection lighting plans submitted by the county for approval prior to contract letting or the installation of lighting. The appropriate district and the Office of Local Systems shall be notified of the results of the review.

Appendix
Administrative Rules 761 IAC Chapter 136
Lighting

761—136.1(319) Lighting of primary-secondary intersections. The purpose of this rule is to establish the qualification criteria, application procedure and financial responsibilities for the placement of roadway luminaires within the limits of the primary road right-of-way at a rural intersection of a primary road and a paved secondary road.

136.1(1) Lighting criteria. A primary-secondary intersection is a candidate for lighting if one of the following is met:



Major traffic flow (primary): A to B & B to A
 Minor traffic flow (secondary): C to D & D to C
 Possible left turns: A to C, B to D, C to B, and D to A

- a. The night-to-day accident rate ratio is 2.0 or greater with a minimum of three reportable nighttime accidents in a 12-month period.
- b. Substantial lighted commercial or business development that is affecting operations exists adjacent to the intersection.
- c. Motorists are experiencing operational problems which might be expected to be reduced by lighting.
- d. The current average daily traffic (ADT) is 3500 entering vehicles for the intersection and:
 - (1) The intersection is channelized or "T," or
 - (2) A change in the direction of the major route occurs.
- e. After making the following calculations, the total in subparagraph (3) below exceeds 3000 points.
 - (1) Determine the "Roadway/Traffic Factors" for traffic at A and for traffic at B, using the following formula and "Standard Sight Distances for Speed":

$$\begin{array}{l} \text{Roadway/} \\ \text{Traffic} \\ \text{Factor} \end{array} = \frac{\text{Standard Passing Sight} \\ \text{Distance for Speed}}{\text{Actual Sight Distance}} \quad \times \quad \frac{\text{Actual Approaching} \\ \text{Traffic Volume}}{1000}$$

Standard Passing Sight Distances For Posted Speeds

Speed	Distance
55 mph	2000 ft.
50 mph	1800 ft.
45 mph	1700 ft.
40 mph	1500 ft

- (2) Compare the two answers; the larger number is the "Greater Roadway/Traffic Factor."
- (3) Calculate points based on the following formula, using current average daily traffic (ADT):

Greater Roadway/Traffic Factor x Traffic Volume from C to D	=	_____
Greater Roadway/Traffic Factor x Traffic Volume from D to C	=	_____
Greater Roadway/Traffic Factor x Traffic Volume from C to B x (1.5)	=	_____
Greater Roadway/Traffic Factor x Traffic Volume from D to A x (1.5)	=	_____
Roadway/Traffic Factor for A x Traffic Volume from B to D x (1.5)	=	_____
Roadway/Traffic Factor for B x Traffic Volume from A to C x (1.5)	=	_____
TOTAL	=	_____

136.1(2) Reserved.

136.1(3) Procedures.

a. A request for lighting shall be made by the county to the appropriate district engineer. The request shall indicate the type and size of luminaires proposed, sight distance measurements and posted speed. If the county is requesting that the department participate in the installation costs as a C-STEP (County-State Traffic Engineering Program) project, this should be indicated in the request. A lighting plan shall accompany the request showing:

- (1) The complete dimensions of the intersection including pavement and shoulders.
- (2) The locations of proposed luminaires and poles.
- (3) The mounting heights, mast arm lengths, lateral and vertical light distributions of proposed luminaires and the approximate location for electrical service.

b. The district engineer shall forward the request to the department's office of traffic and safety for review.

c. If design requirements are satisfied, the department shall approve the lighting installation.

(1) The county shall be responsible for designing and installing the lighting and for all future energy and maintenance costs.

(2) If the location qualifies for lighting installation and if funds are available, the department shall share the installation costs on the basis of the current C-STEP participation ratio.

(3) If the department does not share the installation costs but the county wishes to install the lighting, the county shall be responsible for the installation costs.

d. If the department will share the installation costs, the department shall prepare an agreement for departmental and county approval.

This rule is intended to implement Iowa Code sections 319.1, 319.12 and 319.14.

761—136.2(319) Destination lighting. The purpose of this rule is to establish the application procedure and financial responsibilities for the placement of a roadway luminaire within the limits of primary road right-of-way at a rural intersection of a primary road and a minor road.

136.2(1) Definition.

"Minor road," for the purposes of this rule, is an entrance to a primary road from a frontage road, a rural commercial establishment, a governmental agency facility, a generator of a substantial traffic volume, or a secondary road.

136.2(2) Reserved.

136.2(3) Procedures.

a. Application shall be made to the appropriate district engineer on Form 810025, "Application for Use of Highway Right-of-Way for Utilities Accommodation." The application shall indicate the type of luminaire and intensity of illumination proposed. A sketch shall accompany the application showing the location of the proposed luminaire and pole and the mounting height of the luminaire.

b. The district engineer shall be responsible for departmental approval of the application. A copy of the application indicating the district engineer's determination shall be returned to the applicant. Approved applications are termed "permits."

c. The applicant shall be responsible for installing the lighting and for all installation, energy and maintenance costs.

This rule is intended to implement Iowa Code sections 319.1, 319.12 and 319.14.

761—136.3 to 136.5 Reserved.

761—136.6(306) Warrants and design requirements for lighting.

136.6(1) Warrants. Meeting departmental warrants or criteria for lighting simply establishes the location as a candidate for lighting. It does not obligate the department to provide lighting or to participate in lighting costs.

136.6(2) Design requirements. The design of lighting installations shall comply with departmental specifications and standard road plans for highway lighting as they exist at the time of installation of the lighting.

This rule is intended to implement Iowa Code subsections 306.4(1) and 669.14(8).

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