



**GREAT PLAINS**  
Center for Agricultural Health

## Rural Roadway Safety Training Kit

[gpcah.org](http://gpcah.org)

# Rural Roadway Safety Training Kit

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## Introduction

The Rural Roadway Safety outreach kit was developed to help you present information that will guide farmers on:

- 1) How and why to adopt the lighting and marking recommendations published by the American Society of Agricultural and Biological Engineers (ASABE) in 2016, and
- 2) Identifying risk factors for when and where crashes between farm equipment and passenger vehicles are most likely to occur.

This “train-the-trainer” introduction will **help presenters understand what farmers can do to decrease their chances of being in a crash with a passenger vehicle. This kit was generated using findings from research conducted by investigators at the Great Plains Center for Agricultural Health (GPCAH).**

## Background Information for Trainer

Transportation remains a major contributor to occupational injuries among farmers and nonoccupational injuries in the general population. In the GPCAH region (IL, IA, KS, MN, MO, NE, ND, SD, WI), over 1100 crashes between farm equipment and passenger vehicles occur each year. These crashes are usually caused by the passenger vehicle driver, and people in the passenger vehicles are more likely to be injured than the farm equipment operator. In many cases, passenger vehicle drivers may not be familiar with farm equipment and do not know how to interact with very large, slow moving vehicles on public roadways.

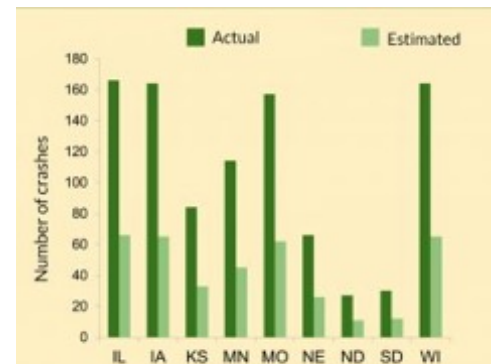
From 2005-2010, 7094 crashes involving farm vehicles occurred on public roadways across the GPCAH region. The GPCAH partnered with state departments of transportation, who provided incident reports so that researchers could identify patterns and develop precautionary guidance for drivers.

**ASABE-compliant lighting and marking of farm equipment on public roadways** is one way to reduce farm vehicle crashes. States differ in their requirements for lighting and marking of farm equipment. When state lighting and marking policies were compared to the newest ASABE guideline (released in June 2016, shown on the next page), the team found that the better a **state’s regulations matched the ASABE guideline, the fewer the crashes.** Lighting of farm equipment improves visibility, particularly from behind, and helps them be seen from a greater distance than unlit equipment. This gives drivers of passenger vehicles more time to react and slow down/stop before reaching a slow moving farm vehicle. **In addition, marking farm equipment with reflective tape and slow-moving vehicle (SMV) emblems reduces crash rates.**

Roadway characteristics were also found to contribute to crashes. Records of crash data showed that **roadways with wider shoulders had fewer crashes between vehicles and farm equipment than roads with narrow or no shoulders.** Unexpectedly, more crashes occurred where the road was relatively straight and flat, as compared to hilly and curving roads. Some think that drivers may be more cautious on hills and curving roads compared to long, straight driving.

## Training Scenarios

We have developed two ways to conduct training on the topic of lighting and marking to improve farm equipment visibility on roadways. The objective of each scenario is to inform farm equipment operators about how and why to improve visibility of their vehicle on the road. The first scenario outlines a simple table display, appropriate for a farm show or other community event. The second outlines an interactive game where visitors try their hand at correctly positioning lights and reflective tape onto images of farm implements.



**Figure 1. Number of crashes per state**

## Scenario 1: Script for Table Display

Intended audience: Farm equipment operators

Question (to engage audience): Do you ever have to drive your farm equipment on the road?

Follow up: Have you ever had a crash with another vehicle or a close call?

The GPCAH studied over 7000 crashes between farm equipment and passenger vehicles on public roads, looking for patterns. Here are some of the things we found (*choose the information you find most compelling based on the answer to your questions - don't try to tell every person every detail*):

- **Most prevalent crash types:**
  - Farm equipment is rear-ended
  - Over one-third of crashes occurred on the **left side** of the farm equipment
    - Roadway vehicle clips the back left corner of the farm equipment when trying to pass (does not move out far enough to clear the edge of the farm equipment)
    - Farm equipment is hit on the side while making a left turn (roadway vehicle tries to pass when farmer moves to right shoulder to prepare for wide left turn)
- **When crashes happen:**
  - Nearly 80% of crashes happened during daylight hours
  - 77% of crashes happened under clear weather conditions.
  - Harvest season has most crashes, followed by growing season, then planting season. (Fewest crashes were in winter)
- **Where crashes happen (by zip code type):**
  - Nearly 1/3 of crashes occur in “urban” areas (population of largest city 50,000+ people)
  - Nearly 1/3 in “isolated rural” areas (population of largest town <2500)
  - Just over 1/3 split between “large rural” and “small rural” (population of largest town 10,000-49,999 and 2500-9999 people, respectively)
  - More crashes on straight roads than on curves
  - More crashes on flat areas of roads than on steep hills
  - Crashes more likely on high speed roads and roads with more traffic
- **Injuries resulting from farm vehicle crashes:**
  - 41% of crashes resulted in injuries – roadway vehicle occupants over twice as likely to get injured, and their injuries are usually more severe.
  - 2% of crashes resulted in at least one fatality. Roadway vehicle occupants were much more likely to sustain a fatal injury.
- **Lighting and Marking**
  - Each state regulates lighting and marking of farm equipment operating on its public roadways
  - Expected decrease in annual average crashes if there is a 25% improvement in reaching ASABE standards for lighting and marking. (Figure 1, page 2)
  - Compared lighting and marking policies of each state in GPCAH region to the new ASABE standard (Figure 2, page 7) – gave each a compliance score
  - Those states with policy similar to ASABE standard had nearly 50% less crashes than those with low compliance
- **What you can do**
  - Check your SMV emblem regularly – remove dust and dirt. Replace a faded SMV.
  - Check your front and rear lights regularly
  - Consider adding lights to pulled implements that currently don't have them or using magnetic lights when you take these implements onto a roadway.
  - Update marking on older implements to include red and orange tape at widest point



An example of a table display, using posters up on a three-way board during these presentations. This requires a three-panel display and posters, take-away cards, and illustrations of temporary lights that can be used for display. Note: This board is magnetic.

## Scenario 2: Script for Position the Light on the Implement activity

Intended audience: farm youth and multi-generation family groups.

These activities can be printed as posters and played as a game or used as a worksheet in a classroom setting.

For use as a game:

- Print the grain cart poster at 24x36" and mount it on a solid surface
- Print the game pieces on cardstock and laminate if you want them to be reusable
  - If the poster backing surface is magnetic, mount the pieces onto magnets
  - If the poster backing surface is not magnetic, use repositionable glue dots on the back of the pieces
- Invite participants to place the lighting and marking where they think it should go (adults are often willing to help children with this task, but are not usually willing to do it on their own)
- When all of the pieces are placed, give the participant a handout with the diagram of the ASABE standard printed on it. Help them move the pieces as necessary, so they see it with the lighting and marking in the correct places.
- Encourage adults and teens to add checking the lighting and marking to their maintenance of all equipment
  - SMV emblem is intact and not faded. Replace a faded SMV. Clean dirt and dust off the SMV regularly.
  - Lights are working as intended (amber lights flash, red lights are solid)
  - Red and orange reflective tape marks the widest point on the rear of the vehicle
  - Yellow reflective tape marks the side of implements with solid sides (combine, grain cart, etc.)

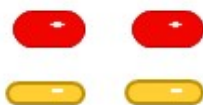
For use as a worksheet:

- Print worksheets in color on 8.5x11" paper
- Discuss the reasons lighting and marking on farm implements that travel on roadways is important (use talking points from Scenario 1)
- Give each youth their own worksheet and ask them to use colored pencils, crayons, or markers to add the lighting and marking symbols to the implement in the drawing
- Show the correct placement of the lighting and marking
- Send a handout (with the ASABE lighting and marking standard) home with each youth

Activity: Where does the lighting and marking go?



Instructions: Add the lighting and marking to the back of the tractor using the symbols below. Use each symbol once.



Source: American Society of Agricultural and Biological Engineers (ASABE) Standards Program, (276.18) 2016.

Activity: Where does the lighting and marking go?



Instructions: Add the lighting and marking to the back and side of the grain cart using the symbols below. Use each symbol only once.



Source: American Society of Agricultural and Biological Engineers (ASABE) Standards Program, (276.8) 2016.

Specific materials that can be used in these training events are below.

## Kit Contents and Additional Materials Needed

### ASABE lighting and marking standard (2016)

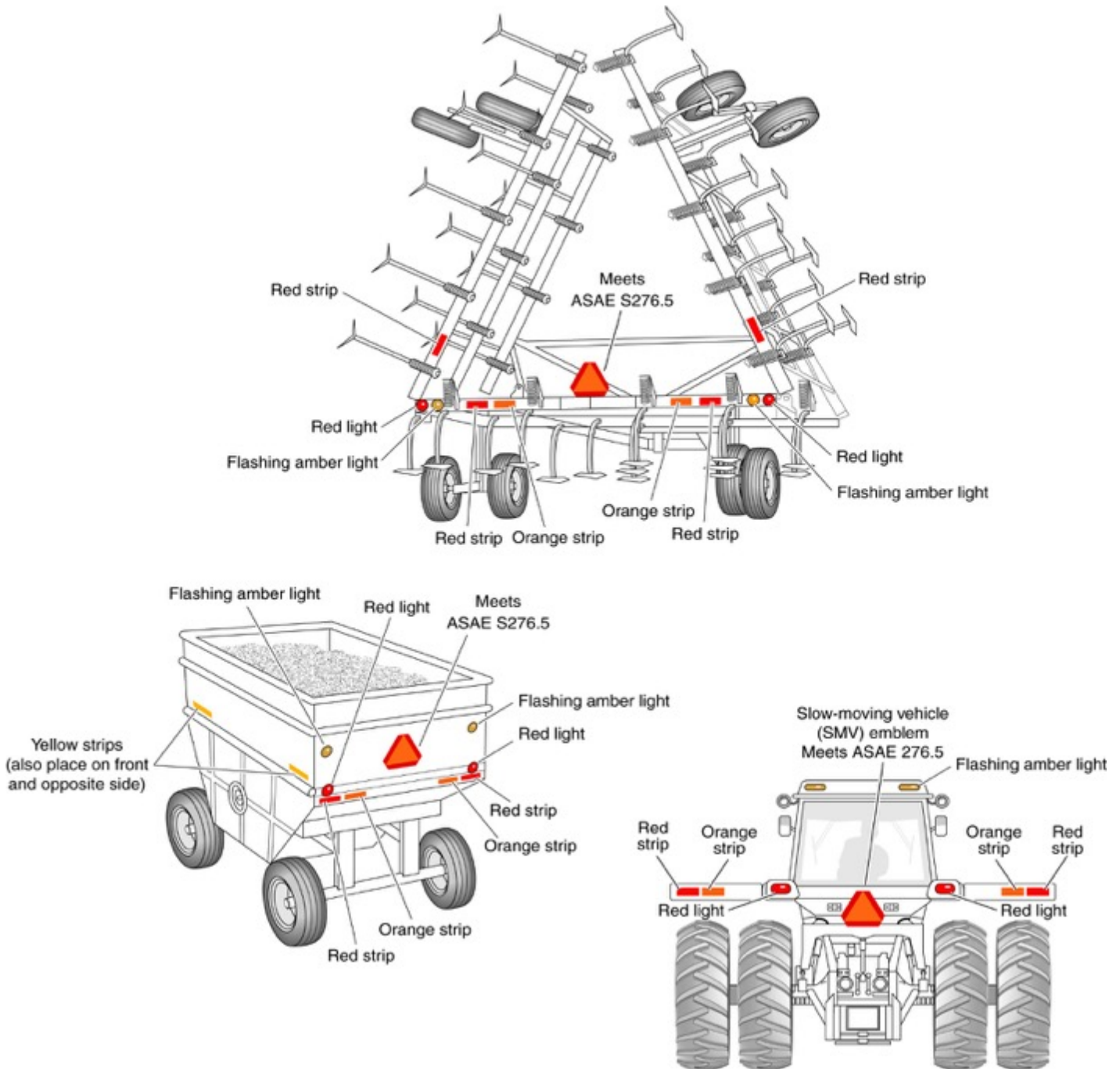


Figure 2.

Source: American Society of Agricultural and Biological Engineers (ASABE) Standards Program, (276.18) 2016





## Display for "Where does the lighting and marking go?" (Scenario 2)

Three 24x36" single-sided panels (download files at <https://bit.ly/2ELD6La>)

**When Driving Farm Equipment on Roadways**

**ALWAYS**

- Follow rules of the road
- Use reflective materials and SMV
- Clean and replace reflective materials
- Be visible 24/7

**WHEN POSSIBLE**

- Use lead cars
- Use flashers
- Avoid heavy traffic
- Avoid bad weather

**NEVER**

- Drink and drive
- Allow riders on fenders
- Use personal electronics
- Drive within limit

IPRC  
www.iprc.org  
http://www.public.health.wisc.edu/iprc/

**Don't let this happen to you.**

**Incident Description:**  
A driver in a small car attempted to pass this sprayer in the evening. A van was traveling in the opposite direction. The van attempted to swerve around the car, but hit the sprayer. The van's driver had difficulty seeing the sides of the sprayer in the dark.

In five years (2005 - 2010), there were more than **7,000 crashes** involving farm equipment in the Great Plains region.  
Increased lighting was associated with a **50% reduction** in crash rates.

**Where does the lighting and marking go?**

Source: American Society of Agricultural and Biological Engineers (ASABE) Standards Program, (276.5) 2016

## Videos:



Agricultural Vehicle Lighting and Marking Requirements: <http://bit.ly/359nNDI>



Roadway Safety and Agricultural Vehicle Lighting and Marking: <http://bit.ly/2rZoi4Y>



Farm Vehicle Safety - Interview with Dr Corinne Peek-Asa: <http://bit.ly/2OssBgM>



[Link](#)

## Frequently Asked Questions

### Q: Do I have to update the lighting and marking on my equipment?

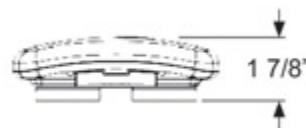
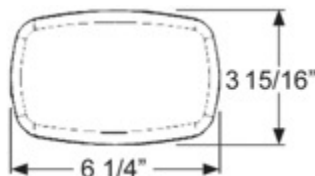
A: No. Each state regulates the lighting and marking policies for its roadways. You are only **required** to ensure that your equipment meets the policy set by the state(s) you drive in. All new equipment will come with lighting and marking to meet the ASABE standard. However, if you have older equipment, you can **choose** to update the lighting and marking to reduce the risk of collisions when on public roadways. The slow moving vehicle (SMV) emblem is especially important – be sure it is clean and not faded. If it has faded, it is easy and inexpensive to replace – you can buy these online and at most farm stores. You can purchase retroreflective/conspicuity tape by the foot or in rolls.

### Q: If other drivers don't see my huge combine on the road, how is that little triangle going to help?

A: Chances are the other drivers do see your combine on the road. However, almost any other vehicles that size on the road (e.g., emergency vehicles, utility vehicles, semi's) are driving the same speed as they are. The slow moving vehicle (SMV) emblem on the back of your farm implements is the **only** thing that warns other drivers that you are moving at a much slower speed than them. Be sure your SMV is clean and not faded. If it has faded, it is easy and inexpensive to replace – you can buy these online and at most farm stores. The addition of lights will also help catch drivers' attention.

### Q: My grain cart isn't wired for lighting on the back. It's too expensive to have the wiring retrofitted – what do I do?

A: Low cost magnetic lights can be purchased to use on the back of equipment that isn't wired for lights (see images below). They are available in red and amber and have both steady and flashing modes. You can purchase these online (search for "magnetic emergency light") and at most farm stores for ~\$10-15. It is best to choose lights that have a waterproof battery compartment. You can move these from one implement to another as needed.



### Q: Do I have to have a slow moving vehicle (SMV) emblem on every piece of pulled equipment?

A: If the pulled implement blocks visibility of the SMV on your farm vehicle, you need to have an SMV on the back of that piece of equipment.

## Research Publications with More Details:

- Ranapurwala SI, Mello ER, Ramirez MR. [A GIS-based matched case-control study of road characteristics in farm vehicle crashes.](#) *Epidemiology*.
- Ramirez M, Bedford R, Wu H, Harland K, Cavanaugh JE, Peek-Asa C. [Lighting and marking policies are associated with reduced farm equipment-related crash rates: a policy analysis of nine Midwestern US states.](#) *Occupational and Environmental Medicine*.
- Toussaint M, Smith K, Peek-Asa C, Ramirez MR. [Characteristics of farm equipment-related crashes associated with injury in children and adolescents on farm equipment.](#) *Journal of Rural Health*.
- Harland KK, Greenan, M, Ramirez M. [Not just a rural occurrence: Differences in agricultural equipment crash characteristics by rural–urban crash site and proximity to town.](#) *Accident Analysis & Prevention*.

## Presentation Checklist and Order Form

### MAKE YOUR OWN KIT

- Handout: When driving farm equipment on roadways [LINK](#)
- Handout: Lighting and marking guidelines [LINK](#)
- Poster: Rural roadway safety [LINK](#)
- Poster: Traffic safety [LINK](#)
- Where does the lighting go activity [LINK \(game board\)](#) [LINK \(pieces\)](#)

### ORDER ITEMS FROM GPCAH

- Handout: When driving farm equipment on roadways # needed \_\_\_\_\_
- Handout: Lighting and marking guidelines # needed \_\_\_\_\_
- Poster: Rural roadway safety # needed \_\_\_\_\_
- Poster: Traffic safety # needed \_\_\_\_\_
- Where does the lighting go activity # needed \_\_\_\_\_

Name:

Institution:

Mailing Address:

Please fill out this order form, copy it, and paste it into an email to [cph-greatplainscenter@uiowa.edu](mailto:cph-greatplainscenter@uiowa.edu). Alternatively, you may call Marsha at (319) 335-6871.

Thank you.