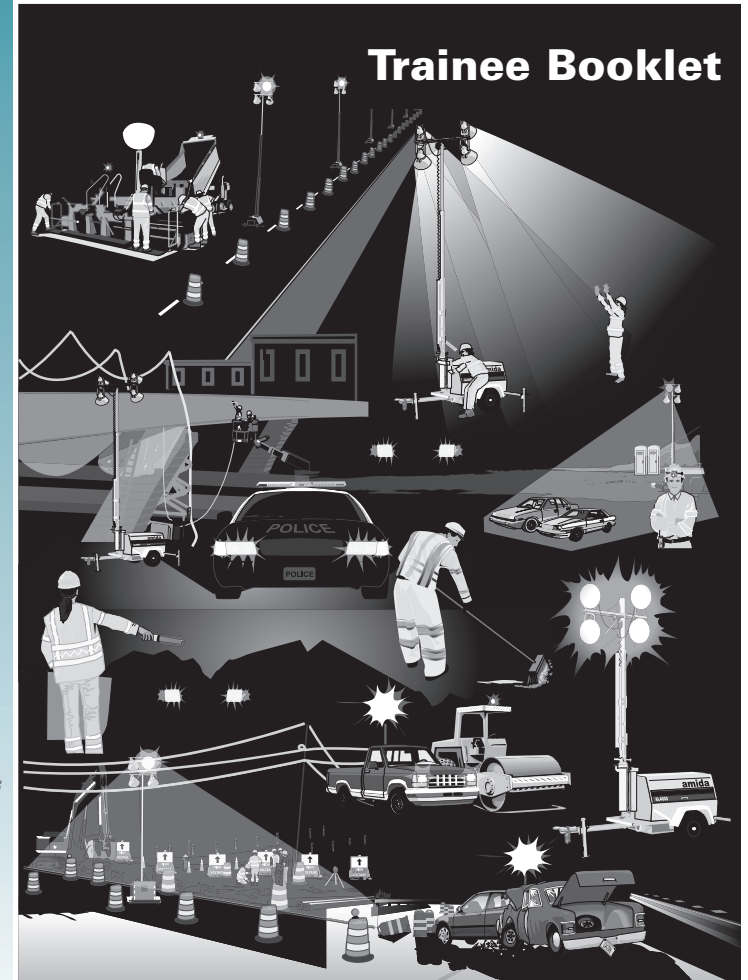


NIGHT WORK

ROADWAY SAFETY⁺

Awareness Program

Trainee Booklet



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A Road Construction Industry Consortium Awareness Program


Night Work


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Introduction

Night work offers advantages. But night work also introduces additional hazards not present in daytime.

This booklet informs you of night work hazards and the specific enhancements and protections that are necessary when we work at night.

Federal, state, and municipal agencies all report increases in night projects.

Night Work: Risks

Why Do We Focus on Night Work?

Night work has many advantages. But it also presents many serious concerns for workers and motorists.

Advantages of night work:

- Reduced traffic volume — less congestion, improved mobility.

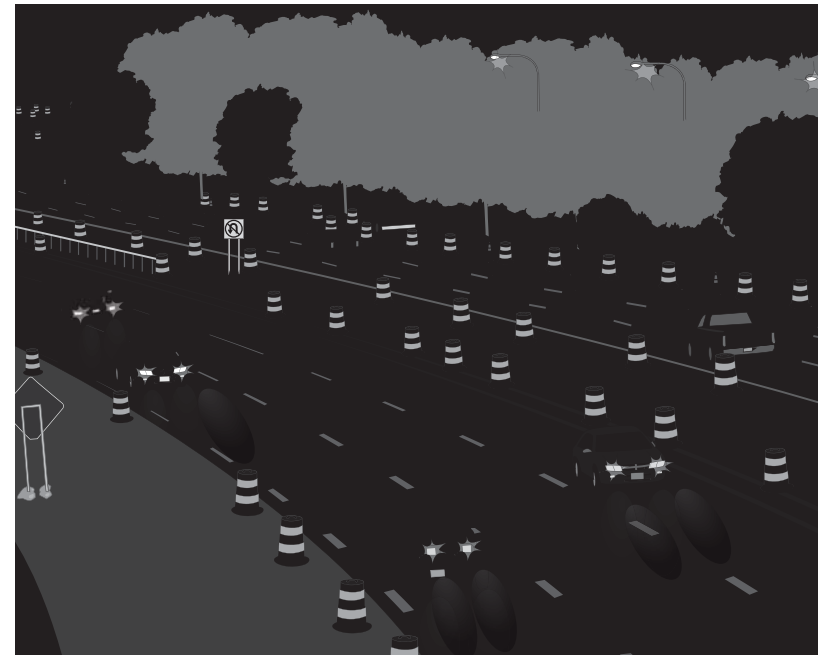


- Better access to work site.
- Longer work shifts.
- Reduced impact to local businesses.

Night Work: Risks

Disadvantages of night work:

- Poses added health and safety issues.
- Requires more effort to achieve health and safety for workers, public.
- Increases worker and contractor fear of traffic.

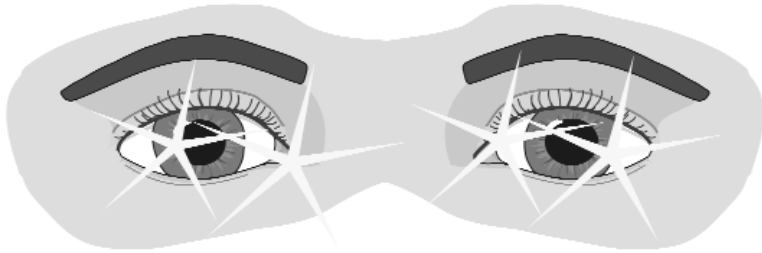


Federal, state, and municipal agencies all report increases in night projects.

Why Is Night Work Hazardous?

Night work poses special hazards:

- Reduced visibility for motorists, increased difficulty driving safely through work zone.



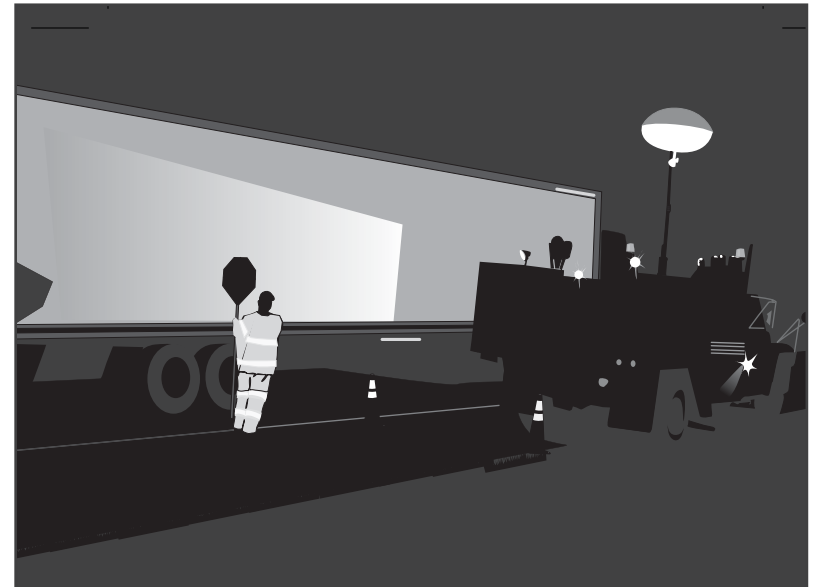
- Bright work lights may produce glare.
- Alcohol, drug impaired, drowsy drivers.



- Drivers, pedestrians, workers are generally less alert, more tired.

Night Work: Risks

- Lower traffic volumes may result in higher speeds.
- Increased truck traffic.

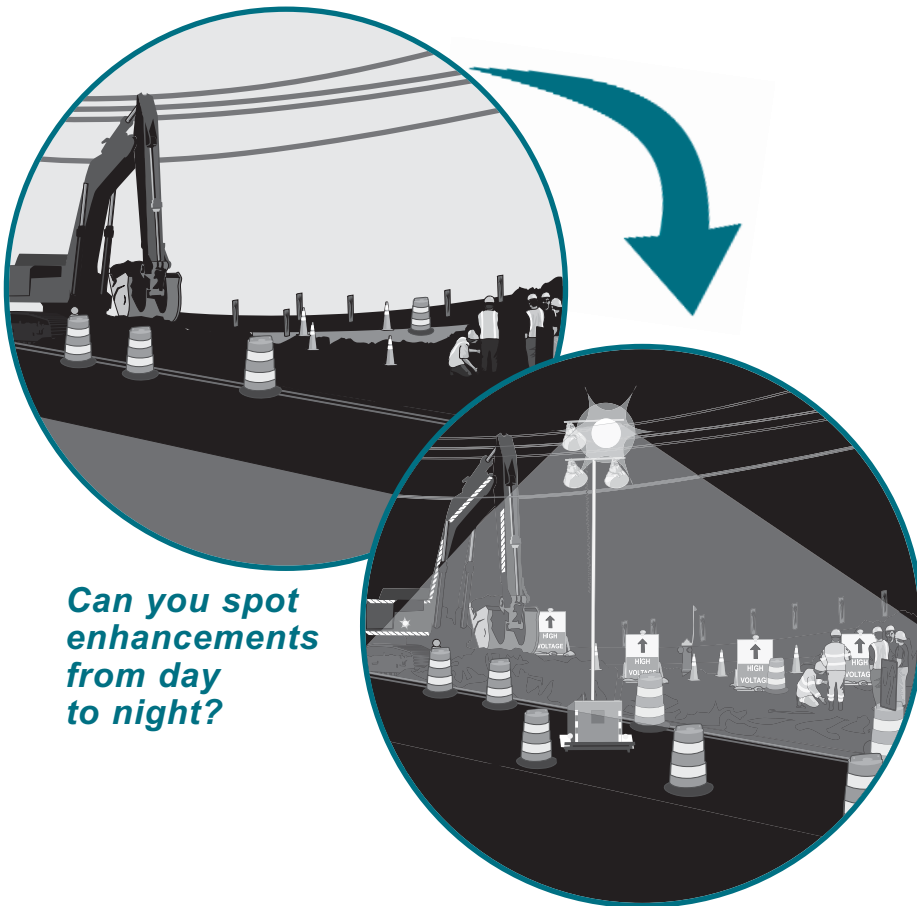


- Daytime hazards are compounded by darkness.
- Workers are less visible to motorists and to truck and equipment operators.
- Decreased visibility can cause more trips, falls, runovers, backovers.

What About Nighttime TTC?

The FHWA MUTCD (*Manual on Uniform Traffic Control Devices*) Section 6G.04 provides guidelines. Nighttime Temporary Traffic Control:

- Contractors must enhance daytime work zone safety principles at night.



Night Work: Risks

- MUTCD Section 6G.04 'Modifications To Fulfill Special Needs' lists modifications to typical applications that may be useful in complex conditions such as night work.
- Enhanced traffic controls are needed to mitigate night work hazards.

See the FHWA MUTCD at <http://mutcd.fhwa.dot.gov>



What Are the Key Safety Enhancements?

Safety enhancements improve human performance:

- Retroreflective high visibility apparel meeting ANSI / ISEA 107-2004 - Class 3* to improve visibility.
- Signs, channelizing devices, other hardware set up to account for longer reaction times in low light.



* ANSI/ISEA - American National Standards Institute / International Safety Equipment Association

Class 3 Apparel: For work when exposed to high speed traffic and/or conditions where visibility of workers may be reduced. For conditions where equipment operators perform tasks near pedestrian workers. Worker must be conspicuous through a full range of body motions at a minimum of 1,280 feet and identifiable as a person. Examples include flaggers, roadway construction workers, utility survey crews, and emergency responders.

Night Work: Risks

- Temporary work zone lighting to ensure good visibility for drivers, workers.
- Temporary lighting set to avoid glare and shadows for motorists, equipment drivers, workers.



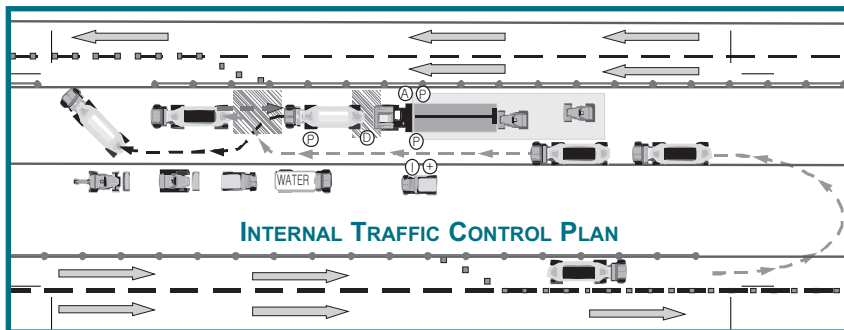
- Increased visibility of work vehicles, equipment, materials, worksite hazards.
- ITCP (Internal Traffic Control Plan — see page 10) for construction vehicles, workers on foot.
- Work schedules set up to allow enough sleep.
- Police presence/enforcement.

What About Worker Protections?

Protections increase our safety on work sites.

Recommendations include:

- High visibility Class 3 ANSI / ISEA 107-2004 apparel (See page 8.).
- Retroreflective strips on hard hats.
- Worksite safety training.
- Be familiar with TTCP (*Temporary Traffic Control Plan*) and the ITCP (*Internal Traffic Control Plan*).



- Be aware of nightly changes and changes within a shift.
- Know where traffic, work vehicles/equipment are allowed — what lanes are open.
- Be familiar with procedures for entering, crossing open travel lanes, e.g., look both ways, etc.

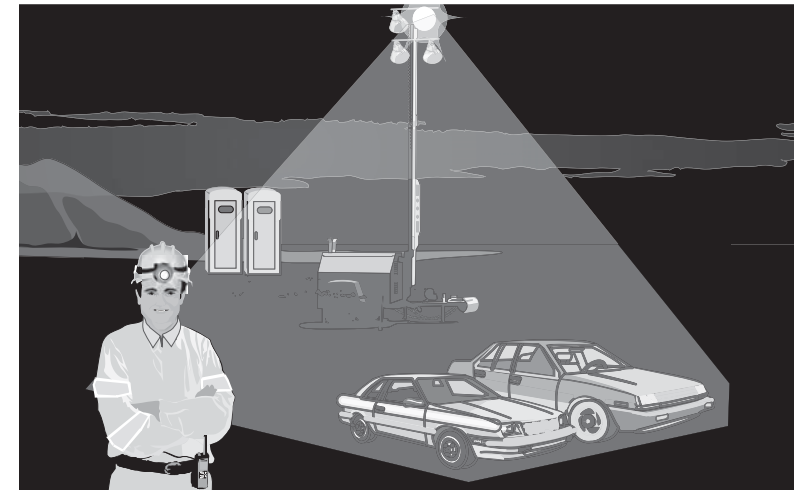
A booklet on Internal Traffic Control Plans is available through the Roadway Safety Program and at workzonesafety.org.

Night Work: Risks

How Do We Work Safely at Night?

To work safely at night, follow these steps:

- Know the location of and safe route(s) to employee parking, restrooms and other facilities. If safe routes are not present, notify your supervisor immediately.



- Know where to park and a safe route to your work station.
- Be familiar with general safety rules for your project.
- Be aware of project-specific hazards — electrical hazards, fall hazards, hazardous materials, excavation, etc.
- Know which supervisors are responsible for safety and who to contact with questions or to report problems.

How Do We Minimize Sleep Loss?

Here are some recommended measures to help minimize sleep loss:

- Maintain strict sleep schedule, make sleep a priority.
- During night: eat small protein-rich meals, avoid fats and sugars.



- Drink water at night even though you are not in the sun.
- Minimize caffeine at night to help you sleep during the day.



- Keep daylight out of sleep room with heavy curtains, foil, and blinds.



- On the family calendar: record your night work schedule, sleep schedule, and days off to help communicate with family and friends.

Night Work: Hi-Viz

Night Work: High Visibility ('Hi-Viz')

What Are High-Visibility Garments?

Hi-Viz garments make us highly visible under a range of day and night conditions. Hi-Viz characteristics:

- Fluorescent background colors — orange, yellow, and green.
- Retroreflective material in orange, yellow, white, silver, and green.



- Visible at 1,000 feet or more.
- Required for ALL workers within the right-of-way.

What Is Required for Worker Visibility?

The requirements are set by ANSI (American National Standards Institute) and by FHWA (Federal Highway Administration in the U.S. Department of Transportation) in its MUTCD (*Manual on Uniform Traffic Control Devices* — see page 7 of this booklet).

The American National Standard for High-Visibility Safety Apparel (ANSI/ISEA 107-2004) specifies minimum amounts of retroreflective and background material, color, and placement.

Minimum Areas of Visibility

	Performance Class 1	Performance Class 2	Performance Class 3	Performance Class E	Headwear
Background Material	217 in ²	775 in ²	1240 in ²	465 in ²	78 in ²
Retroreflective or combined-performance material w/ background material	Level 2 or Level 1 Minimum width is 1"	Level 2 or Level 1 Minimum width is 1 1/2"	Level 2 or Level 1 Minimum width is 2"	Level 2 or Level 1 Minimum width is 2"	Level 2 or Level 1
Combined-performance material used w/o background material	310 in ² Level 2 or Level 1 Minimum width is 2"				78 in ² Level 2 or Level 1

From ANSI 107-2005: Table 1. Minimum areas of visible material

The FHWA MUTCD requires ANSI/ISEA 107-2004 apparel.
See MUTCD at <http://mutcd.fhwa.dot.gov>

Night Work: Hi-Viz

What Garments Should We Wear?

Wear garments recommended for night work.

Requirements:

- ANSI/ISEA 107 provides 3 classes of high-visibility apparel.

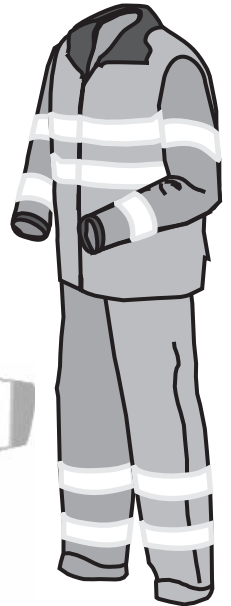


Class 2

- For most road work, Class 2 is a minimum.
- For night work, Class 3 is highly recommended.



Class 3



- Class 2 and 3 are required on Federal projects.
- Localities may have additional requirements.



Class 1

- Class 1 is not allowed on Federal projects.

See Class 3 definition on page 8 of this booklet.

How Do We Inspect Hi-Viz Garments?

Inspect your garments before each use. Issues:

- Garments must be clean.
- Proper reflectivity — visible from 1,000 feet, day or night.
- Not faded, torn, dirty, worn, or defaced.
- No fraying or missing stripes.
- Proper fit to allow motorists to recognize a human shape.
- Service life is about 6 months of everyday use.

To learn more about when garments should be replaced, see the Roadway Safety Plus module 'Night Work — High Visibility'.



Night Work: Hi-Viz

What Is Required for Vehicle Visibility?

ANSI sets the requirements. Work vehicles need:

- Flashing or rotating beacons, strobe lights.



- Retroreflective tape to define size and shape - 2-inch band of red-white shape.
- Keep lights and tape clean.
- Make sure lights work properly.



What About Other Work Zone Items?

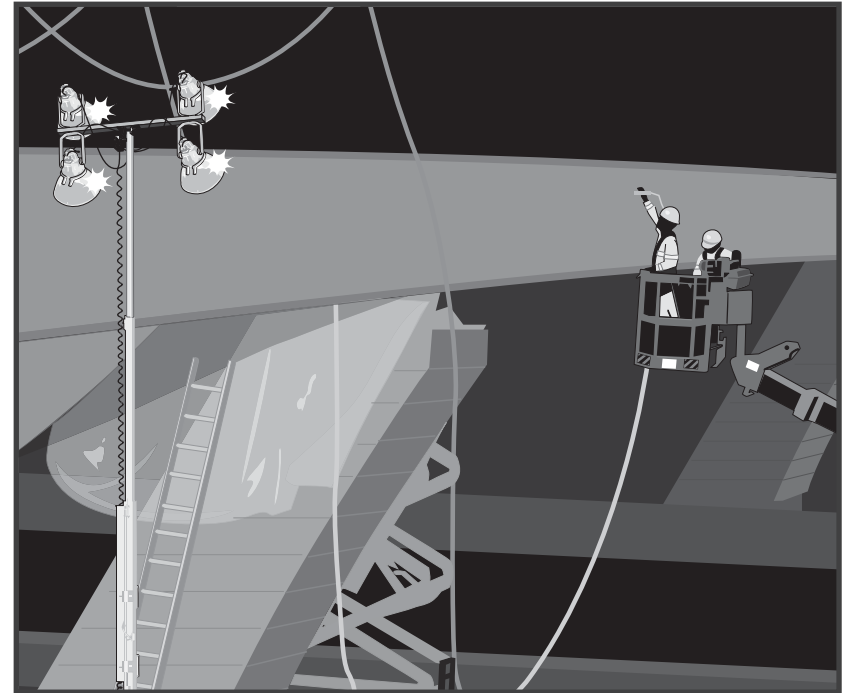
Here are considerations for other work zone items:

- Equipment, materials, and hazards all must be made visible.
- Use barriers, crash cushions, and channelizing devices to protect equipment.
- Store equipment away from work zone or protect it with barriers, crash cushions, or channelizing devices.
- Never store equipment in a buffer zone.



Night Work: Lighting

Night Work: Temporary Lighting




What Is the Goal of Temporary Lighting?

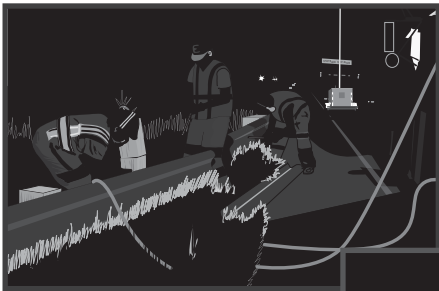
Temporary lighting should achieve basic goals:

- Proper illumination of the work space.
- Control glare to avoid blinding motorists and workers.
- Minimize shadows.
- Increase safety.
- Increase productivity.
- Improve work quality.

What Is the Goal of Temporary Lighting?

Follow minimum recommendations:

- 
- Project lighting plan details adequate illumination, control of glare and shadows.
 - Competent person* oversees installation, adjustment of lights.
 - Stay in lighted areas — avoid dark areas.
- When setting up light towers, avoid overhead power lines.
 - Report problems to your supervisor:



- Excessive shadows.
- Glare.
- Unlighted work areas.
- Missing or malfunctioning lights.



*** Competent person means**
"one who is capable of identifying existing and predictable hazards in the surroundings or working conditions ... and who has authorization to take prompt corrective measures to eliminate them."

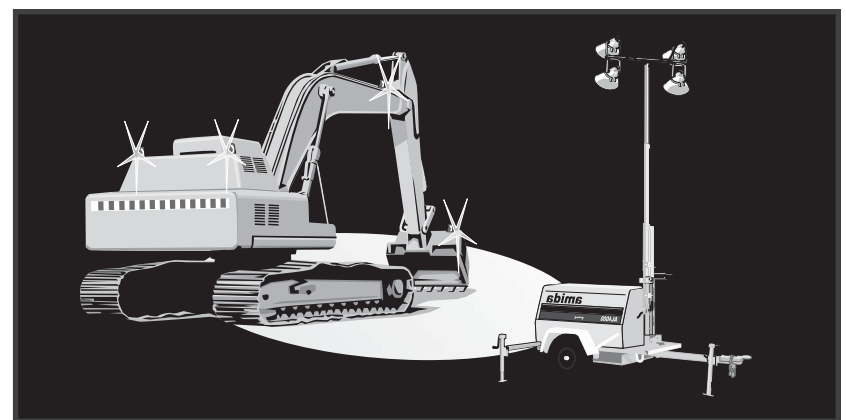
Night Work: Lighting

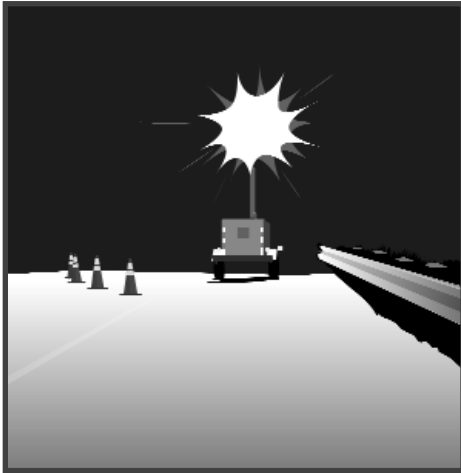
What Should Be Illuminated?

Lighting should achieve basic goals:



- Illuminate so workers can see work area.
- Illuminate equipment for motorists, workers.
- Mounted lights should not shadow work space.
- Backhoes, buckets, other rotating equipment radii all should be illuminated.
 - Illuminate safety circle around the equipment.





Why Should We Control Glare?

Glare is a hazard for motorists and workers.

Glare:

- Is caused by light scatter within eye.
- Reduces contrast.
- Decreases visibility.
- Causes crashes.



Glare causes crashes.

Night Work: Lighting



How Do We Control Glare?

Here are some basic guidelines:

- Mount light sources as *high* as practical.
- Direct light *downward* toward pavement.
- Aim light parallel or perpendicular to traffic but keep it *within the work zone*.
- Do not aim light sources at oncoming traffic.

A 'competent person' checks lights after every set up and adjusts it to ensure no glare from any likely viewing position.

The 'competent person' test drives the work zone to make sure motorists are not blinded by glare.

What About Work Vehicle Lights?

Follow requirements for vehicles and equipment.



Work vehicles, equipment:

- Must have conventional headlights.
- Should have warning lights — strobes, rotating, or flashing.

Best practices:

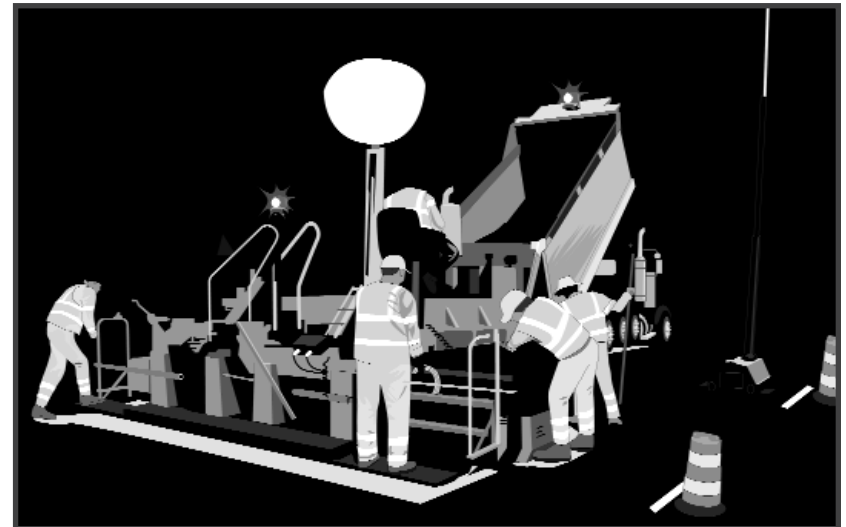
- Use temporary work lights — headlights not for illuminating work.
- Check all lights at start of each shift.

All non-working lights must be replaced before use of vehicle or equipment.

Night Work: Lighting

What Other Lights Can Be Used?

Equipment-mounted and balloon lights are supplementals. Features:



- Good supplement to fixed lights.
- Reduce shadows, glare for operator.
- Better mobility for equipment.
- Require secure mounting.
- Aim to minimize glare.
- Provide forward, rear illumination.
- Beware of overhead line clearance.

Minimum Safe Distances Power Lines	
Voltage	Distance
50 kV or below	10
> 50 - 200 kV	15
> 200 - 350 kV	20
> 350 - 500 kV	25
> 500 - 750 kV	35
> 750 - 1,000 kV	45
More in fog or rain	

Night Work: Flagging

What Are Night Flagging Concerns?

Night flagging is different from day flagging.

Concerns:

- Risks increase at night.
- Reduced visibility, impaired drivers.



General recommendations:

- Use flaggers at night only if necessary.
- Provide temporary lighting for all flagging.
- Temporary signals or police officers are preferred when flagger not required.

Night Work: Flagging

What Are Proper Flagging Operations?

Follow the MUTCD* guidelines. Proper operations:

- Good equipment, illumination.
- Well-trained flaggers.
- Avoid stopping moving traffic.
- Advance signing.
- Good sight distance.
- Safe flagger position with escape path.
- Flaggers in Class 3 or Class E gear at night.

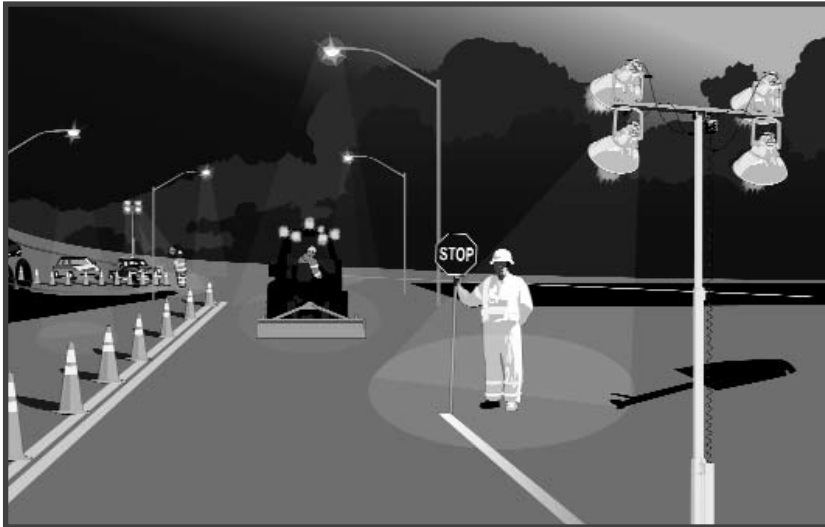


***Manual on Uniform Traffic Control Devices.**
See MUTCD at <http://mutcd.fhwa.dot.gov>

What Illumination Is Needed?

Flaggers must be totally visible at night. Best practices:

- Provide temporary illumination for all stations.
- Supplement permanent road lighting.
- Avoid:
 - Glare
 - Shadows
 - Backlighting



- Use floodlight towers, other overhead light sources.
- Temporary illumination required for flagger use.

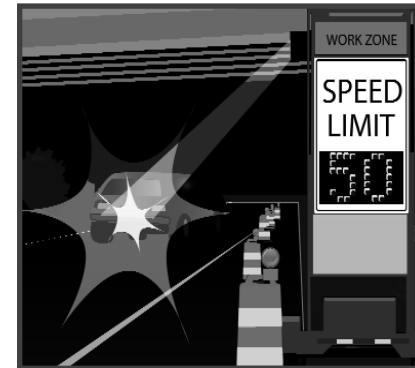
Flaggers and all other road workers must be totally visible at night.

Night Work: Flagging

What Are Night Flagging Applications?

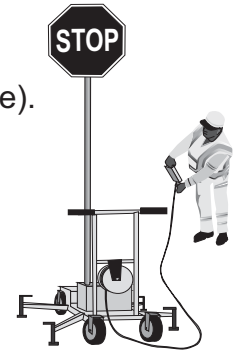
Here are basic applications and alternatives to flagging: _____

- Alternating one-way flow.
 - Temporary traffic signals, AFADs (Automatic Flagging Assist Device).



- Vehicle/equipment access points.
 - Lane closure.

- Intersection control.
 - Temporary traffic signals, uniformed police.
- Temporary traffic stoppage.
 - Rolling road block, uniformed police and patrol cars.
- Flaggers as spotters.
 - ITCPs, no-backing zones, back and rear view devices.
- Flaggers for speed control.
 - Police, radar activated CMS, automated speed enforcement.



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