
700 ILLUMINATION

700.1 INTRODUCTION

The purpose of this guideline is to provide general information as to where ADOT provides roadway lighting.

The purpose of highway illumination is to promote orderly and safe movement of nighttime traffic by artificially illuminating the roadway. Engineering judgment should be used in determining if lighting will be installed. Cost and readily available electrical service, are major factors in the determination in light installations.

The guideline conditions are for the purpose of establishing a guide on which lighting may be considered. **However, the meeting of the guideline conditions shall not obligate ADOT to provide lighting. Lighting shall be installed by the State only where engineering judgment indicates there are sufficient traffic volumes and/or collisions to satisfy one or more of the conditions set forth where illumination would enhance highway safety.**

700.2 FREEWAY ILLUMINATION

Continuous Freeway Illumination

When practicable, median lighting is preferred. The following data is used to evaluate the need for freeway illumination:

- (1) Estimated average daily traffic at the time of the opening of the freeway to traffic, for the freeway lanes, each ramp, and each crossroad, shown on the appropriate traffic volume movement forms.
- (2) For freeway projects in urban areas:
 - a. Visibility of city street lighting from ground level or elevated freeways.
 - b. Illumination of cross streets up to one-half (1/2) mile in each direction from the freeway.
 - c. Three or more successive interchanges with an average spacing of three (3) miles or less.
 - d. Presence of three or more lanes in each direction on freeway mainline.
 - e. Comparison of number of night vs day crashes in the past three (3) years.

Complete or Partial Interchange Illumination

The following data is used to evaluate the need the need for freeway illumination:

- a. Visibility of city street lighting from ground level or elevated freeways.
- b. Presence of commercial development in the vicinity of the interchange.
- c. Comparison of number of night vs day crashes in the past three (3) years.

Freeway to Freeway Interchange Illumination

Freeway to Freeway interchange illumination should utilize high-mast poles and fixtures.

Special Considerations

Continuous, complete, or partial interchange lighting, and pedestrian walkway bridge lighting, may be considered to be justified where the local governmental agency finds sufficient benefit in the forms of convenience, safety, policing, community promotion, public relations, etc., to wholly finance the installations, maintenance, and operation of the lighting facilities.

700.3 CONVENTIONAL HIGHWAY ILLUMINATION

(1) Intersection Lighting

The following data is used to evaluate the need for conventional highway lighting:

- a. Pedestrian and vehicular traffic counts.
- b. Availability of electrical service. Where electrical service is available only at excessive cost, consideration should be given to deferment of the installation, unless a benefit/cost analysis indicates a ratio of one or greater.
- c. Comparison of number of night vs day crashes in the past three (3) years.

(2) Continuous Lighting on Conventional Highways

Continuous lighting on conventional highways is considered to be justified where local agencies find sufficient benefit in the forms of convenience, safety, policing, community promotion, public relations, etc. to pay the cost of installation, maintenance, and operation of the lighting. Continuous lighting may be permitted by the State after the consideration of the following conditions:

- a. Visibility of city street lighting from ground level or elevated freeways
- b. Illumination of cross streets up to one-half (1/2) mile in each direction from the highway
- c. Presence of urban development
- d. Comparison of number of night vs day crashes in the past three (3) years

(3) Intersections on Conventional Highways

The following data is used to evaluate the need for illumination at intersections on conventional highways:

1. Pedestrian and vehicular traffic counts.
2. Availability of electrical service. Where electrical service is available only at excessive cost, consideration should be given to deferment of the installation, unless a benefit/cost analysis indicates a ratio of 1.0 or greater.
3. An average of three or more crashes per year over the three most current years have occurred under conditions other than daylight.
4. The intersection is signalized.
5. The intersection has raised channelization and/or complex geometrics.

700.4 PROVISIONS FOR FUTURE LIGHTING

Structures

Provisions for future lighting should be made on structures which are within urban areas and on others which may require lighting in the future.

Roadways

Underground conduit roadway crossings and pull boxes should be installed under a highway construction contract where it appears that lighting may be justified in the future.

Signalization

Intersections which are projected to be signalized should use poles for illumination that can be employed as future traffic signal supports.

700.5 DESIGN

ADOT Standard Drawings should be used unless otherwise specified.

Illuminance shall be the primary design method practiced for ADOT projects.

ADOT or the designer may require veiling luminance calculations in lieu or in addition to illuminance calculations for design.

In general, high pressure sodium (HPS) light sources are installed.

Typical wattage by mounting type:

High Mast: 400 watt.

Vertical Offset installations: typically 250 watt, not to exceed 400 watt.

Horizontal Mount: typically 150 watt or 250 watt, not to exceed 400 watt.

700.6 ILLUMINATION RESPONSIBILITY AND FINANCING

The Arizona Department of Transportation's participation in financing illumination on State highways will be as set forth below.

If local governmental agencies desire more expensive equipment than that normally used by the State, the additional cost is financed by the local agency.

On Federal-Aid projects, Federal participation will be requested when the desirability of providing lighting is established in accordance with the warrant conditions set forth in this guide.

Freeways

The cost of installing and maintaining lighting on freeways will be borne entirely by the State. The State financing will include all necessary lighting on the freeway and connecting ramps, including where necessary, lighting under structures. If other governmental agencies desire additional lighting, the installation, maintenance, and operation costs must be borne by the sponsoring agency.

Existing At-Grade Intersections

The installation of lighting at intersections at grade will normally be financed jointly by the State, the City, and/or County in a manner to be determined by the agencies and stated in a formal agreement between the parties involved. Maintenance and operation costs will normally be assumed by the local agency. The need for lighting will be established in accordance with the warrant conditions stated in this guideline.

New At Grade Intersections

The installation cost of lighting at intersections at grade on new construction will be borne entirely by the State. The maintenance and operation costs of lighting of new grade intersections will normally be assumed by the local agency. The need for lighting will be established in accordance with the guideline conditions set forth in this guideline.

Special Conditions

Where an engineering evaluation shows special conditions existing on roadways other than freeways, the State may assume the total financial responsibility for lighting, if the evaluation indicates that such lighting will address the condition until other countermeasures can be implemented.

Lighting by Other Agencies

When fixed lighting on State highways is desired by other governmental agencies, lighting may be permitted, provided the following conditions are met:

- a. **The State shall not be obligated to bear any portion of the costs for its construction, maintenance, or operation.**
- b. **Full authority is retained by the State to exercise control in all matters relating both to design and operation of such installations.**
- c. **Any such installation shall be subject to approval by the State, and will require an encroachment permit.**
- d. **The proposed lighting shall in no way detract from or nullify the effectiveness of any lighting placed by the State, or interfere with the safe and orderly movement of traffic.**
- e. **On freeways and divided highways, the installations shall incorporate metal poles with underground wiring. On conventional roadways these installations may be made on existing wood poles with overhead wiring.**

700.7 APPROVAL

The installation of illumination shall be approved by the State Traffic Engineer.

Figure 700-1. Example of Partial Interchange Lighting

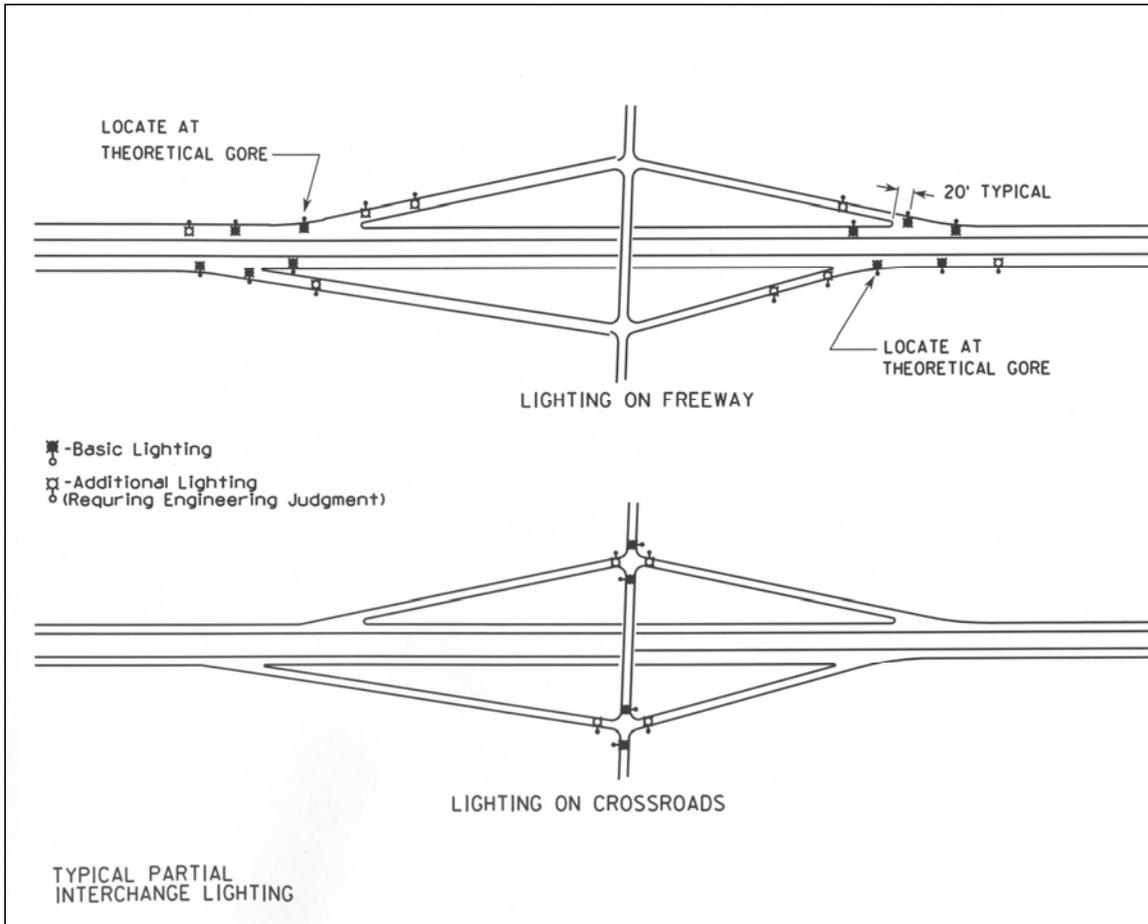
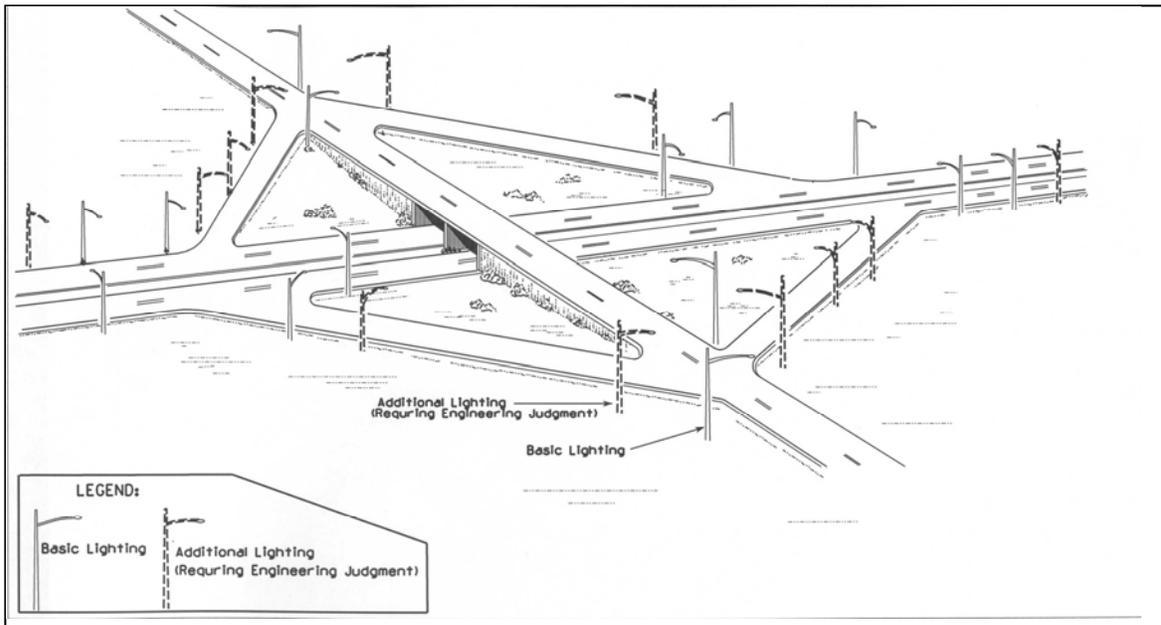
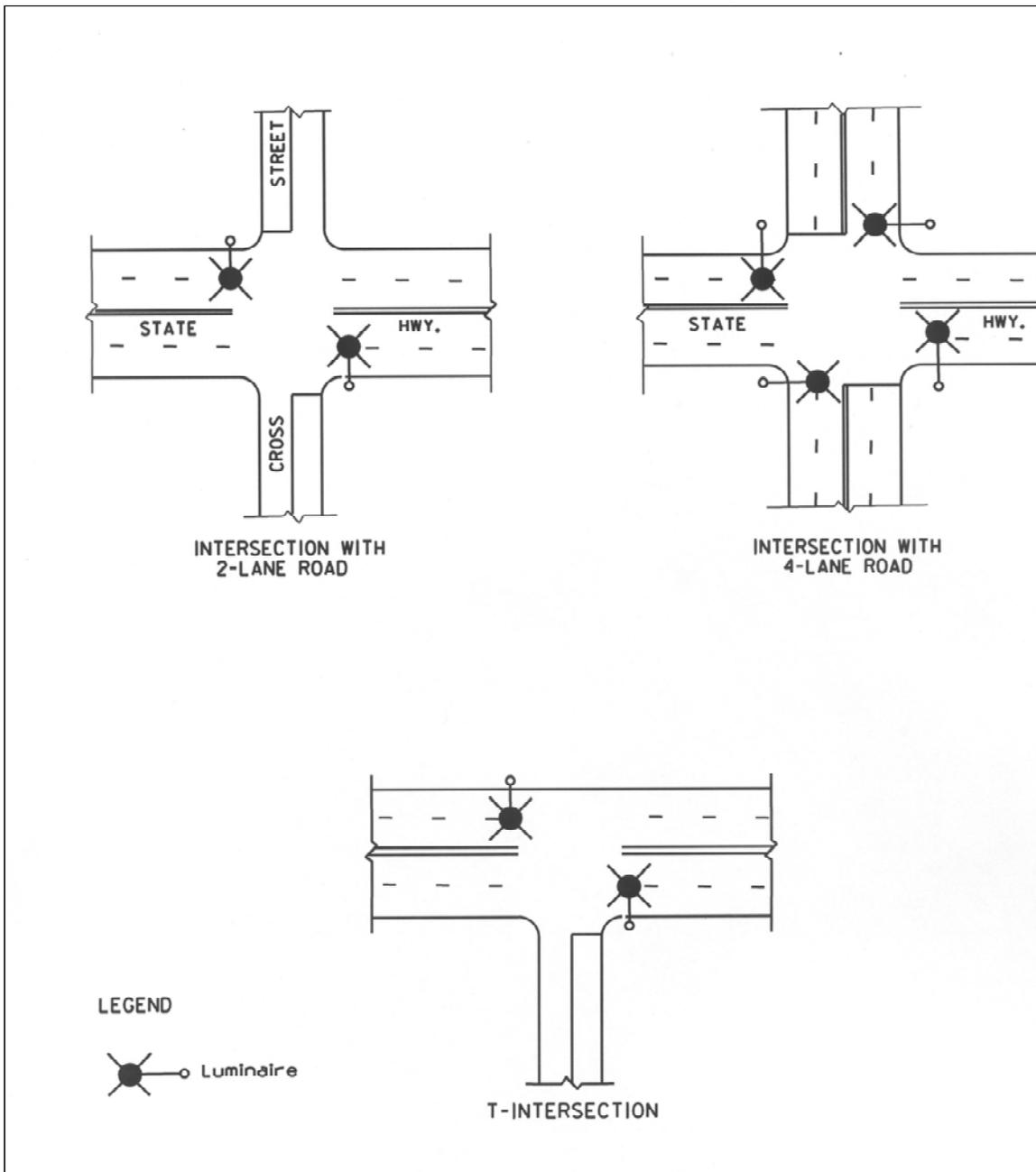


Figure 700-2. Example of Interchange Lighting Locations



**Figure 700-3. Example of Lighting Locations
at a Non-Channelized Intersection**



**Figure 700-4. Example of Lighting Locations
at a Channelized Intersection**

